2019 ANNUAL REPORT
WETLAND VEGETATION AND WILDLIFE MONITORING
CONTRACT NO. W91238-14-D-0007

FORMER FORT ORD

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ACRONYMS AND ABBREVIATIONS

BO	Biological Opinion
BRAC	Base Realignment and Closure
Burleson	Burleson Consulting, Inc.
CCG	Contra Costa goldfields
CNPS	California Native Plant Society
CTS	California Tiger Salamander
cm	centimeter(s)
DQO	Data Quality Objective
FAC	Facultative Plant
FACU	Facultative Upland Plant
FACW	Facultative Wetland Plant
fairy shrimp	California Fairy Shrimp
FNU	Formazin Nephelometric Unit
HLA	Harding Lawson and Associates
HMP	Habitat Management Plan
MEC	Munitions and Explosives of Concern
m	meter(s)
mg/L	milligram(s) per liter
NCDC	National Climatic Data Center
NOAA	National Oceanic and Atmospheric Administration
NWSFO	National Weather Service Forecast Office
NL	Not Listed
OBL	Obligate Wetland Plant
sp.	species
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
UPL	Obligate Upland Plant
Wetland Plan	Wetland Monitoring and Restoration Plan for Munitions and Contaminated Soil Remediation

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1 INTRODUCTION

The United States Army Corps of Engineers (USACE) contracted Burleson Consulting, Inc. (Burleson) to conduct wetland monitoring at former Fort Ord, Monterey County, California (see Figure 1-1). Wetland monitoring includes three types of monitoring: hydrology, vegetation, and wildlife. These monitoring activities are centered around historic vernal pools on former Fort Ord.

The team monitored hydrological and water quality conditions, wetland vegetation including federally endangered Contra Costa goldfields (*Lasthenia conjugens;* CCG), the state and federally threatened California tiger salamander (*Ambystoma californiense*; CTS) and California fairy shrimp (*Linderiella occidentalis*; fairy shrimp) and other aquatic invertebrates in wetlands on former Fort Ord. All biologists handling CTS were approved by the United States Fish and Wildlife Service (USFWS) under the Programmatic Biological Opinion issued to the Army to handle, capture, and relocate individuals on former Fort Ord (USFWS, 2017). These monitoring requirements were documented in the *Installation-wide Multispecies Habitat Management Plan* (HMP), the *Programmatic Biological Opinion for Cleanup and Property Transfer Actions Conducted at the Former Fort Ord, Monterey County, California* (BO); and the *Wetland Monitoring and Restoration Plan for Munitions and Contaminated Soil Remedial Activities at Former Fort Ord* (Wetland Plan) (USACE, 1997; USFWS, 2017; Burleson, 2006).

This report presents the results of monitoring within a number of vernal pools on former Fort Ord. Vernal pools assessed in 2019 included reference ponds 5, 101 East (East), 997; baseline ponds 14, 17, 21, 103; and remediated ponds 101 East (West), 101 West, 41, 3 North, 3 South, 39, 40 North, 40 South, 43, 35, 42, 44, 56, 60, 61, 73, Machine Gun Flats, 16, 54, and 72 (see Figure 1-2 and Figure 1-3). The populations of CCG were mapped and evaluated at Ponds 997, 3 North, 3 South, 61 and Machine Gun Flats. Occurrences of vernal pool bent grass (*Agrostis lacuna-vernalis*) were mapped at Pond 43. Invertebrate and protocol-level CTS aquatic sampling surveys were completed only at vernal pools that held water long enough to trigger the wildlife surveys. For the 2018-2019 water-year, wildlife surveys were completed at Ponds 5, 101 East (East), 997, 14, 17, 21, 101 East (West), 101 West, 41, 3 North, 3 South, 39, 40 North, 40 South, 43, 35, 42, 44, 56, 60, 61, 73, Machine Gun Flats, 16, 54, and 72.

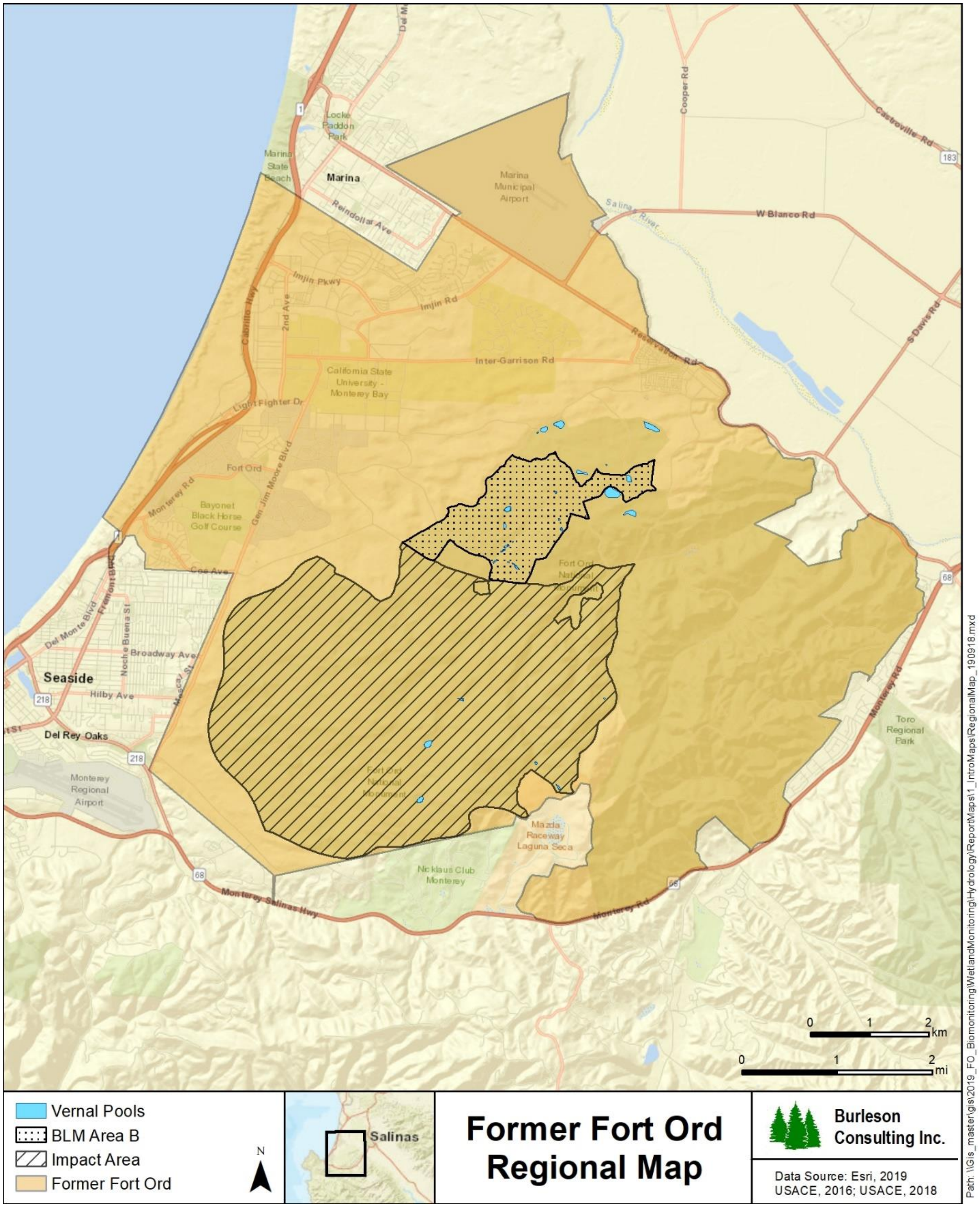

Figure 1-1. Location Map of Vernal Pools on Former Fort Ord

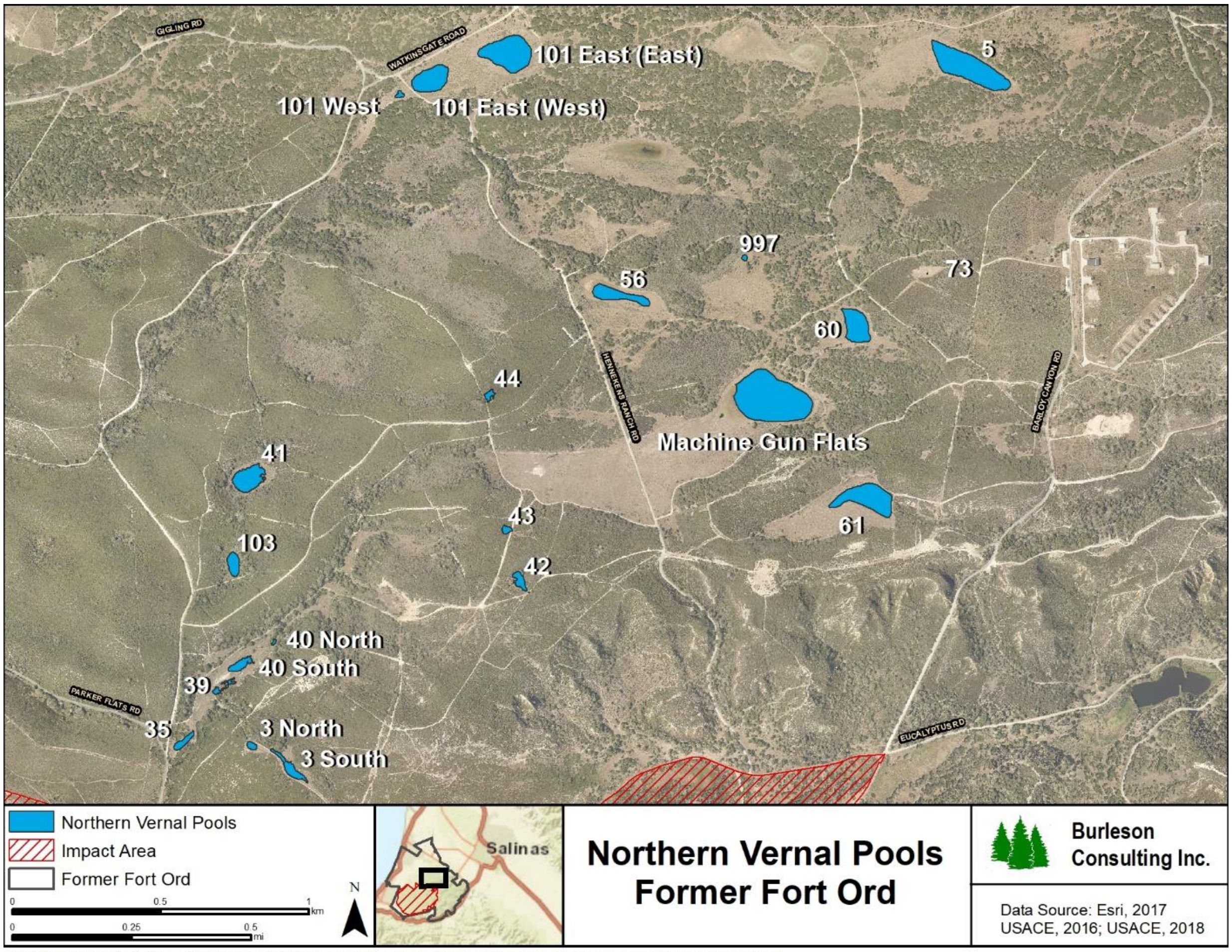

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Figure 1-2. Location Map of Ponds 5, 101 East (East), 997, 103, 101 East (West), 101 West, 41, 3 North, 3 South, 39, 40 North, 40 South, 43, 35, 42, 44, 56, 60, 61, 73, and Machine Gun Flats

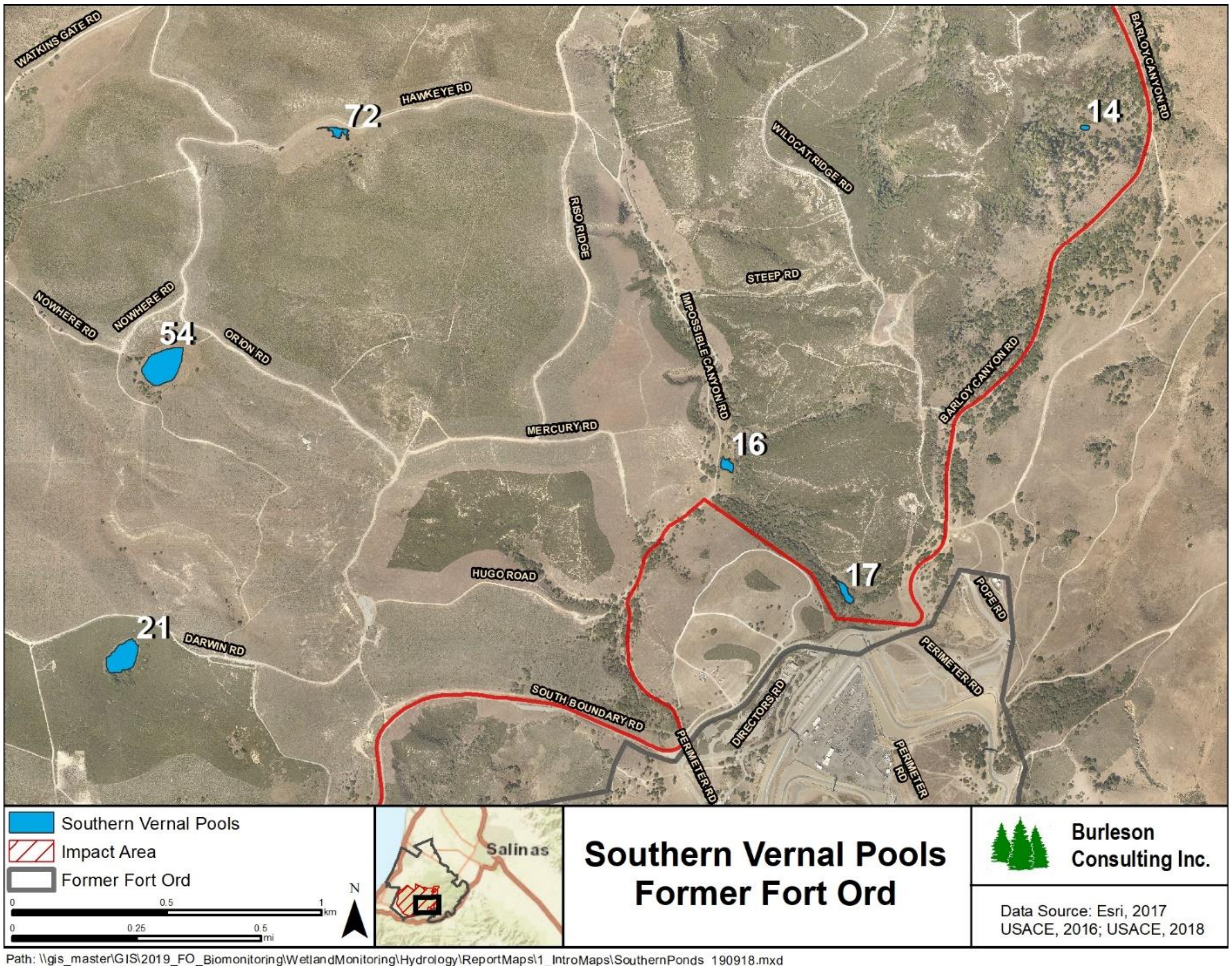

Figure 1-3. Location Map of Ponds 14, 17, 21, 16, 54, and 72

In the 2018-2019 water-year, the state of California experienced above-normal precipitation (Naval Postgraduate School Department of Meteorology, 2019; see Figure 1-4). The water-year exhibited common annual timing of precipitation with the bulk of rain falling in January and February; however, there was an additional series of uncommon rainfall events which occurred in May (see Figure 1-5). The National Weather Service Forecast Office (NWSFO) and Monterey Peninsula Regional Airport meteorological towers, approximately 5 miles southwest of Site 39 on former Fort Ord, recorded cumulative monthly precipitation values. The Monterey Peninsula Regional Airport tower replaced the NWSFO tower on April 1, 2019 and is located within 1 kilometer of the NWSFO tower. NWSFO determines normal rainfall based on a 30-year average that at the end of each decade is moved forward another 10 years. Normal for the NWSFO tower is defined as the mean precipitation from years 1981-2010.

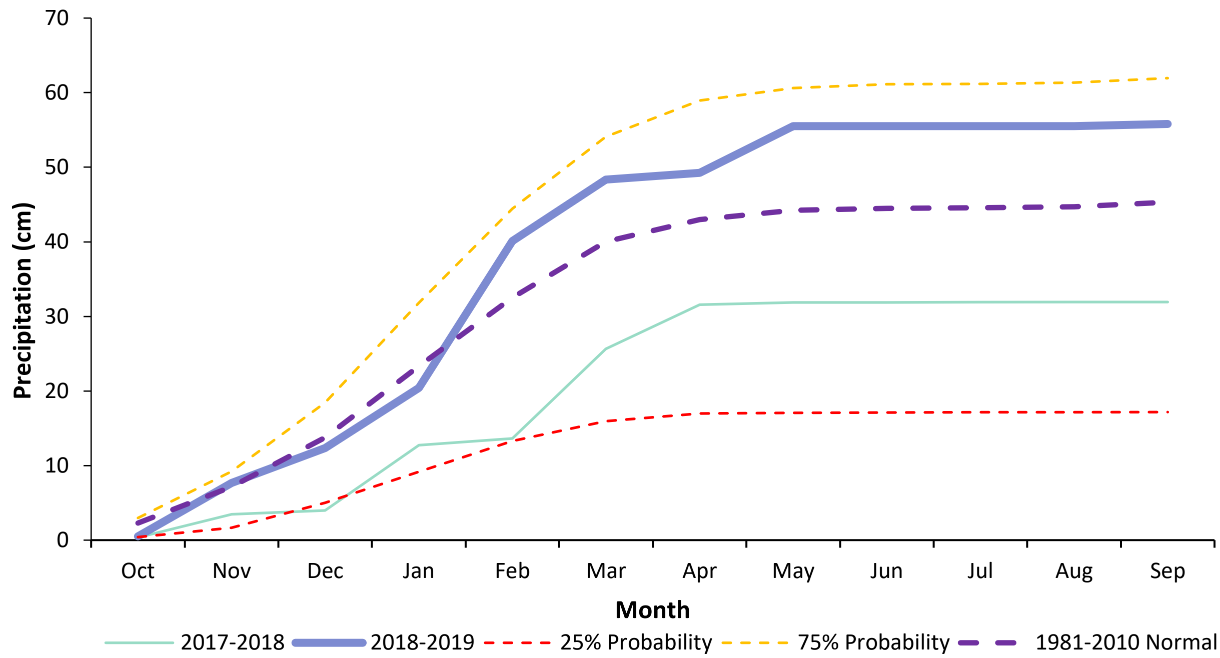

Figure 1-4. Cumulative Monthly Precipitation for the 2018-2019 Water-Year compared to the 30-Year Normal (mean 1981-2010), the 2017-2018 Water-Year, and the 25% and 75% Probabilities (NPS, 2019; National Climatic Data Center [NCDC] and National Oceanic and Atmospheric Administration [NOAA], 2019)

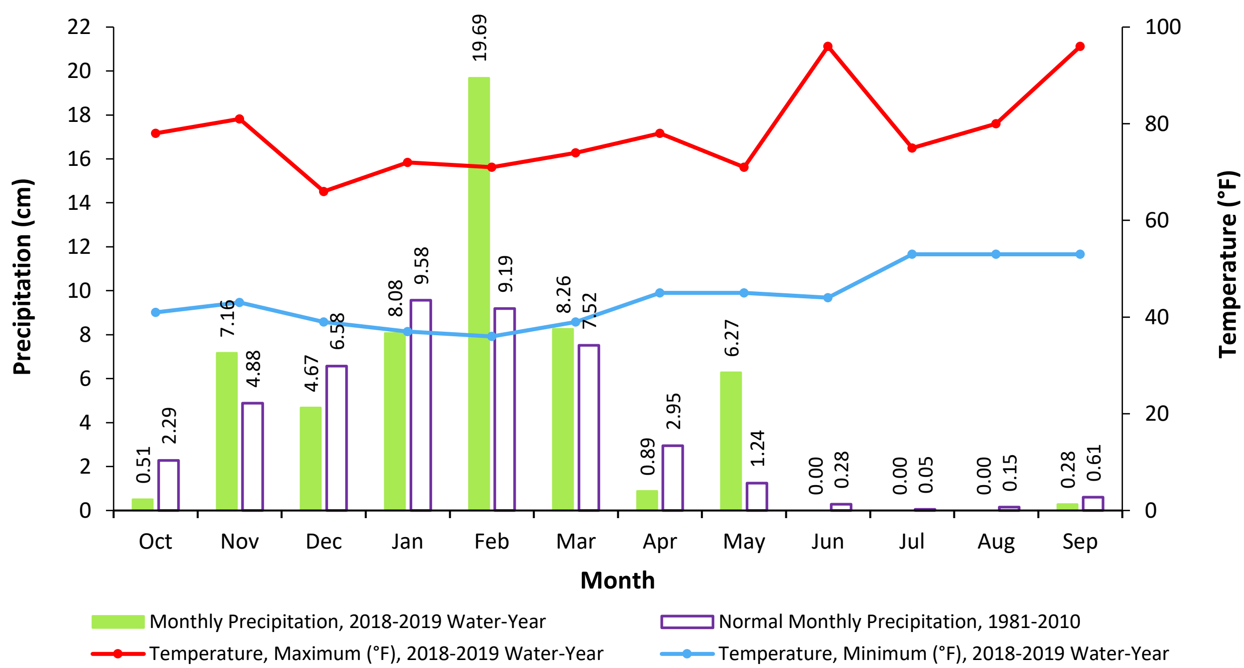

Figure 1-5. Monthly Precipitation, Maximum and Minimum Temperatures for the 2018-2019 Water-Year, and Normal Monthly Precipitation (NPS, 2019)

The goal of hydrology, wetland vegetation, and wildlife monitoring efforts is to evaluate vernal pools potentially affected by remediation activities against success criteria identified in the HMP, Programmatic BO, and Wetland Plan (USACE, 1997; USFWS, 2017; Burleson, 2006). The Wetland Plan outlines the Data Quality Objectives (DQO) used to evaluate success criteria for this report. The DQOs focus on vernal pool depth, inundation, vegetation, water quality, and wildlife. The Programmatic BO outlines success criteria specifically for CTS and CCG. Reestablishment of these species will be considered successful if, at the end of monitoring, wetland function, wildlife usage, wetland plant cover, diversity and dominance, and CCG abundance are directly comparable to the conditions before remediation. Monitoring results guide decision-making to evaluate if and when corrective actions are necessary and to provide insight for potential mitigation or evaluation of monitoring methodologies. The objectives of monitoring were to document the ability of vernal pools to support CTS and fairy shrimp, understand hydrologic function and water quality conditions, document baseline conditions, and provide data for follow-up comparison. Table 1-1 presents the status of vernal pools monitored in 2019 at former Fort Ord.

Table 1-1. 2019 Monitoring Status of Vernal Pools on Former Fort Ord

Vernal Pool	Monitoring Status
Pond 3 North	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation
Pond 3 South	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation
Pond 5	Reference
Pond 14	Baseline
Pond 16	Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation
Pond 17	Baseline
Pond 21	Baseline
Pond 35	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation
Pond 39	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation
Pond 40 North	Year 2 Post-Burn
Pond 40 South	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation
Pond 41	Year 1 Post-Subsurface Munitions Remediation
Pond 42	Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation
Pond 43	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation
Pond 44	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation
Pond 54	Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation
Pond 56	Year 2 Post-Mastication
Pond 60	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation
Pond 61	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation
Pond 72	Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation
Pond 73	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation
Pond 101 East (East)	Reference
Pond 101 East (West)	Year 1 Post-Mastication
Pond 101 West	Year 1 Post-Mastication
Pond 103	Baseline
Pond 997	Reference
Machine Gun Flats	Year 2 Post-Mastication

2 METHODS

Sampling methods for wetland vegetation monitoring and aquatic surveys were consistent with the BO and Wetland Plan (USFWS, 2017; Burleson, 2006). Biologists did not enter areas where standing water was present at Ponds 14, 17, 21, 103, 54, and 72. Sampling and observations were completed from the bank due to risk of Munitions and Explosives of Concern (MEC).

Vernal pools must be monitored for baseline condition prior to any remedial activities such as prescribed burns, mastication, excavation, or artificial draining (USFWS, 2017). As described in the BO, the Army will conduct two years of pre-activity larval CTS sampling, to the extent possible, in the ponds where more than 50 percent of the watershed is affected by prescribed burns; thus, vernal pools may be monitored multiple years for baseline (USFWS, 2017). Additionally, at some ponds, baseline surveys were conducted more than 10 years ago and were sampled again to account for any changes that may have occurred over that period. Historical accounts of all surveys are presented in Appendix F.

Vernal pools are then monitored following any remedial activity for 3 to 5 years depending on the type of disturbance. Post-burn monitoring occurs in vernal pools if more than 50 percent of the watershed of a vernal pool is affected, and is conducted annually for the first three years following a burn (USFWS, 2017). The same standard is applied to vernal pools where more than 50 percent of the watershed was masticated, but no mastication of vegetation occurred within the inundation area. If vegetation is mowed within the inundation area, the vernal pool is monitored for vegetation in first, third, and fifth years following mastication (Burleson 2006). Vernal pools where subsurface munitions remediation activities disturbed less than 10 square feet and were shallower than four feet deep are monitored in first, third, and fifth years following remediation, whereas vernal pools with greater and/or deeper disturbance are monitored annually for five years following remediation (Burleson 2006). In cases of vernal pools where more than one type of remedial activity occurred, the most stringent monitoring frequency is followed. Three reference vernal pools that were not remediated are also monitored for comparison.

In 2015, vegetation within watersheds of Ponds 54 and 72 and within Pond 72 inundation area was masticated. In 2016, vegetation within watershed and inundation area of Pond 16 was masticated. In 2017, vegetation within watersheds of Ponds 35, 42, 44, 56, 60, 61, 73, and Machine Gun Flats was masticated. In the same year, vegetation within watersheds of Ponds 3 North, 3 South, 39, 40 North, 40 South, 42, and 43 was prescribed burned. In 2018, vegetation in Pond 101 West, and 101 East (West) was masticated. Also, in 2018, Ponds 3 North, 3 South, 16, 35, 39, 40 North, 40 South, 41, 42, 43, 44, 60, 61, and 73 were investigated for geophysical anomalies that potentially represented munitions and explosives of concern (MEC) items, and all had subsurface munitions remediation except for Pond 40 North. The same year, risk reduction activities in Unit 23 resulted in subsurface munitions remediation in Pond 54.

In 2019, Ponds 14, 17, 21, and 103 were monitored for baseline. Ponds 101 East (West) and 101 West were monitoring for year 1 post-mastication. Pond 41 was monitored for year 1 post-subsurface munitions remediation. Ponds 3 North, 3 South, 39, 40 South and 43 were monitored for year 2 post-burn and year 1 post-subsurface munitions remediation. Pond 40 North was monitored for year 2 post-burn. Ponds 35 and 44 were monitored for year 2 post-mastication and year 1 post-subsurface munitions remediation. Pond 42 was monitored for year 2 post-mastication and post-burn and year 1 post-subsurface munitions remediation. Ponds 56, 60, and Machine Guns Flats were monitored for year 2 post-mastication. Ponds 16 and 54 were monitored for year 3 post-mastication and year 1 post-subsurface munitions remediation. Pond 72 was monitored for year 3 post-mastication and year 3 post subsurface munitions remediation. Ponds 5, 101 East (East), and 997 are reference vernal pools.

2.1 Hydrology Monitoring

Biologists measured pH, turbidity, temperature, dissolved oxygen, vernal pool depth and inundated area. Water quality data were collected using a Hanna Instrument 9829 Multi-parameter Meter. The meter was calibrated prior to each data collection event (see Appendix A). Data were collected monthly between January and June. Data collection for water quality ceased at the end of June or when vernal pools became completely dry, whichever came first. These sampling methods are consistent with the BO and Wetland Plan (Burleson, 2006). Recommendations were to collect data at mid-pool and mid-depth in all vernal pools. The staff gauge is located at the deepest point of the vernal pool, and mid-pool was therefore considered the location of the staff gauge, regardless of the variable vernal pool perimeter. Mid-depth was dependent on the depth of the vernal pool during the time of monitoring. Recommendations to collect mid-pool, mid-depth data necessitated entry into the vernal pool. Due to MEC-associated safety concerns of Base Realignment and Closure (BRAC), biologists only entered ponds where it was deemed safe to do so. When vernal pools were entered, biologists used chest waders and personal flotation devices. With large storms or cumulative high precipitation, the depth of the water sometimes restricted biologists from reaching mid-pool and mid-depth at the largest vernal pools, including Ponds 5, 101 East (East), 16, and Machine Gun Flats. In these instances, biologist took water quality measurements as reasonably close to mid-pool as possible with consideration of surveyor safety. Supplemental data for December 2018 depth and inundation were collected as part of staff gauge installation and maintenance. Additionally, Burleson continued to monitor depth through September to record when the vernal pools dried.

Data were collected at the pool edge for Ponds 14, 17, 21, 54, and 72. When water quality data were collected from the pool edge, the probe was placed just beyond vegetation. Care was taken to ensure the probe was completely covered by water and within reach of the biologist. The locations of these collection points were recorded with GPS units. Data were collected at the same location in subsequent months. However, when pools began drying, sampling locations moved inward. The pH, temperature, and turbidity were logged and recorded on the field data sheet after initial probe adjustment was complete (see Appendix A). The dissolved oxygen was recorded while the probe was held vertically and bobbed up and down in the water column. When dissolved oxygen values stabilized, the reading was taken. This was done because the probe consumes oxygen as it takes the reading. If the probe is left motionless in low oxygen water, false readings of 0.00 mg/L are possible.

Inundated surface area was delineated by creating shape files with a Trimble® Juno ® T41 Series GPS unit. The perimeters of the vernal pools were mapped in their entirety, unless physically impossible due to safety risks. The perimeter only included ponded areas that had surface hydrological connectivity to the ponded area at the staff gauge. Peripheral ponding was observed and documented but was not mapped. Areas were calculated from the resultant shape files using ArcGIS (Esri, 2018). Vernal pool depths were recorded from staff gauges in the deepest point of each pool. Photographs of each vernal pool were taken at established photo points.

2.2 Vegetation Monitoring

Prior to collecting transect data, vernal pools were visited in early spring to assess the condition and initiate a list of present plant species. Vernal pools were visited more than once prior to collection of quadrat data to identify species present, evaluate vegetative strata, and determine the ideal time to collect data. Vegetation quadrat data were collected between May 8 and September 9, 2019. Data were collected as the vernal pools dried and the vegetation was sufficiently identifiable (see Appendices B, C, G, and H). Biologists visually assessed the historic vernal pool basins for each resource and identified homogeneous vegetative strata.

Vernal pool basins are defined by the hydrogeomorphic basin feature and the distinctly different vegetative community compared to the surrounding upland area. Because the basins vary from year to year and from wet to dry weather cycles over decades, the center portions of the basins typically support wetland vegetation associations, whereas outer portions at the highest elevations may not. The basin may vary from year to year from a combination of factors that include the amount of precipitation and timing, the duration of inundation, decaying vegetation from the previous season, sediment load, soil chemistry, and other stochastic processes. For some vernal pools, these variables only minimally impact the vernal pool basin and for others it can expand, contract, and change dramatically. The basin boundary is identifiable in the field because the hydrologic regime often precludes the presence of mature stands of upland tree and shrub communities within the basin boundaries. For vernal pools located within grasslands, basin boundaries are typically defined by a change from mesic grasses to monotypic stands of upland grasses.

For the purposes of this report, vegetative strata refer to the different homogenous vegetative communities that are distributed around the vernal pools in a zonate pattern. These are characteristically concentric circles similar to a bullseye. Open water typically recedes towards the center through the dry season. Differing depths and duration of inundation result in suites of plant species which are organized into discernable zones. These can be readily differentiated and mapped. During the visual assessment, biologists recorded the percent of submergent, emergent, and floating vegetative cover within the inundated areas when present. Inundated areas were characterized by the presence of standing water with wetland vegetation, whereas open water areas were characterized by standing water without vegetation. An upland stratum is characterized by upland species but is only mapped when it is within the vernal pool and therefore surrounded by wetland species, such as mima mounds. The upland transition on the periphery of the vernal pool is not mapped.

Strata were differentiated based on dominant species and overall species composition. The team used a stratified random quadrat method to collect data within each accessible stratum (Barbour *et al.*, 1980). When strata were inundated, vegetation was too dense or tall to enter, or in areas with MEC concern, visual cover data were estimated to define strata. In vernal pools that have been monitored using the same methodology in previous years, the transect locations were repeated when the strata were defined by the same dominant species and the transect locations were representative of the species composition for that strata. Otherwise, biologists placed a new transect in the most homogenous representative area for each accessible stratum. These were mapped using a Trimble® Juno ® T41 Series GPS unit. Transects were 5-meters (m) or 10-m in length depending on stratum size. Biologists used a random number table to determine placement of a 0.25 m^2 quadrat along each transect. The quadrat was placed a minimum of three times for every 5 m of transect. Biologists recorded the absolute percent cover by plant species, thatch, and bare ground (see Appendix B). Species percent cover was averaged for each stratum of the sampled vernal pools (see Appendix C). Biologists mapped strata the same day as quadrat sampling using a Trimble® Juno ® T41 Series GPS unit and calculated absolute percent cover of the strata using ArcGIS (Esri, 2018).

Plant species observed at each vernal pool were recorded. Most species were identified in the field using *The Plants of Monterey County, an Illustrated Field Key; Second Edition* (Matthews and Mitchell, 2015), *Monterey County Wildflowers, a Field Guide, First Edition* (Matthews and Mitchell, 2016), *Plants of San Francisco Bay Region, Mendocino to Monterey, Third Edition* (Beidleman and Kozloff, 2003) and *The Jepson Manual: Vascular Plants of California, Second Edition* (Baldwin *et al.*, 2012). Plants were categorized as native, non-native, or unidentified (see Appendix G Tables G-1 – G-17). Additional categorization of the plants occurred to identify them as one of the following: obligate wetland (OBL), facultative wetland (FACW), facultative (FAC), facultative upland (FACU), obligate upland (UPL), or not listed (NL) (see Appendix G Tables G-18 – G-34) (Lichvar *et al.*, 2016). When species could not be identified in the field, samples were collected from the vernal pool (not from the quadrats) and identified in the office.

Contra Costa goldfields (*Lasthenia conjugens*) and vernal pool bent grass (*Agrostis lacuna-vernalis)* were mapped using a Trimble® Juno ® T41 Series GPS unit. CCG populations were mapped by creating polygons. Absolute cover was visually estimated for these polygons. Vernal pool bent grass occurrences were mapped to document the extent of the species across former Fort Ord. Vernal pool bent grass is a recently described Fort Ord endemic 1B.1 ranked species by California Native Plant Society (CNPS) but is currently not federally listed and is not an HMP species (Peterson *et al.,* 2011). In 2019, vernal pool bent grass was only mapped at new locations.

2.3 Wildlife Monitoring

Following the HMP, PBO, and Wetland Plan, biologists conducted aquatic surveys for CTS and fairy shrimp (USACE, 1997; USFWS, 2017; Burleson, 2006). In 2019, early fairy shrimp surveys were implemented. These surveys occurred monthly in January and February. In March, April, and May the CTS and fairy shrimp surveys were conducted concurrently. The criterion used to identify suitable fairy shrimp habitat requires that a vernal pool retain an average of 10 cm of water for at least 18 consecutive days. The criterion used to identify suitable CTS breeding habitat requires that a vernal pool retain average depth of at least 25 cm from the first rain event through March (Burleson, 2006). Surveys began for fairy shrimp when the vernal pools maintained a minimum depth of 10 cm of water during the January hydrologic monitoring event, and for CTS when the vernal pools maintained a minimum depth of 10 cm during the March events.

Nets, boots, and other equipment were scrubbed with 10% diluted bleach solution and completely air-dried between monitoring different vernal pools to reduce the possibility of spreading disease. Additionally, nets, boots, and equipment were treated with 10% diluted bleach solution and air-dried at the end of each day. Cleaning solutions were applied to equipment in areas away from aquatic resources, on disturbed or developed roads to reduce contamination.

2.3.1 California Tiger Salamander

Survey methods for CTS followed the *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (USFWS and California Department of Fish and Game, 2003). Some exceptions were made as needed: aquatic sampling continued after initial detection and some inundated vernal pools were not entered. Further aquatic sampling was completed to provide additional insight into vernal pool function. Biologists did not enter some vernal pools due to MEC-related safety concerns and instead collected samples from the pool's edge. USACE Safety deemed the following vernal pools safe to enter: Ponds 5, 101 East (East), 997, 101 East (West), 101 (West), 41, 3 North, 3 South, 39, 40 North, 40 South, 43, 35, 42, 44, 56, 60, 61, 73, Machine Gun Flats, and 16. Ponds 14, 17, 21, 54, and 72 were surveyed from the vernal pool's edge.

CTS larvae were collected using long-handled, fine-meshed, D-shaped dipnets to allow biologists to record individual metrics and derive an approximate CTS count for each vernal pool. All sites were sampled using dipnets to minimize aquatic habitat disturbance. This methodology was chosen to allow direct comparison to past results. Depending on the extent of aquatic habitat, two to six biologists sampled each site. Biologists collected samples from each vernal pool until the habitat was adequately represented.

Biologists measured and recorded the length of a subset of 30 individual CTS larvae collected. When the total number of CTS collected was less than 30, all individuals were measured. California tiger salamander and other amphibian species encountered were identified and the total numbers recorded (see Appendix D Table D-1).

2.3.2 California Fairy Shrimp

Aquatic sampling for fairy shrimp and other aquatic invertebrates was conducted using a fine-meshed dip net and followed the *Interim Survey Guidelines to Permittees for Recovery Permits Under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods* (USFWS and California Department of Fish and Game, 1996). Representative portions of the bottom, edges, and vertical water column of each vernal pool were sampled. When fairy shrimp were present, the abundance was estimated by collecting 5-20 swipes throughout the vernal pool. The number of collected fairy shrimp were totaled and the abundance was reported as follows (see Appendix D Tables D-2 – D-3):

- Low abundance: 1 to 10 individuals;
- Moderate abundance: 11 to 100 individuals;
- High abundance: 101 to 300 individuals; and
- Very high abundance: greater than 300 individuals.

2.4 Evaluation for Data Quality Objectives and Success Criteria

Data quality objectives (DQOs) and performance standards outlined in the Wetland Plan were used to measure successful wetland function following MEC and soil remediation activities (Burleson, 2006). DQOs can be summarized as:

- DQO 1: depth – average of 25 cm through March for CTS and average of at least 10 cm through May for fairy shrimp
- DQO 2: inundation – consistent with baseline and similar to reference vernal pool trends
- DQO 3: vegetation – similar hydrophytic vegetation as reference control wetlands
- DQO 4: water quality – adequate for the presence of CTS and/or fairy shrimp
- DQO 5: wildlife – consistent with baseline and similar to reference control wetland trends

Hydrological conditions and inundation areas were assessed using DQO 1 and DQO 2. Hydrology survey results were analyzed to evaluate if the vernal pool held a sufficient depth of water appropriate for CTS and fairy shrimp for the duration of the breeding season. Suitable CTS habitat was defined as a vernal pool that retains an average depth of at least 25 cm from the first rain event through March (Burleson, 2006). Suitable fairy shrimp habitat was defined as a vernal pool that retains an average depth of 10 cm for 18 consecutive days through May. Hydrology results were compared to previous surveys and reference vernal pools to better understand if the vernal pool followed trends in inundation and function similar to the baseline and reference vernal pools. Water quality results were evaluated in a similar manner; however, observed water quality parameters in vernal pools were variable. This is common due to the complex mechanisms contributing to water quality, such as air temperature, plant respiration rates, microbial community structure, and soil chemistry. In addition, the primary measure of adequate water quality was measured by the presence or absence of wildlife in DQO 4.

Plant cover and species diversity were assessed using DQO 3. Species diversity was assessed by examining species richness and species abundance. Wetland vegetation monitoring results were analyzed to identify whether the vernal pool was similar to baseline and reference vernal pools and if wetland function was consistent through time. The disturbed vernal pool should have the following characteristics by the end of the last year of monitoring:

- A number of native wetland species present in the vernal pool comparable to the number present in the vernal pool before MEC and contaminated soils removal or in control wetlands, and
- A relative dominance of native wetland species in the vernal pool comparable to the relative dominance in the vernal pool before MEC and contaminated soil removal or in control wetlands.

Wildlife usage was assessed using DQO 1, DQO 4, and DQO 5. The vernal pool was considered successful if the post-remediation wildlife usage was similar to pre-disturbance usage. The Wetland Plan indicates that a vernal pool which supported CTS and fairy shrimp prior to remediation activities should continue to support those species following such activities (Burleson, 2006). The presence or absence of wildlife was taken into consideration with regards to sufficient depth and inundation, described in DQO 1, as well as whether water quality was adequate to support wetland species, described in DQO 4.

In addition to the Wetland Plan, the Programmatic BO from 2017 outlines the following success criteria specifically for CTS and CCG (USFWS, 2017). Species reestablishment will be considered successful if, at the end of monitoring, each of the following is directly comparable to the conditions before the start of work:

1. Wetland function, as measured by the parameters of hydrologic conditions (inundation area and depth, pH, temperature, dissolved oxygen levels);
2. Wildlife usage, specifically CTS larval presence;
3. Plant cover and wetland plant species diversity and dominance; and
4. CCG abundance.

These four conditions were assessed in conjunction with the DQOs. Wetland function was assessed with DQO 1, DQO 2, and DQO 4. Wildlife usage was assessed with DQO 5. Plant cover and wetland plant species diversity and dominance were assessed with DQO 3. Contra Costa goldfield abundance was assessed with DQO 3.

Historic data for cumulative precipitation, physical characteristics, water quality, wetland vegetation, and wildlife presence or absence for all reference and post-remediation vernal pools were summarized by vernal pool. Vernal pool inundations were mapped and compared to the inundations in previous years at remediated and reference vernal pools. A historic outline of inundation and water quality compared to the precipitation year is provided in Appendix F with text and tables. Wetland vegetation was compared across years and to reference vernal pools based on the stratum, absolute percent vegetative cover, species richness, native plant species richness, relative percent native species cover, wetland plant species richness, relative percent wetland plant cover, and species composition (see Appendices G and H). Wildlife was evaluated using the presences or absences of CTS and fairy shrimp.

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3 RESULTS

Hydrology surveys were conducted monthly from January through September at reference Ponds 5, 101 East (East), 997; baseline Ponds 14, 17, 21, 103; and remediated Ponds 101 East (West), 101 West, 41, 3 North, 3 South, 39, 40 North, 40 South, 43, 35, 42, 44, 56, 60, 61, 73, Machine Gun Flats, 16, 54, and 72. Measurable ponding was observed in 26 of the 27 vernal pools monitored in 2019. Pond 103 did not hold water and was recorded as dry for the entire monitoring season. Machine Gun Flats was the largest vernal pool by maximum depth (149 cm) and inundation (10.45 acres). Pond 997 was the smallest vernal pool by maximum depth (14 cm), and Pond 40 North was the smallest vernal pool by average inundation (0.03 acres).

Vernal pool hydrological conditions were characteristic of an above-normal precipitation year with late rain events. Gradual filling occurred following a series of winter rain events with the majority of the precipitation and consequent inundation occurring in February (NPS, 2019). Drying began in March and April; however, a series of uncommon late rains extended the drying period beyond what is typical. Of the 26 vernal pools that held water in 2019, one dried by April (Pond 44), six dried by May (Ponds 997, 21, 40 South, 43, 35, 61), four dried by June (Ponds 101 West, 3 South, 44, 72), ten dried by July (Ponds 101 East (East), 14, 17, 101 East (West), 41, 3 North, 39, 40 North, 42, 54), one dried by August (Pond 5), and four did not dry during the monitoring season (Ponds 56, 60, Machine Gun Flats, 16).

Observed water quality measurements were similar to previous years for all vernal pools (see Appendix A Tables A-1 – A-9). Mean temperature decreased from 10.94 °C in January to 9.67 °C in February and then gradually increased to 20.60 °C by June. Mean dissolved oxygen values were approximately 8.30 milligrams per liter (mg/L) in January and February, decreased to 7.31 mg/L in March, 5.24 mg/L in April, 4.91 mg/L May, and then slightly increased to 5.77 mg/L in June. The minimum pH value was 6.48 in February but otherwise averaged approximately 6.60 throughout the water-year. Mean turbidity values were generally similar from January through June. February was higher at 90.17 formazin nephelometric units (FNU). The minimum mean turbidity value was 47.68 FNU in May. Mean turbidities for all months were between 55 and 70 FNU.

The minimum depth requirement for wildlife surveys was 10 cm and was based on the success criterion for fairy shrimp outlined in the Wetland Plan (Burleson, 2006). Hydrology survey results for March indicated that CTS and fairy shrimp wildlife monitoring minimum depth requirements were met at 26 of the 27 vernal pools monitored in 2019. Pond 103 was dry for the entirety of the monitoring season and did not meet the minimum depth requirement to trigger wildlife surveys in 2019.

Vegetation monitoring was conducted at Ponds 5, 101 East (East), 997, 14, 17, 21, 103, 101 East (West), 101 West, 41, 3 North, 3 South, 39, 40 North, 40 South, 43, 35, 42, 44, 56, 60, 61, 73, Machine Gun Flats, 16, 54, and 72. Across all monitored vernal pools, the mean number of native plant species was 20 and non-native species was 14 (see Table 3-1). Of these species, a mean of 20 were wetland species, either obligate (OBL), facultative wetland (FACW), or facultative (FAC) (see Table 3-2). In addition to vegetative strata mapping and transect surveys, populations of CCG were mapped at Ponds 3 North, 3 South, 61, 997, and Machine Gun Flats and occurrences of vernal pool bent grass were mapped at Pond 43.

Table 3-1. Vegetation Species Richness of Native and Non-Native Species Observed on Transects at Vernal Pools Monitored in 2019

Vernal Pool	Monitoring Status	Native	Non-Native
Pond 5	Reference	21	14
Pond 101 East (East)	Reference	18	19
Pond 997	Reference	27	21
Mean (Reference)	-	**22**	**18**
Pond 14	Baseline	21	13
Pond 17	Baseline	14	14
Pond 21	Baseline	14	8
Pond 101 East (West)	Year 1 Post-Mastication	29	19
Pond 101 West	Year 1 Post-Mastication	22	18
Pond 41	Year 1 Post-Subsurface Munitions Remediation	21	12
Pond 3 North	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	13	9
Pond 3 South	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	34	20
Pond 39	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	25	19
Pond 40 North	Year 2 Post-Burn	9	12
Pond 40 South	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	17	23
Pond 43	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	30	14
Pond 35	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	10	15
Pond 42	Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation	16	11
Pond 44	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	28	15
Pond 56	Year 2 Post-Mastication	11	4
Pond 60	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	7	7
Pond 61	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	32	13
Pond 73	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	14	3
Machine Gun Flats	Year 2 Post-Mastication	31	21
Pond 16	Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	17	10
Pond 54	Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	26	14
Pond 72	Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation	16	6
Mean (Remediated)	-	**20**	**13**
Mean (All)	-	**20**	**14**

Table 3-2. Vegetation Species Richness of Obligate and Facultative Wetland Species Observed on Transects at Vernal Pools Monitored in 2019

Vernal Pool	Monitoring Status	OBL	FACW	FAC	Wetland Species
Pond 5	Reference	5	9	4	18
Pond 101 East (East)	Reference	4	8	7	19
Pond 997	Reference	9	9	6	24
Mean (Reference)	-	**6**	**8**	**6**	**20**
Pond 14	Baseline	3	6	8	17
Pond 17	Baseline	3	7	8	18
Pond 21	Baseline	6	8	2	16
Pond 101 East (West)	Year 1 Post-Mastication	7	15	10	32
Pond 101 West	Year 1 Post-Mastication	9	9	10	28
Pond 41	Year 1 Post-Subsurface Munitions Remediation	7	7	5	19
Pond 3 North	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	6	6	5	17
Pond 3 South	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	10	13	9	32
Pond 39	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	6	9	6	21
Pond 40 North	Year 2 Post-Burn	4	4	4	12
Pond 40 South	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	4	6	5	15
Pond 43	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	8	10	7	25
Pond 35	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	6	3	5	14
Pond 42	Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation	6	7	3	16
Pond 44	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	7	10	6	23
Pond 56	Year 2 Post-Mastication	5	6	1	12
Pond 60	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	6	4	2	12
Pond 61	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	11	11	6	28
Pond 73	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	7	7	1	15
Machine Gun Flats	Year 2 Post-Mastication	7	14	8	29
Pond 16	Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	4	6	6	16
Pond 54	Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	8	9	6	23
Pond 72	Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation	6	9	4	19
Mean (Remediated)	-	**6**	**9**	**6**	**20**
Mean	-	**6**	**8**	**6**	**20**

Aquatic wildlife monitoring was conducted at Ponds 5, 101 East (East), 997, 14, 17, 21, 101 East (West), 101 West, 41, 3 North, 3 South, 39, 40 North, 40 South, 43, 35, 42, 44, 56, 60, 61, 73, Machine Gun Flats, 16, 54, and 72 (see Appendix D Tables D-1 – D-3). No wildlife surveys were completed at Pond 103, as it did not hold water and was recorded as dry for the monitoring season.

Early fairy shrimp surveys took place in January and February and were completed at all vernal pools without historic CTS presence to minimize a potential disturbance to CTS eggs. This included Ponds 14, 17, 21, 3 North, 3 South, 39, 40 North, 40 South, 43, 35, 44, 73, and 72. Early fairy shrimp surveys indicated presence for Ponds 3 North, 3 South, 39, 40 North, 40 South, 43, 35, and 44. Fairy shrimp surveys continued in conjunction with CTS surveys for all vernal pools monitored in 2019. Additional presence of fairy shrimp was recorded for Ponds 5, 101 East (East), 101 East (West), 41, 42, 56, 60, 61, Machine Gun Flats, and 16. Overall, fairy shrimp were present in 20 of the 26 vernal pools monitored ranging from a low to very high abundance (see Table 3-3).

For CTS surveys, vernal pools were sampled up to three times in March, April, and May. Ponds 997, 21, 40 South, 43, 35, 44, and 61 dried completely during the sampling period and were not sampled during all events. California tiger salamanders were present in Ponds 5, 101 East (East), 17, 21, 101 East (West), 101 West, 41, 56, 60, Machine Gun Flats, 16, 54, and 72. One thousand seven hundred and fifty-two larvae were observed during sampling in 2019. Overall, CTS were present in 13 of the 26 vernal pools monitored (see Table 3-3).

Table 3-3. California Tiger Salamander and Fairy Shrimp Detections at Vernal Pools in 2019

Vernal Pool	Monitoring Status	CTS Detected	Fairy Shrimp Detected
Pond 5	Reference	Yes	Yes
Pond 101 East (East)	Reference	Yes	Yes
Pond 997	Reference	No	No
Pond 14	Baseline	No	No
Pond 17	Baseline	Yes	No
Pond 21	Baseline	Yes	No
Pond 103	Baseline	N/A*	N/A*
Pond 101 East (West)	Year 1 Post-Mastication	Yes	Yes
Pond 101 West	Year 1 Post-Mastication	Yes	No
Pond 41	Year 1 Post-Subsurface Munitions Remediation	Yes	Yes
Pond 3 North	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	No	Yes
Pond 3 South	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	No	Yes
Pond 39	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	No	Yes
Pond 40 North	Year 2 Post-Burn	No	Yes
Pond 40 South	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	No	Yes
Pond 43	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	No	Yes
Pond 35	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	No	Yes
Pond 42	Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation	No	Yes
Pond 44	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	No	Yes
Pond 56	Year 2 Post-Mastication	Yes	Yes
Pond 60	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	Yes	Yes
Pond 61	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	No	Yes
Pond 73	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	No	Yes
Machine Gun Flats	Year 2 Post-Mastication	Yes	Yes
Pond 16	Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	Yes	Yes
Pond 54	Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	Yes	No
Pond 72	Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation	Yes	No

*Surveys were not conducted since depths did not trigger protocol-level surveys

3.1 Pond 5

Pond 5 is a reference vernal pool that was monitored as a control for comparison to the remediated vernal pools. In 2019, Pond 5 was monitored for hydrology, vegetation, and wildlife.

3.1.1 Hydrology Monitoring

Pond 5 was monitored for hydrology eight times and dried by August (see Table 3-4 and Figure 3-1). The final monitoring events in July and August only included depth surveys and were completed as an additional effort to document when the vernal pool dried.

Table 3-4. Pond 5 (Reference) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/14/2019	11:50	6.70	11.09	10.16	4.7	4	0.47‡
2/13/2019	14:02	6.89	10.55	10.24	8.4	42	4.21‡
3/7/2019	11:39	6.58	14.10	5.58	1.5	56	4.83‡
4/4/2019	10:25	6.41	14.87	1.71	1.2	53	4.59
5/9/2019	10:14	6.51	17.15	3.80	0.6	37	3.96
6/6/2019	13:27	7.09	20.32	6.07	13.6	30	3.62
7/9/2019	15:30	-	-	-	-	25§	-
8/13/2019	14:40	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.
§Depth is an estimate. Decreased visibility due to emergent vegetation.

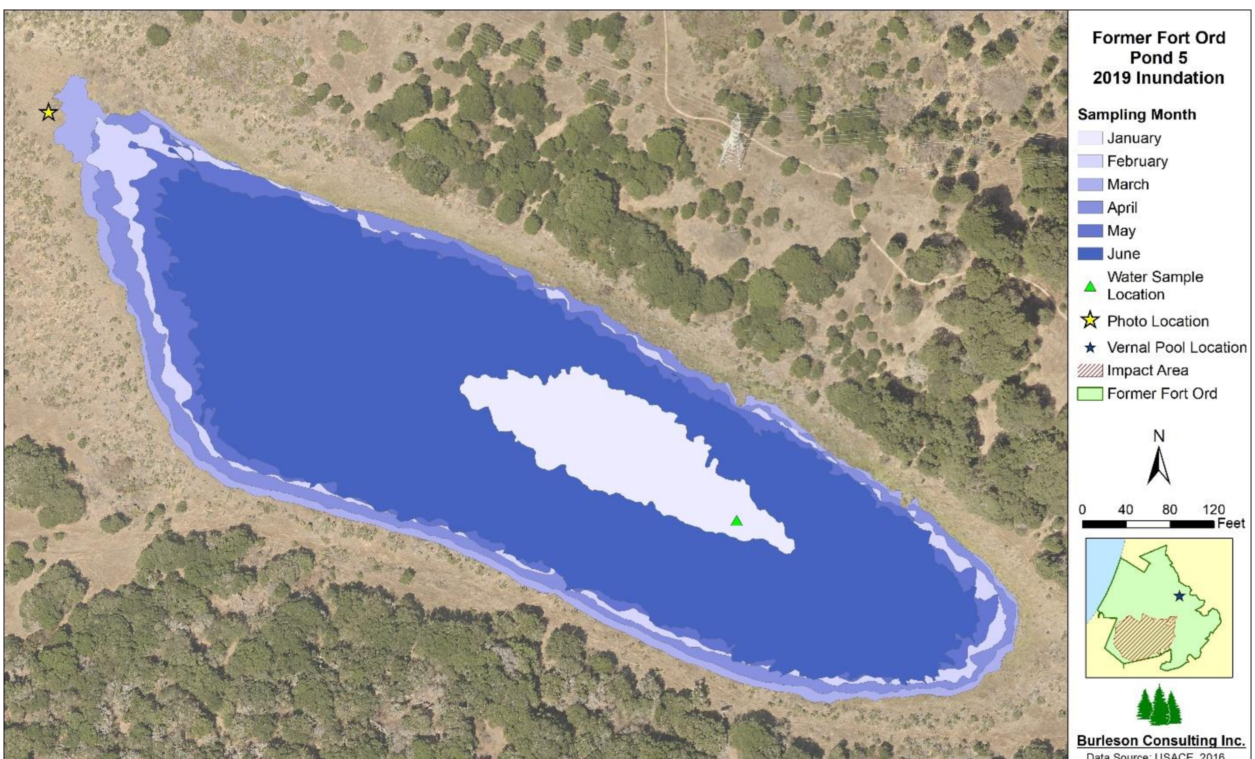

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Figure 3-1. Pond 5 (Reference) Inundation on Former Fort Ord, 2019

3.1.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 5 on June 17, June 20, and August 13, 2019. These monitoring data represent reference conditions. Pond 5 was dry by the August 13 monitoring event. Biologists identified six vegetative strata at the vernal pool (see Table 3-5 and Figure 3-2). Appendix C provides the species cover results for each stratum. Stratum 1 was repeated from 2016 and 2018, strata 2, 3, 4, and 6 were repeated from 2016, 2017, and 2018. Stratum 7 was identified in 2019. Transect 1 was repeated from 2016 and 2018 and Transect 3 was repeated from 2018. Transect 6 was repeated from 2018. Transect 2 was relocated because the previous location was no longer within the correct stratum. Transect 4 was placed in a location similar to 2018 but was shortened to 5 m to fit within the stratum. Transect 7 was established in 2019.

Table 3-5. Pond 5 (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	23%
2	1%
3	26%
4	1%
6	45%
7	4%

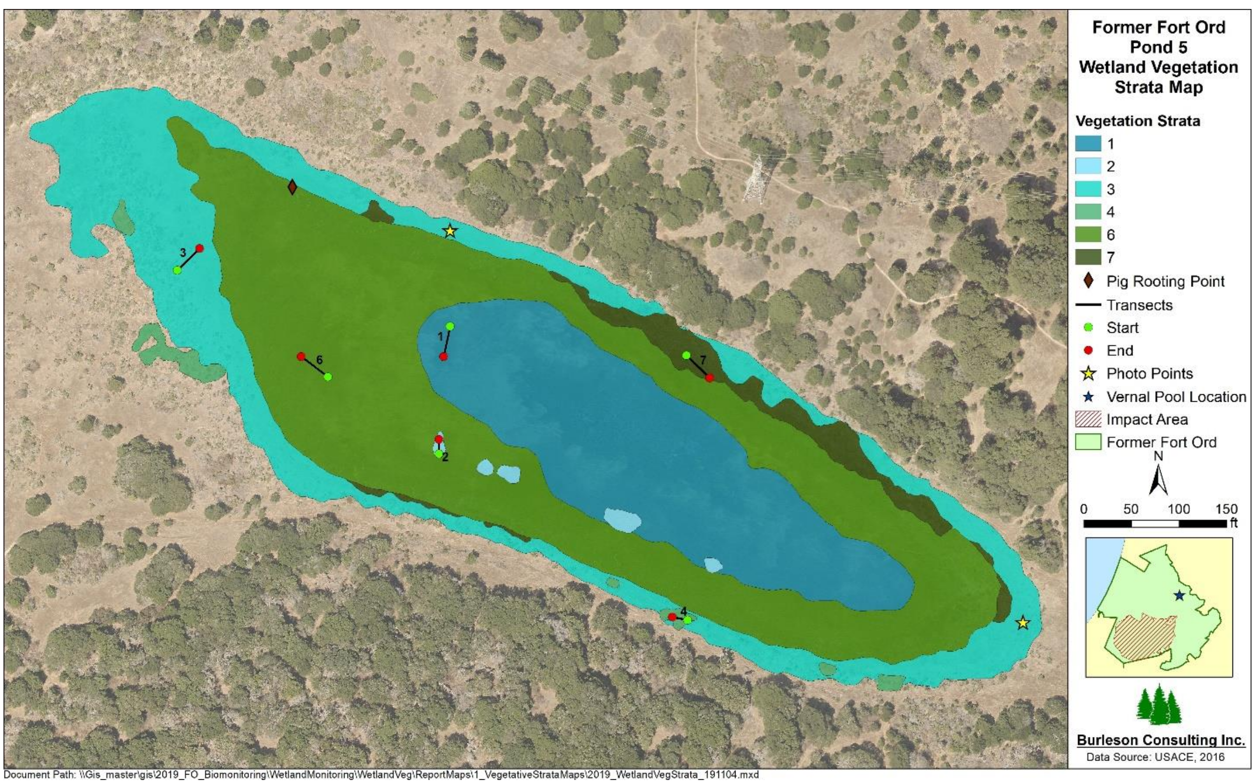

Figure 3-2. Pond 5 (Reference) Vegetation Strata and Transects on Former Fort Ord, 2019

Ninety-four plant species were observed within the vernal pool basin boundary. Of these species, 62 were native and 32 were non-native. Additionally, 11 species were OBL wetland plants, 31 were FACW or FAC, 17 were FACU or UPL, and 35 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 5 consisted of a 10-m transect placed in stratum 1. Five plant species were observed along the transect. Of these species, three were native and two were non-native. Pale spikerush (*Eleocharis macrostachya)* was the dominant species, accounting for approximately 84% cover (see Appendix C Table C-1). Bare ground and thatch were present accounting for approximately 7% and 4% cover, respectively. Other species included Pacific bent grass (*Agrostis avenacea*), spreading alkaliweed (*Cressa truxillensis*), alkali mallow (*Malvella leprosa*), and rabbitfoot grass (*Polypogon monspeliensis*).

Transect 2 at Pond 5 consisted of a 5-m transect placed in stratum 2. Five plant species were observed along the transect. Of these species, four were native and one was non-native. Pale spikerush and salt grass (*Distichlis spicata*) were the dominant species, accounting for approximately 65% and 23% cover, respectively (see Appendix C Table C-1). Thatch and bare ground were present, accounting for approximately 7% and 2% cover, respectively. Rabbitfoot grass contributed approximately 2% cover. Other species included spreading alkaliweed and alkali mallow.

Transect 3 at Pond 5 consisted of a 10-m transect placed in stratum 3. Twenty-eight plant species were observed along the transect. Of these species, 15 were native and 13 were non-native. Annual quaking grass (*Deschampsia danthonioides*) and salt grass were the dominant species, accounting for approximately 32% and 11% cover, respectively (see Appendix C Table C-1). Thatch and bare ground were fairly abundant, accounting for approximately 16% and 10% cover, respectively. Pale spikerush, purple cudweed (*Gamochaeta ustulata*), rough cat's-ear (*Hypochaeris radicata)*, grass poly (*Lythrum hyssopifolia),* cutleaf burnweed (*Senecio glomeratus*), and bugle hedge nettle (*Stachys ajugoides)* contributed cover ranging from 2% to 7%. Rabbitfoot grass and prickly sow thistle (*Sonchus asper*) each contributed approximately 1% cover. Other species included hill lotus (*Acmispon parviflorus*), Chilean trefoil (*Acmispon wrangelianus*), coyote brush (*Baccharis pilularis*), rattlesnake weed (*Daucus pusillus*), horseweed (*Erigeron canadensis*), brome fescue (*Festuca bromoides*), cut-leaved geranium (*Geranium dissectum*), Baltic rush (*Juncus balticus*), common toad rush (*Juncus bufonius* var. *bufonius*), clustered toad rush (*Juncus bufonius* var. *congestus*), scarlet pimpernel (*Lysimachia arvensis*), chaffweed (*Lysimachia minima*), Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*), weedy cudweed (*Pseudognaphalium luteoalbum*), cottonbatting plant (*Pseudognaphalium stramineum*), sheep sorrel (*Rumex acetosella*), curly dock (*Rumex crispus*), and common sow thistle (*Sonchus oleraceus*).

Transect 4 at Pond 5 consisted of a 5-m transect placed in stratum 4. Twenty-three plant species were observed along the transect. Of these species, 11 were native and 12 were non-native. Brown-headed rush (*Juncus phaeocephalus*), annual quaking grass (*Briza minor*), and sheep sorrel were the dominant species, accounting for approximately 16%, 9%, and 9% cover, respectively (see Appendix C Table C-1). Thatch and bare ground were abundant, accounting for approximately 27% and 17%, respectively. Spanish lotus (*Acmispon americanus* var. *americanus*), salt grass, pale spikerush, and cutleaf burnweed contributed cover ranging from 2% to 4%, while horseweed, purple cudweed, rabbitfoot grass, weedy cudweed, pink everlasting (*Pseudognaphalium ramosissimum*), cottonbatting plant, and bugle hedge nettle contributed approximately 1% cover. Other species included needle spikerush (*Eleocharis acicularis* var. *acicularis*), brome fescue, cut-leaved geranium, rough cat's-ear, common toad rush, scarlet pimpernel, grass poly, prickly sow thistle, and common sow thistle.

Transect 6 at Pond 5 consisted of a 10-m transect placed in stratum 6. Seven plant species were observed along the transect. Of these species, five were native and two were non-native. Pale spikerush and rabbitfoot grass were the dominant species, accounting for approximately 45% and 39% cover, respectively (see Appendix C Table C-1). Thatch was fairly abundant, accounting for approximately 9%. Salt grass contributed approximately 6% cover. Other species included spreading alkaliweed, brown-headed rush, alkali mallow, and curly dock. Bare ground was also present.

Transect 7 at Pond 5 consisted of a 10-m transect placed in stratum 7. Six plant species were observed along the transect. Of these species, four were native and two were non-native. Baltic rush and pale spikerush were the dominant species, accounting for approximately 32% and 19% cover, respectively (see Appendix C Table C-1). Thatch and bare ground were fairly abundant, accounting for approximately 26% and 22%, respectively. Other species included salt grass, needle spikerush, cut-leaved geranium, and grass poly.

3.1.3 Wildlife Monitoring

Pond 5 was surveyed for CTS and fairy shrimp on March 15, April 17, and May 14, 2019. California tiger salamanders were present at the April and May surveys, while fairy shrimp were present in March and April. The March wildlife survey was stopped due to the presence of CTS eggs. Following guidance of the BRAC biologist, the surveys were canceled when eggs were observed. The March presence of fairy shrimp was due to detection in CTS dip nets. Table 3-6 and Table 3-7 provide results of the CTS and fairy shrimp surveys in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-6. Pond 5 (Reference) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
5	3/15/2019	0	-	-	-	-	-	-	-	1 hr 50 min†
	4/17/2019	165	30	49.5	31-91	40, 44	27	14-50	25	7 hrs 30 min
	5/14/2019	46	30	65	46-85	57, 64, 70, 71	35	23-44	31, 37	5 hrs 30 min

*The mean was rounded to the nearest whole number
†Did not complete CTS survey due to CTS egg presence

Table 3-7. Pond 5 (Reference) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/15/2019	Present*
4/17/2019	Low (3)
5/14/2019	Not detected

*Fairy shrimp detected during CTS survey; fairy shrimp survey was not completed in March due to the presence of CTS eggs.

3.2 Pond 101 East (East)

Pond 101 East (East) is a reference vernal pool that was monitored as a control for comparison to the remediated vernal pools. In 2019, Pond 101 East (East) was monitored for hydrology, vegetation, and wildlife.

3.2.1 Hydrology Monitoring

Pond 101 East (East) was monitored for hydrology seven times and dried by July (see Table 3-8 and Figure 3-3). The final monitoring event in July only included a depth survey and was completed as an additional effort to document when the vernal pool dried.

Table 3-8. Pond 101 East (East) (Reference) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/14/2019	11:06	-	-	-	-	DRY	0.00
2/14/2019	12:45	6.88	14.36	8.94	10.4	47	2.21‡
3/7/2019	13:14	6.51	14.08	5.48	9.7	56	2.76‡
4/4/2019	9:45	6.80	14.15	5.63	6.1	53	2.51‡
5/9/2019	9:23	6.38	16.26	3.09	13.0	34	1.14
6/6/2019	14:26	7.13	21.92	5.48	79.8	26	0.38
7/9/2019	16:00	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

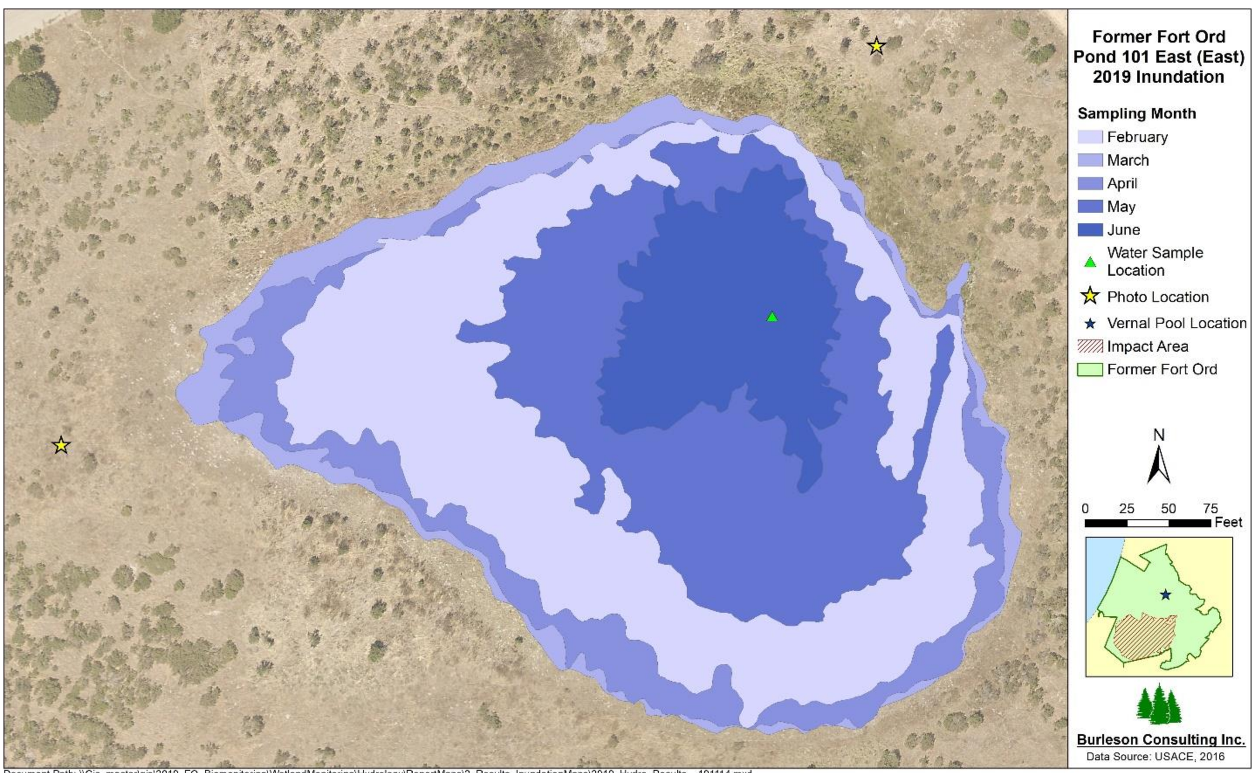

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Figure 3-3. Pond 101 East (East) (Reference) Inundation on Former Fort Ord, 2019

3.2.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 101 East (East) on June 14 and July 17, 2019. These monitoring data represent reference conditions. Pond 101 East (East) was dry by the July 17 monitoring event. Biologists identified three strata at the vernal pool (see Table 3-9 and Figure 3-4). Appendix C provides the species cover results within each stratum. Stratum 2 was repeated from 2016 and 2018, whereas strata 5 and 6 were repeated from 2017 and 2018. Transect 2 was repeated from 2018. Transects 5 and 6 were repeated from 2017 and 2018.

Table 3-9. Pond 101 East (East) (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
2	34%
5	46%
6	20%

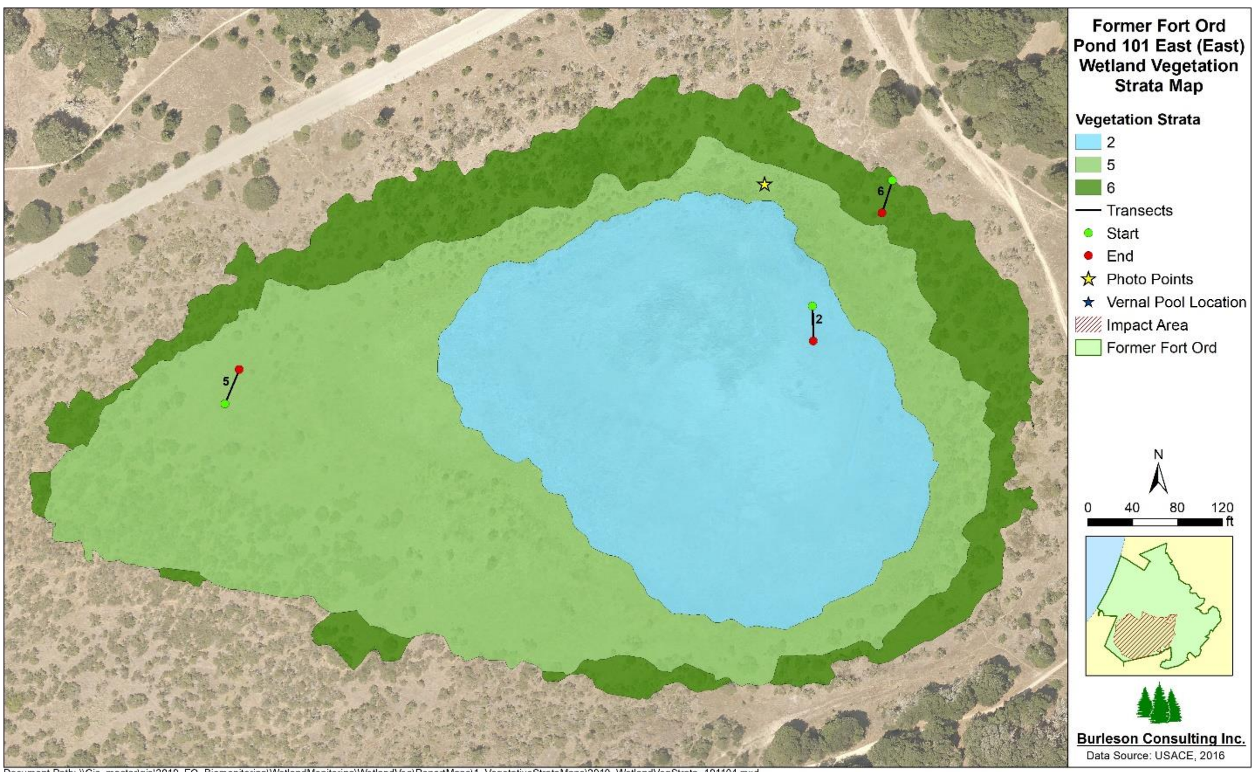

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Figure 3-4. Pond 101 East (East) (Reference) Vegetation Strata and Transects on Former Fort Ord, 2019

Eighty-four plant species were observed within the vernal pool basin boundary. Of these species, 51 were native and 33 were non-native. Additionally, five species were OBL wetland plants, 31 were FACW or FAC, 17 were FACU or UPL, and 31 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 2 at Pond 101 East (East) consisted of a 10-m transect placed in stratum 2. Six plant species were observed along the transect. Of these species, two were native and four were non-native. Pale spikerush was the dominant species, accounting for approximately 63% cover (see Appendix C Table C-2). Thatch was fairly abundant, accounting for approximately 18%. Rabbitfoot grass contributed approximately 14% cover. Pacific bent grass, grass poly, and alkali mallow contributed cover ranging from 1% to 3%. Curly dock was also present. Bare ground was also present and accounted for approximately 2%.

Transect 5 at Pond 101 East (East) consisted of a 10-m transect placed in stratum 5. Twenty-four plant species were observed along the transect. Of these species, 11 were native and 13 were non-native. Sheep sorrel, Spanish lotus, and annual quaking grass were the dominant species, accounting for approximately 20%, 12%, and 10% cover, respectively (see Appendix C Table C-2). Thatch and bare ground were fairly abundant, accounting for approximately 11% and 9%, respectively. Horseweed, bugle hedge nettle, small head clover (*Trifolium microcephalum*), and spring vetch (*Vicia sativa* ssp. *sativa*) contributed cover ranging from 5% to 8%. Pacific bent grass, scarlet pimpernel, weedy cudweed, and cottonbatting plant contributed cover ranging from 1% to 3%. Other species included vernal pool bent grass, needle spikerush, long-beaked filaree (*Erodium botrys*), brome fescue, Chinese pusley, smooth cat's-ear (*Hypochaeris glabra*), rough cat's-ear, brown-headed rush, grass poly, coast tarweed (*Madia sativa*), rabbitfoot grass, common sow thistle, and variegated clover (*Trifolium variegatum*).

Transect 6 at Pond 101 East (East) consisted of a 10-m transect placed in stratum 6. Sixteen plant species were observed along the transect. Of these species, eight were native and eight were non-native. Baltic rush, sheep sorrel, and clustered field sedge (*Carex praegracilis*) were the dominant species, accounting for approximately 24%, 11%, and 9% cover, respectively (see Appendix C Table C-2). Thatch was abundant, accounting for approximately 37% cover. Western vervain (*Verbena lasiostachys* var. *lasiostachys*) and common vetch (*Vicia sativa* ssp. *nigra*) contributed approximately 2% and 5% cover, respectively. Other species included Spanish lotus, bull thistle (*Cirsium vulgare*), salt grass, horseweed, cut-leaved geranium, smooth cat's-ear, cottonbatting plant, curly dock, willow dock (*Rumex salicifolius*), small-flower catchfly (*Silene gallica*), and prickly sow thistle. Bare ground was also present and accounted for approximately 8%.

3.2.3 Wildlife Monitoring

Pond 101 East (East) was surveyed for CTS and fairy shrimp on March 11, April 18, and May 14, 2019. California tiger salamanders were present at all three monitoring events while fairy shrimp were present at the March survey event. Table 3-10 and Table 3-11 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-10. Pond 101 East (East) (Reference) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
101 East (East)	3/11/2019§	38	30	15	12-27	14, 15	N/A	N/A	N/A	4 hrs
	4/18/2019	212	30	72	47-105	60, 65, 74, 85	39	24-60	31	3 hrs 32 min
	5/14/2019	225	30	85	57-115	76	46	27-62	45	2 hrs 5 min

*The mean was rounded to the nearest whole number
§SVL not measured, CTS larvae were too small for accurate infield measurements

Table 3-11. Pond 101 East (East) (Reference) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/11/2019	Moderate (32)
4/18/2019	Not detected
5/14/2019	Not detected

3.3 Pond 997

Pond 997 is a reference vernal pool that was monitored as a control for comparison to the remediated vernal pools. In 2019, Pond 997 was monitored for hydrology, vegetation, and wildlife.

3.3.1 Hydrology Monitoring

Pond 997 was monitored for hydrology five times and dried by May (see Table 3-12 and Figure 3-5).

Table 3-12. Pond 997 (Reference) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/14/2019	12:56	-	-	-	-	DRY	0.00
2/13/2019	13:10	6.39†	11.79†	10.62†	26.0†	13	0.11‡
3/5/2019	11:05	6.37†	12.61†	9.28†	24.2†	14	0.12‡
4/9/2019	10:05	-	-	-	-	2	0.03
5/9/2019	10:56	-	-	-	-	DRY	0.00

†Water quality probe was horizontal for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

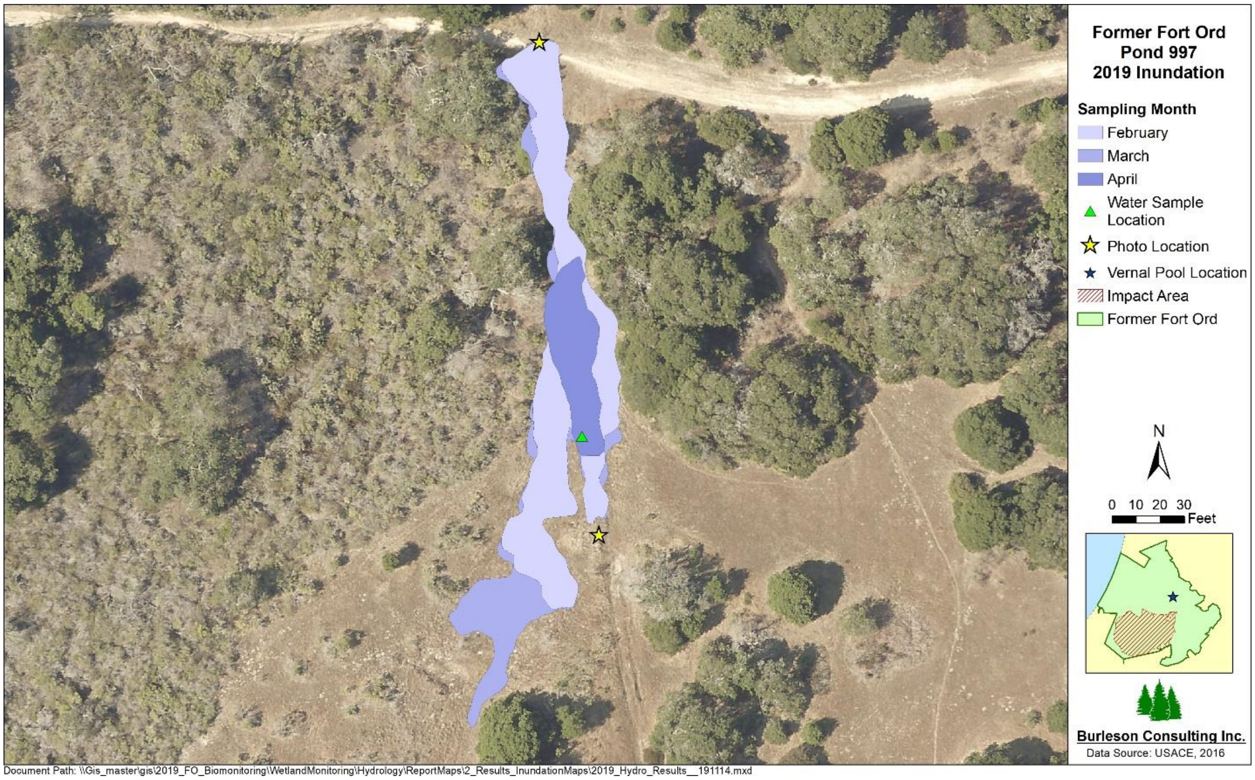

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Figure 3-5. Pond 997 (Reference) Inundation on Former Fort Ord, 2019

3.3.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 997 on May 10, 2019. These monitoring data represent reference conditions. Pond 997 was dry by the May 10 monitoring event. Biologists identified four wetland strata at the vernal pool (see Table 3-13 and Figure 3-6). Appendix C provides the species cover results within each stratum. Strata 1, 2, and 3 were repeated from 2017 and 2018, whereas stratum 5 was repeated from 2018. Transects 1 and 3 were repeated from 2017 and 2018. Transect 5 was repeated from 2018. Stratum 2 consisted of CCG and no transects were placed in this stratum. Figure 3-7 illustrates the extent and density of the CCG population at Pond 997.

Table 3-13. Pond 997 (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	7%
2 (CCG)	2%
3	45%
5	45%
Upland	1%

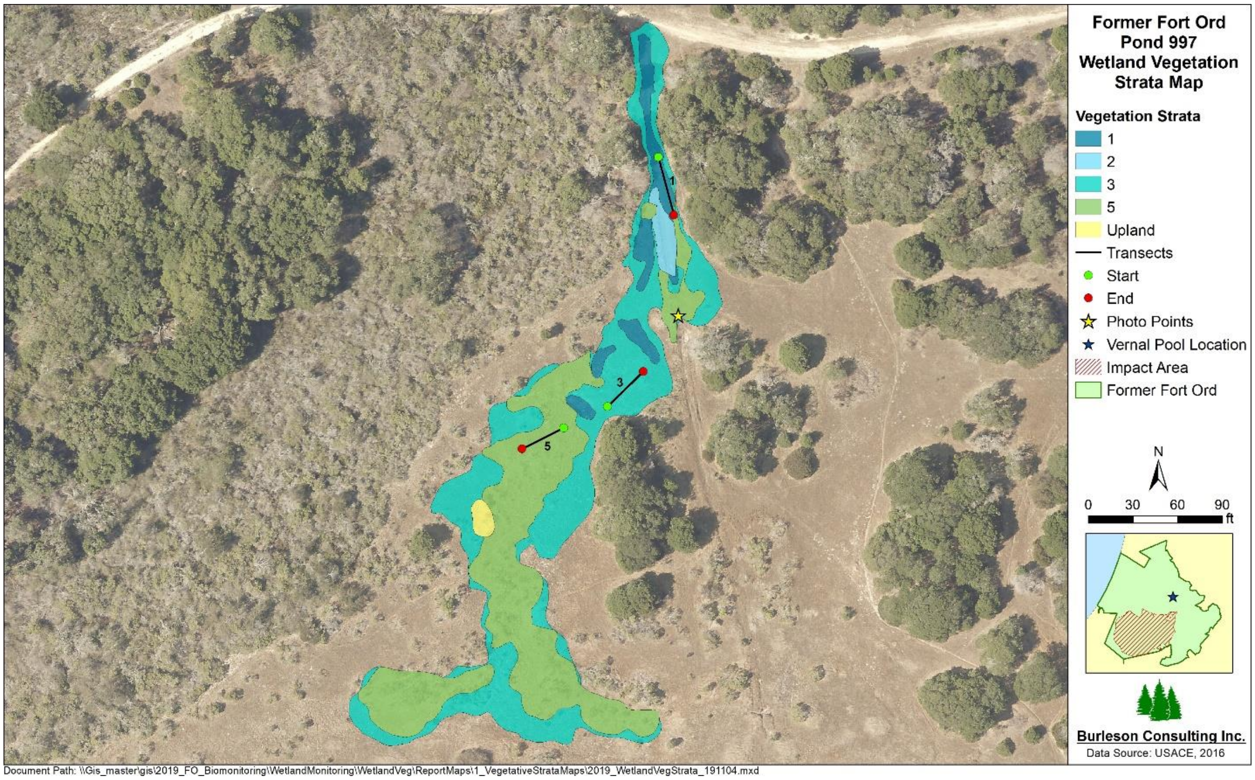

Figure 3-6. Pond 997 (Reference) Vegetation Strata and Transects on Former Fort Ord, 2019

Eighty-two plant species were observed within the vernal pool basin boundary. Of these species, 54 were native and 28 were non-native. Additionally, 11 species were OBL wetland plants, 23 were FACW or FAC, 16 were FACU or UPL, and 32 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 997 consisted of a 10-m transect placed in stratum 1. Thirteen plant species were observed along the transect. Of these species, 11 were native and two were non-native. Rabbitfoot grass, coyote thistle (*Eryngium armatum*), and Hickman's popcorn flower were the dominant species, accounting for approximately 22%, 20%, and 16% cover, respectively (see Appendix C Table C-3). Thatch and bare ground were fairly abundant, accounting for approximately 15% and 13%, respectively. Round woolly-marbles (*Psilocarphus chilensis*) contributed approximately 7%, while pale spikerush, Howell's quillwort (*Isoetes howellii*), grass poly, and chaffweed contributed cover ranging from 1% to 4%. Other species included timwort (*Cicendia quadrangularis*), aquatic pygmy-weed (*Crassula aquatica*), needle spikerush, brown-headed rush, and smooth goldfields (*Lasthenia glaberrima*).

Stratum 2 consisted of CCG. Figure 3-7 illustrates the extent and density of the population at Pond 997. No transects were placed in stratum 2 to avoid disturbing the population.

Transect 3 at Pond 997 consisted of a 10-m transect placed in stratum 3. Thirty-two plant species were observed along the transect. Of these species, 16 were native and 16 were non-native. Coyote thistle was the dominant species, accounting for approximately 16% cover (see Appendix C Table C-3). Thatch and bare ground were fairly abundant, accounting for approximately 20% and 7%, respectively. Grass poly, gumweed (*Madia gracilis*), coast tarweed, common toad rush, and annual quaking grass contributed cover ranging from 5% to 8%. Silvery hair-grass (*Aira caryophyllea*), rattlesnake grass (*Briza maxima*), Johnny-Nip (*Castilleja ambigua* ssp. *ambigua*), California oat grass (*Danthonia californica*), coastal tarweed (*Deinandra corymbosa*), long-beaked filaree, smooth cat's-ear, keeled bulrush (*Isolepis carinata*), low bulrush (*Isolepis cernua*), brown-headed rush, chaffweed, and sheep sorrel contributed cover ranging from 1% to 3%. Other species included Spanish lotus, soft chess (*Bromus hordeaceus*), dwarf brodiaea (*Brodiaea terrestris* ssp. *terrestris*), brome fescue, rattail sixweeks grass (*Festuca myuros*), cut-leaved geranium, dwarf rush (*Juncus capitatus*), narrowleaf cottonrose (*Logfia gallica*), scarlet pimpernel, marsh microseris (*Microseris paludosa*), cut-leaved plantain (*Plantago coronopus*), western blue-eyed grass (*Sisyrinchium bellum*), small-flower catchfly, and coast pretty face (*Triteleia ixioides*).

Transect 5 at Pond 997 consisted of a 10-m transect placed in stratum 5. Thirty-one plant species were observed along the transect. Of these species, 17 were native and 14 were non-native. Brown-headed rush was the dominant species, accounting for approximately 44% cover (see Appendix C Table C-3). Thatch and bare ground were abundant, accounting for approximately 21% and 10%, respectively. Rattlesnake grass, annual quaking grass, cut-leaved geranium, smooth cat's-ear, scarlet pimpernel, grass poly, gumweed, coast tarweed, and English plantain (*Plantago lanceolata*) contributed cover ranging from 1% to 4%. Other species included Spanish lotus, silvery hair-grass, coyote brush, dwarf brodiaea, Johnny-Nip, coastal tarweed, coyote thistle, long-beaked filaree, climbing bedstraw (*Galium porrigens*), keeled bulrush, Howell's quillwort, common toad rush, narrowleaf cottonrose, chaffweed, marsh microseris, rabbitfoot grass, cottonbatting plant, cutleaf burnweed, western blue-eyed grass, prickly sow thistle, and common sow thistle.

3.3.2.1 *Contra Costa Goldfields*

Contra Costa goldfields at Pond 997 were mapped on May 10, 2019: they occupied 0.01 acres, with a density of 35% cover. Figure 3-7 illustrates the extent of the CCG population at Pond 997.

Figure 3-7. Contra Costa Goldfields Populations at Pond 997 (Reference), 2019

3.3.3 Wildlife Monitoring

Pond 997 was surveyed for CTS and fairy shrimp on March 15, 2019. California tiger salamanders and fairy shrimp were not detected. No further surveys were conducted in April and May due to insufficient vernal pool depth. Table 3-14 and Table 3-15 provide results of the CTS and fairy shrimp surveys conducted in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-14. Pond 997 (Reference) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
997	3/15/2019	0	-	-	-	-	-	-	-	12 min

Table 3-15. Pond 997 (Reference) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/15/2019	Not detected

3.4 Pond 14

Pond 14 was a baseline vernal pool in 2019 and was monitored for hydrology, vegetation, and wildlife. Pond 14 was sampled from the edge of the inundated area due to risk of potential MEC presence within the vernal pool basin boundary.

3.4.1 Hydrology Monitoring

Pond 14 was monitored for hydrology seven times and dried by July (see Table 3-16 and Figure 3-8). The final monitoring event in July only included a depth survey and was completed as an additional effort to document when the vernal pool dried.

Table 3-16. Pond 14 (Baseline) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/17/2019	8:36	6.39	10.61	4.38	24.1	37	0.05‡
2/12/2019	8:43	6.13	7.49	4.49	57.5	58	0.13‡
3/4/2019	12:07	6.08	13.7	4.97	57	59	0.21
4/2/2019	9:00	6.34†	14.27†	3.43†	18.5†	57	0.17
5/6/2019	10:18	6.21†	15.11†	3.75†	5.3†	37	0.08
6/10/2019	10:44	6.90†	16.45†	3.09†	6.20†	24	0.02
7/9/2019	9:35	-	-	-	-	DRY	0.00

†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

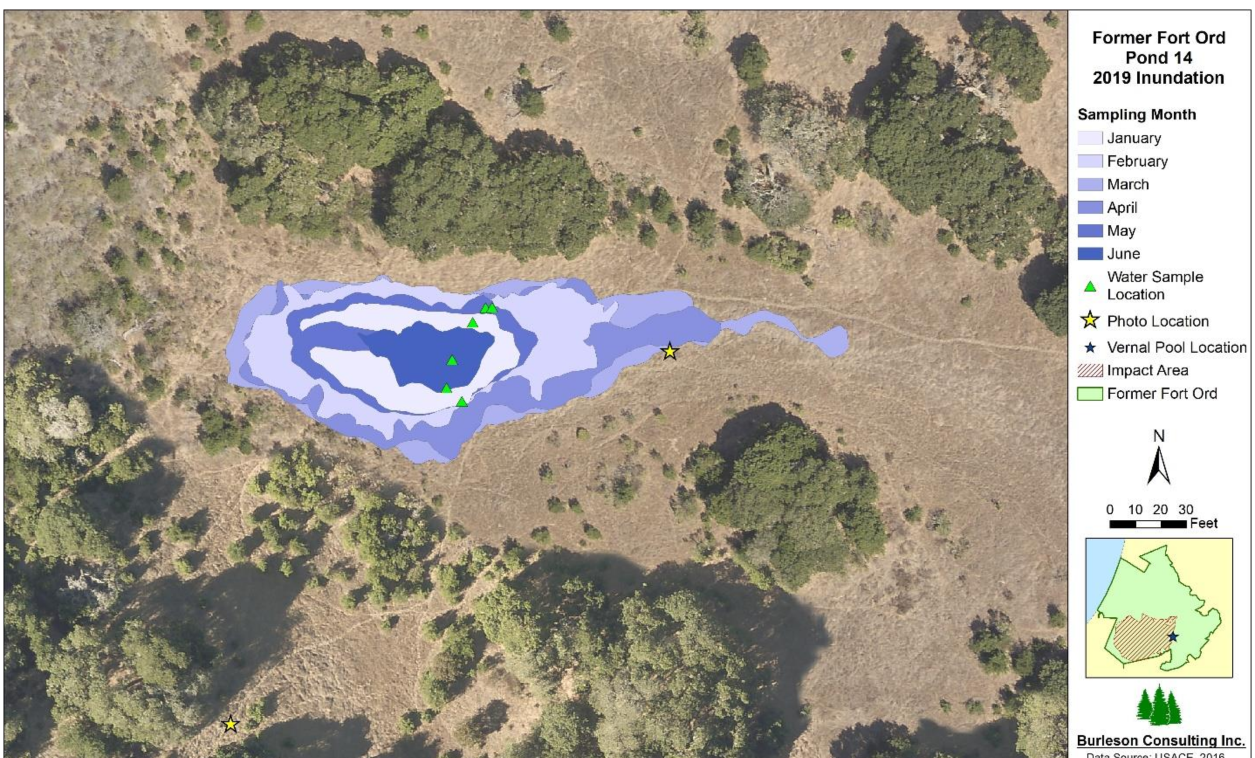

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Figure 3-8. Pond 14 (Baseline) Inundation on Former Fort Ord, 2019

3.4.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 14 on June 5 and June 19, 2019. These monitoring data represent baseline conditions. Pond 14 was dry by the June 19 monitoring event. Biologists identified four strata at the vernal pool (see Table 3-17 and Figure 3-9). Appendix C provides the species cover results within each stratum. Strata and transects 1 through 4 were repeated from 2016.

Table 3-17. Pond 14 (Baseline) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	17%
2	10%
3	36%
4	37%

Figure 3-9. Pond 14 (Baseline) Vegetation Strata and Transects on Former Fort Ord, 2019

Sixty-seven plant species were observed within the vernal pool basin boundary. Of these species, 42 were native and 25 were non-native. Additionally, five species were OBL wetland plants, 25 were FACW or FAC, 11 were FACU or UPL, and 26 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 14 consisted of a 10-m transect placed in stratum 1. Pale spikerush, a native species, was the only plant observed along the transect and accounted for approximately 77% cover (see

Appendix C Table C-4). Bare ground and thatch were also present, accounting for 8% and 14% respectively.

Transect 2 at Pond 14 consisted of a 5-m transect placed in stratum 2. Ten plant species were observed along the transect. Of these species, six were native and four were non-native. Pale spikerush and beardless wild rye (*Elymus triticoides*) were the dominant species, accounting for approximately 56% and 23%, respectively (see Appendix C Table C-4). Other species included soft chess, brome fescue, cut-leaved geranium meadow barley (*Hordeum brachyantherum*), alkali mallow, Lemmon's canary grass (*Phalaris lemmonii*), Hickman's popcornflower and curly dock. Thatch was also present, accounting for approximately 17%.

Transect 3 at Pond 14 consisted of a 10-m transect placed in stratum 3. Twenty-one plant species were observed along the transect. Of these species, 12 were native and nine were non-native. Brown-headed rush was the dominant species, accounting for approximately 54% cover (see Appendix C Table C-4). Thatch was also fairly abundant, accounting for approximately 27%. Common yarrow (*Achillea millefolium*), silvery hair-grass, soft chess, annual quaking grass, dwarf brodiaea, beardless wild rye, cut-leaved geranium, *Madia* sp. and gumweed contributed cover ranging from 1% to 3%. Other species included ripgut grass (*Bromus diandrus*), dense flower owl's clover (*Castilleja densiflora*), long-beaked filaree, brome fescue, purple cudweed, smooth cat's-ear, Pacific woodrush (*Luzula comosa*), scarlet pimpernel, chaffweed, marsh microseris, and California buttercup (*Ranunculus californicus*). Bare ground was also present and accounted for approximately 1%.

Transect 4 at Pond 14 consisted of a 10-m transect placed in stratum 4. Twenty-four plant species were observed along the transect. Of these species, 14 were native and ten were non-native. Brown-headed rush and Italian rye grass (*Festuca perennis*) were the dominant species, accounting for approximately 44% and 6% cover, respectively (see Appendix C Table C-4). Thatch was fairly abundant, accounting for approximately 23% cover. Pale spikerush, beardless wild rye, brome fescue, grass poly, alkali mallow, and coast tarweed contributed cover ranging from 1% to 5%. Other species included ripgut grass, soft chess, annual quaking grass, dwarf brodiaea, coastal tarweed, cut-leaved geranium, smooth cat's-ear, rough cat's-ear, common toad rush, western rush (*Juncus occidentalis*), scarlet pimpernel, gumweed, marsh microseris, Hickman's popcornflower, California buttercup, and variegated clover. Bare ground was also present and accounted for approximately 4%.

3.4.3 Wildlife Monitoring

Pond 14 was surveyed for fairy shrimp January 24 and February 21, 2019, and subsequent CTS and fairy shrimp surveys March 13, April 16, and May 15, 2019. California tiger salamanders and fairy shrimp were not detected during any survey. Table 3-18 and Table 3-19 provide results of the CTS and fairy shrimp surveys conducted in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-18. Pond 14 (Baseline) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
14	3/13/2019	0	-	-	-	-	-	-	-	34 min
	4/16/2019	0	-	-	-	-	-	-	-	24 min
	5/15/2019	0	-	-	-	-	-	-	-	4 min

Table 3-19. Pond 14 (Baseline) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (#) Individuals
1/24/2019	Not detected
2/21/2019	Not detected
3/13/2019	Not detected
4/16/2019	Not detected
5/15/2019	Not detected

3.5 Pond 17

Pond 17 was a baseline vernal pool in 2019 and was monitored for hydrology, vegetation, and wildlife. Pond 17 was sampled from the edge of the inundated area due to risk of potential MEC presence within the vernal pool basin boundary.

3.5.1 Hydrology Monitoring

Pond 17 was monitored for hydrology seven times and dried by July (see Table 3-20 and Figure 3-10). The depth at Pond 17 was not recorded from the staff gauge because the gauge was located in an ephemeral stream not representative of vernal pool conditions. Instead, measurements were taken at the approximate deepest, accessible area of the vernal pool. The final monitoring event in July only included a depth survey and was completed as an additional effort to document when the vernal pool dried.

Table 3-20. Pond 17 (Baseline) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/22/2019	9:54	6.89	6.15	9.97	190.0	15§	0.28‡
2/12/2019	9:45	6.93	5.82	10.88	290.0	15§	0.37‡
3/4/2019	13:59	7.38†	12.45†	15.30†	273.0†	15§	0.36‡
4/2/2019	9:47	6.66†	12.02†	8.29†	462.0†	19§	0.35‡
5/6/2019	11:19	7.21	14.14	9.60	41.0†	13§	0.26
6/10/2019	11:21	6.91†	21.49†	6.39†	502.0†	9§	0.19
7/9/2019	9:59	-	-	-	-	DRY	0.00

†Water quality probe was on side for measurements

‡Peripheral ponding was observed but was not mapped. as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

§Depth not recorded from staff gauge due to placement of gauge in ephemeral stream. Measurement taken at approximate deepest accessible part of vernal pool.

Figure 3-10. Pond 17 (Baseline) Inundation on Former Fort Ord, 2019

3.5.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 17 on June 4, June 19, and July 17, 2019. These monitoring data represent baseline conditions. Pond 17 was dry by the July 17 monitoring event. Biologists identified six strata at the vernal pool (see Table 3-21 and Figure 3-11). Appendix C provides the species cover results within each stratum. Strata 1 through 6 were identified as new strata in 2019. The transects within strata 3 through 6 were established in 2019. No transects were placed within strata 1 and 2 due to the height and density of vegetation; instead, visual cover estimates were conducted to assess vegetative cover.

Table 3-21. Pond 17 (Baseline) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	18%
2	2%
3	5%
4	14%
5	9%
6	52%

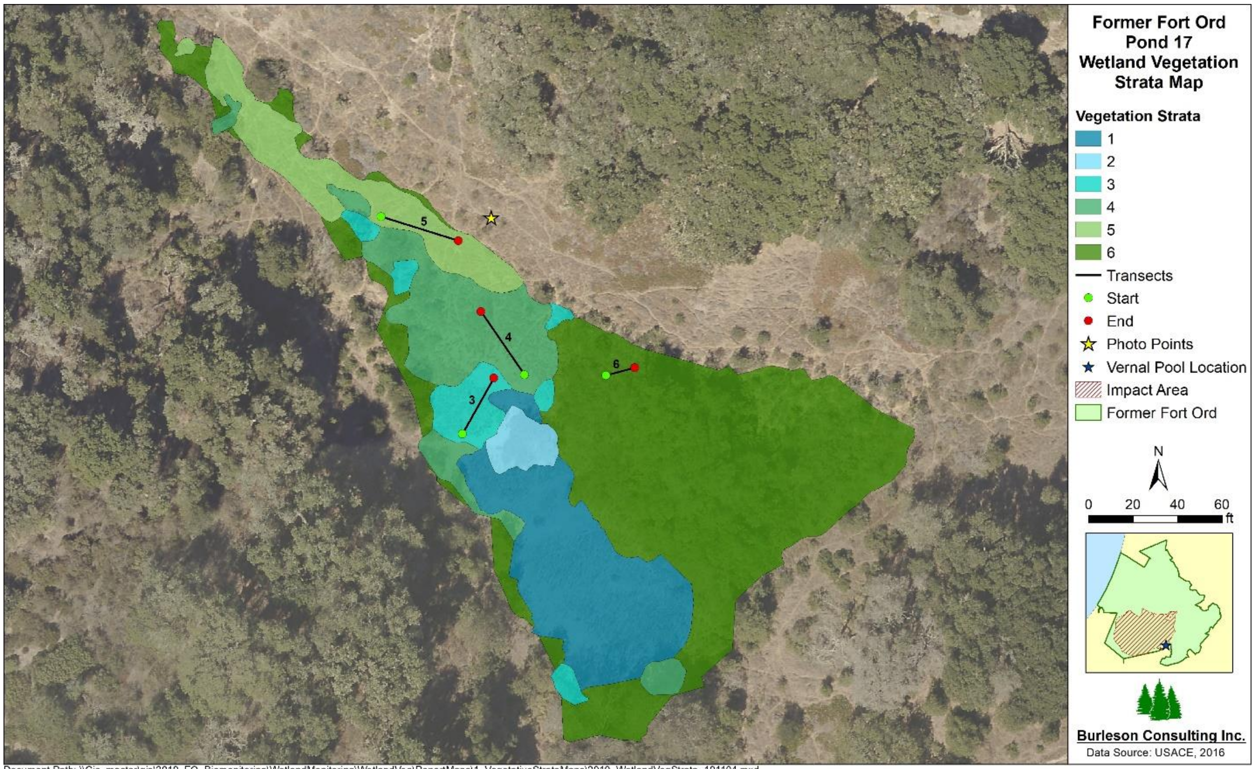

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Figure 3-11. Pond 17 (Baseline) Vegetation Strata and Transects on Former Fort Ord, 2019

Eighty-one plant species were observed within the vernal pool basin boundary. Of these species, 50 were native and 31 were non-native. Additionally, 12 species were OBL wetland plants, 26 were FACW or FAC, 16 were FACU or UPL, and 27 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Stratum 1 at Pond 17 consisted of an estimated broad-leaved cattail (*Typha latifolia*) 40%, river bulrush (*Bolboschoenus fluviatilis*) 15%, thatch 35%, and bare ground 10% cover. No transects were placed in the stratum since the height and density of the cattail created accessibility issues. Percent cover was visually assessed for this stratum.

Stratum 2 at Pond 17 consisted of an estimated California bulrush (*Schoenoplectus californicus*) 60%, thatch 25%, and bare ground 15% cover. No transects were placed in the stratum since the height and density of the bulrush created accessibility issues. Percent cover was visually assessed for this stratum.

Transect 3 at Pond 17 consisted of a 10-m transect placed in stratum 3. Five plant species were observed along the transect. Of these species, three were native and two were non-native. Pale spikerush was the dominant species, accounting for approximately 51% cover (see Appendix C Table C-5). Thatch was abundant, accounting for approximately 45% cover. Other species included tall cyperus (*Cyperus eragrostis*), rye grass, brown-headed rush, and rabbitfoot grass. Algal mat and bare ground were also present and each accounted for 2% cover.

Transect 4 at Pond 17 consisted of a 10-m transect placed in stratum 4. Seven plant species were observed along the transect. Of these species, three were native and four were non-native. Rabbitfoot grass and California bulrush were the dominant species, accounting for approximately 30% and 14% cover, respectively (see Appendix C Table C-5). Algal mat and thatch were abundant accounting for approximately 25% and 20% cover, respectively. Tall cyperus, pale spikerush, rye grass, and grass poly contributed cover ranging from 1% to 4% cover. Curly dock was the other species observed. Bare ground was also present and accounted for approximately 3%.

Transect 5 at Pond 17 consisted of a 10-m transect placed in stratum 5. Twenty-one plant species were observed along the transect. Of these species, eight were native and 13 were non-native. Rye grass was the dominant species, accounting for approximately 27% cover (see Appendix C Table C-5). Bare ground was abundant, accounting for 20% cover. Grass poly, variegated clover, and pale spikerush accounting for approximately 12%, 12%, and 10% cover, respectively. Soft chess, annual quaking grass, tall cyperus, Mediterranean barley, and curly dock contributed cover ranging from 1% to 4% cover. Other species included California oat grass, cut-leaved geranium, common toad rush, clustered toad rush, willowleaf lettuce (*Lactuca saligna*), scarlet pimpernel, common madia (*Madia elegans*), cut-leaved plantain, rabbitfoot grass, willow dock, prickly sow thistle, and hairy vetch (*Vicia villosa* ssp. *villosa*). Thatch was also present and accounted for approximately 8%.

Transect 6 at Pond 17 consisted of a 5-m transect placed in stratum 6. Ten plant species were observed along the transect. Of these species, five were native and five were non-native. Brown-headed rush and spreading rush (*Juncus patens*) were the dominant species, accounting for approximately 24% and 20% cover, respectively (see Appendix C Table C-5). Thatch and bare ground were abundant, accounting for approximately 27% and 12%, respectively. Coyote thistle and California blackberry (*Rubus ursinus*) each contributed 7% cover, while cut-leaved geranium contributed 1%. Other species included annual quaking grass, blue wild-rye (*Elymus glaucus*), brome fescue, scarlet pimpernel, and grass poly.

3.5.3 Wildlife Monitoring

Pond 17 was surveyed for fairy shrimp January 24 and February 21, 2019, and subsequent CTS and fairy shrimp surveys March 13, April 16, and May 15, 2019. California tiger salamanders were present in April and May while fairy shrimp were not detected during any survey. Table 3-22 and Table 3-23 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-22. Pond 17 (Baseline) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
17	3/13/2019	0	-	-	-	-	-	-	-	23 min
	4/16/2019	29	29	34	24-43	27, 31, 34, 36, 40	20	15-29	19	1 hr 21 min
	5/15/2019	4	4	57	36-65	N/A	31	18-41	N/A	42 min

*The mean was rounded to the nearest whole number

Table 3-23. Pond 17 (Baseline) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
1/24/2019	Not detected
2/21/2019	Not detected
3/13/2019	Not detected
4/16/2019	Not detected
5/15/2019	Not detected

3.6 Pond 21

Pond 21 was a baseline vernal pool in 2019 and was monitored for hydrology, vegetation, and wildlife. Pond 21 was sampled from the edge of the inundated area due to risk of potential MEC presence within the vernal pool basin boundary.

3.6.1 Hydrology Monitoring

Pond 21 was monitored for hydrology five times and dried by May (see Table 3-29 and Figure 3-12).

Table 3-24. Pond 21 (Baseline) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/17/2019	10:49	-	-	-	-	2	0.01‡
2/12/2019	14:00	6.51	10.42	8.60	16.8	16	0.83‡
3/5/2019	13:23	6.39†	13.6†	8.83†	41.1†	19	0.86‡
4/2/2019	10:30	6.66†	13.2†	7.36†	30.6†	14	0.81‡
5/6/2019	12:55	-	-	-	-	DRY	0.00

†Water quality probe was on side for measurements.

‡Peripheral ponding was observed but was not mapped. as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Figure 3-12. Pond 21 (Baseline) Inundation on Former Fort Ord, 2019

3.6.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 21 on May 22, 2019. These monitoring data represent baseline conditions. Pond 21 was dry by the May 22 monitoring event. Biologists identified two strata at the vernal pool (see Table 3-25 and Figure 3-13). Appendix C provides the species cover results within each stratum. Strata 1 and 2 were identified and corresponding transect were established in 2019.

Table 3-25. Pond 21 (Baseline) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	27%
2	71%
Upland	2%

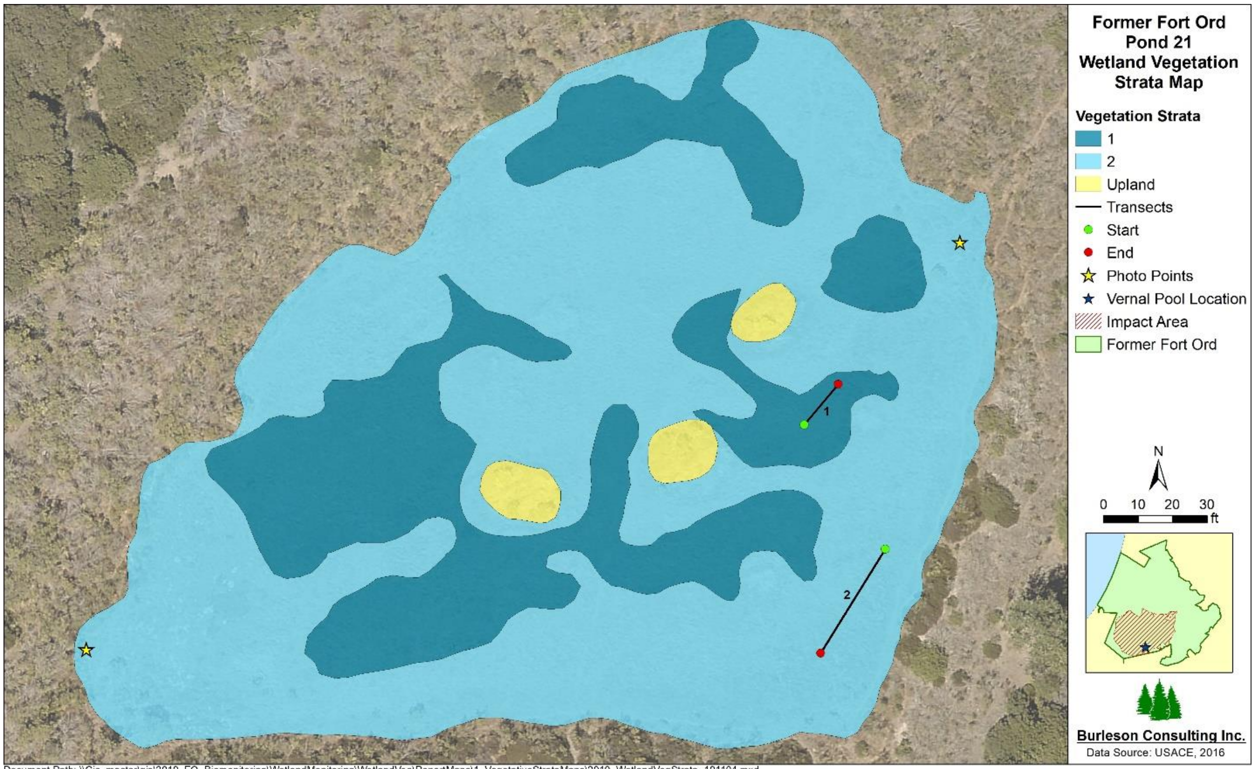

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Figure 3-13. Pond 21 (Baseline) Vegetation Strata and Transects on Former Fort Ord, 2019

Fifty-nine plant species were observed within the vernal pool basin boundary. Of these species, 46 were native and 13 were non-native. Additionally, nine species were OBL wetland plants, 28 were FACW or FAC, eight were FACU or UPL, and 14 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 21 consisted of a 5-m transect placed in stratum 1. Twelve plant species were observed along the transect. Of these species, ten were native and two were non-native. Coyote thistle, smooth goldfields, and annual hair grass were the dominant species, accounting for approximately 37%, 10%, and 10% cover, respectively (see Appendix C Table C-6). Pale spikerush contributed approximately 8% cover, while rabbitfoot grass contributed approximately 7% cover. Needle spikerush, brown-headed rush, alkali mallow, and Hickman's popcornflower contributed cover ranging from 1% to 3%. Other species included timwort, grass poly, and chaffweed. Thatch and bare ground were also present and accounted for 13% and 8%, respectively.

Transect 2 at Pond 21 consisted of a 10-m transect placed in stratum 2. Twenty plant species were observed along the transect. Of these species, 12 were native and eight were non-native. Brown-headed rush was the dominant species, accounting for approximately 39% cover (see Appendix C Table C-6). Bare ground was fairly abundant, accounting for approximately 22%. Annual quaking grass, needle spikerush, pale spikerush, brome fescue, cut-leaved geranium, meadow barley (*Hordeum brachyantherum* ssp. *brachyantherum*), Howell's quillwort, smooth goldfields, chaffweed, Lemmon's canary grass, Hickman's popcornflower, rabbitfoot grass, and California buttercup contributed cover ranging from 1% to 4%. Other species included soft chess, coyote thistle, smooth cat's-ear, grass poly, alkali mallow, and sheep sorrel. Thatch was present and accounted for approximately 7%.

3.6.3 Wildlife Monitoring

Pond 21 was surveyed for fairy shrimp February 21, 2019, and subsequent CTS and fairy shrimp surveys March 13 and April 16, 2019. California tiger salamanders were present in April while fairy shrimp were not detected during any survey. No surveys were conducted in January or May due to insufficient vernal pool depth. Table 3-26 and Table 3-27 provide results of the CTS and fairy shrimp surveys conducted in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-26. Pond 21 (Baseline) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
21	3/13/2019	0	-	-	-	-	-	-	-	1 hr 3 min
	4/16/2019	4	4	55	52-56	56	31	29-33	N/A	54 min

*The mean was rounded to the nearest whole number

Table 3-27. Pond 21 (Baseline) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
2/21/2019	Not detected
3/13/2019	Not detected
4/16/2019	Not detected

3.7 Pond 103

Pond 103 was in the baseline year of monitoring in 2019 and was monitored for hydrology and vegetation. The area did not hold water and therefore no wildlife surveys were conducted.

3.7.1 Hydrology Monitoring

Pond 103 was monitored for hydrology seven times and remained dry throughout the 2018-2019 water-year.

3.7.2 Vegetation Monitoring

Vegetation monitoring was conducted at Pond 103 on June 19, 2019 and consisted of a species list for the historic vernal pool basin and photo points. Vegetative strata were not mapped and transects were not placed because the area did not hold water or support wetland vegetation.

Thirty-six plant species were observed within the vernal pool basin boundary. Of these species, 25 were native and 11 were non-native. Additionally, none of the species were OBL, four species were FAC or FACW wetland plants, eight were FACU or UPL, and 24 were not-listed. The majority (32 of 36) of the species observed at Pond 103 were shrubs and herbaceous plants characteristically found in maritime chaparral habitats (Figure 3-14).

Figure 3-14. Pond 103 (Baseline) on Former Fort Ord, February 14, 2019

3.7.3 Wildlife Monitoring

Wildlife surveys were not completed at Pond 103 in 2019 because the vernal pool did not have sufficient depth to trigger surveys.

3.8 Pond 101 East (West)

Pond 101 East (West)[1], a post-mastication remediation vernal pool, was in year 1 of monitoring in 2019. In 2019, Pond 101 East (West) was monitored for hydrology, vegetation, and wildlife. Prior to 2019, Pond 101 East (West) was a reference vernal pool.

3.8.1 Hydrology Monitoring

Pond 101 East (West) was monitored for hydrology seven times and dried by July (see Table 3-28 and Figure 3-15). The final monitoring event in July only included a depth survey and was completed as an additional effort to document when the vernal pool dried.

[1] Pond 101 East (West) is identified as "Waterbody 53" in Harding ESE (2002).

Table 3-28. Pond 101 East (West) (Year 1 Post-Mastication) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/14/2019	10:52	-	-	-	-	DRY	0.00
2/14/2019	10:45	6.50	11.84	7.61	7.7	70	1.20‡
3/7/2019	13:48	6.12	14.31	4.48	2.9	76	1.86‡
4/4/2019	9:21	6.44	14.46	3.89	3.0	71	1.18‡
5/9/2019	8:34	6.28	15.94	3.97	1.8	46	0.35
6/11/2019	12:43	6.35	23.74	6.35	64.9	23	0.02
7/9/2019	16:00	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

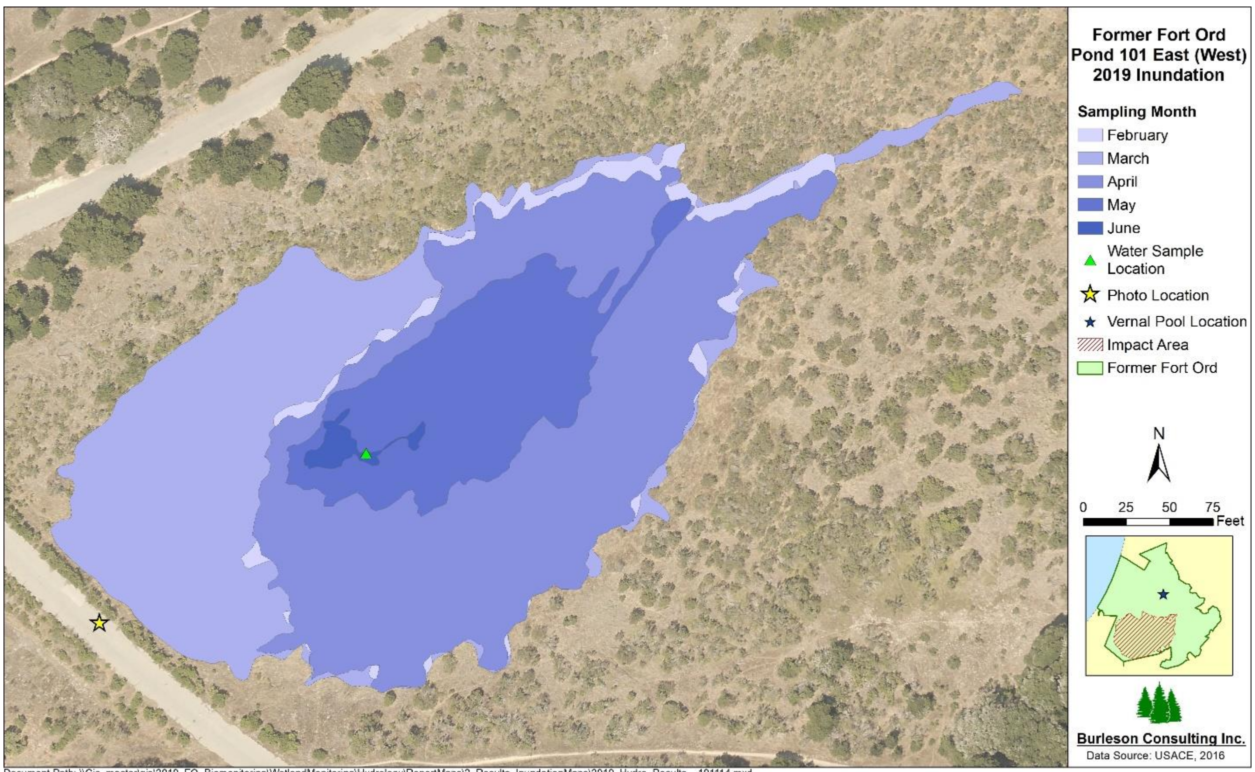

Figure 3-15. Pond 101 East (West) (Year 1 Post-Mastication) Inundation on Former Fort Ord, 2019

3.8.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 101 East (West) on June 11, June 14, and July 23, 2019. These monitoring data represent year 1 post-mastication conditions. Pond 101 East (West) was dry by the July 23 monitoring event. Biologists identified seven strata at the vernal pool (see Table 3-29 and Figure 3-16). Appendix C provides the species cover results within each stratum. Strata 1, 2, 3, 4, and 5 were repeated from 2016, 2017, and 2018. Stratum 6 was repeated from 2017 and 2018. Stratum 8 was new in 2019. Transects 2 and 5 were repeated from 2016, 2017, and 2018. Transect 4 was repeated from 2017 and 2018. Transects 1, 3, and 6 were relocated to areas with more representative vegetative composition. Transect 8 was established in 2019.

Table 3-29. Pond 101 East (West) (Year 1 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	0.3%
2	52%
3	10%
4	11%
5	20%
6	5%
8	2%

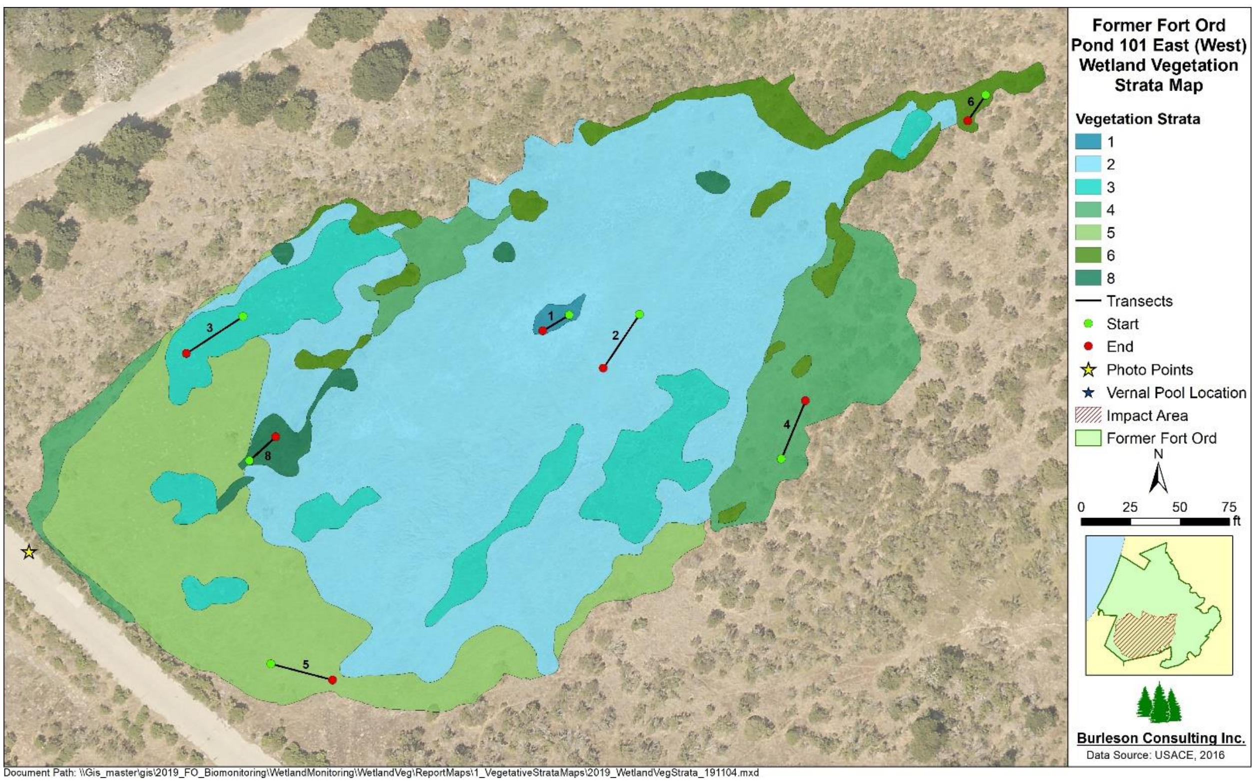

Figure 3-16. Pond 101 East (West) (Year 1 Post-Mastication) Vegetation Strata and Transects on Former Fort Ord, 2019

Eighty-five plant species were observed within the vernal pool basin boundary. Of these species, 49 were native and 36 were non-native. Additionally, ten species were OBL wetland plants, 32 were FACW or FAC, 17 were FACU or UPL, and 26 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 101 East (West) consisted of a 5-m transect placed in stratum 1. Ten plant species were observed along the transect. Of these species, six were native and four were non-native. Pale spikerush and alkali mallow were the dominant species, accounting for approximately 26% and 18% cover, respectively (see Appendix C Table C-7). Thatch and bare ground were abundant, accounting for approximately 23% and 12%, respectively. Rabbitfoot grass contributed approximately 10% cover, while Pacific foxtail (*Alopecurus saccatus*), needle spikerush, grass poly, and western vervain contributed cover ranging from approximately 1% to 5%. Other species included Pacific bent grass, lowland cudweed (*Gnaphalium palustre*), and prostrate knotweed (*Polygonum aviculare* ssp. *depressum*).

Transect 2 at Pond 101 East (West) consisted of a 10-m transect placed in stratum 2. Eleven plant species were observed along the transect. Of these species, seven were native and four were non-native. Pale spikerush and smooth goldfields were the dominant species, accounting for approximately 39% and 20% cover, respectively (see Appendix C Table C-7). Thatch was abundant, accounting for approximately 31% cover. Needle spikerush, Hickman's popcornflower, and rabbitfoot grass contributed cover ranging from approximately 1% to 3% cover. Other species included Pacific bent grass, Pacific foxtail, annual hair grass, grass poly, Lemmon's canary grass, and curly dock. Bare ground was also present and accounted for approximately 3% cover.

Transect 3 at Pond 101 East (West) consisted of a 10-m transect placed in stratum 3. Twenty-one plant species were observed along the transect. Of these species, 15 were native, five were non-native, and one was unidentified. Hickman's popcornflower and coyote thistle were the dominant species, accounting for approximately 33% and 17% cover, respectively (see Appendix C Table C-7). Thatch and bare ground were fairly abundant, accounting for approximately 10% and 7% cover, respectively. Rabbitfoot grass contributed 7%, while salt grass, pale spikerush, rye grass, Chinese pusley, Howell's quillwort, brown-headed rush, smooth goldfields, grass poly, cut-leaved plantain, and bugle hedge nettle contributed cover ranging from 1% to 4%. Other species included annual hair grass, Baltic rush, common toad rush, chaffweed, weedy cudweed, cottonbatting plant, curly dock, and variegated clover.

Transect 4 at Pond 101 East (West) consisted of a 10-m transect placed in stratum 4. Twenty-three plant species were observed along the transect. Of these species, ten were native and 13 were non-native. Coast tarweed and gumweed were the dominant species, accounting for 39% and 15% cover, respectively (see Appendix C Table C-7). Brome fescue contributed approximately 11% cover, while annual quaking grass, Chinese pusley, brown-headed rush, rabbitfoot grass, small head clover, common vetch, and spring vetch contributed cover ranging from 1% to 3% cover. Other species included Pacific ben grass, soft chess, salt grass, pale spikerush, purple cudweed, cut-leaved geranium, smooth cat's-ear, Baltic rush, scarlet pimpernel, grass poly, weedy cudweed, and bugle hedge nettle. Thatch and bare ground were also present and accounted for approximately 6% and 2% cover, respectively.

Transect 5 at Pond 101 East (West) consisted of a 10-m transect placed in stratum 5. Eighteen plant species were observed along the transect. Of these species, eight were native and ten were non-native. Italian rye grass was the dominant species, accounting for approximately 43% cover (see Appendix C Table C-7). Brome fescue contributed approximately 14% cover. Thatch was fairly abundant, accounting for approximately 16% cover. Needle spikerush contributed approximately 7% cover, while annual quaking grass, pale spikerush, smooth cat's ear, grass poly, and coast tarweed contributed cover ranging from 1% to 4%. Other species included cut-leaved geranium, rough cat's ear, common toad rush, scarlet pimpernel, chaffweed, curly dock, common sow thistle, bugle hedge nettle, bearded clover (*Trifolium barbigerum*), and variegated clover. Bare ground was present and accounted for approximately 3% cover.

Transect 6 at Pond 101 East (West) consisted of a 5-m transect placed in stratum 6. Fifteen plant species were observed along the transect. Of these species, six were native and nine were non-native. Brown-headed rush was the dominant species, accounting for approximately 28% cover (see Appendix C Table C-7). Thatch and bare ground were fairly abundant, accounting for approximately 32% and 7%, respectively. Annual quaking grass, sheep sorrel, and brome fescue contributed approximately 9%, 8%, and 6% cover, respectively. Spanish lotus, smooth cat's-ear, grass poly, cut-leaved geranium, and spring vetch contributed cover ranging from 1% to 2%. Other species included salt grass, Baltic rush, common toad rush, rabbitfoot grass, common sow thistle, and bugle hedge nettle.

Transect 8 at Pond 101 East (West) consisted of a 5-m transect placed in stratum 8. Nineteen plant species were observed along the transect. Of these species, 11 were native, seven were non-native, and one was unidentified. Rabbitfoot grass and western goldenrod (*Euthamia occidentalis*) were the dominant species, accounting for approximately 24% and 15% cover, respectively (see Appendix C Table C-7). Thatch was abundant, accounting for approximately 33%. Pale spikerush and grass poly each contributed 7% cover. While annual quaking grass, needle spikerush, Baltic rush, common toad rush, brown-headed rush, and Hickman's popcorn flower contributed cover ranging from 1% to 2%. Other species included salt grass, brome fescue, rye grass, meadow barley, alkali mallow, *Pseudognaphalium* sp., curly dock, common sow thistle, and variegated clover. Bare ground was present and accounted for 2% cover.

3.8.3 Wildlife Monitoring

Pond 101 East (West) was surveyed for CTS and fairy shrimp on March 11, April 18, and May 14, 2019. California tiger salamanders were present at all three monitoring events while fairy shrimp were present at the March survey event. Table 3-30 and Table 3-31 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-30. Pond 101 East (West) (Year 1 Post-Mastication) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
101 East (West)	3/11/2019§	56	30	14	10-18	12	N/A	N/A	N/A	3 hrs
	4/18/2019	132	30	68	43-86	56, 77, 78	34	19-44	42	2 hrs 20 min
	5/14/2019	144	30	97	59-118	107, 111	51	31-67	52, 60	1 hr 30 min

*The mean was rounded to the nearest whole number
§SVL not measured, CTS larvae were too small for accurate infield measurements

Table 3-31. Pond 101 East (West) (Year 1 Post-Mastication) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/11/2019	High (181)
4/18/2019	Not detected
5/14/2019	Not detected

3.9 Pond 101 West

Pond 101 West, a post-mastication remediation vernal pool, was in year 1 of monitoring in 2019. In 2019, Pond 101 West was monitored for hydrology, vegetation, and wildlife.

3.9.1 Hydrology Monitoring

Pond 101 West was monitored for hydrology six times and dried by June (see Table 3-32 and Figure 3-17).

Table 3-32. Pond 101 West (Year 1 Post-Mastication) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/14/2019	10:56	-	-	-	-	DRY	0.00
2/14/2019	10:30	6.44	13.32	7.45	26.7	54	0.11‡
3/5/2019	9:07	6.53	13.58	5.13	100.0	51	0.11‡
4/4/2019	8:59	6.68	14.69	4.77	90.8	47	0.09
5/8/2019	13:58	6.69†	24.35†	5.40†	202.0†	10	0.01‡
6/11/2019	-	-	-	-	-	DRY	0.00

†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

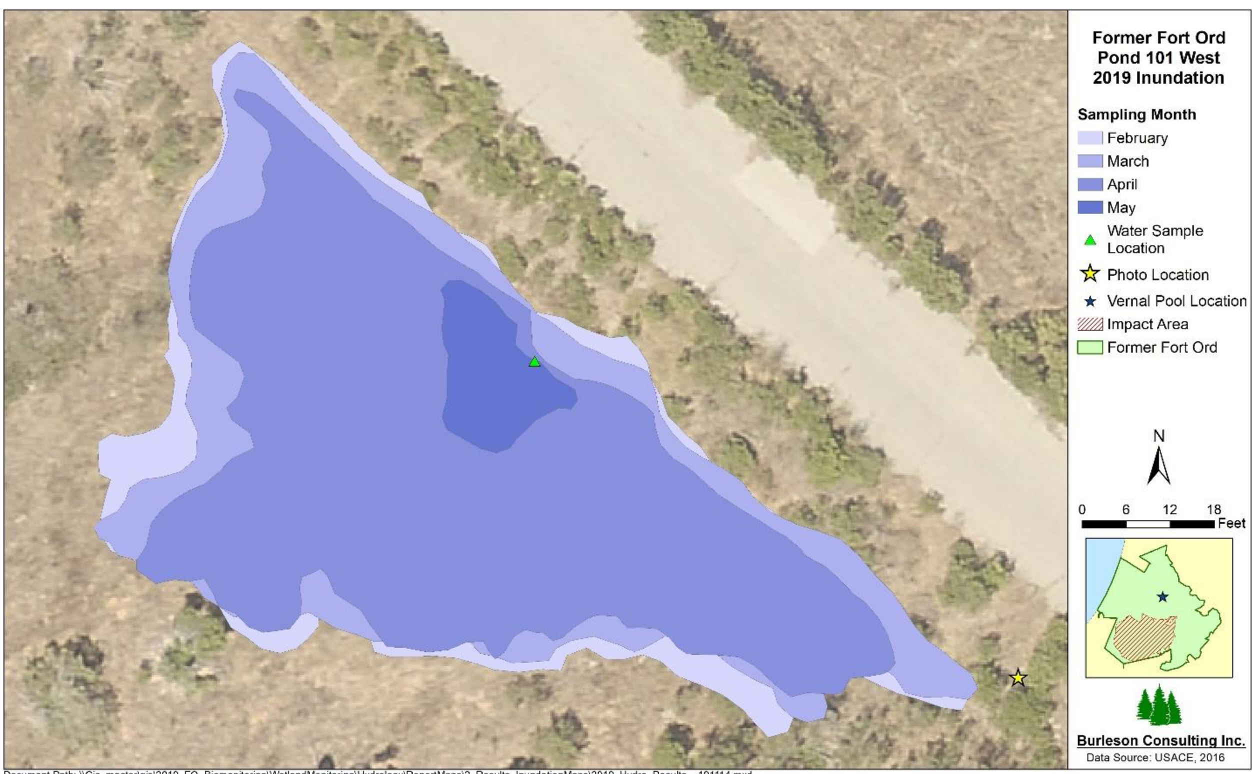

Figure 3-17. Pond 101 West (Year 1 Post-Mastication) Inundation on Former Fort Ord, 2019

3.9.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 101 West on May 31 and July 5, 2019. These monitoring data represent year 1 post-mastication conditions. Pond 101 West was dry by the July 5 monitoring event. Biologists identified three strata at the vernal pool (see Table 3-33 and Figure 3-18). Appendix C provides the species cover results within each stratum. Strata 1 and 2 were repeated from 2016. Stratum 3 was a new stratum. Transect 1 was relocated to an area with more representative vegetative composition. Transect 2 was relocated because the previous location was no longer within the correct stratum. Transect 3 was established in 2019.

Table 3-33. Pond 101 West (Year 1 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	33%
2	62%
3	5%

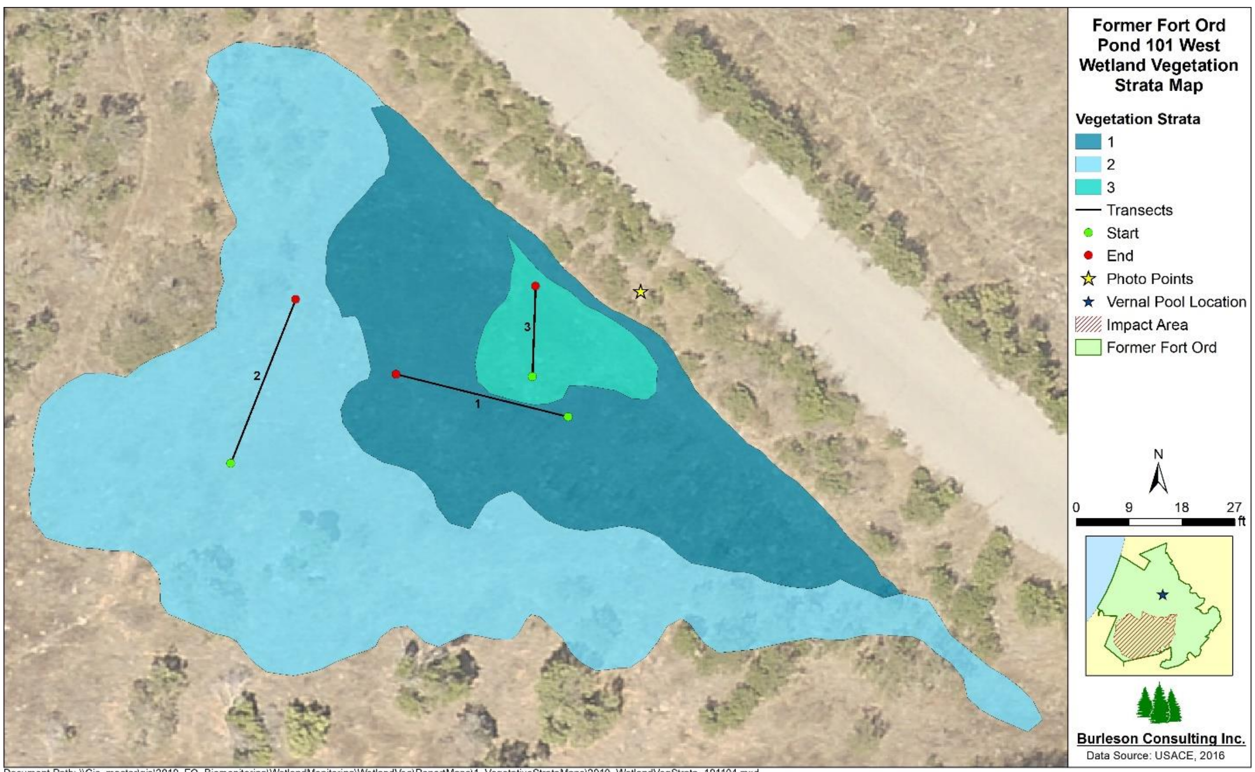

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Figure 3-18. Pond 101 West (Year 1 Post-Mastication) Vegetation Strata and Transects on Former Fort Ord, 2019

Seventy-four plant species were observed within the vernal pool basin boundary. Of these species, 43 were native and 31 were non-native. Additionally, 13 species were OBL wetland plants, 27 were FACW or FAC, 12 were FACU or UPL, and 22 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 101 West consisted of a 10-m transect placed in stratum 1. Fourteen plant species were observed along the transect. Of these species, ten were native and four were non-native. Hickman's popcornflower and smooth goldfields were the dominant species, accounting for approximately 46% and 18%, respectively (see Appendix C Table C-8). Rabbitfoot grass contributed approximately 9% cover, while pale spikerush, western goldenrod, curly dock, and flowering quillwort (*Triglochin scilloides*) contributed cover ranging between 2% and 5%. Other species included brass buttons, annual hair grass, needle spikerush, Chinese pusley, Howell's quillwort, grass poly, and western yellowcress (*Rorippa curvisiliqua*). Bare ground and thatch were also present, accounting for approximately 7% and 3%, respectively.

Transect 2 at Pond 101 West consisted of a 10-m transect placed in stratum 2. Thirty-two plant species were observed along the transect. Of these species, 15 were native and 17 were non-native. Gumweed and brome fescue were the dominant species, accounting for approximately 36% and 15% cover, respectively (see Appendix C Table C-8). Thatch was fairly abundant, accounting for approximately 10%. Annual quaking grass, salt grass, Italian rye grass, Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), common toad rush, grass poly, Hickman's popcornflower, sheep sorrel, willow dock, and variegated clover contributed cover ranging from 2% to 4%. Cut-leaved geranium, meadow barley, rough cat's-ear, rabbitfoot grass, and spring vetch contributed approximately 1% cover. Other species included silvery hair-grass, coyote brush, soft chess, brass buttons (*Cotula coronopifolia*), California oat grass, needle spikerush, pale spikerush, smooth cat's-ear, scarlet pimpernel, chaffweed, gumweed, cut-leaved plantain, common sow thistle, bearded clover, small head clover, and western vervain. Bare ground was also present, accounting for approximately 4%.

Transect 3 at Pond 101 West consisted of a 5-m transect placed in stratum 3. Eight plant species were observed along the transect. Of these species, four were native and four were non-native. Pale spikerush was the dominant species, accounting for approximately 62% cover (see Appendix C Table C-8). Thatch and bare ground were abundant, accounting for approximately 12% and 9%, respectively. Chinese pusley and grass poly accounted for approximately 6% and 5%, respectively. Brass buttons, smooth goldfields, rabbitfoot grass, and curly dock contributed cover ranging from 1% to 2%. Hickman's popcornflower was also present.

3.9.3 Wildlife Monitoring

Pond 101 West was surveyed for CTS and fairy shrimp on March 11 and April 16, 2019. California tiger salamanders were present at both monitoring events while fairy shrimp were not detected. No further surveys were conducted in May due to insufficient vernal pool depth. During the April 16 survey an observation was made that approximately ten larvae had damaged tails. Table 3-34 and Table 3-35 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-34. Pond 101 West (Year 1 Post-Mastication) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
101 West	3/11/2019‡	32	30	16	12-20	15, 17	N/A	N/A	N/A	1 hr
	4/16/2019	106	30	61	44-77	55, 60	33	22-42	32	54 min

*The mean was rounded to the nearest whole number
‡SVL not measured, CTS larvae were too small for accurate infield measurements

Table 3-35. Pond 101 West (Year 1 Post-Mastication) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/11/2019	Not detected
4/16/2019	Not detected

3.10 Pond 41

Pond 41, a post-subsurface munitions remediation vernal pool, was in year 1 of monitoring in 2019. In 2019, Pond 41 was monitored for hydrology, vegetation, and wildlife.

3.10.1 Hydrology Monitoring

Pond 41 was monitored for hydrology six times and dried by July (see Table 3-36 and Figure 3-19). January hydrology surveys did not take place. The final monitoring event in July only included a depth survey and was completed as an additional effort to document when the vernal pool dried.

Table 3-36. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
2/14/2019	11:28	6.34	13.03	7.99	3.00	61	1.29‡
3/6/2019	11:45	6.70	13.54	7.09	2.1	69	1.43
4/2/2019	14:20	6.28	14.20	5.65	0.9	63	1.31‡
5/7/2019	11:49	6.27	16.13	3.30	1.7	38	0.18‡
6/11/2019	8:55	6.45	18.59	8.18	31.4	12	0.002
7/9/2019	15:00	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

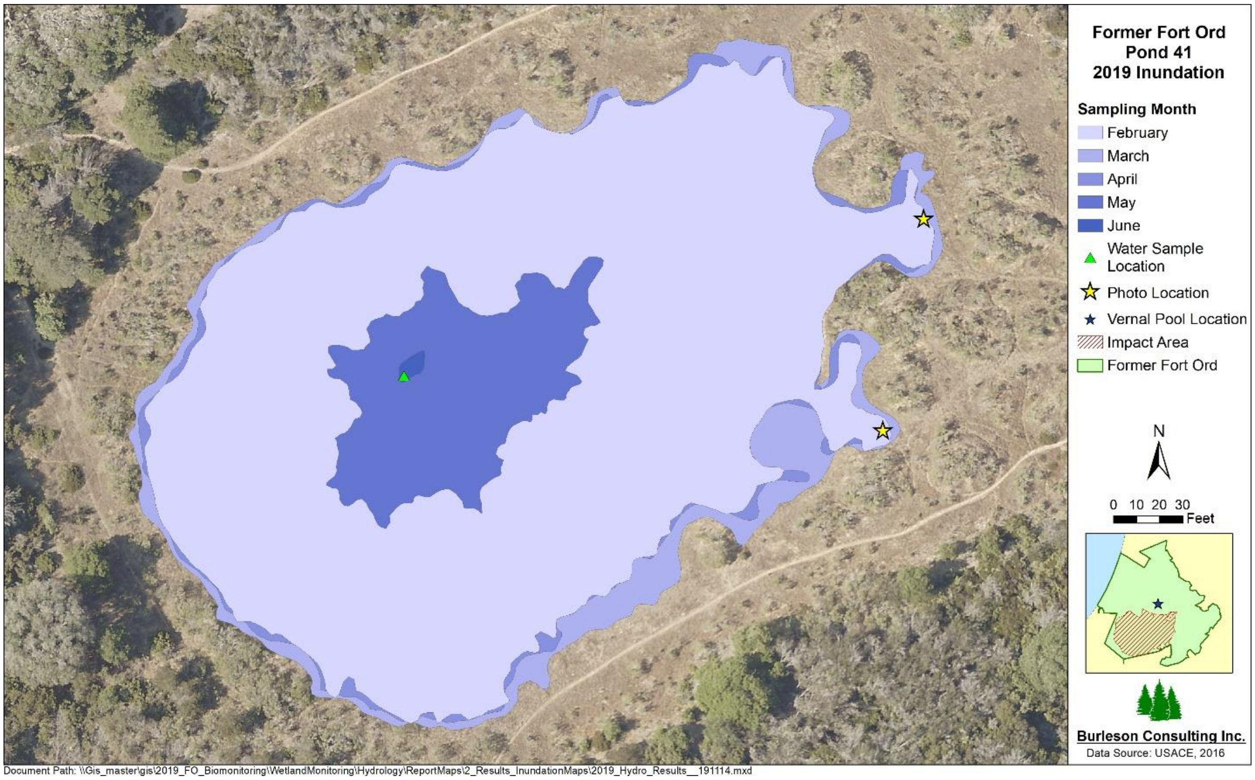

Figure 3-19. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Inundation on Former Fort Ord, 2019

3.10.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 41 on June 12, 2019. These monitoring data represent year 1 post-subsurface munitions remediation conditions. Standing water with a depth of 12 cm was present during the June 12 monitoring event. Biologists identified four strata at the vernal pool (see Table 3-37 and Figure 3-20). Appendix C provides the species cover results within each stratum. Strata and transects 1 through 3 were repeated from 2016. Stratum 4 was identified in 2019 and the subsequent transect was established.

Table 3-37. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	23%
2	52%
3	16%
4	6%
Upland	3%

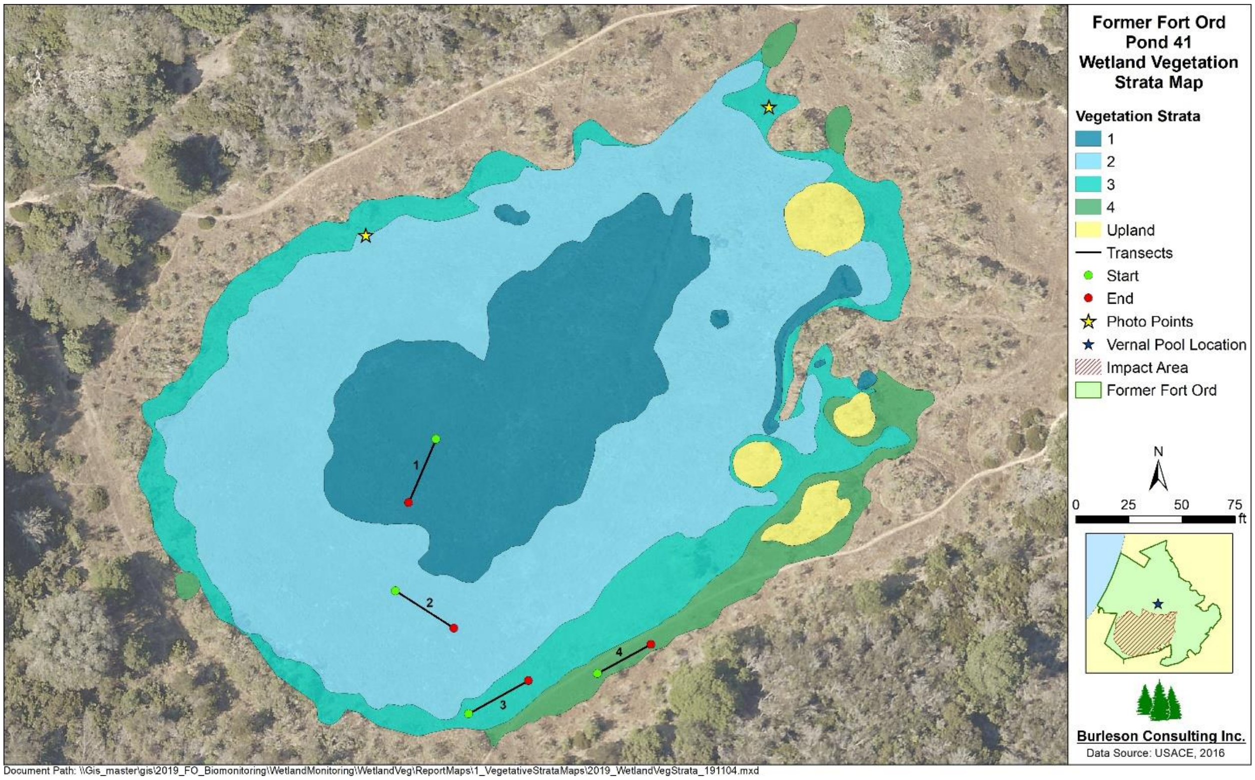

Figure 3-20. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2019

Seventy-five plant species were observed within the vernal pool basin boundary. Of these species, 54 were native and 21 were non-native. Additionally, nine species were OBL wetland plants, 27 were FACW or FAC, 15 were FACU or UPL, and 24 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 41 consisted of a 10-m transect placed in stratum 1. An inundated area of 0.001 acres was present in the center of strata 1. Eleven plant species were observed along the transect. Of these species, ten were native and one was non-native. Pale spikerush and rabbitfoot grass were the dominant species, accounting for approximately 28% and 26% cover, respectively (see Appendix C Table C-9). Thatch was abundant, accounting for approximately 20%. Pale spikerush contributed approximately 11% cover, while brown-headed rush, smooth goldfields, Lemmon's canary grass, and Hickman's popcornflower contributed cover ranging from 1% to 3%. Other species included annual hair grass, Howell's quillwort, alkali mallow, and bugle hedge nettle. Bare ground was also present and accounted for approximately 9%.

Transect 2 at Pond 41 consisted of a 10-m transect placed in stratum 2. Fourteen plant species were observed along the transect. Of these species, ten were native and four were non-native. Pale spikerush, bugle hedge nettle, needle spikerush, and Hickman's popcornflower were the dominant species, accounting for approximately 21%, 16%, 15%, and 14% cover, respectively (see Appendix C Table C-9). Coyote thistle contributed approximately 6% cover, while cut-leaved geranium, smooth goldfields, Lemmon's canary grass, and rabbitfoot grass contributed cover ranging from 3% to 5%. Other species included annual hair grass, brome fescue, brown-headed rush, alkali mallow, and curly dock. Thatch and bare ground were present, accounting for approximately 12% and 0.3%, respectively.

Transect 3 at Pond 41 consisted of a 10-m transect placed in stratum 3. Twenty plant species were observed along the transect. Of these species, 11 were native and nine were non-native. Brown-headed rush was the dominant species, accounting for approximately 36% cover (see Appendix C Table C-9). Thatch was abundant, accounting for approximately 35%. Coyote thistle and bugle hedge nettle each contributed approximately 6% cover. Annual quaking grass, cut-leaved geranium, chaffweed, alkali mallow, coast tarweed, and Hickman's popcornflower contributed cover ranging from 1% to 3%. Other species included silvery hair-grass, soft chess, Johnny-Nip, needle spikerush, pale spikerush, long-beaked filaree, brome fescue, Howell's quillwort, grass poly, rabbitfoot grass, and common sow thistle. Bare ground was present and accounted for approximately 2%.

Transect 4 at Pond 41 consisted of a 10-m transect placed in stratum 4. Twenty-three plant species were observed along the transect. Of these species, 15 were native and eight were non-native. California oat grass was the dominant species, accounting for approximately 40% cover (see Appendix C Table C-9). Thatch was abundant, accounting for approximately 36% cover. Seashore bent grass (*Agrostis pallens*), annual quaking grass, coyote thistle, cut-leaved geranium, smooth cat's-ear, and bugle hedge nettle contributed cover ranging from 1% to 4%. Other species included silvery hair-grass, dwarf brodiaea, Johnny-Nip, pale spikerush, long-beaked filaree, horseweed, brome fescue, goose grass (*Galium aparine*), Howell's quillwort, brown-headed rush, Pacific woodrush, scarlet pimpernel, grass poly, chaffweed, coast tarweed, and Davy's centaury (*Zeltnera davyi*). Bare ground was also present and accounted for approximately 8%.

3.10.3 Wildlife Monitoring

Pond 41 was surveyed for CTS and fairy shrimp on March 14, April 16, and May 14, 2019. California tiger salamanders were present at all three survey events while fairy shrimp were present in March and April. Table 3-38 and Table 3-39 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-38. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
41	3/14/2019 §	2	2	16	15-16	N/A	N/A	N/A	N/A	2 hrs 57 min
	4/16/2019	13	13	66	56-79	N/A	34	28-41	30	2 hrs 5 min
	5/14/2019	9	9	105	88-118	N/A	55	44-64	N/A	20 min

*The mean was rounded to the nearest whole number
§SVL not measured, CTS larvae were too small for accurate infield measurements

Table 3-39. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/14/2019	High (122)
4/16/2019	Low (6)
5/14/2019	Not detected

3.11 Pond 3 North

Pond 3 North was in year 2 of monitoring for post-burn and year 1 for post-subsurface munitions remediation in 2019. In 2019, Pond 3 North was monitored for hydrology, vegetation, and wildlife.

3.11.1 Hydrology Monitoring

Pond 3 North was monitored for hydrology seven times and dried by July (see Table 3-40 and Figure 3-21). The final monitoring event in July only included a depth survey and was completed as an additional effort to document when the vernal pool dried.

Table 3-40. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/16/2019	10:20	6.55	12.08	10.04	13.6	14	0.02‡
2/11/2019	14:10	6.89	8.81	7.80	43.9	61	Connected to 3 South, total 0.86‡
3/7/2019	9:09	6.62	13.37	5.64	1.7	62	Connected to 3 South, total 1.14‡
4/3/2019	10:35	6.64	16.26	5.43	0.3	59	0.27‡
5/7/2019	14:11	6.84	18.90	9.20	0.5	40	0.09‡
6/11/2019	11:02	6.27	20.89	7.14	0.9	26	0.05
7/9/2019	14:45	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

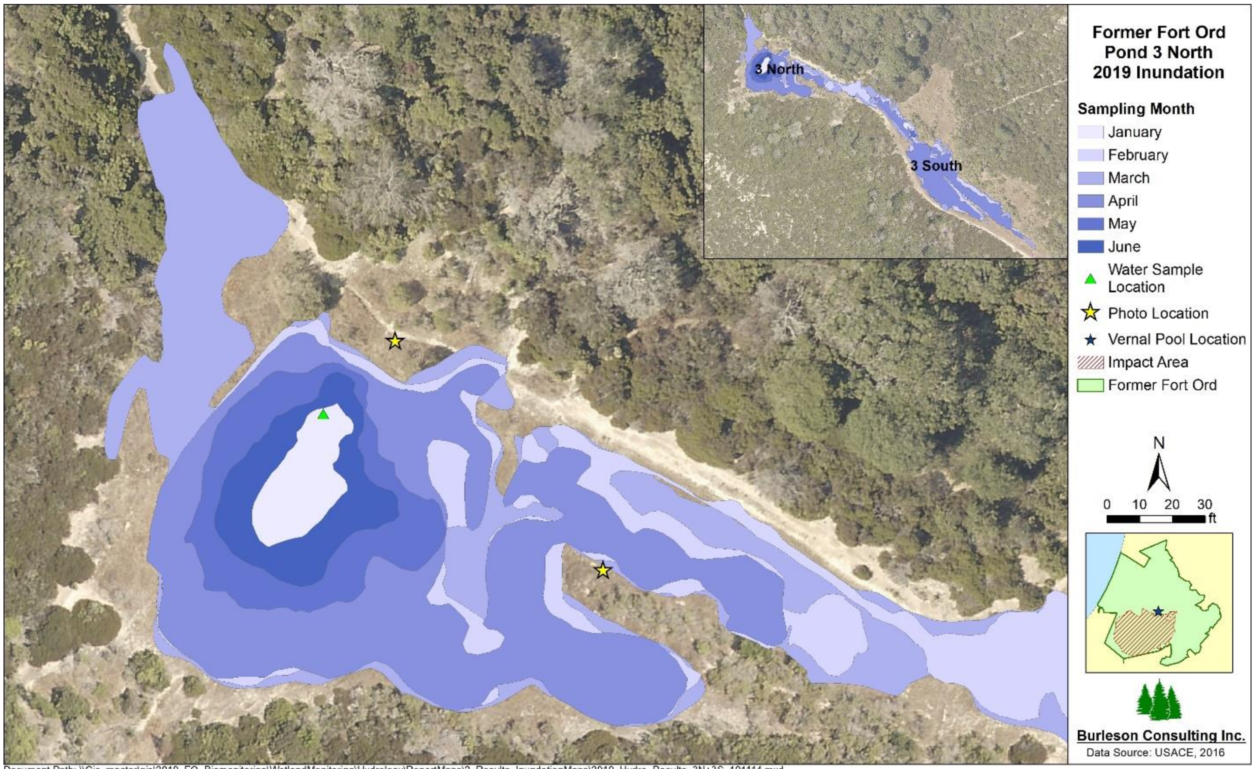

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Figure 3-21. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Inundation on Former Fort Ord, 2019

3.11.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 3 North on May 16, May 28, June 12, and July 16, 2019. These monitoring data represent year 2 post-burn and year 1 post-subsurface munitions remediation conditions. Pond 3 North was dry by the July 16 monitoring event. Biologists identified three strata at the vernal pool (see Table 3-41 and Figure 3-22). Appendix C provides the species cover results within each stratum. Strata 2 through 4 were repeated from 2015 and 2018. Transect 2 was repeated from 2015 and 2018, whereas Transect 3 was relocated to an area with more representative vegetative composition. Stratum 4 consisted of CCG and no transects were placed in this stratum. Figure 3-23 illustrates the extent and density of the goldfield population at Pond 3 North.

Table 3-41. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
2	14%
3	43%
4 (CCG)	43%

Figure 3-22. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2019

Eighty-nine plant species were observed within the vernal pool basin boundary. Of these species, 57 were native and 32 were non-native. Additionally, 14 species were OBL wetland plants, 34 were FACW or FAC, 13 were FACU or UPL, and 28 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 2 at Pond 3 North consisted of a 10-m transect placed in stratum 1. Ten plant species were observed along the transect. Of these species, seven were native and three were non-native. Pale spikerush was the dominant species, accounting for approximately 55% cover (see Appendix C Table C-10). Thatch and bare ground were fairly abundant, accounting for approximately 14% and 9%, respectively. Rabbitfoot grass contributed approximately 15% cover. Other species included brass buttons, needle spikerush, coyote thistle, purple cudweed, brown-headed rush, grass poly, Hickman's popcornflower, and California bulrush.

Transect 3 at Pond 3 North consisted of a 10-m transect placed in stratum 3. Eighteen plant species were observed along the transect. Of these species, ten were native and eight were non-native. Coyote thistle, rabbitfoot grass, and cut-leaved plantain were the dominant species, accounting for approximately 15%, 14%, and 12% cover, respectively (see Appendix C Table C-10). Bare ground and thatch were fairly abundant, each accounting for approximately 16% cover. Needle spikerush, common toad rush, brown-headed rush, grass poly, and variegated clover contributed cover ranging from 2% to 7%. Other species included annual quaking grass, pale spikerush, rye grass, Mediterranean barley, clustered toad rush, gumweed, coast tarweed, round woolly-marbles, narrow-leaved clover (*Trifolium angustifolium*), and common vetch.

Stratum 4 consisted of CCG. Figure 3-23 illustrates the extent and density of the populations at 3 North. No transects were placed in stratum 4 to avoid disturbing the population.

3.11.2.1 *Contra Costa Goldfields*

Contra Costa goldfields at Pond 3 North were mapped on May 16, May 28, and June 12, 2019: they occupied 0.18 acres, with a density range of 10-75% cover. Figure 3-23 illustrates the extent of the CCG population at Pond 3 North.

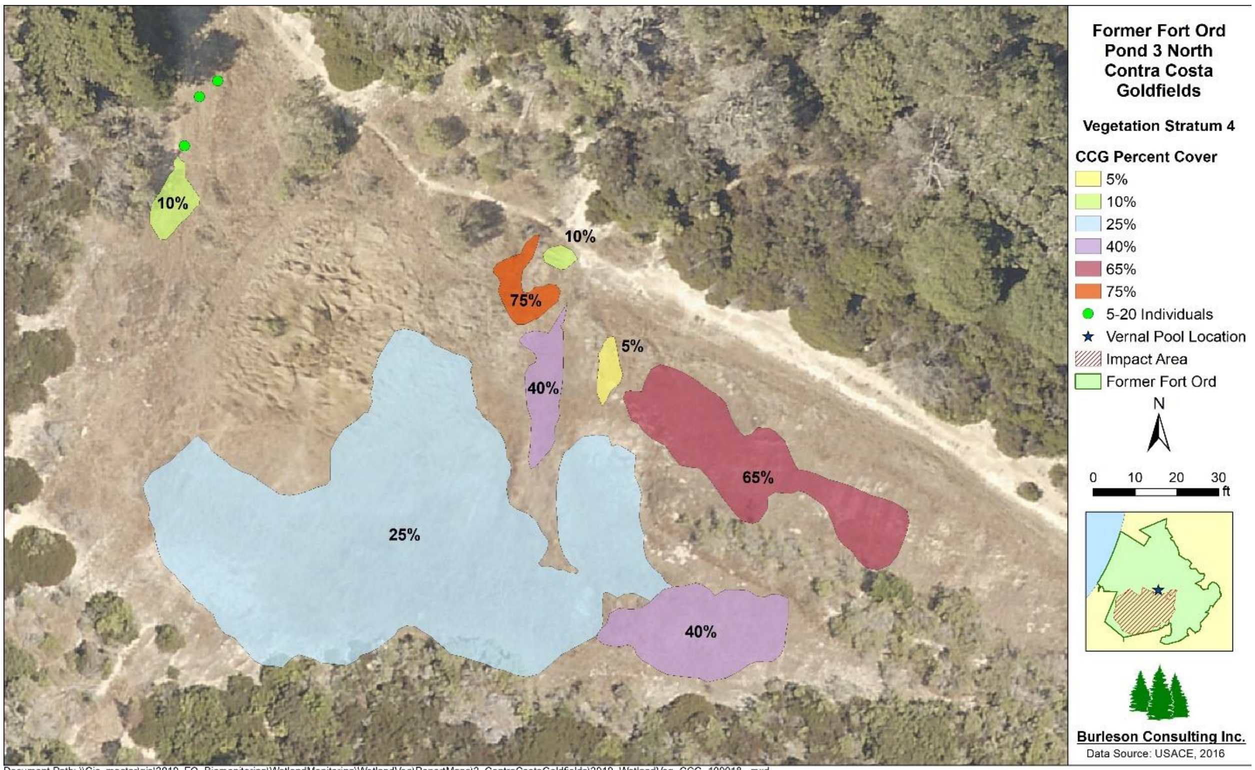

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Figure 3-23. Contra Costa Goldfields Populations at Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation), 2019

3.11.3 Wildlife Monitoring

Pond 3 North was surveyed for fairy shrimp January 24 and February 19, 2019, and subsequent CTS and fairy shrimp surveys March 13, April 16, and May 13, 2019. California tiger salamanders were not detected while fairy shrimp were present in January, February, and March. Table 3-42 and Table 3-43 provide results of the CTS and fairy shrimp surveys conducted in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-42. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
3 North	3/13/2019	0	-	-	-	-	-	-	-	20 min
	4/16/2019	0	-	-	-	-	-	-	-	30 min
	5/13/2019	0	-	-	-	-	-	-	-	13 min

Table 3-43. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
1/24/2019	Moderate (36)
2/19/2019	Moderate (72)
3/13/2019	Low (3)
4/16/2019	Not detected
5/13/2019	Not detected

3.12 Pond 3 South

Pond 3 South was in year 2 of monitoring for post-burn and year 1 for post-subsurface munitions remediation in 2019. In 2019, Pond 3 North was monitored for hydrology, vegetation, and wildlife.

3.12.1 Hydrology Monitoring

Pond 3 South was monitored for hydrology six times and dried by June (see Table 3-44 and Figure 3-24).

Table 3-44. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/16/2019	10:34	6.71†	12.46†	9.03†	6.9†	10	0.01‡
2/11/2019	13:15	6.43	9.99	9.39	26.1	33	Connected to 3 North, total 0.86‡
3/7/2019	8:49	6.33	12.98	5.60	6.2	35	Connected to 3 North, total 1.14‡
4/3/2019	10:19	6.70	15.87	6.91	27.9	33	0.44‡
5/7/2019	13:58	-	-	-	-	9	0.004‡
6/11/2019	10:55	-	-	-	-	DRY	0.00

†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

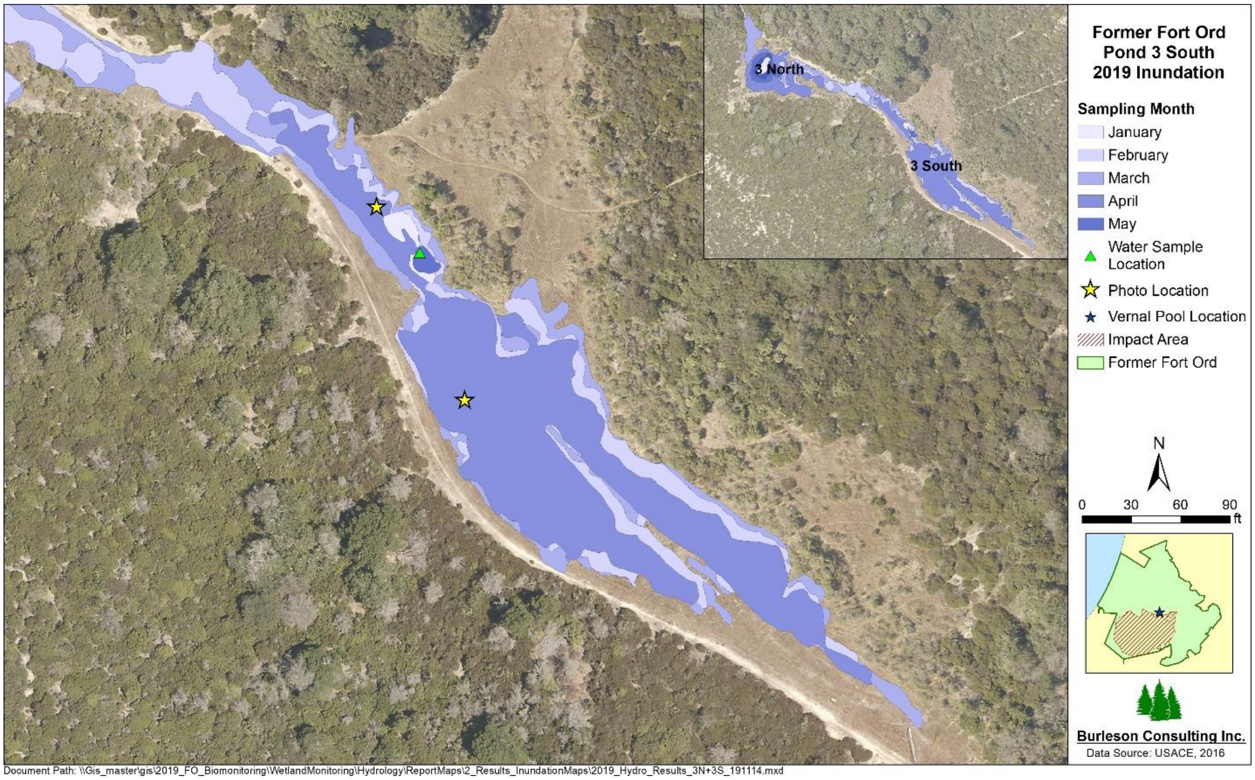

Figure 3-24. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Inundation on Former Fort Ord, 2019

3.12.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 3 South on May 29, May 30, and June 19, 2019. These monitoring data represent year 2 post-burn and year 1 post-subsurface munitions remediation conditions. Pond 3 South was dry by the June 19 monitoring event. Biologists identified five strata at the vernal pool (see Table 3-45 and Figure 3-25). Appendix C provides the species cover results within each stratum. Strata 1 through 4 were repeated from 2016 and 2018. Transect 1 was repeated, whereas Transects 2 through 4 were relocated to an area with more representative vegetative composition. Stratum 5 was a new stratum consisting of CCG and no transects were placed in this stratum.

Table 3-45. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	22%
2	20%
3	47%
4	5%
5 (CCG)	0.2%
Upland	6%

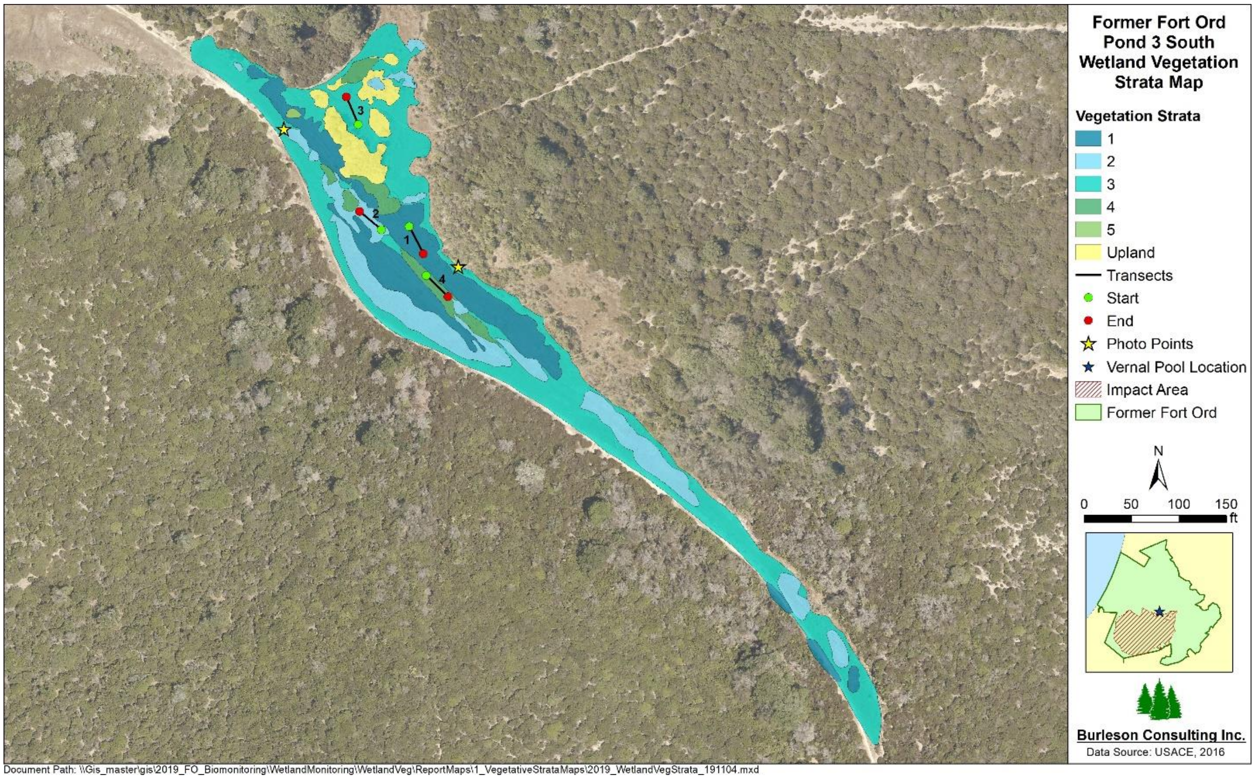

Figure 3-25. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2019

One hundred five plant species were observed within the vernal pool basin boundary. Of these species, 67 were native and 38 were non-native. Additionally, ten species were OBL wetland plants, 38 were FACW or FAC, 19 were FACU or UPL, and 38 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 3 South consisted of a 10-m transect placed in stratum 1. Fourteen plant species were observed along the transect. Of these species, ten were native and four were non-native. Coyote thistle, rabbitfoot grass, and pale spikerush were the dominant species, accounting for approximately 19%, 13%, and 12% cover, respectively (see Appendix C Table C-11). Bare ground and thatch were abundant, each accounting for approximately 22%. Aquatic pygmy-weed, brown-headed rush, smooth goldfields, and Hickman's popcornflower contributed cover ranging from 1% to 3%. Other species included dwarf brodiaea, brass buttons, annual hair grass, needle spikerush, grass poly, chaffweed, and cut-leaved plantain.

Transect 2 at Pond 3 South consisted of a 10-m transect placed in stratum 2. Twenty-eight plant species were observed along the transect. Of these species, 17 were native and 11 were non-native. Brown-headed rush was the dominant species, accounting for approximately 50% cover (see Appendix C Table C-11). Bare ground was abundant, accounting for approximately 20%. Coastal tarweed contributed 5% cover. Annual quaking grass, dwarf brodiaea, California oat grass, low bulrush, grass poly, chaffweed, alkali mallow, rabbitfoot grass, and variegated clover, contributed cover ranging from 1% to 3%. Other species included Johnny-Nip, coyote thistle, long-beaked filaree, brome fescue, Italian ryegrass, cut-leaved geranium, smooth cat's-ear, keeled bulrush, Howell's quillwort, common toad rush, round-fruited toad rush (*Juncus bufonius* var. *occidentalis*), dwarf rush, marsh microseris, cut-leaved plantain, California buttercup small-flower catchfly, and sack clover (*Trifolium depauperatum*). Thatch was also present and accounted for approximately 4% cover.

Transect 3 at Pond 3 South consisted of a 10-m transect placed in stratum 3. Twenty-nine plant species were observed along the transect. Of these species, 15 were native and 14 were non-native. California oat grass and coastal tarweed were the dominant species, accounting for approximately 20% and 14% cover, respectively (see Appendix C Table C-11). Bare ground was abundant, accounting for approximately 26% cover. Grass poly contributed 8%. Annual quaking grass, dwarf brodiaea, pink star-tulip (*Calochortus uniflorus*), cut-leaved geranium, brown-headed rush, narrowleaf cottonrose, scarlet pimpernel, and checkerbloom (*Sidalcea malviflora*) contributed cover ranging from 1% to 5%. Other species included common yarrow, silvery hair-grass, soft chess, Johnny-Nip, long-beaked filaree, brome fescue, purple cudweed, smooth cat's-ear, rough cat's-ear, round-fruited toad rush, chaffweed, cut-leaved plantain, California plantain (*Plantago erecta*), round woolly-marbles, small-flower catchfly, common sow thistle, sack clover, white brodiaea (*Triteleia hyacinthina*), variegated clover, and Davy's centaury. Thatch was also present and accounted for approximately 10%.

Transect 4 at Pond 3 South consisted of a 10-m transect placed in stratum 4. Twenty-eight plant species were observed along the transect. Of these species, 14 were native and 14 were non-native. Italian rye grass and pale spikerush were the dominant species, accounting for approximately 33% and 9% cover, respectively (see Appendix C Table C-11). Cut-leaved geranium and brown-headed rush contributed cover ranging from 4% to 7%. Annual quaking grass, dwarf brodiaea, California oat grass, coastal tarweed, brome fescue, smooth cat's-ear, grass poly, alkali mallow, California buttercup, small-flower catchfly, and common sow thistle contributed cover ranging from 1% to 3%. Other species included ripgut grass, soft chess, horseweed, meadow barley, rough cat's-ear, scarlet pimpernel, *Madia* sp., marsh microseris, rabbitfoot grass, little hop clover (*Trifolium dubium*), bearded clover, variegated clover, and Davy's centaury. Bare ground and thatch were also present and accounted for approximately 10% and 13%, respectively.

Stratum 5 consisted of CCG. Figure 3-26 illustrates the extent and density of the populations at 3 South. No transects were placed in stratum 5 to avoid disturbing the population.

3.12.2.1 *Contra Costa Goldfields*

Contra Costa goldfields at Pond 3 South were mapped on May 30, 2019: they occupied 0.003 acres, with a density of 10% cover. Figure 3-26 illustrates the extent of the CCG population at Pond 3 South.

Figure 3-26. Contra Costa Goldfield Occurrence at Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation), 2019

3.12.3 Wildlife Monitoring

Pond 3 South was surveyed for fairy shrimp January 24 and February 19, 2019, and subsequent CTS and fairy shrimp surveys March 13, and April 16, 2019. No further surveys were conducted in May due to insufficient vernal pool depth. California tiger salamanders were not detected while fairy shrimp were present in January, February, and March. Table 3-46 and Table 3-47 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-46. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
3 South	3/13/2019	0	-	-	-	-	-	-	-	40 min
	4/16/2019	0	-	-	-	-	-	-	-	41 min

Table 3-47. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
1/24/2019	Moderate (21)
2/19/2019	Moderate (44)
3/13/2019	Low (5)
4/16/2019	Not detected

3.13 Pond 39

Pond 39 was in year 2 of monitoring for post-burn and year 1 for post-subsurface munitions remediation in 2019. In 2019, Pond 39 was monitored for hydrology, vegetation, and wildlife.

3.13.1 Hydrology Monitoring

Pond 39 was monitored for hydrology eight times and dried by July (see Table 3-48 and Figure 3-27). The first monitoring event in December was conducted as part of the staff gauge maintenance and only included depth. No inundated surface area was mapped in May because the depth was too shallow and pool too small for submeter accuracy. The final monitoring event in July only included a depth survey and was completed as an additional effort to document when the vernal pool dried.

Table 3-48. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
12/13/2018	-	-	-	-	-	25	-
1/16/2019	9:17	6.47	10.40	5.91	13.0	43	0.01‡
2/11/2019	10:56	6.63	7.18	5.26	574.0	50	0.31‡
3/6/2019	13:33	6.38	13.80	4.29	528.0	50	0.25‡
4/3/2019	8:48	6.52	13.98	4.33	460.0	44	0.01‡
5/7/2019	10:33	-	-	-	-	7	-
6/10/2019	13:40	6.34	30.37	8.20	>1000	14	0.002
7/9/2019	11:15	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

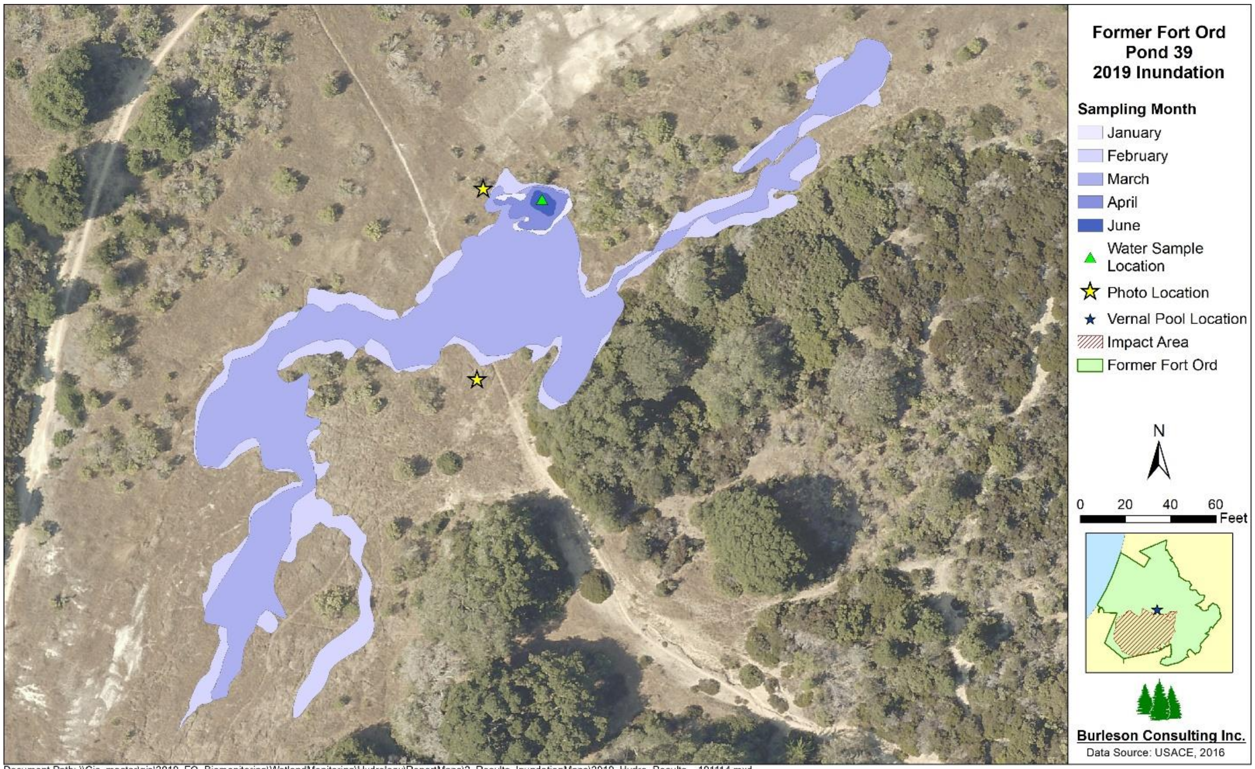

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Figure 3-27. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Inundation on Former Fort Ord, 2019

3.13.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 39 on May 28 and June 19, 2019. These monitoring data represent year 2 post-burn and year 1 post-subsurface munitions remediation conditions. Pond 39 was dry by the June 19 monitoring event. Biologists identified four strata at the vernal pool (see Table 3-49 and Figure 3-28). Appendix C provides the species cover results within each stratum. Stratum 1 and 3 were repeated from 2016 and 2018. Strata 2 was repeated from 2016, and stratum 4 was repeated from 2018. Transect 1 was rotated slightly to stay within the boundary of stratum 1 and a new start point was established. Transect 3 was repeated from 2018. Transects 2 and 4 were relocated because the previous location was no longer within the correct stratum.

Table 3-49. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	6%
2	7%
3	34%
4	48%
Upland	5%

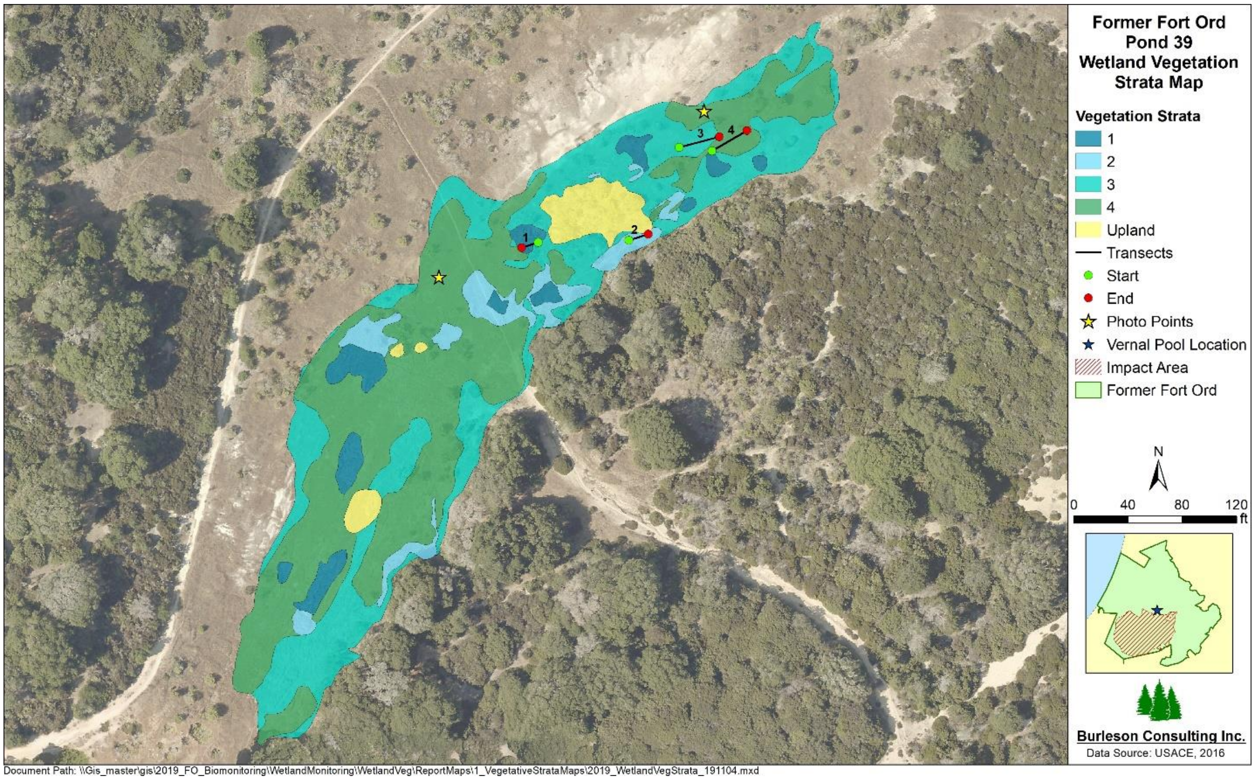

Figure 3-28. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2019

Ninety-eight plant species were observed within the vernal pool basin boundary. Of these species, 57 were native, 39 were non-native, and two were unidentified. Additionally, nine species were OBL wetland plants, 32 were FACW or FAC, 18 were FACU or UPL, and 39 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 39 consisted of a 5-m transect placed in stratum 1. Eight plant species were observed along the transect. Of these species, five were native and three were non-native. Pale spikerush and needle spikerush were the dominant species, accounting for approximately 38% and 25% cover, respectively (see Appendix C Table C-12). Thatch was fairly abundant, accounting for approximately 25%. Hickman's popcornflower and rabbitfoot grass each contributed approximately 1% cover. Other species included brass buttons, brown-headed rush, grass poly, and flowering quillwort. Bare ground was also present and accounted for approximately 8% cover.

Transect 2 at Pond 39 consisted of a 5-m transect placed in stratum 2. Twenty-seven plant species were observed along the transect. Of these species, 13 were native, 13 were non-native, and one was unidentified. Coyote thistle, pale spikerush, and brown-headed rush were the dominant species, accounting for approximately 22%, 12% and 12% cover, respectively (see Appendix C Table C-12). Thatch was fairly abundant, accounting for approximately 18%. Rabbitfoot grass contributed approximately 8% cover, while brome fescue contributed approximately 6% cover. Dwarf brodiaea, California oat grass, annual hair grass, needle spikerush, Italian rye grass, cut-leaved geranium, grass poly, and cut-leaved plantain contributed cover ranging from 1% to 3%. Other species included silvery hair-grass, annual quaking grass, *Hordeum* sp., smooth cat's-ear, common toad rush, common rush (*Juncus effusus*), western rush, gumweed, marsh microseris, common sow thistle, sun cups (*Taraxia ovata*), narrow-leaved clover, little hop clover, spring vetch. Bare ground was also present and accounted for approximately 4%.

Transect 3 at Pond 39 consisted of a 10-m transect placed in stratum 3. Twenty-six plant species were observed along the transect. Of these species, 13 were native and 13 were non-native. Italian rye grass was the dominant species, accounting for approximately 41% cover (see Appendix C Table C-12). Thatch was fairly abundant, accounting for approximately 26%. California oat grass contributed approximately 11% cover, while cut-leaved plantain contributed approximately 5%. Brome fescue, cut-leaved geranium, western rush, brown-headed rush, gumweed, and spring vetch contributed cover ranging from 1% to 3%. Other species included Spanish lotus, ripgut grass, soft chess, annual quaking grass, dwarf brodiaea, coastal tarweed, long-beaked filaree, smooth cat's-ear, common toad rush, clustered toad rush, scarlet pimpernel, grass poly, common tarweed, coast tarweed, common sow thistle, sun cups, and Davy's centaury. Bare ground was also present and accounted for approximately 1%.

Transect 4 at Pond 39 consisted of a 10-m transect placed in stratum 4. Thirty plant species were observed along the transect. Of these species, 14 were native, 15 were non-native, and one was unidentified. Narrow-leaved clover and California oat grass were the dominant species, accounting for approximately 38% and 15% cover, respectively (see Appendix C Table C-12). Thatch was fairly abundant, accounting for approximately 14%. Cut-leaved plantain contributed approximately 6% cover, while hill lotus, annual quaking grass, brown-headed rush, and checkerbloom contributed cover ranging from 1% to 3%. Other species included Spanish lotus, silvery hair grass, ripgut grass, soft chess, dwarf brodiaea, dense flower owl's clover, long-beaked filaree, brome fescue, cut-leaved geranium, smooth cat's-ear, *Juncus* sp., common toad rush, clustered toad rush, western rush, scarlet pimpernel, grass poly, small tarweed (*Madia exigua*), gumweed, small-flower catchfly, and spring vetch. Bare ground was also present and accounted for approximately 8%.

3.13.3 Wildlife Monitoring

Pond 39 was surveyed for fairy shrimp January 24 and February 19, 2019, and subsequent CTS and fairy shrimp surveys March 12, and April 15, 2019. No further surveys were conducted in May due to insufficient vernal pool depth. California tiger salamanders were not detected while fairy shrimp were present in January, February, and March. Table 3-50 and Table 3-51 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-50. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
39	3/12/2019	0	-	-	-	-	-	-	-	10 min
	4/15/2019	0	-	-	-	-	-	-	-	3 min

Table 3-51. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
1/24/2019	Moderate (71)
2/19/2019	Moderate (37)
3/12/2019	Low (7)
4/15/2019	Not detected

3.14 Pond 40 North

Pond 40 North, a post-burn vernal pool, was in year 2 of monitoring in 2019. In 2019, Pond 40 North was monitored for hydrology, vegetation, and wildlife.

3.14.1 Hydrology Monitoring

Pond 40 North was monitored for hydrology seven times and dried by July (see Table 3-52 and Figure 3-29). The final monitoring event in July only included a depth survey and was completed as an additional effort to document when the vernal pool dried.

Table 3-52. Pond 40 North (Year 2 Post-Burn) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/16/2019	9:52	6.55†	11.57†	10.89†	112.0†	8	0.003‡
2/11/2019	11:54	6.69	7.18	7.99	69.9	82	0.08‡
3/6/2019	13:00	6.77	14.05	6.91	16.8	81	0.04‡
4/3/2019	9:42	6.99	14.80	6.20	6.2	64	0.03
5/7/2019	10:56	6.60	17.33	5.40	450.0	26	0.008‡
6/10/2019	13:57	-	-	-	-	8	0.003
7/9/2019	11:20	-	-	-	-	DRY	0.00

†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Figure 3-29. Pond 40 North (Year 2 Post-Burn) Inundation on Former Fort Ord, 2019

3.14.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 40 North on June 25, 2019. These monitoring data represent year 2 post-burn conditions. Pond 40 North was dry by the June 25 monitoring event. Biologists identified three strata at the vernal pool (see Table 3-53 and Figure 3-30). Appendix C provides the species cover results within each stratum. Stratum 2 was repeated from 2015 and 2018, whereas stratum 3 was repeated from 2015 and stratum 4 was repeated from 2018. Transect 2 was repeated from 2018. Transect 3 was relocated because the previous location was no longer within the correct stratum. Transect 4 were relocated to an area with more representative vegetative composition.

Table 3-53. Pond 40 North (Year 2 Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
2	21%
3	33%
4	46%

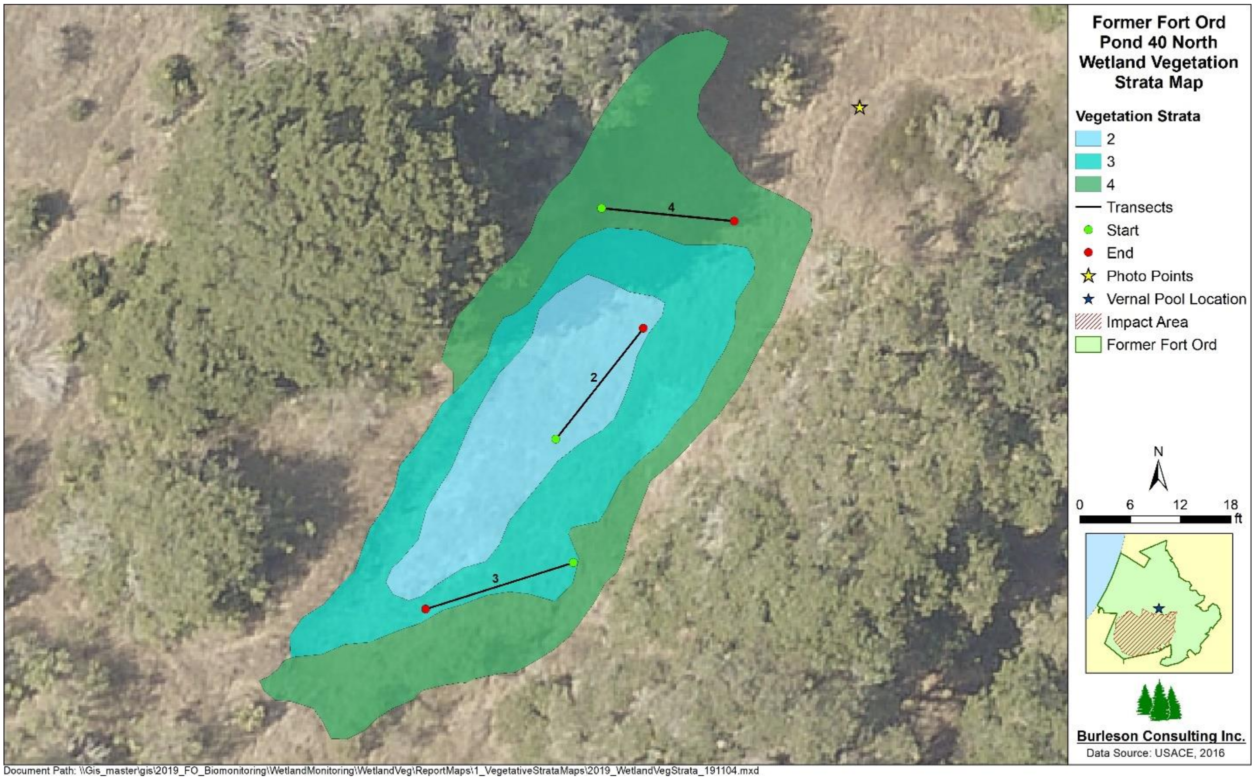

Figure 3-30. Pond 40 North (Year 2 Post-Burn) Vegetation Strata and Transects on Former Fort Ord, 2019

Fifty-nine plant species were observed within the vernal pool basin boundary. Of these species, 33 were native and 26 were non-native. Additionally, six species were OBL wetland plants, 22 were FACW or FAC, 11 were FACU or UPL, and 20 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 2 at Pond 40 North consisted of a 5-m transect placed in stratum 2. Nine plant species were observed along the transect. Of these species, three were native and six were non-native. Pale spikerush was the dominant species, accounting for approximately 40% cover (see Appendix C Table C-13). Thatch and bare ground were abundant, accounting for approximately 29% and 16%, respectively. Brass buttons, purple cudweed, grass poly, cut-leaved plantain, rabbitfoot grass, and round woolly-marbles, contributed cover ranging from 1% to 4%. Other species included curly dock and common sow thistle.

Transect 3 at Pond 40 North consisted of a 5-m transect placed in stratum 3. Eleven plant species were observed along the transect. Of these species, seven were native and four were non-native. Cut-leaved plantain and coyote thistle were the dominant species, accounting for approximately 25% and 22% cover, respectively (see Appendix C Table C-13). Thatch and bare ground were abundant, accounting for approximately 22% and 17%, respectively. Brown-headed rush contributed approximately 8%, while needle spikerush, pale spikerush, and grass poly contributed cover ranging from 1% to 2%. Other species included dwarf brodiaea, horseweed, rabbitfoot grass, round woolly-marbles, and hairy vetch (*Vicia hirsuta*).

Transect 4 at Pond 40 North consisted of a 5-m transect placed in stratum 4. Ten plant species were observed along the transect. Of these species, two were native and eight were non-native. Brown-headed rush was the dominant species, accounting for approximately 47% cover (see Appendix C Table C-13). Thatch was abundant, accounting for approximately 34%. Cut-leaved plantain contributed approximately 7% cover, while annual quaking grass, grass poly, and gumweed contributed cover ranging from 1% to 2%. Other species included soft chess, Italian rye grass, cut-leaved geranium, smooth cat's-ear, and curly dock. Bare ground was also present and accounted for approximately 5%.

3.14.3 Wildlife Monitoring

Pond 40 North was surveyed for fairy shrimp February 19, 2019, and subsequent CTS and fairy shrimp surveys March 12, April 15, and May 13, 2019. No fairy shrimp survey was conducted in January due to insufficient vernal pool depth. California tiger salamanders were not detected while fairy shrimp were present in February, March, and April. Table 3-54 and Table 3-55 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-54. Pond 40 North (Year 2 Post-Burn) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
40 North	3/12/2019	0	-	-	-	-	-	-	-	21 min
	4/15/2019	0	-	-	-	-	-	-	-	9 min
	5/13/2019	0	-	-	-	-	-	-	-	6 min

Table 3-55. Pond 40 North (Year 2 Post-Burn) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
2/19/2019	High (121)
3/12/2019	Moderate (57)
4/15/2019	High (259)
5/13/2019	Not detected

3.15 Pond 40 South

Pond 40 South was in year 2 of monitoring for post-burn and year 1 for post-subsurface munitions remediation in 2019. In 2019, Pond 40 South was monitored for hydrology, vegetation, and wildlife.

3.15.1 Hydrology Monitoring

Pond 40 South was monitored for hydrology five times and dried by May (see Table 3-56 and Figure 3-31). Although Pond 40 South was dry at the staff gauge in January, some disparate puddles were observed. However, the ponding in January was not mapped because there was no surface hydrological connectivity between the puddles and location of the staff gauge.

Table 3-56. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/16/2019	9:46	-	-	-	-	DRY	0.00‡
2/11/2019	11:24	6.55	7.58	7.63	381.0	28	0.22‡
3/6/2019	13:11	6.80	17.36	9.75	19.2	28	0.11‡
4/3/2019	9:16	6.75	13.63	3.30	3.3	20	0.05‡
5/7/2019	10:40	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

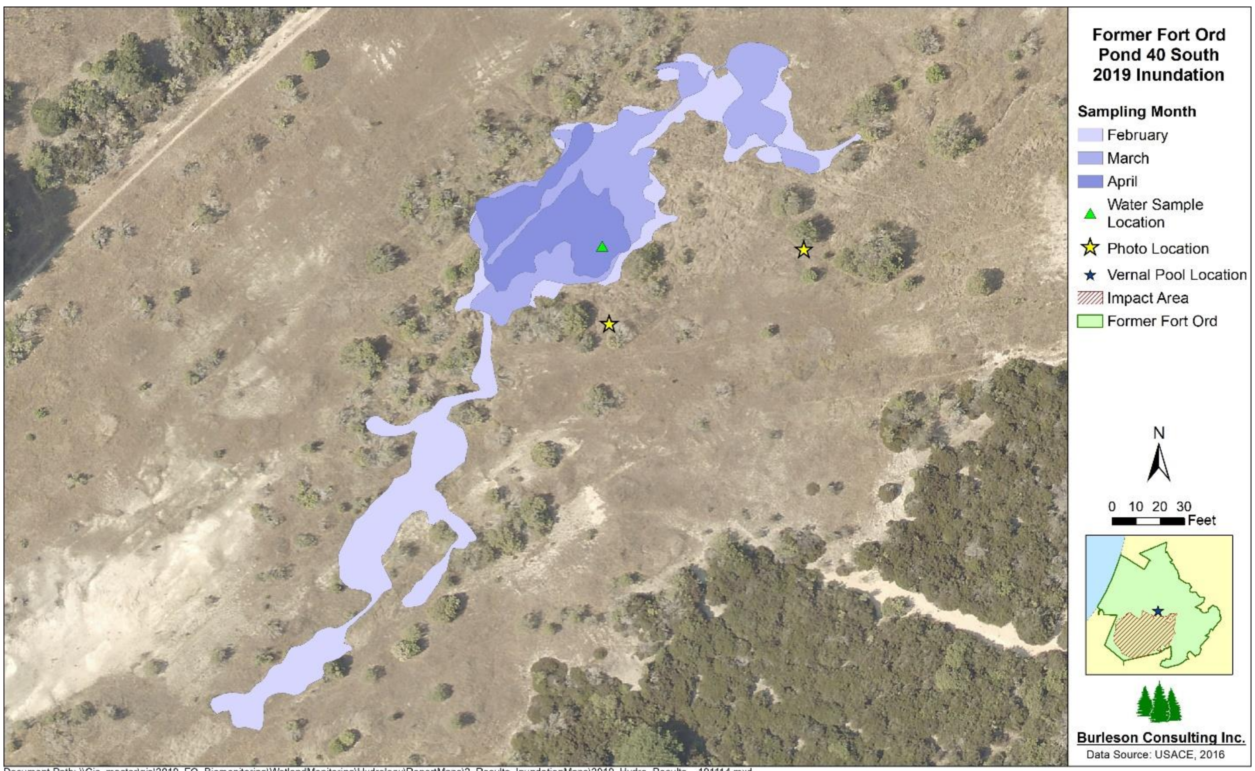

Figure 3-31. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Inundation on Former Fort Ord, 2019

3.15.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 40 South on May 15, 2019. These monitoring data represent year 2 post-burn and year 1 post-subsurface munitions remediation conditions. Pond 40 South was dry by the May 15 monitoring event. Biologists identified three strata at the vernal pool (see Table 3-57 and Figure 3-32). Appendix C provides the species cover results within each stratum. Strata 1 through 3 were repeated from 2016 and 2018. Transects 1 and 2 were repeated, whereas Transect 3 was relocated to an area with more representative vegetative composition.

Table 3-57. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	10%
2	44%
3	46%

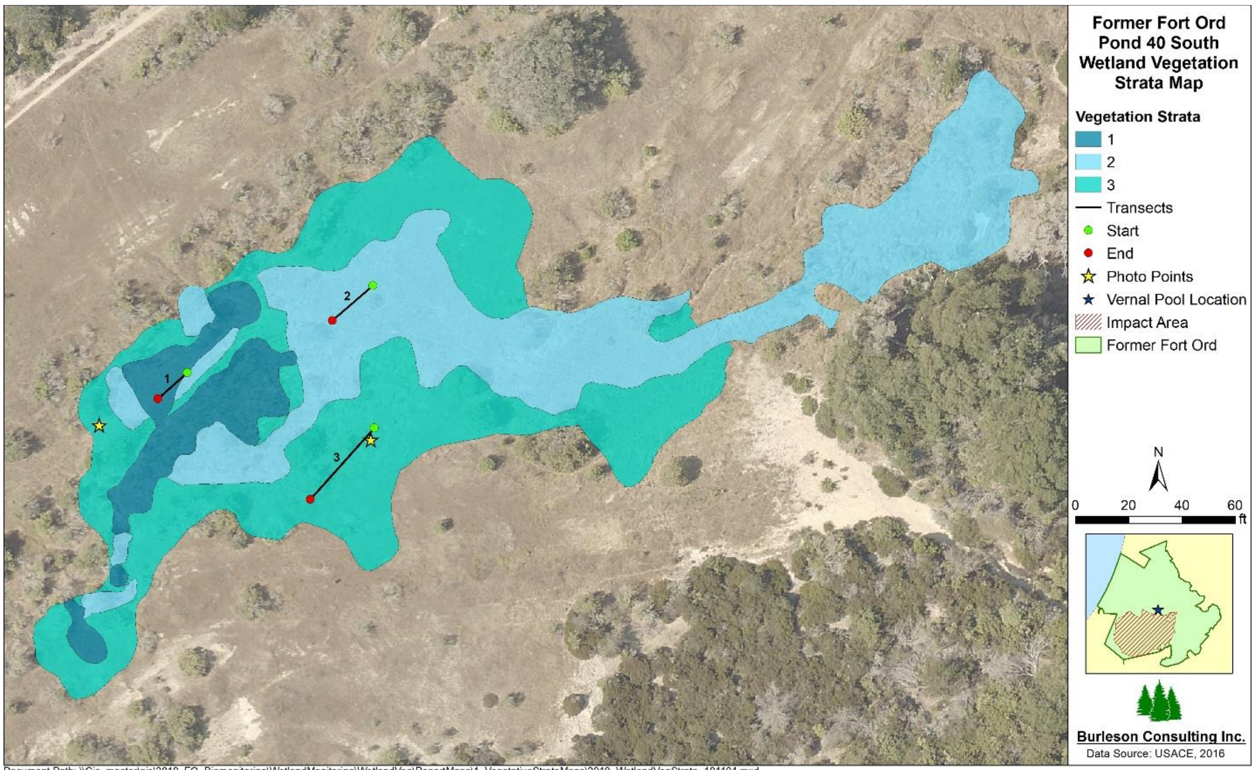

Figure 3-32. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2019

Seventy-five plant species were observed within the vernal pool basin boundary. Of these species, 47 were native and 28 were non-native. Additionally, four species were OBL wetland plants, 27 were FACW or FAC, 15 were FACU or UPL, and 29 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 40 South consisted of a 5-m transect placed in stratum 1. Ten plant species were observed along the transect. Of these species, five were native and five were non-native. Hickman's popcornflower and pale spikerush were the dominant species, accounting for approximately 37% and 21% cover, respectively (see Appendix C Table C-14). Thatch was abundant, accounting for approximately 21%. Rabbitfoot grass and needle spikerush contributed 4% and 2% cover, respectively. Other species included annual hair grass, Italian rye grass, brown-headed rush, grass poly, chaffweed, and cut-leaved plantain. Bare ground was also present and accounted for approximately 7% cover.

Transect 2 at Pond 40 South consisted of a 5-m transect placed in stratum 2. Nineteen plant species were observed along the transect. Of these species, three were native and 16 were non-native. Brown-headed rush, smooth cat's ear, and cut-leaved plantain were the dominant species, accounting for approximately 31%, 15% and 14% cover, respectively (see Appendix C Table C-14). Bare ground was abundant, accounting for approximately 22%. Spanish lotus, silvery hair-grass, soft chess, annual quaking grass, long-beaked filaree, dwarf rush, sheep sorrel, small-flower catchfly, narrow-leaved clover, little hop clover, and common vetch contributed cover ranging from 1% to 5%. Other species included brome fescue, rattail sixweeks grass, cut-leaved geranium, common toad rush, and common sow thistle. Thatch was also present and accounted for approximately 5% cover.

Transect 3 at Pond 40 South consisted of a 10-m transect placed in stratum 3. Twenty-eight plant species were observed along the transect. Of these species, 12 were native and 16 were non-native. Italian rye grass, little hop clover, and gumweed were the dominant species, accounting for approximately 21%, 11%, and 8% cover, respectively (see Appendix C Table C-14). Dwarf brodiaea, California oat grass, coastal tarweed, cut-leaved geranium, smooth cat's-ear, western rush, common tarweed, narrow-leaved clover, and common vetch contributed cover ranging from 1% to 6%. Other species included hill lotus, silvery hair-grass, slender wild oat (*Avena barbata*), ripgut grass, soft chess, annual quaking grass, pale spikerush, long-beaked filaree, brome fescue, rough cat's-ear, clustered toad rush, scarlet pimpernel, small tarweed, cut-leaved plantain, sun cups, and pinpoint clover. Thatch and bare ground were present, accounting for approximately 15% and 3%, respectively.

3.15.3 Wildlife Monitoring

Pond 40 South was surveyed for fairy shrimp February 19, 2019, and subsequent CTS and fairy shrimp surveys March 12 and April 15, 2019. No surveys were conducted in January or May due to insufficient vernal pool depth. California tiger salamanders were not detected while fairy shrimp were present in February and March. Table 3-58 and Table 3-59 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-58. Pond 40 South (Year 2 Post-Burn) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
40 South	3/12/2019	0	-	-	-	-	-	-	-	5 min
	4/15/2019	0	-	-	-	-	-	-	-	1 min

Table 3-59. Pond 40 South (Year 2 Post-Burn) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
2/19/2019	Moderate (13)
3/12/2019	Moderate (12)
4/15/2019	Not detected

3.16 Pond 43

Pond 43 was in year 2 of monitoring for post-burn and year 1 for post-subsurface munitions remediation in 2019. In 2019, Pond 43 was monitored for hydrology, vegetation, and wildlife.

3.16.1 Hydrology Monitoring

Pond 43 was monitored for hydrology five times and dried by May (see Table 3-60 and Figure 3-33).

Table 3-60. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/16/2019	11:43	-	-	-	-	6	0.002‡
2/12/2019	15:00	6.83	10.59	8.91	35.0	34	0.06‡
3/6/2019	10:30	7.05	14.47	8.73	4.4	28	0.05‡
4/2/2019	15:02	7.47	20.00	9.93	1.0	19	0.01‡
5/7/2019	13:16	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

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Figure 3-33. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Inundation on Former Fort Ord, 2019

3.16.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 43 on May 13 and 14, 2019. These monitoring data represent year 2 post-burn and year 1 post-subsurface munitions remediation conditions. Pond 43 was dry by the May 13 monitoring event. Biologists identified three strata at the vernal pool (see Table 3-61 and Figure 3-34). Appendix C provides the species cover results within each stratum. All three strata were repeated from 2016 and 2018. Transects 1 and 3 were repeated. Transect 2 was extended from 5 m to 10 m and was relocated to an area with more representative vegetative composition.

Table 3-61. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	19%
2	67%
3	14%

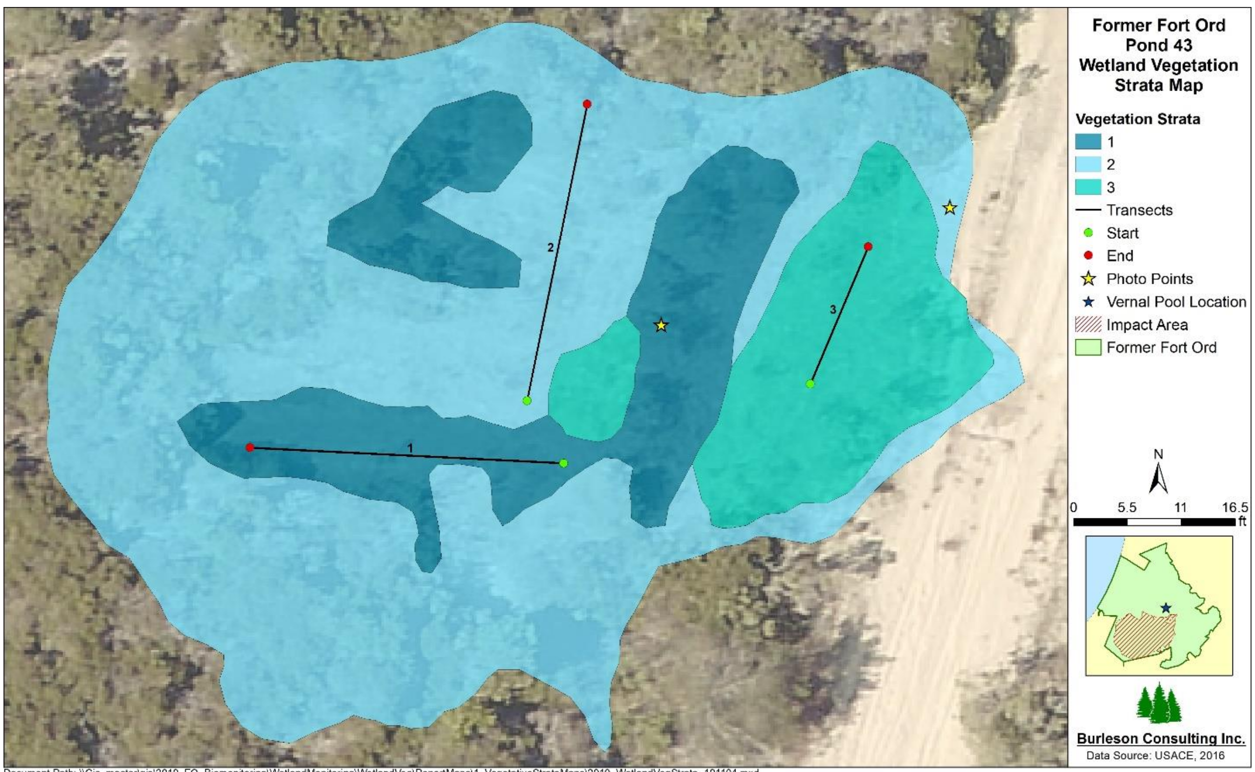

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Figure 3-34. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2019

One hundred three plant species were observed within the vernal pool basin boundary. Of these species, 76 were native, 26 were non-native, and one was unidentified. Additionally, ten species were OBL wetland plants, 30 were FACW or FAC, 13 were FACU or UPL, and 50 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 43 consisted of a 10-m transect placed in stratum 1. Twenty-one plant species were observed along the transect. Of these species, 15 were native and six were non-native. Hickman's popcornflower and rabbitfoot grass were the dominant species, accounting for approximately 18% and 15% cover, respectively (see Appendix C Table C-15). Bare ground and thatch were fairly abundant, each accounting for approximately 20%. Sacramento mesa mint (*Pogogyne zizyphoroides*) contributed approximately 7%, while coyote thistle contributed approximately 6% cover. Timwort, aquatic pygmy-weed, annual hair grass, needle spikerush, brown-headed rush, chaffweed, and round woolly-marbles contributed cover ranging from 1% to 4%. Other species included annual quaking grass, dwarf brodiaea, coastal tarweed, common toad rush, dwarf rush, scarlet pimpernel, grass poly, *Madia* sp., prickly sow thistle, and sun cups.

Transect 2 at Pond 43 consisted of a 10-m transect placed in stratum 2. Twenty-five plant species were observed along the transect. Of these species, 18 were native and seven were non-native. Brown-headed rush, rabbitfoot grass, and coyote thistle were the dominant species, accounting for approximately 24%, 13%, and 9% cover, respectively (see Appendix C Table C-15). Thatch and bare ground were abundant, accounting for approximately 21% and 9%, respectively. Soft chess, dwarf brodiaea, annual hair grass, needle spikerush, Howell's quillwort, grass poly, chaffweed, Hickman's popcornflower, Sacramento mesa mint, and round woolly-marbles contributed cover ranging from 1% to 4%. Other species included silvery hair-grass, annual quaking grass, timwort, aquatic pygmy-weed, California oat grass, coastal tarweed, brome fescue, dwarf rush, western rush, skunk navarretia (*Navarretia mellita*), small head clover, and flowering quillwort.

Transect 3 at Pond 43 consisted of a 5-m transect placed in stratum 3. Thirty-six plant species were observed along the transect. Of these species, twenty-two were native and 14 were non-native. California oat grass was the dominant species, accounting for 16% cover (see Appendix C Table C-15). Bare ground and thatch were fairly abundant, accounting for approximately 35% and 11%, respectively. Little hop clover contributed approximately 7% cover, while Spanish lotus, soft chess, annual quaking grass, coastal tarweed, coyote thistle, brome fescue, cut-leaved geranium, smooth cat's-ear, common toad rush, dwarf rush, brown-headed rush, chaffweed, gumweed, sun cups, Capetown grass (*Tribolium obliterum*), and little owl's clover (*Triphysaria pusilla*) contributed cover ranging from 1% to 4%. Other species included vernal pool bent grass, silvery hair-grass, dwarf brodiaea, timwort, annual hair grass, purple cudweed, keeled bulrush, California cottonrose (*Logfia filaginoides*), Pacific woodrush, scarlet pimpernel, grass poly, Hickman's popcornflower, cut-leaved plantain, California plantain, rabbitfoot grass, round woolly-marbles, prickly sow thistle, and Davy's centaury.

3.16.2.1 *Vernal Pool Bent Grass*

Vernal pool bent grass occurrences at Pond 43 were mapped on May 14, 2019 (see Figure 3-35). This was the first time that the species has been documented at Pond 43.

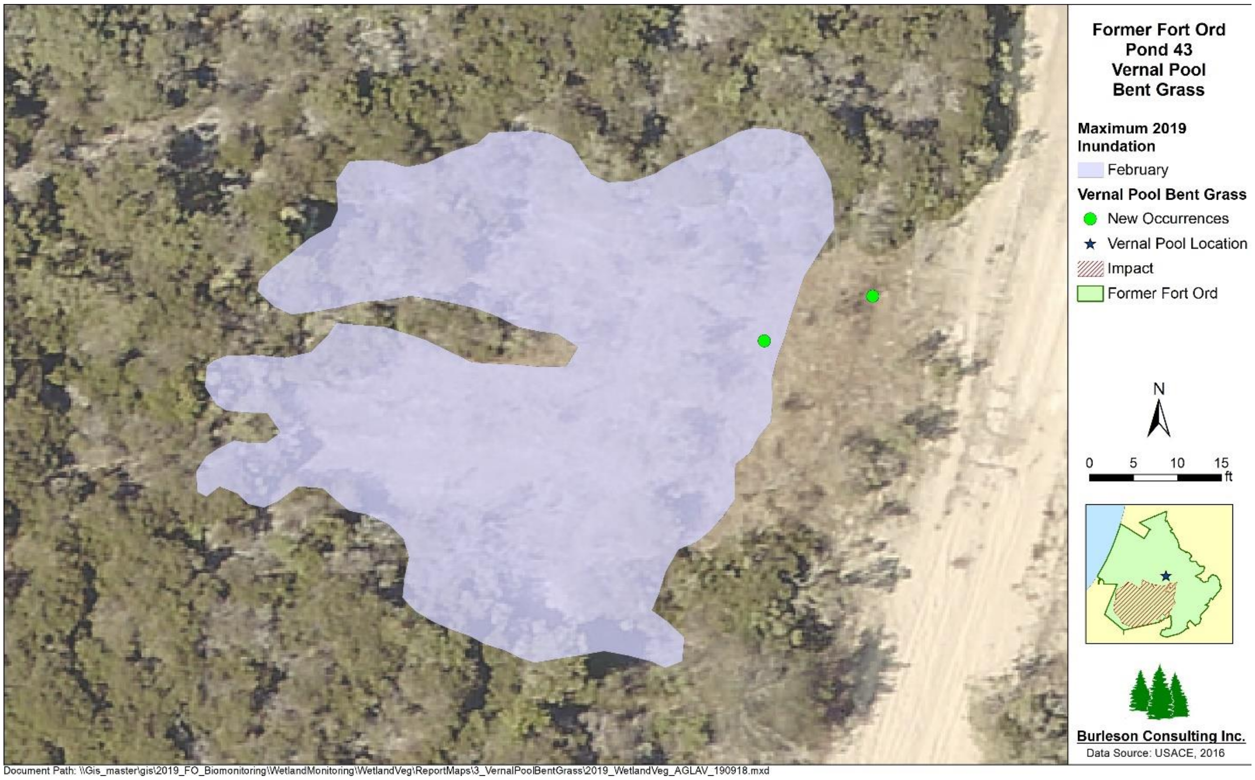

Figure 3-35. Vernal Pool Bent Grass Occurrences at Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation), 2019

3.16.3 Wildlife Monitoring

Pond 43 was surveyed for fairy shrimp February 20, 2019, and the subsequent CTS and fairy shrimp survey March 12, 2019. No surveys were conducted in January, April, or May due to insufficient vernal pool depth. California tiger salamanders were not detected while fairy shrimp were present in February and March. Table 3-62 and Table 3-63 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-62. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
43	3/12/2019	0	-	-	-	-	-	-	-	9 min

Table 3-63. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
2/20/2019	High (135)
3/12/2019	High (210)

3.17 Pond 35

Pond 35 was in year 2 of monitoring for post-mastication and year 1 for post-subsurface munitions remediation in 2019. In 2019, Pond 35 was monitored for hydrology, vegetation, and wildlife.

3.17.1 Hydrology Monitoring

Pond 35 was monitored for hydrology five times and dried by May (see Table 3-64 and Figure 3-36).

Table 3-64. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/16/2019	8:47	-	-	-	-	DRY	0.00
2/11/2019	10:12	6.91	7.64	8.48	193.0	88	0.42‡
3/6/2019	13:52	6.84	16.30	5.61	25.7	47	0.19‡
4/3/2019	8:27	6.81	13.88	2.35	27.4	16	0.01‡
5/7/2019	10:16	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Figure 3-36. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Inundation on Former Fort Ord, 2019

3.17.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 35 on May 8, 2019. These data represent year 2 post-mastication and year 1 post-subsurface munitions remediation conditions. Pond 35 was dry by the May 8 monitoring event. Biologists identified four strata at the vernal pool (see Table 3-65 and Figure 3-37). Appendix C provides the species cover results within each stratum. Strata 1 through 3 were repeated from 2016 and 2018. Stratum 4 was repeated from 2018. Transects 1 and 2 were repeated from 2016 and 2018, while Transect 3 was relocated and shortened to 5 m to remain within the associated stratum. Transect 4 was repeated from 2018.

Table 3-65. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	13%
2	29%
3	5%
4	53%

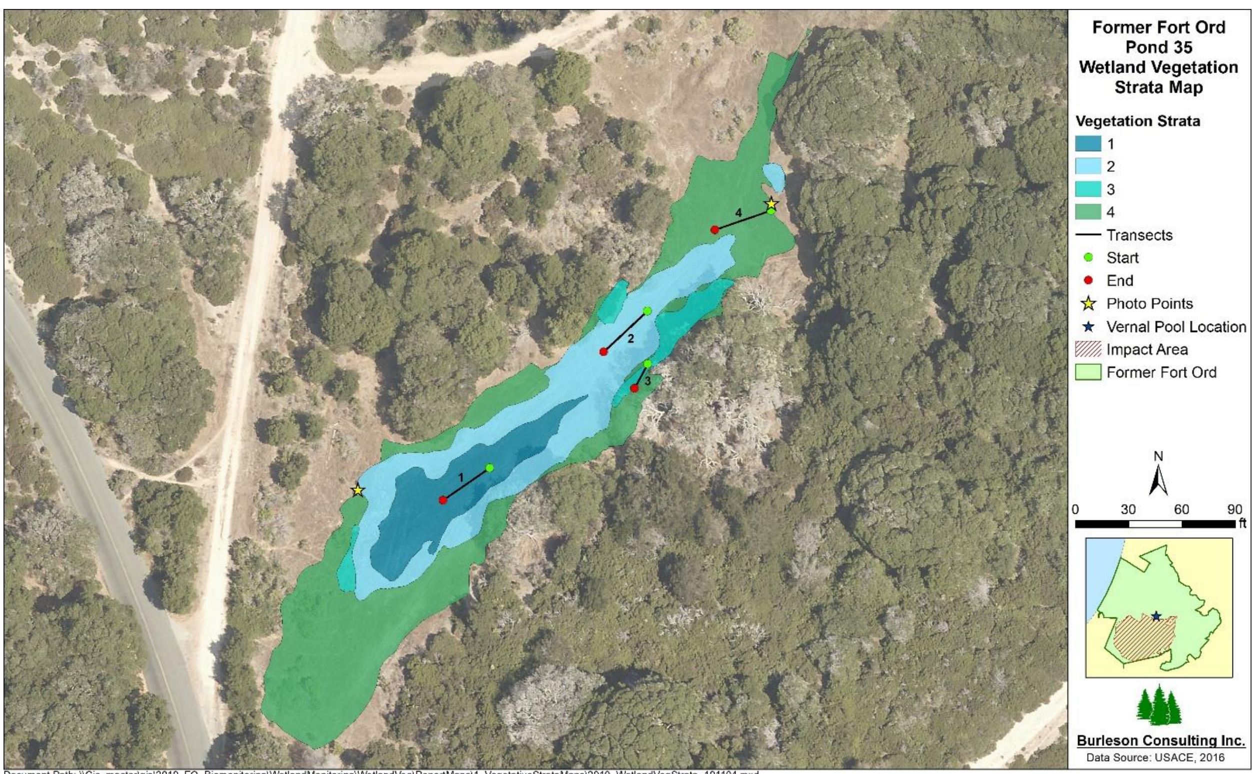

Figure 3-37. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2019

Seventy-nine plant species were observed within the vernal pool basin boundary. Of these species, 48 were native, 30 were non-native, and one was unidentified. Additionally, 11 species were OBL wetland plants, 24 were FACW or FAC, 13 were FACU or UPL, and 31 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 35 consisted of a 10-m transect placed in stratum 1. Nine plant species were observed along the transect. Of these species, six were native and three were non-native. Hickman's popcornflower was the dominant species, accounting for approximately 77% cover (see Appendix C Table C-16). Cut-leaved plantain contributed approximately 7% cover, while brass buttons, grass poly, and round woolly-marbles contributed cover ranging from 1% to 5%. Other species included aquatic pygmy-weed, annual hair grass, pale spikerush, and flowering quillwort. Bare ground and thatch were present and accounted for approximately 6% and 1%, respectively.

Transect 2 at Pond 35 consisted of a 10-m transect placed in stratum 2. Eight plant species were observed along the transect. Of these species, five were native and three were non-native. Cut-leaved plantain was the dominant species, accounting for approximately 25% cover (see Appendix C Table C-16). Thatch and bare ground were abundant, accounting for approximately 35% and 34%, respectively. Round woolly-marbles contributed approximately 3% cover. Other species included dwarf brodiaea, annual hair grass, pale spikerush, Italian rye grass, grass poly, and Hickman's popcornflower.

Transect 3 at Pond 35 consisted of a 5-m transect placed in stratum 3. Seven plant species were observed along the transect. Of these species, three were native and four were non-native. Meadow barley was the dominant species, accounting for approximately 39% cover (see Appendix C Table C-16). Thatch was abundant, accounting for approximately 45%. Cut-leaved plantain accounted for approximately 9%, while Italian rye grass, Hickman's popcornflower, and round woolly-marbles contributed cover ranging from 1% to 2%. Other species included grass poly and sheep sorrel. Bare ground was present and accounted for approximately 1%.

Transect 4 at Pond 35 consisted of a 10-m transect placed in stratum 4. Twenty plant species were observed along the transect. Of these species, six were native and fourteen were non-native. Italian rye grass, narrow-leaved clover, and long-beaked filaree were the dominant species, accounting for approximately 24%, 15%, and 7% cover, respectively (see Appendix C Table C-16). Thatch and bare ground were fairly abundant, accounting for approximately 30% and 10%, respectively. California oat grass, cut-leaved geranium, and cut-leaved plantain each contributed approximately 1% cover. Other species included hill lotus, silvery hair-grass, slender wild oat, soft chess, annual quaking grass, dwarf brodiaea, annual hair grass, brome fescue, meadow barley, smooth cat's-ear, grass poly, round woolly-marbles, sheep sorrel, and curly dock.

3.17.3 Wildlife Monitoring

Pond 35 was surveyed for fairy shrimp February 19, 2019, and the subsequent CTS and fairy shrimp survey March 12, 2019. No surveys were conducted in January, April, or May due to insufficient vernal pool depth. California tiger salamanders were not detected while fairy shrimp were present in February and March. Table 3-66 and Table 3-67 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-66. Pond 35 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
35	3/12/2019	0	-	-	-	-	-	-	-	30 min

Table 3-67. Pond 35 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
2/19/2019	Moderate (74)
3/12/2019	Moderate (50)

3.18 Pond 42

Pond 42 was in year 2 for post-mastication and post-burn and year 1 for post-subsurface munitions remediation in 2019. In 2019, Pond 42 was monitored for hydrology, vegetation, and wildlife.

3.18.1 Hydrology Monitoring

Pond 42 was monitored for hydrology seven times and dried by July (see Table 3-68 and Figure 3-38). The final monitoring event in July only included a depth survey and was completed as an additional effort to document when the vernal pool dried.

Table 3-68. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/16/2019	11:23	6.84	11.99	9.94	14.8	15	0.03‡
2/11/2019	14:55	7.14	10.40	8.12	28.2	63	0.54‡
3/6/2019	10:13	6.85	12.82	7.29	15.3	64	0.59‡
4/3/2019	11:14	6.96	14.51	4.42	1.6	55	0.48‡
5/7/2019	13:30	6.80	17.50	7.36	0.8	34	0.38‡
6/11/2019	9:27	6.45	19.59	5.36	3.7	20	0.13‡
7/9/2019	12:56	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

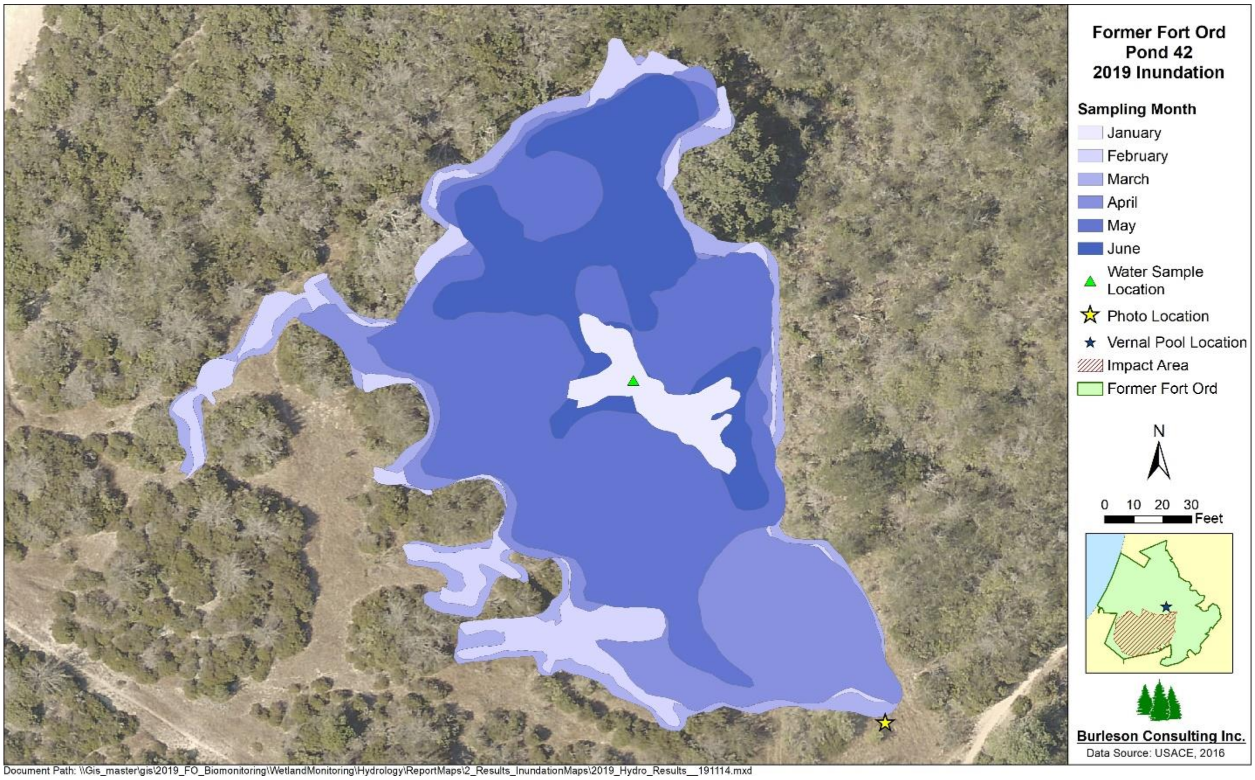

Figure 3-38. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Inundation on Former Fort Ord, 2019

3.18.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 42 on July 16, 2019. These monitoring data represent year 2 post-mastication and post-burn and year 1 post-subsurface munitions remediation conditions. Pond 42 was dry by the July 16 monitoring event. Biologists identified five strata at the vernal pool (see Table 3-69 and Figure 3-39). Appendix C provides the species cover results within each stratum. Strata 1 through 4 were repeated from 2017 and 2018. Stratum 5 was new in 2019. Transect 1 was relocated to an area with more representative vegetative composition. Transect 2 was repeated from 2017, whereas Transects 3 and 4 was repeated from 2017 and 2018. Transect 5 was established in 2019.

Table 3-69. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	3%
2	3%
3	44%
4	14%
5	18%
Upland	18%

Figure 3-39. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2019

Seventy-seven plant species were observed within the vernal pool basin boundary. Of these species, 53 were native and 23 were non-native. Additionally, nine species were OBL wetland plants, 23 were FACW or FAC, 15 were FACU or UPL, and 30 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 42 consisted of a 5-m transect placed in stratum 1. Six plant species were observed along the transect. Of these species, five were native and one was non-native. Needle spikerush was the dominant species, accounting for 59% cover (see Appendix C Table C-17). Thatch was abundant, accounting for approximately 25%. Coyote thistle, brown-headed rush, and smooth goldfields contributed cover ranging from 2% to 7%. Other species included Hickman's popcornflower and rabbitfoot grass. Bare ground was also present and accounted for approximately 1% cover.

Transect 2 at Pond 42 consisted of a 5-m transect placed in stratum 2. Ten plant species were observed along the transect. Of these species, seven were native and three were non-native. Pale spike-rush and rabbitfoot grass were the dominant species, accounting for approximately 43% and 17% cover, respectively (see Appendix C Table C-17). Thatch was abundant, accounting for approximately 22% cover. Brass buttons, needle spikerush, and smooth goldfields contributed cover ranging from 2% to 5% cover. Other species included coyote thistle, brown-headed rush, grass poly, Hickman's popcornflower, and round woolly-marbles.

Transect 3 at Pond 42 consisted of a 10-m transect placed in stratum 3. Nine plant species were observed along the transect. Of these species, seven were native and two were non-native. Coyote thistle, needle spikerush, and brown-headed rush were the dominant species, accounting for approximately 29%, 25%, and 13% cover, respectively (see Appendix C Table C-17). Thatch and bare ground were fairly abundant, accounting for approximately 19% and 8%, respectively. Annual hair grass, smooth goldfields, and rabbitfoot grass contributed cover ranging from 1% to 3%. Other species included dwarf brodiaea, grass poly, and Hickman's popcornflower.

Transect 4 at Pond 42 consisted of a 5-m transect placed in stratum 4. Seventeen plant species were observed along the transect. Of these species, eight were native and nine were non-native. California oat grass and coastal tarweed were the dominant species, accounting for approximately 19% and 17% cover, respectively (see Appendix C Table C-17). Bare ground and thatch were abundant, accounting for approximately 24% and 20% cover, respectively. Nit grass (*Gastridium phleoides*), common toad rush, dwarf rush, and scarlet pimpernel contributed cover ranging from 2% to 7%. Silvery hair-grass, annual quaking grass, rattail sixweeks grass, and grass poly each contributed approximately 1% cover. Other species included slender wild oat, clustered toad rush, California cottonrose, California plantain, round woolly-marbles, little hop clover, and Davy's centaury.

Transect 5 at Pond 42 consisted of a 5-m transect placed in stratum 5. Two plant species were observed along the transect. Both species were non-native. Rabbitfoot grass, brass buttons, and thatch accounted for 35%, 33%, and 27%, respectively. Bare ground was present and accounted for approximately 4% cover.

3.18.3 Wildlife Monitoring

Pond 42 was surveyed for CTS and fairy shrimp on March 12, April 15, and May 13, 2019. California tiger salamanders were not detected while fairy shrimp were present at the March survey event. Table 3-70 and Table 3-71 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-70. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
42	3/12/2019	0	-	-	-	-	-	-	-	50 min
	4/15/2019	0	-	-	-	-	-	-	-	37 min
	5/13/2019	0	-	-	-	-	-	-	-	27 min

Table 3-71. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/12/2019	High (217)
4/15/2019	Not detected
5/13/2019	Not detected

3.19 Pond 44

Pond 44, a post-mastication vernal pool, was in year 2 of monitoring in 2019. In 2019, Pond 44 was monitored for hydrology, vegetation, and wildlife.

3.19.1 Hydrology Monitoring

Pond 44 was monitored for hydrology four times and was only inundated in February and March (see Table 3-72 and Figure 3-40). Although Pond 44 was dry at the staff gauge in January and April, some disparate puddles were observed. However, the ponding in January and April was not mapped because there was no surface hydrological connectivity between the puddles and location of the staff gauge.

Table 3-72. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/16/2019	11:54	-	-	-	-	DRY	0.00‡
2/12/2019	15:22	6.71	10.75	8.16	20.3	24	0.18‡
3/6/2019	10:45	7.07†	15.55†	9.43†	5.1†	15	0.02‡
4/2/2019	14:43	-	-	-	-	DRY	0.00‡

†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

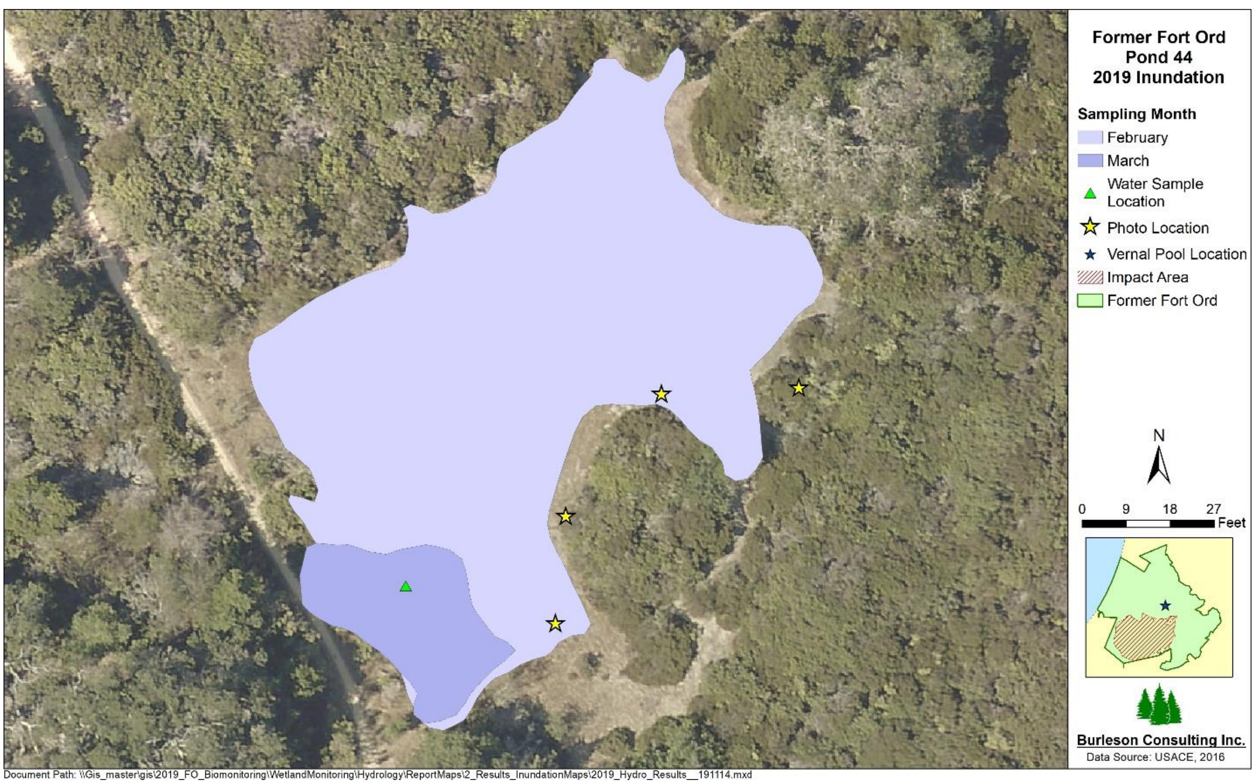

Figure 3-40. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Inundation on Former Fort Ord, 2019

3.19.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 44 on May 14, 2019. These monitoring data represent year 2 post-mastication and year 1 post-subsurface munitions remediation conditions. Pond 44 was dry by the May 14 monitoring event. Biologists identified three strata at the vernal pool (see Table 3-73 and Figure 3-41). All vegetative strata within the basin were mapped and tabulated. Appendix C provides the species cover results within each stratum. Strata 1 and 3 were repeated from 2016 and 2018, whereas stratum 4 was repeated from 2018. Transects 1 was repeated from 2018, Transect 3 was repeated from 2016 and 2018, whereas Transect 4 was relocated to an area with more representative vegetative composition. Pig rooting was also observed within Stratum 1 at Pond 44. The area was mapped as 0.003 acres and photo documented.

Table 3-73. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	52%
3	27%
4	7%
Upland	14%

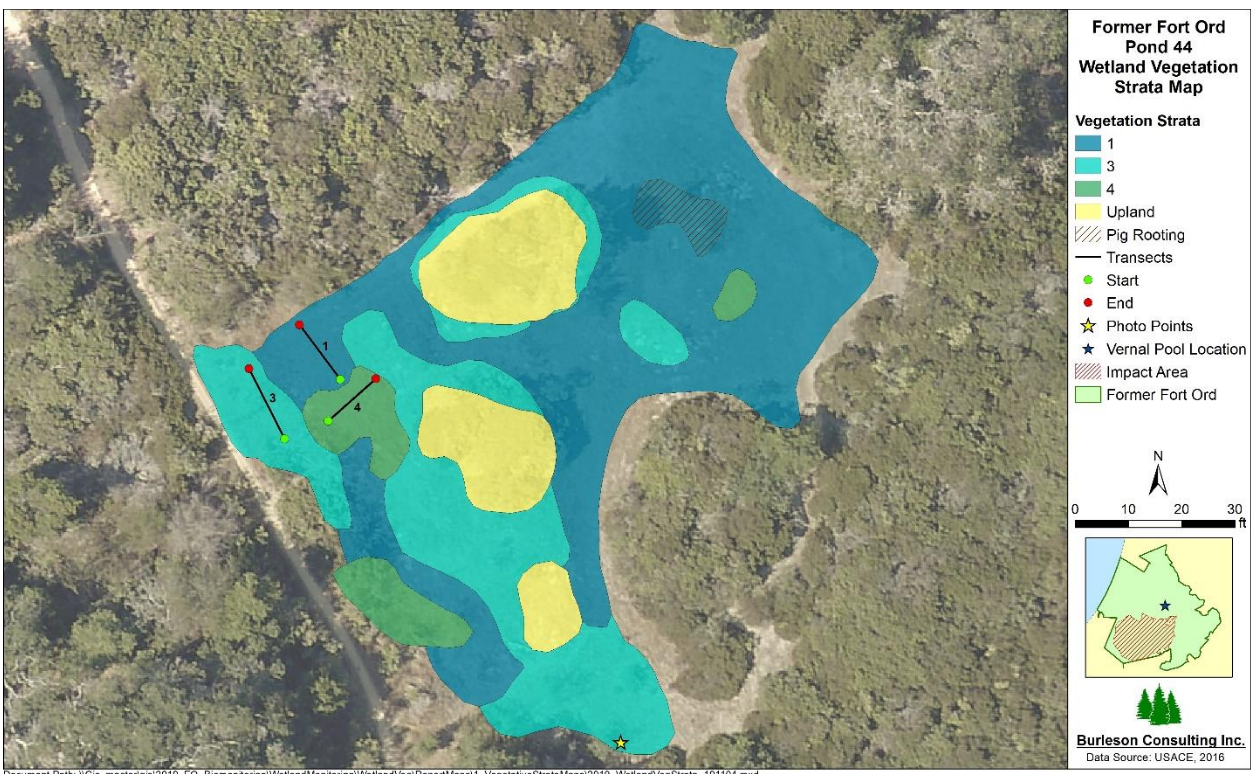

Figure 3-41. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2019

Seventy-four plant species were observed within the vernal pool basin boundary. Of these species, 50 were native and 24 were non-native. Additionally, seven species were OBL wetland plants, 22 were

FACW or FAC, nine were FACU or UPL, and 36 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 44 consisted of a 5-m transect placed in stratum 1. Twenty-three plant species were observed along the transect. Of these species, seventeen were native and six were non-native. Coyote thistle and needle spikerush were the dominant species, accounting for approximately 23% and 17% cover, respectively (see Appendix C Table C-18). Bare ground was fairly abundant, accounting for approximately 16%. Hickman's popcornflower accounted for approximately 6% cover. Vernal pool bent grass, dwarf brodiaea, Howell's quillwort, smooth goldfields, grass poly, chaffweed, rabbitfoot grass, Sacramento mesa mint, round woolly-marbles, little hop clover, and variegated clover contributed cover ranging from 1% to 4%. Other species included annual quaking grass, timwort, aquatic pygmy-weed, annual hair grass, cut-leaved geranium, Chinese pusley (*Heliotropium curassavicum* var. *oculatum*), common toad rush, dwarf rush, and California plantain. Thatch was also present and accounted for approximately 9% cover.

Transect 3 at Pond 44 consisted of a 5-m transect placed in stratum 3. Twenty-nine plant species were observed along the transect. Of these species, fifteen were native and fourteen were non-native. California oat grass was the dominant species, accounting for approximately 22% cover (see Appendix C Table C-18). Bare ground and thatch were fairly abundant, accounting for approximately 31% and 7%, respectively. Little hop clover, gumweed, and cut-leaved plantain contributed approximately 7%, 6%, and 5% cover, respectively. Hill lotus, silvery hair-grass, coastal tarweed, coyote thistle, long-beaked filaree, smooth cat's-ear, common toad rush, scarlet pimpernel, chaffweed, and little owl's clover contributed cover ranging from 1% to 3%. Other species included coyote brush, rattlesnake grass, annual quaking grass, dwarf brodiaea, needle spikerush, brome fescue, cut-leaved geranium, dwarf rush, western rush, California cottonrose, Pacific woodrush, grass poly, small-flower catchfly, common sow thistle, and sun cups.

Transect 4 at Pond 44 consisted of a 5-m transect placed in stratum 4. Twenty-one plant species were observed along the transect. Of these species, thirteen were native and eight were non-native. Brown-headed rush was the dominant species, accounting for approximately 27% cover (see Appendix C Table C-18). Bare ground and thatch were fairly abundant, accounting for approximately 18% and 15%, respectively. Coyote thistle and dwarf brodiaea accounted for approximately 10% and 9% cover, respectively. Annual quaking grass, needle spikerush, cut-leaved geranium, smooth cat's-ear, dwarf rush, grass poly, Hickman's popcornflower, rabbitfoot grass, round woolly marbles, and little hop clover contributed cover ranging from 1% to 3%. Other species included timwort, Howell's quillwort, common toad rush, smooth goldfields, chaffweed, *Madia* sp., cut-leaved plantain, and Sacramento mesa mint.

3.19.3 Wildlife Monitoring

Pond 44 was surveyed for fairy shrimp February 20, 2019, and the subsequent CTS and fairy shrimp survey March 12, 2019. No surveys were conducted in January, April, or May due to insufficient vernal pool depth. California tiger salamanders were not detected while fairy shrimp were present in February and March. Table 3-74 and Table 3-75 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-74. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
44	3/12/2019	0	-	-	-	-	-	-	-	10 min

Table 3-75. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
2/20/2019	Very High (650)
3/12/2019	Very High (370)

3.20 Pond 56

Pond 56, a post-mastication vernal pool, was in year 2 of monitoring in 2019. In 2019, Pond 56 was monitored for hydrology, vegetation, and wildlife.

3.20.1 Hydrology Monitoring

Pond 56 was monitored for hydrology ten times (see Table 3-76 and Figure 3-42). The first monitoring event in December was conducted as part of the staff gauge maintenance and only included depth. Final monitoring events in July, August, and September only included depth and were completed as an additional effort to document when the vernal pool dried. Pond 56 did not dry before the last recorded monitoring event on September 9, 2019.

Table 3-76. Pond 56 (Year 2 Post-Mastication) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
12/13/2018	-	-	-	-	-	15	-
1/15/2019	9:27	6.55	9.40	8.22	11.4	35	0.25‡
2/14/2019	9:45	6.39	11.80	7.66	7.1	88	4.86‡
3/5/2019	10:08	6.20	14.26	7.38	2.6	101	5.13‡
4/9/2019	9:15	6.63	16.72	6.47	1.5	99	4.99‡
5/8/2019	13:15	6.55	17.24	3.01	2.8	84	4.49‡
6/6/2019	10:45	6.92	18.53	5.40	10.2	78	3.73‡
7/9/2019	14:40	-	-	-	-	56	-
8/15/2019	9:09	-	-	-	-	36	-
9/9/2019	14:40	-	-	-	-	20	-

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

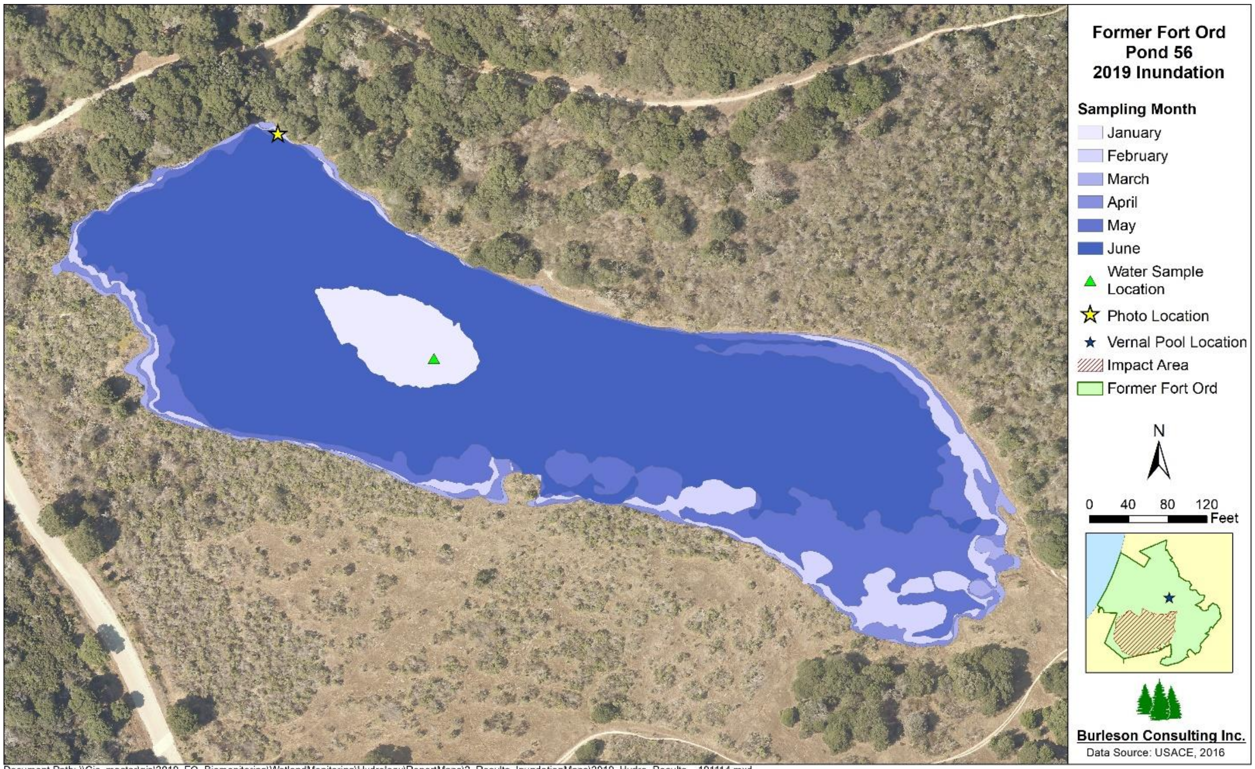

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Figure 3-42. Pond 56 (Year 2 Post-Mastication) Inundation on Former Fort Ord, 2019

3.20.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 56 on July 10, August 15, and September 9, 2019. These monitoring data represent year 2 post-mastication conditions. Standing water with a depth of 20 cm was present during the September 9 monitoring event. Biologists identified five strata at the vernal pool (see Table 3-77 and Figure 3-43). Appendix C provides the species cover results within each stratum. Strata 2 through 5 were repeated from 2015 and 2016. Transects 3 and 4 were repeated from 2016, whereas Transects 2 and 5 were relocated to an area with more representative vegetative composition.

Table 3-77. Pond 56 (Year 2 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	5%
2	19%
3	31%
4	41%
5	0.3%
Upland	4%

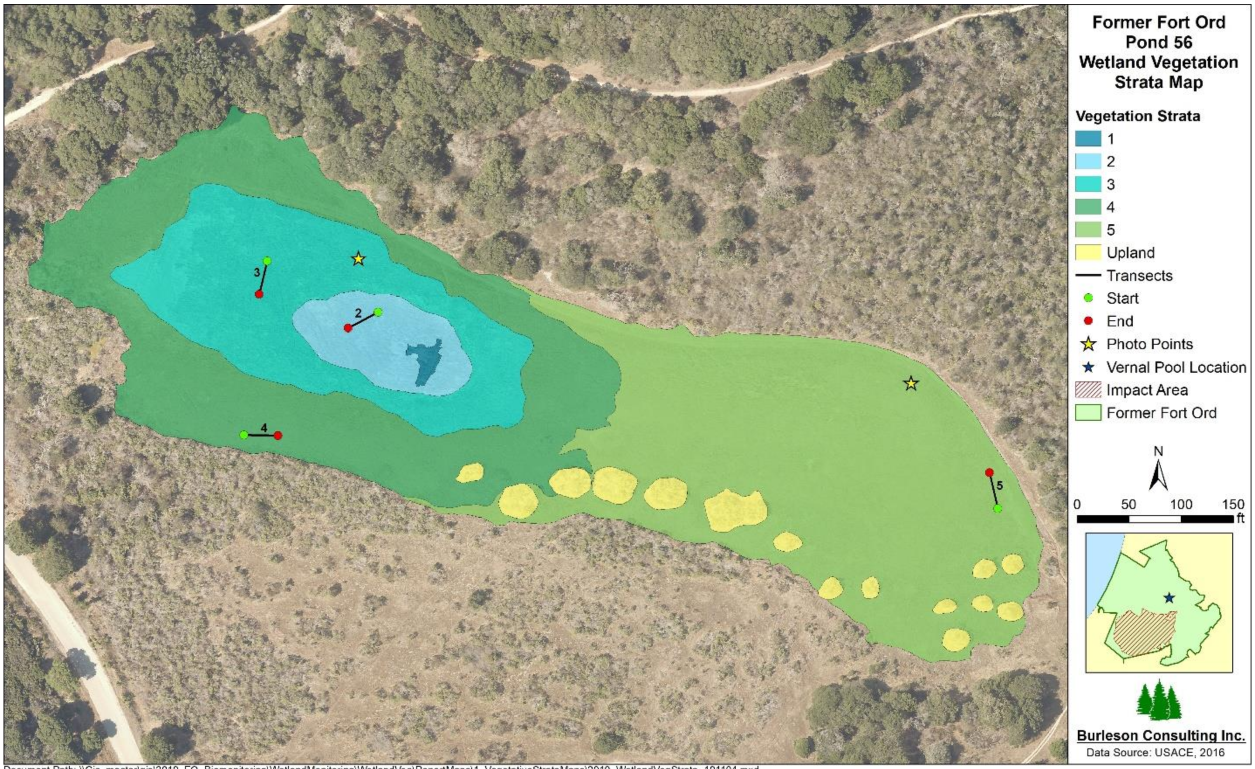

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Figure 3-43. Pond 56 (Year 2 Post-Mastication) Vegetation Strata and Transects on Former Fort Ord, 2019

Seventy-nine plant species were observed within the vernal pool basin boundary. Of these species, 50 were native and 29 were non-native. Additionally, 8 species were OBL wetland plants, 29 were FACW or FAC, 17 were FACU or UPL, and 25 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Stratum 1 consisted of the inundated area with about 90% emergent vegetation, 2% floating vegetation, and 8% open water. Emergent vegetation consisted of pale spikerush. Floating vegetation was open water and smartweed. No transects were placed in the stratum because it was inundated at the time of monitoring. Percent cover was visually assessed for this stratum.

Transect 2 at Pond 56 consisted of a 10-m transect placed in stratum 2. One native plant species, pale spikerush, was observed along the transect and contributed 48% cover (see Appendix C Table C-19). Thatch and bare ground accounted for approximately 32% and 19%, respectively.

Transect 3 at Pond 56 consisted of a 10-m transect placed in stratum 3. Six plant species were observed along the transect. Of these species, five were native and one was non-native. Pale spikerush and salt grass were the dominant species, accounting for approximately 41% and 30% cover, respectively (see Appendix C Table C-19). Thatch was abundant accounting for approximately 23%. Brown-headed rush contributed 2%, while needle spikerush and curly each contributed approximately 1% cover. Bare ground was also present and accounted for approximately 3% cover.

Transect 4 at Pond 56 consisted of a 10-m transect placed in stratum 4. Ten plant species were observed along the transect. Of these species, eight were native and two were non-native. Brown-headed rush was the dominant species, accounting for approximately 47% cover (see Appendix C Table C-19). Thatch was abundant, accounting for approximately 40% cover. Salt grass, coyote thistle, Howell's quillwort, and rabbitfoot grass contributed cover ranging from 2% to 5%. Other species included needle spikerush, pale spikerush, grass poly, Lemmon's canary grass, and bugle hedge nettle.

Transect 5 at Pond 56 consisted of a 10-m transect placed in stratum 5. Ten plant species were observed along the transect. Of these species, seven were native and three were non-native. Brown-headed rush and needle spikerush were the dominant species, accounting for approximately 26% and 14% cover, respectively (see Appendix C Table C-19). Thatch was abundant, accounting for approximately 34%. Pacific bent grass and alkali mallow contributed approximately 8% and 5% cover, respectively, while coyote thistle, grass poly and rabbit foot grass contributed cover ranging from 1% to 2%. Other species included dwarf brodiaea, Howell's quillwort, and chaffweed. Bare ground was also present and accounted for approximately 8% cover.

3.20.3 Wildlife Monitoring

Pond 56 was surveyed for CTS and fairy shrimp on March 14, April 17 and May 13, 2019. California tiger salamanders were present at all three monitoring events while fairy shrimp were present at the March survey event. Table 3-78 and Table 3-79 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-78. Pond 56 (Year 2 Post-Mastication) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
56	3/14/2019§	20	20	23	18-29	21	N/A	N/A	N/A	5 hrs 40 min
	4/17/2019	19	19	38	22-85	31	20	11-51	14	3 hrs 45 min
	5/13/2019	10	10	66	48-106	N/A	36	26-58	27, 29	3 hrs 45 min

*The mean was rounded to the nearest whole number
§SVL not measured, CTS larvae were too small for accurate infield measurements

Table 3-79. Pond 56 (Year 2 Post-Mastication) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/14/2019	Moderate (22)
4/17/2019	Not detected
5/13/2019	Not detected

3.21 Pond 60

Pond 60 was in year 2 post-mastication vernal pool monitoring and year 1 for post-subsurface munitions remediation in 2019. In 2019, Pond 60 was monitored for hydrology, vegetation, and wildlife.

3.21.1 Hydrology Monitoring

Pond 60 was monitored for hydrology ten times (see Table 3-80 and Figure 3-44). The first monitoring event in December was conducted as part of the staff gauge maintenance and only included depth. Final monitoring events in July, August, and September only included depth and were completed as an additional effort to document when the vernal pool dried. Pond 60 did not dry before the last recorded monitoring on September 9, 2019.

Table 3-80. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
12/12/2018	-	-	-	-	-	10	-
1/14/2019	13:43	6.84	11.36	8.47	1.2	33	0.18
2/13/2019	11:22	6.58	9.23	9.10	9.3	84	2.17‡
3/6/2019	8:21	6.36	12.94	5.85	11.5	98	2.48‡
4/3/2019	12:55	6.39	15.04	4.80	3.1	98	2.43‡
5/8/2019	9:11	6.57	16.37	4.12	2.2	84	2.32
6/11/2019	10:05	6.53	20.01	4.27	67.1	76	1.89
7/9/2019	13:30	-	-	-	-	60	-
8/13/2019	13:34	-	-	-	-	37	-
9/9/2019	13:50	-	-	-	-	10	-

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

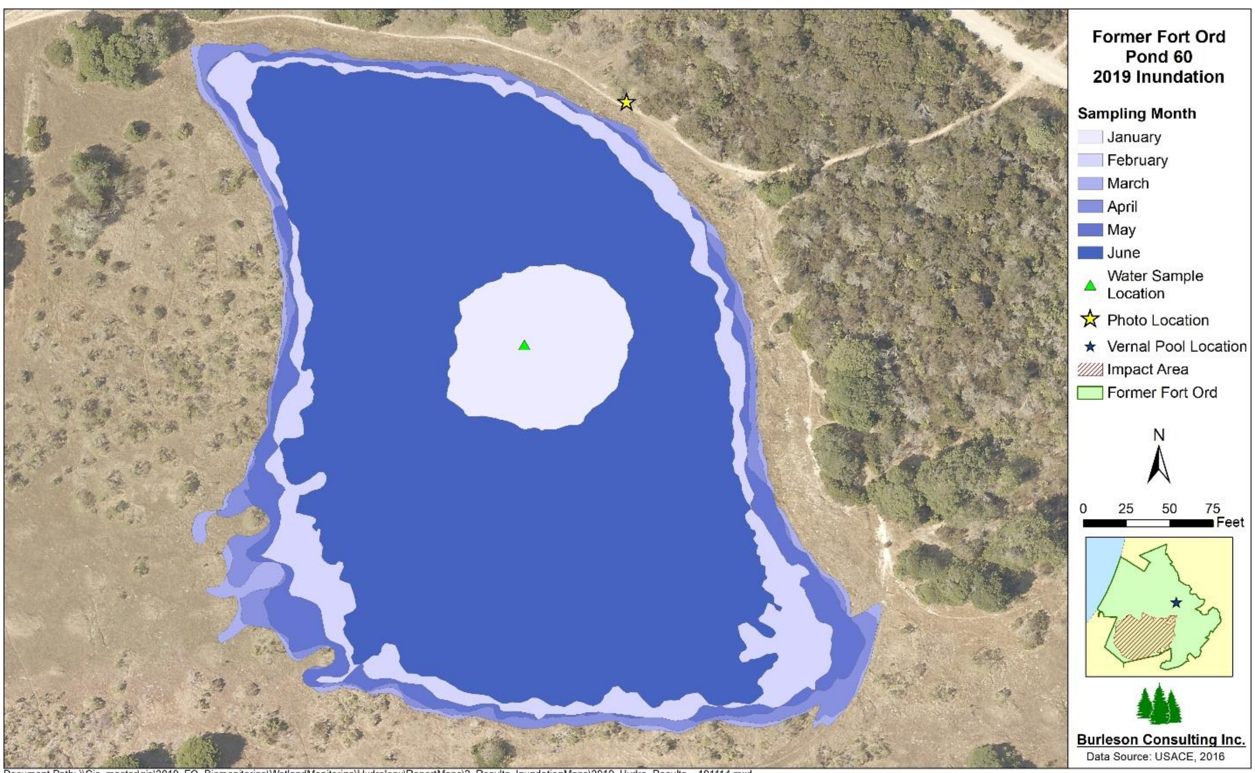

Figure 3-44. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Inundation on Former Fort Ord, 2019

3.21.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 60 on July 23, and September 9, 2019. These monitoring data represent year 2 post-mastication conditions. Standing water with a depth of 10 cm was present during the September 9 monitoring event. Biologists identified four strata at the vernal pool (see Table 3-81 and Figure 3-45). Appendix C provides the species cover results within each stratum. Strata 1 through 4 were repeated from 2015 and 2018. Transects 1 and 2 were repeated from 2018, while Transect 3 was relocated because the previous location was no longer within the correct stratum. Transect 4 was relocated to an area with more representative vegetative composition.

Table 3-81. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	10%
2	46%
3	20%
4	24%

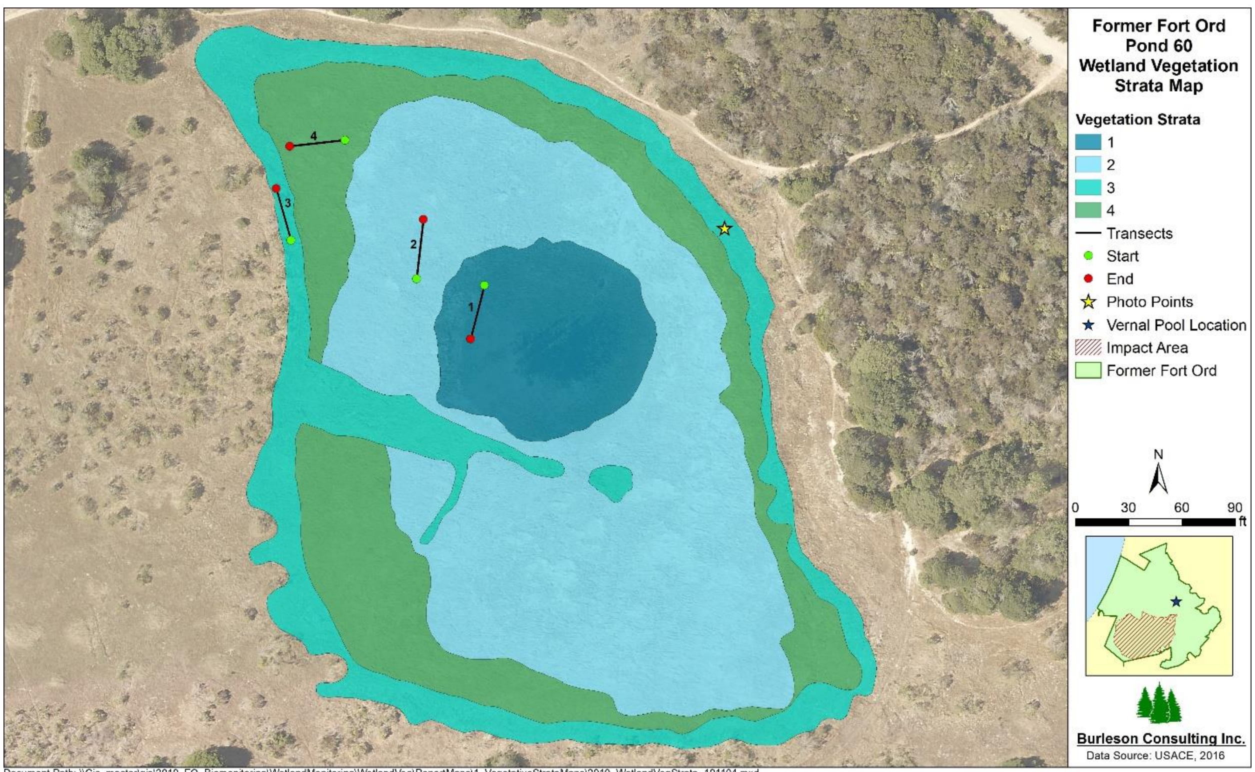

Figure 3-45. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2019

Forty-six plant species were observed within the vernal pool basin boundary. Of these species, 30 were native and 16 were non-native. Additionally, seven species were OBL wetland plants, 18 were FACW or FAC, 7 were FACU or UPL, and 14 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 60 consisted of a 10-m transect placed in stratum 1. An inundated area of 0.002 acres was present in the center of strata 1. Three plant species were observed along the transect. All three species were native. Pale spikerush was the dominant species, accounting for approximately 69% cover (see Appendix C Table C-20). Thatch was fairly abundant accounting for approximately 23% cover. Salt grass and alkali mallow were the other two species observed. Bare ground was also present and accounted for approximately 9%.

Transect 2 at Pond 60 consisted of a 10-m transect placed in stratum 2. Three plant species were observed along the transect. All three were native. Pale spikerush was the dominant species, accounting for approximately 62% cover (see Appendix C Table C-20). Thatch was fairly abundant accounting for approximately 24% cover. Salt grass contributed approximately 11% cover while brown-headed rush was approximately 1% cover. Bare ground was also present and accounted for approximately 2%.

Transect 3 at Pond 60 consisted of a 10-m transect placed in stratum 3. Eleven plant species were observed along the transect. Of these species, five were native and six were non-native. Brown-headed rush was the dominant species, accounting for approximately 72% cover (see Appendix C Table C-20). Thatch was fairly abundant accounting for approximately 12% cover. Salt grass, grass poly, rabbitfoot grass, and bugle hedge nettle and contributed cover ranging from 1% to 3% cover. Other species included annual quaking grass, needle spikerush, Howell’s quillwort, weedy cudweed, curly dock, and prickly sow thistle. Bare ground was also present and accounted for approximately 4%.

Transect 4 at Pond 60 consisted of a 10-m transect placed in stratum 4. Seven plant species were observed along the transect. Of these species, five were native and two were non-native. Pale spikerush and rabbitfoot grass were the dominant species, accounting for approximately 35% and 31% cover, respectively (see Appendix C Table C-20). Thatch was fairly abundant accounting for approximately 17% cover. Salt grass and brown-headed rush contributed 9% and 7% cover, respectively. Other species included brass buttons, needle spikerush, and bugle hedge nettle.

3.21.3 Wildlife Monitoring

Pond 60 was surveyed for CTS and fairy shrimp on March 13, April 15 and May 13, 2019. California tiger salamanders were present at all three monitoring events while fairy shrimp were present at the March survey event. Table 3-82 and Table 3-83 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-82. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
60	3/13/2019 §	5	5	19	10-24	N/A	N/A	N/A	N/A	4 hrs 21 min
	4/15/2019	53	30	36	27-48	29	19	12-25	20, 22, 23	3 hrs 48 min
	5/13/2019	18	18	60	47-81	59, 61	31	23-43	30	2 hrs 40 min

*The mean was rounded to the nearest whole number
§SVL not measured, CTS larvae were too small for accurate infield measurements

Table 3-83. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/13/2019	Low (6)
4/15/2019	Not detected
5/13/2019	Not detected

3.22 Pond 61

Pond 61 was in year 2 of monitoring for post-mastication and year 1 for post-subsurface munitions remediation in 2019. In 2019, Pond 61 was monitored for hydrology, vegetation, and wildlife.

3.22.1 Hydrology Monitoring

Pond 61 was monitored for hydrology five times and dried by May (see Table 3-84 and Figure 3-46). Although Pond 61 was dry at the staff gauge in January, some disparate puddles were observed. January inundation was not mapped because there was no surface hydrological connectivity between the puddles and location of the staff gauge.

Table 3-84. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/15/2019	11:10	-	-	-	-	DRY	0.00‡
2/13/2019	10:40	6.46	9.42	9.34	52.3	20	0.06‡
3/6/2019	9:32	6.48	12.40	5.94	21.1	19	0.12‡
4/3/2019	12:18	6.79†	14.15†	6.01†	17.1†	8	0.04‡
5/8/2019	8:49	-	-	-	-	DRY	0.00

†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

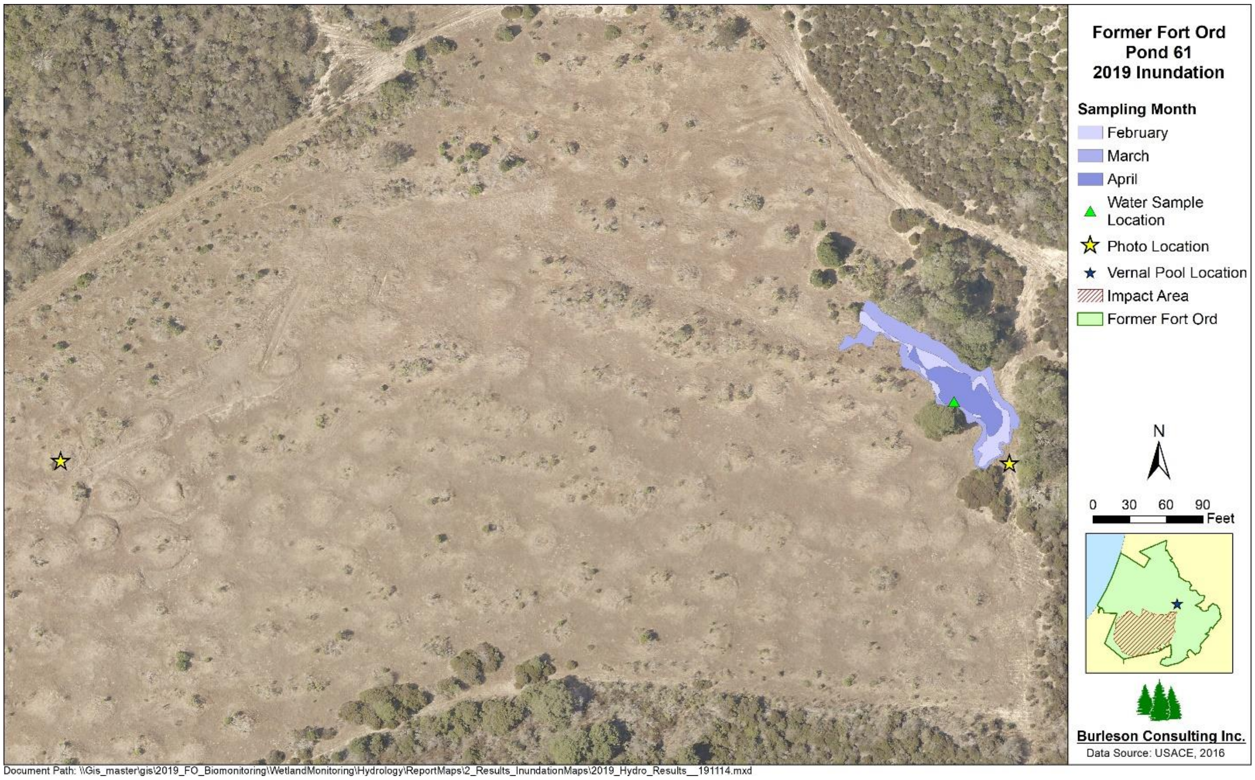

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Figure 3-46. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Inundation on Former Fort Ord, 2019

3.22.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 61 on May 9, May 13, and June 6, 2019. These monitoring data represent year 2 post-mastication and year 1 post-subsurface munitions remediation conditions. Pond 61 was dry by the June 6 monitoring event. Biologists identified four strata at the vernal pool (see Table 3-85 and Figure 3-47). Appendix C provides the species cover results within each stratum. Strata 1 through 4 were repeated from 2017 and 2018. Transect 1 was repeated from 2018, whereas Transect 3 was repeated from 2017 and 2018. Transect 4 was relocated because the previous location was no longer within the correct stratum. Stratum 2 consisted of CCG and no transect was placed in this stratum. Figure 3-47 illustrates the extent and density of the populations at Pond 61. Pig rooting was also observed within Strata 1, 2, and 3 at Pond 61 for a total area of 0.05 acres. The area was mapped and photo documented.

Table 3-85. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	1%
2 (CCG)	4%
3	4%
4	55%
Upland	36%

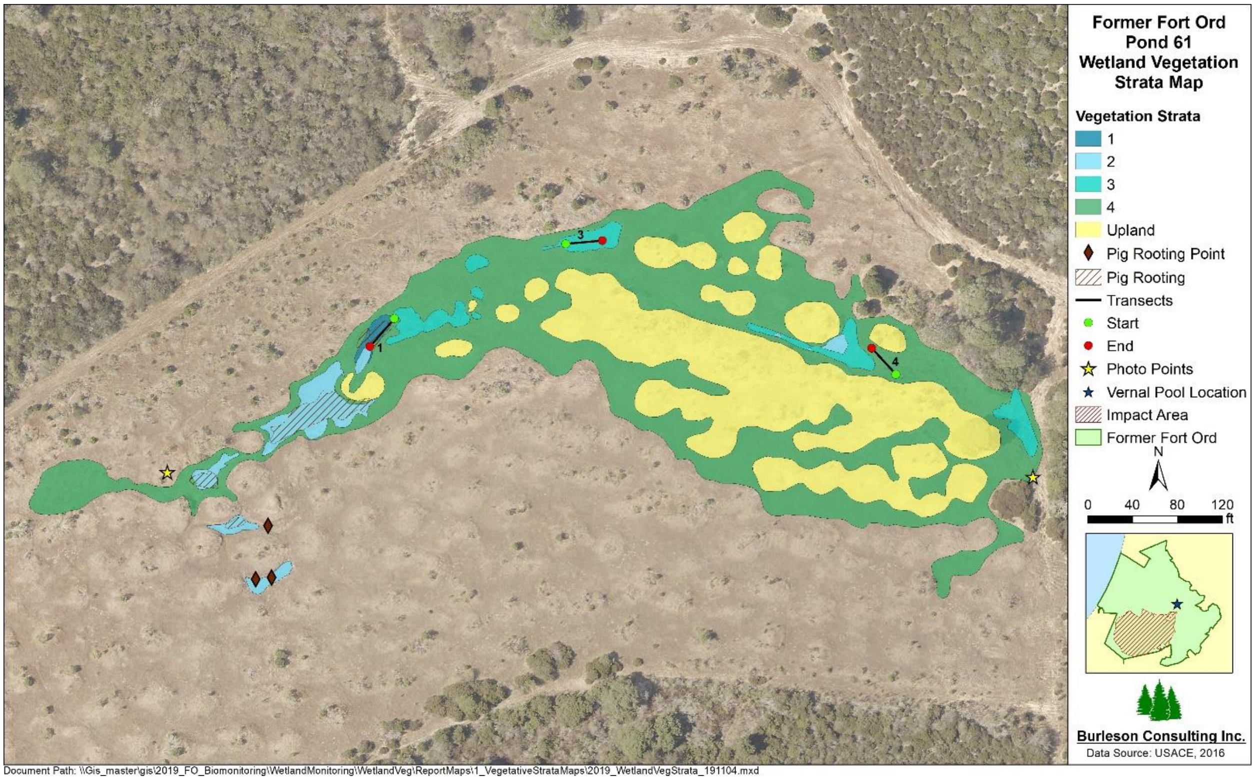

Figure 3-47. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2019

One hundred nineteen plant species were observed within the vernal pool basin boundary. Of these species, 83 were native and 36 were non-native. Additionally, 13 species were OBL wetland plants, 33 were FACW or FAC, 18 were FACU or UPL, and 55 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 61 consisted of a 10-m transect placed in stratum 1. Stratum 1 was heavily impacted by pig rooting. The transect was not completed prior to pig activity due to immature vegetation and saturated soil. It is likely that changes observed on transect 1 are related to pig activity. Twenty-one plant species were observed along the transect. Of these species, 17 were native, three were non-native, and one was unidentified. Howell's quillwort was the dominant species, accounting for approximately 16% cover (see Appendix C Table C-21). Thatch and bare ground were abundant, accounting for approximately 28% and 26%, respectively. Pale spikerush and grass poly accounted for approximately 8% and 5% cover, respectively. Dwarf brodiaea, smooth goldfields, Hickman's popcornflower, rabbitfoot grass, Sacramento mesa mint, and round woolly-marbles contributed cover ranging from 1% to 3%. Other species included vernal pool bent grass, annual quaking grass, California water-starwort (*Callitriche marginata*), aquatic pygmy-weed, annual hair grass, needle spikerush, brown-headed rush, chaffweed, marsh microseris, California plantain, *Pseudognaphalium* sp. and flowering quillwort.

Stratum 2 consisted of CCG and was heavily impacted by pig rooting; however, the area was mapped prior to pig activity. Figure 3-48 illustrates the extent and density of the populations at Pond 61. No transects were placed in stratum 2 to avoid disturbing the population.

Transect 3 at Pond 61 consisted of a 10-m transect placed in stratum 3. Stratum 3 was heavily impacted by pig rooting; however, the area was mapped and transect completed prior to pig activity. Eighteen plant species were observed along the transect. Of these species, 14 were native and four were non-native. Hickman's popcornflower, brown-headed rush, and annual hair grass were the dominant species, accounting for approximately 28%, 17%, and 9% cover, respectively (see Appendix C Table C-21). Thatch was abundant, accounting for approximately 15% cover. Dwarf brodiaea, coyote thistle, and grass poly contributed cover ranging from 4% to 6%. Needle spikerush, smooth goldfields, and round woolly-marbles contributed cover ranging from 1% to 3%. Other species included annual quaking grass, timwort, aquatic pygmy-weed, cut-leaved geranium, chaffweed, marsh microseris, rabbitfoot grass, Sacramento mesa mint, and variegated clover. Bare ground was also present and accounted for approximately 7%.

Transect 4 at Pond 61 consisted of a 10-m transect placed in stratum 4. Thirty-three plant species were observed along the transect. Of these species, 19 were native, 13 were non-native, and one was unidentified. Brown-headed rush was the dominant species, accounting for approximately 30% cover (see Appendix C Table C-21). Thatch was also very abundant and accounted for approximately 22% cover. Cut-leaved geranium accounted for approximately 10% cover, while rattlesnake grass and California oat grass contributed cover ranging from 4% to 5%. Annual quaking grass, coyote thistle, smooth cat's-ear, scarlet pimpernel, grass poly, gumweed, coast tarweed, and marsh microseris contributed cover ranging from 1% to 3%. Other species included Spanish lotus, common yarrow, silvery hair-grass, slender wild oat, dwarf brodiaea, Johnny-Nip, needle spikerush, long-beaked filaree, purple cudweed, keeled bulrush, common toad rush, dwarf rush, Pacific woodrush, chaffweed, gumweed, Hickman's popcornflower, rabbitfoot grass, *Pseudognaphalium* sp., California buttercup, western blue-eyed grass, small-flower catchfly, and common sow thistle. Bare ground was also present and accounted for approximately 9%.

3.22.2.1 *Contra Costa Goldfields*

Contra Costa goldfields at Pond 61 were mapped on May 9, and May 13, 2019: they occupied 0.11 acres with a density of 5-65% cover. Pig activity was observed in 0.05 acres at Pond 61 primarily within the area occupied by CCG. The activity occurred after CCG had been mapped and cover estimates were recorded. Additionally, the CCG had already gone to seed. However, for future monitoring, this disturbance should be taken into consideration. Figure 3-48 illustrates the extent of the CCG population at Pond 61.

Figure 3-48. Contra Costa Goldfields Populations at Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation), 2019

3.22.3 Wildlife Monitoring

Pond 61 was surveyed for CTS and fairy shrimp on March 13, 2019. California tiger salamanders were not detected while fairy shrimp were present at the March survey event. April surveys were cancelled to avoid disturbance to CCG. May surveys were not conducted due to insufficient vernal pool depth. Table 3-86 and Table 3-87 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-86. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
61	3/15/2019	0	-	-	-		-	-	-	24 min

Table 3-87. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/15/2019	High (162)

3.23 Pond 73

Pond 73 was in year 2 of monitoring for post-mastication and year 1 for post-subsurface munitions remediation in 2019. In 2019, Pond 73 was monitored for hydrology, vegetation, and wildlife.

3.23.1 Hydrology Monitoring

Pond 73 was monitored for hydrology six times and dried by June (see Table 3-88 and Figure 3-49). Although Pond 73 was dry at the staff gauge in January, some disparate puddles were observed. However, the ponding in January was not mapped because there was no surface hydrological connectivity between the puddles and location of the staff gauge.

Table 3-88. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/14/2019	13:19	-	-	-	-	DRY	0.00‡
2/13/2019	12:25	6.53	9.75	9.59	43.5	52	0.74‡
3/6/2019	8:50	6.38	12.31	4.97	10.8	56	0.85‡
4/3/2019	13:20	6.42	14.12	2.93	2.4	49	0.76‡
5/8/2019	9:55	6.00	15.39	4.66	2.6	27	0.57
6/11/2019	10:22	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Figure 3-49. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Inundation on Former Fort Ord, 2019

3.23.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 73 on June 18, 2019. These monitoring data represent year 2 post-mastication and year 1 post-subsurface munitions remediation conditions. Pond 73 was dry by the June 18 monitoring event. Biologists identified four strata at the vernal pool (see Table 3-89 and Figure 3-50). Appendix C provides the species cover results within each stratum. Strata 1 and 2 were repeated from 2017 and 2018, whereas stratum 3 was repeated from 2017 and stratum 4 was repeated from 2018. Transect 1 was repeated from 2018 and Transect 2 was repeated from 2017. Transects 3 and 4 were relocated to areas with more representative vegetative composition.

Table 3-89. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	6%
2	77%
3	8%
4	7%
Upland	2%

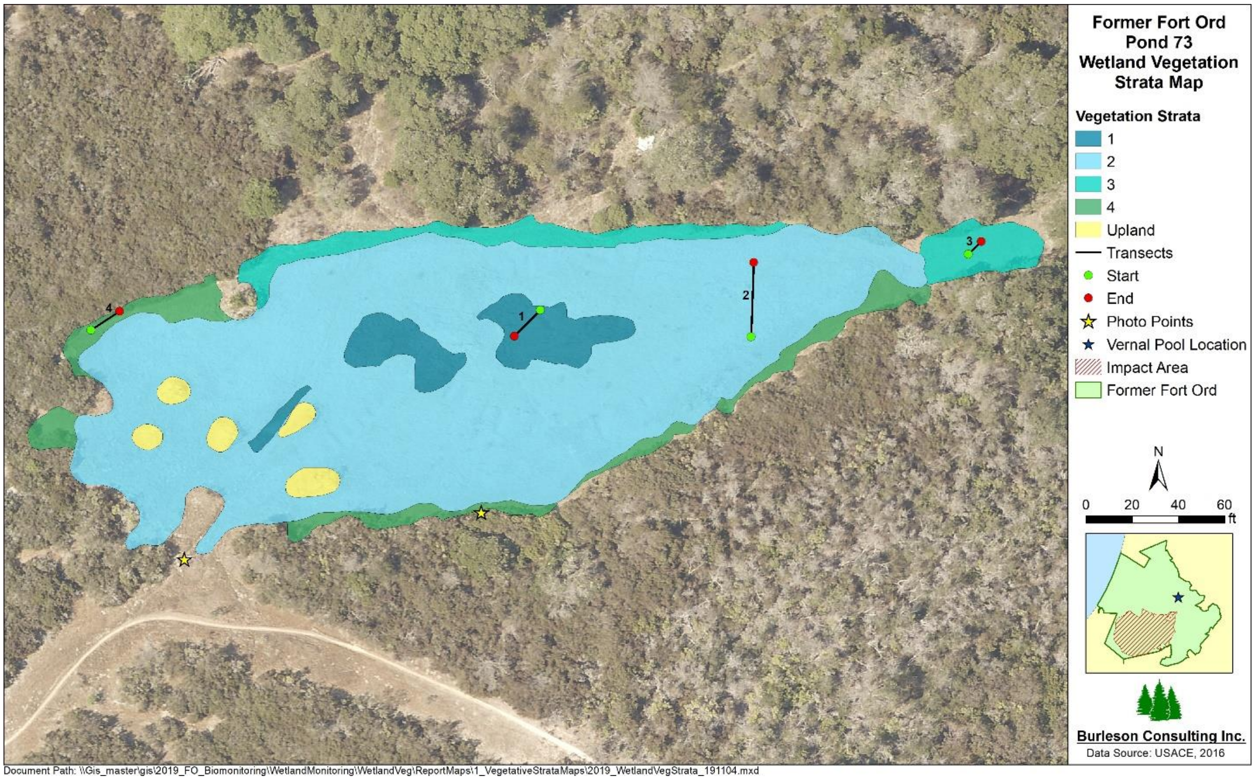

Figure 3-50. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2019

Sixty-two plant species were observed within the vernal pool basin boundary. Of these species, 40 were native, 21 were non-native, and one was unidentified. Additionally, ten species were OBL wetland plants, 25 were FACW or FAC, eight were FACU or UPL, and 19 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 73 consisted of a 5-m transect placed in stratum 1. Six plant species were observed along the transect. Of these species, five were native and one was non-native. Pale spikerush was the dominant species, accounting for approximately 54% cover (see Appendix C Table C-22). Thatch was fairly abundant, accounting for approximately 27% cover. Needle spikerush contributed approximately 12%, while rabbitfoot grass and Hickman's popcornflower contributed approximately 2% and 1% cover, respectively. Annual hair grass and smooth goldfields were the other two species observed. Bare ground was also present and contributed approximately 5% cover.

Transect 2 at Pond 73 consisted of a 10-m transect placed in stratum 2. Twelve plant species were observed along the transect. Of these species, ten were native and two were non-native. Brown-headed rush was the dominant species accounting for approximately 44% (see Appendix C Table C-22). Thatch was also fairly abundant and contributed approximately 22% cover. Coyote thistle and pale spikerush contributed 8% and 6% cover, respectively. Annual hair grass, Howell's quillwort, smooth goldfields, grass poly, Hickman's popcornflower, and rabbitfoot grass contributed cover ranging from 1% to 4%. Other species included dwarf brodiaea, pale spikerush, and chaffweed. Bare ground was also present and contributed approximately 6% cover.

Transect 3 at Pond 73 consisted of a 5-m transect placed in stratum 3. Ten plant species were observed along the transect. Of these species, eight were native and two were non-native. Howell's quillwort was the dominant species, accounting for approximately 48% cover (see Appendix C Table C-22). Thatch was also fairly abundant and contributed 28% cover. Needle spikerush, coyote thistle, brown-headed rush, grass poly, Hickman's popcornflower, and rabbitfoot grass contributed cover ranging from 1% to 5%. Other species included aquatic pygmy-weed, annual hair grass, and round woolly-marbles. Bare ground was also present and contributed 5% cover.

Transect 4 at Pond 73 consisted of a 5-m transect placed in stratum 4. Twelve plant species were observed along the transect. Of these species, nine were native and three were non-native. Coyote thistle was the dominant species, accounting for approximately 36% cover (see Appendix C Table C-22). Bare ground and thatch were also abundant, accounting for approximately 32% and 19% cover, respectively. Needle spikerush, common toad rush, brown-headed rush, grass poly and rabbitfoot grass contributed cover ranging from 1% to 4%. Other species included annual quaking grass, dwarf brodiaea, annual hair grass, chaffweed, round woolly-marbles, and Davy's centaury.

3.23.3 Wildlife Monitoring

Pond 73 was surveyed for fairy shrimp February 21, 2019, and subsequent CTS and fairy shrimp surveys March 14, April 16, and May 13, 2019. No surveys were conducted in January due to insufficient vernal pool depth. California tiger salamanders were not detected while fairy shrimp were present in March. The March fairy shrimp presence was observed in CTS dip nets and not as a part of the fairy shrimp survey. Table 3-90 and Table 3-91 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-90. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
73	3/14/2019	0	-	-	-	-	-	-	-	2 hrs
	4/15/2019	0	-	-	-	-	-	-	-	1 hr 57 min
	5/13/2019	0	-	-	-	-	-	-	-	35 min

Table 3-91. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
2/21/2019	Not detected
3/14/2019	Present*
4/15/2019	Not detected
5/13/2019	Not detected

*Fairy shrimp detected during CTS survey, not during the fairy shrimp survey

3.24 Machine Gun Flats

Machine Gun Flats, a post-mastication vernal pool, was in year 2 of monitoring in 2019. In 2019, Machine Gun Flats was monitored for hydrology, vegetation, and wildlife.

3.24.1 Hydrology Monitoring

Machine Gun Flats was monitored for hydrology nine times (see Table 3-92 and Figure 3-51). The final monitoring events in July, August, and September only included depth and were completed as an additional effort. Machine Gun Flats did not dry before the last recorded monitoring on September 9, 2019.

Table 3-92. Machine Gun Flats (Year 2 Post-Mastication) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/15/2019	10:06	7.24	9.69	7.90	178.0	48	0.24*
2/13/2019	9:23	6.77	8.60	9.73	34.5	128	9.42*
3/7/2019	10:16	6.72	13.20	6.40	10.2	149	10.45*
4/3/2019	14:15	6.62	14.97	2.78	2.8	149	10.20*
5/8/2019	11:18	6.62	17.30	4.51	17.5	134	9.59*
6/6/2019	11:47	7.29	18.13	6.03	10.4	127	9.52*
7/9/2019	15:00	-	-	-	-	109	-
8/13/2019	12:43	-	-	-	-	90	-
9/9/2019	12:35	-	-	-	-	76	-

*No hydrological connectivity between pools. However, both inundation areas were mapped in order to compare to baseline data.

Figure 3-51. Machine Gun Flats (Year 2 Post-Mastication) Inundation on Former Fort Ord, 2019

3.24.2 Vegetation Monitoring

Vegetation monitoring was completed at Machine Gun Flats on May 17, June 13, August 13, and September 9, 2019. These monitoring data represent year 2 post-mastication conditions. Standing water with a depth of 76 cm was present during the September 9 monitoring event. Biologists identified nine strata at the vernal pool (see Table 3-93 and Figure 3-52). Appendix C provides the species cover results within each stratum. Strata 1 through 9 were identified and corresponding transect were established in 2019. Pig rooting was also observed within Stratum 1 at Machine Gun Flats. The area was mapped as 0.01 acres and photo documented.

Table 3-93. Machine Gun Flats (Year 2 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	0.3%
2	61%
3	0.4%
4	8%
5	2%
6	1%
7	10%
8	15%
9	2%
Upland	0.1%

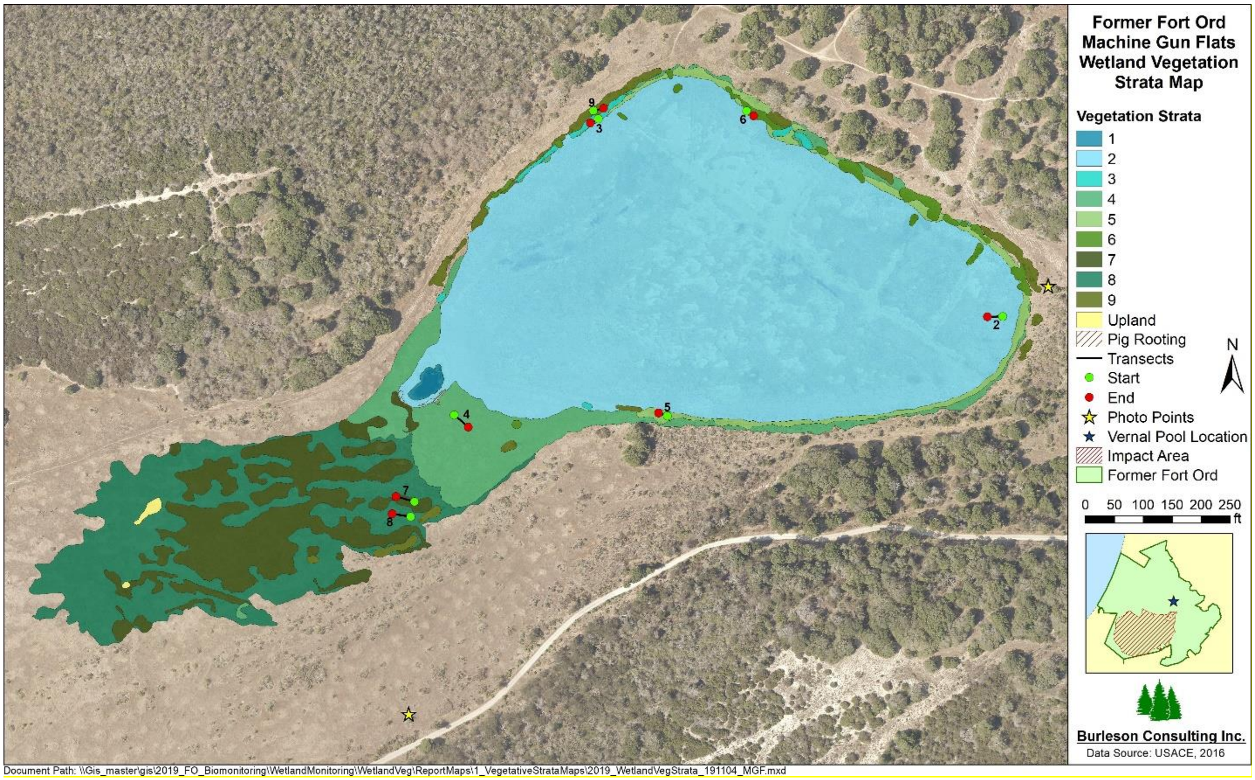

Figure 3-52. Machine Gun Flats (Year 2 Post-Mastication) Vegetation Strata and Transects on Former Fort Ord, 2019

One hundred thirty-one plant species were observed within the vernal pool basin boundary. Of these species, 85 were native, 45 were non-native, and one was unidentified. Additionally, nine species were OBL wetland plants, 45 were FACW or FAC, 27 were FACU or UPL, and 50 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Stratum 1 consisted of the inundated area with about 35% emergent vegetation, 45% floating vegetation, and 20% open water. Emergent vegetation consisted of pale spikerush. Floating vegetation was water smartweed (*Persicaria amphibia*). No transects were placed in the stratum because it was inundated at the time of monitoring. Percent cover was visually assessed for this stratum.

Transect 2 at Machine Gun Flats consisted of a 10-m transect placed in stratum 2. Eleven plant species were observed along the transect. Of these species, seven were native and four were non-native. Pale spikerush was the dominant species accounting for 63% cover (see Appendix C Table C-23). Bare ground and thatch were fairly abundant, accounting for approximately 17% and 12%, respectively. Salt grass, needle spikerush, water smartweed, and rabbitfoot grass contributed cover ranging from 1% to 2%. Other species included Pacific bent grass, brass buttons, Baltic rush, brown-headed rush, grass poly, and flowering quillwort.

Transect 3 at Machine Gun Flats consisted of a 5-m transect placed in stratum 3. Sixteen plant species were observed along the transect. Of these species, seven were native and nine were non-native. Rabbitfoot grass and alkali mallow were the dominant species, accounting for approximately 39% and 18% cover, respectively (see Appendix C Table C-23). Thatch was fairly abundant, accounting for approximately 13% cover. Grass poly and coast tarweed contributed approximately 9% and 7% cover, respectively. Annual quaking grass, coastal tarweed, rough cat's-ear, and cut-leaved plantain contributed cover ranging from 1% to 3% cover. Other species included Pacific bent grass, beardless wild rye, horseweed, Italian rye grass, Baltic rush, weedy cudweed, cottonbatting plant, and cutleaf burnweed.

Transect 4 at Machine Gun Flats consisted of a 10-m transect placed in stratum 4. Nineteen plant species were observed along the transect. Of these species, eight were native and 11 were non-native. Brown-headed rush and coyote thistle were the dominant species, accounting for approximately 19%, and 16% cover, respectively (see Appendix C Table C-23). Thatch was abundant, accounting for approximately 43%. Coastal tarweed, salt grass, cut-leaved geranium, smooth cat's-ear, alkali mallow, common sow thistle, and bugle hedge nettle contributed cover ranging from 1% to 4%. Other species included annual quaking grass, long-beaked filaree, brome fescue, Italian rye grass, pale flax (*Linum bienne*), grass poly, Lemmon's canary grass, Hickman's popcornflower, weedy cudweed, and curly dock. Bare ground was also present and accounted for approximately 1%.

Transect 5 at Machine Gun Flats consisted of a 5-m transect placed in stratum 5. Seven plant species were observed along the transect. Of these species, five were native and two were non-native. Baltic rush was the dominant species, accounting for 46% cover (see Appendix C Table C-23). Thatch was abundant, accounting for approximately 40%. Needle spikerush contributed 5% cover, while salt grass and grass poly each contributed approximately 1% cover. Other species included cut-leaved geranium, brown-headed rush, and alkali mallow. Bare ground was also present and accounted for approximately 5% cover.

Transect 6 at Machine Gun Flats consisted of a 5-m transect placed in stratum 6. Eight plant species were observed along the transect. Of these species, five were native and three were non-native. Baltic rush, needle spikerush, and western goldenrod were the dominant species, accounting for approximately 34%, 16%, and 12% cover, respectively (see Appendix C Table C-23). Thatch and bare ground were fairly abundant, accounting for approximately 22% and 11% cover, respectively. Pale spikerush, grass poly, and rabbitfoot grass each contributed approximately 1% cover. Other species included Pacific bent grass and salt grass.

Transect 7 at Machine Gun Flats consisted of a 10-m transect placed in stratum 7. Twenty-three plant species were observed along the transect. Of these species, 14 were native and nine were non-native. Coyote thistle and cut-leaved plantain were the dominant species, accounting for approximately 11% and 10% cover, respectively (see Appendix C Table C-23). Thatch and bare ground were abundant, accounting for approximately 32% and 30%, respectively. Silvery hair-grass, annual quaking grass, Johnny-Nip, brome fescue, dwarf rush, brown-headed rush, and contributed cover ranging from 1% to 5%. Other species included vernal pool bent grass, dwarf brodiaea, winecup clarkia (*Clarkia purpurea* ssp. *quadrivulnera*), California oat grass, coastal tarweed, needle spikerush, Italian rye grass, purple cudweed, smooth cat's-ear, common toad rush, scarlet pimpernel, chaffweed, round woolly-marbles, and Davy's centuary.

Transect 8 at Machine Gun Flats consisted of a 10-m transect placed in stratum 8. Sixteen plant species were observed along the transect. Of these species, seven were native and nine were non-native. Brome fescue, California oat grass, and Italian rye grass were the dominant species, accounting for approximately 24%, 22%, and 15% cover, respectively (see Appendix C Table C-23). Thatch was abundant, accounting for approximately 23%. Coyote thistle contributed approximately 5% cover, while annual quaking grass, pale flax, and smooth cat's-ear contributed cover ranging from 1% to 2%. Other species included dwarf brodiaea, Johnny-Nip, coastal tarweed, long-beaked filaree, dwarf rush, brown-headed rush, scarlet pimpernel, grass poly, and chaffweed. Bare ground was present and accounted for approximately 3% cover.

Transect 9 at Machine Gun Flats consisted of a 5-m transect placed in stratum 9. Nineteen plant species were observed along the transect. Of these species, eight were native and 11 were non-native. Beardless wild rye was the dominant species, accounting for approximately 22% cover (see Appendix C Table C-23). Thatch was abundant, accounting for approximately 41%. Horseweed and scarlet pimpernel contributed approximately 6% and 8% cover, respectively. While needle spikerush, rough cat's ear, Baltic rush, grass poly, weedy cudweed, cottonbatting plant, cutleaf burnweed, and common sow thistle contributed cover ranging from 1% to 3%. Other species included annual quaking grass, brome fescue, cut-leaved geranium, clustered toad rush, blue toadflax (*Nuttallanthus texanus*), pink everlasting, sheep sorrel, and curly dock. Bare ground was present and accounted for 8% cover.

3.24.2.1 *Contra Costa Goldfields*

The area was surveyed four times between April and June. One individual CCG plant at Machine Gun Flats was mapped on May 17, 2019 (see Figure 3-53).

Figure 3-53. Contra Costa Goldfields Populations at Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation), 2019

3.24.3 Wildlife Monitoring

Machine Gun Flats was surveyed for CTS and fairy shrimp on March 12, April 17, and May 15, 2019. California tiger salamanders were present at all three survey events, while fairy shrimp were present in

March and April. Table 3-94 and Table 3-95 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-94. Machine Gun Flats (Year 2 Post-Mastication) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
Machine Gun Flats	3/12/2019§	11	11	22	14-36	22	23	23	23	7 hrs
	4/17/2019	61	30	47	22-76	55	24	13-37	27	7 hrs
	5/15/2019	40	30	62	36-88	66	34	18-44	28, 40	6 hrs 50 min

*The mean was rounded to the nearest whole number
§SVL measurements are for one individual, all other CTS larvae were too small for accurate infield measurements

Table 3-95. Machine Gun Flats (Year 2 Post-Mastication) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/12/2019	High (277)
4/17/2019	Moderate (13)
5/15/2019	Not detected

3.25 Pond 16

Pond 16 was in year 3 of monitoring for post-mastication and year 1 for post-subsurface munitions remediation in 2019. In 2019, Pond 16 was monitored for hydrology, vegetation, and wildlife.

3.25.1 Hydrology Monitoring

Pond 16 was monitored for hydrology nine times (see Table 3-96 and Figure 3-54). The final monitoring events in July, August, and September only included depth and were completed as an additional effort. Pond 16 did not dry before the last recorded monitoring on September 9, 2019.

Table 3-96. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/17/2019	12:11	-	-	-	-	DRY	0.00
2/12/2019	11:17	6.61	7.33	6.68	360.0	139	0.74‡
3/5/2019	14:35	6.25	10.85	4.70	259.0	136	0.73‡
4/2/2019	12:57	6.15	12.45	3.46	118.0	136	0.73‡
5/7/2019	8:48	6.56	16.76	2.75	60.1	112	0.63
6/10/2019	9:58	6.42	17.94	3.84	86.1	93	0.54
7/9/2019	8:55	-	-	-	-	69	-
8/13/2019	10:26	-	-	-	-	42	-
9/9/2019	11:30	-	-	-	-	18	-

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

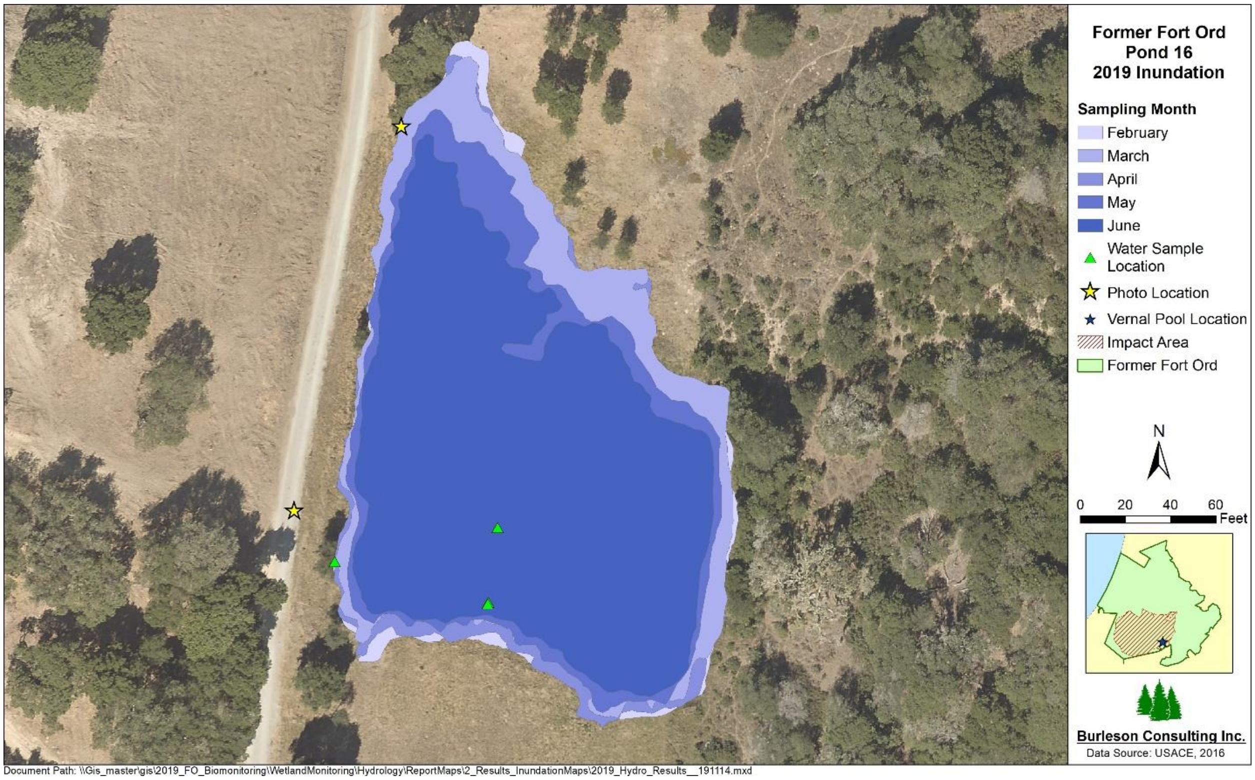

Figure 3-54. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Inundation on Former Fort Ord, 2019

3.25.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 16 on July 23 and September 9, 2019. These monitoring data represent year 3 post-mastication and year 1 post-subsurface munitions remediation conditions. Standing water with a depth of 18 cm was present during the September 9 monitoring event. Biologists identified seven strata at the vernal pool (see Table 3-97 and Figure 3-55). Appendix C provides the species cover results within each stratum. Strata 1 through 4 were repeated from 2015 and 2017. Strata 5 through 7 were repeated from 2017. Transects 1, 5, and 6 were repeated from 2017, whereas Transect 3 was repeated from 2015. Transect 4 was relocated to an area with more representative vegetative composition while Transect 7 was relocated because the previous location was no longer within the correct stratum.

Table 3-97. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	2%
2	11%
3	22%
4	31%
5	32%
6	1%
7	1%

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Figure 3-55. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2019

Eighty-three species were observed within the vernal pool basin boundary. Of these species, 49 were native and 34 were non-native. Additionally, 7 species were OBL wetland plants, 29 were FACW or FAC, 19 were FACU or UPL, and 28 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 16 consisted of a 5-m transect placed in stratum 1. Seven plant species were observed along the transect. Of these species five were native and two were non-native. California bulrush and weedy cudweed were the dominant species, accounting for approximately 28% and 12% cover, respectively (see Appendix C Table C-24). Bare ground was abundant, accounting for approximately 38% cover. Lowland cudweed and Chinese pusley contributed approximately 6% and 7% cover, respectively. Bull thistle contributed approximately 2% cover, while pale spikerush and small-flowered nightshade (*Solanum americanum*) were less than 1%. Thatch was also present and accounted for 5% cover.

Stratum 2 consisted of the inundated area with about 40% emergent vegetation, 25% floating vegetation, 1% submerged vegetation, and 35% open water. Emergent vegetation consisted of pale spikerush, California bulrush, and thatch. Floating vegetation was algae and submerged vegetation consisted of coon's tail (*Ceratophyllum demersum*). No transects were placed in the stratum because it was inundated at the time of monitoring. Percent cover was visually assessed for this stratum.

Transect 3 at Pond 16 consisted of a 10-m transect placed in stratum 3. Four plant species were observed along the transect. Of these species three were native and one was non-native. Pale spikerush was the dominant species, accounting for approximately 69% cover (see Appendix C Table C-24). Bare ground was abundant, accounting for approximately 22% cover. Lowland cudweed contributed approximately 4%, while rabbitfoot grass and alkali mallow contributed 1% cover or less.

Transect 4 at Pond 16 consisted of a 10-m transect placed in stratum 4. Twenty plant species were observed along the transect. Of these species 13 were native and seven were non-native. Clustered field sedge was the dominant species, accounting for approximately 48% cover (see Appendix C Table C-24). California blackberry contributed 9% cover, while Baltic rush and bull thistle contributed cover ranging from 2% to 4%. Thatch was fairly abundant, accounting for approximately 18% cover. Other species included common yarrow, soft chess, annual quaking grass, pale spikerush, beardless wild rye, horseweed, cut-leaved geranium, lowland cudweed, smooth cat's-ear, *Madia* sp., Gairdner's yampah (*Perideridea gairdneri*), rabbitfoot grass, weedy cudweed, West Coast Canada goldenrod (*Solidago elongata*), and bugle hedge nettle. Bare ground was also present, accounting for approximately 3% cover.

Transect 5 at Pond 16 consisted of a 10-m transect placed in stratum 5. Five plant species were observed along the transect. All five were native. Whiteroot (*Carex barbarae*) and California blackberry were the dominant species, accounting for approximately 48% and 11% cover, respectively (see Appendix C Table C-24). Thatch was abundant, accounting for approximately 34% cover. West Coast Canada goldenrod contributed approximately 6% cover. Other species included lowland cudweed and Baltic rush. Bare ground was also present, accounting for 1% cover.

Transect 6 at Pond 16 consisted of a 5-m transect placed in stratum 6. Six plant species were observed along the transect. Of these species three were native, two were non-native, and one was unidentified. Baltic rush was the dominant species, accounting for approximately 52% cover (see Appendix C Table C-24). Thatch was abundant accounting for 35% cover. Pale spikerush and curly dock contributed 3% and 1% cover, respectively. Other species included bull thistle, lowland cudweed, and *Pseudognaphalium* sp. Bare ground contributed approximately 8% cover.

Transect 7 at Pond 16 consisted of a 5-m transect placed in stratum 7. Five plant species were observed along the transect. Of these species two were native and three were non-native. Swamp pricklegrass (*Crypsis schoenoides*) and barnyard grass (*Echinochloa crus-galli*) were the dominant species, accounting for approximately 37% and 32% cover, respectively (see Appendix C Table C-24). Pale spikerush contributed approximately 12% cover. Lowland cudweed contributed approximately 3%, while bull thistle contributed less than 1%. Bare ground and thatch were also present, accounting for 14% and 4% cover, respectively.

3.25.3 Wildlife Monitoring

Pond 16 was surveyed for CTS and fairy shrimp on March 14, April 18, and May 16, 2019. California tiger salamanders were present at all three surveys, while fairy shrimp were present in March. The March and April wildlife surveys were stopped due to the presence of CTS eggs. Following guidance of the BRAC biologist, the surveys were canceled when eggs were observed. The March presence of fairy shrimp was due to detection in CTS dip nets. No fairy shrimp survey was completed in April. Table 3-98 and Table 3-99 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-98. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
16	3/14/2019§	5	5	15	14-16	15, 16	N/A	N/A	N/A	1 hr 40 min‡
	4/18/2019	87	30	56	32-81	46	34	16-48	28, 37	2 hrs 12 min‡
	5/16/2019	46	30	107	81-121	108	54	41-62	52, 55, 56, 57, 58	2 hrs

*The mean was rounded to the nearest whole number
‡Did not complete CTS survey due to CTS egg presence
§SVL not measured, CTS larvae were too small for accurate infield measurements

Table 3-99. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/14/2019	Present*
5/16/2019	Not detected

*Fairy shrimp detected during CTS survey; fairy shrimp survey was not completed in March due to the presence of CTS eggs.

3.26 Pond 54

Pond 54 was in year 3 of monitoring for post-mastication and year 1 for post-subsurface munitions remediation. In 2019, Pond 54 was monitored for hydrology, vegetation, and wildlife. Pond 54 was sampled from the edge of the inundated area due to risk of potential MEC presence within the vernal pool basin boundary.

3.26.1 Hydrology Monitoring

Pond 54 was monitored for hydrology seven times and dried by July (see Table 3-100 and Figure 3-56). The final monitoring event in July only included a depth survey and was completed as an additional effort to document when the vernal pool dried.

Table 3-100. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/17/2019	11:21	6.13	12.09	6.62	127.0	28	0.002‡
2/12/2019	13:19	6.62	9.37	9.16	12.7	46	1.62‡
3/4/2019	15:17	6.70	17.73	11.26	9.1	58	1.95‡
4/2/2019	11:09	6.34†	15.88†	6.82†	2.6†	63	2.00‡
5/6/2019	13:38	5.98	15.57	4.49	6.1	40	1.66‡
6/10/2019	12:42	5.92	20.45	4.99	28.6	15	0.0003
7/9/2019	10:43	-	-	-	-	DRY	0.00

†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

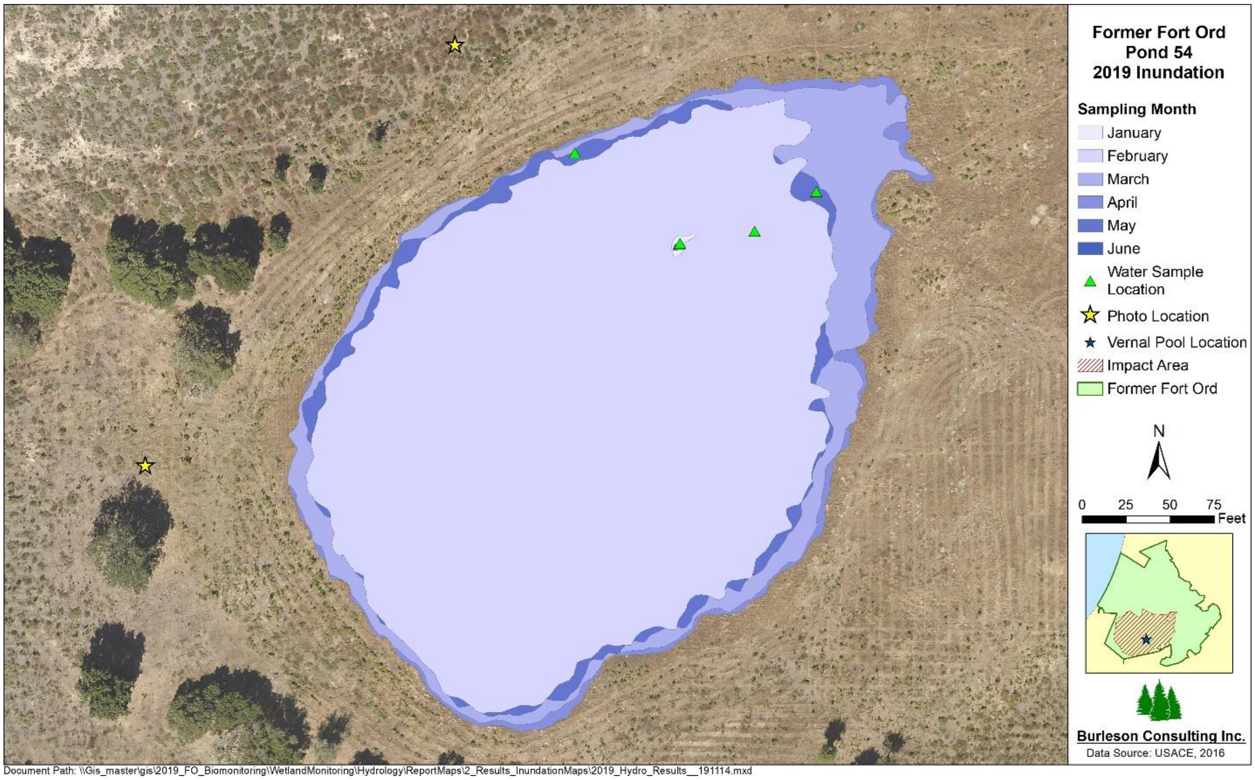

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Figure 3-56. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Inundation on Former Fort Ord, 2019

3.26.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 54 on June 4 and June 26, 2019. These monitoring data represent year 3 post-mastication conditions. Pond 54 was dry by the June 26 monitoring event. Biologists identified four strata at the vernal pool (see Table 3-101 and Figure 3-57). Appendix C provides the species cover results within each stratum. Because Pond 54 has not historically been surveyed for wetland vegetation using the current methodology, strata 1 through 4 were identified and the corresponding transects established in 2019.

Table 3-101. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	55%
2	11%
3	31%
4	2%
Upland	1%

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Figure 3-57. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2019

Seventy-nine plant species were observed within the vernal pool basin boundary. Of these species, 55 were native and 24 were non-native. Additionally, 11 species were OBL wetland plants, 34 were FACW or FAC, 13 were FACU or UPL, and 21 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 54 consisted of a 10-m transect placed in stratum 1. Thirteen plant species were observed along the transect. Of these species, ten were native and three were non-native. Pale spikerush and brown-headed rush were the dominant species, accounting for 40% and 36% cover, respectively (see Appendix C Table C-25). Needle spikerush accounted for approximately 6% cover, while coyote thistle, rabbitfoot grass, and bugle hedge nettle contributed cover ranging from 1% to 3%. Other species included California water-starwort, annual hair grass, cut-leaved geranium, Howell's quillwort, grass poly, Lemmon's canary grass, and Hickman's popcornflower. Thatch and bare ground were also present and accounted for approximately 5% and 3% cover, respectively.

Transect 2 at Pond 54 consisted of a 10-m transect placed in stratum 2. Thirteen plant species were observed along the transect. Of these species, ten were native and three were non-native. Rabbitfoot grass, needle spikerush, and Hickman's popcornflower were the dominant species, accounting for approximately 38%, 22%, and 14%, respectively (see Appendix C Table C-25). Pale spikerush, brown-headed rush, chaffweed, and bugle hedge nettle contributed cover ranging from 1% to 5% cover. Other species included aquatic pygmy-weed, annual hair grass, meadow barley, grass poly, Lemmon's canary grass, and curly dock. Thatch and bare ground were also present and accounted for approximately 8% and 1% cover, respectively.

Transect 3 at Pond 54 consisted of a 10-m transect placed in stratum 3. Twenty plant species were observed along the transect. Of these species, ten were native and ten were non-native. Brown-headed rush and needle spikerush were the dominant species, accounting for approximately 38% and 18% cover, respectively (see Appendix C Table C-25). Thatch was abundant accounting for approximately 17%. Coyote thistle accounted for approximately 9% cover, while annual quaking grass, pale spikerush, grass poly, rabbitfoot grass, and bugle hedge nettle contributed cover ranging from 1% to 4%. Other species included common yarrow, silvery hair-grass, ripgut grass, long-beaked filaree, brome fescue, purple cudweed, cut-leaved geranium, clustered toad rush, round-fruited toad rush, scarlet pimpernel, chaffweed, and common sow thistle. Bare ground was also present and accounted for approximately 5% cover.

Transect 4 at Pond 54 consisted of a 5-m transect placed in stratum 4. Twenty plant species were observed along the transect. Of these species, 11 were native and nine were non-native. Whiteroot and western vervain were the dominant species, accounting for approximately 31% and 22% cover, respectively (see Appendix C Table C-25). Thatch was abundant, accounting for approximately 17%. Scarlet pimpernel accounted for approximately 6% cover, while common yarrow, rattlesnake weed, horseweed, cut-leaved geranium, pink everlasting, and common sow thistle contributed cover ranging from 1% to 4%. Other species included Spanish lotus, hill lotus, silvery hair-grass, coyote brush, annual quaking grass, bull thistle, coastal tarweed, western pearlflower (*Heterocodon rariflorum*), smooth cat's-ear, rabbitfoot grass, and prickly sow thistle. Bare ground was also present and accounted for approximately 6% cover.

3.26.3 Wildlife Monitoring

Pond 54 was surveyed for CTS and fairy shrimp on March 13, April 16, and May 16, 2019. California tiger salamanders were present in April and May, while fairy shrimp were not detected during any survey. Table 3-102 and Table 3-103 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-102. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
54	3/13/2019	0	-	-	-	-	-	-	-	1 hr 54 min
	4/16/2019	14	14	42	27-65	29, 38, 50	24	15-41	18	1 hrs 34 min
	5/16/2019	14	14	83	62-107	108	45	33-58	50, 58	4 min

*The mean was rounded to the nearest whole number

Table 3-103. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/12/2019	Not detected
4/17/2019	Not detected
5/15/2019	Not detected

3.27 Pond 72

Pond 72, a post-mastication and post-subsurface munitions remediation vernal pool, was in year 3 of monitoring in 2019. In 2019, Pond 72 was monitored for hydrology, vegetation, and wildlife. Pond 72 was sampled from the edge of the inundated area due to risk of potential MEC presence within the vernal pool basin boundary.

3.27.1 Hydrology Monitoring

Pond 72 was monitored for hydrology six times and dried by June (see Table 3-104 and Figure 3-58).

Table 3-104. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/17/2019	12:34	6.41	13.29	7.16	101.0	18	0.002‡
2/12/2019	12:45	6.51	7.06	6.70	9.8	51	2.14‡
3/5/2019	15:00	6.75†	14.90†	9.39†	6.3†	56	2.28‡
4/2/2019	12:22	6.36	14.56	8.83	22.0	54	2.20‡
5/7/2019	9:30	6.24	15.04	4.98	2.6	36	0.38‡
6/10/2019	13:15	-	-	-	-	DRY	0.00

†Water quality probe was on its side for measurements.

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

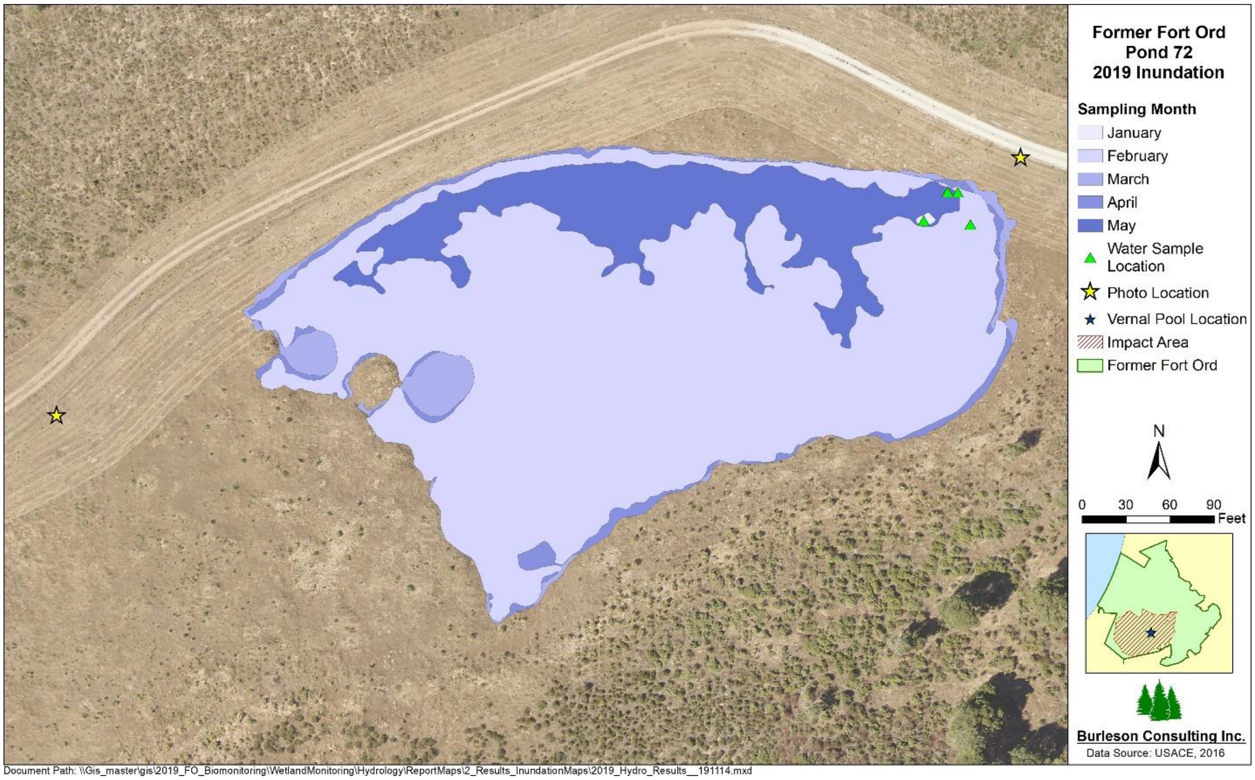

Figure 3-58. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) Inundation on Former Fort Ord, 2019

3.27.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 72 on May 30, 2019. These monitoring data represent year 3 post-mastication conditions. Pond 72 was dry by the May 30 monitoring event. Biologists identified three strata at the vernal pool (see Table 3-105 and Figure 3-59). Appendix C provides the species cover results within each stratum. Strata 1 through 3 were identified and transects established in 2019 because Pond 72 has not been previously surveyed for wetland vegetation.

Table 3-105. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	48%
2	28%
3	18%
Upland	6%

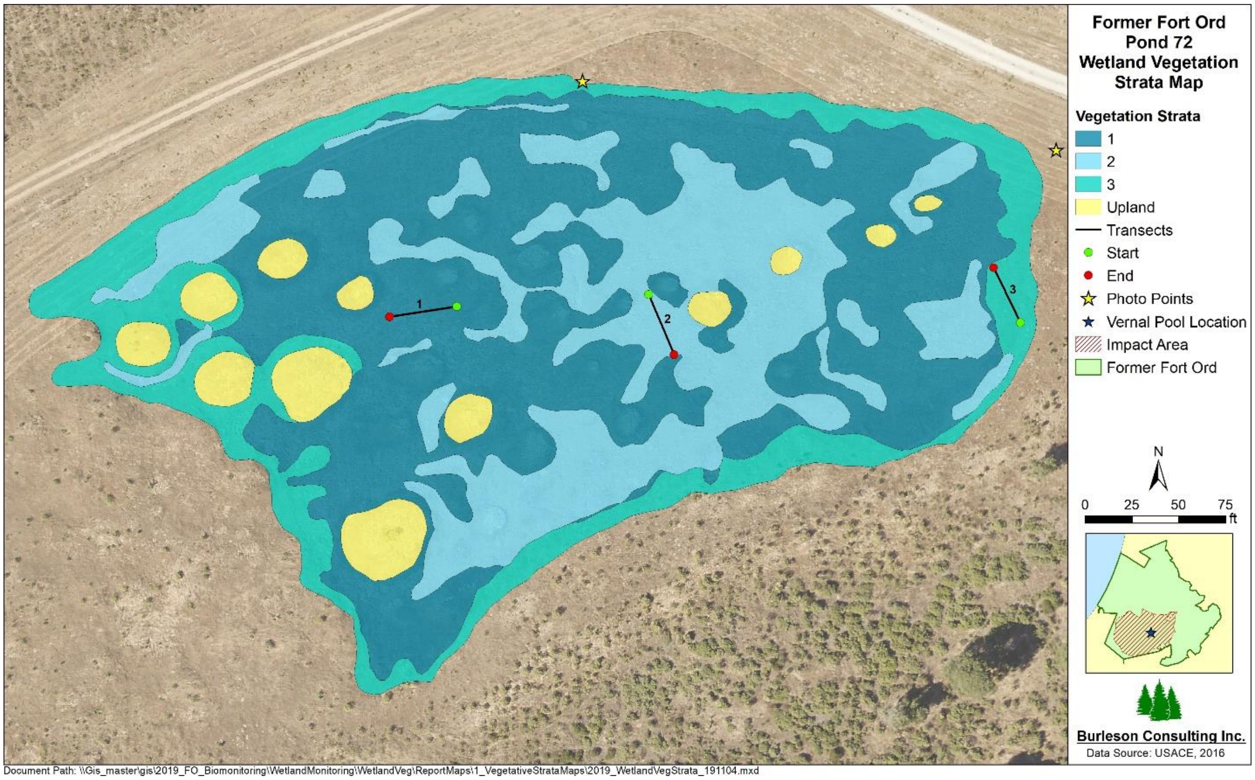

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Figure 3-59. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2019

Sixty-two plant species were observed within the vernal pool basin boundary. Of these species, 44 were native and 18 were non-native. Additionally, ten species were OBL wetland plants, 29 were FACW or FAC, eight were FACU or UPL, and 15 were not-listed. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 72 consisted of a 10-m transect placed in stratum 1. Eleven plant species were observed along the transect. All species were native. Pale spikerush was the dominant species, accounting for 52% cover (see Appendix C Table C-26). Thatch was abundant, accounting for approximately 17%. Smooth goldfields, salt grass, Hickman's popcornflower, meadow barley, and brown-headed rush contributed cover ranging from 2% to 8%. Other species included needle spikerush, coyote thistle, Lemmon's canary grass, Sacramento mesa mint, and California buttercup. Bare ground was also present and accounted for approximately 3% cover.

Transect 2 at Pond 72 consisted of a 10-m transect placed in stratum 2. Fifteen plant species were observed along the transect. Of these species, thirteen were native and two were non-native. Coyote thistle and pale spikerush were the dominant species, accounting for approximately 42% and 12% cover, respectively (see Appendix C Table C-26). Thatch was fairly abundant, accounting for approximately 14%. Annual hair grass, salt grass, needle spikerush, Hickman's popcornflower, and rabbitfoot grass contributed cover ranging from 1% to 7% cover. Other species included smooth goldfields, grass poly, and speedwell (*Veronica peregrina* ssp. *xalapensis*). Bare ground was also present and accounted for approximately 5% cover.

Transect 3 at Pond 72 consisted of a 10-m transect placed in stratum 3. Nine plant species were observed along the transect. Of these species, five were native and four were non-native. Brown-headed rush was the dominant species, accounting for approximately 66% cover (see Appendix C Table C-26). Thatch was abundant, accounting for approximately 27%. Beardless wild rye and cut-leaved geranium contributed cover ranging from 1% to 2%. Other species included salt grass, needle spikerush, coyote thistle, brome fescue, scarlet pimpernel, and grass poly. Bare ground was also present and accounted for approximately 1% cover.

3.27.3 Wildlife Monitoring

Pond 72 was surveyed for fairy shrimp January 24 and February 21, 2019, and subsequent CTS and fairy shrimp surveys March 14, April 16, and May 16, 2019. California tiger salamanders were present at all three survey events, while fairy shrimp were not detected during any survey. Table 3-106 and Table 3-107 provide results of the CTS and fairy shrimp surveys completed in 2019. Invertebrate results for 2019 are provided in Appendix D (see Table D-2).

Table 3-106. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
72	3/14/2019§	7	5	22	20-24	20	N/A	N/A	N/A	2 hr 8 min
	4/16/2019	104	30	59	40-83	49, 67, 72	34	21-50	41	1 hrs 34 min
	5/16/2019	21	21	72	62-87	69	36	29-45	35, 37, 38	4 min

*The mean was rounded to the nearest whole number
§SVL not measured, CTS larvae were too small for accurate infield measurements

Table 3-107. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
1/24/2019	Not detected
2/21/2019	Not detected
3/14/2019	Not detected
4/15/2019	Not detected
5/13/2019	Not detected

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4 DISCUSSION

Data quality objectives (DQO) and performance standards outlined in the Wetland Plan were used to measure successful wetland function following MEC and soil remediation activities (Burleson, 2006). Evaluation for the DQOs was included in the Methods Section 2.4. DQOs are summarized below:

- DQO 1: depth – average of 25 cm through March for CTS and at least 10 cm through May for fairy shrimp
- DQO 2: inundation – consistent with baseline and similar to reference vernal pool trends
- DQO 3: vegetation – similar hydrophytic vegetation as reference control wetlands
- DQO 4: water quality – adequate for the presence of CTS and/or fairy shrimp
- DQO 5: wildlife – consistent with baseline and similar to reference control wetland trends

4.1 Pond 5 – Reference

Pond 5 has been monitored for eleven years as a reference vernal pool. Table 4-1 summarizes the years in which monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 5 (see Figure 4-1). Above-normal water-years were 1994-1995, 2015-2016, 2016-2017, and 2018-2019. All other monitoring was conducted either in a below-normal water-year, drought year, or consecutive drought year.

Table 4-1. Pond 5 (Reference) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year										
	1993-1994	1994-1995	1995-1996	2006-2007	2009-2010	2012-2013	2013-2014	2015-2016	2016-2017	2017-2018	2018-2019
Hydrology	●	●	●	●		●	●	●	●	●	●
Vegetation	●	●	●	●				●	●	●	●
Wildlife	●	●	●	●	●			●	●	●	●

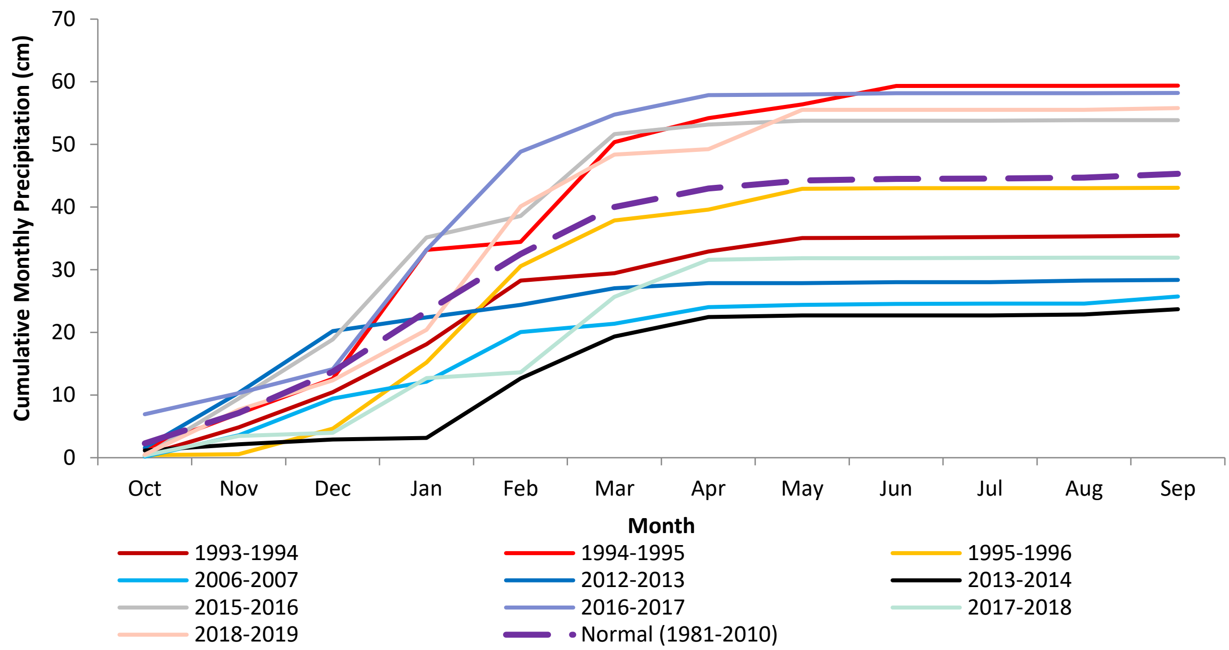

Figure 4-1. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 5 (Reference) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.1.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 5 was 4.83 acres with a maximum depth of approximately 56 cm. The depth and inundation values were within range of previously recorded values (see Appendix F Table F-1). Pond 5 was inundated from the first recorded monitoring in January and through July. Figure 4-2 illustrates the relationship of precipitation and depth at Pond 5 for 2019.

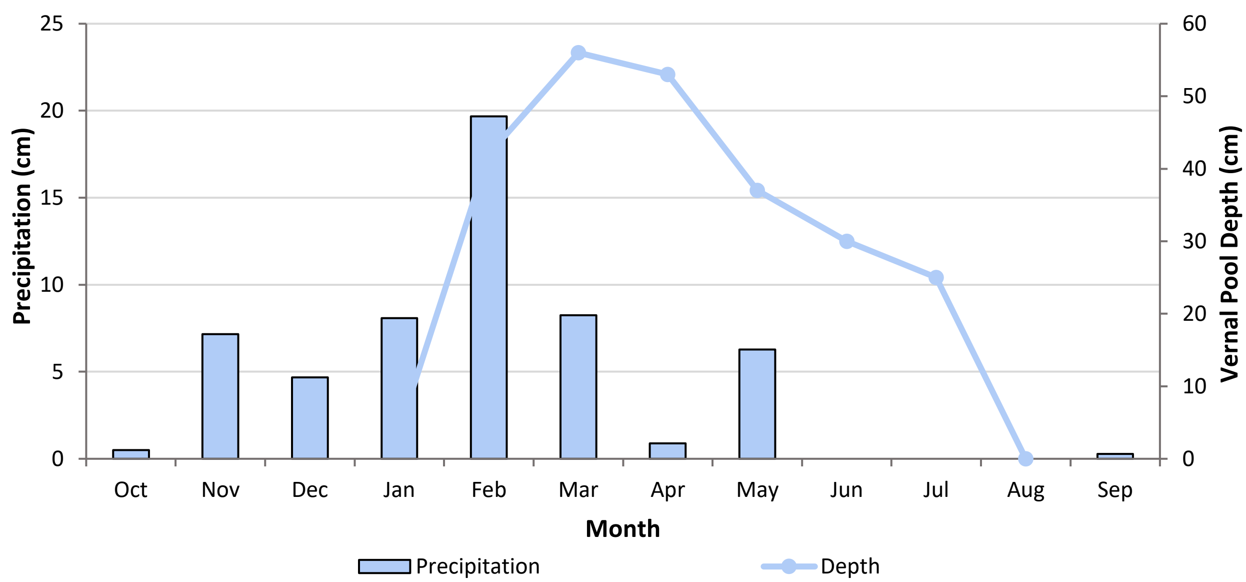

Figure 4-2. Monthly Depth and Precipitation at Pond 5 (Reference) for 2018-2019 Water-Year

In below-normal precipitation years, Pond 5 is likely to range from 0-30 cm in depth with a maximum inundation of 0-3 acres. In normal precipitation years, Pond 5 is likely to have a maximum depth of approximately 40 cm and a maximum inundation of approximately 3-5 acres. In above-normal precipitation years, Pond 5 has maximum depths of 130 cm or more and a maximum inundation of 7.8 acres (see Appendix F Table F-1). Figure 4-3 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-4 illustrates historic and recent inundation areas.

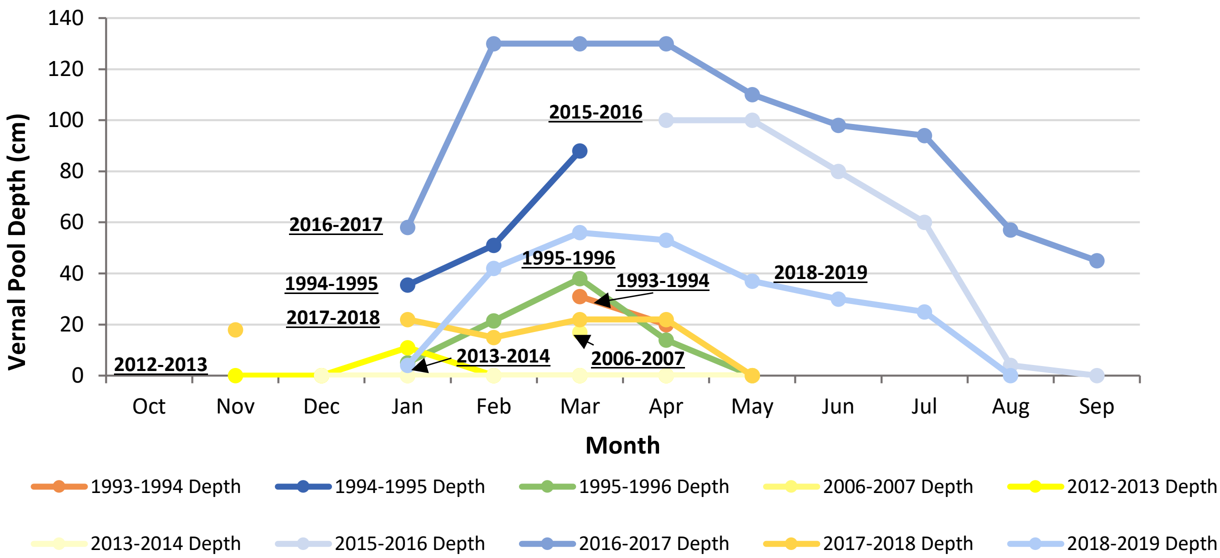

Figure 4-3. Historic Monthly Depths at Pond 5 (Reference). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

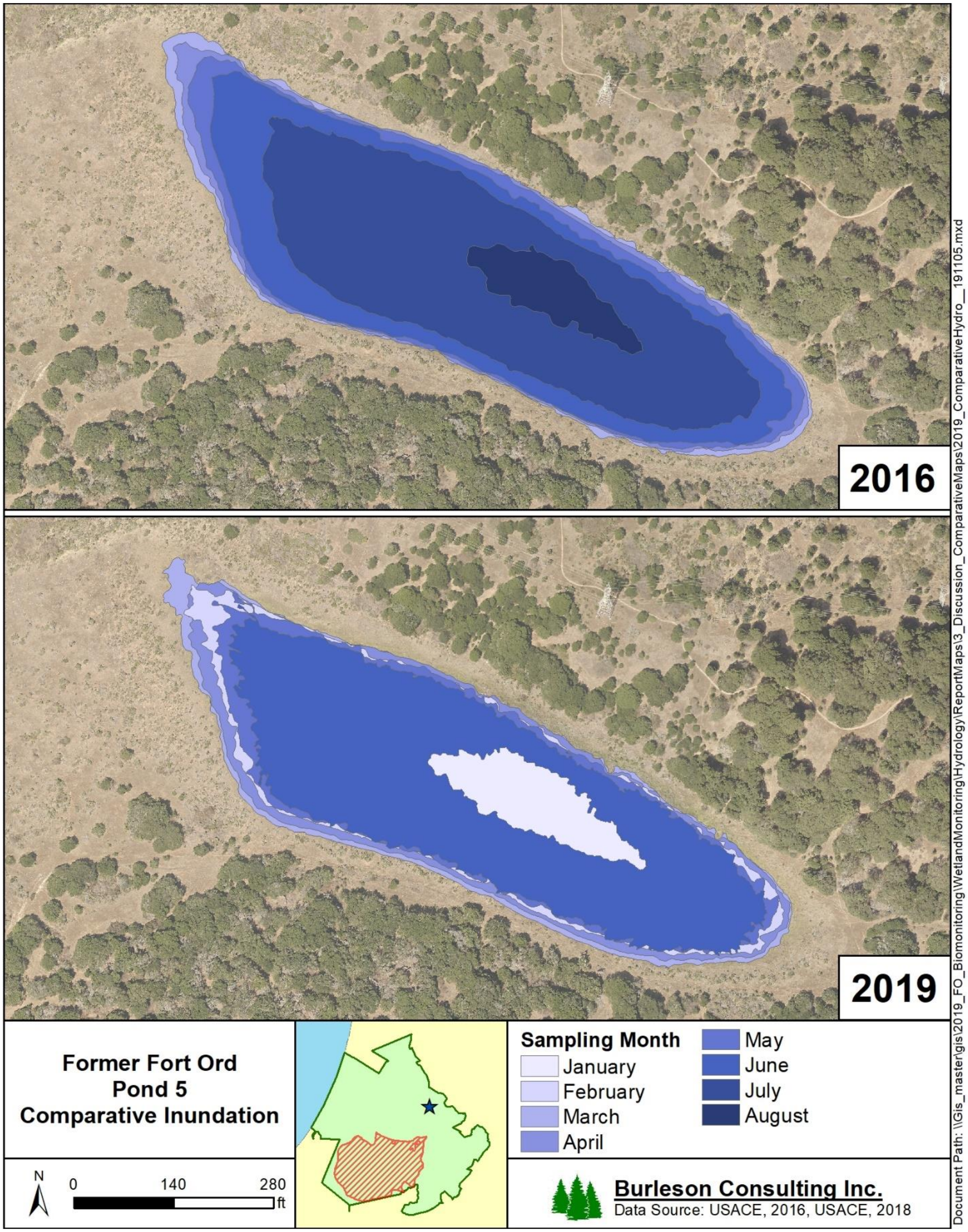

Figure 4-4. Pond 5 (Reference) Inundations for 2015-2016 (above-normal precipitation) and 2018-2019 (above-normal precipitation). Remediation effort did not occur at this vernal pool.

4.1.1.1 *Data Quality Objective 1*

Pond 5 met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 5 provided sufficient depth for CTS (34 cm through March) and fairy shrimp (38 cm through May).

4.1.1.2 *Data Quality Objective 2*

Pond 5 was inundated January through July with an inundation range of 0.47-4.83 acres and a mean of 3.61 acres. The vernal pool was dry by August 13, 2019.

4.1.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 5 is a reference vernal pool and was not required to meet the performance standards. Instead, the vernal pool was used as a control for comparison to the remediated vernal pools.

4.1.2 Vegetation Monitoring

Vegetation data were collected at Pond 5 in 2007, 2016, 2017, 2018, and 2019 (Shaw, 2008; Burleson, 2017, 2018, and 2019). Data from 1994, 1995, and 1996 only represent dominant species and are not included in the following analyses because the data were collected using a different methodology than was used in more recent years (Jones and Stokes, 1996). In 2007, data were collected in three zones using a 1.0 m^2 quadrat placed at three locations within each zone and data for all strata were combined for the entire pool to allow for comparison to other years. In 2016, 2017, 2018, and 2019, data were collected using methodologies described in the Methods section of this report. Data from 2016 and 2019 were compared stratum-to-stratum in Table 4-2 as well as visually in Figure 4-5.

Table 4-2. Pond 5 (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2019
1	26%	23%
2	32%	1%
3	38%	26%
4	4%	1%
6	N/A	45%
7	N/A	4%

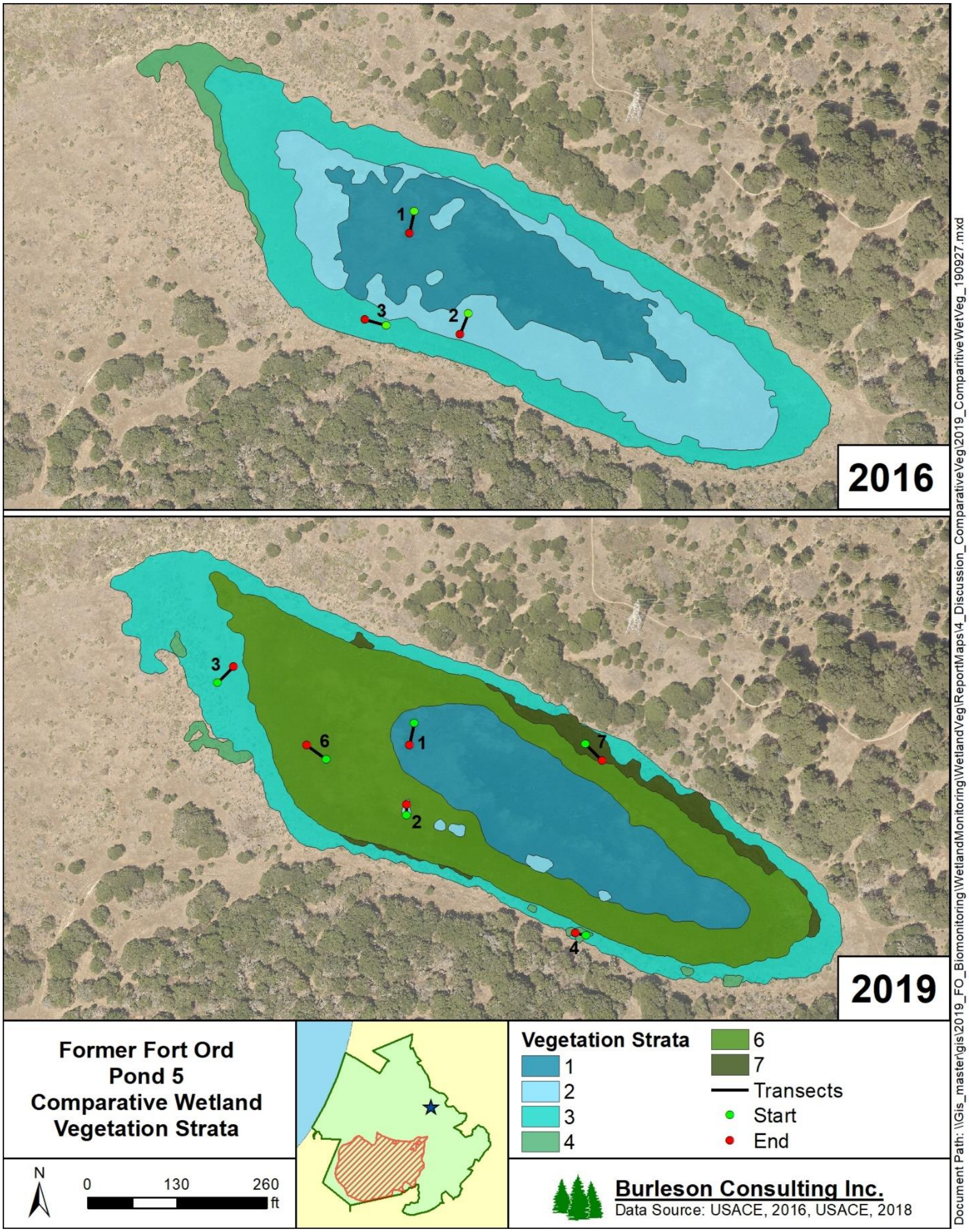

Figure 4-5. Pond 5 (Reference) Vegetation Strata and Transects for 2016 and 2019

The absolute percent vegetative cover observed in 2019 was comparable to previous years and most similar to 2016 (see Table 4-3). Vegetative cover ranged from 36.3% in 2007 to 76.0% in 2019, whereas thatch/bare ground ranged from 24.0% in 2019 to 63.7% in 2007.

Table 4-3. Pond 5 (Reference) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2007	36.3%	63.7%
2016	75.1%	25.2%
2017	60.5%	40.4%
2018	54.6%	45.5%
2019	76.0%	24.0%

Species richness increased between 2007 and 2018, and subsequently decreased slightly on the transects in 2019 at Pond 5. Species richness on transects was 4, 7, 29, 41, and 35 species in 2007, 2016, 2017, 2018, and 2019, respectively, whereas overall basin species richness was 26, 40, 73, 88, and 94 species, respectively (see Table 4-4 and Appendix B Table B-1).

Species composition at Pond 5 varied between monitoring years; however, the dominant species in the vernal pool were pale spikerush (*Eleocharis macrostachya*) and salt grass (*Distichlis spicata*) in all monitoring years. Baltic rush (*Juncus balticus)*, little quaking-grass (*Briza minor*), and rabbitfoot grass (*Polygonum monspeliensis*) contributed more cover in 2019 than has been previously observed. A complete comparison of species composition observed during the surveys at Pond 5 in 2007, 2016, 2017, 2018, and 2019 can be found in Appendix H. Figure 4-6 shows a subset of this comparison for species observed with a 2% cover or greater.

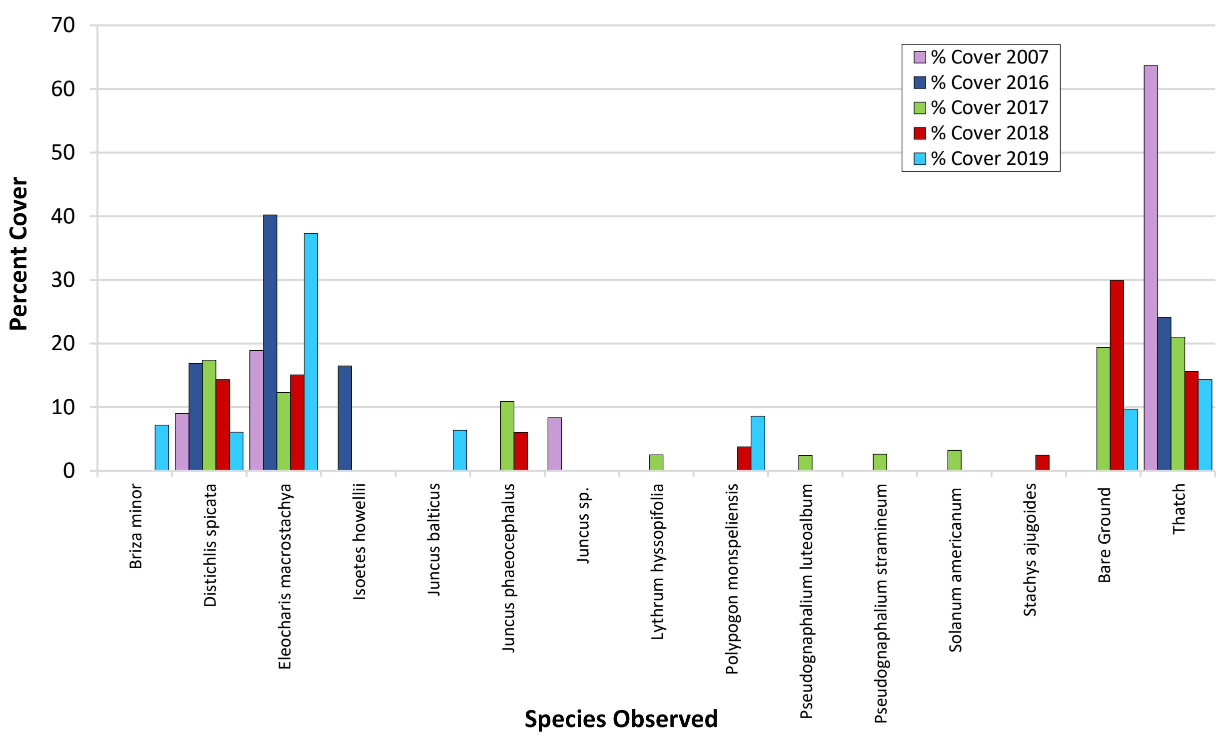

Figure 4-6. Percent Cover of Dominant Species at Pond 5 (Reference)

Native and non-native species richness on Pond 5 transects increased through time until 2018 and decreased slightly in 2019 (see Table 4-4). The relative percent cover of native species varied through time, and the 2019 values were slightly less than the previously observed values. The relative percent cover of non-native species increased through time (see Table 4-5).

Table 4-4. Pond 5 (Reference) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2007	2	1	1
2016	7	0	0
2017	15	11	3
2018	25	16	0
2019	21	14	0

Table 4-5. Pond 5 (Reference) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2007	76.9%	0.3%	22.9%
2016	100.0%	0.0%	0.0%
2017	86.6%	12.9%	0.6%
2018	83.3%	16.7%	0.0%
2019	73.6%	26.4%	0.0%

Wetland and non-wetland species richness on Pond 5 transects increased through time until 2018 and decreased slightly in 2019 (see Table 4-6). The relative percent cover of wetland and non-wetland species varied through time and the 2019 values were within the range of previously observed values (see Table 4-7).

Table 4-6. Pond 5 (Reference) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2007	1	1	0	1	0	1
2016	3	3	0	1	0	0
2017	5	8	5	5	0	6
2018	5	11	7	8	1	9
2019	5	9	4	5	1	11

Table 4-7. Pond 5 (Reference) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2007	52.1%	24.8%	0.0%	0.3%	0.0%	22.9%
2016	75.9%	23.3%	0.0%	0.8%	0.0%	0.0%
2017	26.3%	55.3%	9.6%	8.0%	0.0%	0.8%
2018	33.7%	50.5%	10.2%	3.3%	0.3%	2.0%
2019	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%

4.1.2.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. As a reference vernal pool, Pond 5 was used for comparison to baseline and remediated vernal pools.

4.1.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 5 is a reference vernal pool and was not required to meet the performance standard in 2019. However, the vernal pool provides a control for comparison to the remediated vernal pools.

4.1.3 Wildlife Monitoring

Wildlife data were collected at Pond 5 in 1994, 1995, 1996, 2007, 2010, 2016, 2017, 2018, and 2019 (Jones and Stokes, 1996; Shaw, 2008, 2011; Burleson, 2017, 2018, 2019). Fairy shrimp were detected in 1995 and 2019. California tiger salamander larvae were observed in 1995, 2010, 2016, 2017, and 2019. Table 4-8 shows historic wildlife monitoring results.

Table 4-8. Pond 5 (Reference) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1994	Not detected	Not detected
1995	Abundant	Very low – moderate
1996	Not detected	Not detected
2007	Not detected	Not detected
2010	Few - Common	Not detected
2016	Common - Abundant (101, 75, 100)	Not detected
2017	Common (12, 18, 16)	Not detected
2018	Not detected	Not detected
2019	Common - Abundant (0, 165, 46)	Low (3)

4.1.3.1 *Data Quality Objective 1*

Pond 5 provided suitable depth for CTS and fairy shrimp as discussed in Section 4.1.1.1.

4.1.3.2 *Data Quality Objective 4*

California tiger salamanders and fairy shrimp were present at Pond 5 in 2019; therefore, the water quality was adequate to support both species. Compared to other vernal pools and previous Pond 5 data, the water quality data were within normal ranges. The pH ranged from 6.41 in April to 7.09 in June with a mean of 6.70. Temperatures ranged from 10.55°C in February to 20.32°C in June with a mean of 14.68°C. Dissolved oxygen ranged from 1.71 mg/L in April to 10.24 mg/L in February with a mean of 6.26 mg/L. The turbidity ranged from 0.6 FNU in May to 13.6 FNU in June with a mean of 5.0 FNU (see Table 3-4).

4.1.3.3 *Data Quality Objective 5*

California tiger salamanders were present in 2019. They were also present in 1995, 2010, 2016, and 2017, but were not detected in 1994, 1996, 2007, or 2018. The variation in CTS presence may be associated with rainfall patterns and the resultant vernal pool habitat. Presence was always observed in the surveyed above-normal water years, however CTS were only detected once (2010) in a normal or below normal water-year (see Figure 4-1 and Table 4-8).

Fairy shrimp were present in 2019. Fairy shrimp were previously detected in 1995. Fairy shrimp detection timing has been variable and the species were detected in every month between January and April.

4.1.3.4 *Performance Standard: Wildlife Usage*

Pond 5 is a reference vernal pool and was not required to meet the performance standards. Instead, the vernal pool was used as a control for comparison to remediated vernal pools.

4.1.4 Conclusion

Pond 5 was used for comparison to the remediated vernal pools (see Table 4-9).

Table 4-9. Success at Pond 5 (Reference) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	Suitable for Comparison
	DQO 2	Suitable for Comparison
Plant Cover & Species Diversity	DQO 3	Suitable for Comparison
Wildlife Usage	DQO 1	Suitable for Comparison
	DQO 4	Suitable for Comparison
	DQO 5	Suitable for Comparison

4.2 Pond 101 East (East) – Reference

Pond 101 East (East) was monitored for eleven years as a reference vernal pool. Table 4-10 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 101 East (East) (see Figure 4-7). Above-normal water-years were 2015-2016, 2016-2017, and 2018-2019. All other monitoring was conducted either in a below-normal water-year, drought year, or consecutive drought year.

Table 4-10. Pond 101 East (East) (Reference) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year										
	1991-1992	2000-2001	2006-2007	2009-2010	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Hydrology		●	●		●	●	●	●	●	●	●
Vegetation								●	●	●	●
Wildlife	●	●	●	●				●	●	●	●

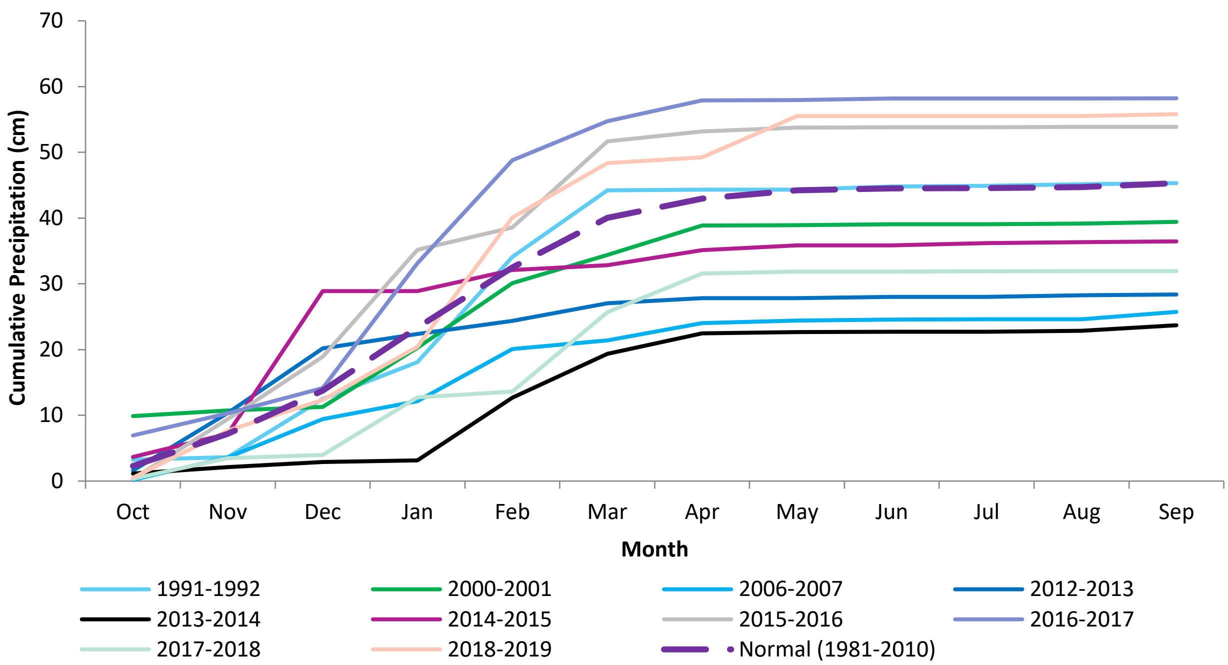

Figure 4-7. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 101 East (East) (Reference) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.2.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 101 East (East) was 2.76 acres with a maximum depth of approximately 56 cm. The depth and inundation values were within range of previously recorded values (see Appendix F Table F-2). Pond 101 East (East) was inundated from the second recorded monitoring in February through June. Figure 4-8 illustrates the relationship of precipitation and depth at Pond 101 East (East) for 2019.

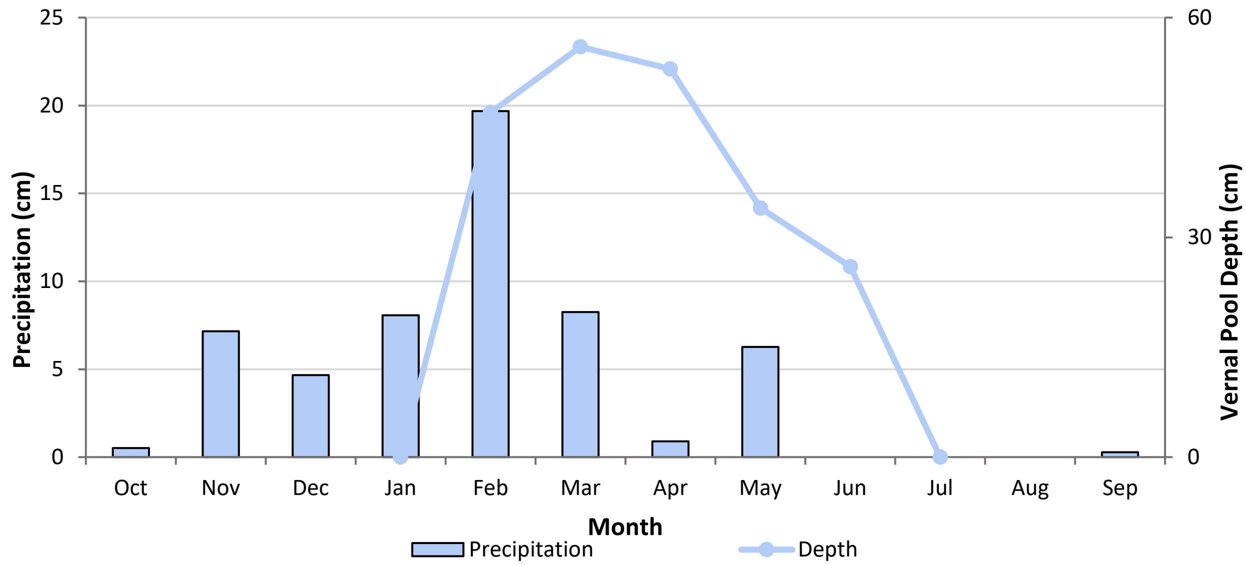

Figure 4-8. Monthly Depth and Precipitation at Pond 101 East (East) (Reference) for 2018-2019 Water-Year

In below-normal precipitation years, Pond 101 East (East) is likely to range from 0-45 cm in depth with a maximum inundation of 0-1.5 acres. In normal precipitation years, Pond 101 East (East) is likely to have a maximum depth of approximately 50 cm and a maximum inundation of approximately 2 acres. In above-normal precipitation years, Pond 101 East (East) could have maximum depths of 160 cm or more and a maximum inundation of 6.5 acres but would likely be connected to Pond 101 East (West), as observed in 2017 (see Appendix F Tables F-2 and F-8). Figure 4-9 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-10 illustrates historic and recent inundation areas.

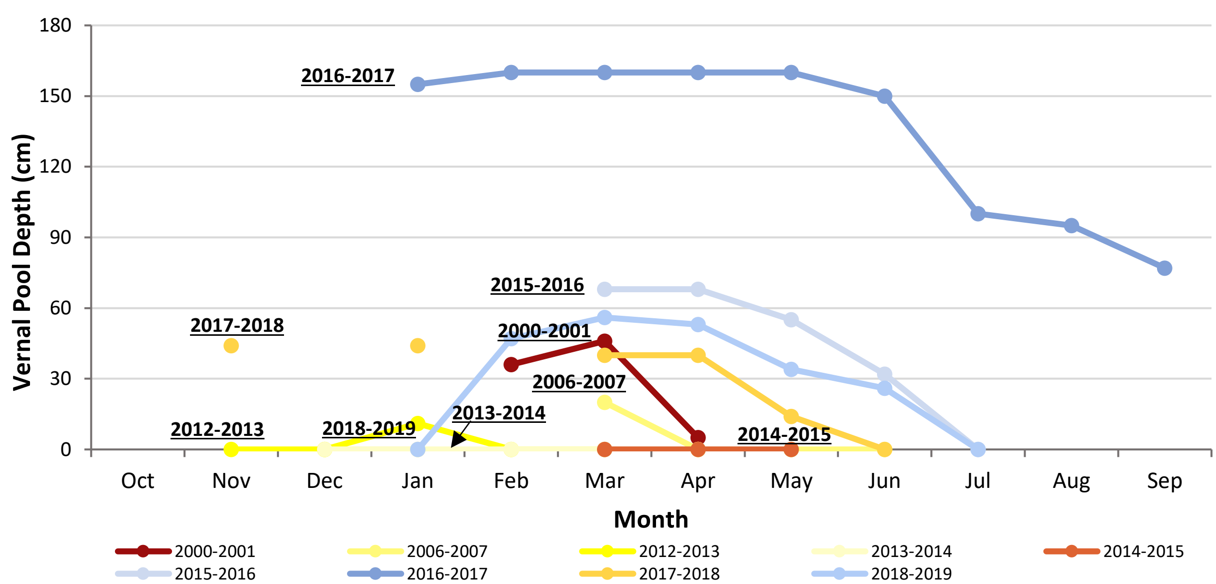

Figure 4-9. Historic Monthly Depths at Pond 101 East (East) (Reference). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

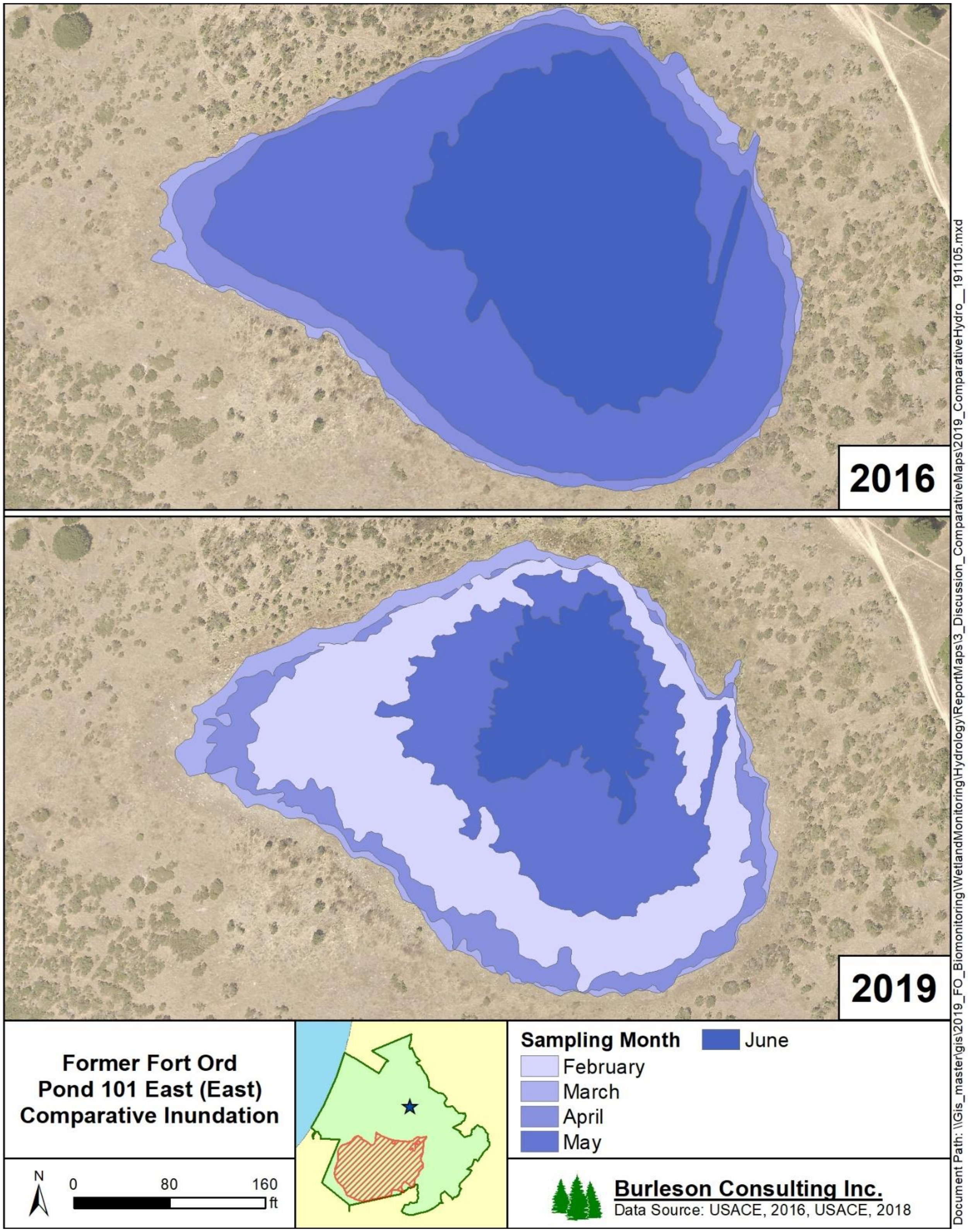

Figure 4-10. Pond 101 East (East) (Reference) Inundations for 2015-2016 (above-normal precipitation) and 2018-2019 (above-normal precipitation). Remediation effort did not occur at this vernal pool.

4.2.1.1 *Data Quality Objective 1*

Pond 101 East (East) met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 101 East (East) provided sufficient depth for both CTS (52 cm through March) and fairy shrimp (48 cm through May).

4.2.1.2 *Data Quality Objective 2*

Pond 101 East (East) was inundated January through June with an inundation range of 0.38-2.76 acres and a mean of 1.80 acres. The vernal pool was dry by July 9, 2019.

4.2.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 101 East (East) is a reference vernal pool and was not required to meet the performance standard. Instead, the vernal pool was used as a control for comparison to the remediated vernal pools.

4.2.2 Vegetation Monitoring

Vegetation data were collected at Pond 101 East (East) in 2016, 2017, 2018, and 2019 (Burleson, 2017, 2018, 2019). In 2016, 2017, 2018, and 2019, data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2019 were compared stratum-to-stratum in Table 4-11 as well as visually in Figure 4-11.

Table 4-11. Pond 101 East (East) (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2019
1	0.4%	N/A
2	48%	34%
3	44%	N/A
4	8%	N/A
5	N/A	46%
6	N/A	20%
7	N/A	N/A

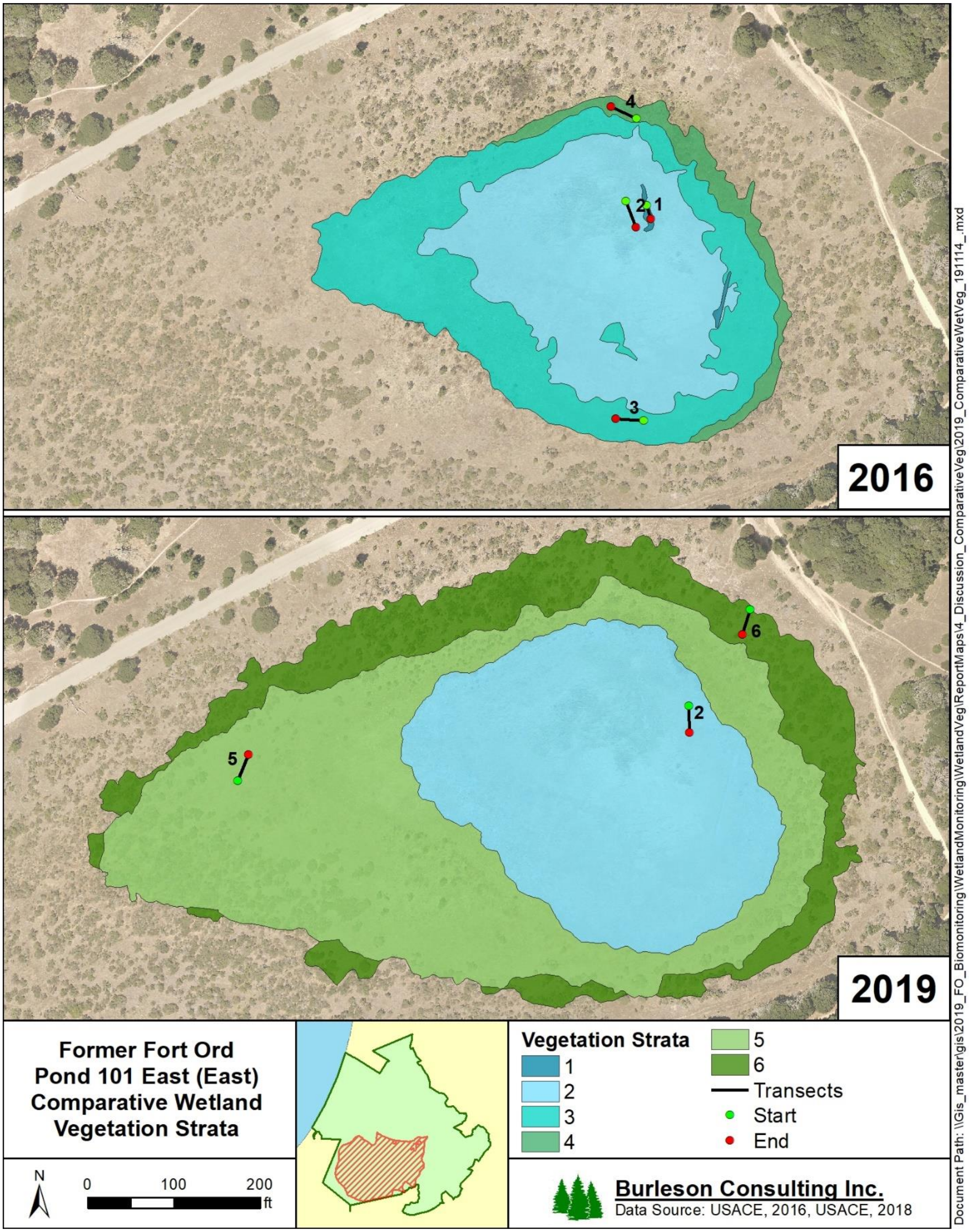

Figure 4-11. Pond 101 East (East) (Reference) Vegetation Strata and Transects for 2016 and 2019

The absolute percent vegetative cover observed in 2019 was comparable to previous years and most similar to 2018 (see Table 4-12). Vegetative cover ranged from 60.7% in 2016 to 84.6% in 2017, whereas thatch/bare ground ranged from 16.6% in 2017 to 41.0% in 2016.

Table 4-12. Pond 101 East (East) (Reference) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2016	60.7%	41.0%
2017	84.6%	16.6%
2018	68.7%	32.6%
2019	72.6%	28.6%

Species richness increased between 2016 and 2018 on the transects and decrease slightly in the overall basin in 2019 at Pond 101 East (East). Species richness on transects was 18, 18, 32, and 37 species in 2016, 2017, 2018, and 2019, respectively, whereas overall basin species richness was 37, 59, 89, and 84 species, respectively (see Table 4-13 and Appendix B Table B-2).

Species composition at Pond 101 East (East) was variable through time, and the dominant species were different between years. Pale spikerush (*Eleocharis macrostachya*) and Baltic rush (*Juncus balticus*) were the dominant species in 2016, Baltic rush (*Juncus balticus*) and purple cudweed (*Gnaphalium palustre*) were the dominant species in 2017, pale spikerush (*Eleocharis macrostachya*), common toadrush (*Juncus bufonius* var. *bufonius)* and alkali mallow (*Malvella leprosa*) were dominant in 2018, and pale spikerush (*Eleocharis macrostachya*), sheep sorrel (*Rumex acetosella*), and Baltic rush (*Juncus balticus*) were dominant in 2019. A complete comparison of species composition observed at Pond 101 East (East) in 2016, 2017, 2018, and 2019 can be found in Appendix H. Figure 4-12 shows a subset of this comparison for species observed with a 2% cover or greater.

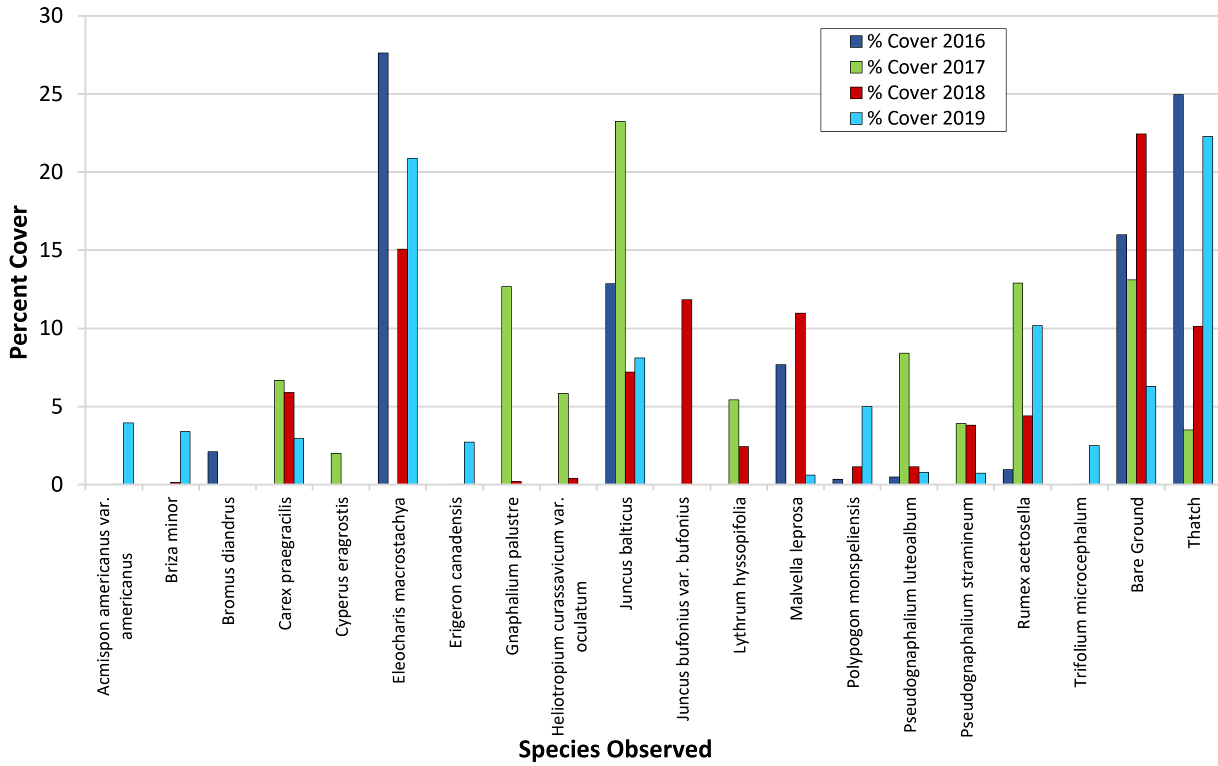

Figure 4-12. Percent Cover of Dominant Species at Pond 101 East (East) (Reference)

Native species richness on Pond 101 East (East) transects increased between 2016 and 2018 and then did not change by 2019 (see Table 4-13). Non-native species richness was more variable between monitoring years, but generally increased by 2019. Native and non-native species relative percent cover were variable, and 2019 values were most similar to 2017 (see Table 4-14). The non-native relative cover in 2017 and 2019 was notably higher than 2016 or 2018 which might be due to the above-normal water-year.

Table 4-13. Pond 101 East (East) (Reference) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2016	9	9	0
2017	13	5	0
2018	18	11	3
2019	18	19	0

Table 4-14. Pond 101 East (East) (Reference) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2016	88.9%	11.1%	0.0%
2017	67.7%	32.3%	0.0%
2018	84.4%	14.7%	0.9%
2019	64.7%	35.3%	0.0%

Wetland species richness on Pond 101 East (East) transects increased between 2016 and 2018, but was relatively static in 2019 (see Table 4-15). Non-wetland species on transects increased from 2016 to 2019. The relative percent cover of wetland species was variable between surveys with a slight decrease in 2019 (see Table 4-16). The relative percent cover of non-wetland species was relatively static between surveys with slight increase in 2018 and 2019.

Table 4-15. Pond 101 East (East) (Reference) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2016	3	6	1	3	0	5
2017	3	8	3	2	0	2
2018	5	9	5	4	2	7
2019	4	8	7	7	3	8

Table 4-16. Pond 101 East (East) (Reference) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2016	48.4%	27.3%	1.0%	15.1%	0.0%	8.2%
2017	8.1%	64.0%	5.3%	15.6%	0.0%	7.0%
2018	28.2%	40.2%	6.0%	22.6%	1.1%	1.8%
2019	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%

4.2.2.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. As a reference vernal pool, Pond 101 East (East) was used for comparison to baseline and remediated vernal pools.

4.2.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 101 East (East) is a reference vernal pool and was not required to meet the performance standard in 2018. However, the vernal pool provides a control for comparison to the remediated vernal pools.

4.2.3 Wildlife Monitoring

Wildlife data were collected at Pond 101 East (East) in 1992, 2001, 2007, 2010, 2016, 2017, 2018, and 2019 (Jones and Stokes, 1992; Harding ESE, 2002; Shaw, 2007; Shaw, 2011; Burleson, 2017, 2018, 2019). California tiger salamander larvae were observed in 1992, 2010, 2016, 2017, 2018 and 2019. Fairy shrimp were detected in 2001 and 2019. Table 4-17 shows historic wildlife monitoring results.

Table 4-17. Pond 101 East (East) (Reference) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1992	Present*	Not detected*
2001	Not detected*	Moderate (100, 12)
2007	Not detected	Not detected
2010	Common*	Not detected*
2016	Common – Abundant (>101, 101, 67)	Not detected
2017	Common (36, 70, 5)	Not detected
2018	Few (2)	Not detected
2019	Common – Abundant (38, 212, 225)	Moderate (32)

*Data do not differentiate between 101 East (East), 101 East (West), and 101 West. They are identified collectively as Pond 101.

4.2.3.1 *Data Quality Objective 1*

Pond 101 East (East) provided suitable depth for CTS and fairy shrimp as discussed in Section 4.2.1.1.

4.2.3.2 *Data Quality Objective 4*

California tiger salamanders and fairy shrimp were present at Pond 101 East (East) in 2019; therefore, the water quality was adequate to support both species. Compared to other vernal pools and previous Pond 101 East (East) data, the water quality data were within normal ranges. The pH ranged from 6.38 in May to 7.13 in June with a mean of 6.74. Temperature ranged from 14.08°C in March to 21.92°C in June with a mean of 16.15°C. Dissolved oxygen ranged from 3.09 mg/L in May to 8.94 mg/L in February with a mean of 5.72 mg/L. Turbidity ranged from 6.1 FNU in April to 79.8 FNU in June with a mean of 23.8 FNU (see Table 3-8).

4.2.3.3 *Data Quality Objective 5*

California tiger salamanders were present in 2019, which was generally consistent with previous monitoring. California tiger salamanders were also present in 1992, 2010, 2016, 2017, and 2018 but were not detected in 2001 or 2007. The lack of CTS in 2001 may have been associated with below-normal precipitation.

Fairy shrimp were present in 2019, which was generally inconsistent with previous surveys. Fairy shrimp were not detected in 1992, 2007, 2010, 2016, 2017, or 2018, but were detected in 2001. It was possible that survey event timing prevented detections since previous fairy shrimp detections were made in February and March and surveys during years with no detections occurred later between March and May.

4.2.3.4 *Performance Standard: Wildlife Usage*

Pond 101 East (East) is a reference vernal pool and was not required to meet the performance standard. Instead, the vernal pool was used as a control for comparison to the remediated vernal pools.

4.2.4 Conclusion

Pond 101 East (East) was used for comparison to the remediated vernal pools (see Table 4-18).

Table 4-18. Success at Pond 101 East (East) (Reference) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	Suitable for Comparison
	DQO 2	Suitable for Comparison
Plant Cover & Species Diversity	DQO 3	Suitable for Comparison
Wildlife Usage	DQO 1	Suitable for Comparison
	DQO 4	Suitable for Comparison
	DQO 5	Suitable for Comparison

4.3 Pond 997 – Reference

Pond 997 was monitored for three years as a reference vernal pool, although approximately 13% of vegetation within the Pond 997 watershed was masticated in 2017. Table 4-19 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 997 (see Figure 4-13). The 2016-2017 and 2018-2019 water-years were above-normal, whereas the 2017-2018 water-year was below-normal.

Table 4-19. Pond 997 (Reference) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year		
	2016-2017	2017-2018	2018-2019
Hydrology	●	●	●
Vegetation	●	●	●
Wildlife	●		●

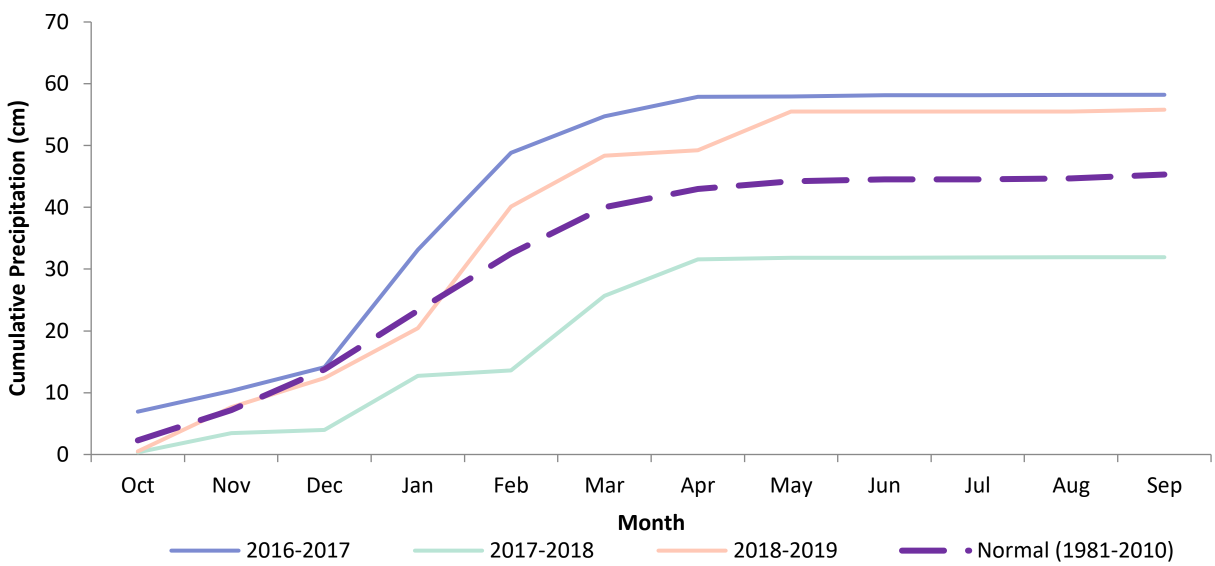

Figure 4-13. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 997 (Reference) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.3.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 997 was 0.12 acres with a maximum depth of approximately 14 cm. The depth and inundation values were within range of previously recorded values (see Appendix F Table F-3). Pond 997 was inundated from the second recorded monitoring in February through April. Figure 4-14 illustrates the relationship of precipitation and depth at Pond 997 for 2019.

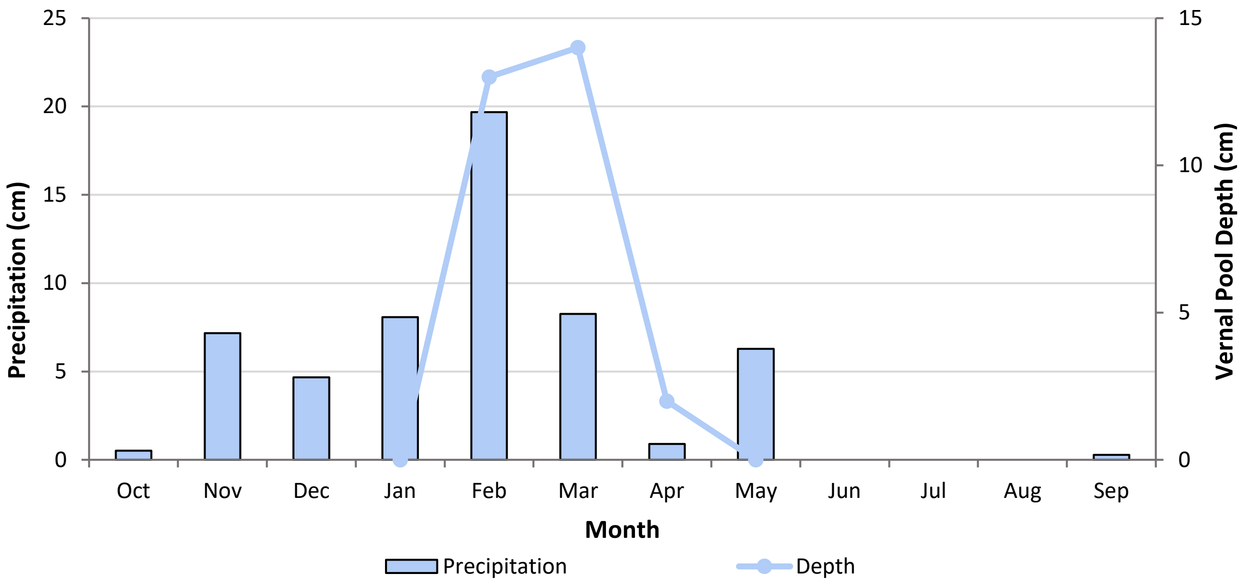

Figure 4-14. Monthly Depth and Precipitation at Pond 997 (Reference) for 2018-2019 Water-Year

Pond 997 was inundated in 2017 and 2019 but was dry in 2018. These inundations were between 0.02 and 0.33 acres. In below-normal precipitation years, Pond 997 may remain dry as observed in 2018. No depths or inundations for Pond 997 have been recorded in normal precipitation years. In above-normal precipitation years, Pond 997 could have maximum depths of 15 cm or more and a maximum inundation of 0.33 acres (see Appendix F Table F-3). Figure 4-15 illustrates historic vernal pool depths by month and organized by water-year.

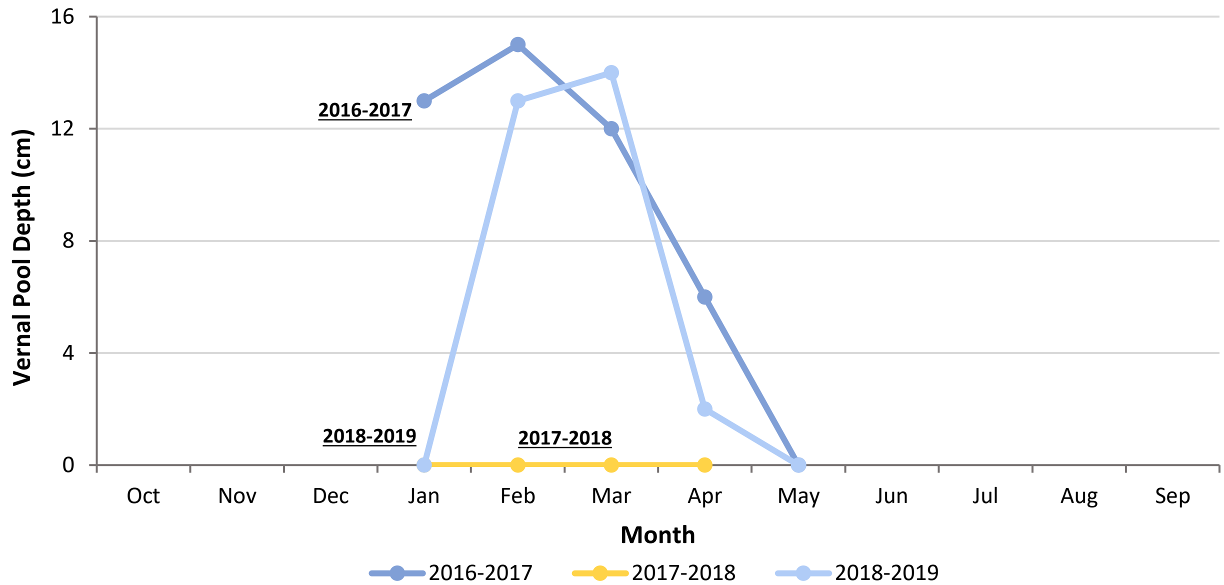

Figure 4-15. Historic Monthly Depths at Pond 997 (Reference). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

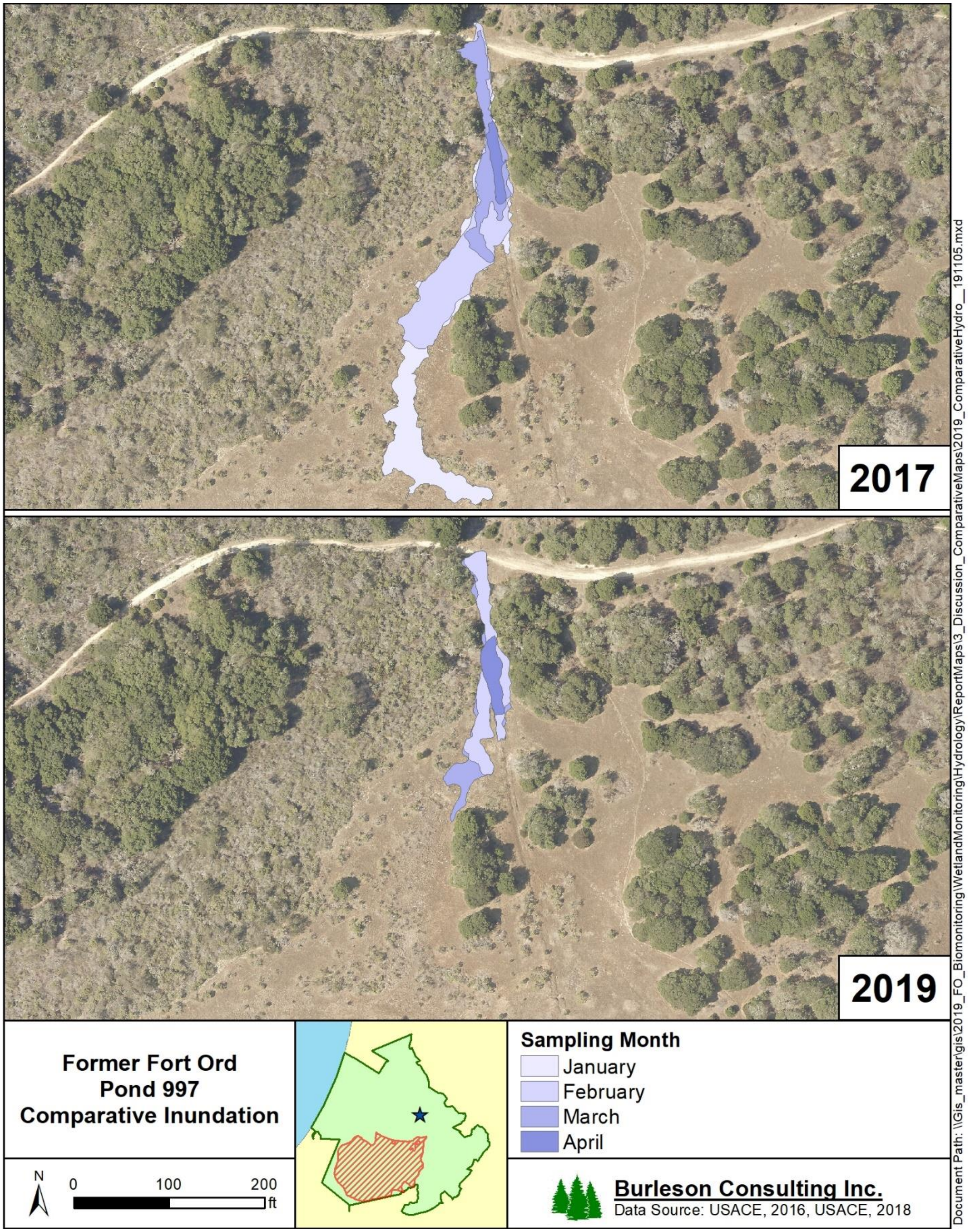

Figure 4-16. Pond 997 (Reference) Inundations for 2016-2017 (above-normal precipitation) and 2018-2019 (above-normal precipitation). Remediation effort did not occur at this vernal pool.

4.3.1.1 *Data Quality Objective 1*

Pond 997 did not meet the required average depths of 25 cm from the first rain event through March for CTS or 10 cm for 18 consecutive days through May for fairy shrimp. Pond 997 did not provide sufficient depth for either CTS (14 cm through March) or fairy shrimp (10 cm through April) and was dry by the May survey.

4.3.1.2 *Data Quality Objective 2*

Pond 997 was inundated February through April with an inundation range of 0.03-0.12 acres and a mean of 0.09 acres. The vernal pool was dry by May 9, 2019.

4.3.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 997 is a reference vernal pool and was not required to meet the performance standard. Instead, the vernal pool was used as a control for comparison to the remediated vernal pools.

4.3.2 Vegetation Monitoring

Vegetation data were collected at Pond 997 in 2017, 2018, and 2019 (Burleson, 2018, 2019). In 2017, 2018, and 2019, data were collected using the methodology described in the Methods section of this report. Data from 2018 and 2019 were compared stratum-to-stratum in Table 4-20 as well as visually in Figure 4-17.

Pond 997 also supports a CCG population, located in stratum 2. The population was mapped and a visual estimate of percent cover was recorded in 2019 to compare to 2017 and 2018 (see Figure 4-19 in Section 4.3.2.1).

Table 4-20. Pond 997 (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2017	2019
1	3%	7%
2 (CCG)	2%	2%
3	89%	45%
4	2%	N/A
5	N/A	45%
Upland	4%	1%

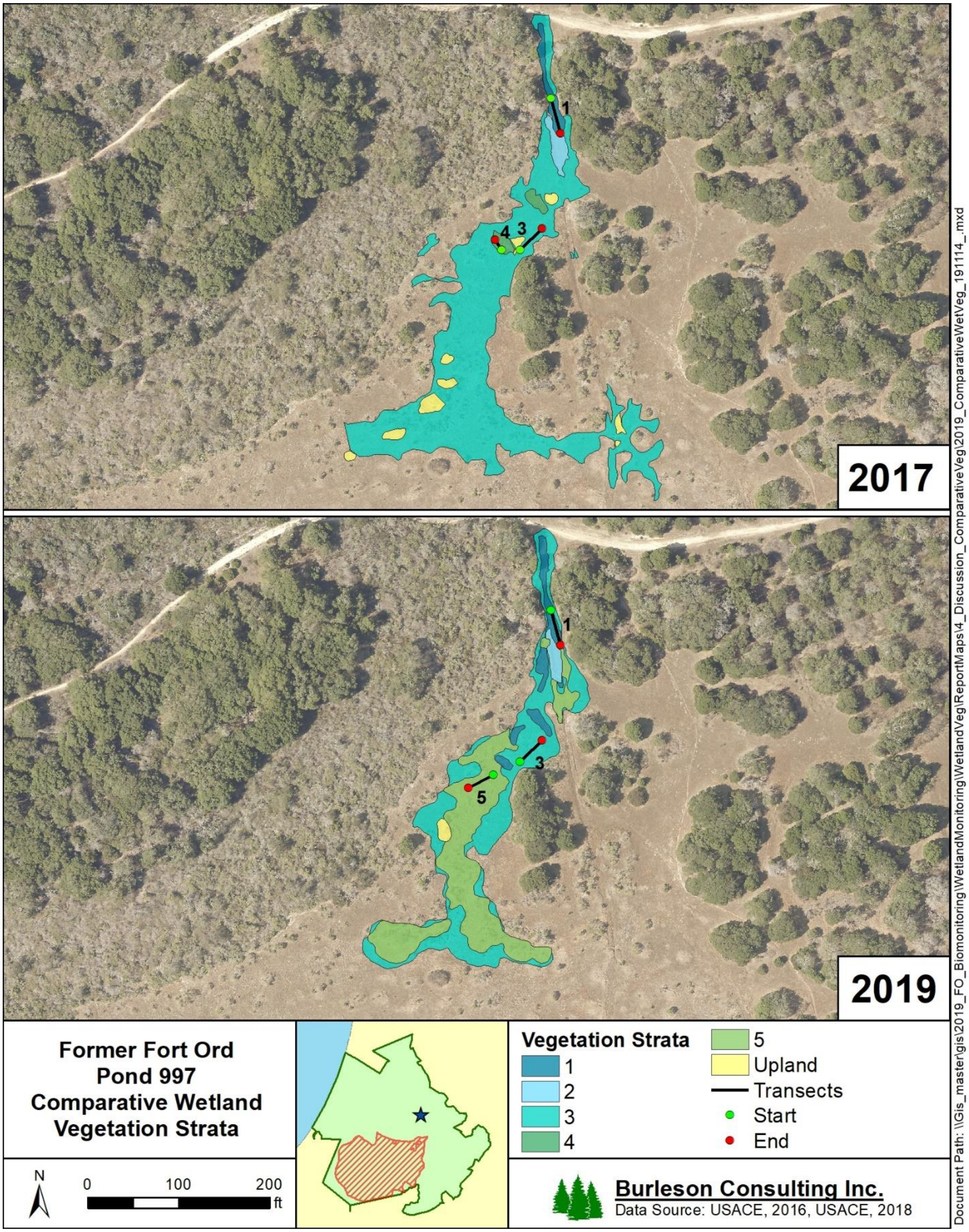

Figure 4-17. Pond 997 (Reference) Vegetation Strata and Transects for 2017 and 2019

The absolute percent vegetative cover in Pond 997 increased in 2019 from previous years, whereas thatch decreased (see Table 4-21).

Table 4-21. Pond 997 (Reference) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2017	57.3%	43.7%
2018	44.7%	55.4%
2019	73.3%	28.6%

Species richness on transects increased between 2017 and 2019 and decrease slightly in the overall basin at Pond 997. Species richness on transects was 27, 45, and 48 species in 2017, 2018, and 2019, respectively, whereas overall basin species richness was 65, 87, 82 species, respectively (see Table 4-22 and Appendix B Table B-3).

Species composition at Pond 997 was similar for all three years. Coyote thistle (*Eryngium armatum*) and brown-headed rush (*Juncus phaeocephalus*) were the dominant species in 2018 and 2019, while coyote thistle and California oatgrass (*Danthonia californica*) were dominant in 2017. Other important species were loosestrife (*Lythrum hyssopifolia*), Hickman's popcorn flower (*Plagiobothrys chorisianus* var. *hickmanii*) and rabbitfoot grass (*Polypogon monspeliensis*) in 2019. A complete list of species observed at Pond 997 in 2017, 2018, and 2019 can be found in Appendix H. Figure 4-18 shows a subset of the observed species with a 2% cover or greater.

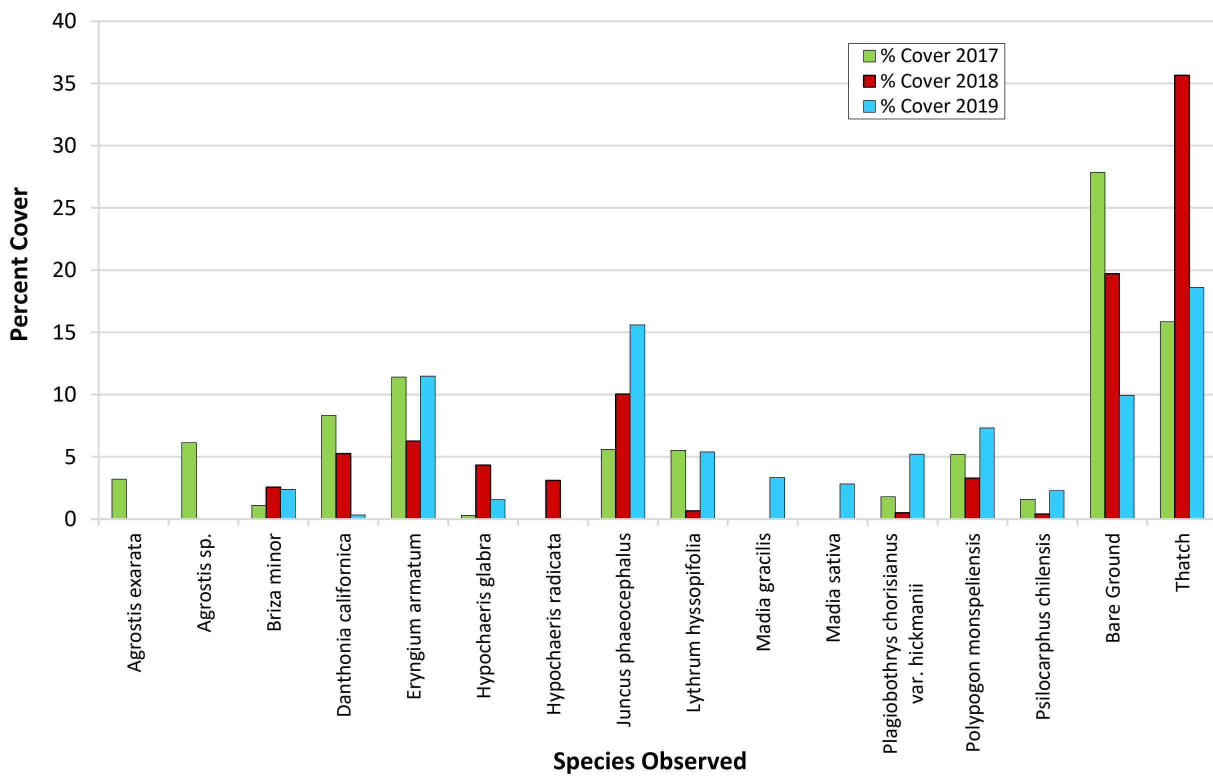

Figure 4-18. Percent Cover of Dominant Species at Pond 997 (Reference)

Native and non-native species richness on Pond 997 transects increased from 2017 to 2019 (see Table 4-22). Native relative percent cover was higher in 2019 than in previous years, while non-native cover was within the range of previous years (see Table 4-23).

Table 4-22. Pond 997 (Reference) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2017	15	11	1
2018	24	19	2
2019	27	21	0

Table 4-23. Pond 997 (Reference) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2017	66.3%	23.0%	10.7%
2018	56.3%	43.5%	0.2%
2019	68.5%	31.5%	0.0%

Wetland and non-wetland species richness on Pond 997 transects increased from 2017 to 2019 (see Table 4-24). The relative percent cover of wetland and non-wetland species in 2019 were within the ranges of previous years (see Table 4-25).

Table 4-24. Pond 997 (Reference) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2017	5	10	2	3	0	7
2018	8	10	5	8	0	14
2019	9	9	6	8	1	15

Table 4-25. Pond 997 (Reference) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2017	19.3%	50.7%	16.5%	0.5%	0.0%	13.0%
2018	4.6%	47.5%	20.7%	14.2%	0.0%	13.0%
2019	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%

4.3.2.1 *Contra Costa Goldfields*

Contra Costa goldfield populations have been noted at Pond 997 in previous years; however, populations and cover estimates were only collected in 2017, 2018, and 2019 (Burleson, 2018, 2019). The area of CCG at Pond 997 decreased from 0.02 acres in 2017 to 0.01 acres in 2018 and remained at 0.01 acres in 2019 (see Figure 4-19). However, the density increased from 10% cover in 2017 to 25% cover in 2018 to 35% in 2019. The CCG population was in a similar location in all survey years. Minor changes in population size can be attributed to natural fluctuation.

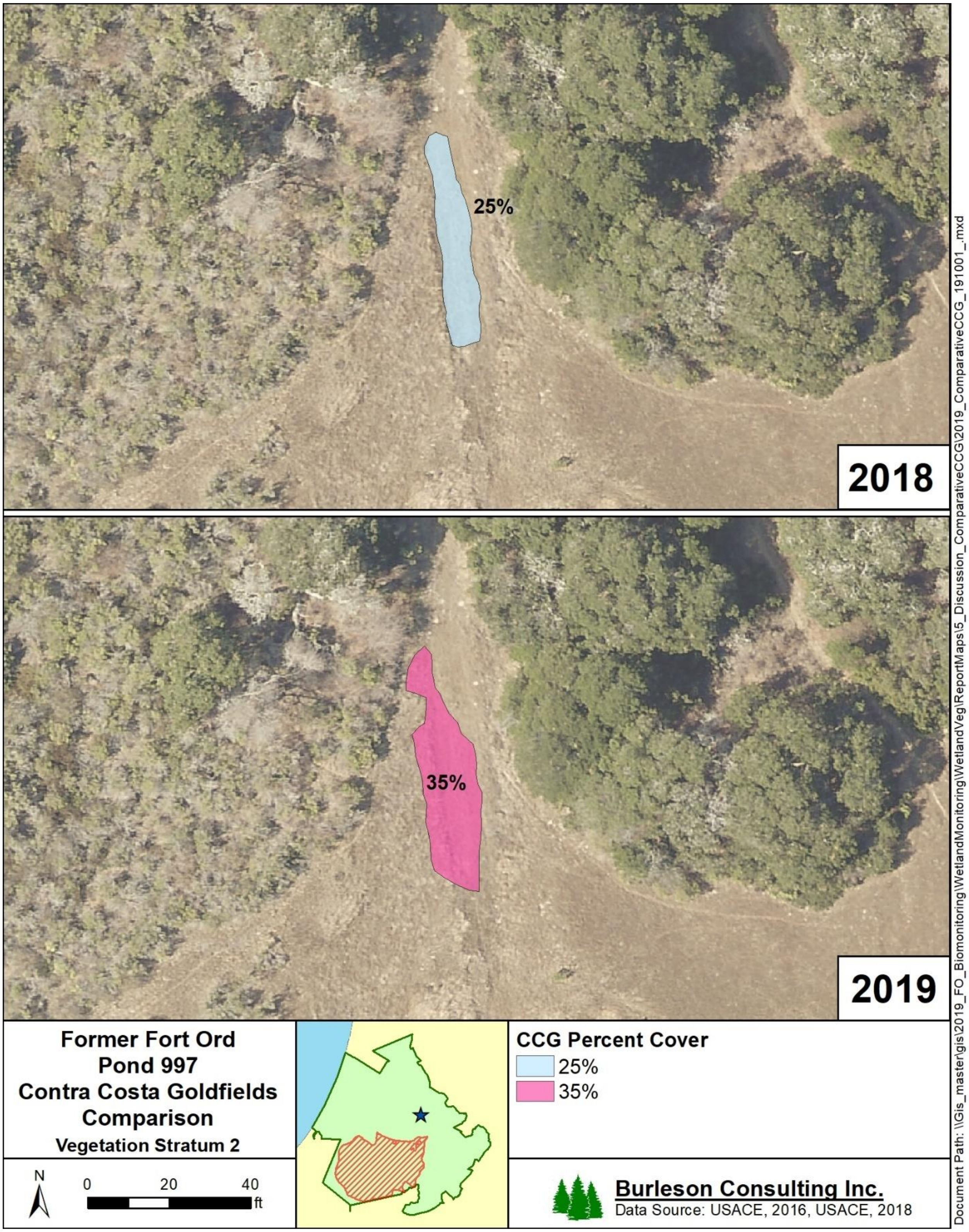

Figure 4-19. Contra Costa Goldfields Populations at Pond 997 (Reference) in 2018 and 2019

4.3.2.2 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. As a reference vernal pool, Pond 997 was used for comparison to baseline and remediated vernal pools.

4.3.2.3 *Performance Standard: Plant Cover and Species Diversity*

Pond 997 is a reference vernal pool and was not required to meet performance standard in 2019. However, the vernal pool provides a control for comparison to the remediated vernal pools.

4.3.3 Wildlife Monitoring

Wildlife data were collected at Pond 997 in 2017 and 2019 (Burleson, 2018). California tiger salamander and fairy shrimp were not detected.

Table 4-26. Pond 997 (Reference) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2017	Not detected	Not detected
2019	Not detected	Not detected

4.3.3.1 *Data Quality Objective 1*

Pond 997 did not provide suitable depth for CTS and fairy shrimp as discussed in Section 4.3.1.1.

4.3.3.2 *Data Quality Objective 4*

Neither CTS nor fairy shrimp were detected in 2019 at Pond 997. This was most likely due to insufficient depth; however, the water quality was adequate. Compared to other vernal pools and previous Pond 997 data, the water quality data were within normal ranges. The pH ranged from 6.37 in March to 6.39 in February with a mean of 6.38. Temperature ranged from 11.79°C in February to 12.61°C in March with a mean of 12.20°C. Dissolved oxygen ranged from 9.28 mg/L in March to 10.62 mg/L in February with a mean of 9.95 mg/L. Turbidity ranged from 24.2 FNU in March to 26.0 FNU in February with a mean of 25.1 FNU (see Table 3-12).

4.3.3.3 *Data Quality Objective 5*

California tiger salamanders and fairy shrimp were not detected in 2019, which was consistent with the previous survey in 2017. Pond 997 may not provide suitable habitat for CTS or fairy shrimp.

4.3.3.4 *Performance Standard: Wildlife Usage*

Pond 997 is a reference vernal pool and was not required to meet the performance standard but was used as a control for comparison to the remediated vernal pools.

4.3.4 Conclusion

Pond 997 was used for comparison to the remediated vernal pools (see Table 4-27).

Table 4-27. Success at Pond 997 (Reference) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	Suitable for Comparison
	DQO 2	Suitable for Comparison
Plant Cover & Species Diversity	DQO 3	Suitable for Comparison
Wildlife Usage	DQO 1	Suitable for Comparison
	DQO 4	Suitable for Comparison
	DQO 5	Suitable for Comparison

4.4 Pond 14 – Baseline

Pond 14 was first monitored as a baseline vernal pool in 1992. Additional baseline surveys occurred in 1999, 2016, and 2019. Table 4-28 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 14 (see Figure 4-20). All monitoring was conducted in either a normal or above-normal water-year in 1991-1992, 1998-1999, 2015-2016, and 2018-2019.

Table 4-28. Pond 14 (Baseline) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year			
	1991-1992	1998-1999	2015-2016	2018-2019
Hydrology	●	●	●	●
Vegetation		●	●	●
Wildlife	●		●	●

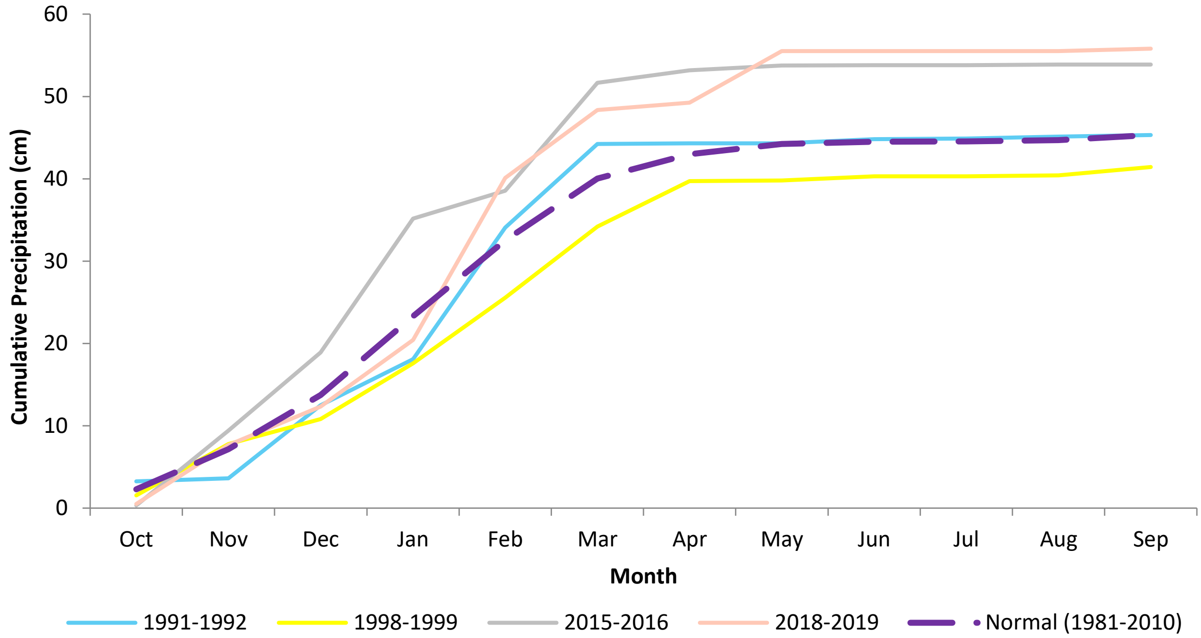

Figure 4-20. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 14 (Baseline) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.4.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 14 was 0.21 acres with a maximum depth of approximately 59 cm. The depth and inundation values were the largest recorded at Pond 14 to date (see Appendix F Table F-4). Pond 14 was inundated from the first recorded monitoring in January through June. Figure 4-21 illustrates the relationship of precipitation and depth at Pond 14 for 2019.

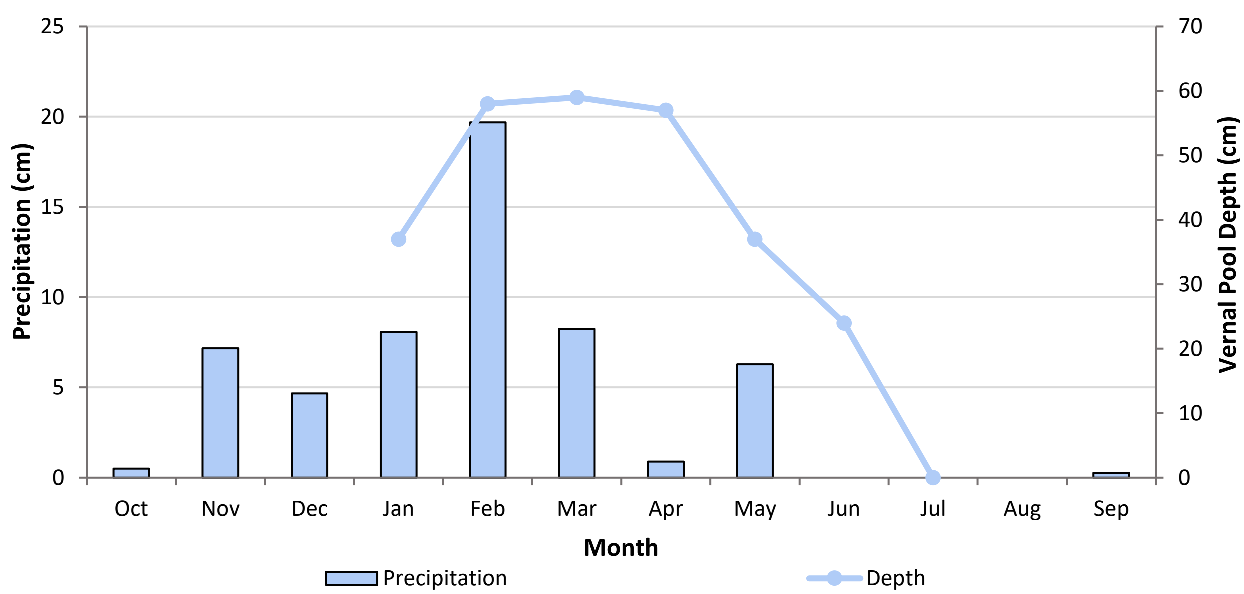

Figure 4-21. Monthly Depth and Precipitation at Pond 14 (Baseline) for 2018-2019 Water-Year

No depths and inundations for Pond 14 have been recorded in below-normal precipitation years. In normal precipitation years, Pond 14 could have a maximum depth of approximately 45 cm and a maximum inundation of 0.12 acres. In above-normal precipitation years, Pond 14 could have maximum depths of 60 cm or more and a maximum inundation up to 0.21 acres (see Appendix F Table F-4). Figure 4-22 illustrates historic vernal pool depths by month and organized by water-year.

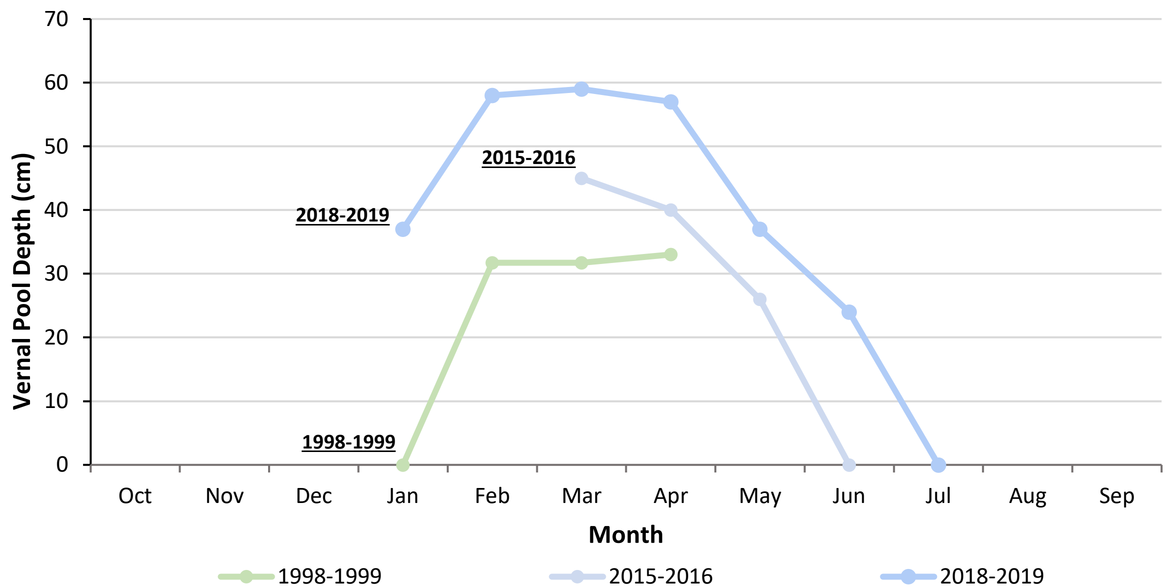

Figure 4-22. Historic Monthly Depths at Pond 14 (Baseline). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

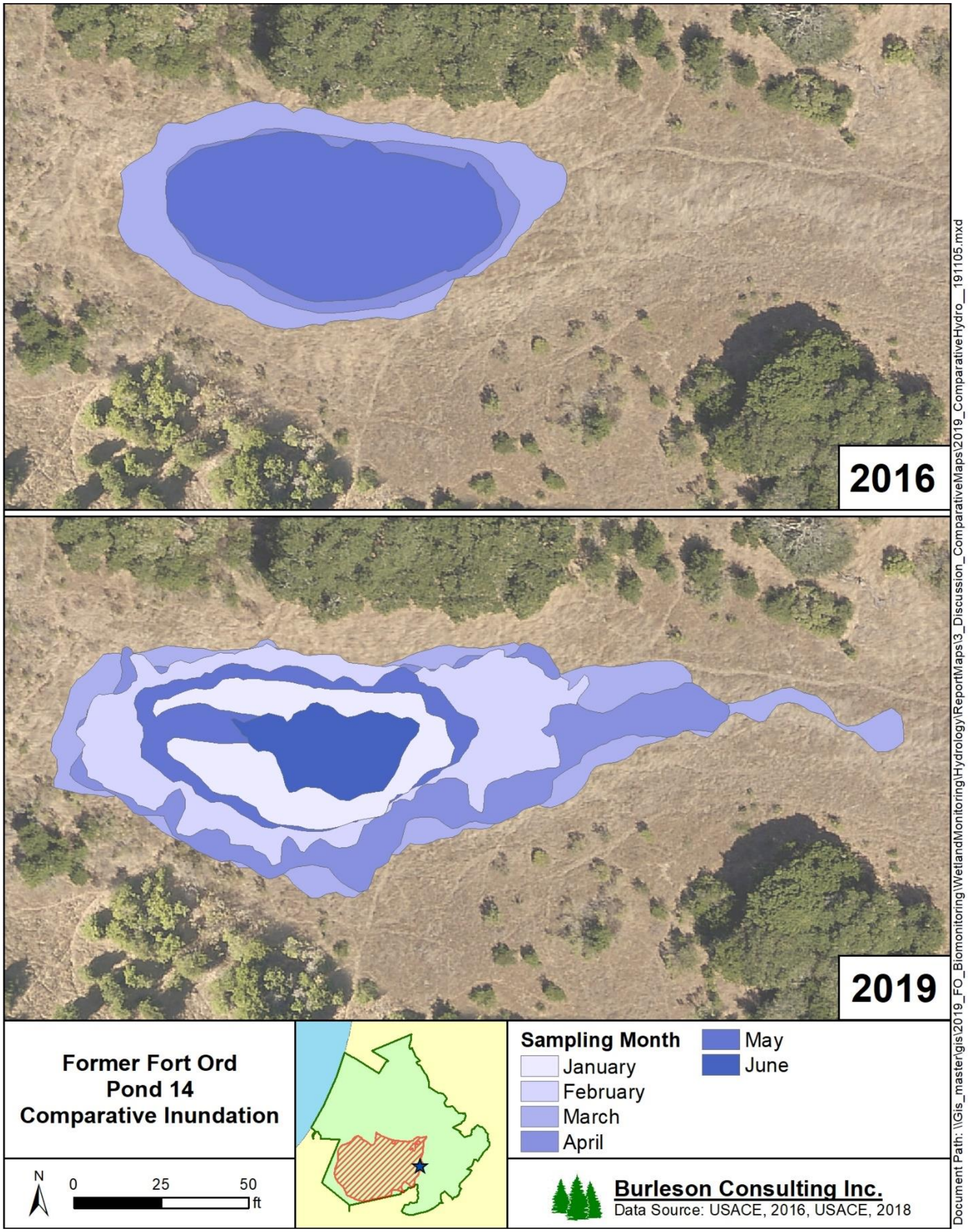

Figure 4-23. Pond 14 (Baseline) Inundations for 2015-2016 (above-normal precipitation) and 2018-2019 (above-normal precipitation). This vernal pool received no remediation but was monitored for baseline in 1992, 1999, 2016, and 2019.

4.4.1.1 *Data Quality Objective 1*

Pond 14 met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 14 provided sufficient depth for both CTS (51 cm through March) and fairy shrimp (50 cm through May).

4.4.1.2 *Data Quality Objective 2*

Pond 14 was inundated January through June of 2019 with an inundation range of 0.02-0.21 acres and a mean of 0.11 acres. Pond 14 is a small vernal pool that likely fills in a normal or slightly below-normal water year but may remain dry during a drought year. There is no baseline data for a below-normal water-year. The most appropriate reference vernal pool for comparison is Pond 997. However, Pond 14 is slightly larger and may fill in years when Pond 997 remains dry.

4.4.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 14 was a baseline vernal pool in 2019 and was not required to meet the performance standard. As a baseline vernal pool, Pond 14 will be monitored after remediation and compared to baseline in future years.

4.4.2 Vegetation Monitoring

Vegetation data were collected at Pond 14 in 1999, 2016, and 2019 (HLA, 1999; Burleson, 2017). In 1999, data were collected along one transect with a length of 67 feet. Quadrats were placed at 10-foot intervals, alternating from right to left along the transect. Because 1999 data were collected differently than in more recent years, strata were combined across the vernal pool to allow for comparison to other years. Data from 2016 and 2019 were collected using the methodology described in the Methods section of this report and were compared stratum-to-stratum in Table 4-29 as well as visually in Figure 4-24.

Table 4-29. Pond 14 (Baseline) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2019
1	16%	17%
2	8%	10%
3	37%	36%
4	38%	37%

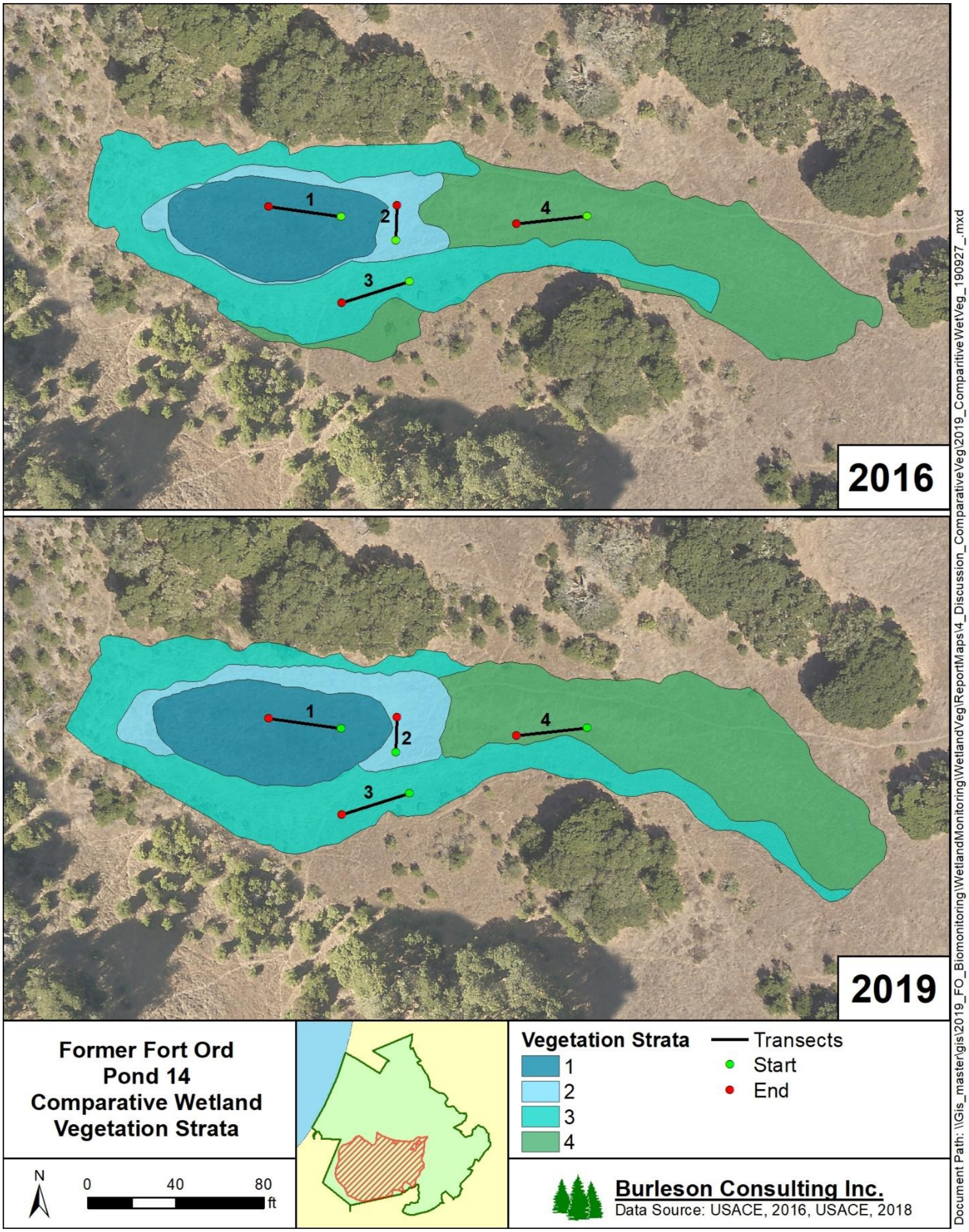

Figure 4-24. Pond 14 (Baseline) Vegetation Strata and Transects for 2016 and 2019

The absolute percent vegetative and thatch cover values of Pond 14 in 2019 were within the ranges observed in previous years (see Table 4-30). These values were within ranges observed at the reference vernal pools, and Pond 14 was most similar to reference Pond 5 (see Table 4-31).

Table 4-30. Pond 14 (Baseline) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1999	77.3%	32.7%
2016	58.8%	41.2%
2019	75.2%	24.8%

Table 4-31. Pond 14 (Baseline) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
14	**75.2%**	**24.8%**

Species richness increased between 2016 and 2019. Species richness on transects was 4, 17, and 35 species in 1999, 2016, and 2019, respectively, whereas overall basin species richness was 43 and 67 species in 2016, and 2019, respectively (see Table 4-32 and Appendix B Table B-4). The 1999 survey was limited to species observed on the transect and total vernal pool species richness was not recorded. Pond 14 species richness on transects was similar to the reference vernal pools, however the species richness for the overall basin was less than the values observed at reference vernal pools (see Table 4-33 and Appendix G Tables G-27 and G-54).

Species composition at Pond 14 was similar between monitoring years. The dominant species were pale spikerush (*Eleocharis macrostachya*) and brown-headed rush (*Juncus phaeocephalus*) in 2019; Italian rye (*Festuca perennis*) and pale spikerush in 2016; and brown-headed rush, beardless wildrye (*Elymus triticoides*), and pale spikerush in 1999. A complete comparison of species composition observed at Pond 14 in 1999, 2016, and 2019 can be found in Appendix H. Figure 4-25 shows a subset of this comparison for species observed with a 2% cover or greater.

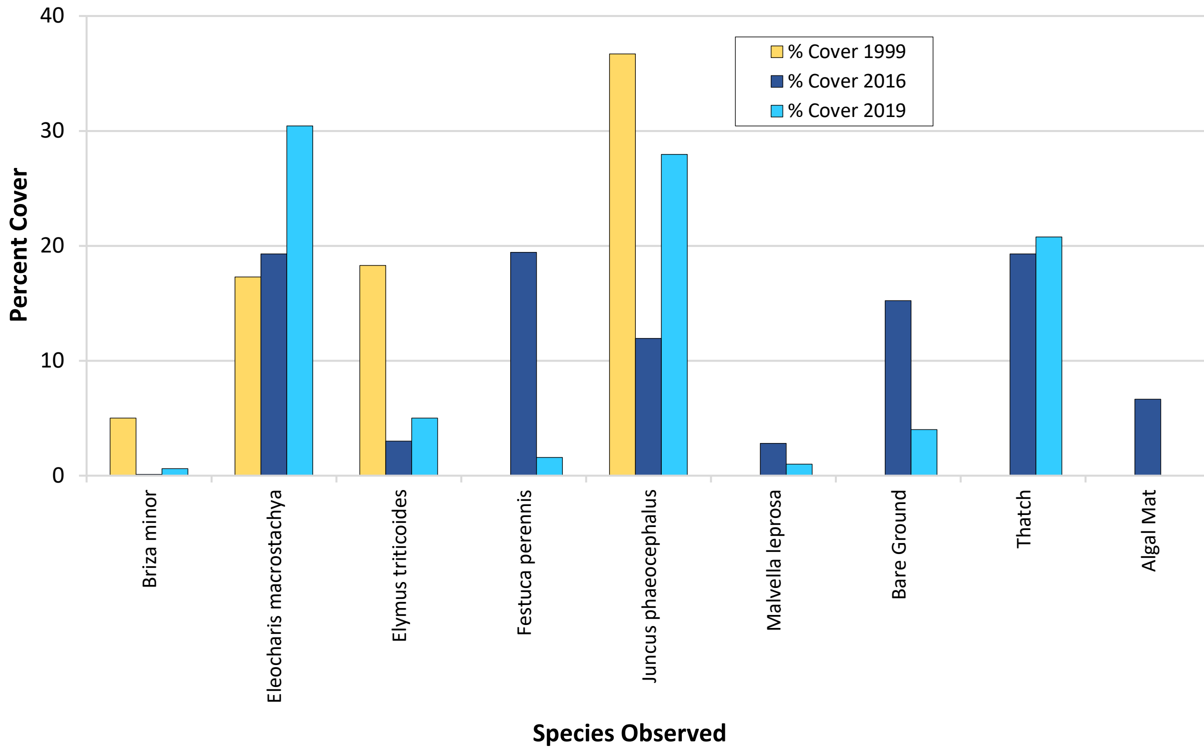

Figure 4-25. Percent Cover of Dominant Species at Pond 14 (Baseline)

Native and non-native species richness on Pond 14 transects increased through time (see Table 4-32). Native species richness in 2019 was within the ranges observed at the reference vernal pools and non-native species were lower (see Table 4-33). The relative percent cover of native and non-native species were within the ranges of previous years and very similar to 1999. (see Table 4-34). Pond 14 had greater native species cover, and lower non-native species cover, than observed in reference vernal pools in 2019 (see Table 4-35).

Table 4-32. Pond 14 (Baseline) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1999	3	1	0
2016	10	6	1
2019	21	13	1

Table 4-33. Pond 14 (Baseline) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
14	**21**	**13**	**1**

Table 4-34. Pond 14 (Baseline) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1999	93.5%	6.5%	0.0%
2016	65.3%	34.5%	0.2%
2019	91.5%	7.9%	0.6%

Table 4-35. Pond 14 (Baseline) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
14	**91.5%**	**7.9%**	**0.6%**

Wetland and non-wetland species richness on Pond 14 transects increased between 1999 and 2019 (see Table 4-36). The wetland species richness was slightly less than observed at the reference vernal pools in 2019, however non-wetland species were within range. The wetland and non-wetland species richness were most similar to reference Pond 101 East (East) (see Table 4-37). The relative percent cover of wetland species decreased slightly from 1999 to 2019, whereas the relative percent cover of non-wetland species was within range of previous years (see Table 4-38). The wetland and non-wetland species relative percent cover values were within the ranges observed at the reference vernal pools in 2019 and were most similar to reference Pond 5 (see Table 4-39).

Table 4-36. Pond 14 (Baseline) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1999	1	1	2	0	0	0
2016	2	3	4	3	0	5
2019	3	6	8	6	0	12

Table 4-37. Pond 14 (Baseline) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
14	**3**	**6**	**8**	**6**	**0**	**12**

Table 4-38. Pond 14 (Baseline) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1999	22.4%	47.5%	30.1%	0.0%	0.0%	0.0%
2016	32.9%	21.4%	38.4%	5.7%	0.0%	1.6%
2019	41.0%	37.7%	10.3%	3.2%	0.0%	7.8%

Table 4-39. Pond 14 (Baseline) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
14	**41.0%**	**37.7%**	**10.3%**	**3.2%**	**0.0%**	**7.8%**

4.4.2.1 *Data Quality Objective 3*

Pond 14 was dominated by native and wetland plant species during baseline monitoring in 2019. Native relative percent cover was particularly high in 2019 compared to the reference vernal pools.

4.4.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 14 was a baseline vernal pool in 2019 and was not required to meet the performance standard. As a baseline vernal pool, Pond 14 will be monitored after remediation and compared to baseline in future years.

4.4.3 Wildlife Monitoring

Wildlife data were collected at Pond 14 in 1992, 1999, 2016, and 2019 (Jones and Stokes, 1992; HLA, 1999; Burleson, 2017). California tiger salamander larvae were observed in 1992. Fairy shrimp were not detected. Table 4-40 shows historic wildlife monitoring results.

Table 4-40. Pond 14 (Baseline) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1992	Low (1)	Not detected
1999	Not detected	Not detected
2016	-	Not detected
2019	Not detected	Not detected

4.4.3.1 *Data Quality Objective 1*

Pond 14 provided suitable depth for CTS and fairy shrimp as discussed in Section 4.4.1.1.

4.4.3.2 *Data Quality Objective 4*

Neither CTS nor fairy shrimp were detected in 2019 at Pond 14; however, water quality was adequate. Compared to other vernal pools and previous Pond 14 data, the water quality data were within normal ranges. The pH ranged from 6.08 in March to 6.90 in June with a mean of 6.34. Temperature ranged from 7.49°C in February to 16.45°C in June with a mean of 12.94°C. Dissolved oxygen ranged from 3.09 mg/L in June to 4.97 mg/L in March with a mean of 4.02 mg/L. Turbidity ranged from 5.3 FNU in May to 57.5 FNU in February with a mean of 28.1 FNU (see Table 3-16)

4.4.3.3 *Data Quality Objective 5*

California tiger salamanders were not detected in 2019, which was consistent with some previous monitoring. California tiger salamanders were not detected during surveys in 1999 or 2016, but were observed in 1992.

Fairy shrimp were not detected in 2019, which was consistent with previous monitoring since the species has never been detected at this vernal pool. Previous surveys in 1992, 1999 and 2016 yielded no detections.

4.4.3.4 Performance Standard: Wildlife Usage

Pond 14 was a baseline vernal pool in 2019 and was not required to meet the performance standard. As a baseline vernal pool, Pond 14 will be monitored after remediation and compared to baseline in future years.

4.4.4 Conclusion

Pond 14 was not compared to DQOs in 2019 because it was in baseline condition. The vernal pool is suitable for comparison to future monitoring events for all DQOs (see Table 4-18).

Table 4-41. Success at Pond 14 (Baseline) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	Suitable for Baseline
	DQO 2	Suitable for Baseline
Plant Cover & Species Diversity	DQO 3	Suitable for Baseline
Wildlife Usage	DQO 1	Suitable for Baseline
	DQO 4	Suitable for Baseline
	DQO 5	Suitable for Baseline

4.5 Pond 17 – Baseline

Pond 17 was first monitored as a baseline vernal pool in 1992. Additional baseline surveys occurred in 1994, 1995, 1996, 1999, 2009, and 2019. Table 4-42 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 17 (see Figure 4-26). The normal or above-normal water-years were 1991-1992, 1994-1995, 1995-1996, 1998-1999, and 2018-2019. Monitoring in 1993-1994 and 2008-2009 was conducted in a below-normal water-years.

Table 4-42. Pond 17 (Baseline) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year						
	1991-1992	1993-1994	1994-1995	1995-1996	1998-1999	2008-2009	2018-2019
Hydrology	●	●	●	●			●
Vegetation		●	●	●	●		●
Wildlife		●	●	●		●	●

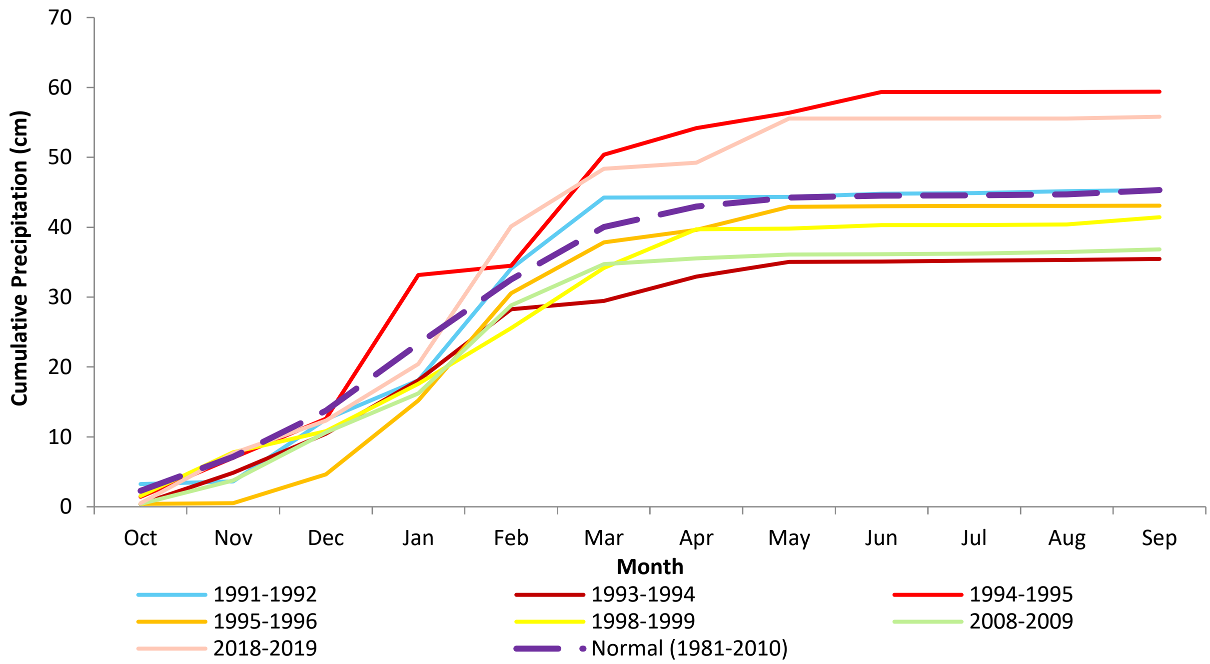

Figure 4-26. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 17 (Baseline) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.5.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 17 was 0.37 acres with a maximum depth of approximately 19 cm. No previous inundation areas are recorded for Pond 17. The depth values were within range of previously recorded values (see Appendix F Table F-5). Pond 17 was inundated from the first recorded monitoring in January through June. Figure 4-27 illustrates the relationship of precipitation and depth at Pond 17 for 2019.

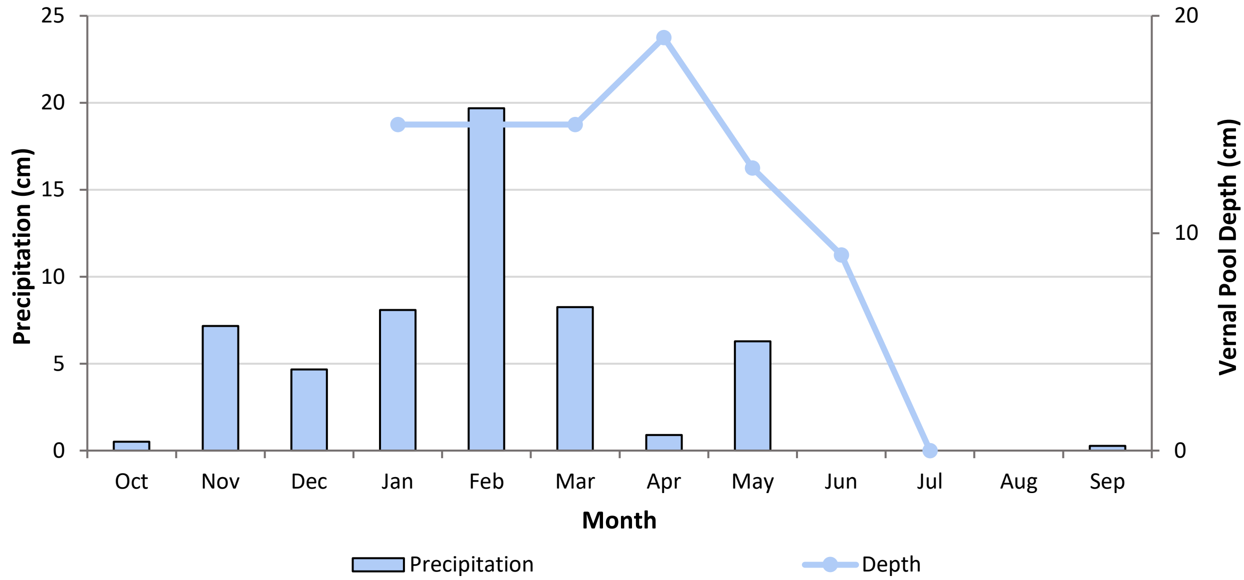

Figure 4-27. Monthly Depth and Precipitation at Pond 17 (Baseline) for 2018-2019 Water-Year

There are no recorded historic inundations for Pond 17. In below-normal and normal precipitation years, Pond 17 is likely to range from 0-25 cm in depth. Data collected in 1992 suggests that it could have been as deep as 76 cm in a normal water-year, however this depth was approximate and prior to the construction of the Laguna Raceway Wall. Pond 17 is described as "highly disturbed by Laguna Seca turn 11 expansion" with "big sediment loads" and "a lot of sediment coming in from construction" (Jones and Stokes, 1996). In above-normal precipitation years, Pond 17 may have maximum depths of approximately 55 cm or more and a maximum inundation up to 0.37 acres (see Appendix F Table F-5). Figure 4-28 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-29 illustrates historic and recent inundation areas.

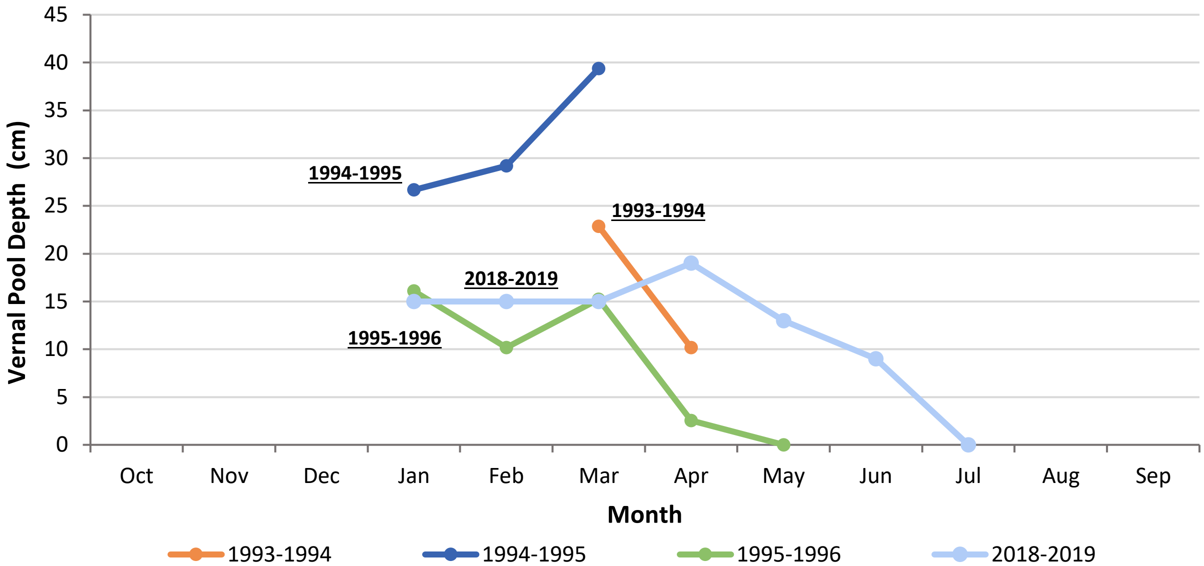

Figure 4-28. Historic Monthly Depths at Pond 17 (Baseline). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal. Depths from 1991-1992 were a range of estimates and were not included in the figure.

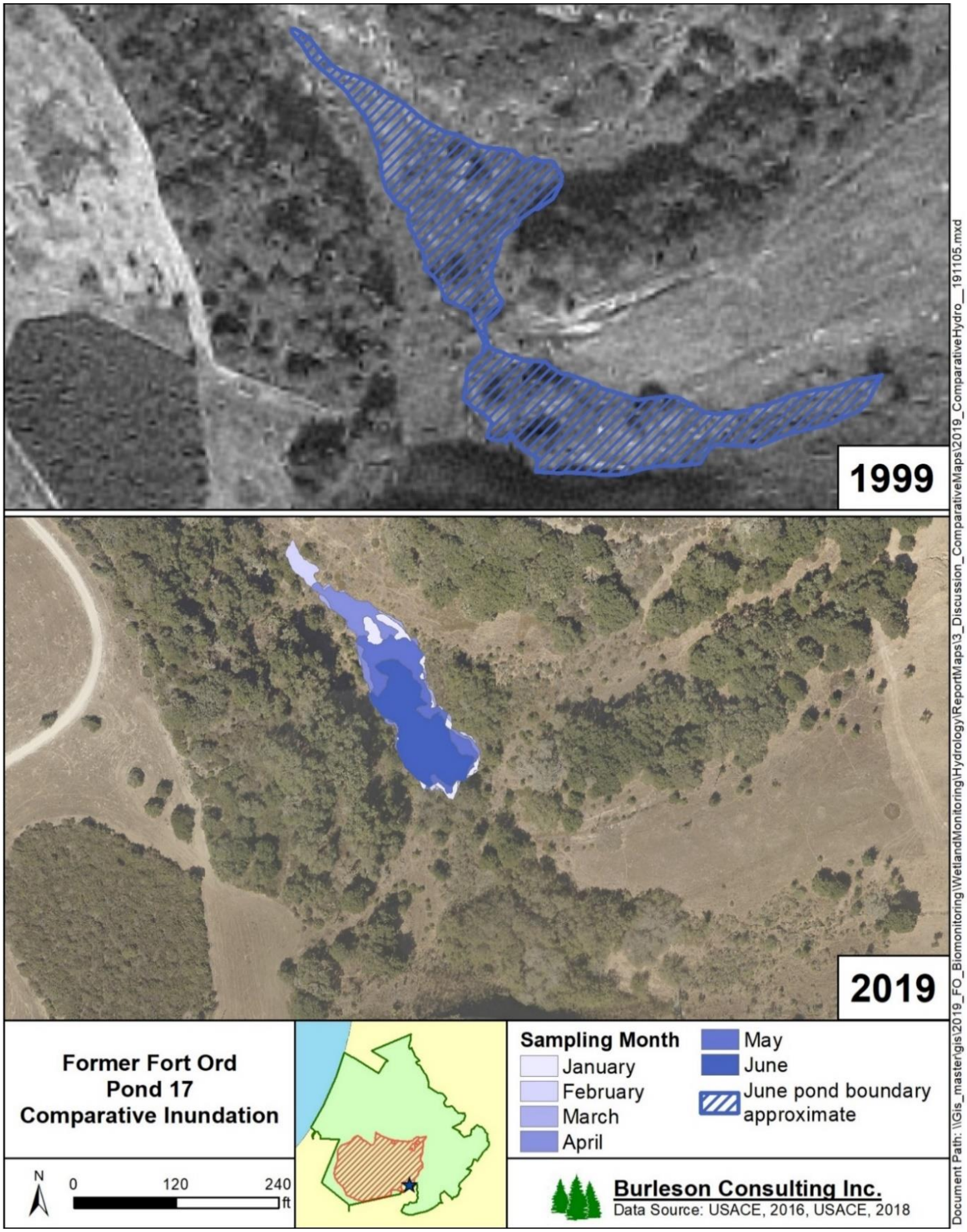

Figure 4-29. Pond 17 (Baseline) Inundations for 1998-1999 (normal precipitation) and 2018-2019 (above-normal precipitation). The pond boundary from 1999 was mapped based on extent of wetland vegetation and the estimated mean high-water mark, not actual inundation. Subsurface munitions remediation did not occur at this vernal pool and it was monitored for baseline in 1992, 1994, 1995, 1996, and 2019.

4.5.1.1 *Data Quality Objective 1*

Pond 17 partially met DQO 1. The required average depths of 25 cm from the first rain event through March for CTS was not met but the required 10 cm for 18 consecutive days through May for fairy shrimp was met. Pond 17 did not provide sufficient depth for CTS (15 cm through March) but did provide sufficient depth for fairy shrimp (15 cm through May).

4.5.1.2 *Data Quality Objective 2*

Pond 17 was inundated January through June of 2019 with an inundation range of 0.19-0.37 acres and a mean of 0.30 acres. Pond 17 is a small vernal pool that likely fills in a normal or slightly below-normal water year but may remain dry during a below-normal or drought year. There is not a reference vernal pool that is similar in size, but mean inundations at Pond 17 would be expected to be between Pond 997 and Pond 101 East (East).

4.5.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 17 was a baseline vernal pool in 2019 and was not required to meet the performance standard. As a baseline vernal pool, Pond 17 will be monitored after remediation and compared to baseline in future years.

4.5.2 Vegetation Monitoring

Vegetation data were collected at Pond 17 in 1999 and 2019 (HLA, 1999). In 1999, data were collected along two transects with lengths close to 150 feet. Quadrats were placed at 10-foot intervals, alternating from right to left along the transect. Because 1999 data were collected differently than in 2019, strata were combined across the vernal pool to allow for comparison.

Absolute percent vegetative cover decreased between 1999 and 2019, whereas thatch cover increased (see Table 4-43). The absolute percent vegetative cover of Pond 14 in 2019 was below the range of values observed at the reference vernal pools, whereas thatch cover was above the range observed at the reference vernal pools (see Table 4-44).

Table 4-43. Pond 17 (Baseline) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1999	80.1%	29.2%
2019	59.7%	41.0%

Table 4-44. Pond 17 (Baseline) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
17	**59.7%**	**41.0%**

Species richness was similar between 1999 and 2019 on transects. Species richness on transects was 31 species in 1999 and 28 species in 2019. Overall basin species richness was 83 species in 2019, and not recorded in 1999 (see Table 4-45 and Appendix B Table B-5). Pond 17 species richness on transects was less than the values observed at the reference vernal pools, especially native species richness. The species richness for the overall basin was within the range of the reference vernal pools (see Table 4-46 and Appendix G Tables G-27 and G-54).

Species composition at Pond 17 was slightly different between monitoring years. The dominant species in 1999 were broad-leaved cattail (*Typha latifolia*), spreading rush (*Juncus patens*), brown-headed rush, and red willow (*Salix laevigata*). The dominant species in 2019 were pale spikerush (*Eleocharis macrostachya*), Italian ryegrass (*Festuca perennis*), and rabbitfoot grass (*Polygonum monspeliensis*). It should be noted that two of the strata, including one that was dominated by broad-leaved cattail, were visually assessed for cover and therefore were not included as part of the transect data set. A complete comparison of species composition observed at Pond 17 in 1999 and 2019 can be found in Appendix H. Figure 4-30 shows a subset of this comparison for species observed with a 2% cover or greater.

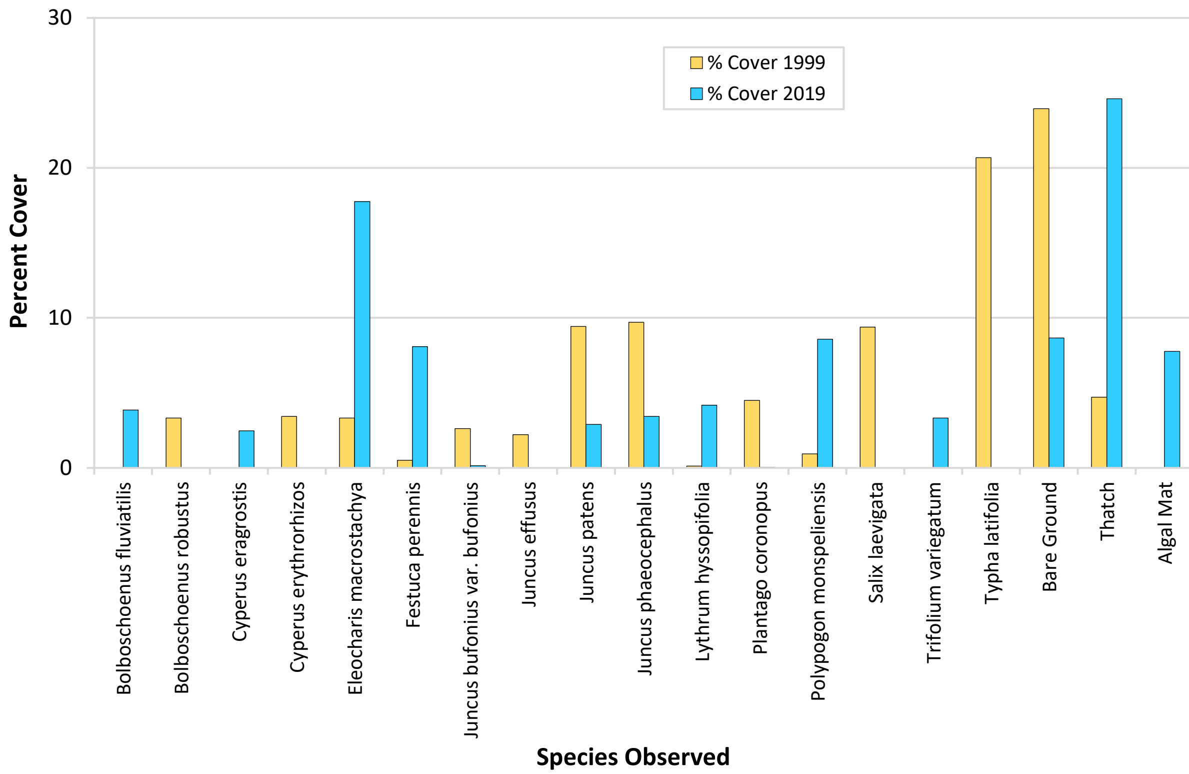

Figure 4-30. Percent Cover of Dominant Species at Pond 17 (Baseline)

Native species richness on Pond 17 transects decreased between 1999 and 2019 while non-native species slightly increased (see Table 4-45). Native species richness in 2019 was below values observed in the reference vernal pools while non-native species were within the ranges observed at the reference vernal pools and most similar to Pond 5 (see Table 4-46). The relative percent cover of native species decreased between monitoring years, while the relative percent cover of non-native species increased (see Table 4-47). The relative percent cover values of native and non-native species in Pond 17 were slightly lower and slightly higher, respectively, than the relative percent cover observed at reference vernal pools in 2019 (see Table 4-48).

Table 4-45. Pond 17 (Baseline) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1999	18	13	0
2019	14	14	0

Table 4-46. Pond 17 (Baseline) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
17	**14**	**14**	**0**

Table 4-47. Pond 17 (Baseline) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1999	88.1%	11.9%	0.0%
2019	60.7%	39.3%	0.0%

Table 4-48. Pond 17 (Baseline) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
17	**60.7%**	**39.3%**	**0.0%**

Wetland species richness on Pond 17 transects decreased between 1999 and 2019, and non-wetland species richness remained the same (see Table 4-49). The wetland and non-wetland species richness were within the ranges observed at the reference vernal pools in 2019 and were most similar to reference Pond 101 East (East) (see Table 4-50). The relative percent cover of wetland species were similar between 1999 and 2019 (see Table 4-51). The wetland and non-wetland species relative percent cover values were within the ranges observed at the reference vernal pools in 2019 and were most similar to reference Pond 5 (see Table 4-52).

Table 4-49. Pond 17 (Baseline) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1999	7	11	5	5	0	3
2019	3	7	8	5	0	5

Table 4-50. Pond 17 (Baseline) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
17	**3**	**7**	**8**	**5**	**0**	**5**

Table 4-51. Pond 17 (Baseline) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1999	40.2%	46.7%	8.8%	1.8%	0.0%	2.5%
2019	43.3%	29.6%	22.1%	2.4%	0.0%	2.6%

Table 4-52. Pond 17 (Baseline) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
17	**43.3%**	**29.6%**	**22.1%**	**2.4%**	**0.0%**	**2.6%**

4.5.2.1 *Data Quality Objective 3*

Pond 17 was dominated by native and wetland plant species during baseline monitoring in 2019. Native vegetative cover, native species richness, and native relative percent cover were lower at Pond 17 than the reference vernal pools, and non-native relative percent cover was higher.

4.5.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 17 was a baseline vernal pool in 2019 and was not required to meet the performance standard. As a baseline vernal pool, Pond 17 will be monitored after remediation and compared to baseline in future years.

4.5.3 Wildlife Monitoring

Wildlife data were collected at Pond 17 in 1992, 1994, 1995, 1996, 2009, and 2019 (Jones and Stokes, 1992, 1996; Shaw, 2010). California tiger salamander larvae were observed in 2019. Fairy shrimp were not detected in any year. Table 4-53 shows historic wildlife monitoring results.

Table 4-53. Pond 17 (Baseline) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1992	Not detected	Not detected
1994	Not detected	Not detected
1995	Not detected	Not detected
1996	Not detected	Not detected
2009	Not detected	Not detected
2019	Few – Common (0, 29, 4)	Not detected

4.5.3.1 *Data Quality Objective 1*

Pond 17 provided suitable depth for fairy shrimp but not CTS as discussed in Section 4.5.1.1.

4.5.3.2 *Data Quality Objective 4*

Fairy shrimp were not detected in 2019. CTS were present at Pond 17 in April and May but were not detected in March. The water quality was adequate although the temperature was low in February. Compared to other vernal pools and previous Pond 17 data, the water quality data were within normal ranges (with the exception of low temperature in February). The pH ranged from 6.66 in April to 7.38 in March with a mean of 7.00. Temperature ranged from 5.82°C in February to 21.49°C in June with a mean of 12.01°C. Dissolved oxygen ranged from 6.39 mg/L in June to 15.30 mg/L in March with a mean of 10.07 mg/L. Turbidity ranged from 41.0 FNU in May to 502.0 FNU in June with a mean of 293.0 FNU (see Table 3-20).

4.5.3.3 *Data Quality Objective 5*

California tiger salamanders were present in 2019, which was not consistent with other baseline monitoring. California tiger salamanders were not detected in 1992, 1994, 1995, 1996, or 2009.

Fairy shrimp were not detected in 2019, which was consistent with other baseline monitoring. Fairy shrimp were not detected during surveys in 1992, 1994, 1995, 1996, or 2009.

4.5.3.4 *Performance Standard: Wildlife Usage*

Pond 17 was a baseline vernal pool in 2019 and was not required to meet the performance standard. As a baseline vernal pool, Pond 17 will be monitored after remediation and compared to baseline in future years.

4.5.4 Conclusion

Pond 17 was not compared to DQOs in 2019 because it was in baseline condition. The vernal pool is suitable for comparison to future monitoring events for all DQOs (see Table 4-18).

Table 4-54. Success at Pond 17 (Baseline) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	Suitable for Baseline
	DQO 2	Suitable for Baseline
Plant Cover & Species Diversity	DQO 3	Suitable for Baseline
Wildlife Usage	DQO 1	Suitable for Baseline
	DQO 4	Suitable for Baseline
	DQO 5	Suitable for Baseline

4.6 Pond 21 – Baseline

Pond 21 was first monitored as a baseline vernal pool in 1992. Additional baseline surveys occurred in 1999, 2009, and 2019. Table 4-55 summarizes the years that monitoring occurred and surveys conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 21 (see Figure 4-31). The normal or above-normal water-years were 1991-1992, 1998-1999, and 2018-2019. Monitoring in 2008-2009 was conducted in a below-normal water-year.

Table 4-55. Pond 21 (Baseline) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year			
	1991-1992	1998-1999	2008-2009	2018-2019
Hydrology	●	●		●
Vegetation		●		●
Wildlife			●	●

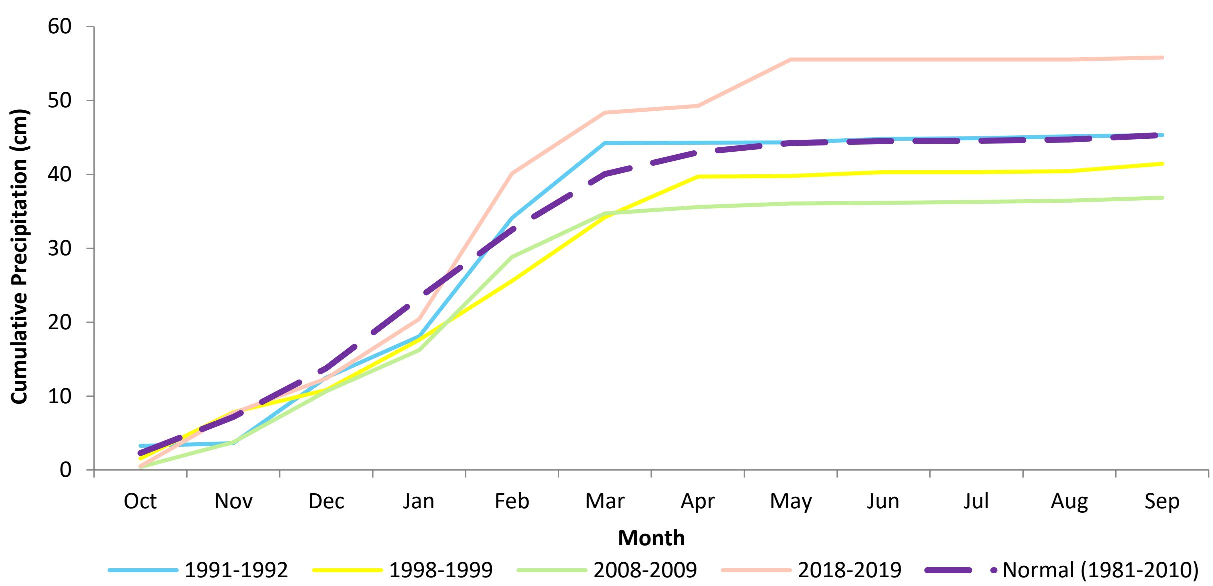

Figure 4-31. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 21 (Baseline) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.6.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 21 was 0.86 acres with a maximum depth of approximately 19 cm. The depth and inundation values were within range of previously recorded values (see Appendix F Table F-6). Pond 21 was inundated from the first recorded monitoring in January through April. Figure 4-32 illustrates the relationship of precipitation and depth at Pond 21 for 2019.

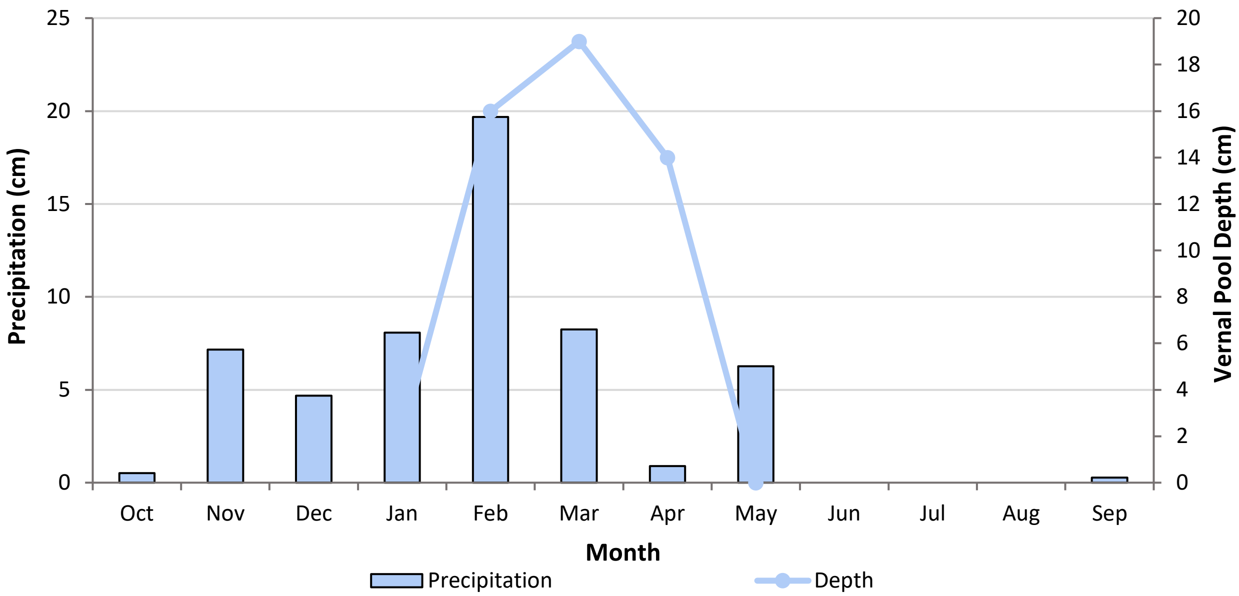

Figure 4-32. Monthly Depth and Precipitation at Pond 21 (Baseline) for 2018-2019 Water-Year

Pond 21 was inundated in 1992, 1999, and 2019 but was dry in 2007. In below-normal precipitation years, Pond 21 may remain dry as observed in 2007. In normal precipitation years, Pond 21 could have a maximum depth of 36 cm and a maximum inundation of 0.94 acres. However, the data representing a normal precipitation year was from 1998-1999 which followed an El Nino year. It is likely that the vernal pool depths and inundations were greater in 1998-1999 than in other normal precipitation years. In above-normal precipitation years, Pond 21 could have maximum depths of 19 cm or more and a maximum inundation up to 0.86 acres (see Appendix F Table F-6). Figure 4-33 illustrates historic vernal pool depths by month and organized by water-year.

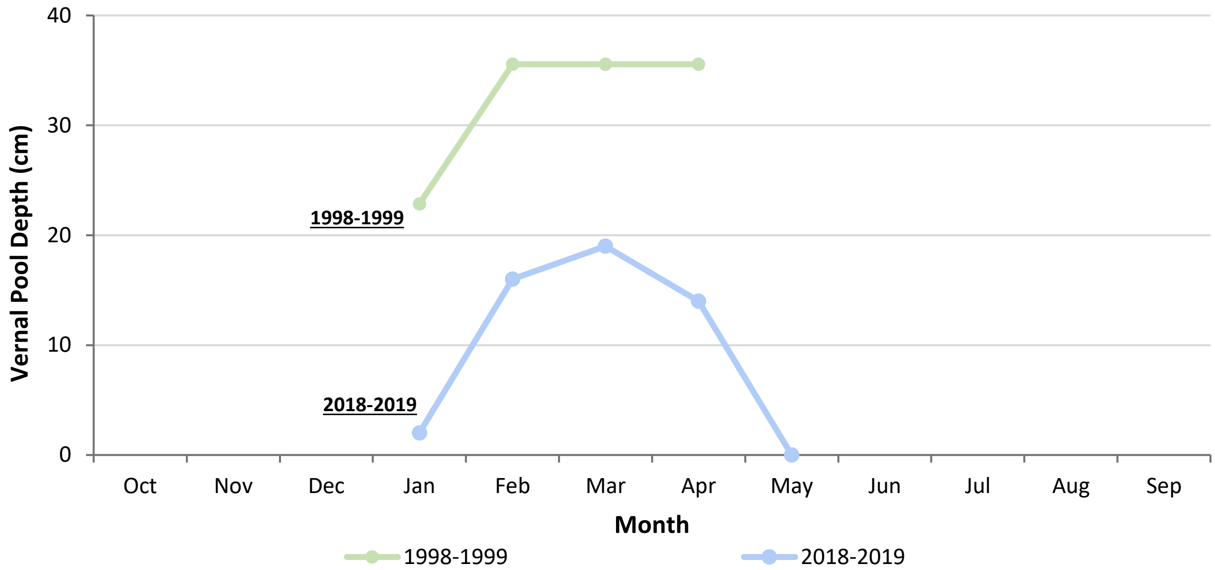

Figure 4-33. Historic Monthly Depths at Pond 21 (Baseline). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

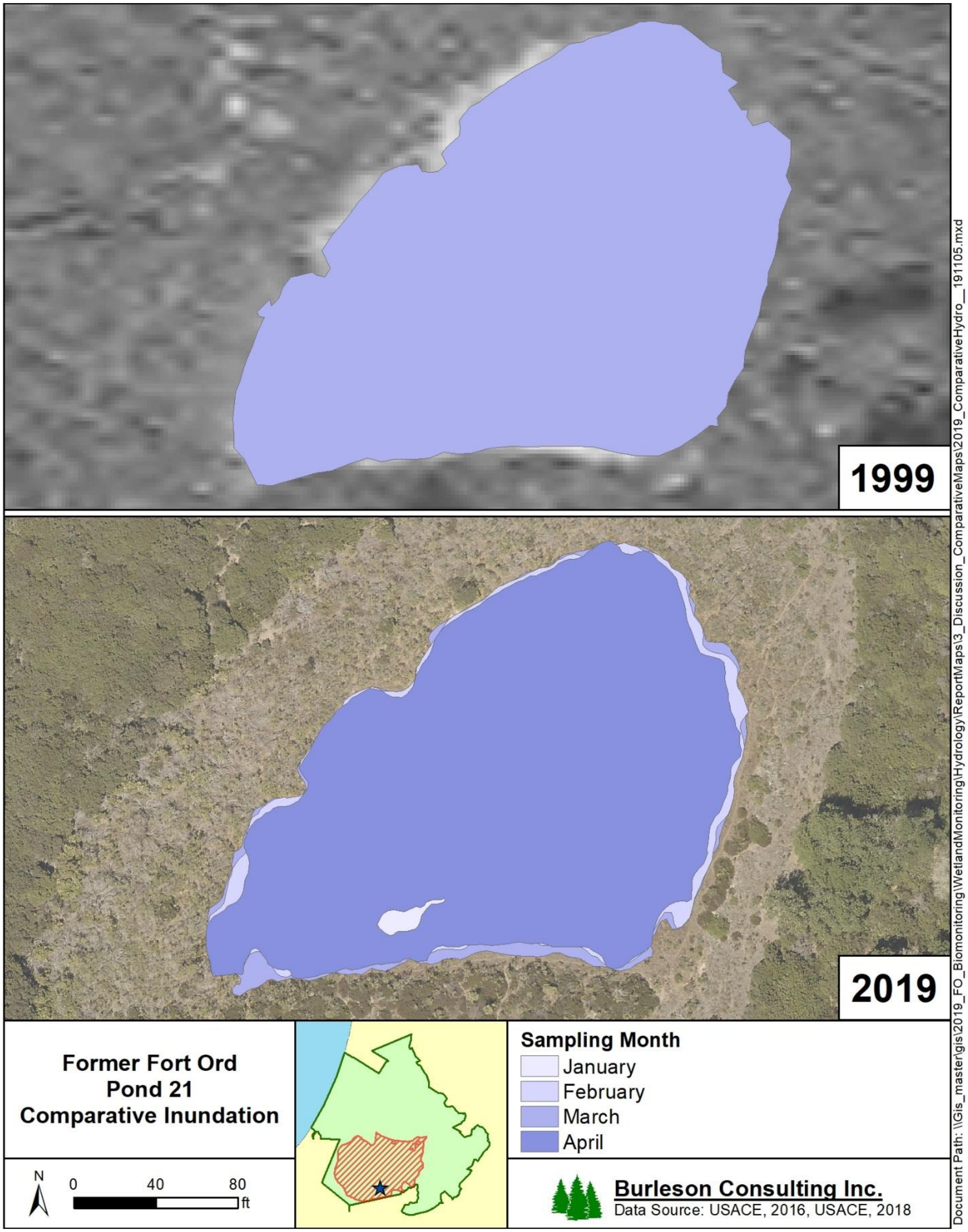

Figure 4-34. Pond 21 (Baseline) Inundations for 1998-1999 (normal precipitation) and 2018-2019 (above-normal precipitation). This vernal pool received no remediation but was monitored for baseline in 1992, 1999, 2009, and 2019.

4.6.1.1 *Data Quality Objective 1*

Pond 21 did not meet the required average depths of 25 cm from the first rain event through March for CTS or 10 cm for 18 consecutive days through May for fairy shrimp. Pond 21 did not provide sufficient depth for CTS (12 cm through March) or fairy shrimp (13 cm through April). Despite providing greater than 10 cm depth, the vernal pool was dry by the May survey and did not meet the DQO for fairy shrimp.

4.6.1.2 *Data Quality Objective 2*

Pond 21 was inundated January through April of 2019 with an inundation range of 0.01-0.86 acres and a mean of 0.63 acres. Pond 21 fills in a normal or slightly below-normal water year but may remain dry during a below-normal or drought year. There is not a reference vernal pool that is similar in size, but the mean inundations at Pond 21 would be expected to be between Pond 997 and Pond 101 East (East).

4.6.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 21 was a baseline vernal pool in 2019 and was not required to meet the performance standard. As a baseline vernal pool, Pond 21 will be monitored after remediation and compared to baseline in future years.

4.6.2 Vegetation Monitoring

Vegetation data were collected at Pond 21 in 1999 and 2019 (HLA, 1999). In 1999, data were collected along one transect with a length of 316 feet. Quadrats were placed at 10-foot intervals, alternating from right to left along the transect. Because 1999 data were collected differently than in 2019, strata were combined across the vernal pool to allow for comparison.

The absolute percent vegetative and thatch cover values of Pond 21 were very different than the prior survey year (see Table 4-56). Vegetation cover was dramatically higher and thatch/bare ground was lower in 2019 than 1999. At the time of the 1999 survey, 35.2% of the vernal pool was still open water which likely contributed to the limited vegetative cover. The survey likely occurred too early and did not allow for germination and growth of the wetland species. The 2019 values were within the ranges observed at the reference vernal pools, and Pond 21 was most similar to reference vernal pool Pond 997 (see Table 4-57).

Table 4-56. Pond 21 (Baseline) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1999	18.6%	46.1%
2019	73.7%	26.3%

Table 4-57. Pond 21 (Baseline) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
21	**73.7%**	**26.3%**

Species richness was the same in 1999 and 2019 on transects. Species richness on transects was 22 species in both years, whereas overall basin species richness was 59 species in 2019, and not recorded in 1999 (see Table 4-58 and Appendix B Table B-6). Pond 21 species richness was less than the values observed at the reference vernal pools (see Table 4-59 and Appendix G Tables G-27 and G-54).

Species composition at Pond 21 varied between monitoring years. Common toad rush (*Juncus bufonius* var. *bufonius*) was the dominant species in 1999, whereas brown-headed rush (*Juncus phaeocephalus*) was dominant in 2019. Other important species in both years were needle spikerush (*Eleocharis acicularis* var. *acicularis*), pale spikerush (*Eleocharis macrostachya*), and Hickman's popcorn flower (*Plagiobothrys chorisianus* var. *hickmanii*). A complete comparison of species composition observed at Pond 21 in 1999 and 2019 can be found in Appendix H. Figure 4-35 shows a subset of this comparison for species observed with a 2% cover or greater.

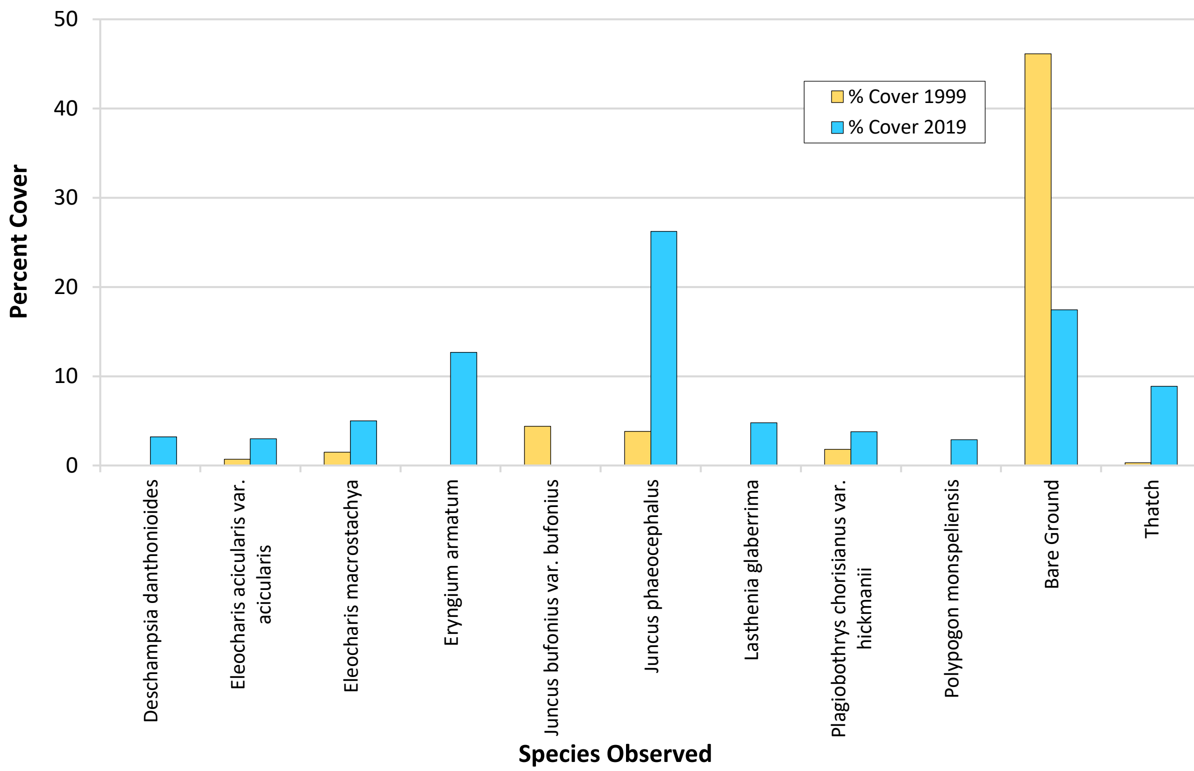

Figure 4-35. Percent Cover of Dominant Species at Pond 21 (Baseline)

Native species richness on transects decreased, whereas non-native species richness increased (see Table 4-58). Native and non-native species richness in at Pond 21 in 2019 were below the ranges observed at the reference vernal pools (see Table 4-59). The relative percent cover of native species decreased, and non-native species increased compared to 1999 (see Table 4-60). Despite the change from previous years, the relative percent cover values of native species were greater than the reference vernal pools and non-native cover was less than the reference vernal pools in 2019 (see Table 4-61).

Table 4-58. Pond 21 (Baseline) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1999	17	5	0
2019	14	8	0

Table 4-59. Pond 21 (Baseline) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
21	**14**	**8**	**0**

Table 4-60. Pond 21 (Baseline) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1999	95.9%	4.1%	0.0%
2019	88.4%	11.6%	0.0%

Table 4-61. Pond 21 (Baseline) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
21	**88.4%**	**11.6%**	**0.0%**

Wetland and non-wetland species richness on Pond 21 transects was very similar between 1999 and 2019 with slightly more facultative wetland species and less facultative species observed in 2019 (see Table 4-62). The wetland and non-wetland species richness were both less than the reference vernal pools in 2019 (see Table 4-63). The relative percent cover of wetland species was similar to 1999, with slightly more facultative wetland species but less obligate cover in 2019 (see Table 4-64). The wetland and non-wetland species relative percent cover values were similar to the ranges observed at the reference vernal pools in 2019 and were most similar to reference Pond 997 (see Table 4-65).

Table 4-62. Pond 21 (Baseline) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1999	7	5	5	2	0	3
2019	6	8	2	3	0	3

Table 4-63. Pond 21 (Baseline) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
21	**6**	**8**	**2**	**3**	**0**	**3**

Table 4-64. Pond 21 (Baseline) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1999	38.1%	50.5%	5.0%	4.7%	0.0%	1.6%
2019	25.6%	65.0%	3.3%	1.5%	0.0%	4.5%

Table 4-65. Pond 21 (Baseline) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
21	**25.6%**	**65.0%**	**3.3%**	**1.5%**	**0.0%**	**4.5%**

4.6.2.1 *Data Quality Objective 3*

Pond 21 was dominated by native and wetland plant species during baseline monitoring in 2019. Native relative percent cover was particularly high in 2019 compared to the reference vernal pools. However, species richness, both native and non-native, was lower on the Pond 21 transects than the reference vernal pools.

4.6.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 21 was a baseline vernal pool in 2019 and was not required to meet the performance standard. As a baseline vernal pool, Pond 21 will be monitored after remediation and compared to baseline in future years.

4.6.3 Wildlife Monitoring

Wildlife data were collected at Pond 21 in 1992, 1999, 2009, and 2019 (Jones and Stokes, 1992; HLA, 1999; DD&A, 2009). California tiger salamander larvae were observed in 2019. Fairy shrimp were not detected. Table 4-66 shows historic wildlife monitoring results.

Table 4-66. Pond 21 (Baseline) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1992	Not detected	Not detected
1999	Not detected	Not detected
2009	Not detected	Not detected
2019	Few (4)	Not detected

4.6.3.1 *Data Quality Objective 1*

Pond 21 did not provide suitable depth for CTS and fairy shrimp as discussed in Section 4.6.1.1.

4.6.3.2 *Data Quality Objective 4*

Fairy shrimp were not detected in 2019. California tiger salamanders were present at Pond 21 in April and were not detected in May because the vernal pool was dry. The water quality was adequate. Compared to other vernal pools and previous Pond 21 data, the water quality data were within normal ranges. The pH ranged from 6.39 in March to 6.66 in April with a mean of 6.52. Temperature ranged from 10.42°C in February to 13.60°C in March with a mean of 12.41°C. Dissolved oxygen ranged from 7.36 mg/L in April to 8.83 mg/L in March with a mean of 8.26 mg/L. Turbidity ranged from 16.8 FNU in February to 41.1 FNU in March with a mean of 29.5 FNU (see Table 3-24).

4.6.3.3 *Data Quality Objective 5*

California tiger salamanders were present in 2019, which was inconsistent with previous monitoring years. California tiger salamanders were not detected in 1992, 1999 or 2009.

Fairy shrimp were not detected in 2019, which was consistent with previous years of monitoring. Fairy shrimp were not detected during surveys in 1992, 1999, or 2009.

4.6.3.4 *Performance Standard: Wildlife Usage*

Pond 21 was a baseline vernal pool in 2019 and was not required to meet the performance standard. As a baseline vernal pool, Pond 21 will be monitored after remediation and compared to baseline in future years.

4.6.4 Conclusion

Pond 21 was not compared to DQOs in 2019 because it was in baseline condition. The vernal pool is suitable for comparison to future monitoring events for all DQOs (see Table 4-67).

Table 4-67. Success at Pond 21 (Baseline) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	Suitable for Baseline
	DQO 2	Suitable for Baseline
Plant Cover & Species Diversity	DQO 3	Suitable for Baseline
Wildlife Usage	DQO 1	Suitable for Baseline
	DQO 4	Suitable for Baseline
	DQO 5	Suitable for Baseline

4.7 Pond 103 – Baseline

Pond 103 was first monitored as a baseline vernal pool in 1992 and again in 2019. Table 4-68 summarizes the years that monitoring occurred and surveys conducted**.** Figure 4-36 shows the cumulative precipitation graph for the years in which these surveys took place. The area was described in 1992 as an "excavated ditch" with habitat conditions that were "heavily disturbed, barb wire, lumber, graded around area." In 1992, the ditch held approximately 152 cm of water (see Appendix F Table F-7) (USACE, 1992). In 2019, this area is no longer a ditch and did not hold water. There is no evidence of the area having held water in recent years and it supported dominate upland maritime chaparral rather than wetland vernal pool habitat. The area was surveyed six times for hydrology and once for wetland vegetation. The area historically called Pond 103 should not be considered a vernal pool and no further monitoring is recommended.

Table 4-68. Pond 103 (Baseline) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year	
	1991-1992	2018-2019
Hydrology	●	●
Vegetation		●
Wildlife		●

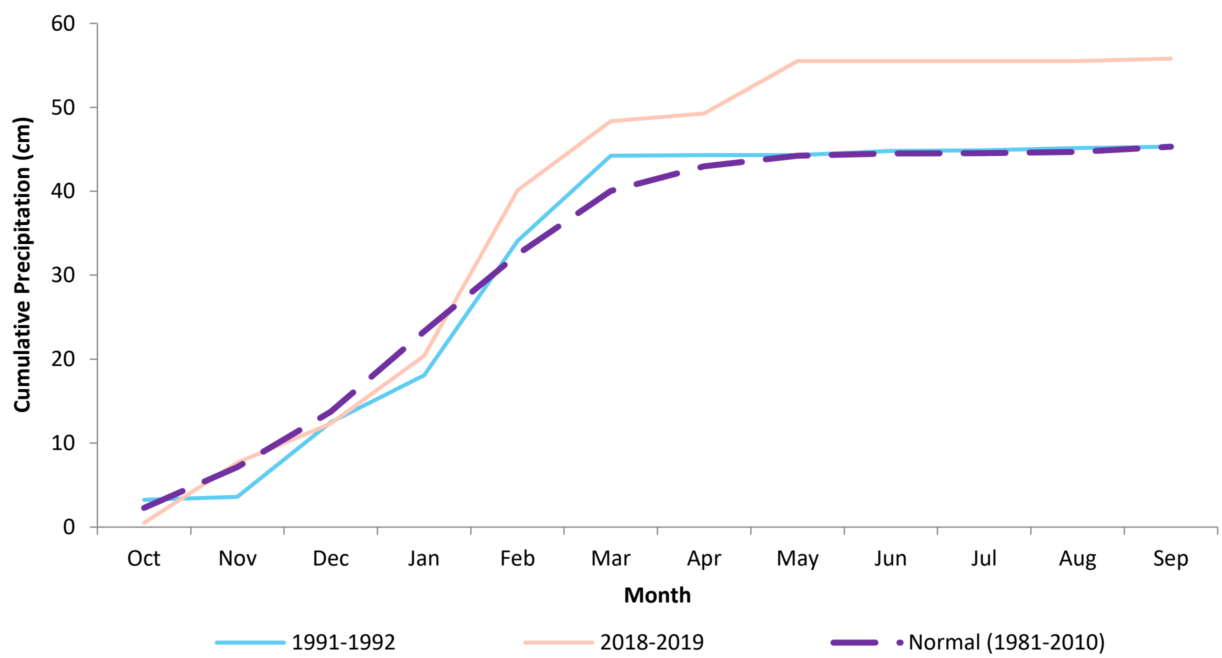

Figure 4-36. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 103 (Baseline) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.8 Pond 101 East (West) – Year 1

Pond 101 East (West) was monitored in 2019 as a year 1 post-mastication vernal pool. Pond 101 East (West) was monitored in previous years as a reference vernal pool. Vegetation in Pond 101 East (West) was masticated in 2018. Table 4-69 summarizes the years that monitoring occurred and surveys conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 101 East (West) (see Figure 4-37). The 2015-2016, 2016-2017, and 2018-2019 water-years were above-normal. All other monitoring was conducted either in a normal or below-normal water-years.

Table 4-69. Pond 101 East (West) (Year 1 Post-Mastication) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year								
	1991-1992	2000-2001	2009-2010	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Hydrology		●		●	●	●	●	●
Vegetation		●			●	●	●	●
Wildlife	●	●	●		●	●		●

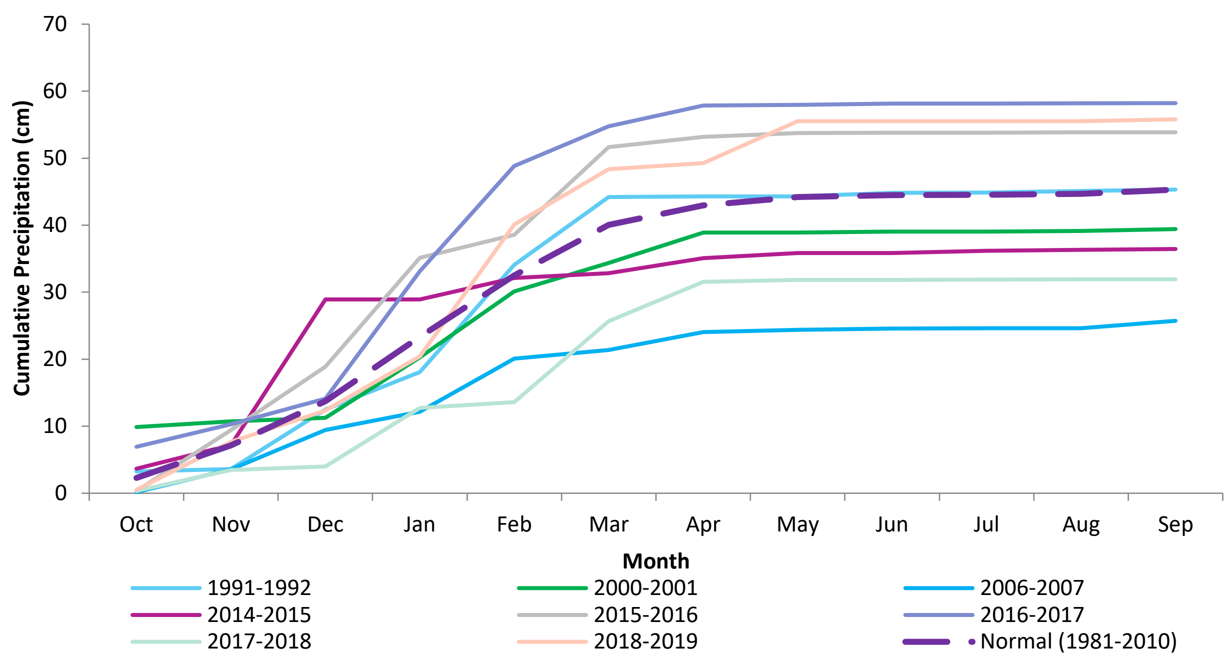

Figure 4-37. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 101 East (West) (Year 1 Post-Mastication) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.8.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 101 East (West) was 1.86 acres with a maximum depth of approximately 76 cm. The depth and inundation values were within range of previously recorded values (see Appendix F Table F-8). Pond 101 East (West) was inundated from February through June. Figure 4-38 illustrates the relationship of precipitation and depth at Pond 101 East (West) for 2019 as well as baseline in 2016.

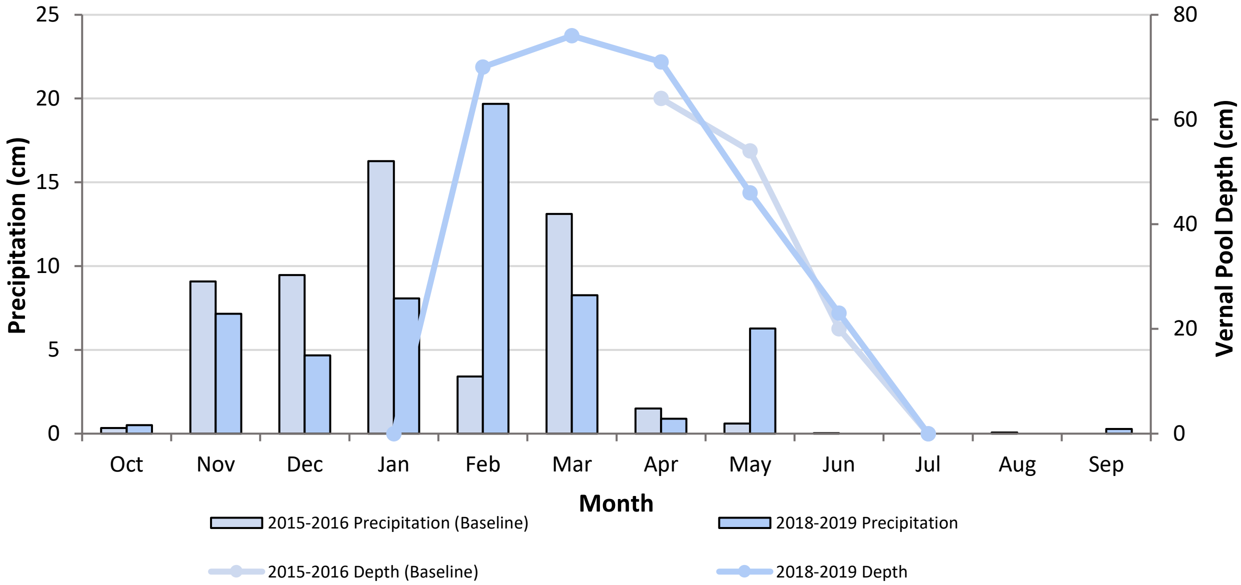

Figure 4-38. Monthly Depth and Precipitation at Pond 101 East (West) (Year 1 Post-Mastication) for 2018-2019 Water-Year Compared to Baseline 2015-2016 Water-Year

In below-normal precipitation years, Pond 101 East (West) is likely to range from 0-45 cm in depth with a maximum inundation of 0-0.1 acres. In normal precipitation years, Pond 101 East (West) is likely to have a maximum depth of approximately 50 cm and a maximum inundation of approximately 0.5 acres. In above-normal precipitation years, Pond 101 East (West) could have maximum depths of 88 cm or more and a maximum inundation of 1.9 acres or more but would likely be connected to Pond 101 East (East), as observed in 2017 (see Appendix F Tables F-2 and F-8). Figure 4-39 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-40 illustrates historic and recent inundation areas.

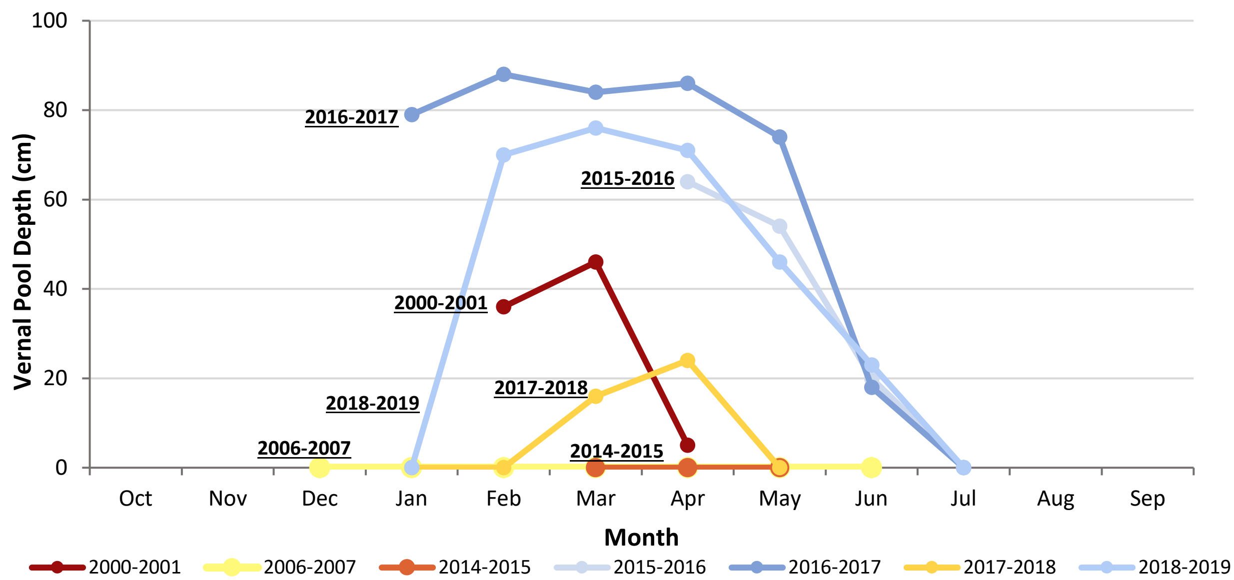

Figure 4-39. Historic Monthly Depths at Pond 101 East (West) (Year 1 Post-Mastication). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

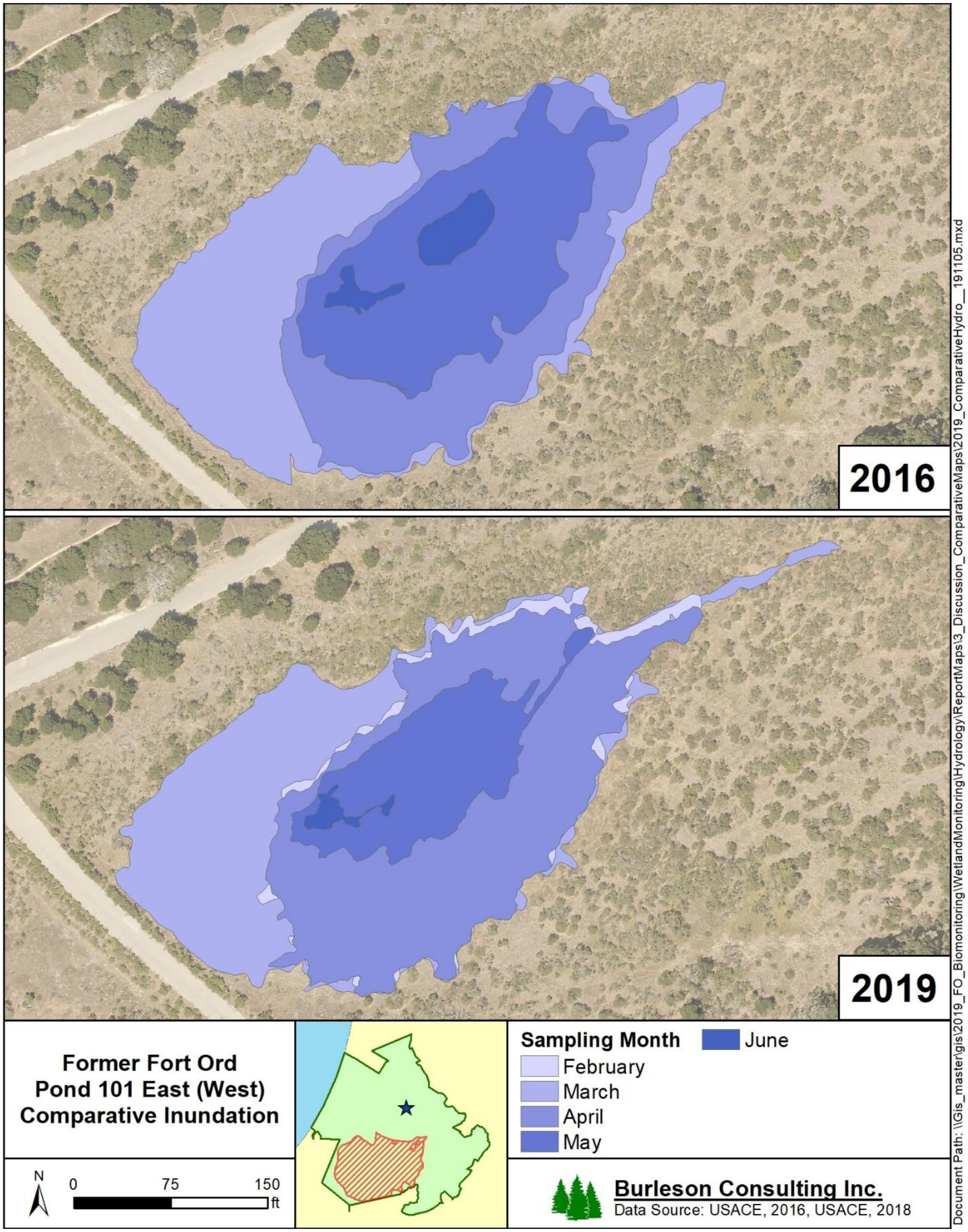

Figure 4-40. Pond 101 East (West) (Year 1 Post-Mastication) Inundations for 2015-2016 (above-normal precipitation) and 2018-2019 (above-normal precipitation). The vernal pool was masticated in 2018 and was in year 1 of monitoring in 2019.

4.8.1.1 *Data Quality Objective 1*

Pond 101 East (West) met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 101 East (West) provided sufficient depth for CTS (73 cm through March) and fairy shrimp (66 cm through May). Recorded depths indicate that DQO 1 was likely met for Pond 101 East (West) in 2016 and 2017 and not met in 2015 or 2018. Depths at Pond 101 East (West) were higher in 2019 than the ranges observed at reference vernal pools 5, 101 East (East), and 997.

4.8.1.2 *Data Quality Objective 2*

Pond 101 East (West) had inundations in 2019 similar to the baseline year 2016 and was within the range of the relevant reference vernal pools. Pond 101 East (West) was inundated February through June with an inundation range of 0.02-1.86 acres and a mean of 0.92 acres. The historic inundation ranges were 0.004 acres in 2018 to 9.37 in 2017. Pond 101 East (West) is a fairly large vernal pool that is likely to fill in a normal or slightly below-normal water-year; in a drought year, the vernal pool may remain dry or dry quickly. In above-normal water years, it may connect with Pond 101 East (East). Pond 101 East (West) had similar timing as vernal pool 101 East (East), both were inundated January/February through June. There is not a reference vernal pool that is similar in size, but mean inundations at Pond 101 East (West) would be expected to be between Pond 997 and Pond 101 East (East).

4.8.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 101 East (West), a post-mastication vernal pool, was on track to meet the performance standard for year 1 in 2019. Pond 101 East (West) met DQO 1 and DQO 2 indicating that it provided suitable habitat for CTS and fairy shrimp and was similar to itself in previous monitoring years and reference. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.8.2 Vegetation Monitoring

Vegetation data were collected at Pond 101 East (West) in 2001, 2016, 2017, 2018, and 2019 (Harding ESE, 2002; Burleson, 2017, 2018, 2019). In 2001, data were collected along two 41-foot transects using 0.25 m^2 quadrats at 10-foot intervals, which alternated from the right to left of the transect. Because 2001 data were collected differently than in other years, strata were combined across the vernal pool to allow for comparison to other years. In 2016, 2017, 2018, and 2019, data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2019 were compared stratum-to-stratum in Table 4-70 as well as visually in Figure 4-41.

Table 4-70. Pond 101 East (West) (Year 1 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2019
1	13%	0.3%
2	37%	52%
3	12%	10%
4	22%	11%
5	15%	20%
6	N/A	5%
8	N/A	2%

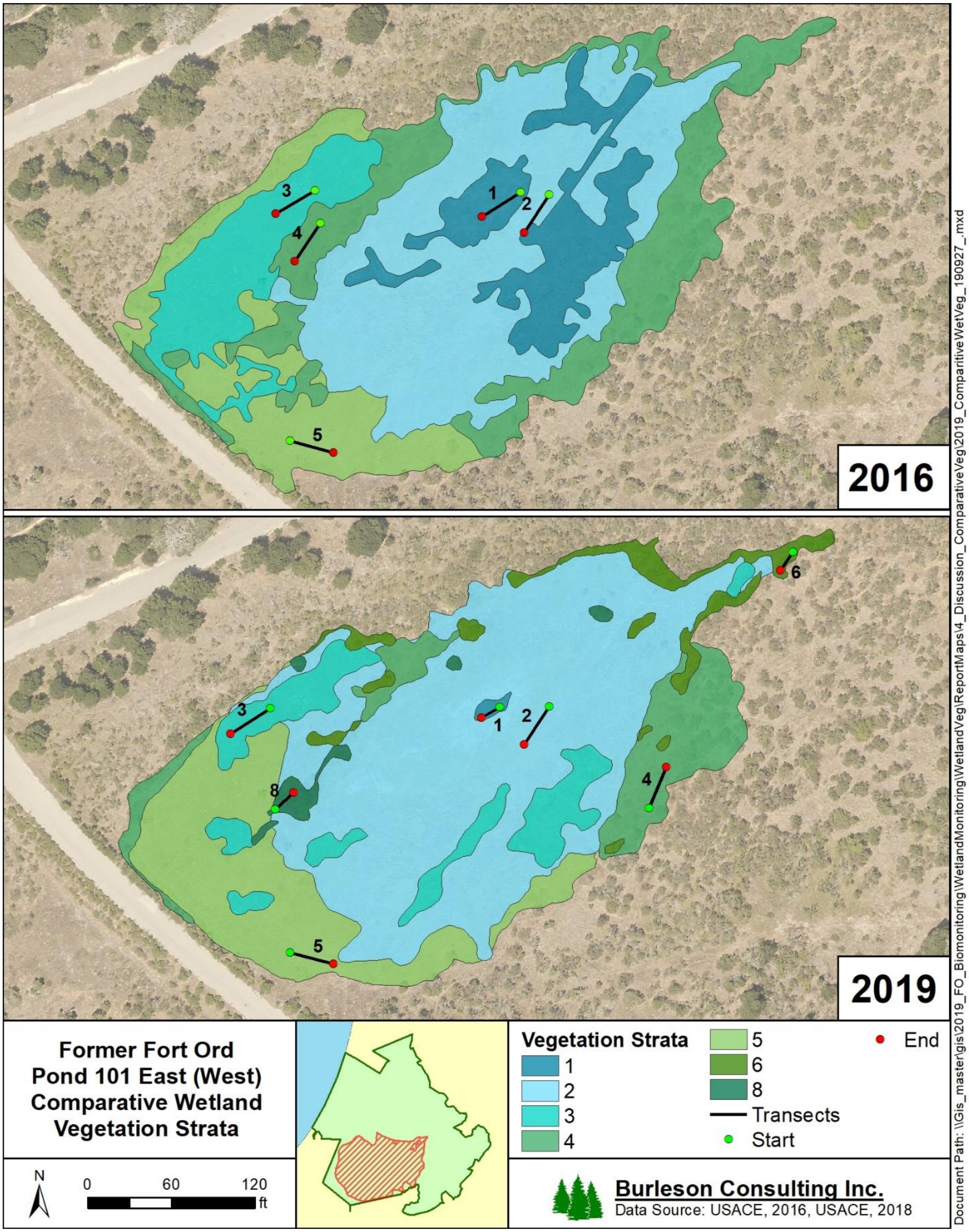

Figure 4-41. Pond 101 East (West) (Year 1 Post-Mastication) Vegetation Strata and Transects for 2016 and 2019

The absolute percent vegetative cover observed in 2019 was comparable to previous years and most similar to 2016 (see Table 4-71). Vegetative cover ranged from 58.1% in 2018 to 76.0% in 2019, whereas thatch/bare ground ranged from 24.0% in 2019 to 42.3% in 2018. The 2019 Pond 101 East (West) values were within the ranges observed at the reference vernal pools, and were the same as reference vernal pool Pond 5 (see Table 4-72).

Table 4-71. Pond 101 East (West) (Year 1 Post-Mastication) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2001	66.5%	34.3%
2016	75.9%	25.5%
2017	69.0%	30.5%
2018	58.1%	42.3%
2019	76.0%	24.0%

Table 4-72. Pond 101 East (West) (Year 1 Post-Mastication) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
101 East (West)	**76.0%**	**24.0%**

Species richness increased between 2016 and 2018 and decreased slightly in 2019 at Pond 101 East (West). Species richness on transects was 31, 30, 36, 50, and 49 species in 2001, 2016, 2017, 2018, and 2019, respectively, whereas overall basin species richness was 58, 68, 88, and 85 species in 2016, 2017, 2018, and 2019, respectively (see Table 4-73 and Appendix B Table B-8). The 2001 survey only included species observed on the transects and total vernal pool species richness was not recorded. Pond 101 East (West) species richness was similar to the reference vernal pools (see Table 4-73 and Appendix G Tables G-27 and G-54).

Species composition at Pond 101 East (West) was variable through time, and the dominant species were different between years. Sand spikerush (*Eleocharis montevidensis)* was the dominant species in 2001, Italian rye grass (*Festuca perennis*) and pale spikerush (*Eleocharis macrostachya*) were dominant species in 2016 and 2018, while pale spikerush and grass poly (*Lythrum hyssopifolia*) were the dominant species in 2017. Pale spikerush, Italian rye grass, and coast tarweed (*Madia sativa*) were the dominant species in 2019. A complete comparison of species composition observed at Pond 101 East (West) in 2001, 2016, 2017, 2018, and 2019 can be found in Appendix H. Figure 4-42 shows a subset of this comparison for species observed with a 2% cover or greater.

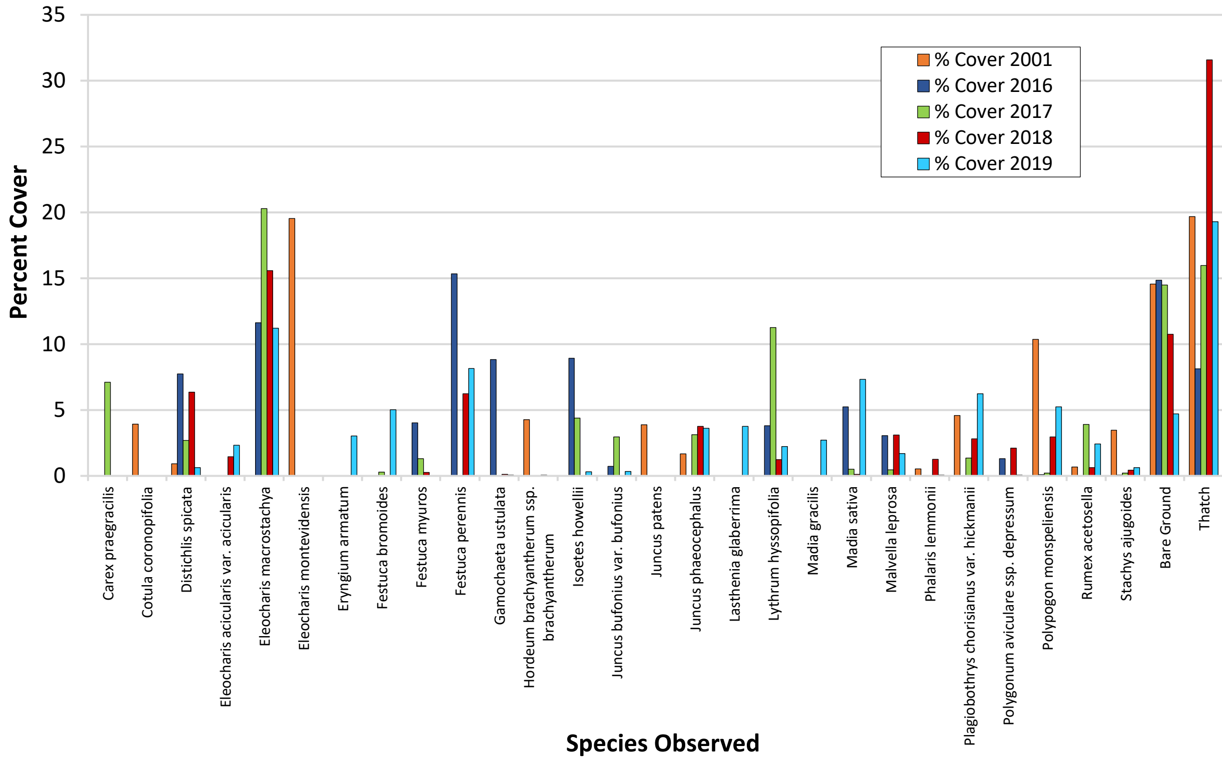

Figure 4-42. Percent Cover of Dominant Species at Pond 101 East (West) (Year 1 Post-Mastication)

Native species richness on Pond 101 East (West) transects increased between 2001 and 2019 (see Table 4-73). Native species richness in 2019 was greater than the reference vernal pools (see Table 4-74). Non-native species richness was variable between monitoring years, and was within the range of previous years and reference vernal pools. The relative percent cover of native and non-native species varied through time, and the 2019 values were within the range of previously observed values (see Table 4-75). The relative percent cover value of native species was slightly less, and the non-native was slightly more, than the reference vernal pools in 2019. Pond 101 East (West) was similar to reference vernal pool Pond 101 East (East) (see Table 4-76).

Table 4-73. Pond 101 East (West) (Year 1 Post-Mastication) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2001	15	16	0
2016	17	12	1
2017	23	12	1
2018	26	21	3
2019	29	19	1

Table 4-74. Pond 101 East (West) (Year 1 Post-Mastication) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
101 East (West)	**29**	**19**	**1**

Table 4-75. Pond 101 East (West) (Year 1 Post-Mastication) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2001	62.5%	37.5%	0.0%
2016	65.6%	34.4%	0.0%
2017	70.3%	29.6%	0.1%
2018	67.1%	32.5%	0.3%
2019	63.4%	36.5%	0.1%

Table 4-76. Pond 101 East (West) (Year 1 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
101 East (West)	**63.4%**	**36.5%**	**0.1%**

Wetland species richness on Pond 101 East (West) transects increased between 2001 and 2019, whereas non-wetland species richness was within the range of previous years (see Table 4-77). Similarly, wetland species richness was greater than the reference vernal pools in 2019, while non-wetland species richness was within the range of the reference vernal pools (see Table 4-78). The relative percent cover of wetland and non-wetland species remained similar across monitoring years and in 2019 was most similar to 2016 (see Table 4-79). The wetland and non-wetland species relative percent cover values were within the ranges observed at the reference vernal pools in 2019 and were most similar to reference Pond 101 East (East) (see Table 4-80).

Table 4-77. Pond 101 East (West) (Year 1 Post-Mastication) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2001	4	8	7	5	2	5
2016	7	5	5	4	0	9
2017	8	12	4	6	0	6
2018	8	11	9	8	2	12
2019	7	15	10	4	3	10

Table 4-78. Pond 101 East (West) (Year 1 Post-Mastication) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
101 East (West)	**7**	**15**	**10**	**4**	**3**	**10**

Table 4-79. Pond 101 East (West) (Year 1 Post-Mastication) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2001	20.9%	62.0%	5.1%	4.6%	2.2%	5.2%
2016	34.5%	11.7%	22.8%	10.0%	0.0%	21.0%
2017	55.1%	29.6%	4.2%	8.6%	0.0%	2.5%
2018	38.6%	29.0%	17.0%	8.4%	1.0%	6.1%
2019	35.2%	20.2%	14.4%	5.7%	1.3%	23.2%

Table 4-80. Pond 101 East (West) (Year 1 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
101 East (West)	**35.2%**	**20.2%**	**14.4%**	**5.7%**	**1.3%**	**23.2%**

4.8.2.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 101 East (West) was dominated by native and wetland plant species during year 1 post-mastication monitoring in 2019. Pond 101 East (West) was generally within range of the baseline and reference vernal pools, except that native and wetland species richness increased in 2019 and was greater than baseline years and the reference vernal pools.

4.8.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 101 East (West), a post-mastication vernal pool, was on track to meet the performance standard for year 1 in 2019. The species composition and native and wetland species relative abundances were similar to baseline and reference vernal pool conditions, and species richness was greater. Pond 101 East (West) provided suitable wetland habitat in 2019.

4.8.3 Wildlife Monitoring

Wildlife data were collected at Pond 101 East (West) in 1992, 2001, 2010, 2016, 2017, and 2019 (Jones and Stokes, 1992; Harding ESE, 2002; Shaw, 2011; Burleson, 2017, 2018). California tiger salamander larvae were detected in 1992, 2010, 2016, 2017, and 2019. Fairy shrimp were detected in 2001 and 2019. Table 4-81 shows historic wildlife monitoring results.

Table 4-81. Pond 101 East (West) (Year 1 Post-Mastication) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1992	Present*	Not detected*
2001	Not detected*	Moderate (12, 100)*
2010	Common*	Not detected*
2016	Common - Abundant (>101, 103, 100)	Not detected
2017	Common (21, 39, 47)	Not detected
2019	Common – Abundant (56, 132, 144)	High (181)

*Data do not differentiate between 101 East (East), 101 East (West), and 101 West. They are identified collectively as Pond 101.

4.8.3.1 *Data Quality Objective 1*

Pond 101 East (West) provided suitable depth for CTS and fairy shrimp as discussed in Section 4.8.1.1.

4.8.3.2 *Data Quality Objective 4*

California tiger salamanders and fairy shrimp were present at Pond 101 East (West) in 2019; therefore, the water quality was adequate. Compared to other vernal pools and previous Pond 101 East (West) data, the water quality data was within normal ranges. The pH ranged from 6.12 in March to 6.50 in February with a mean of 6.34. Temperature ranged from 11.84°C in February to 23.74°C in June with a mean of 16.06°C. Dissolved oxygen ranged from 3.89 mg/L in April to 7.61 mg/L in February with a mean of 5.26 mg/L. Turbidity range was from 1.8 FNU in May to 64.9 FNU in June with a mean of 16.1 FNU (see Table 3-28).

4.8.3.3 *Data Quality Objective 5*

California tiger salamanders were present in 2019, which was generally consistent with other baseline monitoring years (1992, 2010, 2016, and 2017). California tiger salamanders were not detected in 2001.

Fairy shrimp were present in 2019. Fairy shrimp presence in Pond 101 East (West) has been variable with more years of no detection than years with detections. Survey years with no detections were 1992, 2010, 2016, and 2017, while survey years with detections were 2001 and 2019.

4.8.3.4 Performance Standard: Wildlife Usage

Pond 101 East (West) was a post-mastication remediation vernal pool in year 1 of monitoring. Pond 101 East (West) was on track to meet the performance standard. The vernal pool was on track to meet DQOs 1, 4, and 5 and provided suitable CTS and fairy shrimp habitat.

4.8.4 Conclusion

Pond 101 East (West), a post-mastication vernal pool, was in year 1 of monitoring in 2018. The vernal pool was on track to meet all of the performance standards (see Table 4-82). Pond 101 East (West) will continue to be monitored in the future.

Table 4-82. Success at Pond 101 East (West) (Year 1 Post-Mastication) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	On track
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	On track
	DQO 4	On track
	DQO 5	On track

4.9 Pond 101 West – Year 1

Pond 101 West was monitored in 2019 as a year 1 post-mastication vernal pool. Pond 101 West was monitored for baseline conditions in 1992, 2001, 2015, and 2016. Vegetation in Pond 101 West was masticated in 2018. Table 4-83 summarizes the years that monitoring occurred and surveys conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 101 West (see Figure 4-43). The only water-years above-normal were 2015-2016 and 2018-2019. All other monitoring was conducted either in a normal, below-normal water-year, drought year, or consecutive drought year.

Table 4-83. Pond 101 West (Year 1 Post-Mastication) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year				
	1991-1992	2000-2001	2014-2015	2015-2016	2018-2019
Hydrology		●	●	●	●
Vegetation				●	●
Wildlife	●			●	●

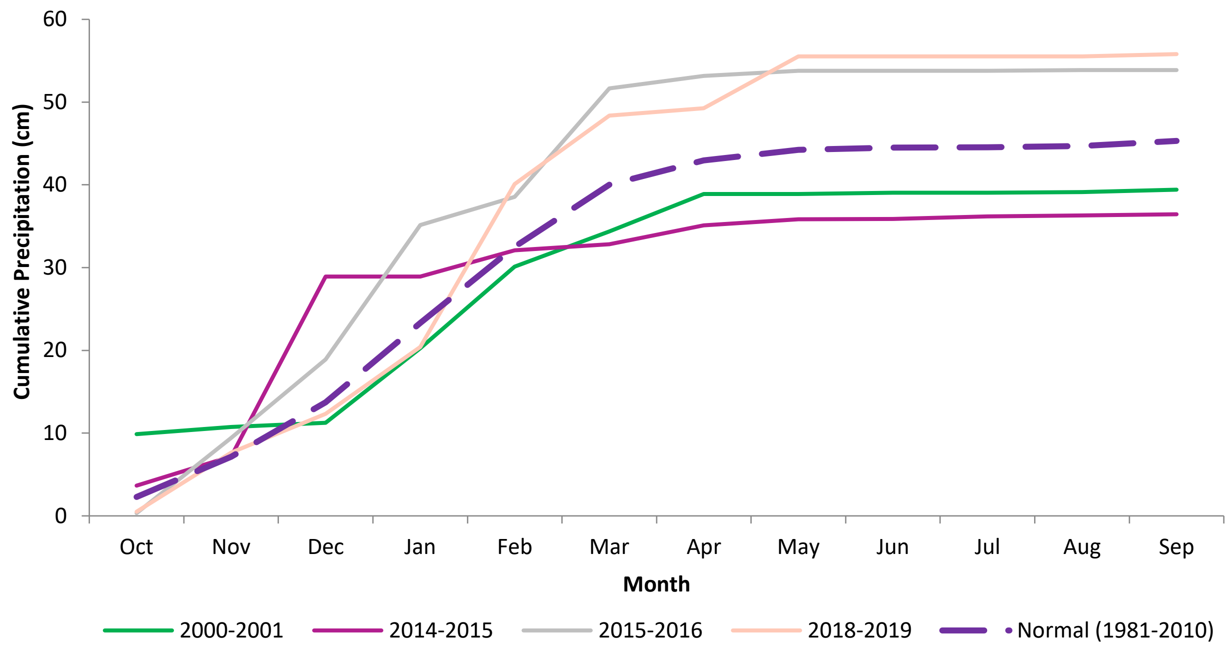

Figure 4-43. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 101 West (Year 1 Post-Mastication) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.9.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 101 West was 0.11 acres with a maximum depth of approximately 54 cm. The depth and inundation values were within range of the previously recorded values (see Appendix F Table F-9). Pond 101 West was inundated from February through May. Figure 4-44 illustrates the relationship of precipitation and depth at Pond 101 West for 2019 as well as baseline in 2016.

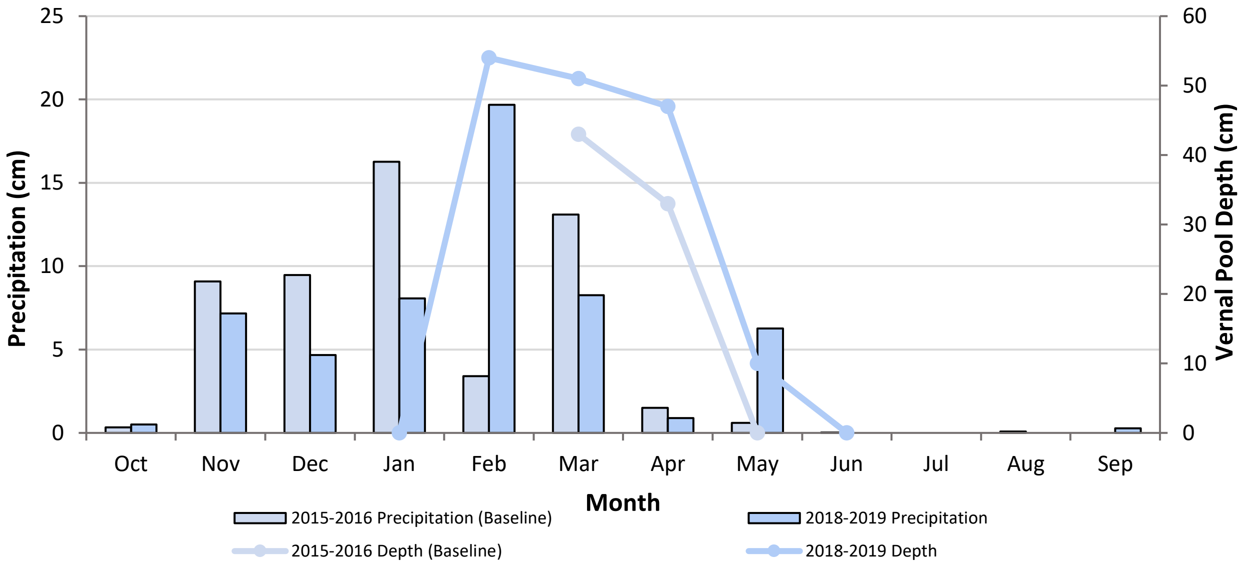

Figure 4-44. Monthly Depth and Precipitation at Pond 101 West (Year 1 Post-Mastication) for 2018-2019 Water-Year Compared to Baseline 2015-2016 Water-Year

In below-normal precipitation years, Pond 101 West is likely to range from 10-46 cm in depth with a maximum inundation of 0.01-0.11 acres. No depths or inundations for Pond 101 West have been recorded in normal precipitation years. In above-normal precipitation years, Pond 101 West could have maximum depths of 54 cm or more and a maximum inundation of 0.14 acres (see Appendix F Table F-9). Figure 4-45 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-46 illustrates historic and recent inundation areas.

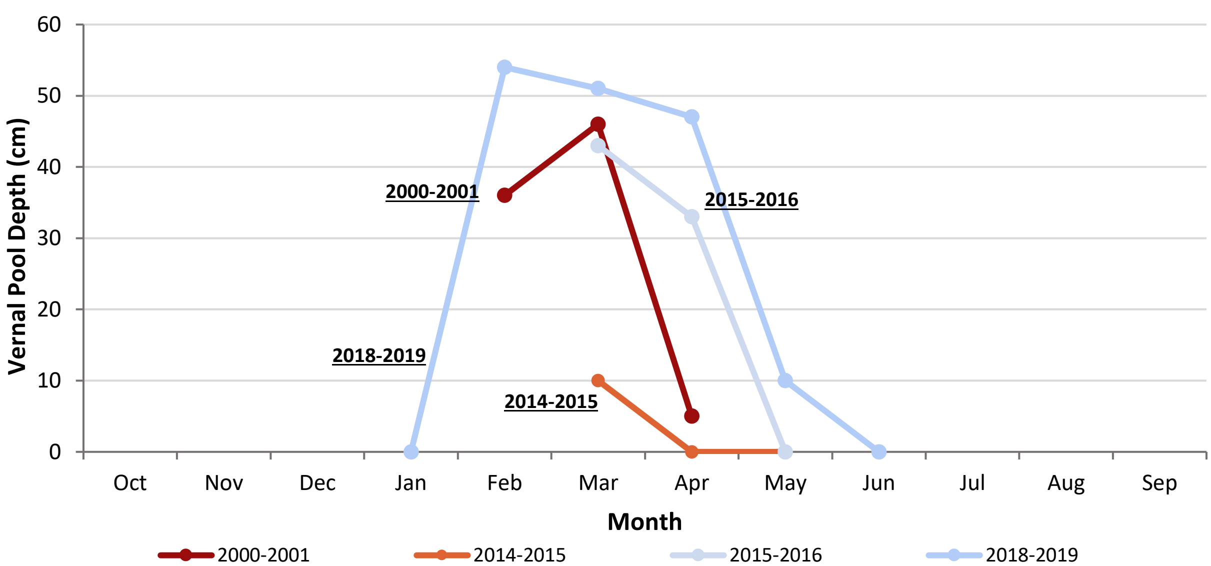

Figure 4-45. Historic Monthly Depths at Pond 101 West (Year 1 Post-Mastication). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

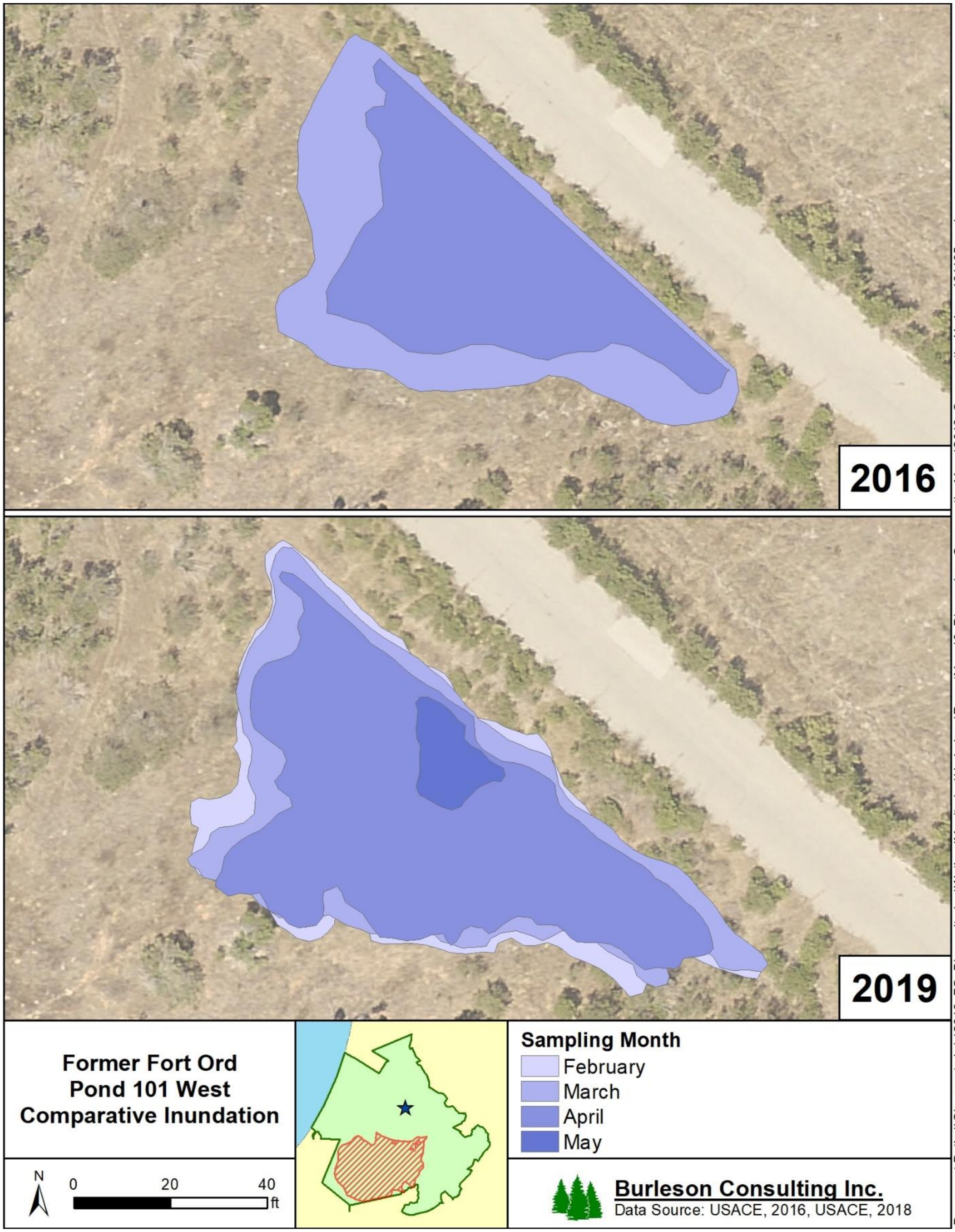

Figure 4-46. Pond 101 West (Year 1 Post-Mastication) Inundations for 2015-2016 (above-normal precipitation) and 2018-2019 (above-normal precipitation). The vernal pool was masticated in 2018 and was in year 1 of monitoring in 2019.

4.9.1.1 *Data Quality Objective 1*

Pond 101 West met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 101 West provided sufficient depth for both CTS (53 cm through March) and fairy shrimp (41 cm through May). Recorded depths indicate that DQO 1 was likely not met for Pond 101 West in 2001, 2015, and 2016. Depths at Pond 101 West in 2019 were similar to the ranges observed at reference vernal pool 101 East (East).

4.9.1.2 *Data Quality Objective 2*

Pond 101 West had inundations in 2019 similar to the baseline year 2016 and was within the range of the relevant reference vernal pools. Pond 101 West was inundated February through May with an inundation range of 0.01-0.11 acres and a mean of 0.08 acres. The historic inundation ranges were 0.01 acres in 2015 to 0.14 in 2001. Pond 101 West is a fairly small vernal pool that is likely to fill in a normal or slightly below-normal water-year, and in a drought year, the vernal pool may remain dry or dry quickly. Pond 101 West had a similar inundation range and timing as vernal pool 997, both were inundated February through April/May and had small inundation areas.

4.9.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 101 West, a post-mastication vernal pool, was on track to meet the performance standard for year 1 in 2019. Pond 101 West met DQO 1 and DQO 2 indicating that it provided suitable habitat for CTS and fairy shrimp and was similar to itself in previous monitoring years and reference. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.9.2 Vegetation Monitoring

Vegetation data were collected at Pond 101 West in 2016 and 2019 (Burleson, 2017). Data from 2016 and 2019 were collected using the methodology described in the Methods section of this report and were compared stratum-to-stratum in Table 4-84 as well as visually in Figure 4-47.

Table 4-84. Pond 101 West (Year 1 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2019
1	56%	33%
2	44%	62%
3	N/A	5%

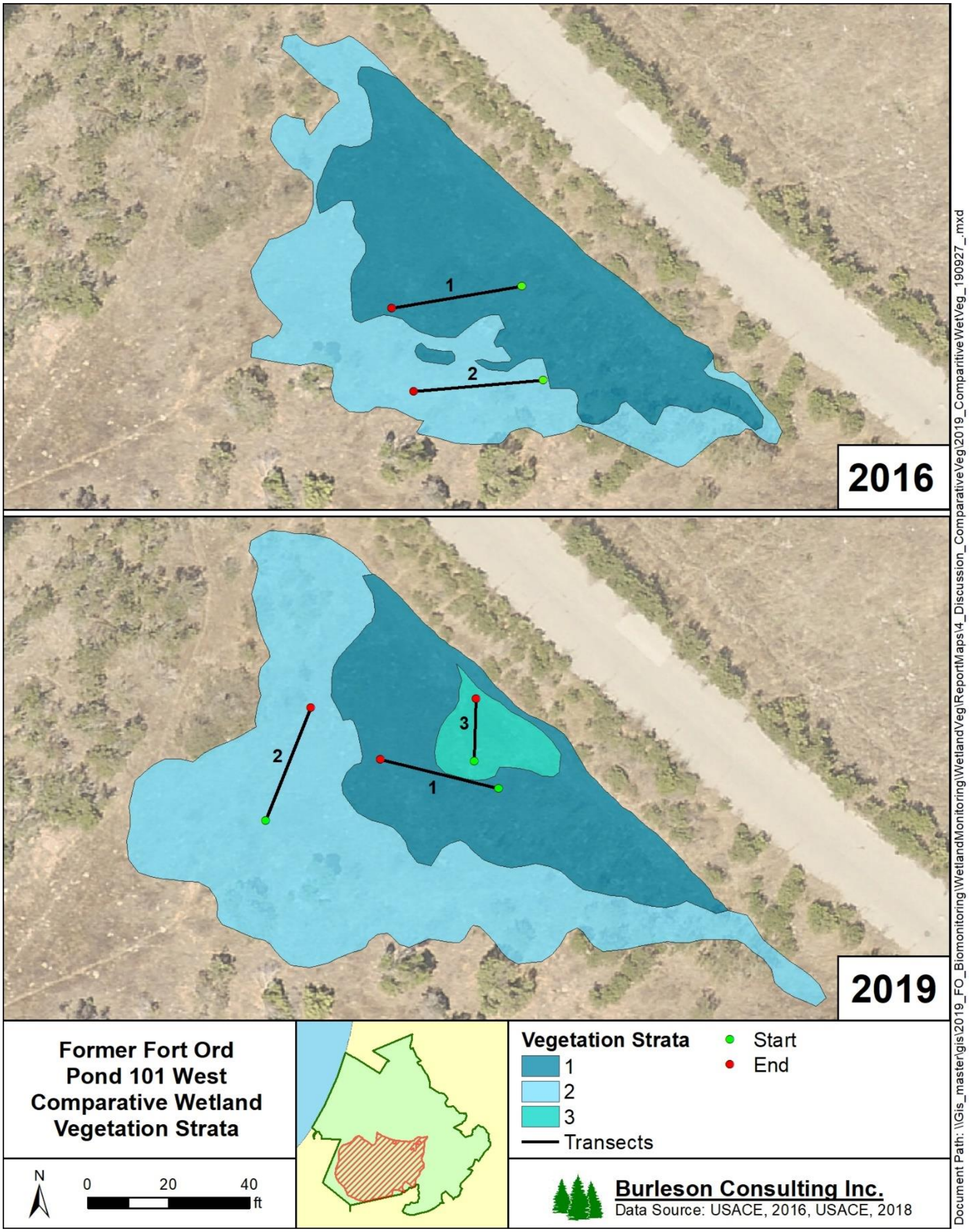

Figure 4-47. Pond 101 West (Year 2 Post-Mastication) Vegetation Strata and Transects for 2016 and 2019

The absolute percent vegetative cover value of Pond 101 West increased between 2016 and 2019, whereas thatch/bare ground decreased (see Table 4-85). Similarly, the absolute vegetation cover was greater at Pond 101 West than the reference vernal pools and thatch/bare ground was less than reference (see Table 4-86).

Table 4-85. Pond 101 West (Year 1 Post-Mastication) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2016	73.2%	26.7%
2019	86.7%	13.5%

Table 4-86. Pond 101 West (Year 1 Post-Mastication) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
101 West	**86.7%**	**13.5%**

Species richness increased between 2016 and 2019. Species richness on transects was 23 and 40 species in 2016 and 2019, respectively, whereas overall basin species richness was 43 and 75 species in 2016 and 2019, respectively (see Table 4-87 and Appendix B Table B-9). Pond 101 West species richness on transects was within range of the reference vernal pools, however, species richness for the overall basin was slightly less than the values observed at the reference vernal pools (see Table 4-88 and Appendix G Tables G-27 and G-54).

Species composition at Pond 101 West was similar between monitoring years; the dominant species in both monitoring years was Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*). Smooth goldfields (*Lasthenia glaberrima*) was an important species in both years. Another important species in 2016 was Italian ryegrass (*Festuca perennis*) and in 2019 were pale spikerush (*Eleocharis macrostachya*) and gumweed (*Madia gracilis*). A complete comparison of species composition observed at Pond 101 West in 2016 and 2019 can be found in Appendix H. Figure 4-48 shows a subset of this comparison for species observed with a 2% cover or greater.

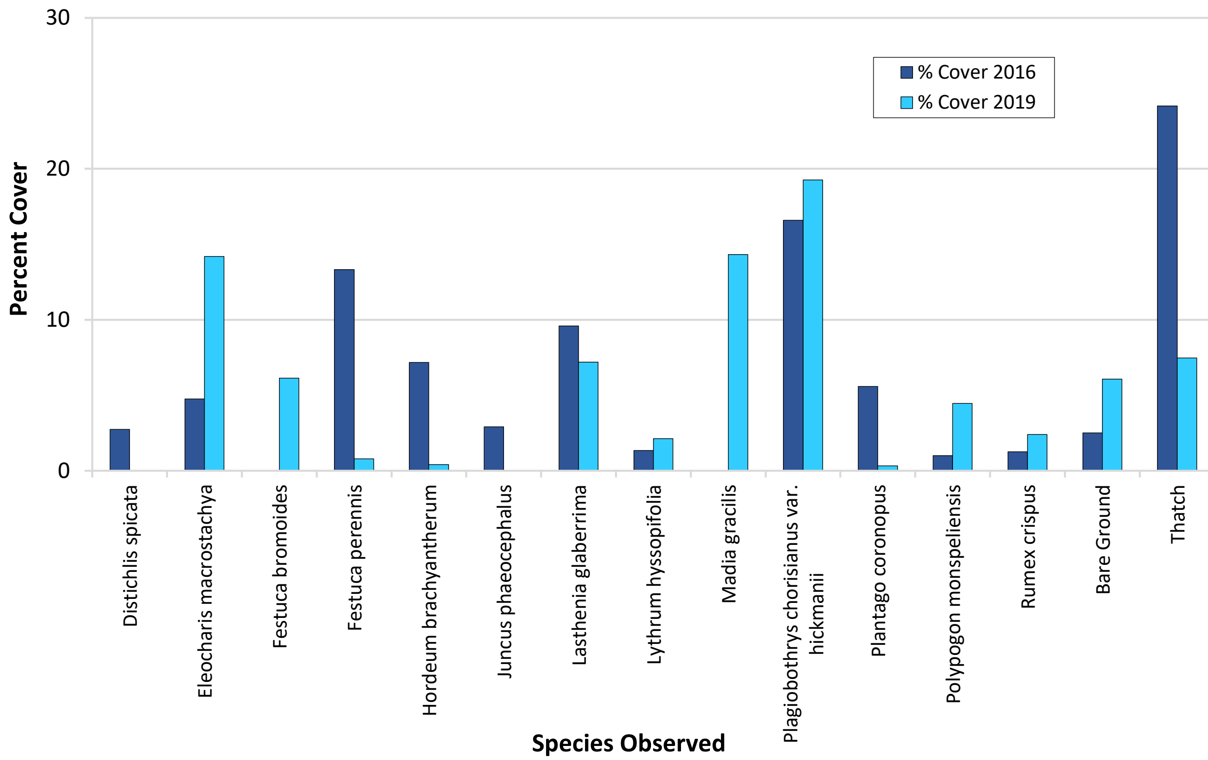

Figure 4-48. Percent Cover of Dominant Species at Pond 101 West (Year 1 Post-Mastication)

Native and non-native species richness on Pond 101 West transects increased between 2016 and 2019 (see Table 4-87). Native and non-native species richness in 2019 were within the ranges observed at the reference vernal pools (see Table 4-88). Relative percent cover of native species increased between 2016 and 2019 and non-native species decreased (see Table 4-89). The relative percent cover values of native and non-native species in Pond 101 West were similar to Pond 5 (see Table 4-90).

Table 4-87. Pond 101 West (Year 1 Post-Mastication) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2016	12	11	0
2019	22	18	0

Table 4-88. Pond 101 West (Year 1 Post-Mastication) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
101 West	**22**	**18**	**0**

Table 4-89. Pond 101 West (Year 1 Post-Mastication) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2016	67.7%	32.3%	0.0%
2019	74.8%	25.2%	0.0%

Table 4-90. Pond 101 West (Year 1 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
101 West	**74.8%**	**25.2%**	**0.0%**

Wetland and non-wetland species richness on Pond 101 West transects increased between 2016 and 2019 (see Table 4-91). The wetland species richness was greater than what was observed at the reference vernal pools in 2019, and the non-wetland species richness was within the range of the reference vernal pools (see Table 4-92). The relative percent cover of wetland species decreased from 2016 to 2019, and the relative percent cover of non-wetland species increased slightly (see Table 4-93). The decrease of wetland species cover is most likely due to a few key 2019 species not listed with wetland indicator codes, which artificially deflates the magnitude of wetland species cover. The wetland and non-wetland species relative percent cover values were within the ranges observed at the reference vernal pools in 2019 (see Table 4-94).

Table 4-91. Pond 101 West (Year 1 Post-Mastication) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2016	6	6	4	3	0	4
2019	9	9	10	4	2	6

Table 4-92. Pond 101 West (Year 1 Post-Mastication) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
101 West	**9**	**9**	**10**	**4**	**2**	**6**

Table 4-93. Pond 101 West (Year 1 Post-Mastication) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2016	46.2%	21.5%	27.8%	0.7%	0.0%	3.8%
2019	52.0%	11.5%	7.1%	2.4%	0.8%	26.2%

Table 4-94. Pond 101 West (Year 1 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
101 West	**52.0%**	**11.5%**	**7.1%**	**2.4%**	**0.8%**	**26.2%**

4.9.2.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 101 West was dominated by native and wetland plant species during year 1 post-mastication monitoring in 2019. Pond 101 West was generally within range of the baseline and reference vernal pools; however, vegetative cover in 2019 was greater than baseline years and the reference vernal pools.

4.9.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 101 West, a post-mastication vernal pool, was on track to meet the performance standard for year 1 in 2019. The species composition, richness, and native and wetland species relative abundances were similar to baseline and/or reference vernal pool conditions, whereas vegetative cover was greater. Pond 101 West provided suitable wetland habitat in 2019.

4.9.3 Wildlife Monitoring

Wildlife data were collected at Pond 101 West in 1992, 2001, 2010, 2016, and 2019 (Jones and Stokes, 1992; Harding ESE, 2002; Shaw, 2011; Burleson, 2017). California tiger salamander larvae were observed in 1992, 2010, 2016, and 2019. Fairy shrimp were detected in 2001. Table 4-95 shows historic wildlife monitoring results.

Table 4-95. Pond 101 West (Year 1 Post-Mastication) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1992	Present*	Not detected*
2001	Not detected*	Moderate (12, 100)*
2010	Common*	Not detected*
2016	Few – Common (11, 12, 10)	Not detected
2019	Common – Abundant (32, 106)	Not detected

*Data do not differentiate between 101 East (East), 101 East (West), and 101 West. They are identified collectively as Pond 101.

4.9.3.1 *Data Quality Objective 1*

Pond 101 West provided suitable depth for CTS and fairy shrimp as discussed in Section 4.9.1.1.

4.9.3.2 *Data Quality Objective 4*

Fairy shrimp were not detected in 2019. California tiger salamanders were present at Pond 101 West in March and April and were not detected in May because the vernal pool was nearly dry. The water quality was adequate. Compared to other vernal pools and previous Pond 101 West data, the water quality data were within normal ranges. The pH ranged from 6.44 in February to 6.69 in May with a mean of 6.59. Temperature ranged from 13.32°C in February to 24.35°C in May with a mean of 16.49°C. Dissolved oxygen ranged from 4.77 mg/L in April to 7.45 mg/L in February with a mean of 5.69 mg/L. Turbidity ranged from 26.7 FNU in February to 202.0 FNU in May with a mean of 104.9 FNU (see Table 3-32).

4.9.3.3 *Data Quality Objective 5*

California tiger salamanders were present in 2019, which was generally consistent with baseline monitoring. California tiger salamanders were present in 1992, 2010, and 2016, but were not detected in 2001.

Fairy shrimp were not detected in 2019, which was generally consistent with baseline monitoring. Fairy shrimp were not detected in 1992, 2010, or 2016, but were observed in 2001. It is possible that survey event timing prevented detection in 1992 and 2016. Fairy shrimp detections typically occur between January and March and all surveys at Pond 101 West occurred in March or later. It is also possible that the detection in 2001 was not in Pond 101 West. The data from 2001 does not specify which of the three vernal pools the detection was in but rather refers to them collectively as Pond 101.

4.9.3.4 *Performance Standard: Wildlife Usage*

Pond 101 West was a post-mastication remediation vernal pool in year 1 of monitoring. Pond 101 West was partially on track to meet the performance standard. The vernal pool was on track to meet DQOs 1, and 4, and provided suitable CTS and fairy shrimp habitat. However, for DQO 5, fairy shrimp were detected in one of the four baseline years but were not detected in 2019.

4.9.4 Conclusion

Pond 101 West, a post-mastication vernal pool, was in year 1 of monitoring in 2019. The vernal pool was partially on track to meet all performance standards (see Table 4-96). Pond 101 West will continue to be monitored in the future years to evaluate its progress to meet the performance standard.

Table 4-96. Success at Pond 101 West (Year 1 Post-Mastication) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	On track
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	On track
	DQO 4	On track
	DQO 5	Partially on track*

*Fairy shrimp were not detected in 2019, but were present in the Pond 101 complex in 2001.

4.10 Pond 41 – Year 1

Pond 41 was monitored in 2019 as a year 1 post-subsurface munitions remediation vernal pool. Pond 41 was monitored for baseline conditions in 1998, 2015, and 2016. Pond 41 was cleared of munitions in 2018. Table 4-97 summarizes the years that monitoring occurred and surveys conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 41 (see Figure 4-49**).** The normal or above-normal water-years were 1997-1998, 2015-2016 and 2018-2019. Monitoring in 2014-2015 was conducted in a below-normal water-year.

Table 4-97. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year			
	1997-1998	2014-2015	2015-2016	2018-2019
Hydrology	●	●	●	●
Vegetation			●	●
Wildlife	●		●	●

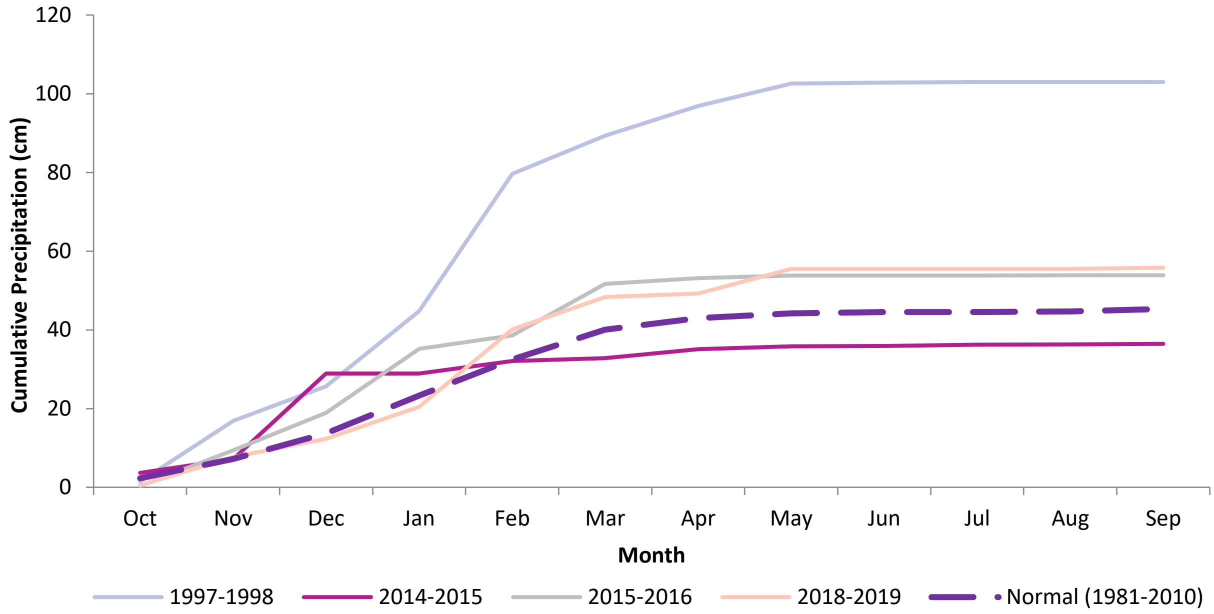

Figure 4-49. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.10.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 41 was 1.43 acres with a maximum depth of approximately 69 cm. The depth and inundation values were within range of previously recorded values (see Appendix F Table F-10). Pond 41 was inundated from the first recorded monitoring in February through June. Figure 4-50 illustrates the relationship of precipitation and depth at Pond 41 for 2019 as well as baseline in 2016.

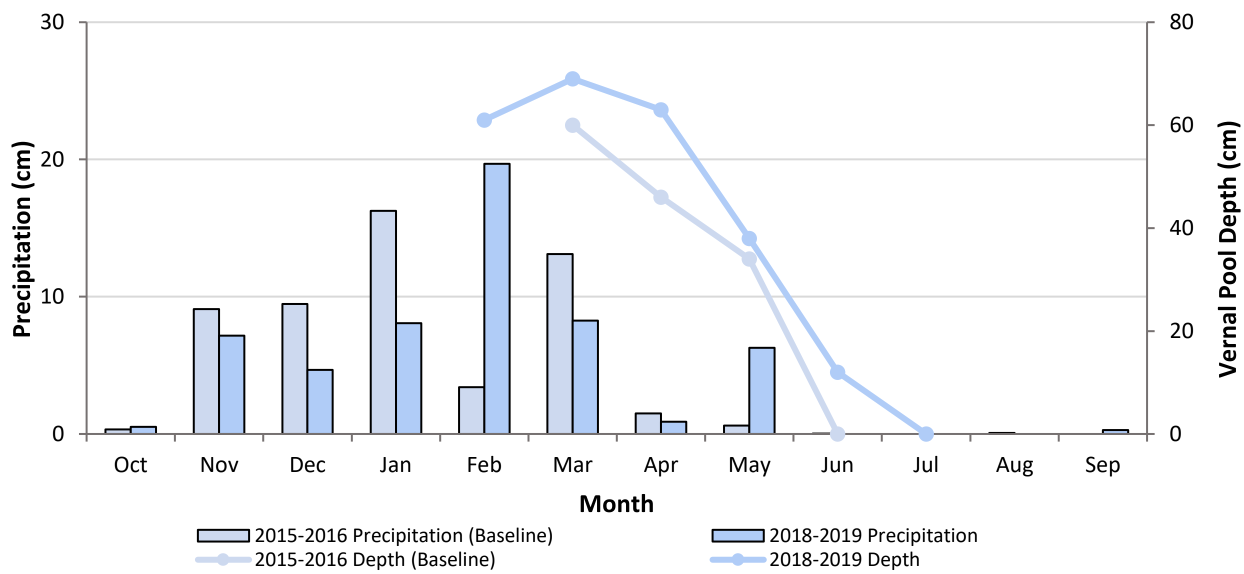

Figure 4-50. Monthly Depth and Precipitation at Pond 41 (Year 1 Post-Subsurface Munitions Remediation) for 2018-2019 Water-Year Compared to Baseline 2015-2016 Water-Year

In below-normal precipitation years, Pond 41 is likely to remain dry. No depths or inundations for Pond 41 were recorded in normal precipitation years. In above-normal precipitation years, Pond 41 could have maximum depths of 130 cm or more and a maximum inundation up to 2.15 acres (see Appendix F Table F-10). Figure 4-51 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-52 illustrates historic and recent inundation areas.

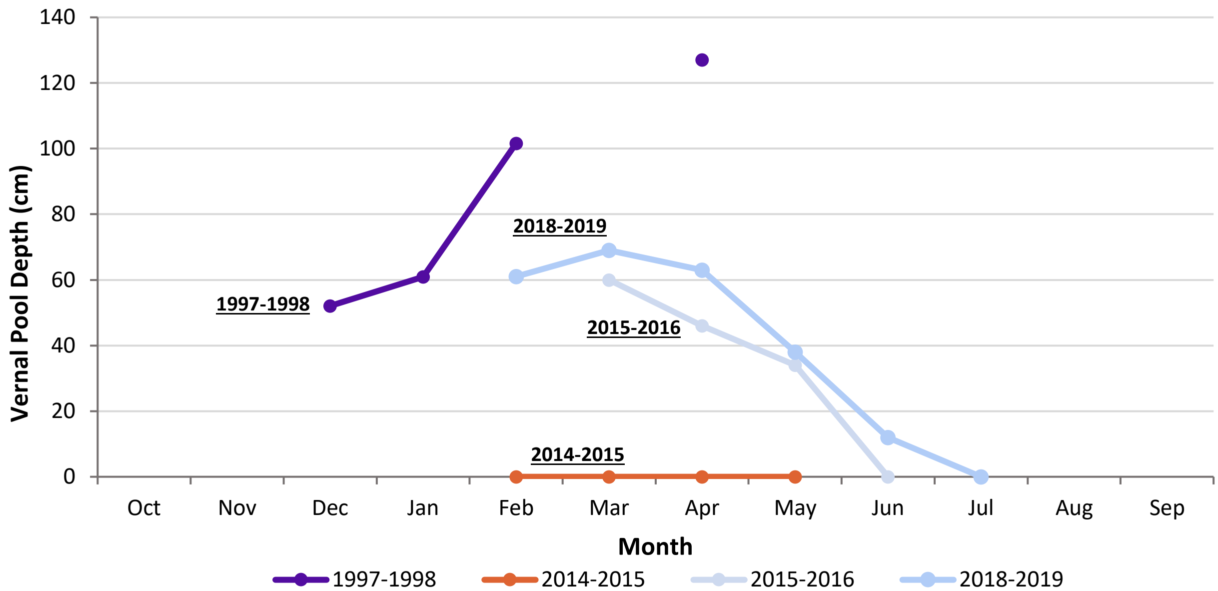

Figure 4-51. Historic Monthly Depths at Pond 41 (Year 1 Post-Subsurface Munitions Remediation). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

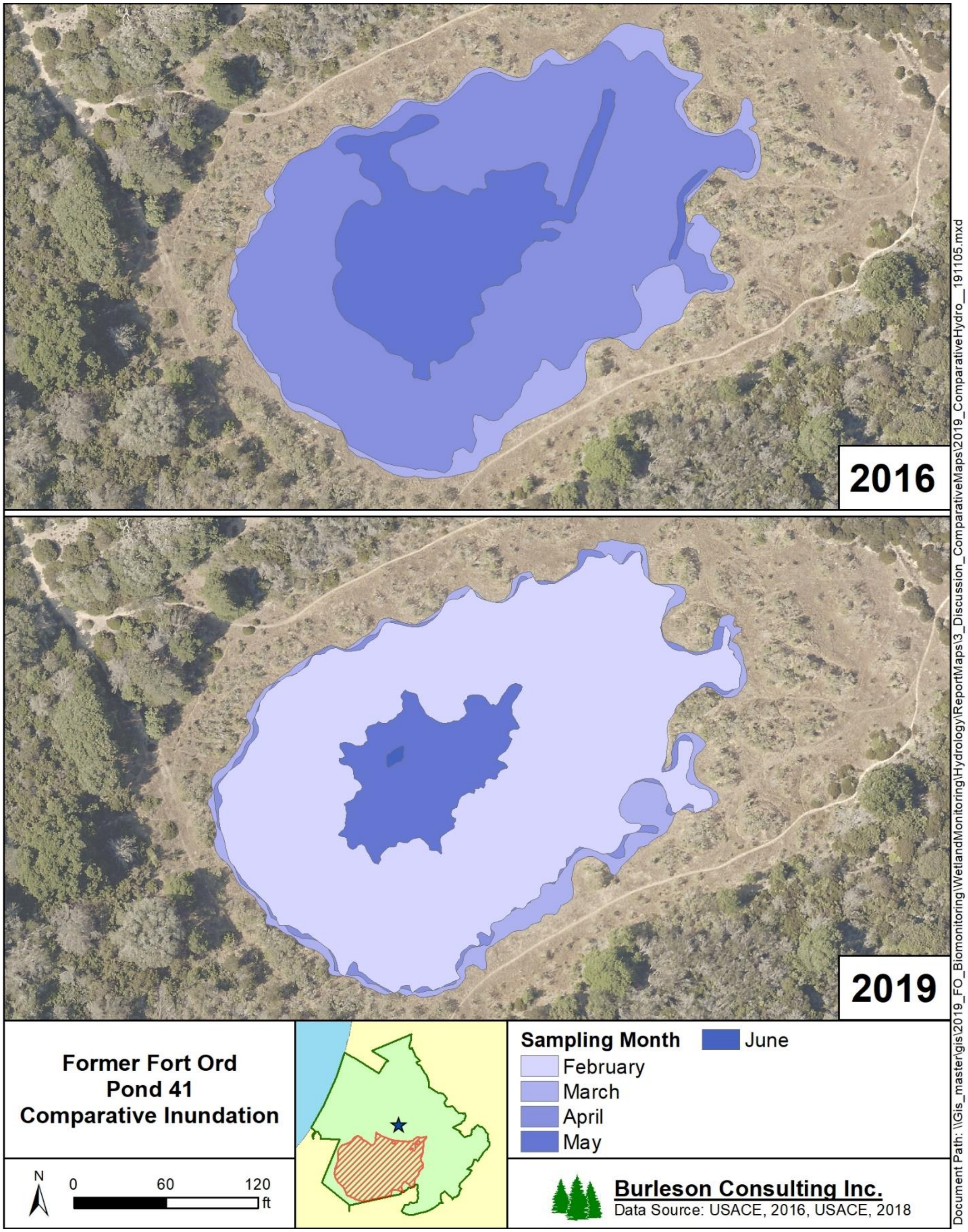

Figure 4-52. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Inundations for 2015-2016 (above-normal precipitation) and 2018-2019 (above-normal precipitation). The vernal pool had subsurface munitions remediation in 2018, and was in year 1 of monitoring in 2019.

4.10.1.1 *Data Quality Objective 1*

Pond 41 met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 41 provided sufficient depth for both CTS (65 cm through March) and fairy shrimp (58 cm through May). Recorded depths indicate that DQO 1 was likely met for Pond 41 in 1998 and 2016 and not met in 2015. Depths at Pond 41 in 2019 were higher than the ranges observed at reference vernal pools 5, 101 East (East), and 997.

4.10.1.2 *Data Quality Objective 2*

Pond 41 had similar inundations in 2019 compared to baseline years and was within the range of the relevant reference vernal pools. Pond 41 was inundated February through June with an inundation range of 0.002-1.43 acres and a mean of 0.84 acres. Pond 41 was likely inundated earlier than February, but data were not collected. The historic inundation ranges were 1.45-2.13 acres in 1998, remained dry in 2015, and 0.33-1.44 acres in 2016. Pond 41 is medium sized vernal pool that is likely to fill in a normal or slightly below-normal water-year, and in a drought year, the vernal pool may remain dry or dry quickly. Similar to reference vernal pool 101 East (East), Pond 41 was inundated January through June and had a large inundation area.

4.10.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 41, a post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for year 1 in 2019. Pond 41 met DQO 1 and DQO 2 indicating that it provided suitable habitat for CTS and fairy shrimp and was similar to itself in previous monitoring years and reference. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.10.2 Vegetation Monitoring

Vegetation data were collected at Pond 41 in 2016 and 2019 (Burleson, 2017). Data from 2016 and 2019 were collected using the methodology described in the Methods section of this report and were compared stratum-to-stratum in Table 4-98 as well as visually in Figure 4-53.

Table 4-98. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2019
1	29%	23%
2	52%	52%
3	27%	16%
4	N/A	6%
Upland	3%	3%

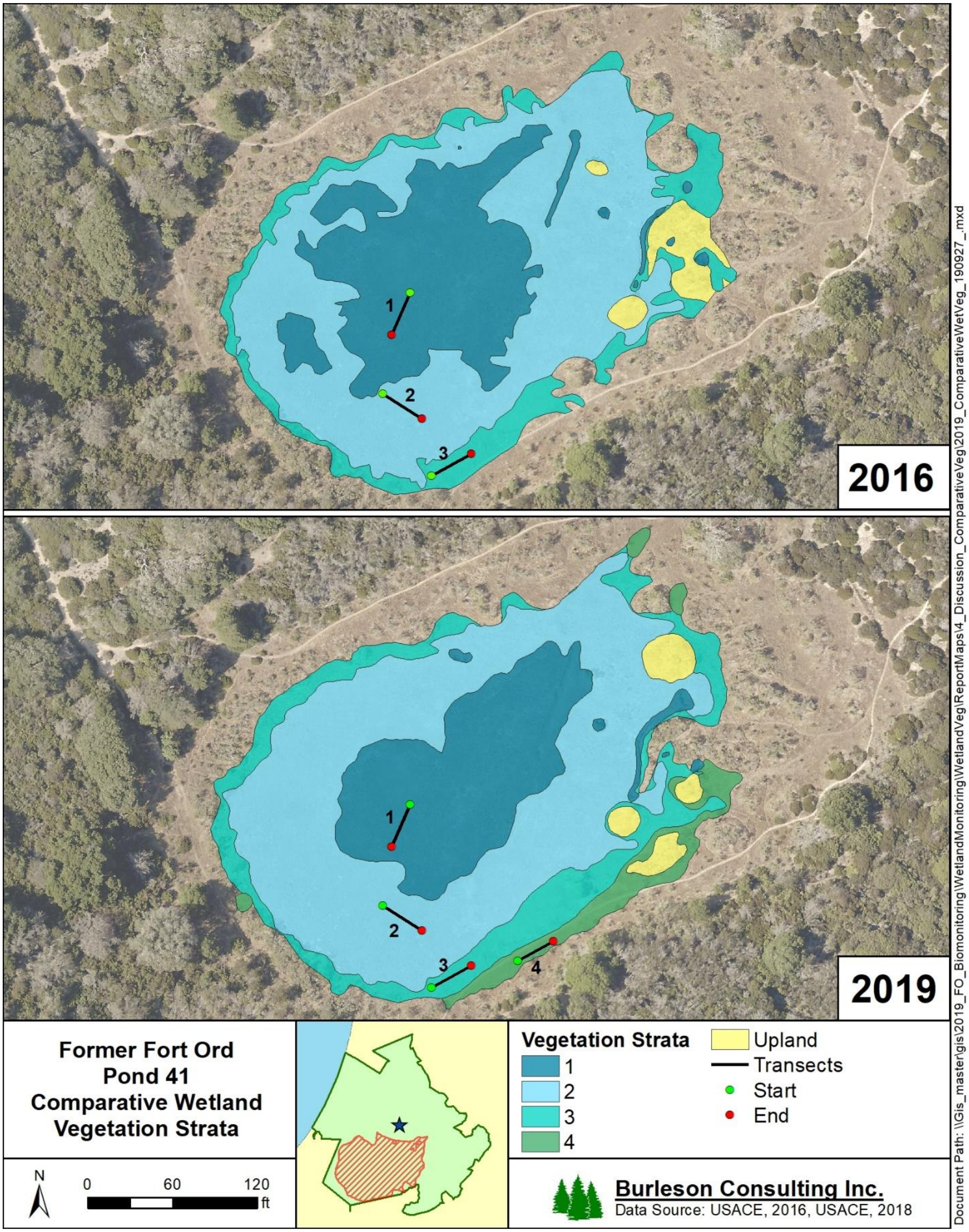

Figure 4-53. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2016 and 2019

The absolute percent vegetative and thatch cover values of Pond 41 in 2019 were very similar to 2016 (see Table 4-99). The vegetative cover was slightly lower and thatch/bare ground slightly higher than the values observed at the reference vernal pools. Pond 41 was most similar to reference vernal pool 101 East (East) (see Table 4-100).

Table 4-99. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2016	71.7%	28.3%
2019	69.7%	30.3%

Table 4-100. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
41	**69.7%**	**30.3%**

Species richness increased between 2016 and 2019. Species richness on transects was 16 and 33 species in 2016 and 2019, respectively, whereas overall basin species richness was 28 and 75 species in 2016 and 2019, respectively (see Table 4-101 and Appendix B Table B-10). Pond 41 species richness was slightly less than the values observed at the reference vernal pools (see Table 4-102 and Appendix G Tables G-27 and G-54).

Species composition at Pond 41 was similar between monitoring years; the dominant species in both years was either pale spikerush (*Eleocharis macrostachya*) or brown-headed rush (*Juncus phaeocephalus*). Other important species in 2016 were hedge nettle (*Stachys ajugoides*), alkali mallow (*Malvella leprosa*), Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*), and smooth goldfields (*Lasthenia glaberrima*). California oatgrass (*Danthonia californica*) and rabbitfoot grass (*Polygonum monspeliensis*) were prevalent in 2019. A complete comparison of species composition observed at Pond 41 in 2016 and 2019 can be found in Appendix H. Figure 4-54 shows a subset of this comparison for species observed with a 2% cover or greater.

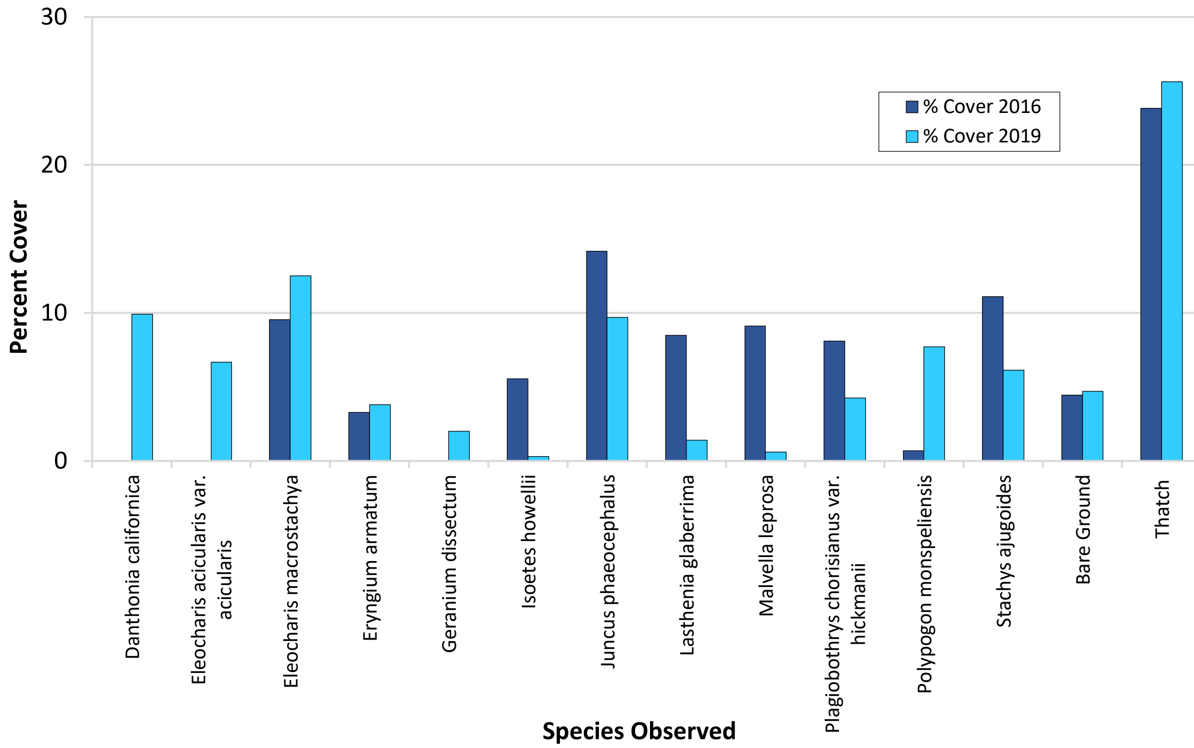

Figure 4-54. Percent Cover of Dominant Species at Pond 41 (Year 1 Post-Subsurface Munitions Remediation)

Native and non-native species richness on Pond 41 transects increased (see Table 4-101). Native species richness in 2019 was within the range observed at the reference vernal pools, whereas non-native species richness was slightly less than the reference vernal pools (see Table 4-102). Despite the increase in species richness, the relative percent cover of native species decreased and non-native species increased between 2016 and 2019 (see Table 4-103). However, the relative percent cover values of native species in Pond 41 was greater than the values observed in reference vernal pools and non-native species was less than the reference vernal pools (see Table 4-104).

Table 4-101. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2016	9	7	0
2019	21	12	0

Table 4-102. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
41	**21**	**12**	**0**

Table 4-103. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2016	97.1%	2.9%	0.0%
2019	82.8%	17.2%	0.0%

Table 4-104. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
41	**82.8%**	**17.2%**	**0.0%**

Wetland and non-wetland species richness on Pond 41 transects increased between 2016 and 2019 (see Table 4-105). The wetland and non-wetland species richness were within the ranges observed at the reference vernal pools in 2019 (see Table 4-106). The relative percent cover of wetland species increased, whereas the relative percent cover of non-wetland species decreased (see Table 4-107). The wetland and non-wetland species relative percent cover values were within the ranges observed at the reference vernal pools (see Table 4-108).

Table 4-105. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2016	6	3	1	3	0	3
2019	7	7	5	6	2	6

Table 4-106. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
41	**7**	**7**	**5**	**6**	**2**	**6**

Table 4-107. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2016	59.8%	25.4%	0.2%	12.9%	0.0%	1.7%
2019	45.1%	32.5%	15.7%	1.6%	0.5%	4.5%

Table 4-108. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
41	**45.1%**	**32.5%**	**15.7%**	**1.6%**	**0.5%**	**4.5%**

4.10.2.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 41 was dominated by native and wetland plant species during year 1 post-subsurface munitions remediation monitoring in 2019. Pond 41 wetland vegetation results were within range of either baseline and/or reference vernal pools.

4.10.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 41, a post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for year 1 in 2019. The species composition, richness, and native and wetland species relative abundances were similar to baseline and/or reference vernal pool conditions. Pond 41 provided suitable wetland habitat in 2019.

4.10.3 Wildlife Monitoring

Wildlife data were collected at Pond 41 in 1998, 2016, and 2019 (HLA, 1998; Burleson, 2017). California tiger salamander larvae were observed in 2016 and 2019. Fairy shrimp were detected in 1998 and 2019. Table 4-109 shows historic wildlife monitoring results.

Table 4-109. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998	Not detected	Low
2016	Few (3)	Not detected
2019	Few – Common (2, 13, 9)	Low – High (122, 6)

4.10.3.1 Data Quality Objective 1

Pond 41 provided suitable depth for CTS and fairy shrimp as discussed in Section 4.10.1.1.

4.10.3.2 Data Quality Objective 4

California tiger salamanders and fairy shrimp were present at Pond 41 in 2019; therefore, the water quality was adequate. Compared to other vernal pools and previous Pond 41 data, the water quality data were within normal ranges. The pH ranged from 6.27 in May to 6.70 in March with a mean of 6.41. Temperature ranged from 13.03°C in February to 18.59°C in June with a mean of 15.10°C. Dissolved oxygen ranged from 3.30 mg/L in May to 8.18 mg/L in June with a mean of 6.44 mg/L. Turbidity ranged from 0.9 FNU in April to 31.4 FNU in June with a mean of 7.8 FNU (see Table 3-36).

4.10.3.3 *Data Quality Objective 5*

California tiger salamanders were present in 2019, which was partially consistent with baseline monitoring. California tiger salamanders were present in 2016 but were not detected in 1998.

Fairy shrimp were present in 2019, which was partially consistent with baseline monitoring. Fairy shrimp were detected in 1998 but not in 2016. It was possible that survey event timing prevented detection in 2016 because surveys occurred later in the year (April and May).

4.10.3.4 *Performance Standard: Wildlife Usage*

Pond 41 was a post-mastication remediation vernal pool in year 1 of monitoring. Pond 41 was on track to meet the performance standard. The vernal pool was on track to meet DQOs 1, 4, and 5 and provided suitable CTS and fairy shrimp habitat.

4.10.4 Conclusion

Pond 41, a post-subsurface munitions remediation vernal pool, was in year 1 of monitoring in 2019. The vernal pool was on track to meet all of the performance standards (see Table 4-110). Pond 41 will continue to be monitored in the future.

Table 4-110. Success at Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	On track
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	On track
	DQO 4	On track
	DQO 5	On track

4.11 Pond 3 North – Year 2 and Year 1

Pond 3 North was monitored in 2019 as a year 2 post-burn and year 1 post-subsurface munitions remediation vernal pool. Pond 3 North was monitored for baseline conditions in 1998, 2015, and 2016. Vegetation in Pond 3 North and within its watershed was burned in October 2017 as part of the prescribed burn of BLM Area B Subunit B. Pond 3 North had intrusive anomaly investigations in 2018. Table 4-111 summarizes the years that monitoring occurred and surveys conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 3 North (see Figure 4-55). The 1997-1998, 2015-2016, and 2018-2019 water-years were above-normal, whereas 2014-2015 and 2017-2018 water-years were below-normal.

Table 4-111. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year				
	1997-1998	2014-2015	2015-2016	2017-2018	2018-2019
Hydrology	●	●	●	●	●
Vegetation	●	●		●	●
Wildlife	●	●	●	●	●

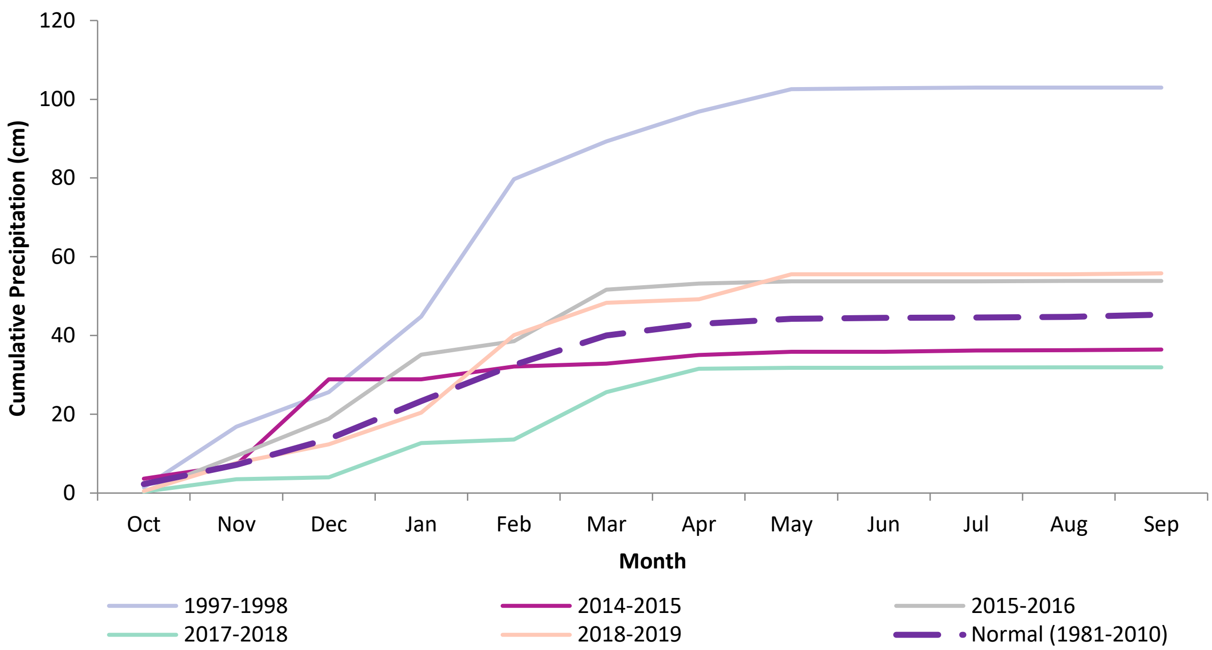

Figure 4-55. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.11.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 3 North was 1.14 acres with a maximum depth of approximately 62 cm. In most years, Ponds 3 North and 3 South are two distinct water bodies. During 2019, these pools were hydrologically connected in February and March. The maximum inundation for 2019 is much greater than previous years due to the hydrological connection with Pond 3 South. The maximum depth was also greater than previously recorded values (see Appendix F Table F-11). Pond 3 North was inundated from the first recorded monitoring in January through June. Figure 4-56 illustrates the relationship of precipitation and depth at Pond 3 North for 2019 as well as baseline in 2016.

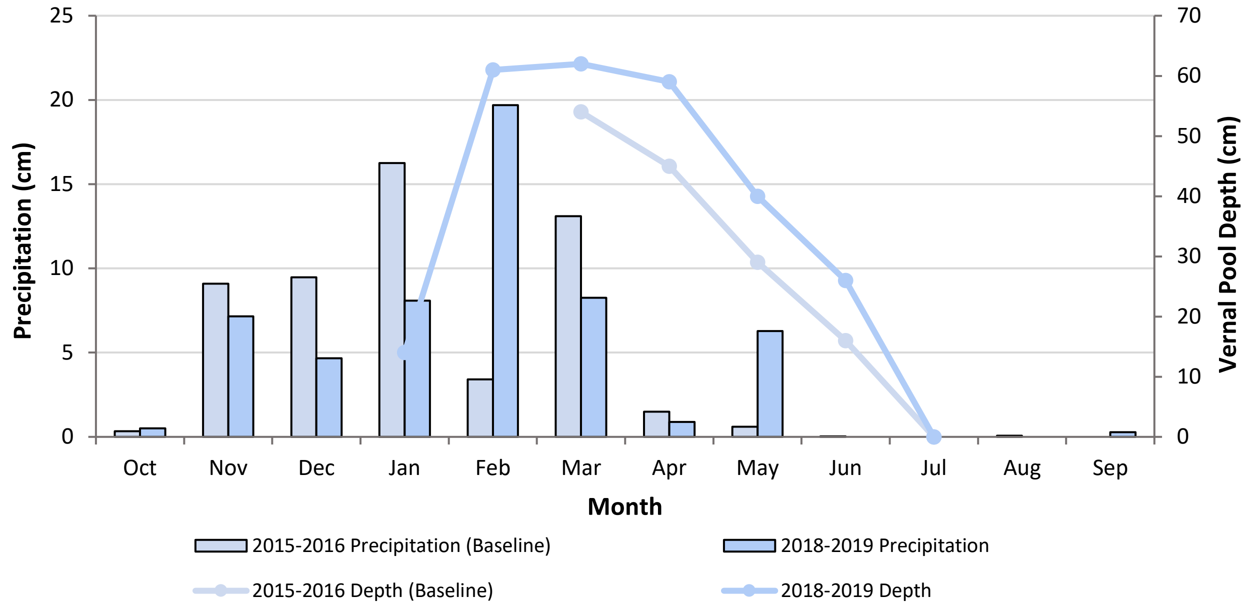

Figure 4-56. Monthly Depth and Precipitation at Pond 3 North Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) for 2018-2019 Water-Year Compared to Baseline 2015-2016 Water-Year

In below-normal precipitation years, Pond 3 North is likely to range from 0-40 cm in depth with a maximum inundation of 0-0.07 acres. No depths or inundations for Pond 3 North have been recorded in normal precipitation years. In above-normal precipitation years, Pond 3 North could have maximum depths of 65 cm or more and a maximum inundation up to 1.14 acres but would likely be connected to Pond 3 South, as observed in 2019 (see Appendix F Table F-11). Figure 4-57 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-58 illustrates historic and recent inundation areas.

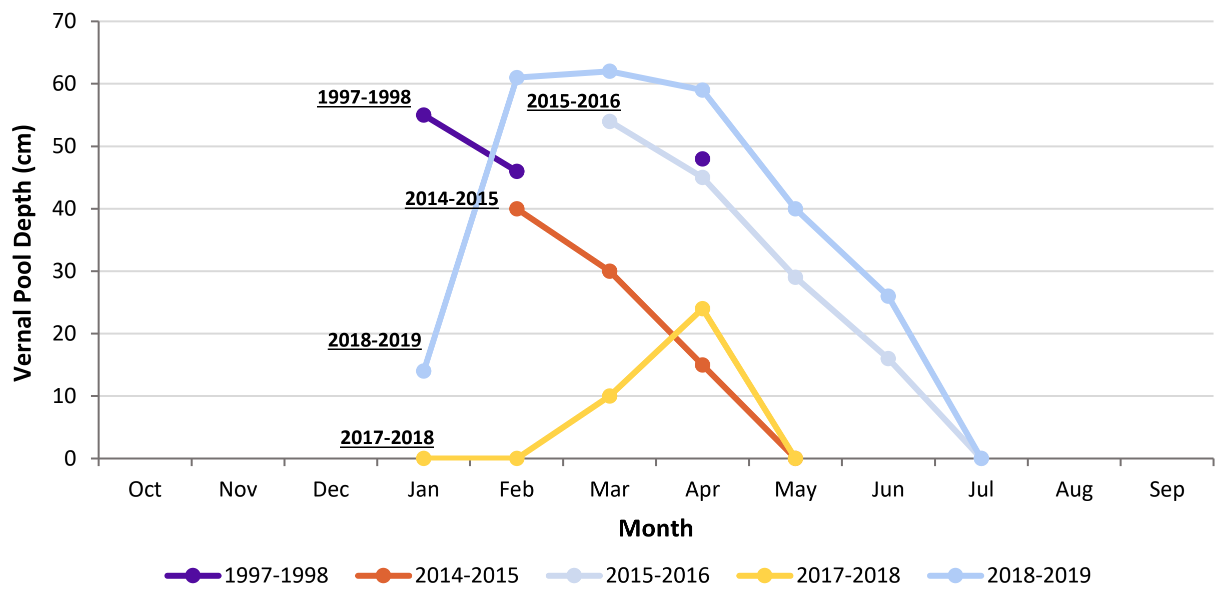

Figure 4-57. Historic Monthly Depths at Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

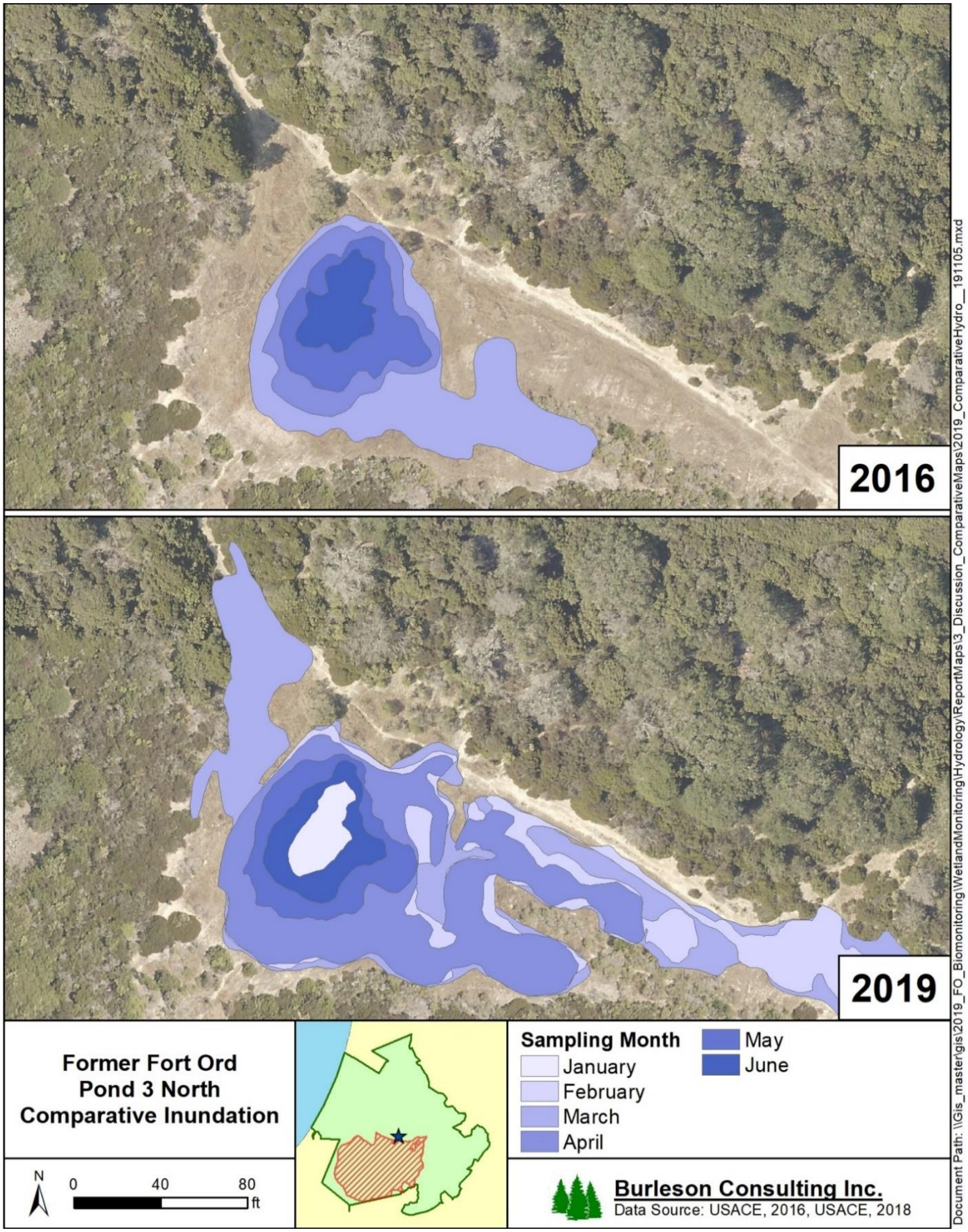

Figure 4-58. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Inundations for 2015-2016 (above-normal precipitation) and 2018-2019 (above-normal precipitation). The vernal pool was burned in 2017 and had subsurface munitions remediation in 2018, and was in years 2 and 1 of monitoring in 2019.

4.11.1.1 *Data Quality Objective 1*

Pond 3 North met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 3 North provided sufficient depth for CTS (46 cm through March) and fairy shrimp (47 cm through May). Recorded depths indicate that DQO 1 was likely met in 1998, 2015, and 2016 although monitoring did not continue into May in 1998. Depths at Pond 3 North were within the ranges observed at reference vernal pools 5 and 101 East (East).

4.11.1.2 *Data Quality Objective 2*

Pond 3 North had a much larger maximum inundation area in 2019 compared to baseline years and was within the range of the relevant reference vernal pools. Pond 3 North was inundated January through June with an inundation range of 0.02-1.14 acres and a mean of 0.41 acres. The maximum inundation recorded was larger than baseline due to the connection with Pond 3 South which was not previously recorded. The historic inundation ranges were much smaller than the 2019 inundation range, with 0.34-0.38 acres in 1998, 0.03-0.07 acres in 2015, and 0.03-0.22 acres in 2016. Pond 3 North is typically a small vernal pool that is likely to fill in a normal or slightly below-normal water-year, and in a drought year, the vernal pool may remain dry or dry quickly. In above-normal water years it may connect with Pond 3 South (see Figure 4-57). Pond 3 North had a similar inundation timing as vernal pool 101 East (East), both were inundated January through June, but had a smaller maximum inundation area.

4.11.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 3 North, a post-burn and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for year 1 and year 2 in 2019. Pond 3 North met DQO 1 and DQO 2 indicating that it provided suitable habitat for CTS and fairy shrimp and was similar to reference vernal pools. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.11.2 Vegetation Monitoring

Vegetation data were collected at Pond 3 North in 1998, 2015, 2018, and 2019 (HLA, 1998; Burleson, 2016, 2019). In 1998, data were collected along one transect with a length of 116 feet. Quadrats were placed at 10-foot intervals, alternating from right to left along the transect. Because 1998 data were collected differently than in other years, strata were combined across the vernal pool to allow for comparison to other years. In 2015, 2018, and 2019 data were collected using the methodology described in the Methods section of this report. Data from 2015 and 2019 were compared stratum-to-stratum in Table 4-112 as well as visually in Figure 4-59.

Pond 3 North also supports a CCG population located in stratum 4. The population was mapped and a visual estimate of percent cover was recorded in 2019 to compare to 2015, 2016, and 2018 (see Figure 4-61 in Section 4.11.2.1).

Table 4-112. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2015	2019
1	16%	N/A
2	14%	14%
3	70%	43%
4 (CCG)	N/A	43%

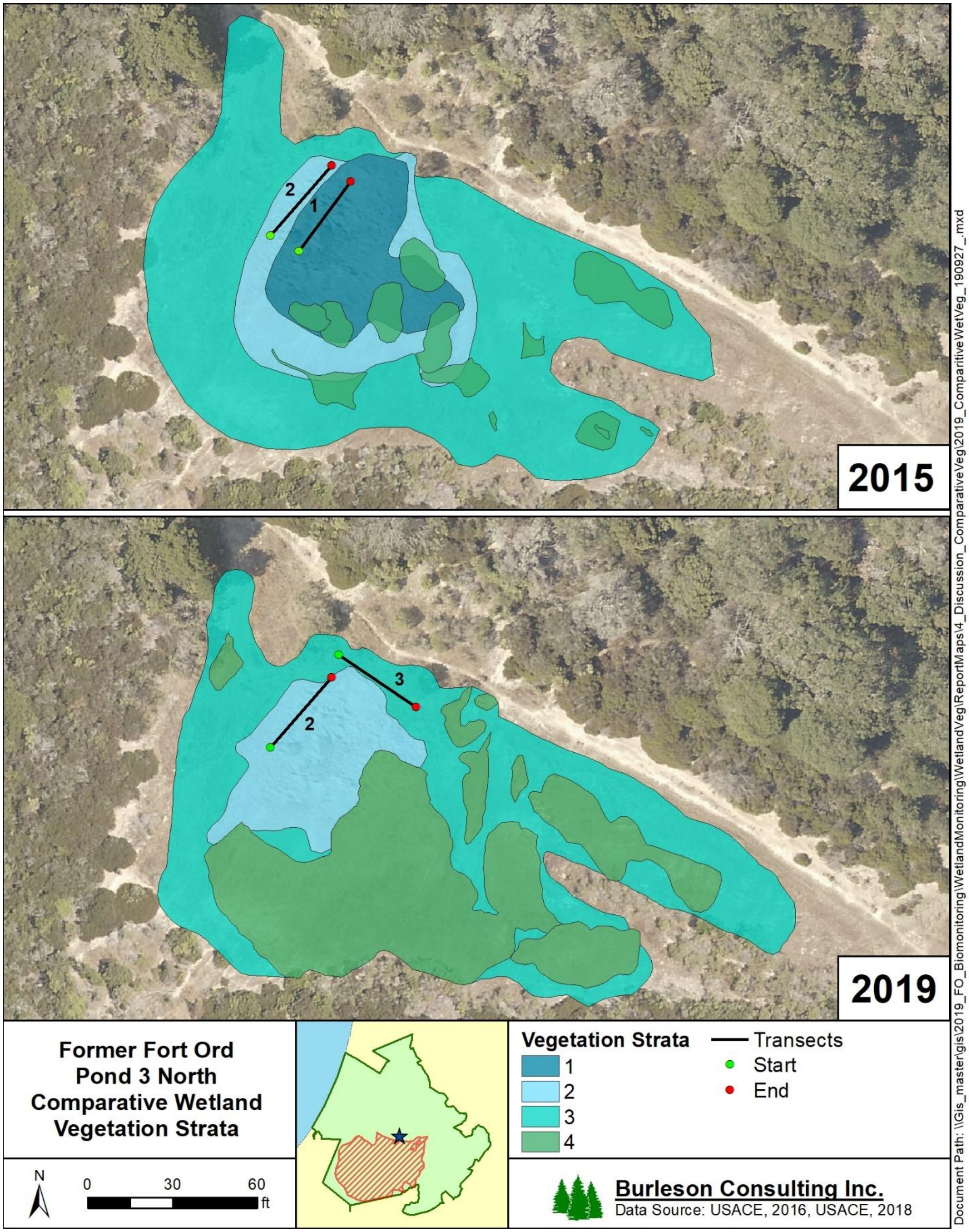

Figure 4-59. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2015 and 2019

The absolute percent vegetative and thatch cover values of Pond 3 North in 2019 were within the ranges observed in previous years (see Table 4-113). These values were within ranges observed at the reference vernal pools, and Pond 3 North was most similar to reference vernal pool 101 East (West) (see Table 4-114).

Table 4-113. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998	46.1%	54.0%
2015	80.6%	14.8%
2018	60.2%	40.1%
2019	72.7%	27.3%

Table 4-114. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
3 North	**72.7%**	**27.3%**

Species richness increased for the overall basin but decreased on the transects. Species richness on transects was 16, 9, 38, and 22 species in 1998, 2015, 2018, and 2019, respectively, whereas overall basin species richness was 24, 82, and 90 species in 2015, 2018, and 2019, respectively (see Table 4-115 and Appendix B Table B-11). The 1998 survey was limited to species observed on the transect and overall basin species richness was not recorded. Pond 3 North species richness was slightly lower on the transects but similar to the reference vernal pools for overall basin value (see Table 4-116 and Appendix G Tables G-27 and G-54).

Species composition at Pond 3 North was similar between monitoring years; the dominant species in all monitoring years was pale spikerush (*Eleocharis macrostachya*). Other important species in 2015 were brass buttons (*Cotula coronopifolia*) and Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*). Coyote thistle (*Eryngium armatum*) and rabbitfoot grass (*Polygonum monspeliensis*) provided moderate cover in 2019. A complete comparison of species composition observed at Pond 3 North in 1998, 2015, 2018, and 2019 can be found in Appendix H. Figure 4-60 shows a subset of this comparison for species observed with a 2% cover or greater.

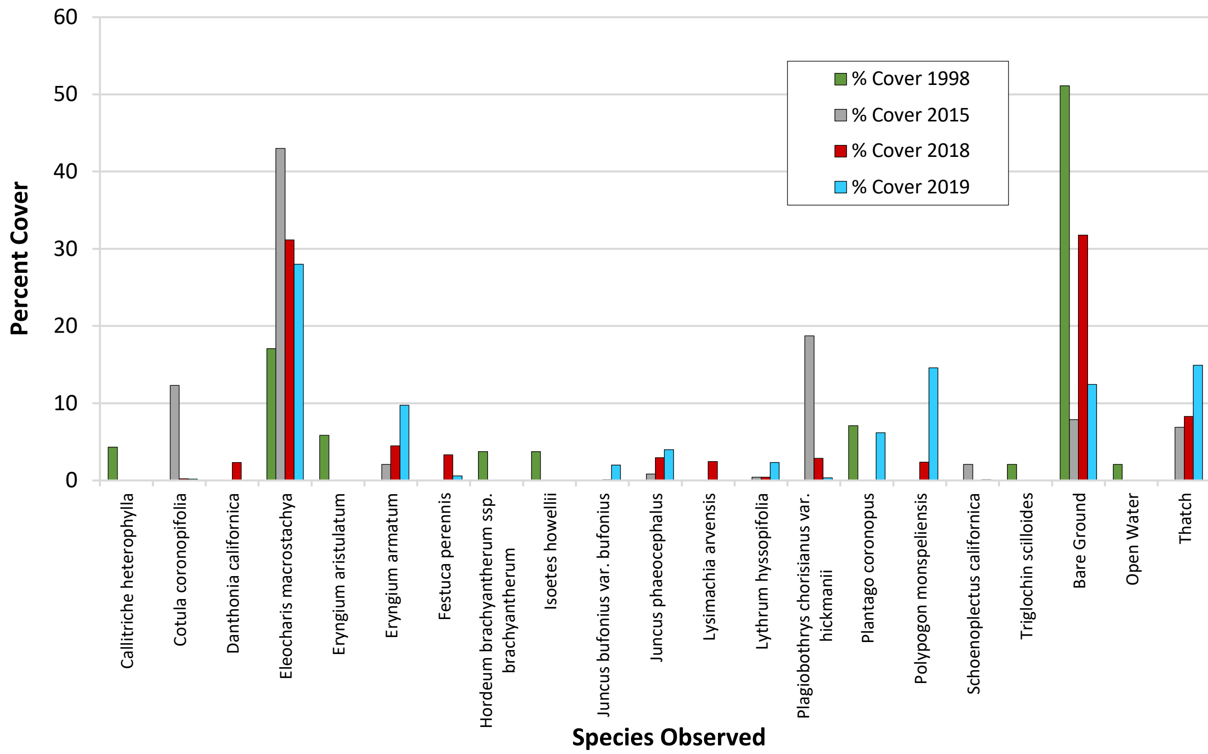

Figure 4-60. Percent Cover of Dominant Species at Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation)

Native and non-native species richness on Pond 3 North transects increased through time between 1998 and 2018 and subsequently decreased by 2019. Native and non-native species richness in 2019 were similar to baseline but less than the values observed at the reference vernal pools (see Table 4-115 and Table 4-116). The relative percent cover of native species decreased and the relative percent cover of non-native species increased (Table 4-117). The relative percent cover values of native and non-native species in Pond 3 North were within the ranges of values observed in reference vernal pools in 2019 (see Table 4-118).

Table 4-115. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998	9	6	1
2015	7	2	0
2018	22	16	0
2019	13	9	0

Table 4-116. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
3 North	**13**	**9**	**0**

Table 4-117. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1998	81.9%	17.7%	0.4%
2015	84.2%	15.8%	0.0%
2018	79.0%	21.0%	0.0%
2019	66.3%	33.7%	0.0%

Table 4-118. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
3 North	**66.3%**	**33.7%**	**0.0%**

Wetland and non-wetland species richness on Pond 3 North transects was within range of previous years and slightly less than the values observed at the reference vernal pools, especially non-wetland species richness (see Table 4-119 and Table 4-120). The relative percent cover of wetland and non-wetland species was within range of previous years (see Table 4-121). However, wetland species relative percent cover values were greater than the values observed at the reference vernal pools in 2019 and non-wetland relative percent cover was less than the values at the reference vernal pools (see Table 4-122).

Table 4-119. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998	6	2	1	1	0	6
2015	7	2	0	0	0	0
2018	10	8	5	6	0	9
2019	6	6	5	0	1	4

Table 4-120. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
3 North	**6**	**6**	**5**	**0**	**1**	**4**

Table 4-121. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998	71.9%	8.2%	15.4%	0.2%	0.0%	4.4%
2015	96.4%	3.6%	0.0%	0.0%	0.0%	0.0%
2018	59.9%	17.1%	15.1%	3.6%	0.0%	4.3%
2019	45.2%	42.0%	10.9%	0.0%	0.2%	1.7%

Table 4-122. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
3 North	**45.2%**	**42.0%**	**10.9%**	**0.0%**	**0.2%**	**1.7%**

4.11.2.1 *Contra Costa Goldfields*

The area of CCG at Pond 3 North increased between 2015 and 2019 (Burleson, 2016, 2017). The population occupied 0.04 acres in 2015, 0.13 acres in 2016, 0.14 acres in 2018, and 0.18 in 2019 (see Figure 4-61). The densities ranged between 5-75% cover. In 2019, the CCG population was in similar locations to previous years. This suggests that remedial burn activities in 2017 and post-subsurface munitions remediation in 2018 likely did not affect the population. Minor changes in population size can be attributed to natural fluctuation.

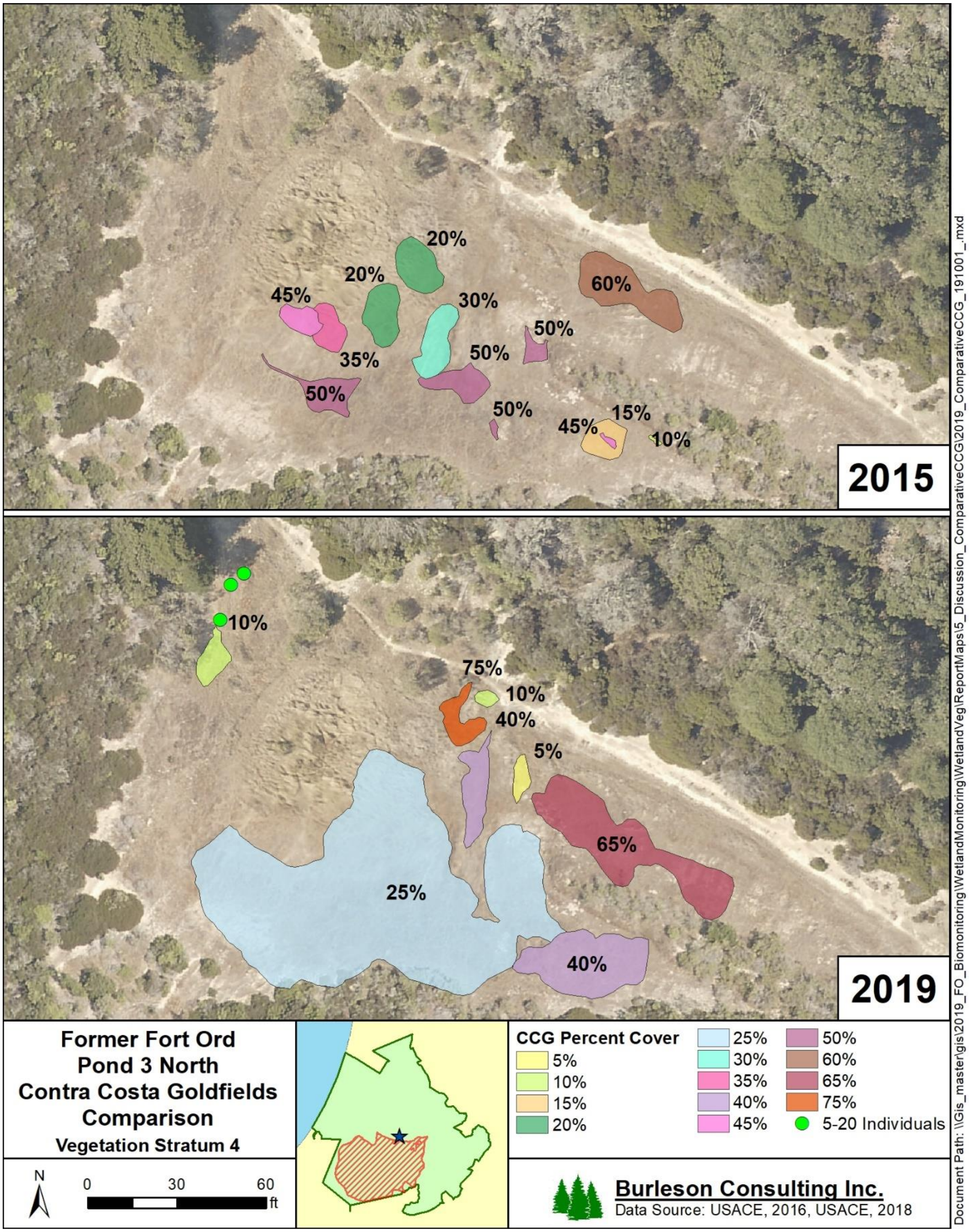

Figure 4-61. Contra Costa Goldfields Populations at Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) in 2015 and 2019

4.11.2.2 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 3 North was dominated by native and wetland plant species during year 2 post-burn and year 1 post-subsurface munitions remediation monitoring in 2019. Pond 3 North wetland vegetation results were within range of either baseline and/or reference vernal pools.

4.11.2.3 *Performance Standard: Plant Cover and Species Diversity*

Pond 3 North, a post-burn and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for years 2 and 1, respectively, in 2019. The species composition, richness, and native and wetland species relative abundances were similar to baseline and/or reference vernal pool conditions. Pond 3 North provided suitable wetland habitat in 2019.

4.11.3 Wildlife Monitoring

Wildlife data were collected at Pond 3 North in 1998, 2015, 2016, 2018, and 2019 (HLA, 1998; Burleson, 2016, 2017, 2019). California tiger salamander larvae were not detected in 2019 or previous survey years. Fairy shrimp were detected in 1998 and 2019. Table 4-123 shows historic wildlife monitoring results.

Table 4-123. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998	Not detected	High
2015	Not detected	Not detected
2016	Not detected	Not detected
2018	Not detected	Not detected
2019	Not detected	Low – Moderate (36, 72, 3)

4.11.3.1 *Data Quality Objective 1*

Pond 3 North provided suitable depth for CTS and fairy shrimp as discussed in Section 4.11.1.1.

4.11.3.2 *Data Quality Objective 4*

Fairy shrimp were present at Pond 3 North in 2019, whereas CTS were not detected. The water quality was adequate although turbidity was low in May and June. Compared to other vernal pools and previous Pond 3 North data, the water quality data were within normal ranges (with the exception of turbidity in May and June). The pH ranged from 6.27 in June to 6.89 in February with a mean of 6.64. Temperature ranged from 8.81°C in February to 20.89°C in June with a mean of 15.05°C. Dissolved oxygen ranged from 5.43 mg/L in April to 10.04 mg/L in January with a mean of 7.54 mg/L. Turbidity ranged from 0.3 FNU in April to 43.9 FNU in February with a mean of 10.2 FNU (see Table 3-40).

4.11.3.3 *Data Quality Objective 5*

California tiger salamanders were not detected in 2019, which was consistent with baseline monitoring. No recorded observations of California tiger salamanders exist at Pond 3 North in any baseline year (1998, 2015, 2016).

Fairy shrimp were present in 2019. Baseline monitoring results were variable for the species. Fairy shrimp were detected in 1998 but not in 2015 or 2016. It was possible survey event timing prevented detection in 2015 and 2016 because surveys occurred later in the year (late March through May).

4.11.3.4 *Performance Standard: Wildlife Usage*

Pond 3 North was a post-burn and post-subsurface munitions remediation vernal pool in years 1 and 2 of monitoring. Pond 3 North was on track to meet the performance standard. The vernal pool was on track to meet DQOs 1, 4, and 5 and provided suitable CTS and fairy shrimp habitat.

4.11.4 Conclusion

Pond 3 North, a post-burn and post-subsurface munitions remediation vernal pool, was in years 2 and 1 of monitoring in 2019. The vernal pool was on track to meet all of the performance standards (see Table 4-124). Pond 3 North will continue to be monitored in the future.

Table 4-124. Success at Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	On track
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	On track
	DQO 4	On track
	DQO 5	On track

4.12 Pond 3 South – Year 2 and Year 1

Pond 3 South was monitored in 2019 as a year 2 post-burn and year 1 post-subsurface munitions remediation vernal pool. Pond 3 South was monitored for baseline conditions in 1998, 2015, and 2016. Vegetation in Pond 3 South and within its watershed was burned in October 2017 as part of the prescribed burn of BLM Area B Subunit B. Pond 3 South had intrusive anomaly investigations in 2018. Table 4-125 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 3 South (see Figure 4-62). The 1997-1998, 2015-2016, 2018-2019 water-years were above-normal, whereas the 2014-2015 and 2017-2018 water-years were below-normal.

Table 4-125. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year				
	1997-1998	2014-2015	2015-2016	2017-2018	2018-2019
Hydrology	●	●	●	●	●
Vegetation	●		●	●	●
Wildlife	●		●		●

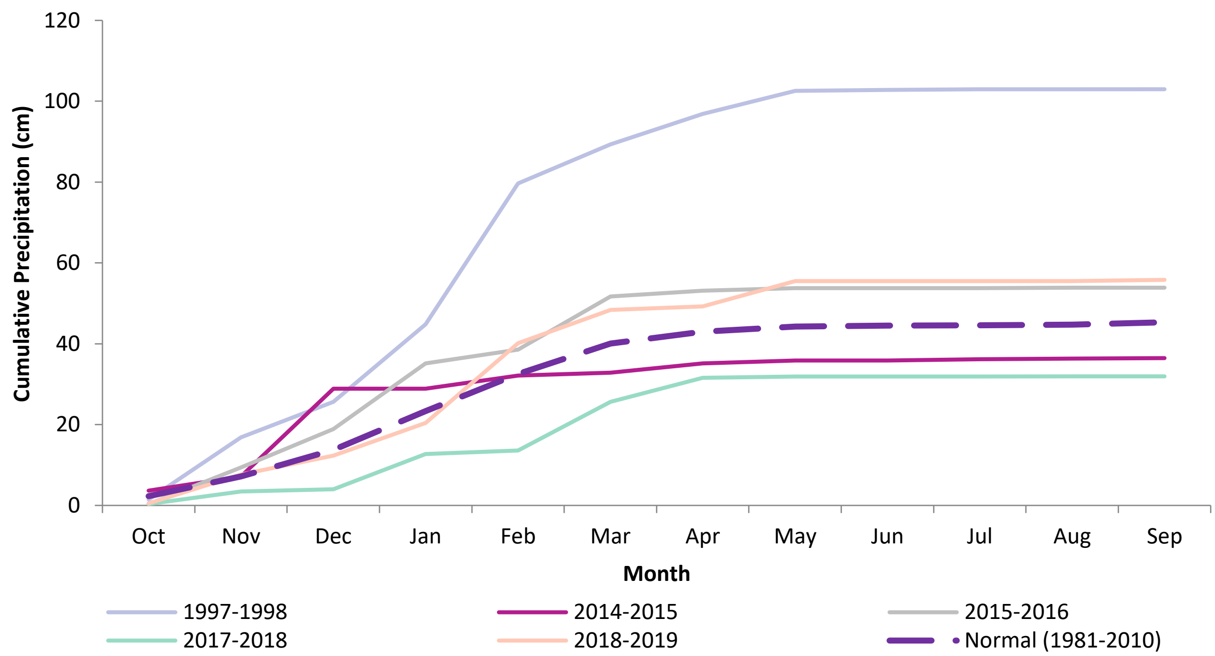

Figure 4-62. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.12.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 3 South was 1.14 acres with a maximum depth of approximately 35 cm. In most years, Ponds 3 North and 3 South are two distinct water bodies. During 2019, these pools were hydrologically connected in February and March. The maximum inundation for 2019 was much greater than previous years due to the hydrological connection with Pond 3 North. The maximum depth was also greater than previously recorded values (see Appendix F Table F-12). Pond 3 South was inundated from the first recorded monitoring in January through May. Figure 4-63 illustrates the relationship of precipitation and depth at Pond 3 South for 2019 as well as baseline in 2016.

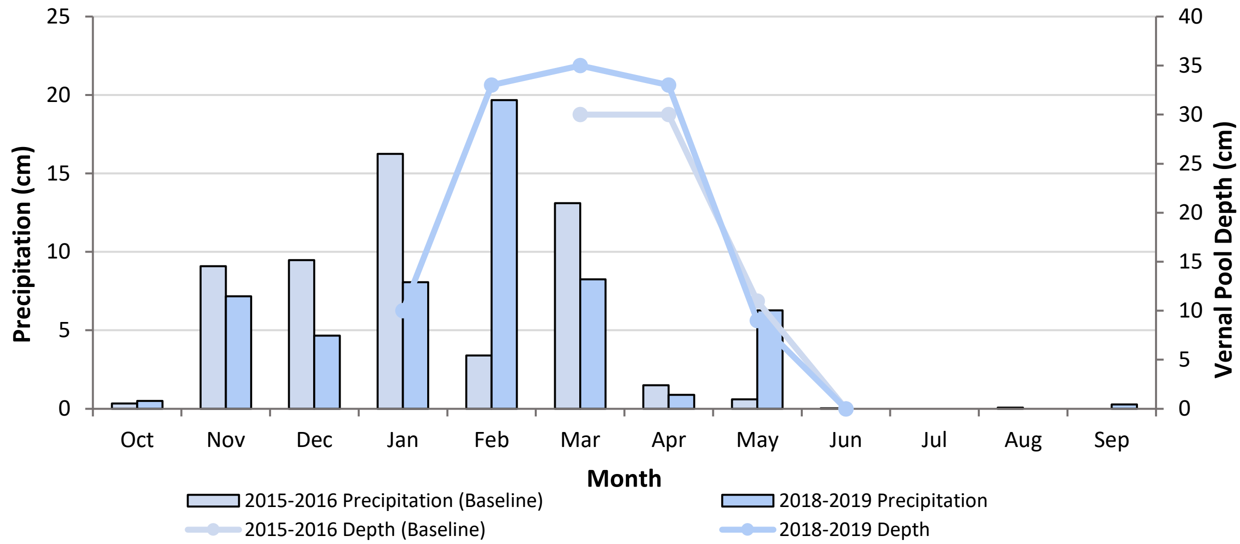

Figure 4-63. Monthly Depth and Precipitation at Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) for 2018-2019 Water-Year Compared to Baseline 2015-2016 Water-Year

In below-normal precipitation years, Pond 3 South is likely to range from 0-8 cm in depth with a maximum inundation of 0-0.001 acres. No depths or inundations for Pond 3 South have been recorded in normal precipitation years. In above-normal precipitation years, Pond 3 South could have maximum depths of 35 cm or more and a maximum inundation up to 1.14 acres but would likely be connected to Pond 3 North, as observed in 2019 (see Appendix F Table F-12). Figure 4-64 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-65 illustrates historic and recent inundation areas.

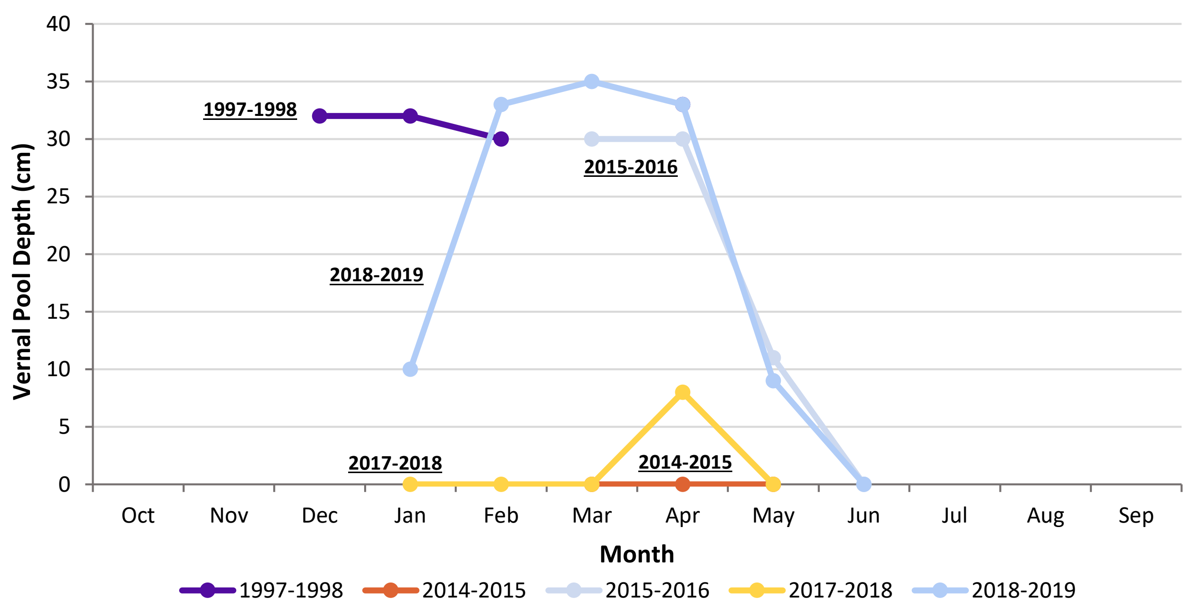

Figure 4-64. Historic Monthly Depths at Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

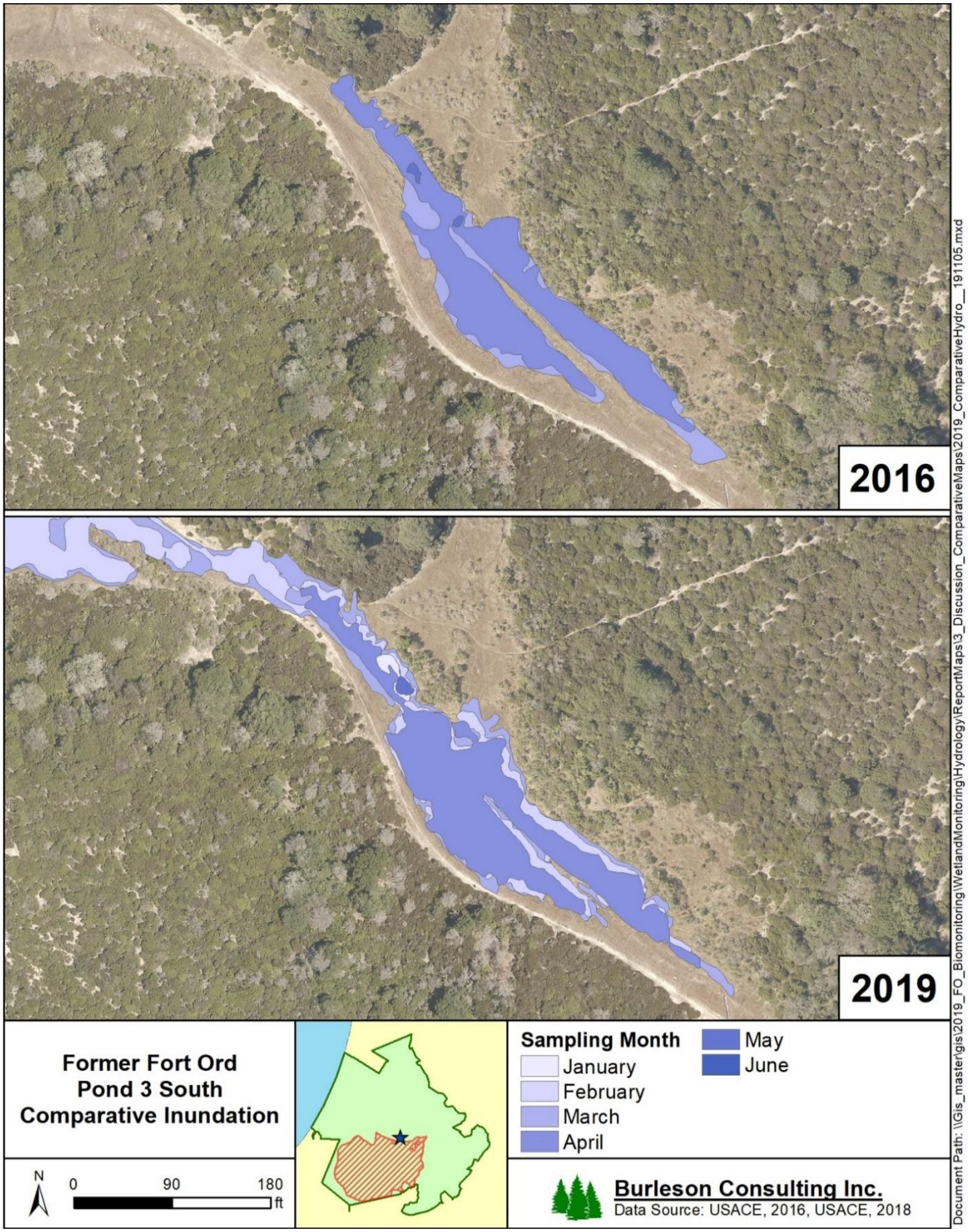

Figure 4-65. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Inundations for 2015-2016 (above-normal precipitation) and 2018-2019 (above-normal precipitation). The vernal pool was burned in 2017 and had subsurface munitions remediation in 2018, and was in years 2 and 1 of monitoring in 2019.

4.12.1.1 *Data Quality Objective 1*

Pond 3 South met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 3 South provided sufficient depth for CTS (26 cm through March) and fairy shrimp (24 cm through May). Recorded depths indicate that DQO 1 was likely met for both CTS and fairy shrimp in 1998 although monitoring did not continue into May. DQO 1 was likely met only for CTS in 2016. The depth at Pond 3 South was below the ranges observed at reference vernal pools 5 and 101 East (West) but was greater than reference vernal pool 997.

4.12.1.2 *Data Quality Objective 2*

Pond 3 South had larger inundations in 2019 compared to baseline years in 1998 and 2016 and was within the range of the relevant reference vernal pools. Pond 3 South was inundated from January through May with an inundation range of 0.004-1.14 acres and a mean of 0.49 acres. The maximum inundation recorded was larger than baseline due to the connection with Pond 3 South which was not previously recorded. The historic inundation ranges were smaller than the range of 2019 inundations, with 0.69-0.78 acres in 1998 and 0.01-0.52 acres in 2016. The vernal pool was dry in 2015. Pond 3 South is a small vernal pool that is likely to fill in a normal or above-normal water-year. In a drought year, the vernal pool may remain dry or dry quickly. In above-normal water years it may connect with Pond 3 North (see Figure 4-64). Pond 3 South had a similar inundation timing as vernal pool 101 East (East), both were inundated January through May/June but had a smaller maximum inundation areas.

4.12.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 3 South, a post-burn and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for year 1 and year 2 in 2019. Pond 3 North met DQO 1 and DQO 2 indicating that it provided suitable habitat for CTS and fairy shrimp and was similar to reference. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.12.2 Vegetation Monitoring

Vegetation data were collected at Pond 3 South in 1998, 2016, 2018, and 2019 (HLA, 1998; Burleson, 2017, 2019). In 1998, data were collected along one transect with a length of 116 feet. Quadrats were placed at 10-foot intervals, alternating from right to left along the transect. Because 1998 data were collected differently than in other years, strata were combined across the vernal pool to allow for comparison to other years. In 2016, 2018, and 2019, data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2019 were compared stratum-to-stratum in Table 4-126 as well as visually in Figure 4-66.

Pond 3 South also supports a CCG population, located in stratum 5. The population was mapped and a visual estimate of percent cover was recorded in 2019 to compare to 2018 (see Figure 4-68 in Section 4.12.2.1).

Table 4-126. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2019
1	20%	22%
2	38%	20%
3	35%	47%
4	5%	5%
5 (CCG)	N/A	0.2%
Upland	2%	6%

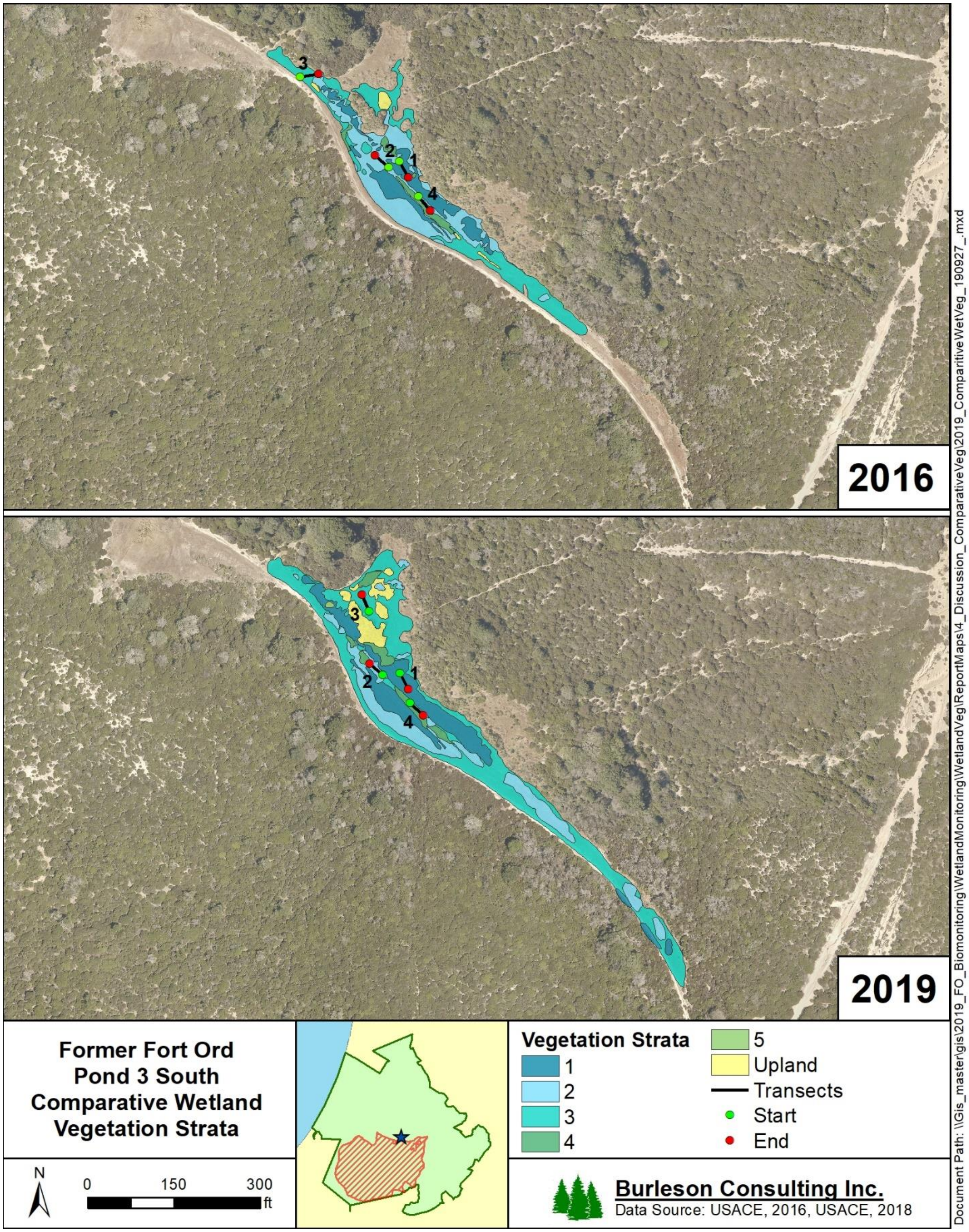

Figure 4-66. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2016 and 2019

The absolute percent vegetative and thatch cover values of Pond 3 South in 2019 were within the ranges observed in previous years (see Table 4-127). Absolute vegetative cover was slightly less than the values observed at the reference vernal pools while thatch cover was slightly more see (Table 4-128).

Table 4-127. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998	90.2%	13.9%
2016	82.8%	15.1%
2018	59.4%	41.0%
2019	68.9%	31.2%

Table 4-128. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
3 South	**68.9%**	**31.2%**

Species richness increased on transects and decreased slightly for the overall basin. Species richness on transects was 38, 30, 49, and 55 species in 1998, 2016, 2018, and 2019, respectively, whereas overall basin species richness was 69, 106, and 105 species in 2016, 2018, and 2019, respectively (see Table 4-129 and Appendix B Table B-12). The 1998 survey was limited to species on the transect and total vernal pool species richness was not recorded. Pond 3 South species richness was greater than the values observed at the reference vernal pools (see Table 4-130 and Appendix G Tables G-27 and G-54).

Species composition at Pond 3 South varied between monitoring years. Pale spikerush (*Eleocharis macrostachya*) was the dominant species in 1998, whereas Italian rye grass (*Festuca perennis*) was dominant in 2016. Coyote thistle (*Eryngium armatum*), Italian rye grass, and brown-headed rush (*Juncus phaeocephalus*) were the dominant species in 2018. The dominant species in 2019 was brown-headed rush. A complete comparison of species composition observed at Pond 3 South in 1998, 2016, 2018, and 2019 can be found in Appendix H. Figure 4-67 shows a subset of this comparison for species observed with a 2% cover or greater.

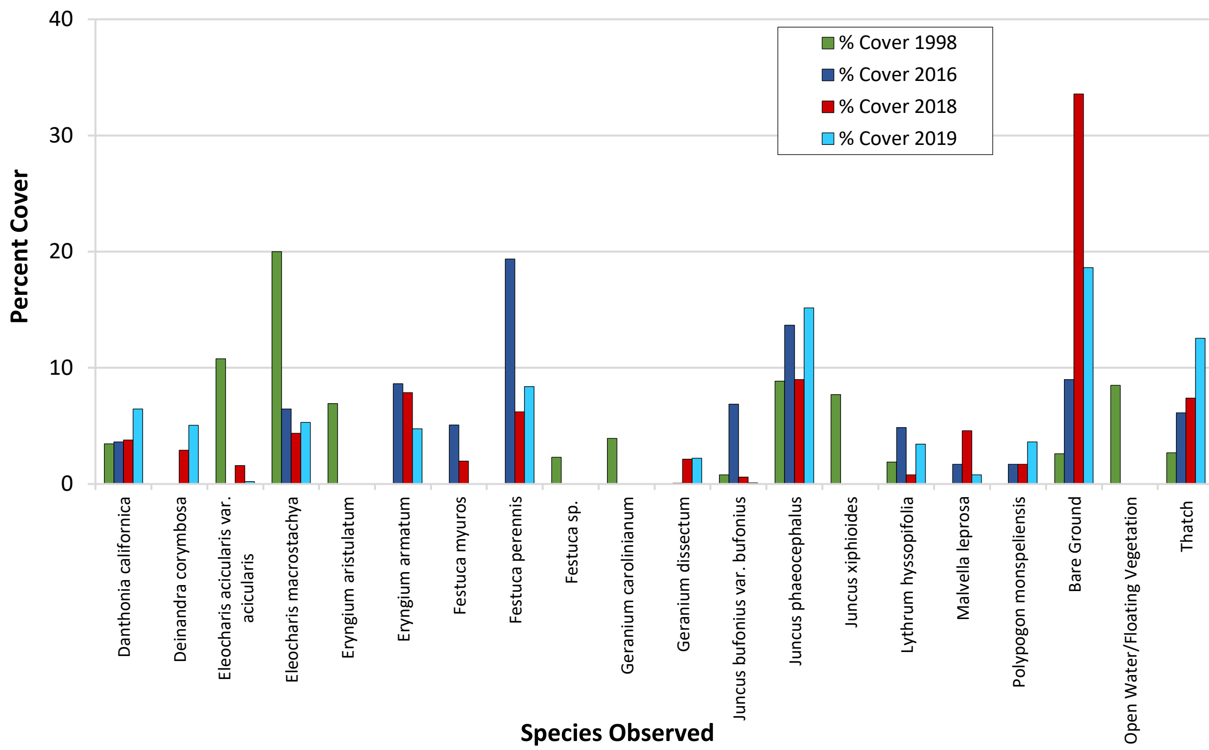

Figure 4-67. Percent Cover of Dominant Species at Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation)

Native species richness on Pond 3 South transects has been variable. The values were the same in 1998 and 2018, lower in 2016, and then at the highest recorded value in 2019 (see Table 4-129). Non-native species richness in Pond 3 South increased through time until 2018 and then decreased by 2019. Native species richness was greater than the values at the reference vernal pools while the non-native species richness was within the range of the reference vernal pools (see Table 4-130). The relative percent cover of native and non-native species was within the range of previous years and reference vernal pools (see Table 4-131 and Table 4-132).

Table 4-129. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998	26	9	3
2016	16	13	1
2018	26	23	0
2019	34	20	1

Table 4-130. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
3 South	**34**	**20**	**1**

Table 4-131. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1998	84.1%	10.4%	5.5%
2016	55.0%	44.9%	0.1%
2018	65.7%	34.3%	0.0%
2019	65.9%	34.0%	0.2%

Table 4-132. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
3 South	**65.9%**	**34.0%**	**0.2%**

Wetland species richness in Pond 3 South increased between 1998 and 2019, while non-wetland species was within range of previous years (see Table 4-133). Wetland and non-wetland species richness at Pond 3 South was greater than the values observed at the reference vernal pools (Table 4-134). The relative percent cover of wetland and non-wetland species were within range of previous years and values observed at reference vernal pools (see Table 4-135 and Table 4-136).

Table 4-133. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998	9	6	5	4	0	14
2016	5	7	5	5	0	8
2018	9	11	6	10	1	12
2019	10	13	9	9	1	13

Table 4-134. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
3 South	**10**	**13**	**9**	**9**	**1**	**13**

Table 4-135. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998	55.8%	14.5%	10.0%	3.8%	0.0%	15.9%
2016	14.8%	39.5%	32.4%	10.1%	0.0%	3.2%
2018	14.1%	33.6%	22.5%	16.1%	0.2%	13.5%
2019	15.4%	37.9%	25.8%	2.4%	1.3%	17.2%

Table 4-136. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
3 South	**15.4%**	**37.9%**	**25.8%**	**2.4%**	**1.3%**	**17.2%**

4.12.2.1 *Contra Costa Goldfields*

The area of CCG at Pond 3 South increased between 2018 and 2019 (Burleson, 2016, 2017). A single CCG plant was documented at Pond 3 South for the first time in 2018. In 2019, CCG occupied 0.003 acres, with a density of 10% cover (see Figure 4-68). In 2019, CCG population was in a similar location to 2018 indicating that post-subsurface munitions remediation likely did not affect the population. Minor changes in population size can be attributed to natural fluctuation.

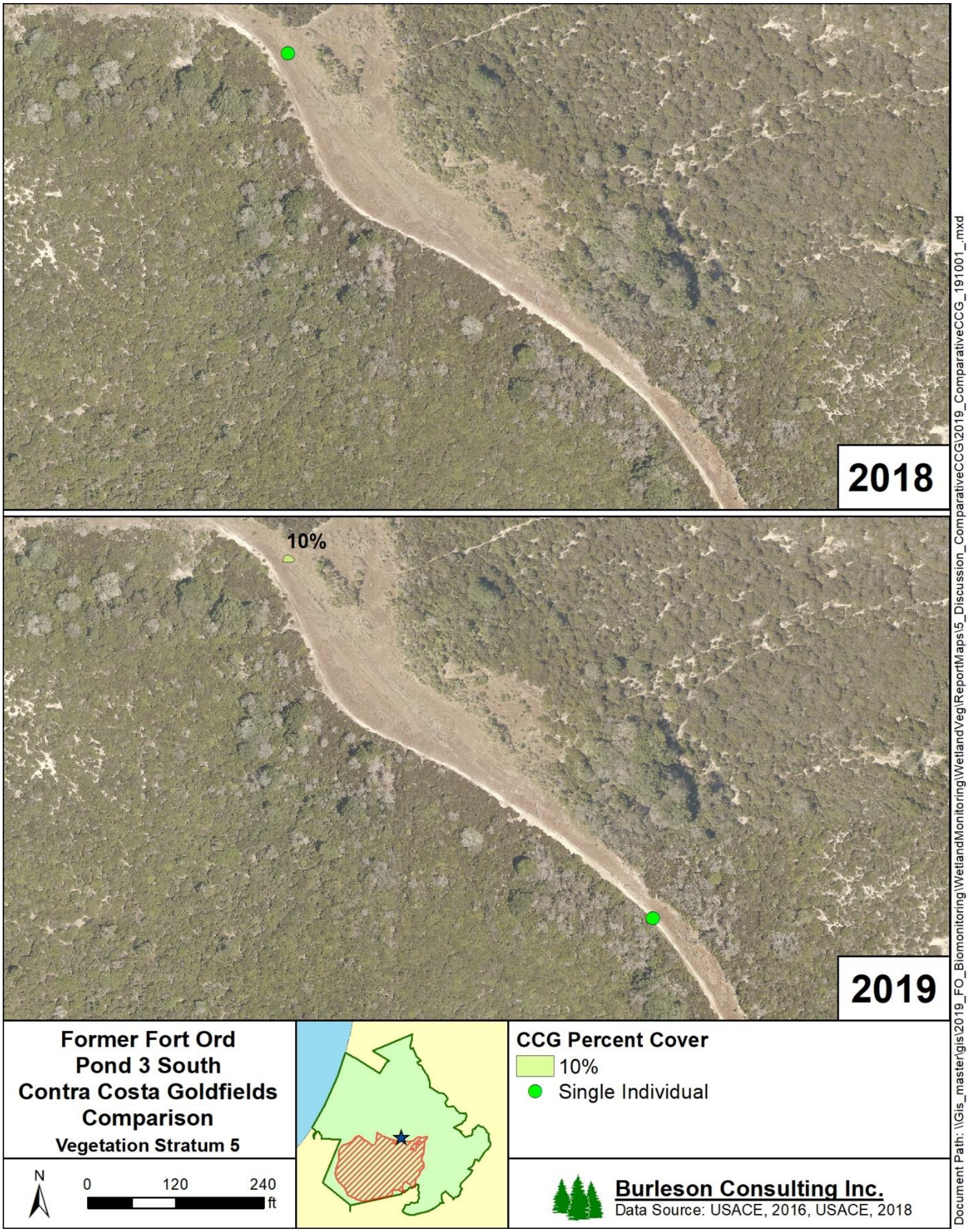

Figure 4-68. Contra Costa Goldfields Populations at Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) in 2018 and 2019

4.12.2.2 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 3 South was dominated by native and wetland plant species during year 2 post-burn and year 1 post-subsurface munitions remediation monitoring in 2019. Pond 3 South wetland vegetation results were generally within range of either baseline and/or reference vernal pools however, native species richness in 2019 was greater than baseline and the reference vernal pools.

4.12.2.3 *Performance Standard: Plant Cover and Species Diversity*

Pond 3 South, a post-burn and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for years 2 and 1, respectively, in 2019. The species composition, richness, and native and wetland species relative abundances were similar to baseline and reference vernal pool conditions, however native species richness was greater. Pond 3 South provided suitable wetland habitat in 2019.

4.12.3 Wildlife Monitoring

Wildlife data were collected at Pond 3 South in 1998, 2016, and 2019 (HLA, 1998; Burleson, 2017). California tiger salamander larvae were not detected in 2019 or any previous year. Fairy shrimp were detected in 1998 and 2019. Table 4-137 shows historic wildlife monitoring results.

Table 4-137. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998	Not detected	Moderate
2016	Not detected	Not detected
2019	Not detected	Low – Moderate (21, 44, 5)

4.12.3.1 *Data Quality Objective 1*

Pond 3 South provided suitable depth for CTS and fairy shrimp as discussed in Section 4.12.1.1.

4.12.3.2 *Data Quality Objective 4*

Fairy shrimp were present at Pond 3 South in 2019, whereas CTS were not detected. The water quality was adequate. Compared to other vernal pools and previous Pond 3 South data, the water quality data were within normal ranges. The pH ranged from 6.33 in March to 6.71 in January with a mean of 6.54. Temperature ranged from 9.99°C in February to 15.87°C in April with a mean of 12.83°C. Dissolved oxygen ranged from 5.60 mg/L in March to 9.39 mg/L in February with a mean of 7.73 mg/L. Turbidity ranged from 6.2 FNU in March to 27.9 FNU in April with a mean of 16.8 FNU (see Table 3-44).

4.12.3.3 *Data Quality Objective 5*

California tiger salamanders were not detected in 2019, which was consistent with baseline monitoring. No recorded observations of California tiger salamanders exist at Pond 3 South in any baseline year (1998, 2016).

Fairy shrimp were present in 2019. Baseline monitoring results were variable for the species. Fairy shrimp were detected in 1998 but not in 2016. It was possible survey event timing prevented detection in 2016 because surveys occurred later in the year (late March through May).

4.12.3.4 *Performance Standard: Wildlife Usage*

Pond 3 South, a post-burn and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for years 1 and 2. The vernal pool was on track to meet DQOs 1, 4, and 5 and provided suitable CTS and fairy shrimp habitat.

4.12.4 Conclusion

Pond 3 South, a post-burn and post-subsurface munitions remediation vernal pool, was in years 2 and 1 of monitoring in 2019. The vernal pool was on track to meet all of the performance standards (see Table 4-138). Pond 3 South will continue to be monitored in the future.

Table 4-138. Success at Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	On track
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	On track
	DQO 4	On track
	DQO 5	On track

4.13 Pond 39 – Year 2 and Year 1

Pond 39 was monitored in 2019 as a year 2 post-burn and year 1 post-subsurface munitions remediation vernal pool. Pond 39 was monitored for baseline conditions in 1998, 2015, and 2016. Vegetation in Pond 39 and within its watershed was burned in October 2017 as part of the prescribed burn of BLM Area B Subunit B. Pond 39 had intrusive anomaly investigations in 2018. Table 4-139 summarizes the years that monitoring occurred and surveys conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 39 (see Figure 4-69). The 1997-1998, 2015-2016, and 2018-2019 water-years were above-normal, whereas the 2014-2015 and 2017-2018 water-years were below-normal.

Table 4-139. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year				
	1997-1998	2014-2015	2015-2016	2017-2018	2018-2019
Hydrology	●	●	●	●	●
Vegetation	●		●	●	●
Wildlife	●		●	●	●

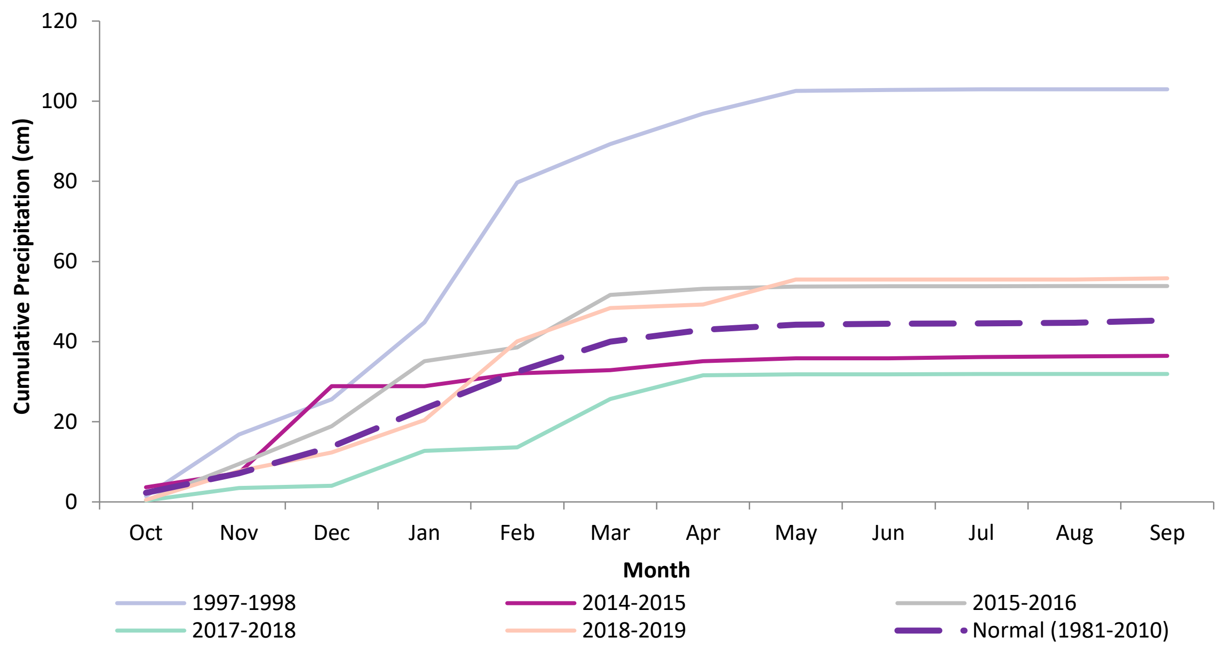

Figure 4-69. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.13.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 39 was 0.31 acres with a maximum depth of approximately 50 cm. The inundation values were within range of the previously recorded values, whereas the maximum depth was slightly greater (see Appendix F Table F-13). Pond 39 was inundated from the first recorded monitoring in December through June. The slight increase in both depth and inundation in April correlated with the precipitation patterns of the 2018-2019 water-year and late rain events. Figure 4-70 illustrates the relationship of precipitation and depth at Pond 39 for 2019 as well as baseline in 2016.

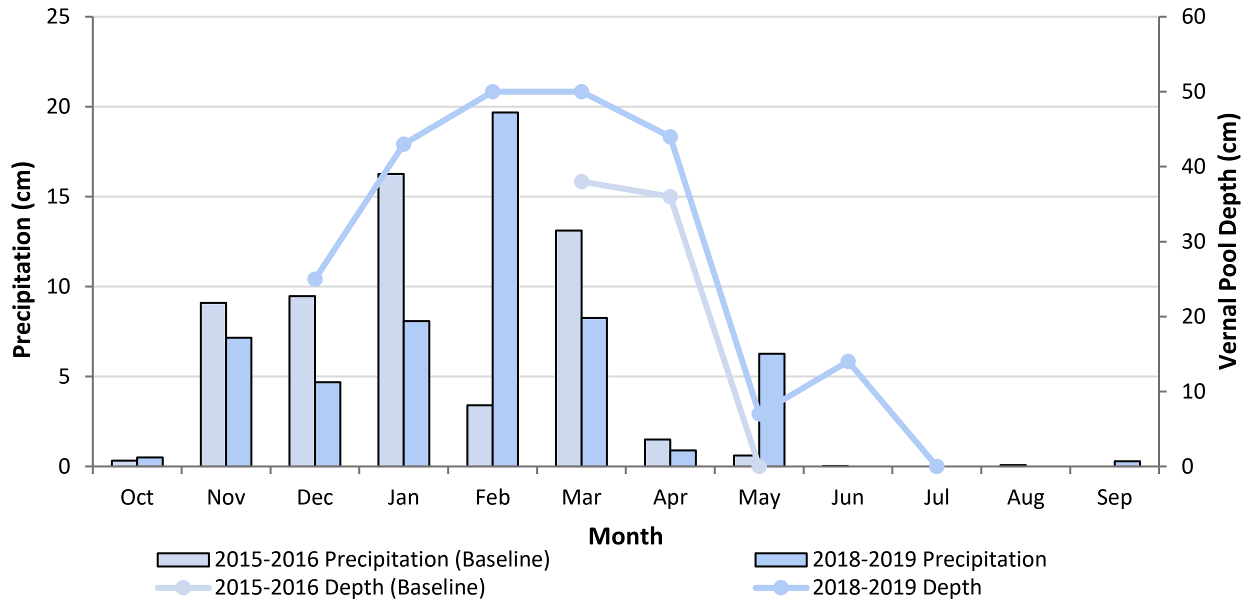

Figure 4-70. Monthly Depth and Precipitation at Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) for 2018-2019 Water-Year Compared to Baseline 2015-2016 Water-Year

In below-normal precipitation years, Pond 39 is likely to range from 0-38 cm in depth with a maximum inundation of 0-0.01 acres. No depths or inundations for Pond 39 have been recorded in normal precipitation years. In above-normal precipitation years, Pond 39 could have maximum depths of 50 cm or more and a maximum inundation up to 0.49 acres (see Appendix F Table F-13). Figure 4-71 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-72 illustrates historic and recent inundation areas.

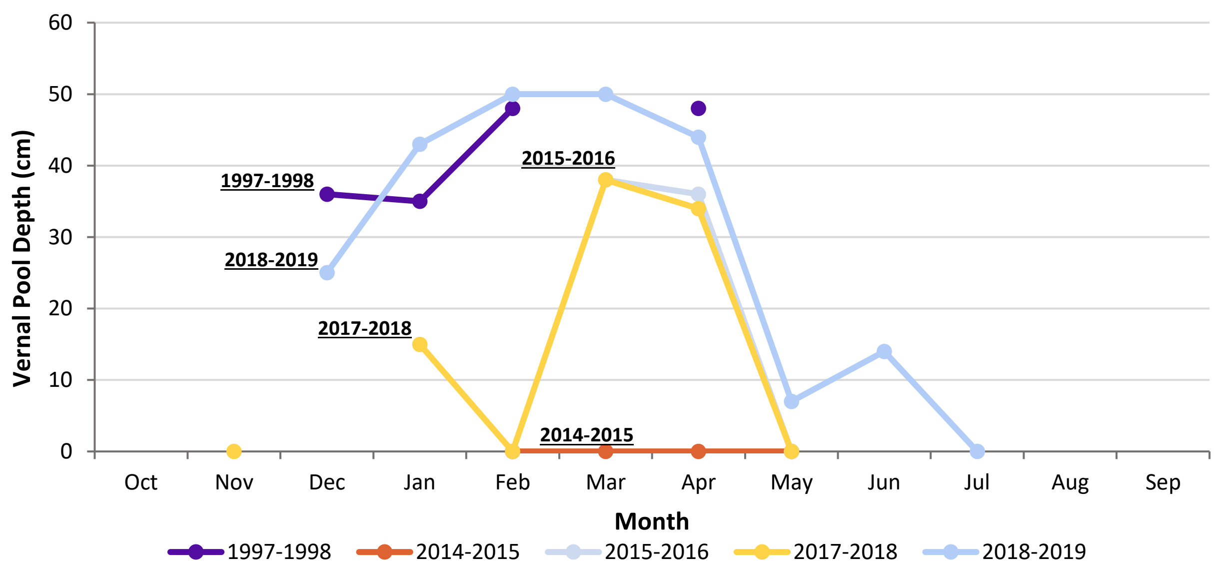

Figure 4-71. Historic Monthly Depths at Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

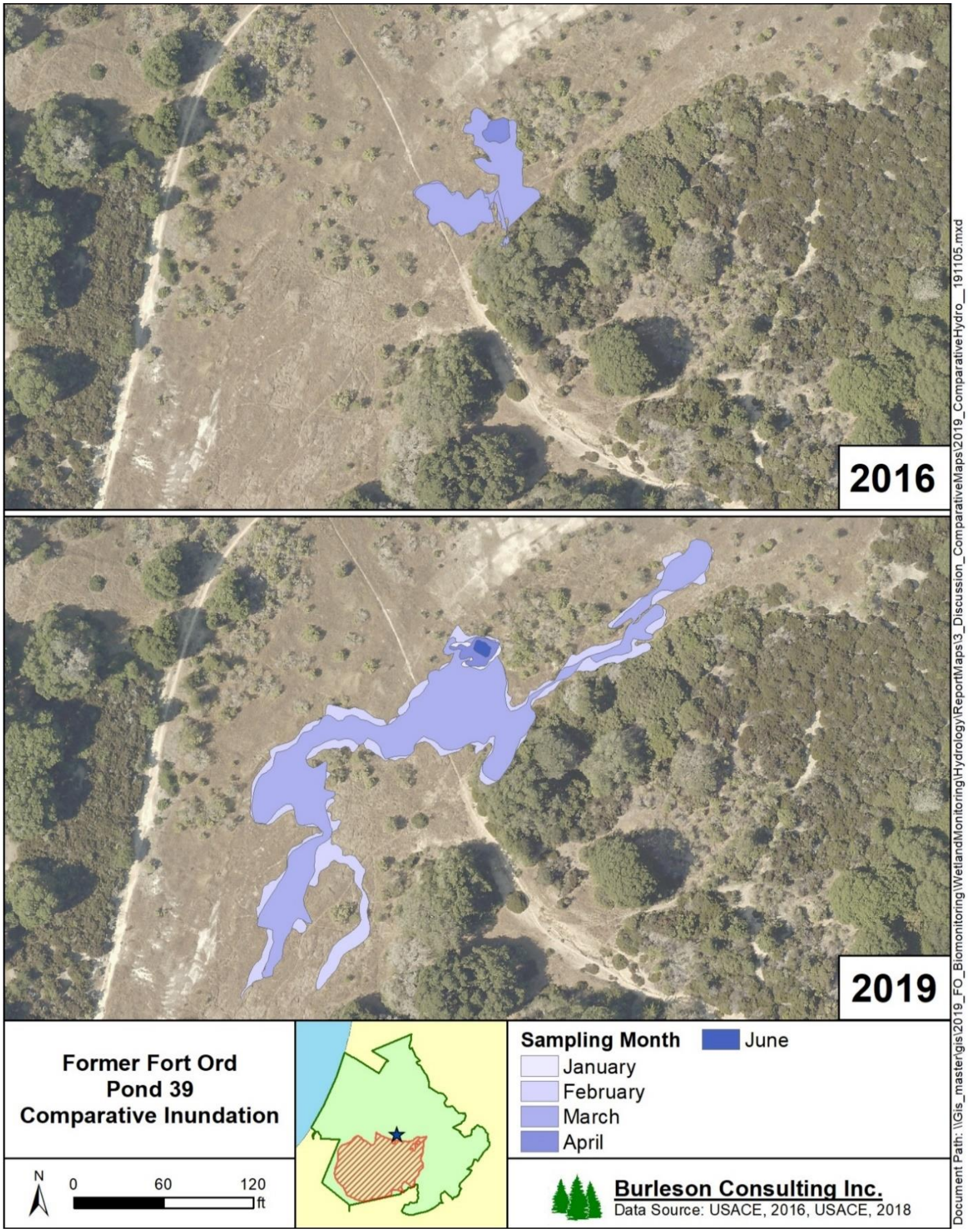

Figure 4-72. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Inundations for 2015-2016 (above-normal precipitation) and 2018-2019 (above-normal precipitation). The vernal pool was burned in 2017, had subsurface munitions remediation in 2018, and was in years 2 and 1 of monitoring in 2019.

4.13.1.1 *Data Quality Objective 1*

Pond 39 met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 39 provided sufficient depth for CTS (42 cm through March) and fairy shrimp (37 cm through May). Recorded depths indicate that DQO 1 was likely met in 1998 although monitoring did not continue into May. In 2015 and 2016, Pond 39 was either dry all year or did not hold water for a duration sufficient for CTS and fairy shrimp habitat. The depths at Pond 39 were within the ranges observed at reference vernal pools 5 and 101 East (West).

4.13.1.2 *Data Quality Objective 2*

Pond 39 inundations in 2019 were within the range of baseline years and reference vernal pools. Pond 39 was inundated December through June with an inundation range of 0.002-0.31 acres and a mean of 0.12 acres. The historic inundation range in 1998 was larger than 2019, whereas the 2016 range was smaller. The inundation ranges were 0.24-0.49 acres in 1998 and 0.00-0.03 acres in 2016. The vernal pool was dry in 2015. Pond 39 is a small vernal pool that is likely to fill in a normal or above-normal water-year when it may connect to Pond 40 South. However, in a drought year, the vernal pool may remain dry or dry quickly (see Figure 4-71). Pond 39 had a similar small inundation range as Pond 997 with similar timing as Pond 101 East (East).

4.13.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 39, a post-burn and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for years 2 and 1, respectively, in 2019. Pond 39 met DQO 1 and DQO 2 indicating that it provided suitable habitat for CTS and fairy shrimp and was similar to itself in previous monitoring years and reference. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.13.2 Vegetation Monitoring

Vegetation data were collected at Pond 39 in 1998, 2016, 2018, and 2019 (HLA, 1998; Burleson, 2017, 2019). In 1998, data were collected along one transect with a length of 239 feet. Quadrats were placed at 10-foot intervals, alternating from right to left along the transect. Because 1998 data were collected differently than in other years, strata were combined across the vernal pool to allow for comparison to other years. In 2016, 2018, and 2019, data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2019 were compared stratum-to-stratum in Table 4-140 as well as visually in Figure 4-73.

Table 4-140. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2019
1	5%	6%
2	8%	7%
3	87%	34%
4	N/A	48%
Upland	N/A	5%

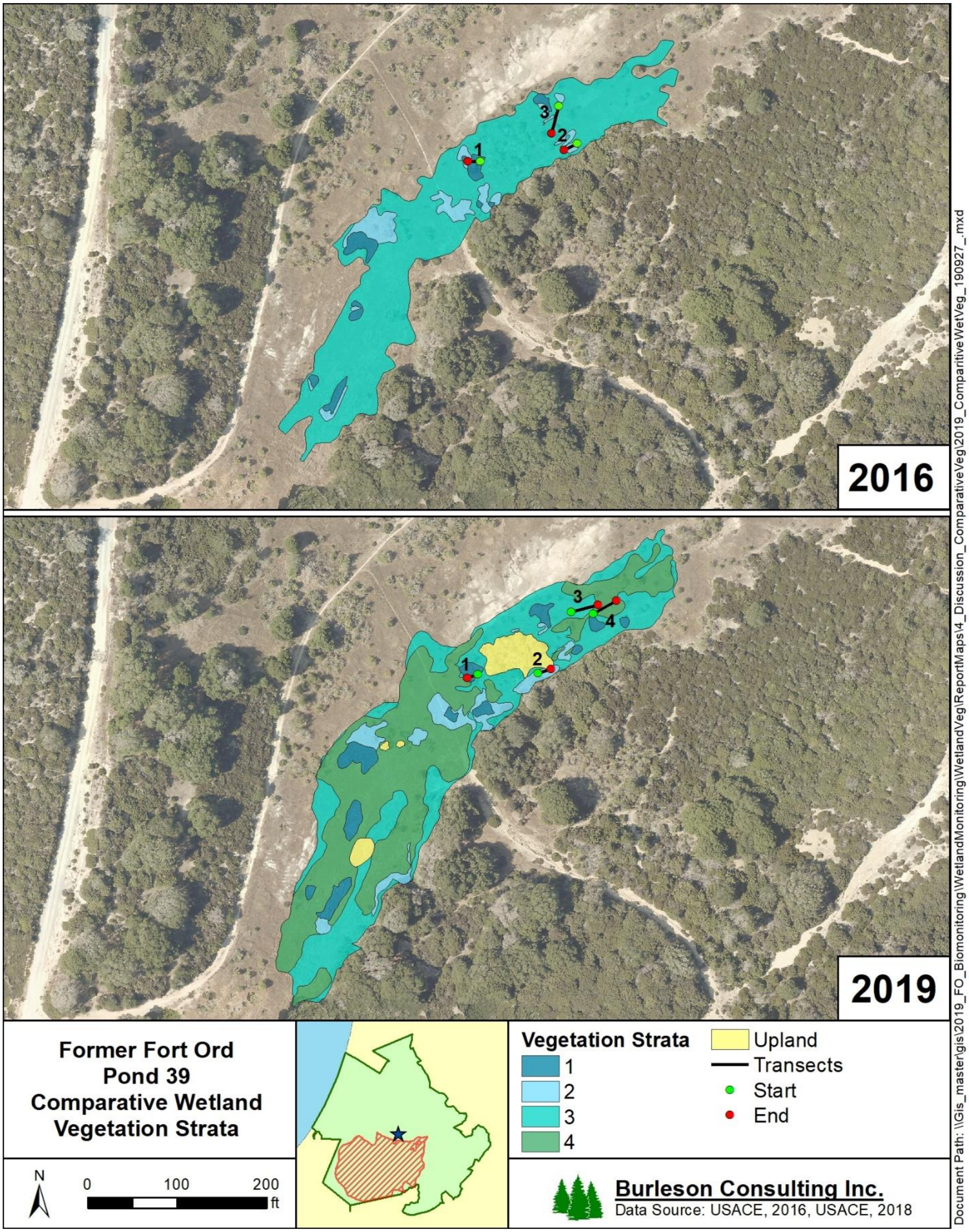

Figure 4-73. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2016 and 2019

Absolute percent vegetative cover increased while thatch/bare ground decreased between 1998 and 2019 (see Table 4-141). The absolute percent vegetative cover of Pond 39 in 2019 was within ranges observed at the reference vernal pools and was most similar to Pond 5 (see Table 4-142).

Table 4-141. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998	48.7%	51.8%
2016	61.9%	37.4%
2018	59.1%	41.3%
2019	75.2%	25.3%

Table 4-142. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
39	**75.2%**	**25.3%**

Species richness increased between 1998 and 2019 at Pond 39. Species richness on transects was 22, 30, 35, and 46 species in 1998, 2016, 2018, and 2019 respectively, whereas overall basin species richness was 61, 90, and 98 species in 2016, 2018, and 2019 respectively (see Table 4-143 and Appendix B Table B-13). The 1998 survey was limited to species on the transect and overall basin species richness was not recorded. Pond 39 species richness was within the range observed on transects at the reference vernal pools and was higher for the entire basin (see Table 4-144 and Appendix G Tables G-27 and G-54).

Species composition at Pond 39 was similar between monitoring years: two of the dominant species were pale spikerush (*Eleocharis macrostachya*) and Italian rye grass (*Festuca perennis*) in all monitoring years. Cut-leaved plantain (*Plantago coronopus*) and California oat grass (*Danthonia californica*) were also dominant in 1998, 2018, and 2019. Narrow-leaved clover (*Trifolium angustifolium*) was also a dominant in 2019. A complete comparison of species composition observed at Pond 39 in 1998, 2016, 2018, and 2019 can be found in Appendix H. Figure 4-74 shows a subset of this comparison for species observed with a 2% cover or greater.

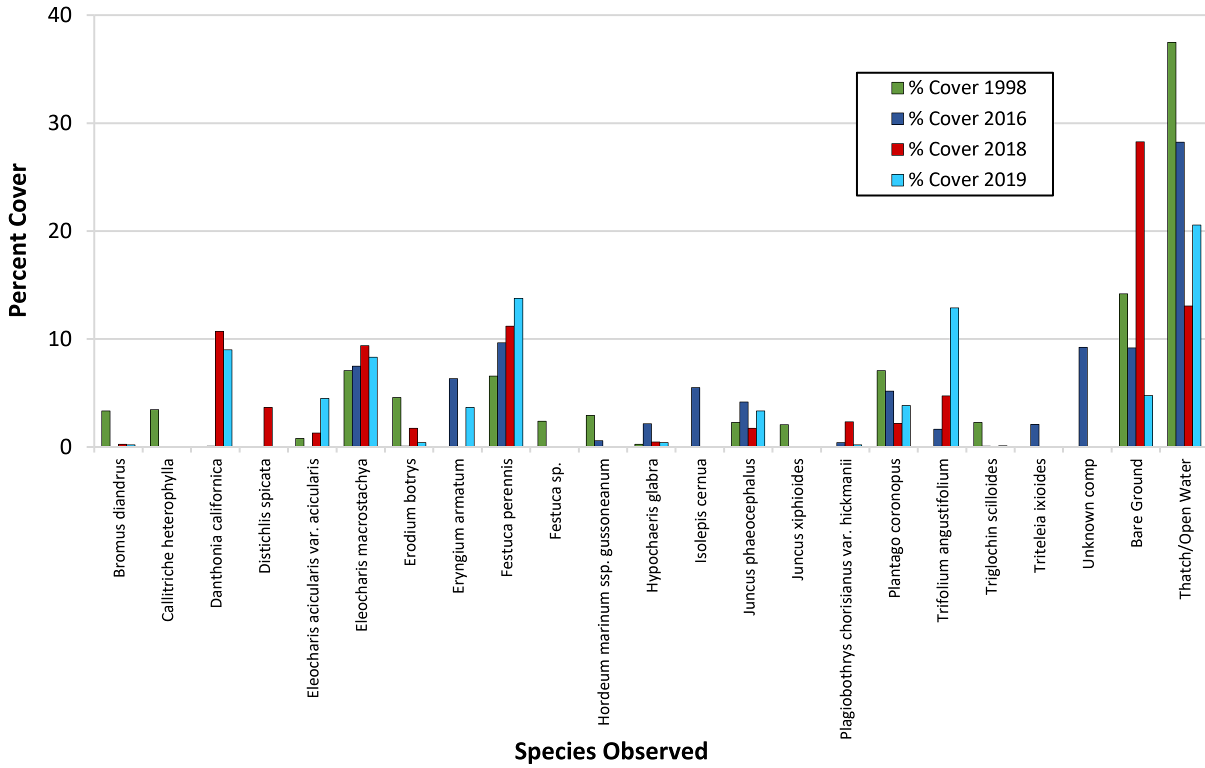

Figure 4-74. Percent Cover of Dominant Species at Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation)

Native species richness on Pond 39 transects increased between 1998 and 2019, whereas non-native richness increased between 1998 and 2018 and remained static between 2018 and 2019 (see Table 4-143). Pond 39 native and non-native species richness was within the range observed at the reference vernal pools (see Table 4-144). The relative percent cover of native and non-native species has been variable between monitoring years. In 2019, the values were within the ranges observed in previous years (see Table 4-145). Pond 39 native and non-native relative percent cover were not similar to the reference vernal pools. Less native cover and greater non-native cover were observed at Pond 39 than the values observed at reference vernal pools (see Table 4-146).

Table 4-143. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998	10	11	1
2016	14	13	3
2018	16	19	0
2019	25	19	2

Table 4-144. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
39	**25**	**19**	**2**

Table 4-145. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1998	39.8%	60.2%	0.0%
2016	47.1%	37.1%	15.7%
2018	54.3%	45.7%	0.0%
2019	46.8%	53.0%	0.2%

Table 4-146. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
39	**46.8%**	**53.0%**	**0.2%**

Wetland and non-wetland species richness on Pond 39 transects increased between 1998 and 2019 (see Table 4-147). Pond 39 wetland and non-wetland species richness were within the ranges observed at the reference vernal pools, and were similar to previous surveys in the vernal pool except that wetland species richness was slightly higher in 2019 (see Table 4-148). The relative percent cover of wetland species decreased from previous monitoring years, and non-wetland species were within the range of values in previous years (see Table 4-149). The relative percent cover of wetland species was slightly less than the values observed at the reference vernal pools (Table 4-150).

Table 4-147. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998	7	2	6	3	0	4
2015	5	5	7	3	0	10
2018	4	7	6	5	1	12
2019	6	9	6	4	2	19

Table 4-148. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
39	**6**	**9**	**6**	**4**	**2**	**19**

Table 4-149. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998	32.8%	5.8%	38.9%	14.5%	0.0%	7.9%
2015	24.2%	20.1%	28.9%	2.4%	0.0%	24.4%
2018	23.0%	12.4%	41.9%	6.1%	1.2%	15.3%
2019	18.2%	14.7%	36.4%	2.1%	1.3%	27.3%

Table 4-150. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
39	**18.2%**	**14.7%**	**36.4%**	**2.1%**	**1.3%**	**27.3%**

4.13.2.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 39 was dominated by non-native and wetland plant species during year 2 post-burn and year 1 post-subsurface munitions remediation monitoring in 2019. Pond 39 wetland vegetation results were within range of either baseline and/or reference vernal pools.

4.13.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 39, a post-burn and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for years 2 and 1, respectively, in 2019. The species composition, richness, and native and wetland species relative abundances were similar to baseline and/or reference vernal pool conditions. Pond 39 provided suitable wetland habitat in 2019.

4.13.3 Wildlife Monitoring

Wildlife data were collected at Pond 39 in 1998, 2016, 2018, and 2019 (HLA, 1998; Burleson, 2017, 2019). California tiger salamander larvae were not detected in 2019 or previous survey years. Fairy shrimp were detected in 1998, 2018, and 2019. Table 4-151 shows historic wildlife monitoring results.

Table 4-151. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998	Not detected	Moderate
2016	Not detected	Not detected
2018	Not detected	Low (8)
2019	Not detected	Low – Moderate (71, 37, 7)

4.13.3.1 *Data Quality Objective 1*

Pond 39 provided suitable depth for CTS and fairy shrimp as discussed in Section 4.13.1.1.

4.13.3.2 *Data Quality Objective 4*

Fairy shrimp were detected at Pond 39 in 2019, whereas CTS were not detected. The water quality was adequate. Compared to other vernal pools and previous Pond 39 data, the water quality data were within normal ranges. The pH ranged from 6.34 in June to 6.63 in February with a mean of 6.47. Temperature ranged from 7.18°C in February to 30.37°C in June with a mean of 15.15°C. Dissolved oxygen ranged from 4.29 mg/L in March to 8.20 mg/L in June with a mean of 5.60 mg/L. Turbidity ranged from 13.0 FNU in January to greater than 1000 FNU in June with a mean of 515 FNU (see Table 3-48).

4.13.3.3 *Data Quality Objective 5*

California tiger salamanders were not detected in 2019, which was consistent with baseline monitoring. California tiger salamanders were not detected in 1998 or 2016.

Fairy shrimp were present in 2019, which was partially consistent with previous baseline monitoring. Fairy shrimp were observed in 1998 but not in 2016. It was possible survey event timing prevented detection in 2016 because surveys occurred later in the year (April and May).

4.13.3.4 *Performance Standard: Wildlife Usage*

Pond 39, a post-burn and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for years 1 and 2. The vernal pool was on track to meet DQOs 1, 4, and 5 and provided suitable CTS and fairy shrimp habitat.

4.13.4 Conclusion

Pond 39, a post-burn and post-subsurface munitions remediation vernal pool, was in years 2 and 1 of monitoring in 2019. The vernal pool was on track to meet all of the performance standards (see Table 4-152). Pond 39 will continue to be monitored in the future.

Table 4-152. Success at Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	On track
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	On track
	DQO 4	On track
	DQO 5	On track

4.14 Pond 40 North – Year 2

Pond 40 North was monitored in 2019 as a year 2 post-burn vernal pool. Pond 40 North was monitored for baseline conditions in 2015. Vegetation in Pond 40 North and within its watershed was burned in October 2017 as part of the prescribed burn of BLM Area B Subunit B. Pond 40 North had anomaly investigations and it was determined no subsurface remediation was necessary at that pond. Table 4-153 summarizes the years that monitoring occurred and surveys conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 40 North (see Figure 4-75). The 2014-2015 and 2017-2018 water-years were below-normal, while 2018-2019 was above-normal.

Table 4-153. Pond 40 North (Year 2 Post-Burn) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year		
	2014-2015	2017-2018	2018-2019
Hydrology	●	●	●
Vegetation	●	●	●
Wildlife	●		●

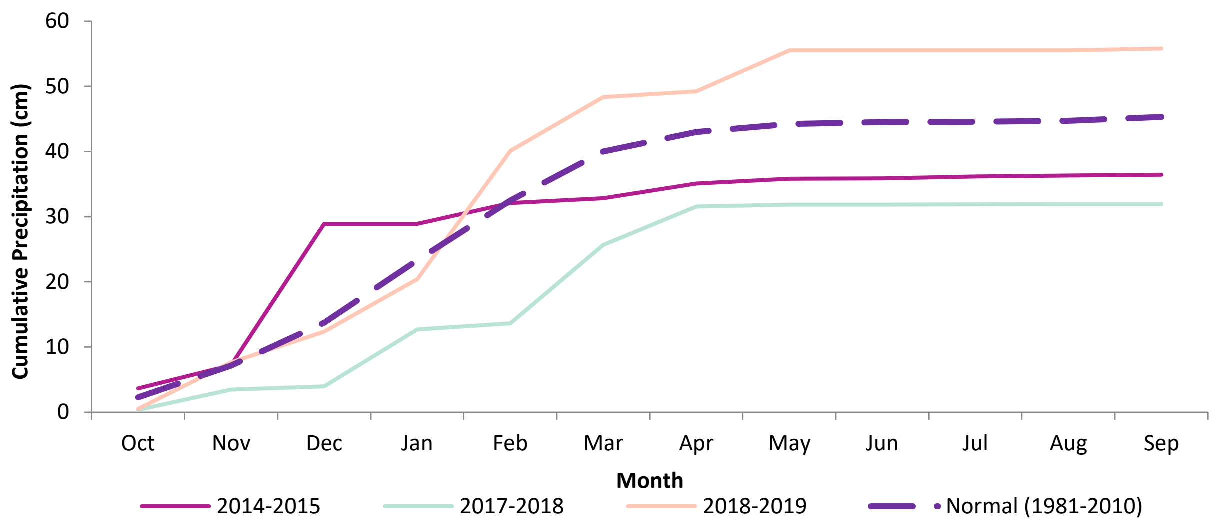

Figure 4-75. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 40 North (Year 2 Post-Burn) North Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.14.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 40 North was 0.08 acres with a maximum depth of approximately 82 cm. The depth and inundation values were the largest recorded at Pond 40 North to date (see Appendix F Table F-14). Pond 40 North was inundated from the first recorded monitoring in January through June. Figure 4-76 illustrates the relationship of precipitation and depth at Pond 40 North for 2019 as well as baseline in 2015.

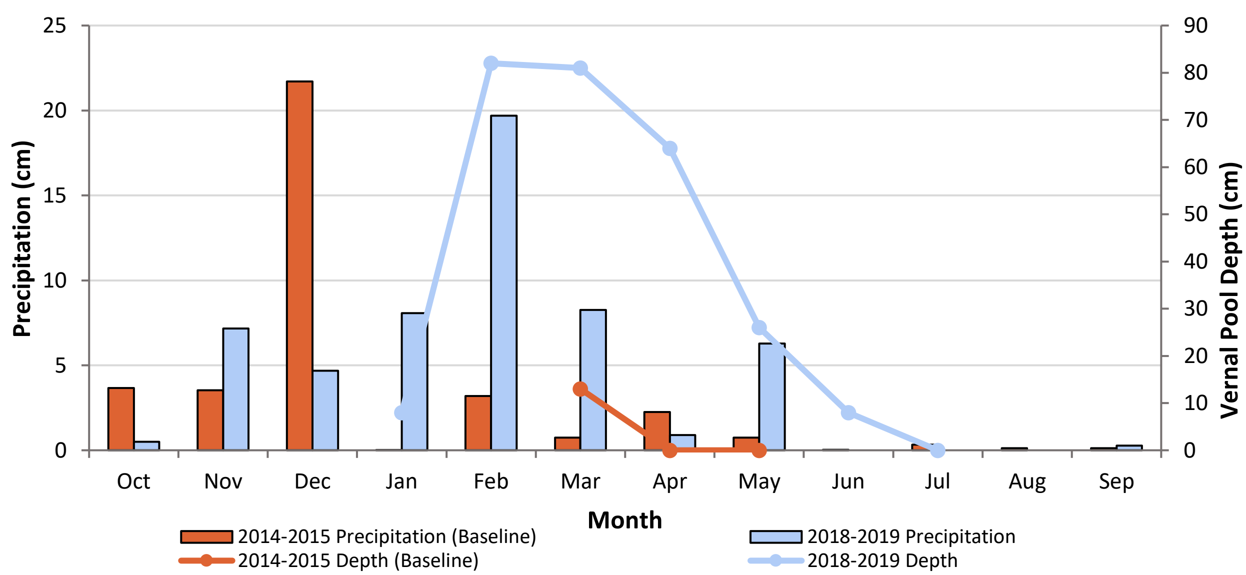

Figure 4-76. Monthly Depth and Precipitation at Pond 40 North (Year 2 Post-Burn) for 2018-2019 Water-Year Compared to Baseline 2014-2015 Water-Year

In below-normal precipitation years, Pond 40 North is likely to range from 8-15 cm in depth with a maximum inundation of 0- 0.01 acres. No depths or inundations for Pond 40 North have been recorded in normal precipitation years. In above-normal precipitation years, Pond 40 North could have maximum depths of 85 cm or more and a maximum inundation up to 0.08 acres (see Appendix F Table F-14). Figure 4-77 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-78 illustrates historic and recent inundation areas.

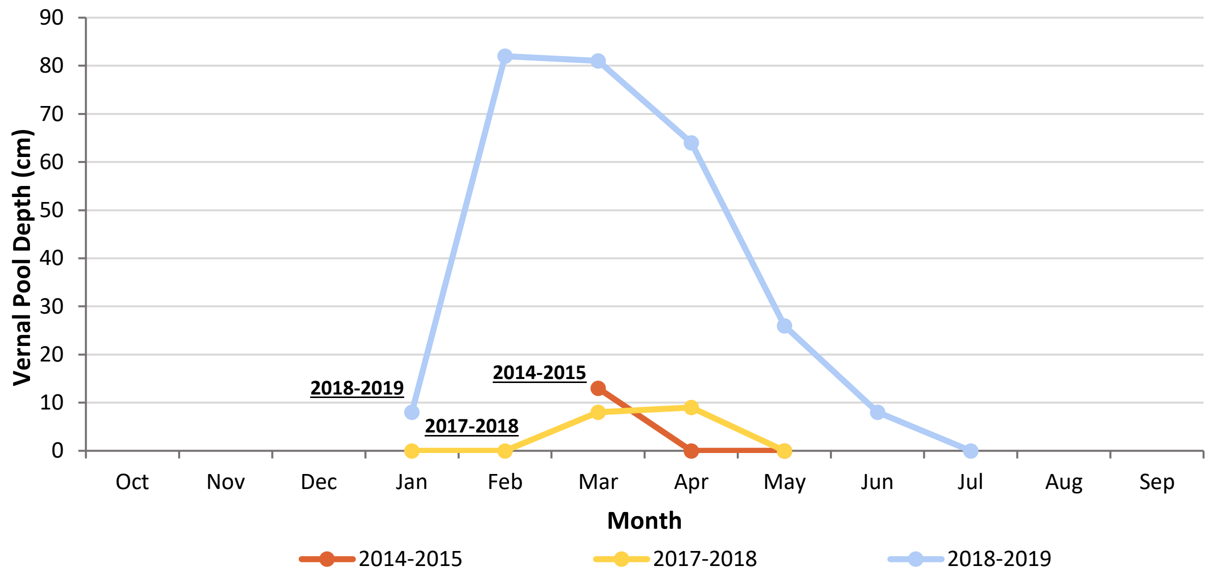

Figure 4-77. Historic Monthly Depths at Pond 40 North (Year 2 Post-Burn). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

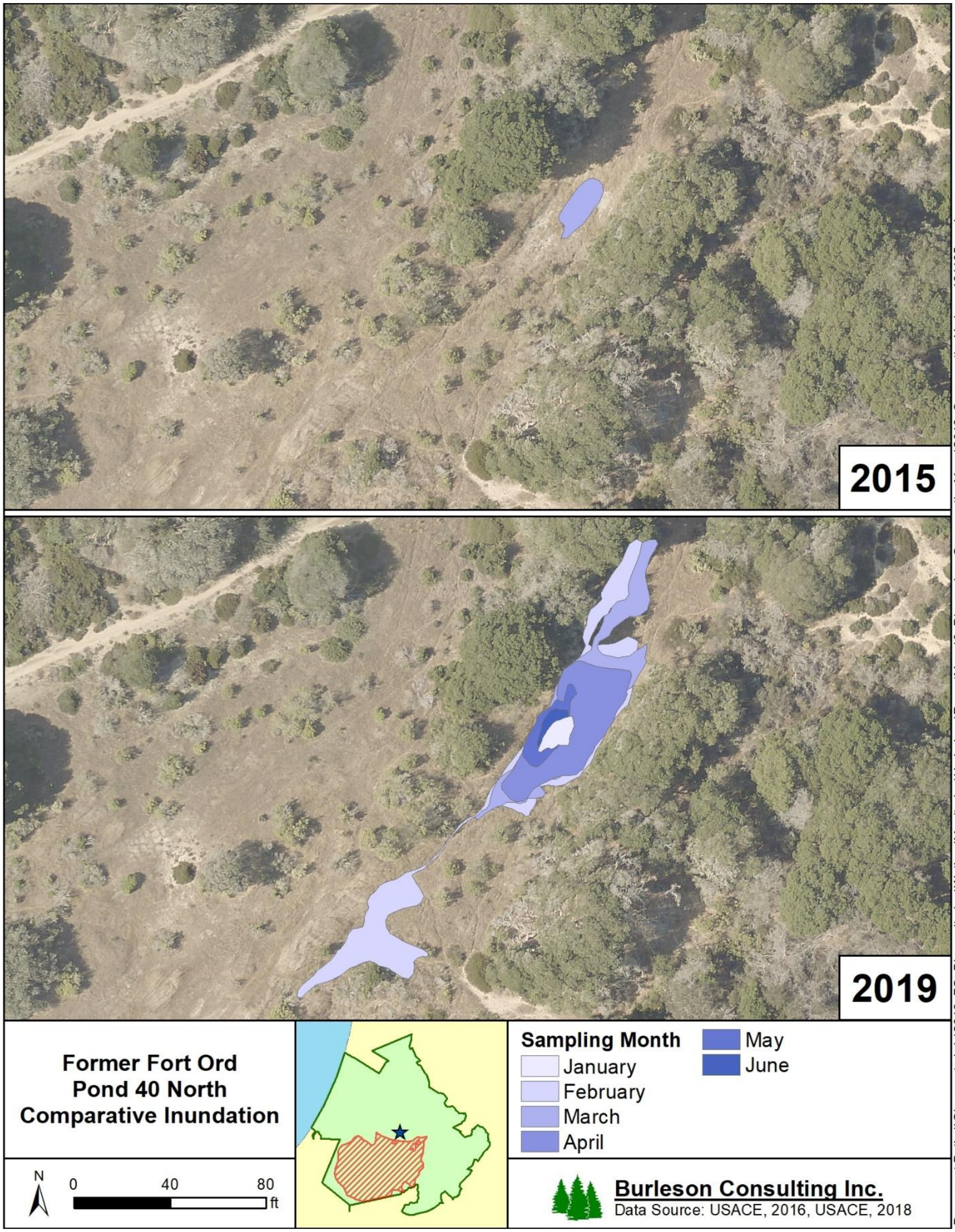

Figure 4-78. Pond 40 North (Year 2 Post-Burn) Inundations for 2014-2015 (below-normal precipitation) and 2018-2019 (above-normal precipitation). The vernal pool was burned in 2017 and was in year 2 of monitoring in 2019.

4.14.1.1 *Data Quality Objective 1*

Pond 40 North met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 40 North provided sufficient depth for CTS (57 cm through March) and fairy shrimp (52 cm through May). Recorded depths indicate that DQO 1 was likely not met in 2015, when an estimated depth of 10-15 cm was recorded in March. The depths at Pond 40 North were above the ranges observed at reference vernal pools 5, 101 East (East), and 997.

4.14.1.2 *Data Quality Objective 2*

Pond 40 North had a larger inundation in 2019 compared to baseline years and was within the range of the relevant reference vernal pools. Pond 40 North was inundated January through June with an inundation range of 0.003-0.08 acres and a mean of 0.03 acres. The March and April 2015 historic inundation of 0.01 acres was comparable to the April and May 2019 inundations. Pond 40 North is a small vernal pool that is likely to fill in a normal or above-normal water-year, and in a drought year, the vernal pool may remain dry or dry quickly (see Figure 4-77). Pond 40 North had a similar small inundation range as Pond 997 with similar timing as Pond 101 East (East).

4.14.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 40 North, a post-burn vernal pool, was on track to meet the performance standard for year 2 in 2019. Pond 40 North met DQO 1 and DQO 2 indicating that it provided suitable habitat for CTS and fairy shrimp and was similar to itself in previous monitoring years and reference. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.14.2 Vegetation Monitoring

Vegetation data were collected at Pond 40 North in 2015, 2018, and 2019 (Burleson., 2016, 2019). In 2015, 2018, and 2019, data were collected using the methodology described in the Methods section of this report. Data from 2015 and 2019 were compared stratum-to-stratum in Table 4-154 as well as visually in Figure 4-79.

Table 4-154. Pond 40 North (Year 2 Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2015	2019
1	2%	N/A
2	40%	21%
3	58%	33%
4	N/A	46%

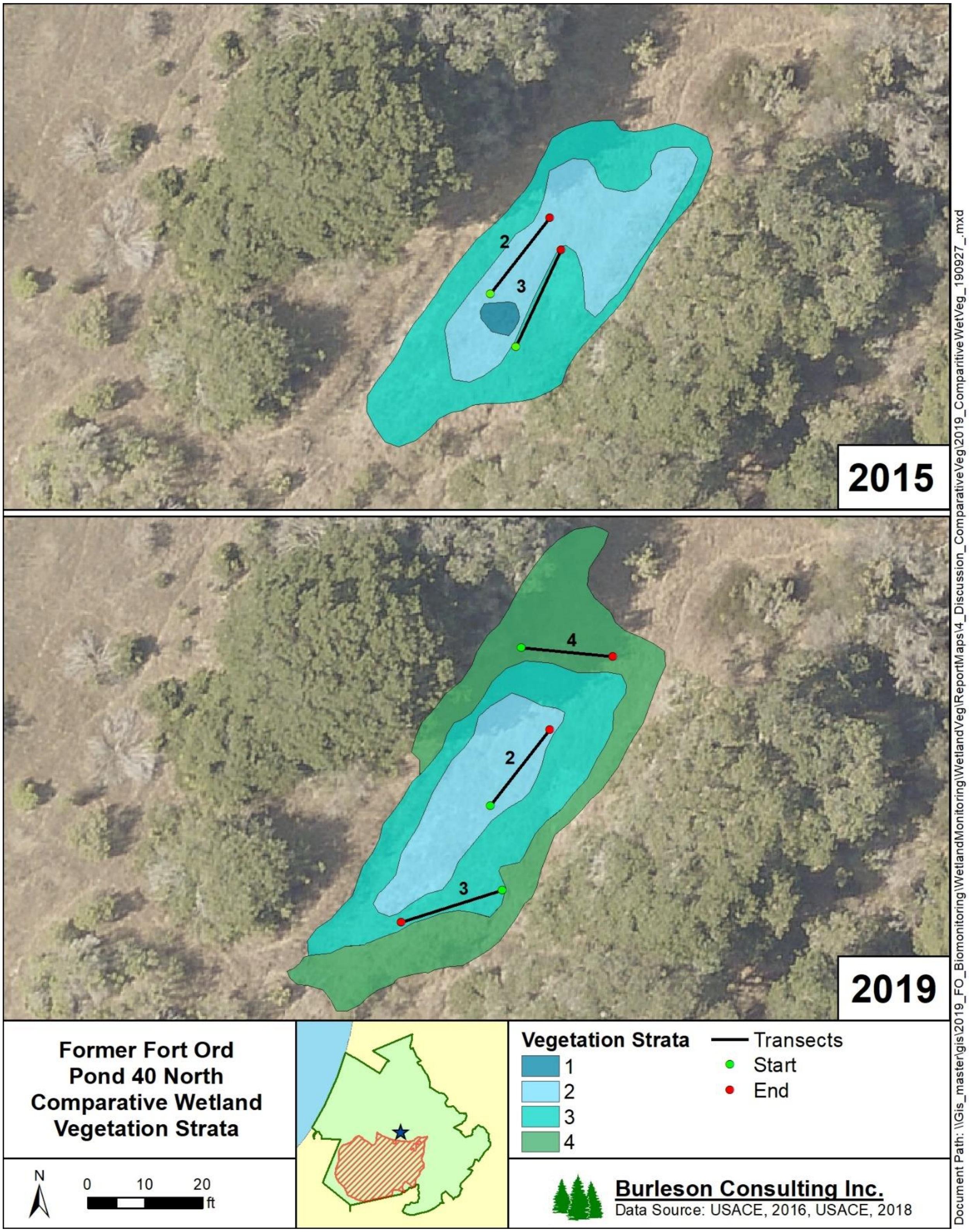

Figure 4-79. Pond 40 North (Year 2 Post-Burn) Vegetation Strata and Transects for 2015 and 2019. The 2019 transect 2 in stratum 2 was identified as transect 1 in 2015 (Burleson *et* al., 2016). The transect number was edited for the comparison map.

Absolute percent vegetative cover increased between 2015 and 2019, and thatch cover decreased (see Table 4-155). The absolute percent vegetative cover of Pond 40 North in 2019 was lower than the values observed at the reference vernal pools, and thatch cover was higher (see Table 4-156).

Table 4-155. Pond 40 North (Year 2 Post-Burn) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2015	42.5%	55.8%
2018	49.2%	49.7%
2019	59.6%	40.8%

Table 4-156. Pond 40 North (Year 2 Post-Burn) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
40 North	**59.6%**	**40.8%**

Species richness increased between 2015 and 2019 at Pond 40 North. Species richness on transects was 5, 17, and 22 species in 2015, 2018, and 2019, respectively, whereas overall basin species richness was 27, 57, and 59 species, in 2015, 2018, and 2019, respectively (see Table 4-157 and Appendix B Table B-14). Despite the increase in overall basin species richness, Pond 40 North species richness was lower than reference vernal pool ranges on transects and for the entire basin (see Table 4-158 and Appendix G Tables G-27 and G-54).

Species composition at Pond 40 North was different in 2018 than in 2015, and the dominant species were different. Pale spikerush (*Eleocharis macrostachya*) was the dominant species in 2015, whereas brown-headed rush (*Juncus phaeocephalus*) was the dominant species in 2018 and 2019. Pale spikerush was still an important species which provided moderate cover in 2018 and 2019. A complete comparison of species composition observed at Pond 40 North in 2015, 2018, and 2019 can be found in Appendix H. Figure 4-80 shows a subset of this comparison for species observed with a 2% cover or greater.

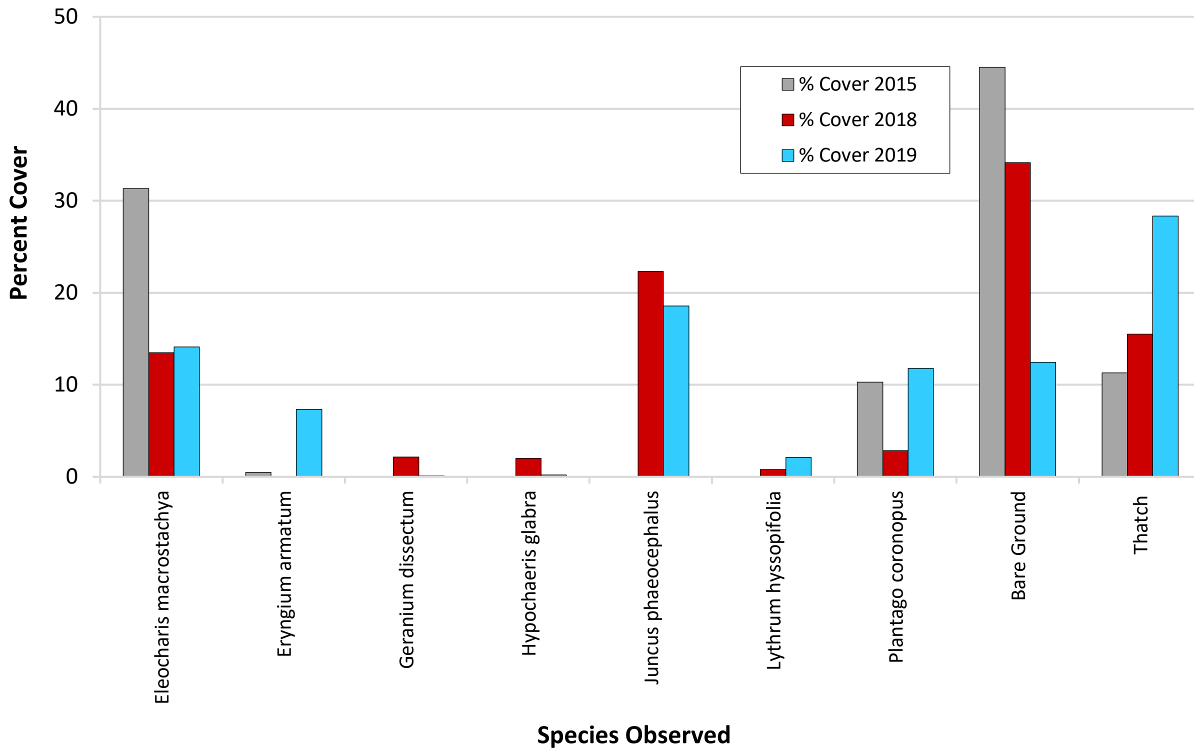

Figure 4-80. Percent Cover of Dominant Species at Pond 40 North (Year 2 Post-Burn)

Native and non-native species richness on Pond 40 North transects increased between 2015 and 2019, and more non-native species than native species were observed in 2018 and 2019 (see Table 4-157). Pond 40 North native and non-native species richness was lower than the ranges observed at the reference vernal pools (see Table 4-158). The relative percent cover of native species decreased between 2015 and 2019, whereas the relative percent cover of non-native species increased (see Table 4-159). Pond 40 North was within the range of native and non-native relative percent cover values observed at the reference vernal pools in 2019 (see Table 4-160).

Table 4-157. Pond 40 North (Year 2 Post-Burn) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2015	2	2	1
2018	6	11	0
2019	9	12	1

Table 4-158. Pond 40 North (Year 2 Post-Burn) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
40 North	**9**	**12**	**1**

Table 4-159. Pond 40 North (Year 2 Post-Burn) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2015	74.9%	24.6%	0.5%
2018	76.3%	23.7%	0.0%
2019	70.9%	28.4%	0.7%

Table 4-160. Pond 40 North (Year 2 Post-Burn) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
40 North	**70.9%**	**28.4%**	**0.7%**

Wetland species richness values on Pond 40 North transects increased between 2015 and 2019, whereas non-wetland species richness was variable with a peak value in 2018 (see Table 4-161). Wetland and non-wetland species richness at the vernal pool were less than the ranges observed at the reference vernal pools in 2019 (see Table 4-162). The relative percent cover of wetland species was within the range of previous years and greater than 2018. Non-wetland species cover was minimal in 2019 (see Table 4-163). The wetland relative percent cover values were greater than the values observed at reference vernal pools (see Table 4-164).

Table 4-161. Pond 40 North (Year 2 Post-Burn) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2015	2	1	1	0	0	1
2018	3	2	2	4	1	5
2019	4	4	4	2	1	7

Table 4-162. Pond 40 North (Year 2 Post-Burn) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
40 North	**4**	**4**	**4**	**2**	**1**	**7**

Table 4-163. Pond 40 North (Year 2 Post-Burn) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2015	74.1%	1.2%	24.2%	0.0%	0.0%	0.5%
2018	30.8%	46.4%	6.8%	4.4%	0.3%	11.2%
2019	29.7%	45.5%	20.9%	0.4%	0.4%	3.2%

Table 4-164. Pond 40 North (Year 2 Post-Burn) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
40 North	**29.7%**	**45.5%**	**20.9%**	**0.4%**	**0.4%**	**3.2%**

4.14.2.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Despite higher non-native species richness than native, vegetative cover in Pond 40 North was dominated by native and wetland plant species during year 2 post-burn monitoring in 2019. Pond 40 North wetland vegetation results were generally within range of baseline and/or reference vernal pools.

4.14.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 40 North, a post-burn vernal pool, was on track to meet the performance standard for year 2 in 2019. The species composition, richness, and native and wetland species relative abundances were generally similar to baseline and/or reference vernal pool conditions. However, the greater non-native species richness as compared to native warrants close evaluation in future years. Pond 40 North provided suitable wetland habitat in 2019.

4.14.3 Wildlife Monitoring

Wildlife data were collected at Pond 40 North in 2015 and 2019 (Burleson *et al.*, 2016). California tiger salamander larvae were not detected in either year. Fairy shrimp were detected at Pond 40 North in 2019. Table 4-165 shows historic wildlife monitoring results.

Table 4-165. Pond 40 North (Year 2 Post-Burn) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2015	Not detected	Not detected
2019	Not detected	Moderate – High (121, 57, 259)

4.14.3.1 *Data Quality Objective 1*

Pond 40 North provided suitable depth for CTS and fairy shrimp as discussed in Section 4.14.1.1.

4.14.3.2 *Data Quality Objective 4*

Fairy shrimp were detected at Pond 40 North in 2019, whereas CTS were not detected. The water quality was adequate. Compared to other vernal pools and previous Pond 40 North data, the water quality data were within normal ranges. The pH ranged from 6.55 in January to 6.99 in April with a mean of 6.72. Temperature ranged from 7.18°C in February to 17.33°C in May with a mean of 12.99°C. Dissolved oxygen ranged from 5.40 mg/L in May to 10.89 mg/L in January with a mean of 7.48 mg/L. Turbidity ranged from 6.2 FNU in April to 450.0 FNU in May with a mean of 131.0 FNU (see Table 3-52).

4.14.3.3 *Data Quality Objective 5*

California tiger salamanders were not detected in 2019, which was consistent with baseline monitoring. California tiger salamanders were not detected in 2015.

Fairy shrimp were present in 2019, which was not consistent with baseline monitoring. Fairy shrimp were not detected in 2015. It was possible that survey event timing prevented detection in 2015 because surveys occurred later in the year (March through May).

4.14.3.4 *Performance Standard: Wildlife Usage*

Pond 40 North, a post-burn vernal pool, was on track to meet the performance standard. Fairy shrimp were present in 2019 but not in baseline, likely because the 2015 survey occurred too late in the season to detect fairy shrimp (April and May). The vernal pool was on track to meet DQOs 1, 4, and 5 and provided suitable CTS and fairy shrimp habitat.

4.14.4 Conclusion

Pond 40 North, a post-burn vernal pool, was in year 2 of monitoring in 2019. The vernal pool was on track to meet all of the performance standards (see Table 4-166). Pond 40 North will continue to be monitored in the future.

Table 4-166. Success at Pond 40 North (Year 2 Post-Burn) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	On track
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	On track
	DQO 4	On track
	DQO 5	On track

4.15 Pond 40 South – Year 2 and Year 1

Pond 40 South was monitored in 2019 as a year 2 post-burn and year 1 post-subsurface munitions remediation vernal pool. Pond 40 South was monitored for baseline conditions in 1998, 2015, 2016, and 2017. Vegetation in Pond 40 South and within its watershed was burned in October 2017 as part of the prescribed burn of BLM Area B Subunit B. Pond 40 South had intrusive anomaly investigations in 2018. Table 4-167 summarizes the years that monitoring occurred and surveys conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 40 South (see Figure 4-81). The 1997-1998, 2015-2016, 2016-2017, and 2018-2019 water-years were above-normal, whereas 2014-2015 and 2017-2018 water-years were below-normal.

Table 4-167. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year					
	1997-1998	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Hydrology	●	●	●	●	●	●
Vegetation	●		●		●	●
Wildlife	●		●			●

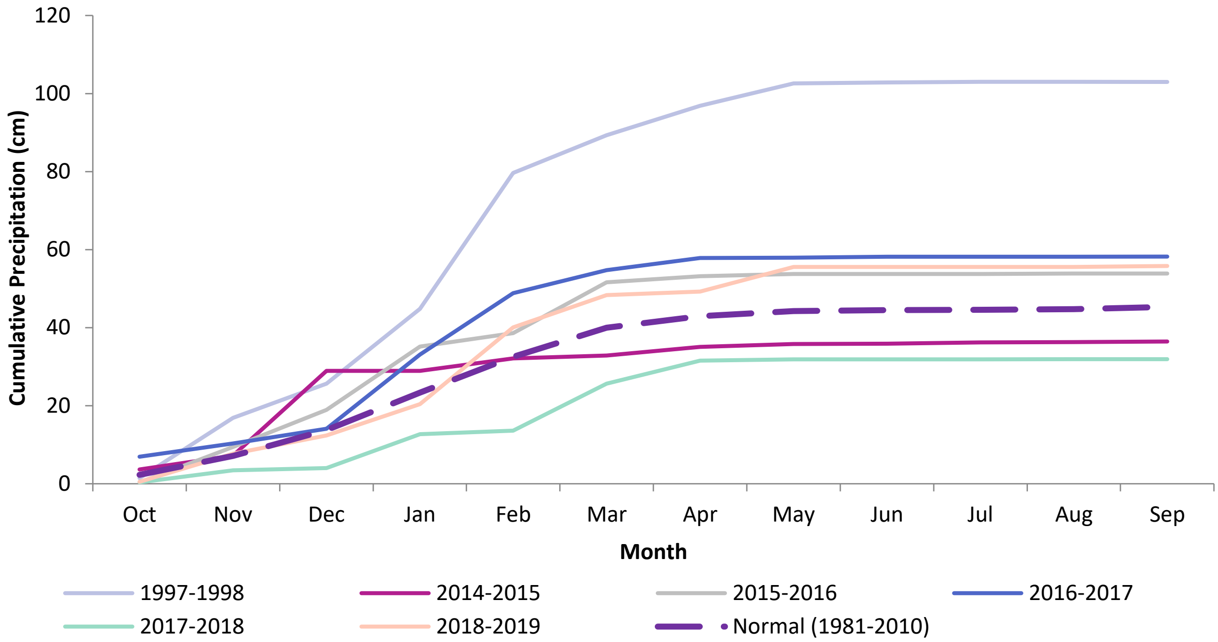

Figure 4-81. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.15.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 40 South was 0.22 acres with a maximum depth of approximately 28 cm. The depth and inundation values were within range of previously recorded values (see Appendix F Table F-15). Pond 40 South was inundated from February through April. Figure 4-82 illustrates the relationship of precipitation and depth at Pond 40 South for 2019 as well as baseline in 2016.

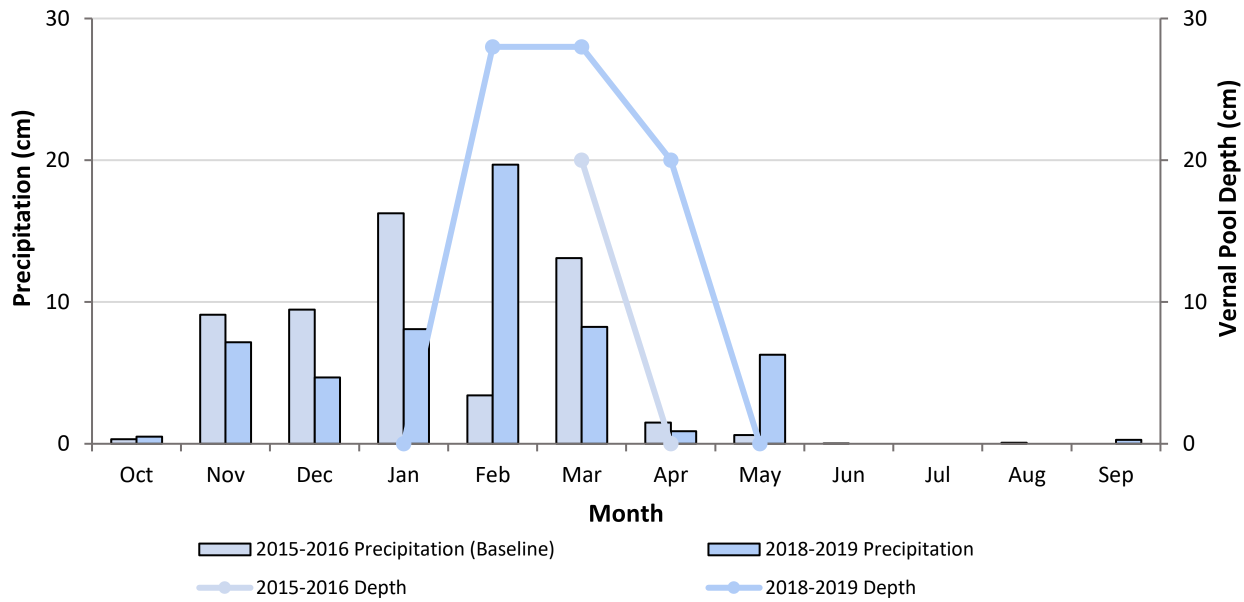

Figure 4-82. Monthly Depth and Precipitation at Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) for 2018-2019 Water-Year Compared to Baseline 2015-2016 Water-Year

In below-normal precipitation years, Pond 40 South is likely to remain dry. No depths or inundations for Pond 40 South have been recorded in normal precipitation years. In above-normal precipitation years, Pond 40 South could have maximum depths of 35 cm or more and a maximum inundation of 1 acre but would likely be connected to Pond 39, as observed in 2017 (see Appendix F Table F-15). Figure 4-83 illustrates historic vernal pool depths by month and organized by water-year.

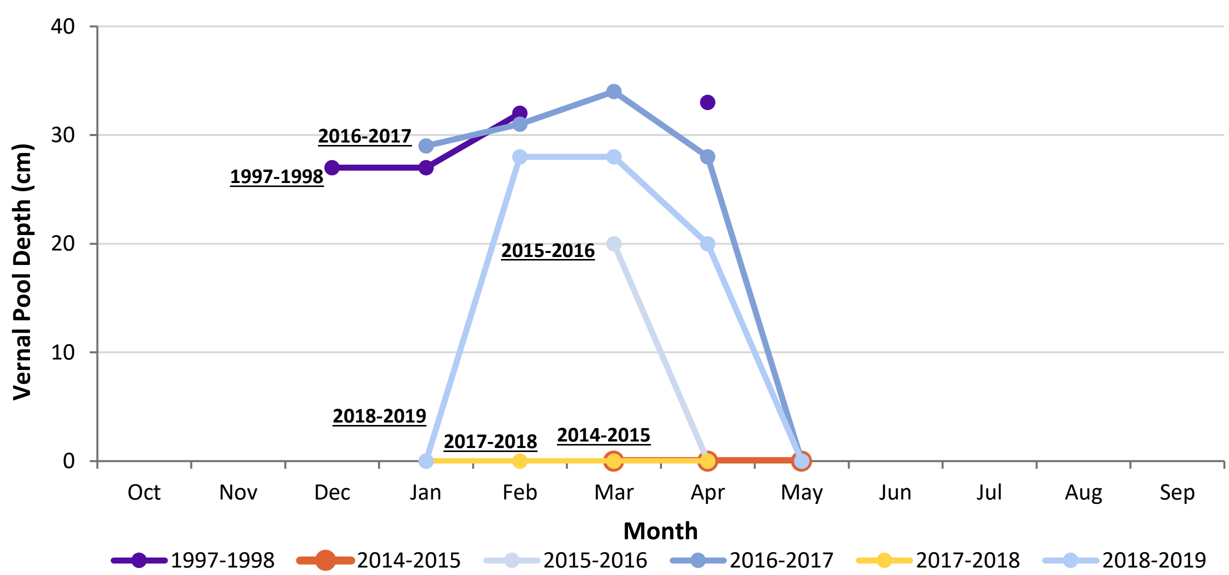

Figure 4-83. Historic Monthly Depths at Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

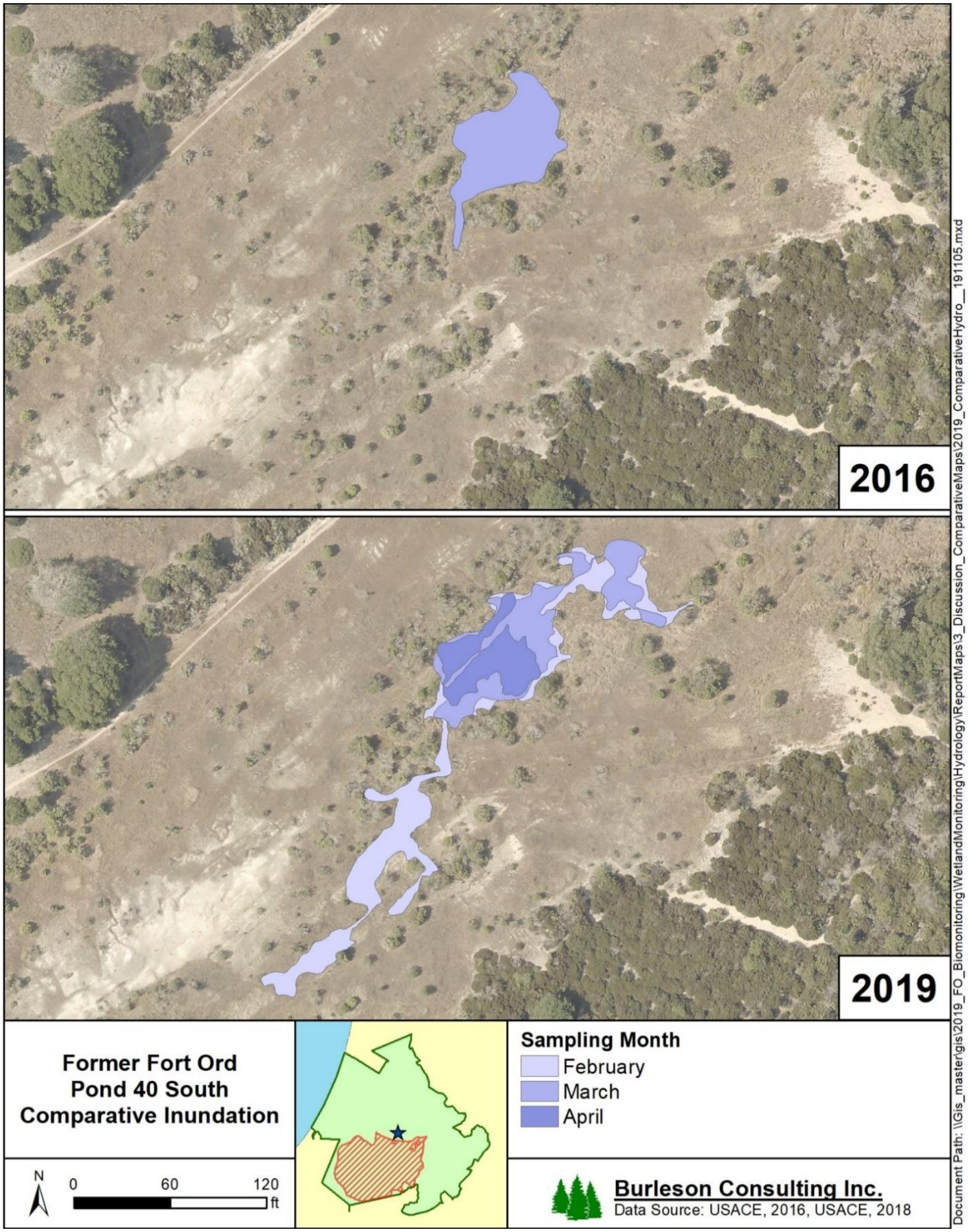

Figure 4-84. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Inundations for 2015-2016 (above-normal precipitation) and 2018-2019 (above-normal precipitation). The vernal pool was burned in 2017, had subsurface munitions remediation in 2018, and was in years 2 and 1 of monitoring in 2019.

4.15.1.1 *Data Quality Objective 1*

Pond 40 South partially met DQO 1. The required average depths of 25 cm from the first rain event through March for CTS was met but the required 10 cm for 18 consecutive days through May for fairy shrimp was not met. Pond 40 South provided sufficient depth for CTS (28 cm through March) but did not provide sufficient depth for fairy shrimp (25 cm through April). Despite providing greater than 10 cm depth, the vernal pool was dry by the May survey and did not meet the DQO for fairy shrimp. Pond 40 South did not meet the DQO in the baseline year 2017, however could have meet it in 1998 although it is unclear as monitoring did not continue into May. Pond 40 South depths in 2019 were below those observed at reference Ponds 5 and 101 East (East), but higher than those at 997.

4.15.1.2 *Data Quality Objective 2*

Pond 40 South had a similar inundation range as 1998 and 2016. Pond 40 South was inundated February through April with an inundation range of 0.05-0.22 acres and a mean of 0.12 acres. Pond 40 South was inundated in 0.12-0.22 acres in 1998, 0.08 acres in March 2016, 0.12-0.96 acres in 2017 but was dry in 2015 and 2018. Pond 40 South is a small vernal pool that is likely to fill in a normal or above-normal water-year when it may connect to Pond 39. However, in a drought year, the vernal pool may remain dry or dry quickly (see Figure 4-83). Pond 40 South had a similar inundation range and timing as Pond 997, both were inundated February through April and had small inundation areas.

4.15.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 40 South, a post-burn and post-subsurface munitions remediation vernal pool, was not on track to meet the performance standard for year 1 and 2 in 2019. Pond 40 South only partially met DQO 1, providing suitable habitat for CTS but not fairy shrimp. Evaluation of DQO 2 indicated that Pond 40 South was similar to itself in previous monitoring years and reference Pond 997. Pond 40 South will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.15.2 Vegetation Monitoring

Vegetation data were collected at Pond 40 South in 1998, 2016, 2018, and 2019 (HLA, 1998; Burleson, 2017, 2019). In 1998, data were collected along one transect with a length of 135 feet. Quadrats were placed at 10-foot intervals, alternating from right to left along the transect. Because 1998 data were collected differently than in other years, strata were combined across the vernal pool to allow for comparison to other years. In 2016, 2018, and 2019, data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2019 were compared stratum-to-stratum in Table 4-168 as well as visually in Figure 4-85.

Table 4-168. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2019
1	9%	10%
2	26%	44%
3	65%	46%

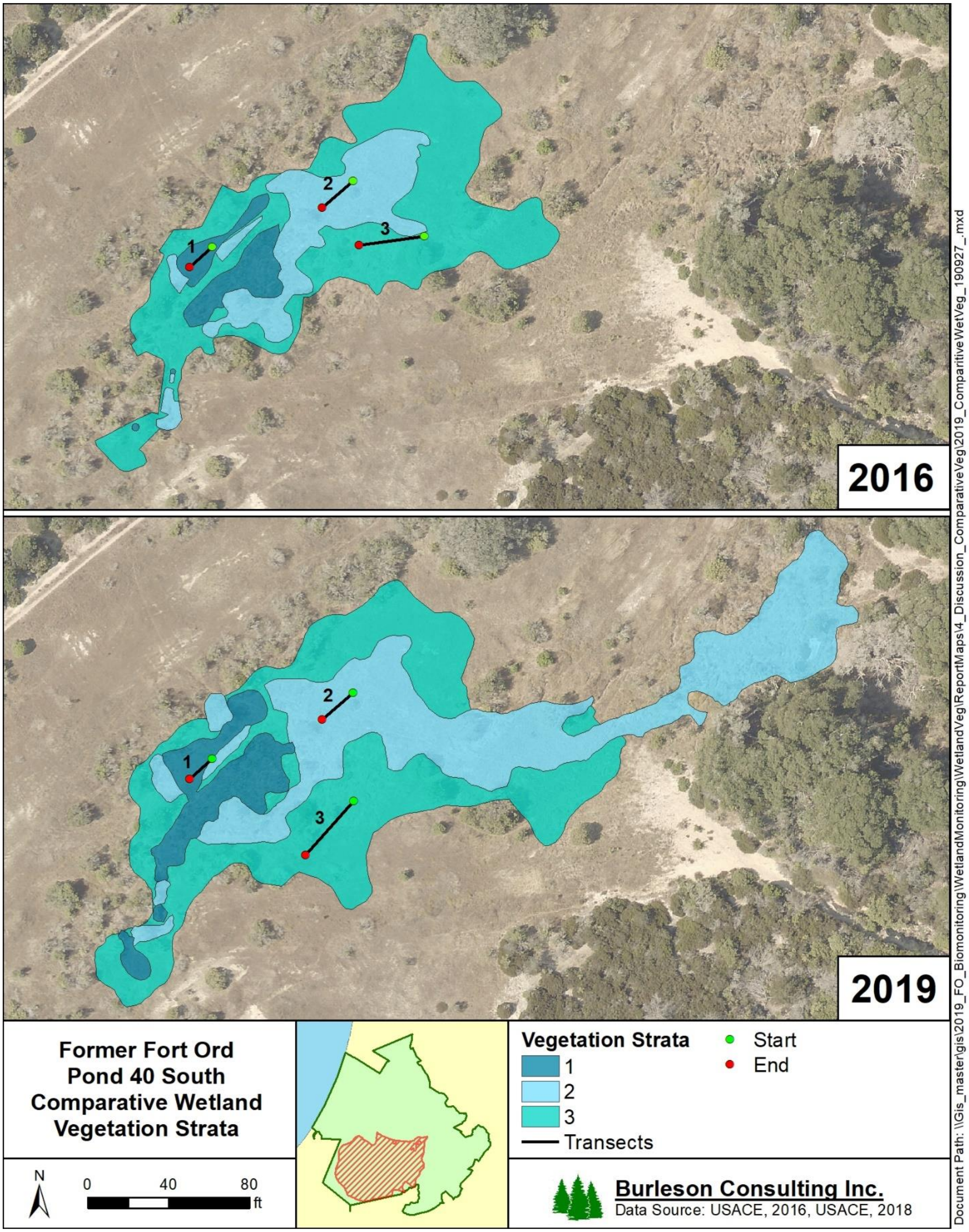

Figure 4-85. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2016 and 2019

Absolute percent vegetative cover has been variable between years. Vegetation cover decreased between 1998 and 2018, and subsequently increased by 2019. Conversely, thatch cover increased until 2018 and decreased between 2018 and 2019 (see Table 4-169). The absolute percent vegetative cover of Pond 40 South in 2019 was greater than the values observed at the reference vernal pools and thatch cover was lower (see Table 4-170).

Table 4-169. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998	72.7%	27.1%
2016	66.7%	33.9%
2018	51.9%	50.3%
2019	78.6%	22.6%

Table 4-170. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
40 South	**78.6%**	**22.6%**

Species richness increased between 1998 and 2019 at Pond 40 South. Species richness on transects was 21, 20, 32, and 41 species in 1998, 2016, 2018, and 2019 respectively, whereas overall basin species richness was 27, 55, and 75 species in 2016, 2018, and 2019, respectively (see Table 4-171 and Appendix B Table B-15). The 1998 survey was limited to species on the transect and overall basin species richness was not recorded. Pond 40 South species richness was within the range observed on transects at the reference vernal pools but below the ranges observed for the entire basin (see Table 4-172 and Appendix G Tables G-27 and G-54).

Species composition in Pond 40 South varied between monitoring years, and the dominant species were different. The dominant species were iris-leaved rush (*Juncus xiphioides*) in 1998, Italian rye grass (*Festuca perennis*) in 2016, and cut-leaved plantain *(Plantago coronopus*) and Italian rye grass co-dominance in 2018. In 2019, Italian ryegrass and Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*) were the dominant species. Pale spikerush (*Eleocharis macrostachya*) and cut-leaved plantain were present at moderate cover in all four years. A complete comparison of species composition observed at Pond 40 South in 1998, 2016, and 2018 can be found in Appendix H. Figure 4-86 shows a subset of this comparison for species observed with a 2% cover or greater.

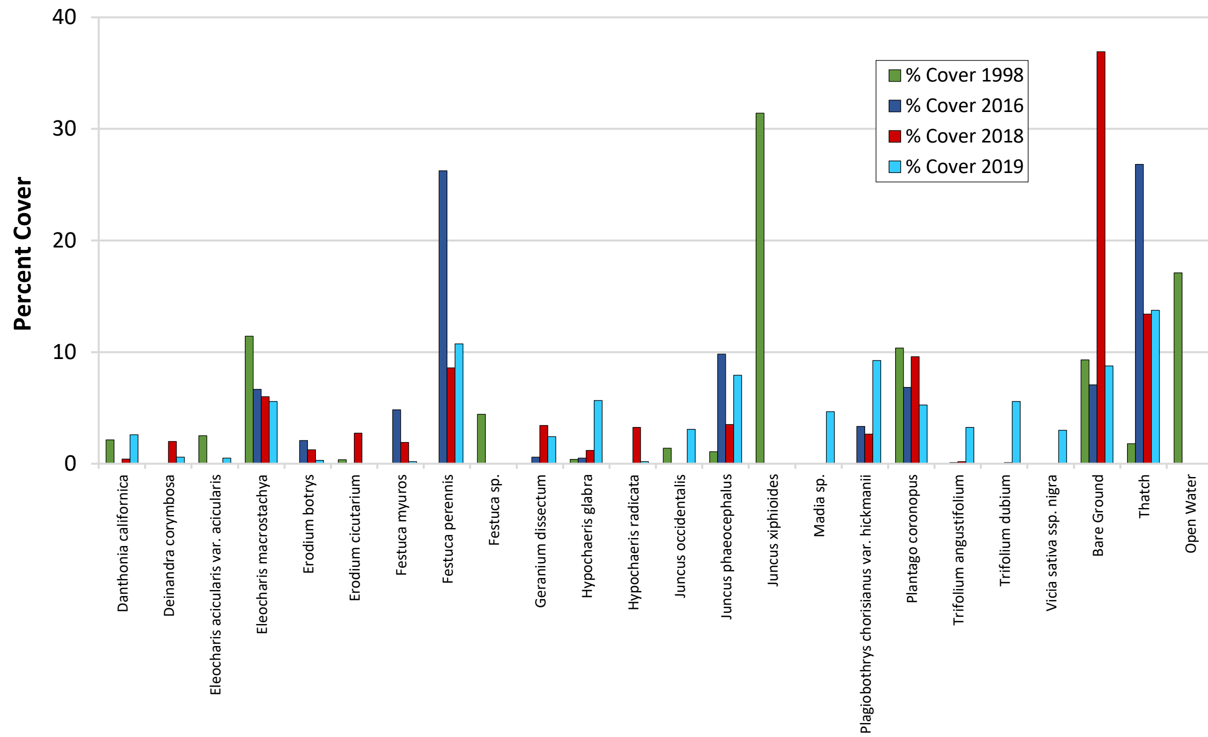

Figure 4-86. Percent Cover of Dominant Species at Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation)

Native species richness on Pond 40 South transects has been variable across monitoring years. Between 1998 and 2016 there was a decrease in native species and an increase in non-native species. (see Table 4-171). Pond 40 South native species richness in 2019 was less than the values observed in the reference pools, whereas non-native species richness was slightly greater (see Table 4-172). The relative percent cover of native species and non-native species was within the range of previous years (see Table 4-173). However, Pond 40 South was well below the range of native relative percent cover at the reference vernal pools in 2019 and above the range of non-native relative percent cover (see Table 4-174). Similar 2016 baseline values suggest that these patterns are not likely an effect of remediation.

Table 4-171. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998	12	6	3
2016	5	14	1
2018	9	22	1
2019	17	23	1

Table 4-172. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
40 South	**17**	**23**	**1**

Table 4-173. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1998	75.7%	15.7%	8.5%
2016	30.1%	69.0%	0.9%
2018	29.4%	70.5%	0.2%
2019	41.5%	52.6%	5.9%

Table 4-174. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
40 South	**41.5%**	**52.6%**	**5.9%**

Wetland and non-wetland species richness on Pond 40 South transects increased between 1998 and 2019 (see Table 4-175). The relative percent cover of wetland species decreased from 1998 to 2019, whereas non-wetland species cover increased (see Table 4-177). The wetland species richness and relative percent cover at Pond 40 South were less than the values observed at the reference vernal pools (see Table 4-176 and Table 4-178). However, the non-wetland species richness and relative percent cover were within ranges observed at the reference vernal pools in 2019.

Table 4-175. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998	4	4	3	1	0	9
2016	3	2	3	5	1	6
2018	3	5	6	7	2	9
2019	4	6	5	8	2	16

Table 4-176. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
40 South	**4**	**6**	**5**	**8**	**2**	**16**

Table 4-177. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998	62.6%	4.9%	18.6%	0.2%	0.0%	13.8%
2016	15.3%	14.9%	50.1%	14.8%	1.1%	3.9%
2018	17.2%	9.3%	36.6%	14.9%	2.2%	19.7%
2019	19.7%	15.7%	24.9%	9.7%	3.9%	26.1%

Table 4-178. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
40 South	**19.7%**	**15.7%**	**24.9%**	**9.7%**	**3.9%**	**26.1%**

4.15.2.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 40 South was dominated by non-native and wetland plant species during year 2 post-burn and year 1 post-subsurface munitions remediation monitoring in 2019. Pond 40 South wetland vegetation results were generally within range of baseline and/or reference vernal pools, however non-native species richness and cover in 2019 was greater than the reference vernal pools.

4.15.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 40 South, a post-burn and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for years 2 and 1, respectively, in 2019. The species composition, richness, and native and wetland species relative abundances were similar to baseline in 2016 but Pond 40 South was different from the reference vernal pools in regard to non-native species richness and relative percent cover. Non-native species richness increased between 2016 and 2019 and should be closely monitored in future years. Pond 40 South provided suitable wetland habitat in 2019.

4.15.3 Wildlife Monitoring

Wildlife data were collected at Pond 40 South in 1998, 2016, and 2019 (HLA, 1998; Burleson, 2017). California tiger salamander larvae were not detected in 2019 or any previous year. Fairy shrimp were detected in 2019. Table 4-179 shows historic wildlife monitoring results.

Table 4-179. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998	Not detected	Not detected
2016	Not detected	Not detected
2019	Not detected	Moderate (13, 12)

4.15.3.1 *Data Quality Objective 1*

Pond 40 South provided suitable depth for CTS but not fairy shrimp as discussed in Section 4.15.1.1.

4.15.3.2 *Data Quality Objective 4*

Fairy shrimp were detected at Pond 40 South in 2019, whereas CTS were not detected. The water quality was adequate. Compared to other vernal pools and previous Pond 40 South data, the water quality data were within normal ranges. The pH ranged from 6.55 in February to 6.80 in March with a mean of 6.70. Temperature ranged from 7.58°C in February to 17.36°C in March with a mean of 12.86°C. Dissolved oxygen ranged from 3.30 mg/L in April to 9.75 mg/L in March with a mean of 6.89 mg/L. Turbidity ranged from 3.3 FNU in April to 381.0 FNU in February with a mean of 134.5 FNU (see Table 3-56).

4.15.3.3 *Data Quality Objective 5*

California tiger salamanders were not detected in 2019, which was consistent with baseline monitoring. California tiger salamanders were not detected in 1998 or 2016.

Fairy shrimp were present in 2019, which was not consistent with baseline monitoring. Fairy shrimp were not detected in 1998 or 2016. It was possible survey timing prevented detection in 2016 because surveys occurred later in the year (April and May).

4.15.3.4 *Performance Standard: Wildlife Usage*

Pond 40 South, a post-burn and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for years 1 and 2. Fairy shrimp were present in 2019 but not baseline, likely because the 2016 survey occurred too late in the season to detect fairy shrimp (April and May). It is unclear why fairy shrimp were not detected in 1998. The vernal pool was on track to meet DQOs 4 and 5. Depths were not suitable for fairy shrimp habitat according to DQO 1; however, the species was present.

4.15.4 Conclusion

Pond 40 South, a post-burn and post-subsurface munitions remediation vernal pool, was in years 2 and 1 of monitoring in 2019. The vernal pool was on track to meet the plant cover and species diversity performance standard but was partially on track to meet hydrological conditions and wildlife usage (see Table 4-180). This is due to the vernal pool drying before the required hydrological conditions for fairy shrimp habitat were met. However, fairy shrimp were detected in Pond 40 South in 2019. Pond 40 South will continue to be monitored in the future.

Table 4-180. Success at Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	Partially on track*
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	Partially on track*
	DQO 4	On track
	DQO 5	On track

*Fairy shrimp depth requirements were not met in 2019, but the species was present.

4.16 Pond 43 – Year 2 and Year 1

Pond 43 was monitored in 2019 as a year 2 post-burn and year 1 post-subsurface munitions remediation vernal pool. Pond 43 was monitored for baseline conditions in 1998, 2000, 2015, and 2016. Vegetation in Pond 43 and within its watershed was burned in October 2017 as part of the prescribed burn of BLM Area B Subunit B. Pond 43 had intrusive anomaly investigations in 2018. Table 4-181 summarizes the years that monitoring occurred and surveys conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 43 (see Figure 4-87). The 1997-1998, 2015-2016, and 2018-2019 water-years were above-normal, whereas the 1999-2000, 2014-2015, and 2017-2018 water-years were below-normal.

Table 4-181. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year					
	1997-1998	1999-2000	2014-2015	2015-2016	2017-2018	2018-2019
Hydrology	●	●	●	●	●	●
Vegetation	●			●	●	●
Wildlife	●	●		●		●

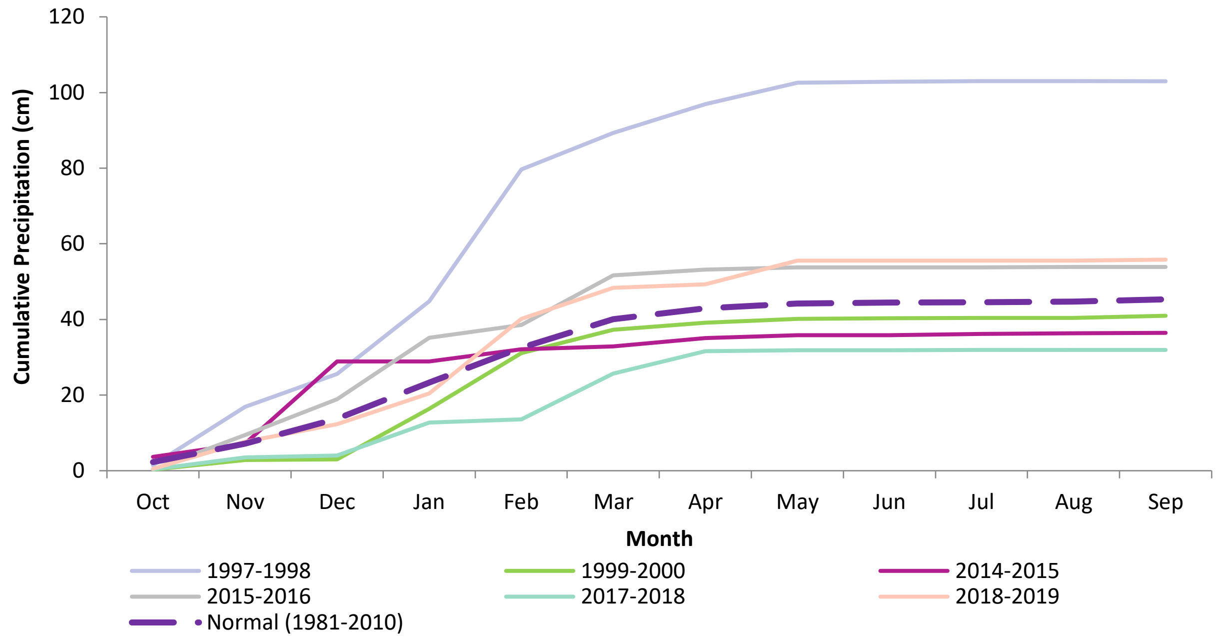

Figure 4-87. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.16.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 43 was 0.06 acres with a maximum depth of approximately 34 cm. The depth values were within range of previously recorded values, whereas inundation was slightly greater (see Appendix F Table F-16). Pond 43 was inundated from the first recorded monitoring in January through April. Figure 4-88 illustrates the relationship of precipitation and depth at Pond 43 for 2019 as well as baseline in 2016.

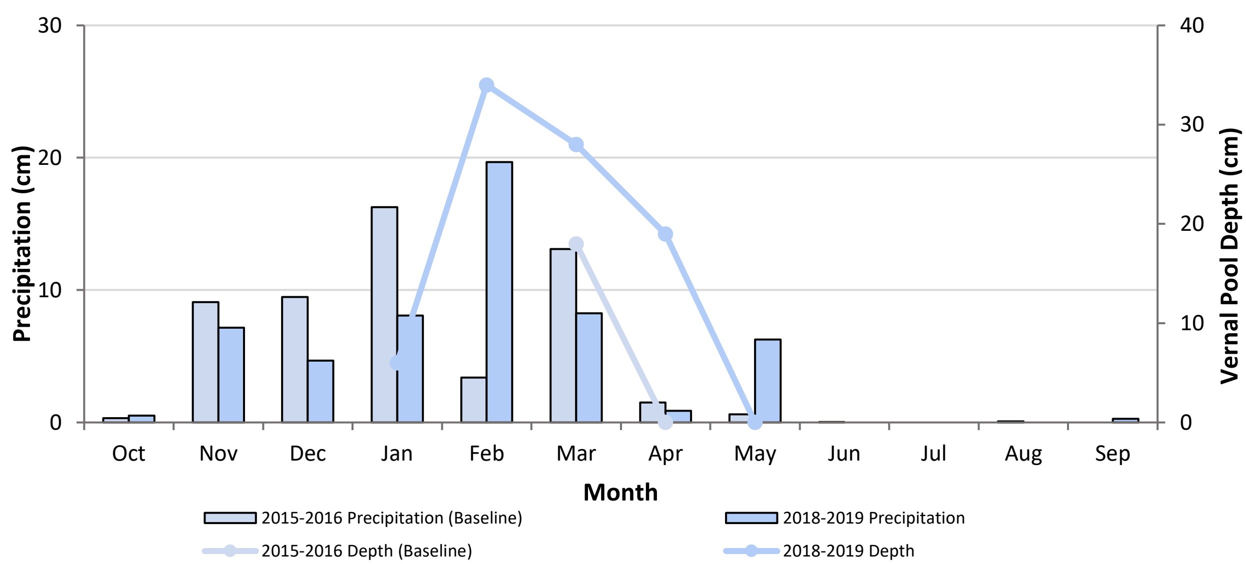

Figure 4-88. Monthly Depth and Precipitation at Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) for 2018-2019 Water-Year Compared to Baseline 2015-2016 Water-Year

In below-normal precipitation years, Pond 43 is likely to remain dry. In a normal precipitation year, Pond 43 could have a maximum depth of 0-25 cm and a maximum inundation of 0-0.04 acres. In above-normal precipitation years, Pond 43 could have maximum depths of 36 cm or more and a maximum inundation up to 0.06 acres (see Appendix F Table F-16). Figure 4-89 illustrates historic vernal pool depths by month and organized by water-year.

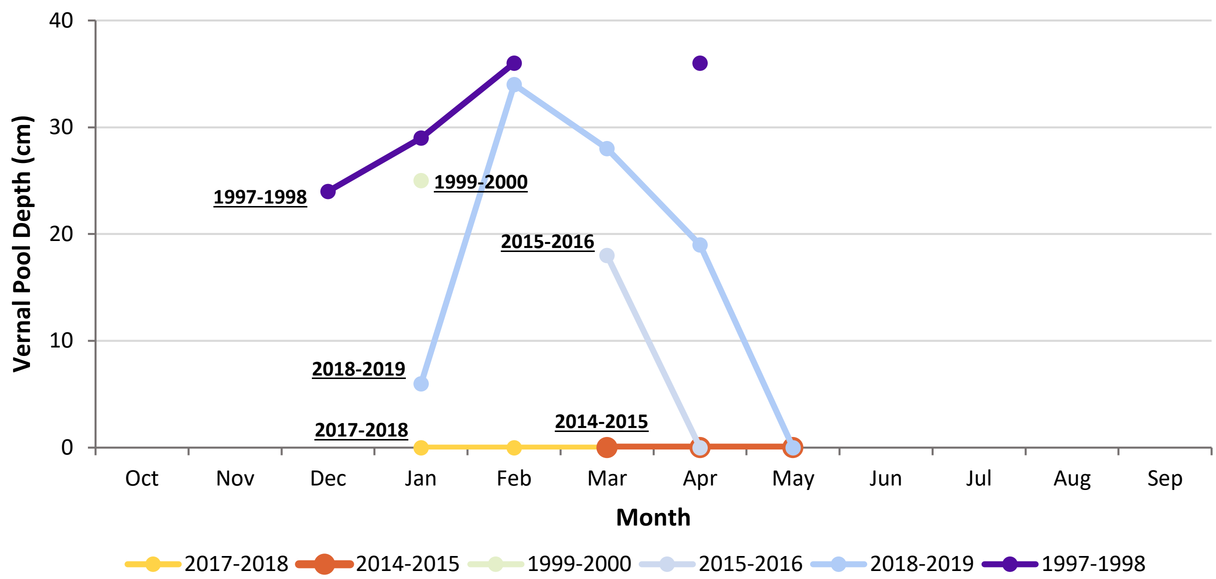

Figure 4-89. Historic Monthly Depths at Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

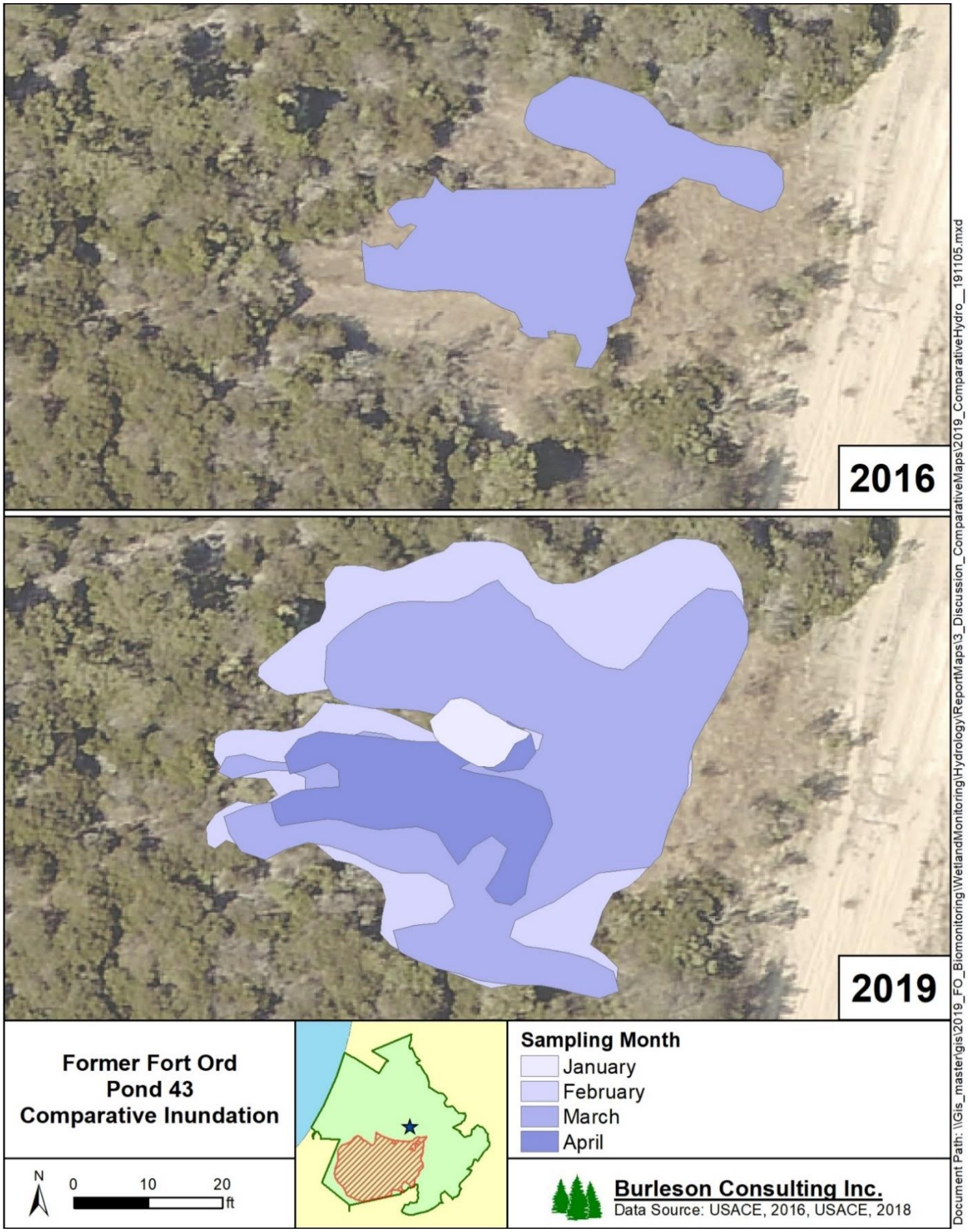

Figure 4-90. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Inundations for 2015-2016 (above-normal precipitation) and 2018-2019 (above-normal precipitation). The vernal pool was burned in 2017, had subsurface munitions remediation in 2018, and was in years 2 and 1 of monitoring in 2019.

4.16.1.1 *Data Quality Objective 1*

Pond 43 did not meet the required average depths of 25 cm from the first rain event through March for CTS or 10 cm for 18 consecutive days through May for fairy shrimp. Pond 43 did not provide sufficient depth for CTS (23 cm through March) or fairy shrimp (22 cm through April). Despite providing greater than 10 cm depth, the vernal pool was dry by the May survey and did not meet the DQO for fairy shrimp. Recorded depths indicate that DQO 1 was likely met in 1998 and 2000 although monitoring did not continue into May for 1998 and depth data were only collected in January 2000. Pond 43 depths in 2019 were below those observed at reference Ponds 5 and 101 East (East), but higher than those at 997.

4.16.1.2 *Data Quality Objective 2*

Pond 43 had a similar inundation range as in 1998, 2000, and 2016. Pond 43 was inundated January through April with an inundation range of 0.002-0.06 acres and a mean of 0.03 acres. Pond 43 was inundated 0.04 acres in 1998, 0.04 acres in 2000, and 0.02 acres in April 2016 but was dry in 2015 and 2018. Pond 43 is a small vernal pool that is likely to fill in a normal or above-normal water-year. In a drought year, the vernal pool may remain dry or dry quickly (see Figure 4-89). Pond 43 had a similar inundation range and timing as Pond 997, both were inundated January/February through April and had small inundation areas.

4.16.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 43, a post-burn and post-subsurface munitions remediation vernal pool, was not on track to meet the performance standard for year 1 and 2 in 2019. Pond 43 did not meet DQO 1. Evaluation of DQO 2 indicated that Pond 43 was similar to itself in previous monitoring years and reference Pond 997. Pond 43 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.16.2 Vegetation Monitoring

Vegetation data were collected at Pond 43 in 1998, 2016, 2018, and 2019 (HLA, 1998; Burleson, 2017, 2019). In 1998, data were collected along one transect with a length of 75 feet. Quadrats were placed at 10-foot intervals, alternating from right to left along the transect. Because 1998 data were collected differently than in other years, strata were combined across the vernal pool to allow for comparison to other years. In 2016, 2018, and 2019, data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2019 were compared stratum-to-stratum in Table 4-182 as well as visually in Figure 4-91.

Table 4-182. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2019
1	19%	19%
2	50%	67%
3	27%	14%
Upland	3%	N/A

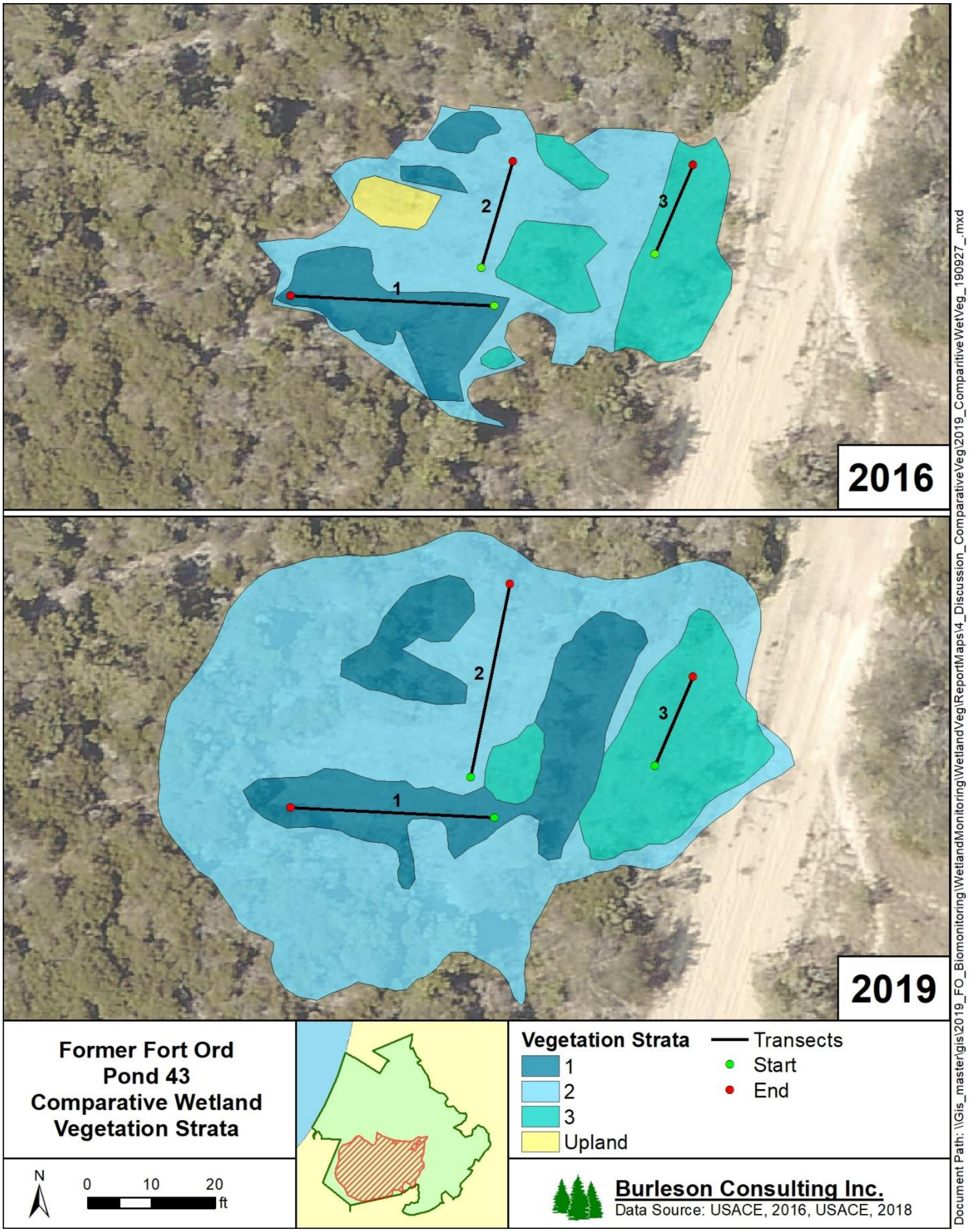

Figure 4-91. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2016 and 2019

Absolute percent vegetative cover and thatch/bare ground cover were most similar to the 2016 baseline values (see Table 4-183). The absolute percent vegetative cover of Pond 43 in 2019 was less than the values observed at the reference vernal pools in 2019 and thatch/bare ground cover was more (see Table 4-184).

Table 4-183. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998	55.9%	54.4%
2016	66.5%	33.3%
2018	56.1%	44.1%
2019	63.9%	37.3%

Table 4-184. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
43	**63.9%**	**37.3%**

Species richness increased between 1998 and 2019 at Pond 43. Species richness on transects was 22, 24, 37, and 45 species in 1998, 2016, 2018, and 2019 whereas overall basin species richness was 35, 51, and 103 species in 2016, 2018, and 2019, respectively (see Table 4-185 and Appendix B Table B-15). The 1998 survey was limited to species on the transect and overall basin species richness was not recorded. Pond 43 species richness was within the range observed on transects at the reference vernal pools but greater than the values observed for the entire basin (see Table 4-186 and Appendix G Tables G-27 and G-54).

Species composition and dominant species at Pond 43 were different across monitoring years. Flowering quillwort (*Triglochin scilloides*) was the dominant species in 1998, Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*) was the dominant species in 2016, and brown-headed rush (*Juncus phaeocephalus*) and rabbitfoot grass (*Polypogon monspeliensis*) were the dominant species in 2018 and 2019. A complete comparison of species composition observed at Pond 43 in 1998, 2016, 2018, and 2019 can be found in Appendix H. Figure 4-92 shows a subset of this comparison for species observed with a 2% cover or greater.

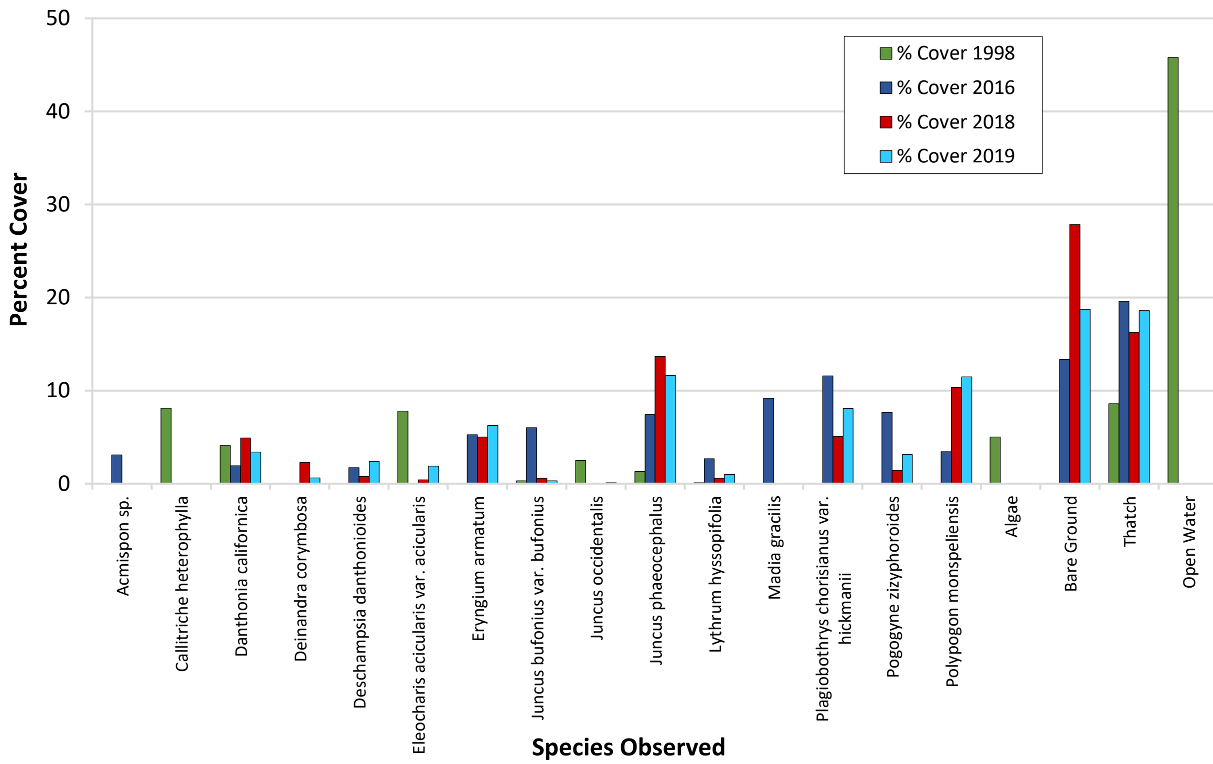

Figure 4-92. Percent Cover of Dominant Species at Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation)

Native species richness on Pond 43 transects increased between 1998 and 2019 (see Table 4-185). Native species richness was greater than the values observed at the reference vernal pools, whereas non-native species richness was within the range observed at the reference vernal pools (see Table 4-186). The relative percent cover of native species increased slightly from 2018 but was still below the values observed in baseline years, whereas the relative percent cover of non-native species has decreased from 2018 but is greater than the values observed in baseline years (see Table 4-187). Pond 43 was within the range of native and non-native relative percent cover values observed at the reference vernal pools in 2019 and was most similar to reference Pond 5 (see Table 4-188).

Table 4-185. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998	13	7	2
2016	13	8	2
2018	22	14	1
2019	30	14	1

Table 4-186. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
43	**30**	**14**	**1**

Table 4-187. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1998	83.7%	4.5%	11.8%
2016	80.3%	14.9%	4.8%
2018	71.2%	28.7%	0.1%
2019	73.2%	26.7%	0.1%

Table 4-188. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
43	**73.2%**	**26.7%**	**0.1%**

Wetland species richness on Pond 43 transects increased between 1998 and 2019. Non-wetland species richness decreased from 2018 but is slightly greater than the values observed in the baseline years (see Table 4-189). Relative percent cover of wetland species also increased from 1998 to 2019. Non-wetland species relative percent cover followed a similar trend as observed with richness; a slight decrease from 2018 but greater than the values observed in the baseline years (see Table 4-191). The wetland species richness was greater than the values observed at the reference vernal pools and non-wetland species richness was slightly lower (see Table 4-190). Relative percent cover values were within the ranges observed at the reference vernal pools in 2019 (see Table 4-192).

Table 4-189. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998	6	5	4	1	0	6
2016	4	6	3	3	0	7
2018	7	8	6	6	0	10
2019	8	10	7	5	0	15

Table 4-190. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
43	**8**	**10**	**7**	**5**	**0**	**15**

Table 4-191. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998	64.6%	8.6%	8.6%	0.2%	0.0%	18.1%
2016	34.2%	36.0%	4.1%	3.8%	0.0%	21.9%
2018	16.5%	57.2%	13.1%	5.1%	0.0%	8.2%
2019	24.2%	56.3%	6.6%	4.8%	0.0%	8.1%

Table 4-192. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
43	**24.2%**	**56.3%**	**6.6%**	**4.8%**	**0.0%**	**8.1%**

4.16.2.1 *Vernal Pool Bent Grass*

Vernal pool bent grass was identified at Pond 43 for the first time in 2019 (see Section 3.16.2.1). This species is listed as a 1B-1 seriously endangered plant in California (CNPS, 2013). Vernal pool bent grass was first identified and described as a new species in 2011 and only occurs at vernal pools in Monterey County (Peterson *et al*., 2011). Vernal pool bent grass has been documented at Ponds 3 North, 3 South, 42, 44, 61, 73, 997, 101 East (East), and Machine Gun Flats on former Fort Ord.

4.16.2.2 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 43 was dominated by native and wetland plant species during year 2 post-burn and year 1 post-subsurface munitions remediation monitoring in 2019. Pond 43 wetland vegetation results were generally within range of baseline and/or reference vernal pools, however native species richness in 2019 was greater than baseline and the reference vernal pools.

4.16.2.3 *Performance Standard: Plant Cover and Species Diversity*

Pond 43, a post-burn and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for years 2 and 1, respectively, in 2019. The species composition, richness, and native and wetland species relative abundances were similar to baseline and/or reference vernal pool conditions, however native species richness was greater than baseline and reference. Pond 43 provided suitable wetland habitat in 2019.

4.16.3 Wildlife Monitoring

Wildlife data were collected at Pond 43 in 1998, 2000, 2016, and 2019 (HLA, 1998, 2000; Burleson, 2017). California tiger salamander larvae were not detected in any survey year. Fairy shrimp were detected in 1998 and 2019. Table 4-193 shows historic wildlife monitoring results.

Table 4-193. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998	Not detected	Moderate
2000	Not detected	Not detected
2016	Not detected	Not detected
2019	Not detected	High (135, 210)

4.16.3.1 *Data Quality Objective 1*

Pond 43 did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.16.1.1.

4.16.3.2 *Data Quality Objective 4*

Fairy shrimp were detected at Pond 43 in 2019, whereas CTS were not detected. The water quality was adequate. Compared to other vernal pools and previous Pond 43 data, the water quality data were within normal ranges. The pH ranged from 6.83 in February to 7.47 in April with a mean of 7.12. Temperature ranged from 10.59°C in February to 20.00°C in April with a mean of 15.02°C. Dissolved oxygen ranged from 8.73 mg/L in March to 9.93 mg/L in April with a mean of 9.19 mg/L. Turbidity ranged from 1.0 FNU in April to 35.0 FNU in February with a mean of 13.5 FNU (see Table 3-60).

4.16.3.3 *Data Quality Objective 5*

California tiger salamanders were not detected in 2019, which was consistent with baseline monitoring. California tiger salamanders were not detected in 1998, 2000, or 2016.

Fairy shrimp were present in 2019. Baseline monitoring results varied by year. Fairy shrimp were detected in 1998, but not in 2000 or 2016. It was possible survey timing prevented detection in 2016 because surveys occurred later in the year (April and May).

4.16.3.4 *Performance Standard: Wildlife Usage*

Pond 43, a post-burn and post-subsurface munitions remediation vernal pool, was partially on track to meet the performance standard for years 1 and 2. The vernal pool was on track to meet DQOs 4 and 5. Depths were not suitable for CTS or fairy shrimp habitat according to DQO 1; however, fairy shrimp were present.

4.16.4 Conclusion

Pond 43, a post-burn and post-subsurface munitions remediation vernal pool, was in years 2 and 1 of monitoring in 2019. The vernal pool was on track to meet the plant cover and species diversity performance standard but was partially on track to meet hydrological conditions and wildlife usage (see Table 4-194). This is due to the vernal pool not providing an average depth appropriate for CTS habitat and drying before the required hydrological conditions for fairy shrimp habitat. However, fairy shrimp were detected in Pond 43. Pond 43 will continue to be monitored in the future.

Table 4-194. Success at Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	Not on track*
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	Not on track*
	DQO 4	On track
	DQO 5	On track

*Fairy shrimp and CTS depth requirements were not met in 2019, but fairy shrimp were present.

4.17 Pond 35 – Year 2 and Year 1

Pond 35 was monitored in 2019 as a year 2 post-mastication and year 1 post-subsurface munitions remediation vernal pool. Pond 35 was monitored for baseline conditions in 1992, 1994, 1995, 1996, 2015, and 2016. Vegetation within the Pond 35 watershed was masticated in summer of 2017 in preparation for a prescribed burn of BLM Area B Subunit B. Vegetation within and immediately around Pond 35 was not burned, although parts of the Pond 35 watershed were burned in October 2017. Pond 35 had intrusive anomaly investigations in 2018. Table 4-195 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 35 (see Figure 4-93). The 1994-1995, 1995-1996, 2015-2016, and 2018-2019 water-years were either normal or above-normal, whereas all other monitoring was conducted during a below-normal water-year, drought year, or consecutive drought year.

Table 4-195. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year							
	1991-1992	1993-1994	1994-1995	1995-1996	2014-2015	2015-2016	2017-2018	2018-2019
Hydrology	●	●	●	●	●	●	●	●
Vegetation		●	●	●		●	●	●
Wildlife		●	●	●				●

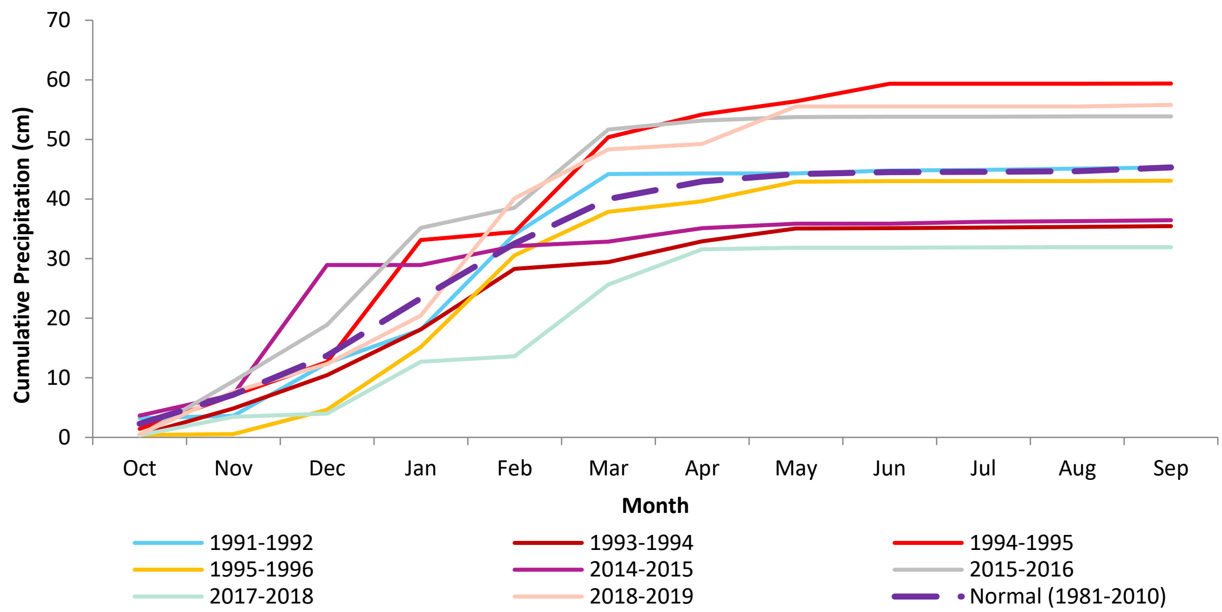

Figure 4-93. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.17.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 35 was 0.42 acres with a maximum depth of approximately 88 cm. The depth values were within range of previously recorded values, whereas the maximum inundation was greater (see Appendix F Table F-17). Pond 35 was inundated from February through April. Figure 4-94 illustrates the relationship of precipitation and depth at Pond 35 for 2019 as well as baseline in 2016.

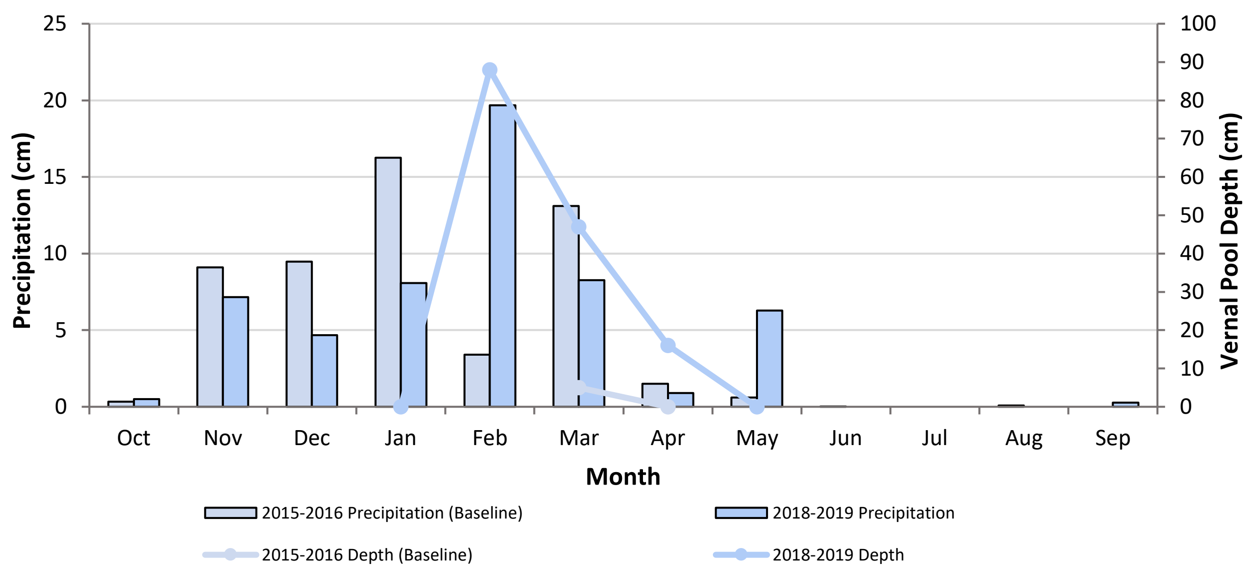

Figure 4-94. Monthly Depth and Precipitation at Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) for 2018-2019 Water-Year Compared to Baseline 2015-2016 Water-Year

In below-normal precipitation years, Pond 35 is likely to range from 0-61 cm in depth. In normal precipitation years, Pond 35 is likely to have a maximum depth of approximately 90 cm. In above-normal precipitation years, Pond 35 could have maximum depths of 102 cm and a maximum inundation of 0.42 acres (see Appendix F Table F-17). Two historic inundations were recorded: 0.20 acres on March 15, 1994 and 0.001 acres on March 31, 2016. Figure 4-95 illustrates historic vernal pool depths by month and organized by water-year.

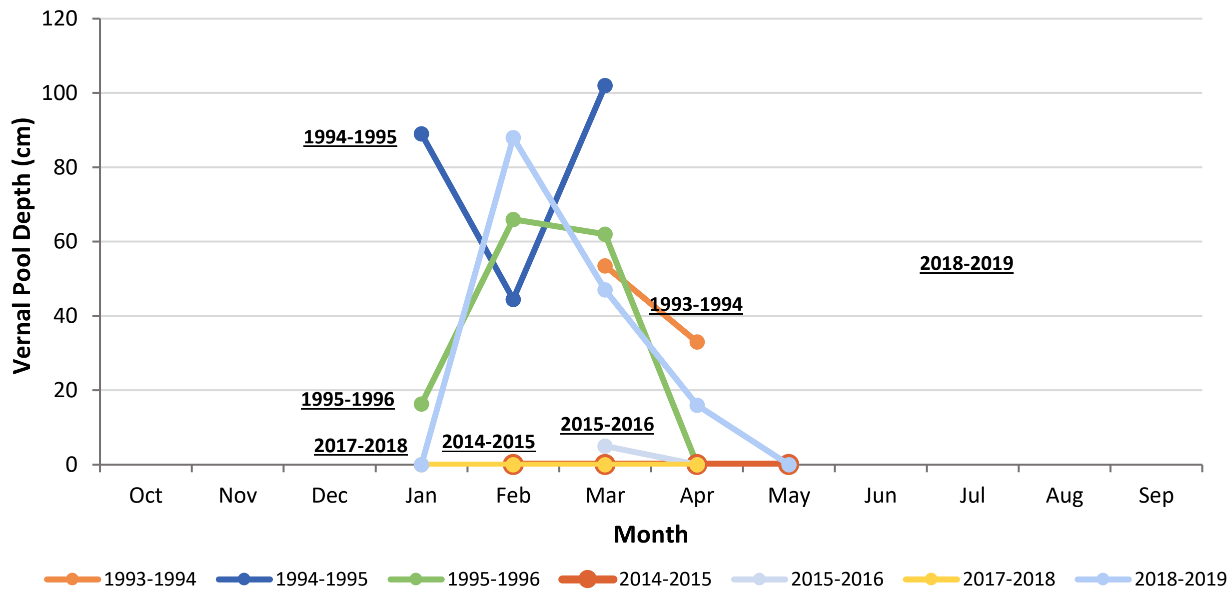

Figure 4-95. Historic Monthly Depths at Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

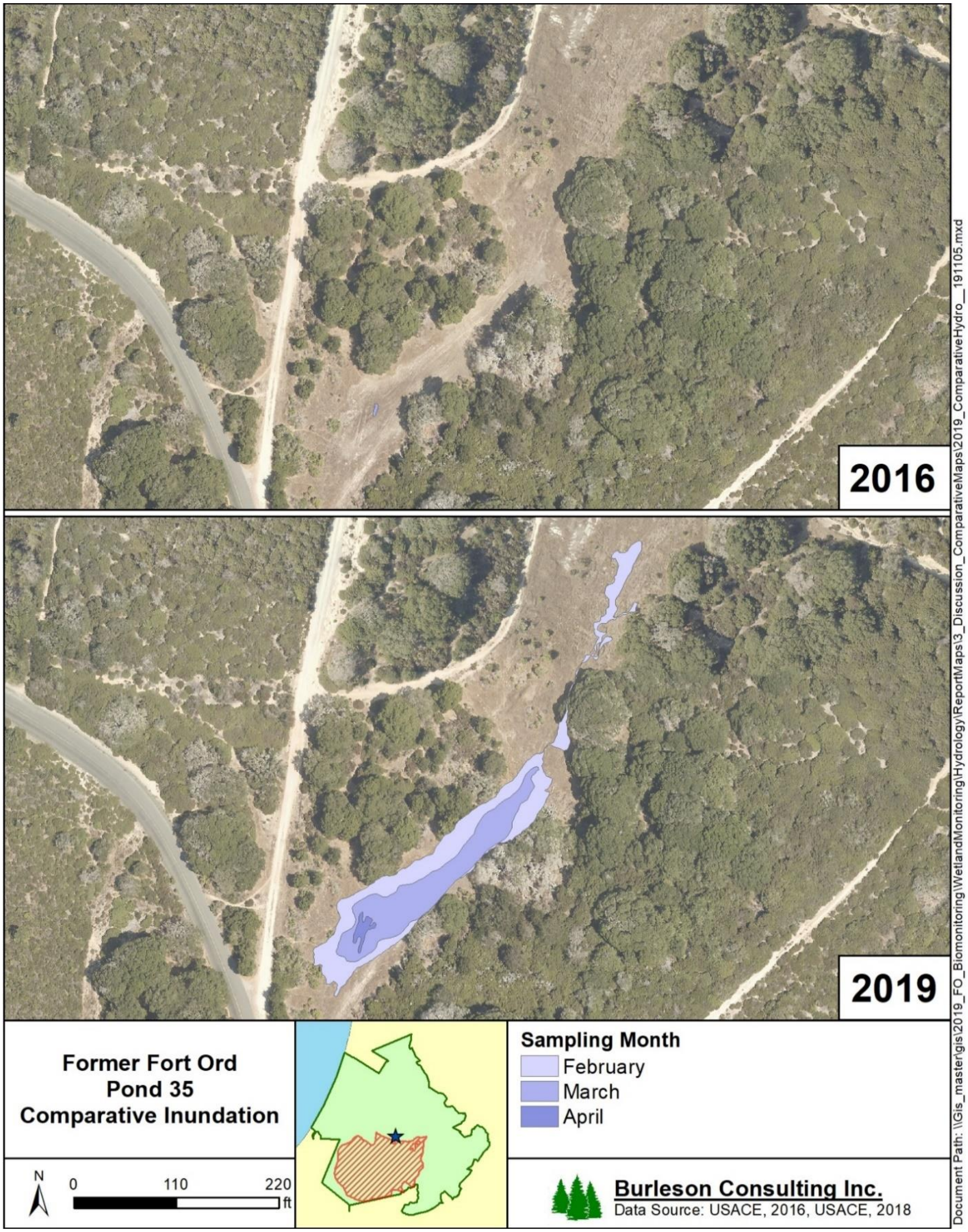

Figure 4-96. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Inundations for 2015-2016 (above-normal precipitation) and 2018-2019 (above-normal precipitation). The vernal pool was masticated in 2017, had subsurface munitions remediation in 2018, and was in years 2 and 1 of monitoring in 2019.

4.17.1.1 *Data Quality Objective 1*

Pond 35 met the required average depths of 25 cm from the first rain event through March for CTS but not 10 cm for 18 consecutive days through May for fairy shrimp. Pond 35 provided sufficient depth for CTS (68 cm through March) but did not provide sufficient depth for fairy shrimp (50 cm through April). Despite providing greater than 10 cm depth, the vernal pool was dry by the May survey and did not meet the DQO for fairy shrimp. Recorded depths indicate that DQO 1 was met only for CTS in 1996 but was likely met for both CTS and fairy shrimp in 1994 and 1995 although monitoring did not continue into May for either year. Pond 35 depths were similar to reference vernal pools 5 and 101 East (East); however, the pool dried earlier than either reference pools vernal pool.

4.17.1.2 *Data Quality Objective 2*

Pond 35 had a larger inundation range than in previous years. Pond 35 was inundated February through April with an inundation range of 0.01-0.42 acres and a mean of 0.21 acres. Pond 35 was inundated in 1994, 1995, 1996, and 2016 but was dry in 2015 and 2018. There is limited historic data; however, acreage was recorded as 0.20 acres in March 1994 and 0.001 acres in March 2016. Pond 35 is a small vernal pool that is likely to fill in a normal or above-normal water-year. In a drought year, the vernal pool may remain dry or dry quickly (see Figure 4-95). Pond 35 had a similar inundation range and timing as Pond 997, both were inundated February through April and had small inundation areas.

4.17.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 35, a post-mastication and post-subsurface munitions remediation, vernal pool, was not on track to meet the performance standard for year 1 and year 2 in 2019. Pond 35 only partially met DQO 1, providing suitable habitat for CTS but not fairy shrimp. Evaluation of DQO 2 indicated that Pond 35 was similar to reference Pond 997. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.17.2 Vegetation Monitoring

Vegetation data were collected at Pond 35 in 2016, 2018, and 2019 (Burleson, 2017, 2019). Data from 1994, 1995, and 1996 only represent dominant species and are not included in the following analyses because the data were collected using a different methodology than was used in more recent years (Jones and Stokes, 1996). In 2016, 2018, and 2019, data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2019 were compared stratum-to-stratum in Table 4-196 as well as visually in Figure 4-97.

Table 4-196. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2019
1	28%	13%
2	39%	29%
3	33%	5%
4	N/A	53%

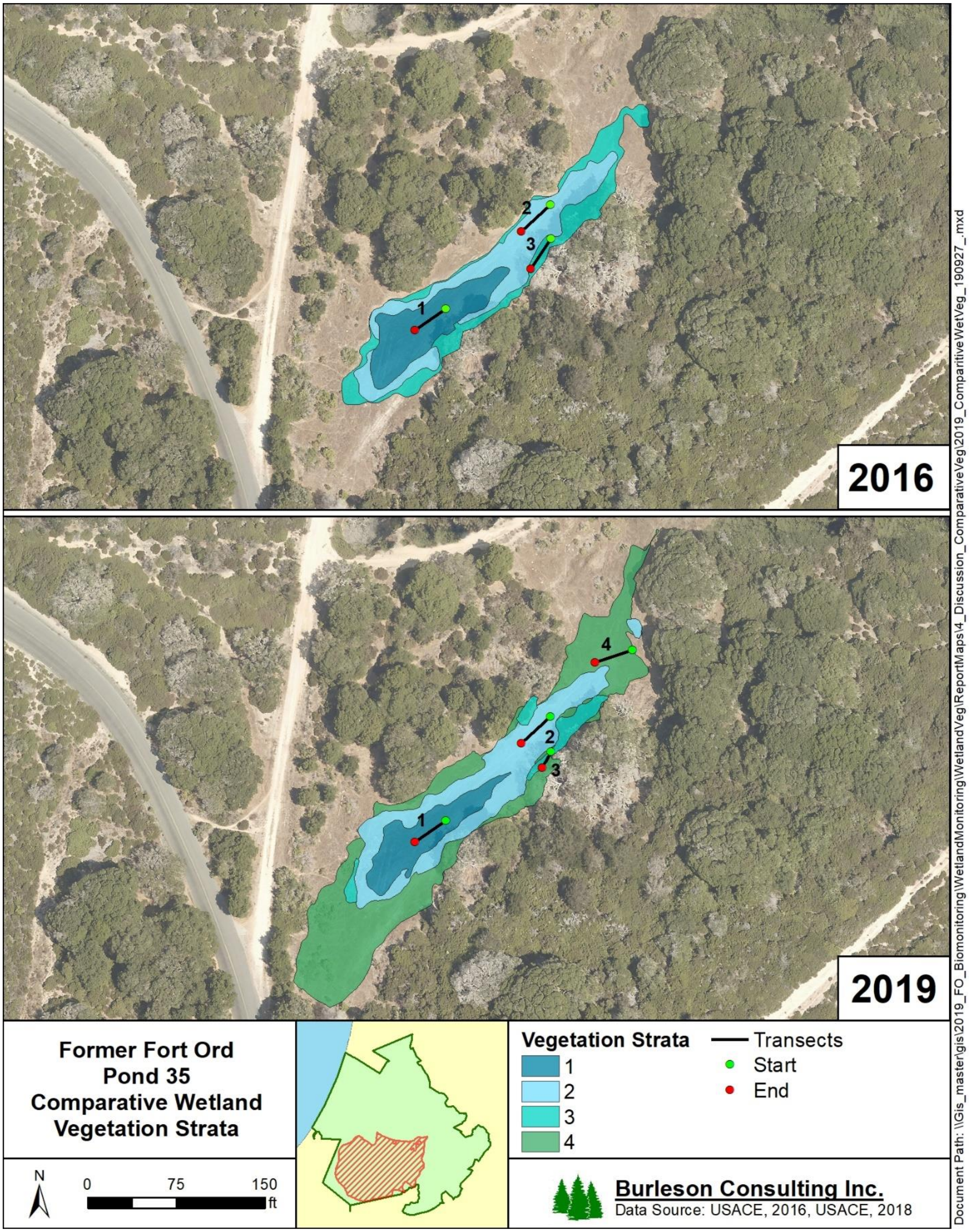

Figure 4-97. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2016 and 2019

Absolute percent vegetative and thatch/bare ground cover were within the range of values observed in previous years (see Table 4-197). The absolute percent vegetative cover of Pond 35 in 2019 was less than the values observed at the reference vernal pools and thatch/bare ground was greater (see Table 4-198).

Table 4-197. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2016	52.1%	48.9%
2018	74.3%	27.7%
2019	59.5%	39.8%

Table 4-198. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
35	**59.5%**	**39.8%**

Species richness on transects increased between 2016 and 2018 and decreased by 2019 at Pond 35, whereas the overall basin species richness increased between 2016 and 2019. Species richness on transects was 12, 38, and 25 species in 2016, 2018, and 2019, respectively, whereas overall basin species richness was 35, 64, and 79 species, respectively (see Table 4-199 and Appendix B Table B-17). Pond 35 species richness for transects as well as the overall basin was less than the values observed at the reference vernal pools (see Table 4-200 and Appendix G Tables G-27 and G-54).

Species composition at Pond 35 was similar across years, and the dominant species was either cut-leaved plantain (*Plantago coronopus*) or Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*) with fluctuations between years. Other dominant species included meadow barley (*Hordeum brachyantherum*) in 2016. A complete comparison of species composition observed at Pond 35 in 2016, 2018, and 2019, can be found in Appendix H. Figure 4-98 shows a subset of this comparison for species observed with a 2% cover or greater.

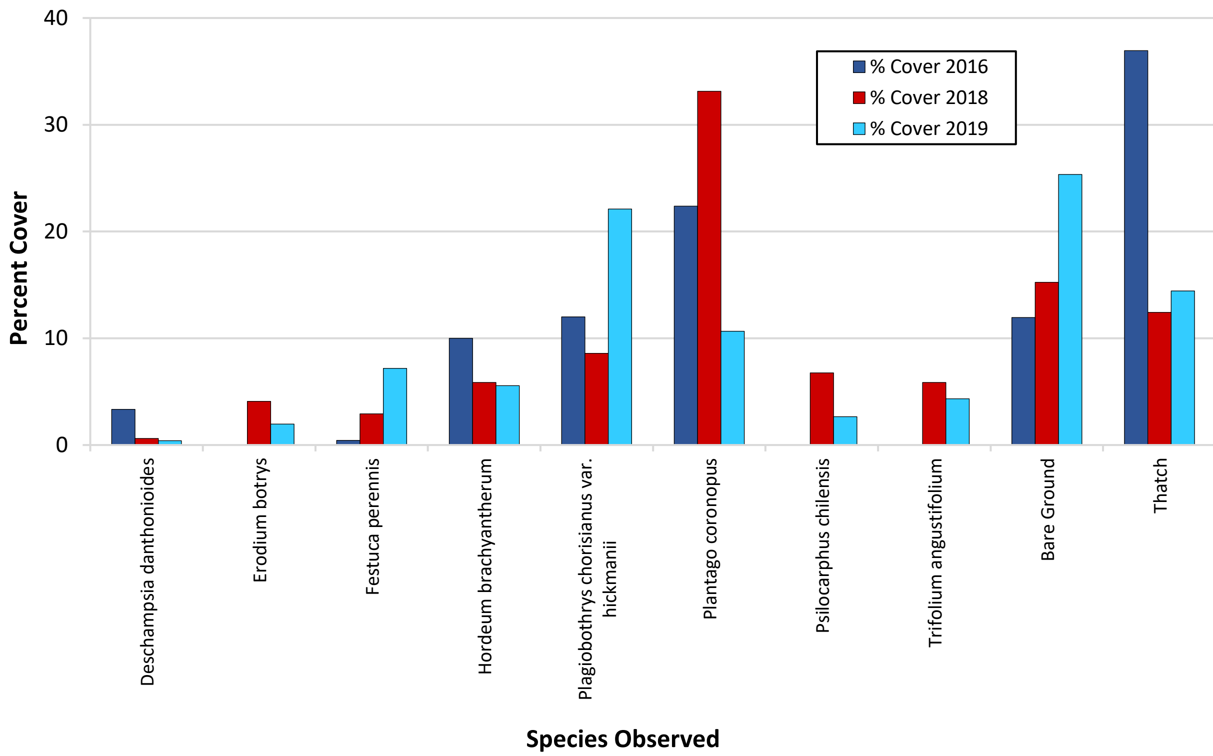

Figure 4-98. Percent Cover of Dominant Species at Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation)

Native species richness on Pond 35 transects more than doubled between 2016 and 2018 and then decreased by 2019. Non-native species richness almost quadrupled between 2016 and 2018, decreased by 2019, and remained higher than native species richness in 2019 (see Table 4-199). Pond 35 native species richness was less than the values observed at the reference vernal pools in 2019, and non-native species richness was in the range of values observed at the reference vernal pools (see Table 4-200). The relative percent cover of native species was very similar to baseline. Pond 35 native relative percent cover was less than the values observed at the reference vernal pools in 2019, whereas non-native relative percent cover values were greater than the range observed at the reference vernal pools (see Table 4-201 and Table 4-202).

Table 4-199. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2016	6	6	0
2018	14	23	1
2019	10	15	0

Table 4-200. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
35	**10**	**15**	**0**

Table 4-201. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2016	52.0%	48.0%	0.0%
2018	33.2%	66.7%	0.1%
2019	53.8%	46.2%	0.0%

Table 4-202. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
35	**53.8%**	**46.2%**	**0.0%**

Wetland and non-wetland species richness on Pond 35 transects increased between 2016 and 2018 then decreased by 2019 (see Table 4-203). The relative percent cover of wetland species increased from 2018 to 2019 but was still less than baseline (see Table 4-205). The wetland and non-wetland species richness at Pond 35 were within than the ranges observed at the reference vernal pools in 2019 (see Table 4-204 and Table 4-206).

Table 4-203. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2016	5	2	3	0	0	2
2018	7	5	6	7	0	13
2019	6	3	5	4	0	7

Table 4-204. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
35	**6**	**3**	**5**	**4**	**0**	**7**

Table 4-205. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2016	28.1%	25.6%	45.7%	0.0%	0.0%	0.5%
2018	14.4%	18.0%	50.8%	7.0%	0.0%	9.8%
2019	41.7%	14.5%	30.9%	4.0%	0.0%	9.0%

Table 4-206. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
35	**41.7%**	**14.5%**	**30.9%**	**4.0%**	**0.0%**	**9.0%**

4.17.2.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 35 was dominated by native and wetland plant species during year 2 post-mastication and year 1 post-subsurface munitions remediation monitoring in 2019. Pond 35 had higher non-native species richness compared to baseline and reference vernal pools; however, those non-native species comprised less cover than the native species in 2019.

4.17.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 35, a post-mastication and post-subsurface munitions remediation vernal pool, was generally on track to meet the performance standard for years 2 and 1, respectively, in 2019. Species composition, and native and wetland species relative abundances were similar to baseline in 2016 but Pond 35 was different from reference vernal pools in regard to non-native species richness and relative percent cover. Non-native species richness increased between 2016 and 2019 and should be closely monitored in future years. Non-native relative percent cover was similar to baseline conditions. Pond 35 provided suitable wetland habitat in 2019.

4.17.3 Wildlife Monitoring

Wildlife data were collected at Pond 35 in 1992, 1994, 1995, 1996, and 2019 (Jones and Stokes, 1992, 1996). California tiger salamander larvae were not detected in any previous survey year. Fairy shrimp were detected in 1994, 1995, 1996, and 2019. Table 4-207 shows historic wildlife monitoring results.

Table 4-207. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1992	Not detected	Not detected
1994	Not detected	Low-High
1995	Not detected	Moderate-High
1996	Not detected	Low (1)
2019	Not detected	Moderate (74, 50)

4.17.3.1 *Data Quality Objective 1*

Pond 35 provided suitable depth for CTS but not fairy shrimp as discussed in Section 4.17.1.1.

4.17.3.2 *Data Quality Objective 4*

Fairy shrimp were detected at Pond 35 in 2019, whereas CTS were not detected. The water quality was adequate. Compared to other vernal pools and previous Pond 35 data, the water quality data were within normal ranges. The pH ranged from 6.81 in April to 6.91 in February with a mean of 6.85. Temperature ranged from 7.64°C in February to 16.30°C in March with a mean of 12.61°C. Dissolved oxygen ranged from 2.35 mg/L in April to 8.48 mg/L in February with a mean of 5.48 mg/L. Turbidity ranged from 25.7 FNU in March to 193.0 FNU in February with a mean of 82.0 FNU (see Table 3-64

4.17.3.3 *Data Quality Objective 5*

California tiger salamanders were not detected in 2019, which was consistent with baseline monitoring. California tiger salamanders were not detected in 1992, 1994, 1995, or 1996.

Fairy shrimp were present in 2019, which was generally consistent with baseline monitoring. Fairy shrimp were detected in 1994, 1995, and 1996, but not in 1992.

4.17.3.4 *Performance Standard: Wildlife Usage*

Pond 35, a post-mastication and post-subsurface munitions remediation vernal pool, was partially on track to meet the performance standard for years 1 and 2. The vernal pool was on track to meet DQOs 4 and 5. Depths were not suitable for fairy shrimp habitat according to DQO 1; however, the species was present.

4.17.4 Conclusion

Pond 35, a post-mastication and post-subsurface munitions remediation vernal pool, was in years 2 and 1 of monitoring in 2019. The vernal pool was on track to meet the plant cover and species diversity performance standard but was partially on track to meet hydrological conditions and wildlife usage (see Table 4-208). This is due to the vernal pool drying before the required hydrological conditions for fairy shrimp habitat were met. However, fairy shrimp were detected in Pond 35. Pond 35 will continue to be monitored in the future.

Table 4-208. Success at Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	Partially on track*
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	Partially on track*
	DQO 4	On track
	DQO 5	On track

*Fairy shrimp depth requirements were not met in 2019, but fairy shrimp were present.

4.18 Pond 42 – Year 2 and Year 1

Pond 42 was monitored in 2019 as a year 2 post-mastication and post-burn and year 1 post-subsurface munitions remediation vernal pool. Vegetation in Pond 42 and within its watershed was masticated in the summer of 2018 and burned in October 2017 as part of the prescribed burn of BLM Area B Subunit B. Pond 42 had intrusive anomaly investigations in 2018. Pond 42 was first monitored for baseline in 1998. Following MEC remediation activities, Pond 42 was monitored annually from 2000 to 2003. Additional baseline surveys occurred in 2015 and 2017. Table 4-209 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 42 (see Figure 4-99). The above-normal water-years were 1997-1998, 2016-2017, and 2018-2019. Other monitoring years were below-normal water-year, drought year, or consecutive drought year.

Table 4-209. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year								
	1997-1998	1999-2000	2000-2001	2001-2002	2002-2003	2014-2015	2016-2017	2017-2018	2018-2019
Hydrology	●	●	●	●	●	●	●	●	●
Vegetation	●	●	●	●	●		●	●	●
Wildlife	●	●	●	●	●			●	●

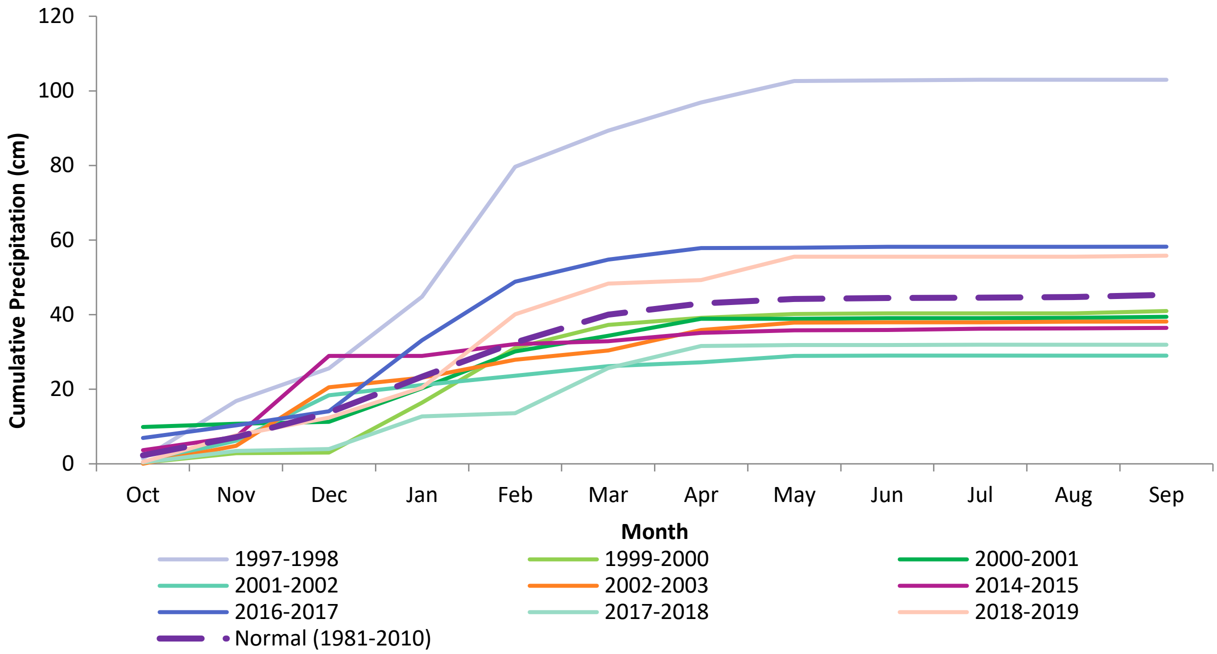

Figure 4-99. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.18.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 42 was 0.59 acres, with a maximum depth of approximately 64 cm. The depth and inundation values were within range of the previously recorded values (see Appendix F Table F-18). Pond 42 was inundated from January through June. Figure 4-100 illustrates the relationship of precipitation and depth at Pond 42 for 2019 as well as baseline in 2016.

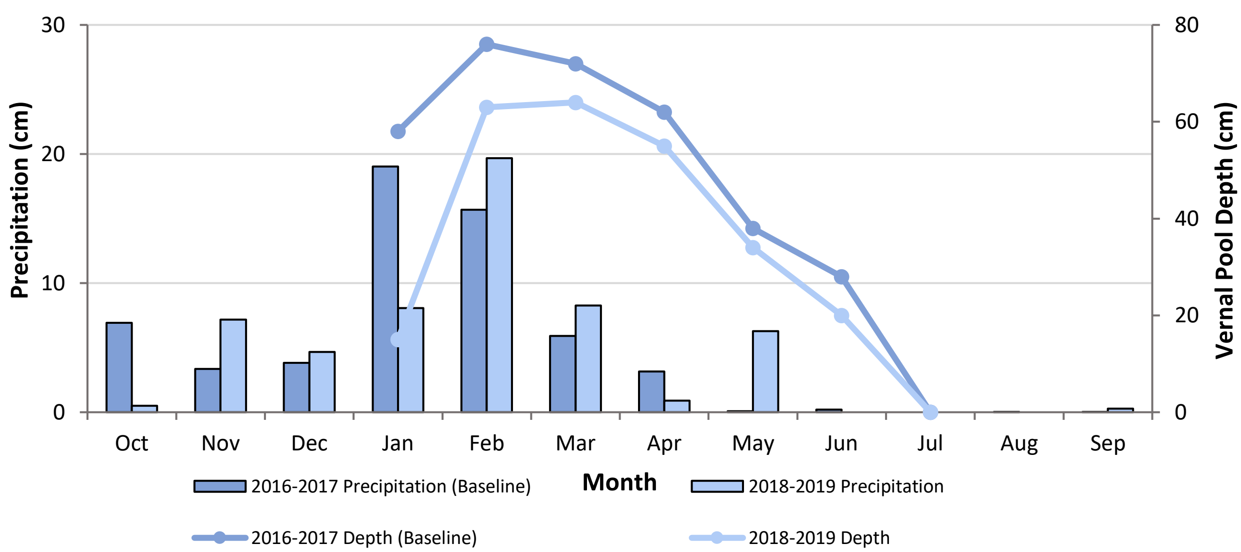

Figure 4-100. Monthly Depth and Precipitation at Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) for 2017-2018 Compared to Baseline 2016-2017 Water-Year

In below-normal precipitation years, Pond 42 is likely to range from 0-30 cm in depth with a maximum inundation of 0-0.35 acres. In a normal precipitation year, Pond 42 could have a depth of 76 cm and inundation of 0.80 acres. In an above-normal precipitation year, Pond 42 could have maximum depths of 76 cm or more and a maximum inundation of up to 1.0 acre (see Appendix F Table F-18). Figure 4-101 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-102 illustrates historic and recent inundation areas.

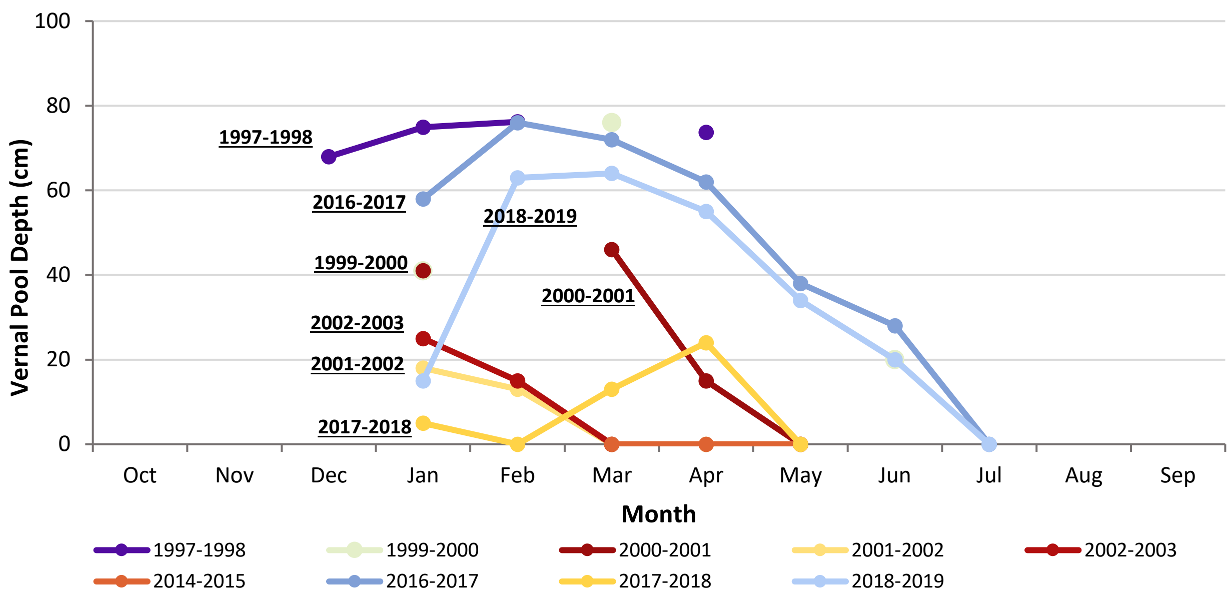

Figure 4-101. Historic Monthly Depths at Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

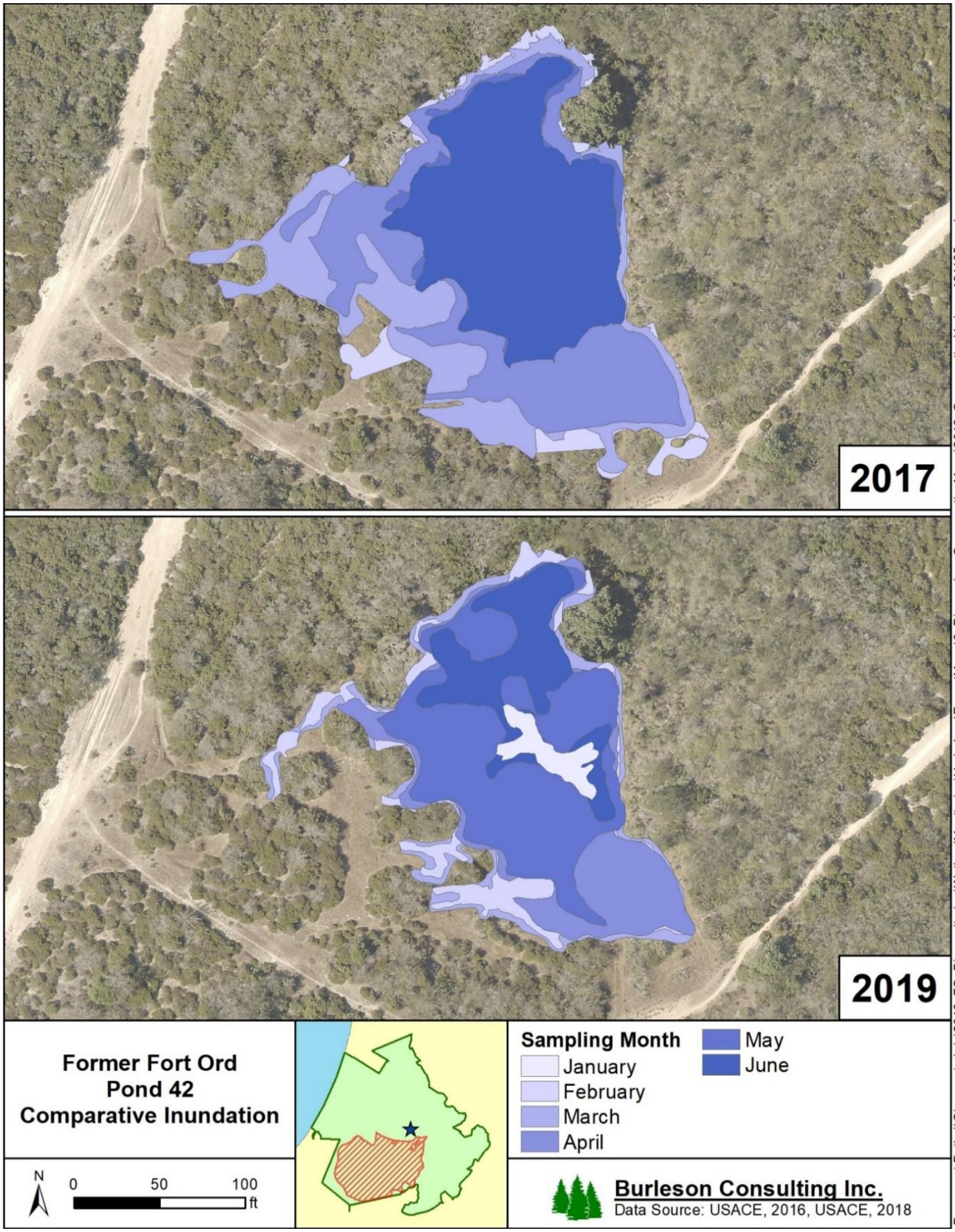

Figure 4-102. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Inundations for 2016-2017 (above-normal precipitation) and 2018-2019 (above-normal precipitation). The vernal pool was masticated and burned in 2017, had subsurface remediation in 2018, and was in years 2 and 1 of monitoring in 2019.

4.18.1.1 *Data Quality Objective 1*

Pond 42 met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 42 provided sufficient depth for CTS (47 cm through March) and fairy shrimp (46 cm through May). In previous years when data were collected from the first rain event through May, DQO 1 was met for CTS in 1998, 2000, and 2017. It was likely met for fairy shrimp in 1998, 2000, 2001, and 2017. Pond 42 depths were similar to reference Ponds 5 and 101 East (East) and higher than those of reference pool 997.

4.18.1.2 *Data Quality Objective 2*

Pond 42 had similar inundations in 2019 as previous years. Pond 42 was inundated from January through June with an inundation range of 0.03-0.59 acres and a mean of 0.36 acres. The historic inundations in 2001, 2002, and 2003, were slightly smaller but comparable to the 2019 inundations. The vernal pool was dry in 2015. Inundations in 1998 and 2017 were slightly larger likely due to a larger above-normal water-year. Pond 42 is a small vernal pool that likely fills in a normal or slightly below-normal water-year. The vernal pool may remain dry during drought years (see Figure 4-101). Pond 42 is generally smaller than reference Ponds 5 and 101 East (East), but larger than Pond 997. The timing of inundation and drying was most similar to Pond 101 East (East).

4.18.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 42, a post-mastication, post-burn, and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for year 1 and year 2 in 2019. Pond 42 met DQO 1 and DQO 2 indicating that it provided suitable habitat for CTS and fairy shrimp and was similar to itself in previous monitoring years and reference. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.18.2 Vegetation Monitoring

Vegetation data were collected at Pond 42 in 1998, 2000, 2001, 2002, 2003, 2017, 2018, and 2019 (HLA, 1998, 2001; Harding ESE, 2002; MACTEC, 2003, 2004; Burleson, 2018, 2019). In 1998, 2000, 2001, 2002, and 2003 data were collected along transects in lengths varying from 50 to 241 feet. In 2000, 0.25 m^2 quadrats were placed at intervals ranging from 10 to 20 feet, whereas in 1998, 2001, 2002, and 2003, quadrats were placed at 10-foot intervals. Quadrats were placed at the given intervals, alternating from right to left along the transect. In 1998, 2000, 2001, 2002, and 2003, transects of varying lengths were in areas of representative transitional and emergent habitats. Due to differing methodologies, data for all strata in each respective year before 2017 were combined to compare to 2017 through 2019. In 2017, 2018, and 2019, data were collected using the methodology described in the Methods section of this report. Data from 2017 and 2019 were compared stratum-to-stratum in Table 4-210 as well as visually in Figure 4-103.

Table 4-210. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2017	2019
Open Water	4%	N/A
1	8%	3%
2	9%	3%
3	52%	44%
4	10%	14%
5	N/A	18%
Upland	17%	18%

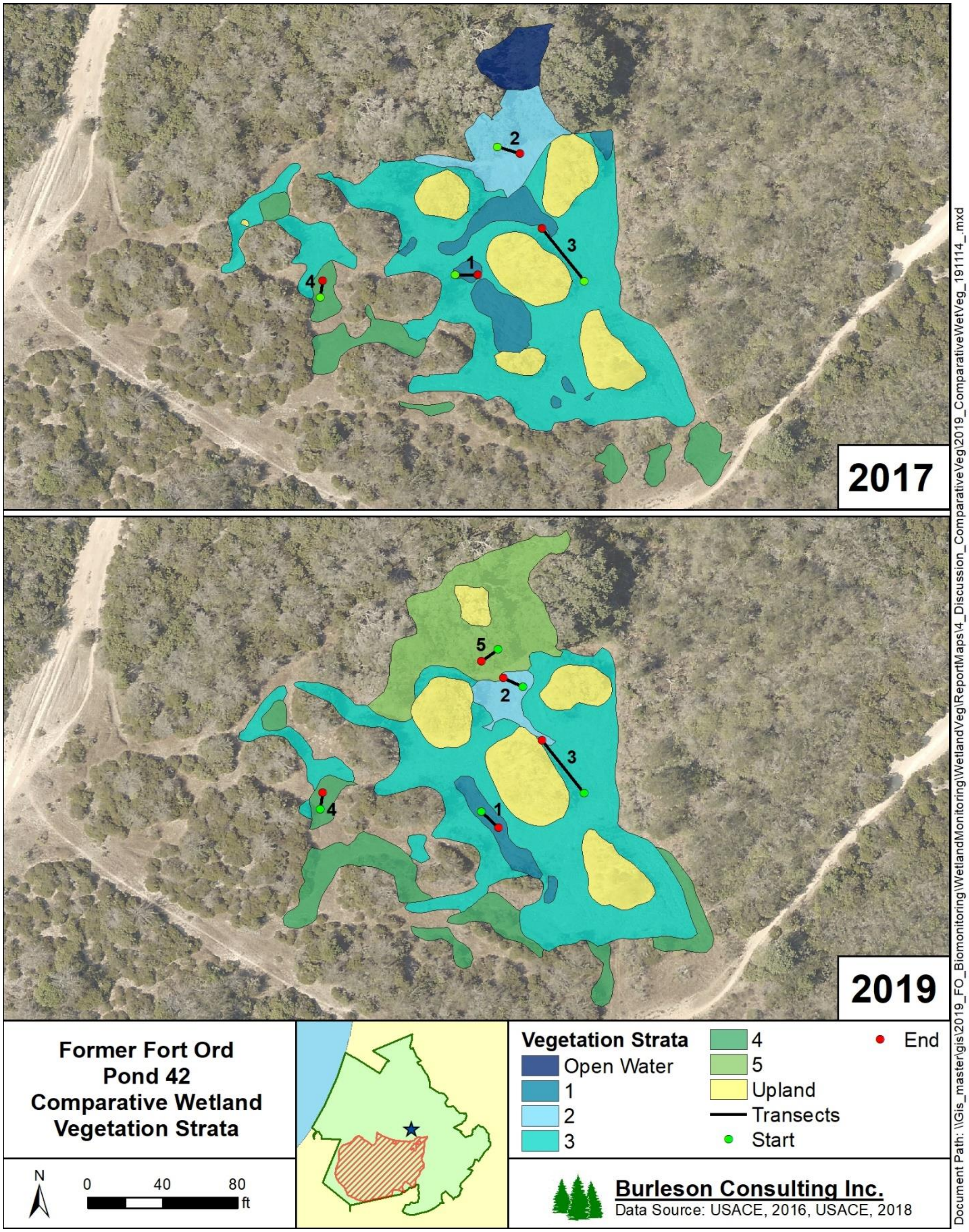

Figure 4-103. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2017 and 2019

The absolute percent vegetative and thatch/bare ground cover in 2019 was within range of values observed in previous years (see Table 4-211). Pond 42 absolute percent vegetative cover was slightly less than the range observed at the reference vernal pools and thatch/bare ground slightly higher (see Table 4-212).

Table 4-211. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998	69.6%	33.1%
2000	101.5%	10.3%
2001	77.5%	24.5%
2002	83.5%	21.2%
2003	84.6%	16.1%
2017	61.9%	38.7%
2018	55.8%	44.3%
2019	70.2%	29.8%

Table 4-212. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
42	**70.2%**	**29.8%**

Species richness increased between 1998 and 2018, and decreased by 2019 at Pond 42. Species richness on transects was 20, 31, 28, 24, 32, 14, 40, and 27 in 1998, 2000, 2001, 2002, 2003, 2017, 2018, and 2019, respectively. Overall basin species richness values were only recorded in 2017, 2018, and 2019 and were 78, 126, and 77 species, respectively (see Table 4-213 and Appendix B Table B-18). Pond 42 species richness was lower than reference vernal pool ranges on transects and for the entire basin (see Table 4-214 and Appendix G Tables G-27 and G-54).

Species composition at Pond 42 was different in 2018 and 2019 than in 2017 and the dominant species were different. Pale spikerush (*Eleocharis macrostachya*) and brown-headed rush (*Juncus phaeocephalus*) were the two most dominant species in 2017, whereas needle spikerush (*Eleocharis acicularis* var. *acicularis*) and coyote thistle (*Eryngium armatum*) were the two most dominant species in 2018 and 2019. Rabbitfoot grass (*Polypogon monspeliensis*) was another important species in 2019. A complete comparison of species composition observed during the surveys at Pond 42 in 1998, 2000, 2001, 2002, 2003, 2017, 2018 and 2019, can be found in Appendix H. Figure 4-104 shows a subset of this comparison for species observed with a 2% cover or greater.

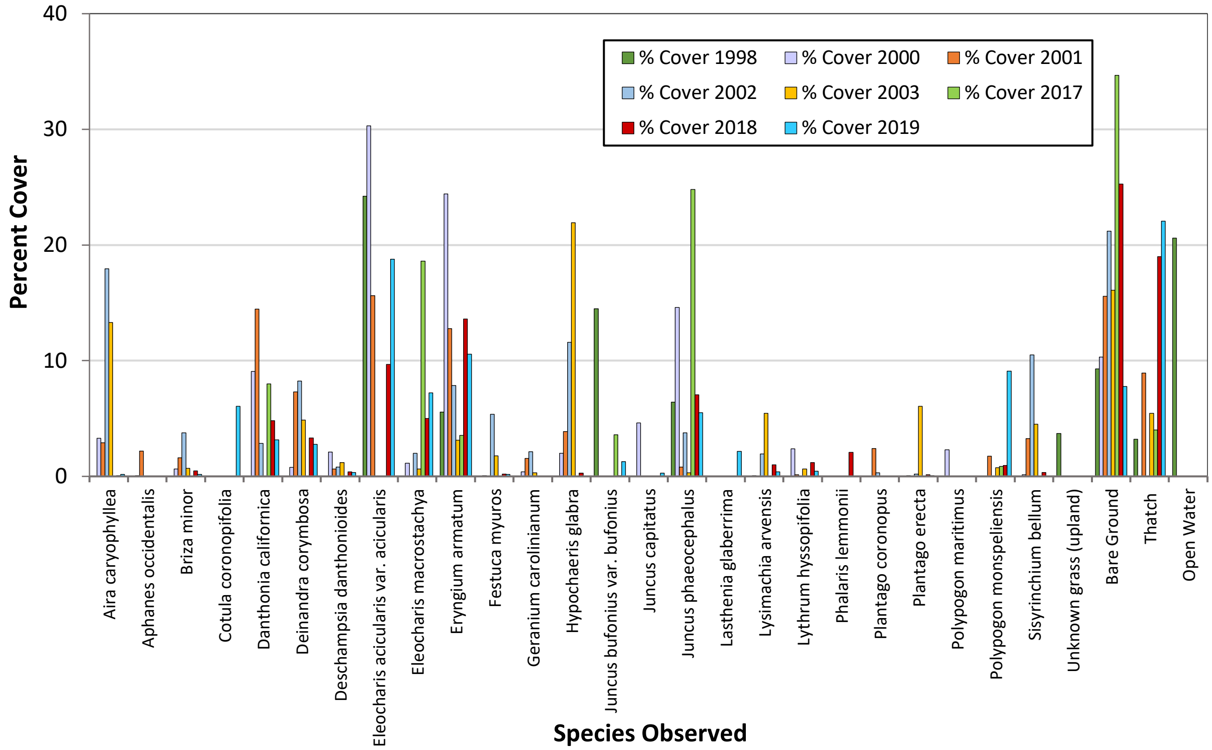

Figure 4-104. Percent Cover of Dominant Species at Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation)

Native and non-native species richness on Pond 42 transects was within the range of previous baseline years (see Table 4-213). Pond 42 species richness was less than the values observed at the reference vernal pools (see Table 4-214). The relative percent cover of natives and non-natives were within the range of baseline years (see Table 4-215). Pond 42 relative native percent cover was greater than the values observed at the reference vernal pools, whereas non-native relative percent cover was less than values observed at reference vernal pools (see Table 4-216).

Table 4-213. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998	12	5	3
2000	20	11	1
2001	14	13	1
2002	16	8	0
2003	19	12	1
2017	10	4	0
2018	24	15	1
2019	16	11	0

Table 4-214. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
42	**16**	**11**	**0**

Table 4-215. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1998	87.7%	4.4%	7.9%
2000	84.4%	15.6%	0.0%
2001	77.4%	22.4%	0.3%
2002	49.0%	51.0%	0.0%
2003	40.4%	58.7%	1.0%
2017	97.8%	2.2%	0.0%
2018	90.0%	9.7%	0.4%
2019	75.5%	24.5%	0.0%

Table 4-216. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
42	**75.5%**	**24.5%**	**0.0%**

Wetland and non-wetland species richness on Pond 42 transects was within the range of previous baseline years but were less than the values observed at the reference vernal pools (see (see Table 4-217 and Table 4-218). The relative percent cover of wetland and non-wetland species were within ranges of previous baseline years (see Table 4-219). Relative percent cover of wetland species was greater than the values observed at reference vernal pools and non-wetland species cover was slightly lower than the ranges observed at reference vernal pools and Table 4-220).

Table 4-217. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998	6	4	4	1	0	5
2000	5	5	4	6	0	11
2001	3	5	4	6	0	10
2002	3	4	4	2	1	10
2003	5	6	3	4	0	14
2017	5	4	1	2	0	2
2018	9	10	3	7	1	10
2019	6	7	3	5	0	6

Table 4-218. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
42	**6**	**7**	**3**	**5**	**0**	**6**

Table 4-219. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998	42.2%	38.6%	8.7%	0.5%	0.0%	10.0%
2000	35.7%	40.9%	10.3%	8.4%	0.0%	4.7%
2001	20.7%	24.8%	24.0%	7.2%	0.0%	23.3%
2002	3.1%	27.4%	10.6%	27.9%	0.2%	30.7%
2003	5.8%	12.2%	7.5%	19.5%	0.0%	55.0%
2017	30.9%	53.0%	12.9%	0.4%	0.0%	2.7%
2018	33.0%	44.8%	11.2%	2.3%	0.4%	8.4%
2019	50.3%	38.5%	5.3%	1.3%	0.0%	4.6%

Table 4-220. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
42	50.3%	38.5%	5.3%	1.3%	0.0%	4.6%

4.18.2.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 42 was dominated by native and wetland plant species during year 2 post-mastication and post-burn and year 1 post-subsurface munitions remediation monitoring in 2019. Pond 42 wetland vegetation results were within range of baseline and/or reference vernal pools.

4.18.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 42, a post-mastication, post-burn, and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for years 2, 2, and 1, respectively, in 2019. The species composition, richness, and native and wetland species relative abundances were similar to baseline and/or reference vernal pool conditions. Pond 42 provided suitable wetland habitat in 2019.

4.18.3 Wildlife Monitoring

Wildlife data were collected at Pond 42 in 1998, 2000, 2001, 2002, 2003, 2018, and 2019 (HLA, 1998, 2001, 2002; MACTEC, 2003, 2004, Burleson, 2019). California tiger salamander larvae were observed in 2000. Fairy shrimp were detected in all years. Table 4-221 shows historic wildlife monitoring results.

Table 4-221. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998	Not detected	Low-Moderate
2000	Common (13)	High – Very High (318, 123)
2001	Not detected	Low (2)
2002	Not detected	High-Very High (250, 1000s)
2003	Not detected	High (low 100s)
2018	Not detected	Low
2019	Not detected	High (217)

4.18.3.1 *Data Quality Objective 1*

Pond 42 provided suitable depth for CTS and fairy shrimp as discussed in Section 4.18.1.1.

4.18.3.2 *Data Quality Objective 4*

Fairy shrimp were present at Pond 42 in 2019, whereas CTS were not detected. The water quality was adequate. Compared to other vernal pools and previous Pond 42 data, water quality data were within normal ranges. The pH ranged from 6.45 in June to 7.14 in February with a mean of 6.84. Temperature ranged from 10.40°C in February to 19.59°C in June with a mean of 14.47°C. Dissolved oxygen ranged from 4.42 mg/L in April to 9.94 mg/L in January with a mean of 7.08 mg/L. Turbidity ranged from 0.8 FNU in May to 28.2 FNU in February with a mean of 10.7 FNU (see Table 3-68).

4.18.3.3 *Data Quality Objective 5*

California tiger salamanders were not detected in 2019, which was generally consistent with baseline monitoring. California tiger salamanders were not detected in 1998, 2001, 2002, and 2003 but were observed in 2000.

Fairy shrimp were present in 2019, which was consistent with previous baseline monitoring. Fairy shrimp were observed in baseline years 1998, 2000, 2001, 2002, and 2003.

4.18.3.4 *Performance Standard: Wildlife Usage*

Pond 42, a post-mastication, post-burn, and post-subsurface munitions remediation vernal pool, was partially on track to meet the performance standard for year 1 and 2. The vernal pool was on track to meet DQOs 1, and 4 and provided suitable CTS and fairy shrimp habitat. However, for DQO 5, CTS were detected in one of the five baseline years but was not detected in 2019. If there are no detection of CTS in all future monitoring years, it is possible that this vernal pool may have been impacted by remediation and steps should be considered for corrective action.

4.18.4 Conclusion

Pond 42, a post-mastication, post-burn, and post-subsurface munitions remediation vernal pool, was in years 2, 2, and 1 of monitoring in 2019. The vernal pool was on track to meet the hydrological conditions and plant cover and species diversity performance standard but was only partially on track to meet the wildlife usage performance standard (see Table 4-222). California tiger salamanders were present in one of the baseline years of monitoring but the species was not detected in 2019. Pond 42 will continue to be monitored in the future.

Table 4-222. Success at Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	On track
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	On track
	DQO 4	On track
	DQO 5	Partially on track*

*CTS were present in baseline but were not detected in 2019

4.19 Pond 44 – Year 2 and Year 1

Pond 44 was monitored in 2019 as a year 1 post-subsurface munitions remediation and year 2 post-mastication vernal pool. Pond 44 was monitored for baseline conditions in 1998, 2015, and 2016. Vegetation in Pond 44 and within its watershed was masticated in summer of 2017 in preparation for a prescribed burn of BLM Area B Subunit B. Pond 44 was had intrusive anomaly investigations in 2018. Table 4-223 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 44 (see Figure 4-105). The 1997-1998, 2015-2016, and 2018-2019 water-years were above-normal, whereas the 2014-2015 and 2017-2018 water-years were below-normal.

Table 4-223. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year				
	1997-1998	2014-2015	2015-2016	2017-2018	2018-2019
Hydrology	●	●	●	●	●
Vegetation	●		●	●	●
Wildlife	●				●

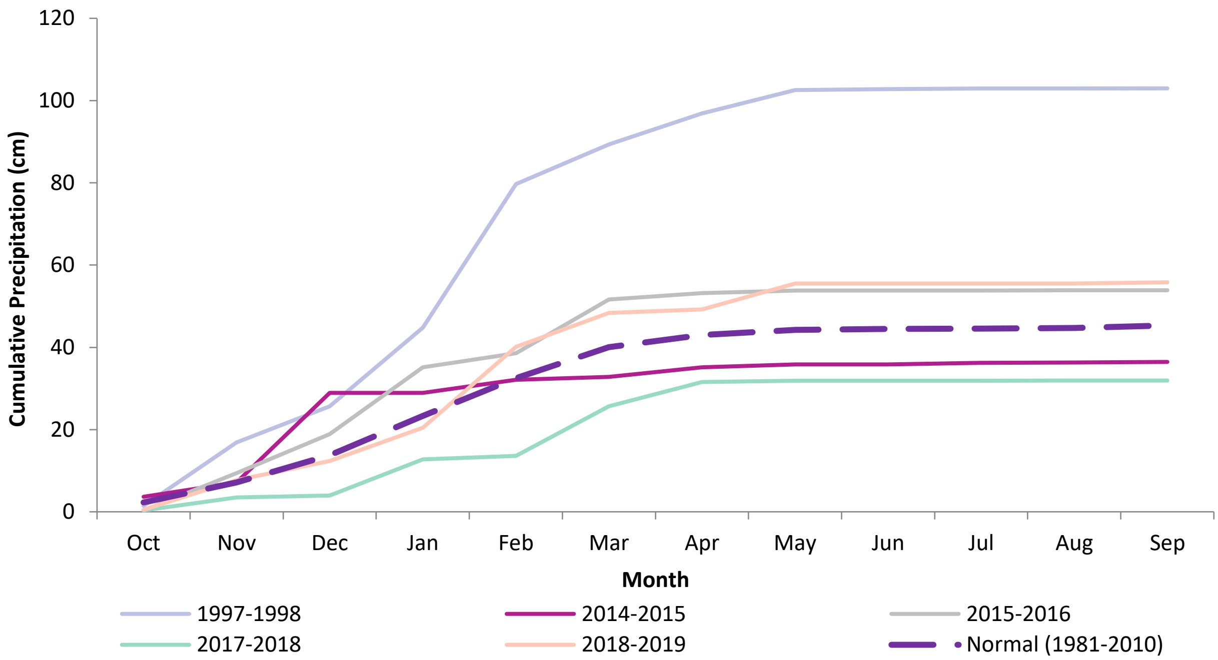

Figure 4-105. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.19.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 44 was 0.18 acres, with a maximum depth of approximately 24 cm. The depth and inundation values were within range of the previously recorded values (see Appendix F Table F-19). Pond 44 was inundated from February through March. Figure 4-106 illustrates the relationship of precipitation and depth at Pond 44 for 2019 as well as baseline in 2016.

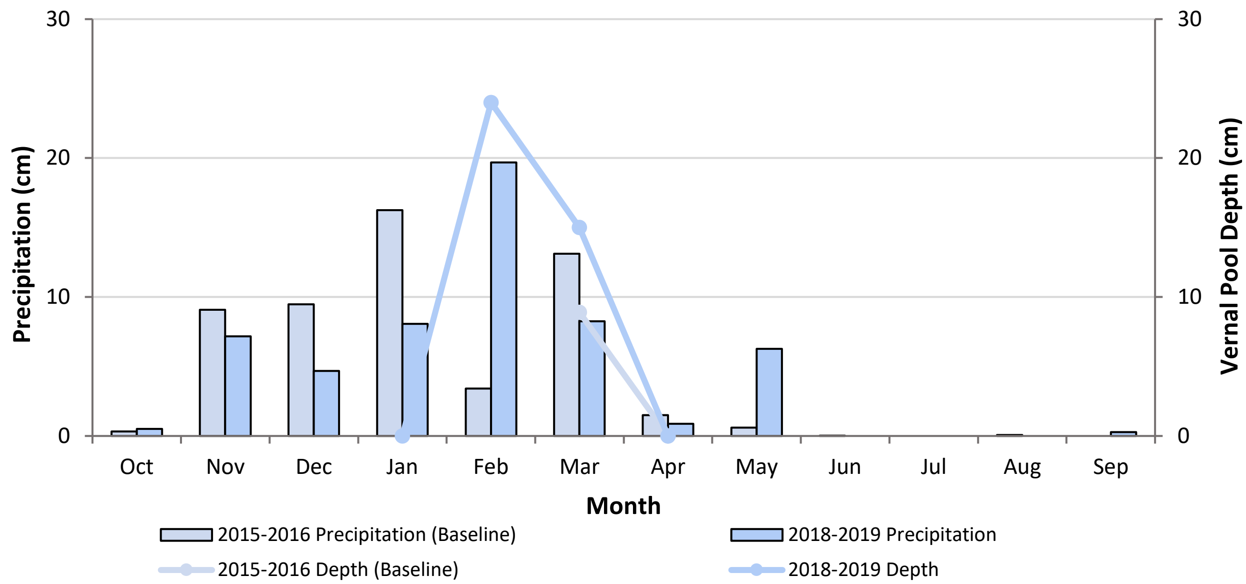

Figure 4-106. Monthly Depth and Precipitation at Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) for 2018-2019 Water-Year Compared to Baseline 2015-2016 Water-Year

In below-normal precipitation years, Pond 44 is likely to remain dry. No depths or inundations for Pond 44 have been recorded in normal precipitation years. In above-normal precipitation years, Pond 44 could have maximum depths of 37 cm or more and a maximum inundation up to 0.19 acres (see Appendix F Table F-19). Figure 4-107 illustrates historic vernal pool depths by month and organized by water-year.

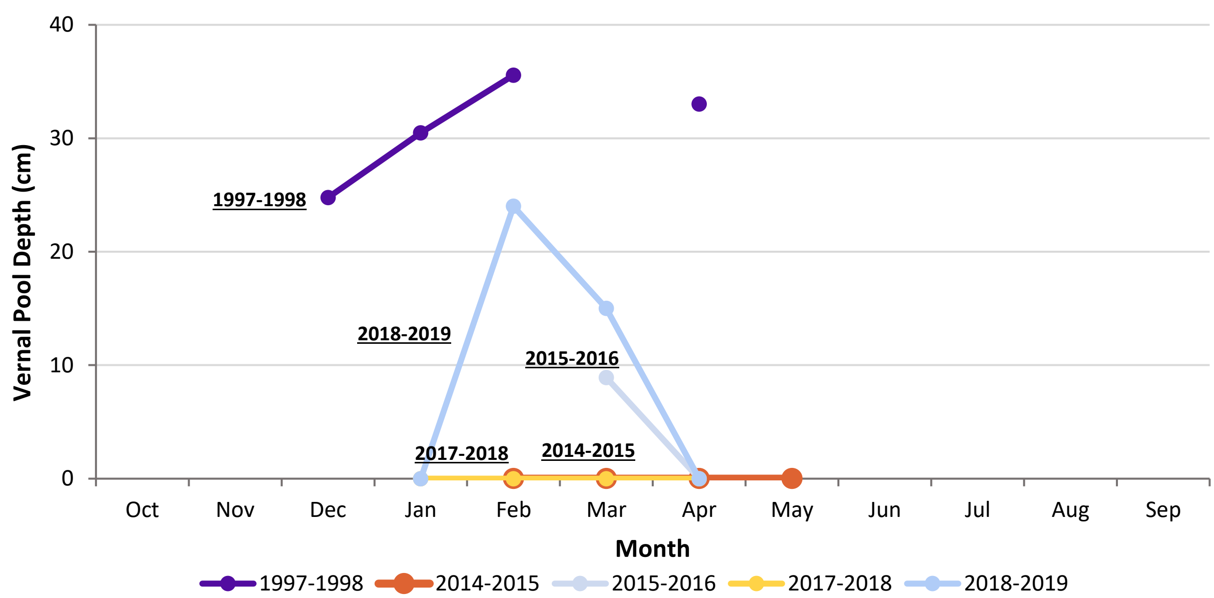

Figure 4-107. Historic Monthly Depths at Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

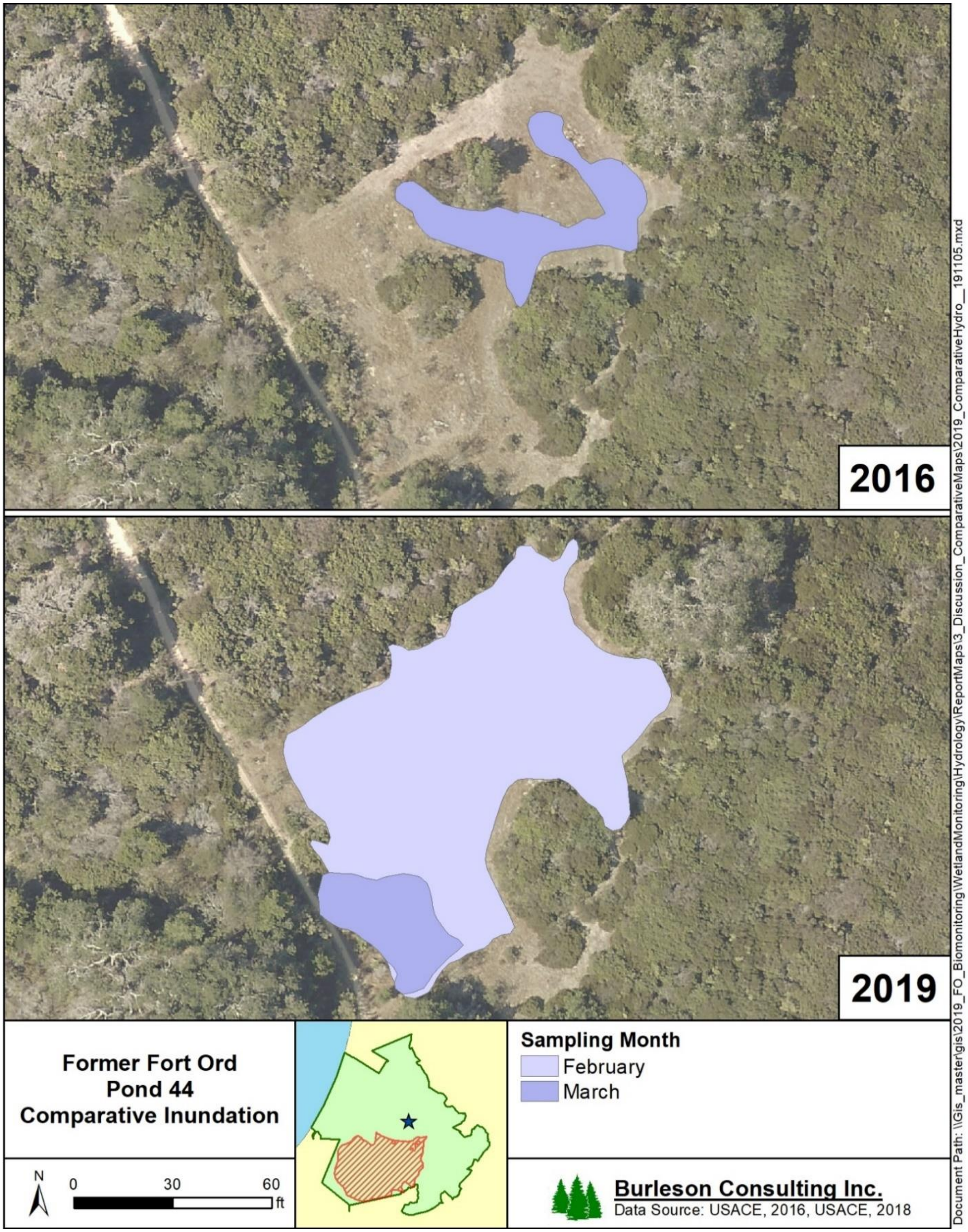

Figure 4-108. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Inundations for 2015-2016 (above-normal precipitation) and 2018-2019 (above-normal precipitation). The vernal pool was masticated in 2017, had subsurface munitions remediation in 2018, and was in years 2 and 1 of monitoring in 2019.

4.19.1.1 *Data Quality Objective 1*

Pond 44 did not meet the required average depths of 25 cm from the first rain event through March for CTS or 10 cm for 18 consecutive days through May for fairy shrimp. Pond 44 did not provide sufficient depth for CTS (20 cm through March) or fairy shrimp (20 cm through April). Despite providing greater than 10 cm depth, the vernal pool was dry by May. Recorded depths indicate that DQO 1 was likely met in 1998 although monitoring did not continue into May. Pond 44 was dry in 2015 and 2016, indicating that it likely does not fill in below-normal water-years. Pond 44 was most similar to reference vernal pool 997.

4.19.1.2 *Data Quality Objective 2*

Pond 44 had a similar inundation maximum as the maximum in 1998 and a similar March/April recording as 2016. Pond 44 was inundated February through March with an inundation range of 0.02-0.18 acres and a mean of 0.10 acres. Pond 44 was inundated in 1998 and was likely inundated in the early months of 2016 although monitoring was only conducted in April. The vernal pool was recorded as dry in 2015. Pond 44 is a small vernal pool that is likely to fill in a normal or above-normal water-year, and in a below normal or drought year, the vernal pool may remain dry or dry quickly (see Figure 4-107). Pond 44 had a similar inundation range and timing as Pond 997, both were inundated February through March/April and had small inundation areas.

4.19.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 44, a post-mastication and post-subsurface munitions remediation vernal pool, was not on track to meet the performance standard for year 1 and year 2 in 2019. Pond 44 did not meet DQO 1. Evaluation of DQO 2 indicated that Pond 44 was similar to previous years and reference Pond 997. Pond 44 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.19.2 Vegetation Monitoring

Vegetation data were collected at Pond 44 in 1998, 2016, 2018, and 2019 (HLA, 1998; Burleson, 2017, 2019). In 1998, data were collected along two transects close to 50 feet in length. Quadrats were placed at 10-foot intervals, alternating from right to left along the transect. Because 1998 data were collected differently than in other years, strata were combined across the vernal pool to allow for comparison to other years. In 2016, 2018, and 2019, data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2019 were compared stratum-to-stratum in Table 4-224 as well as visually in Figure 4-109**.**

Table 4-224. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2019
1	60%	52%
2	17%	N/A
3	7%	27%
4	N/A	7%
Upland	16%	14%

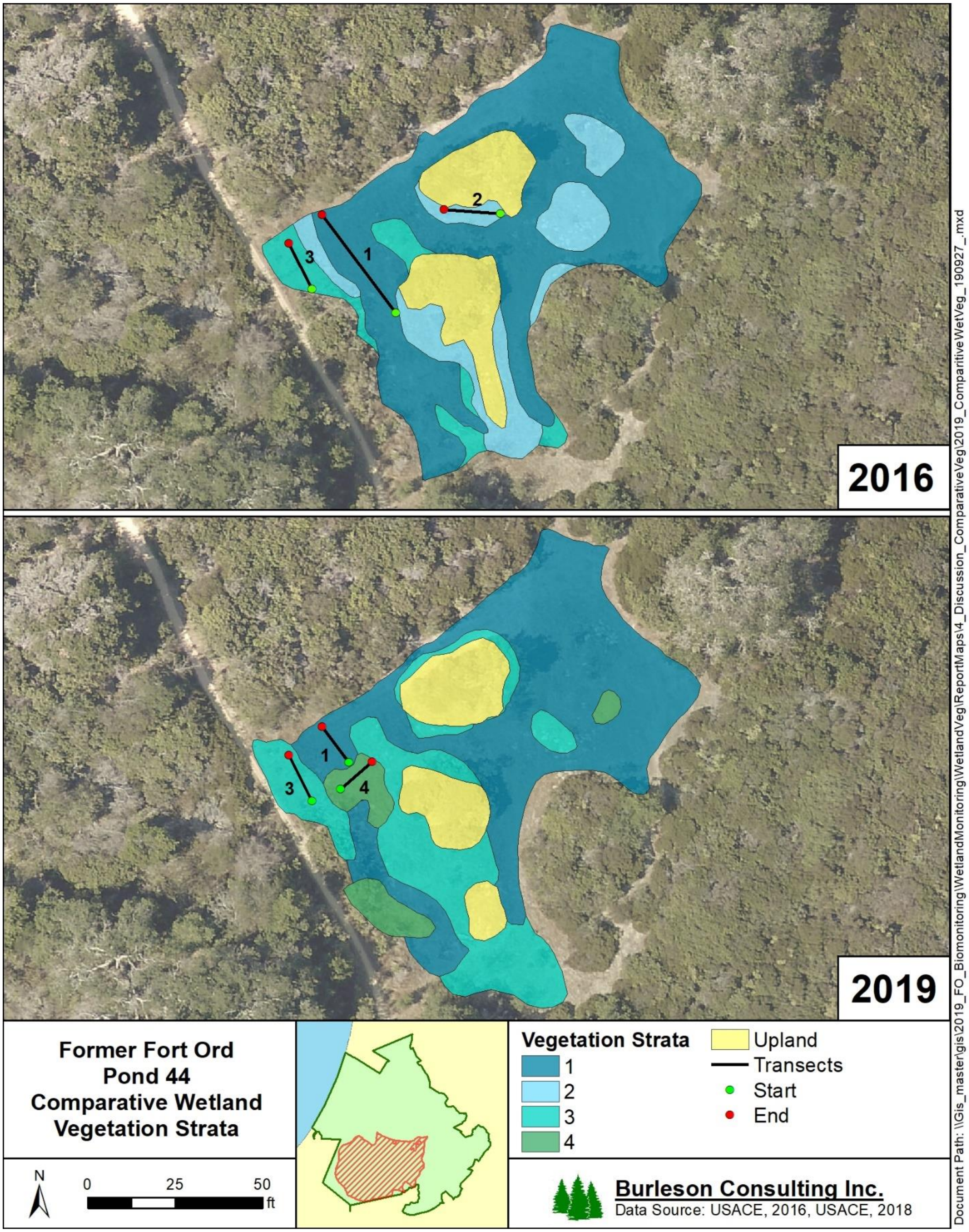

Figure 4-109. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2016 and 2019

Absolute percent vegetative cover decreased slightly between 1998 and 2019 (see Table 4-225). The absolute percent vegetative cover of Pond 44 in 2019 was less than the values observed at the reference vernal pools while thatch/bare ground was greater (see Table 4-226).

Table 4-225. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998	72.8%	26.0%
2016	78.6%	22.9%
2018	70.9%	30.0%
2019	67.7%	32.2%

Table 4-226. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
44	**67.7%**	**32.2%**

Species richness increased between 1998 and 2019, at Pond 44. Species richness on transects was 26, 36, 44, and 44 species in 1998, 2016, 2018, and 2019, respectively, whereas overall basin species richness was 47, 71, and 74 species in 2016, 2018, and 2019, respectively (see Table 4-227 and Appendix B Table B-19). Pond 44 species richness was within the range observed on transects at the reference vernal pools but was slightly less than the values observed for the entire basin (see Table 4-228 and Appendix G Tables G-27 and G-54).

Species composition at Pond 44 was different among the monitoring years, however the dominant species were fairly similar. The dominant species in 1998 was needle spikerush. In 2016, 2017, and 2018 the dominant species was coyote thistle (*Eryngium armatum*). A complete comparison of species composition observed at Pond 44 in 1998, 2016, and 2018 can be found in Appendix H. Figure 4-110 shows a subset of this comparison for species observed with a 2% cover or greater.

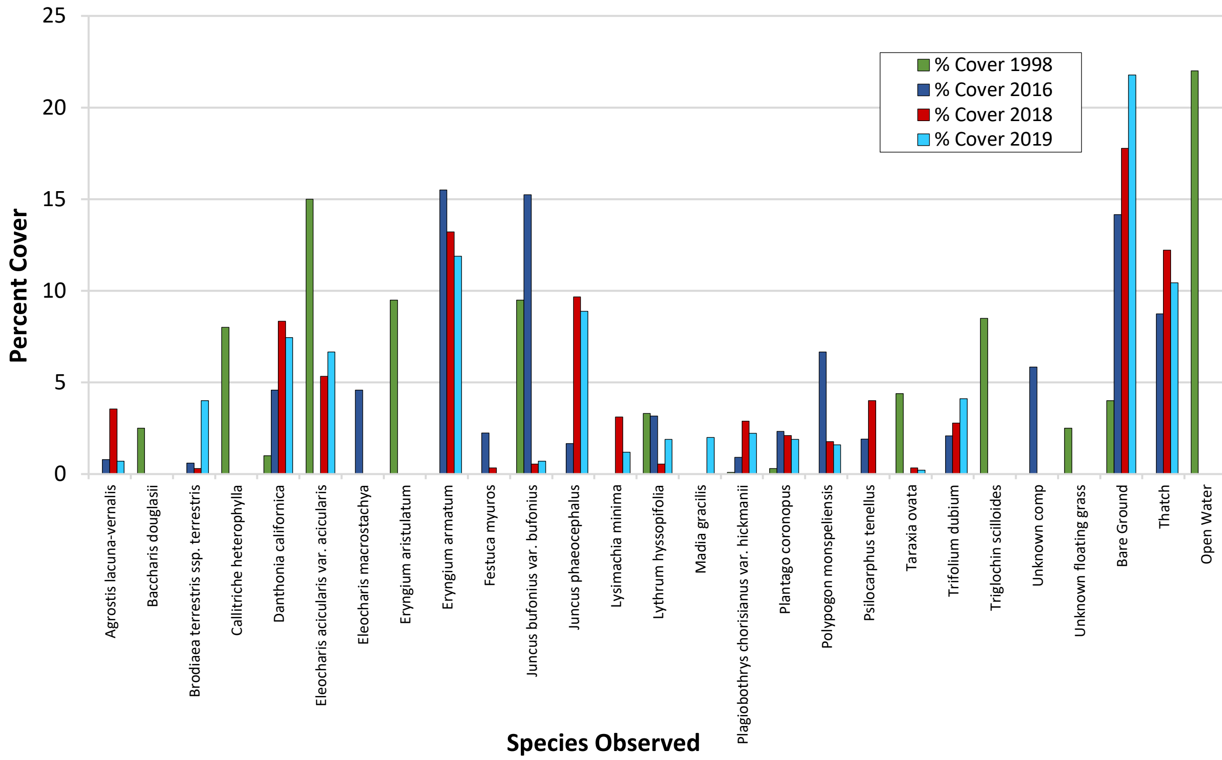

Figure 4-110. Percent Cover of Dominant Species at Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation)

Native and non-native species richness on Pond 44 transects increased between 1998 and 2018 and remained the same in 2019 (see Table 4-227). Pond 44 native species richness in 2019 was slightly higher than the range observed at the reference vernal pools, whereas non-native species richness was within the range observed at the reference vernal pools (see Table 4-228). The relative percent cover of native and non-native species was within the range observed in the baseline years (see Table 4-229). Pond 44 native and non-native relative percent cover in 2019 were higher and lower, respectively, than the values observed at the reference vernal pools (see Table 4-230).

Table 4-227. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998	17	8	2
2016	21	14	1
2018	28	15	1
2019	28	15	1

Table 4-228. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
44	**28**	**15**	**1**

Table 4-229. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1998	87.6%	8.8%	3.4%
2016	66.5%	26.1%	7.4%
2018	82.1%	17.7%	0.2%
2019	78.2%	21.7%	0.2%

Table 4-230. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
44	**78.2%**	**21.7%**	**0.2%**

Wetland species richness on Pond 44 transects increased between 1998 and 2019, while the non-wetland species richness in 2019 was within the range of values seen in baseline years (see Table 4-231). The relative percent cover of wetland and non-wetland species was fairly similar across monitoring years (see Table 4-233). The wetland and non-wetland species richness and relative percent cover values at Pond 44 were within the ranges observed at the reference vernal pools in 2019 (see Table 4-232 and Table 4-234).

Table 4-231. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998	7	4	5	1	0	9
2016	5	9	5	6	0	10
2018	8	9	4	7	1	15
2019	7	10	6	4	1	16

Table 4-232. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
44	**7**	**10**	**6**	**4**	**1**	**16**

Table 4-233. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998	63.5%	15.2%	3.3%	0.4%	0.0%	14.1%
2016	15.8%	53.8%	9.7%	8.7%	0.0%	4.7%
2018	20.7%	46.9%	16.8%	8.0%	0.3%	7.4%
2019	19.9%	39.9%	17.4%	8.2%	0.2%	14.4%

Table 4-234. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
44	**19.9%**	**39.9%**	**17.4%**	**8.2%**	**0.2%**	**14.4%**

4.19.2.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 44 was dominated by native and wetland plant species during year 2 post-mastication and year 1 post-subsurface munitions remediation monitoring in 2019. Pond 44 wetland vegetation results were generally within range of baseline and/or reference vernal pools, however absolute vegetative cover in 2019 was lower than baseline and the reference vernal pools.

4.19.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 44, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for years 2 and 1, respectively, in 2019. The species composition, richness, and native and wetland species relative abundances were similar to baseline and/or reference vernal pool conditions. Pond 44 provided suitable wetland habitat in 2019.

4.19.3 Wildlife Monitoring

Wildlife data were collected at Pond 44 in 1998 and 2019 (HLA, 1998). California tiger salamanders were not detected either year, whereas fairy shrimp were present in both. Table 4-235 shows historic wildlife monitoring results.

Table 4-235. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998	Not detected	Moderate
2019	Not detected	Very High (650, 370)

4.19.3.1 *Data Quality Objective 1*

Pond 44 did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.19.1.1.

4.19.3.2 *Data Quality Objective 4*

Fairy shrimp were present at Pond 44 in 2019, whereas CTS were not detected. The water quality was adequate. Compared to other vernal pools and previous Pond 44 data, water quality data were within normal ranges. The pH ranged from 6.71 in February to 7.07 in March with a mean of 6.89. Temperature ranged from 10.75°C in February to 15.55°C in March with a mean of 13.15°C. Dissolved oxygen ranged from 8.16 mg/L in February to 9.43 mg/L in March with a mean of 8.80 mg/L. Turbidity ranged from 5.1 FNU in March to 20.3 FNU in February with a mean of 12.7 FNU (see Table 3-72).

4.19.3.3 *Data Quality Objective 5*

California tiger salamanders were not detected in 2019, which was consistent with baseline monitoring. California tiger salamanders were not detected in 1998.

Fairy shrimp were present in 2019, which was consistent with previous baseline monitoring. Fairy shrimp were observed in 1998.

4.19.3.4 *Performance Standard: Wildlife Usage*

Pond 44, a post-burn and post-subsurface munitions remediation vernal pool, was partially on track to meet the performance standard for years 1 and 2. The vernal pool was on track to meet DQOs 4 and 5. Depths were not suitable for CTS or fairy shrimp habitat according to DQO 1; however, fairy shrimp were present.

4.19.4 Conclusion

Pond 44, a post-mastication and post-subsurface munitions remediation vernal pool, was in years 2 and 1 of monitoring in 2019. The vernal pool was on track to meet the plant cover and species diversity performance standard but was partially on track to meet hydrological conditions and wildlife usage (see Table 4-236). This is due to the vernal pool not providing an average depth appropriate for CTS habitat and drying before the required hydrological conditions for fairy shrimp habitat. However, fairy shrimp were detected in Pond 44. Pond 44 will continue to be monitored in the future.

Table 4-236. Success at Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	Not on track*
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	Not on track*
	DQO 4	On track
	DQO 5	On track

*Fairy shrimp and CTS depth requirements were not met in 2019, but fairy shrimp were present.

4.20 Pond 56 – Year 2

Pond 56 was monitored in 2019 as a year 2 post-mastication vernal pool. Pond 56 was monitored for baseline conditions in 2007, 2013, 2014, 2015, and 2016. Vegetation within the watershed of Pond 56 was masticated in the summer of 2017 in preparation for a prescribed burn in 2017 and to support MEC remediation in BLM Area B Subunit B-3 East. Vegetation within the watershed was masticated in 2017 to support MEC remediation activities and prepare areas for prescribe burning. Prior to the 2017 mastication, Pond 56 was used as a reference vernal pool. Table 4-237 summarizes the years that monitoring occurred and surveys conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 56 (see Figure 4-111). The 2015-2016 and 2018-2019 water-years were above-normal, whereas all other monitoring was conducted during a below-normal water-year, drought year, or consecutive drought year.

Table 4-237. Pond 56 (Year 2 Post-Mastication) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year						
	2006-2007	2012-2013	2013-2014	2014-2015	2015-2016	2017-2018	2018-2019
Hydrology	●	●	●	●	●	●	●
Vegetation	●			●	●		●
Wildlife	●	●	●	●	●		●

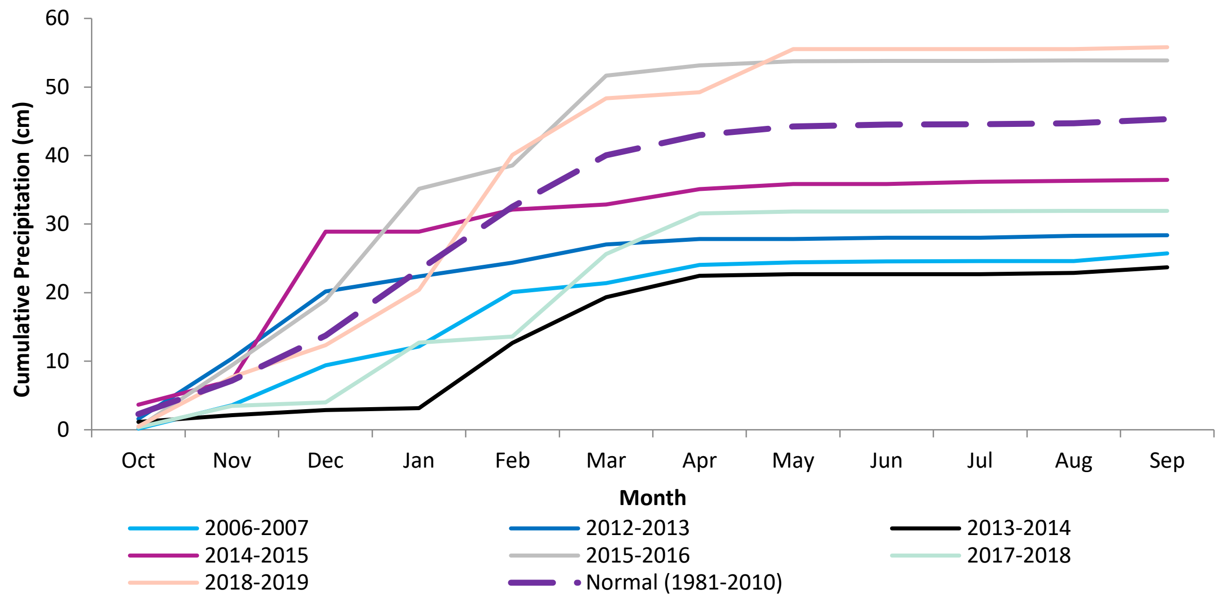

Figure 4-111. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 56 (Year 2 Post-Mastication) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.20.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 56 was 5.13 acres with a maximum depth of approximately 101 cm. The depth and inundation values were within range of the previously recorded values (see Appendix F Table F-20). Pond 56 was inundated from the first recorded monitoring in December and did not dry by the last recorded monitoring in September. Figure 4-112 illustrates the relationship of precipitation and depth at Pond 56 for 2019 as well as baseline in 2016.

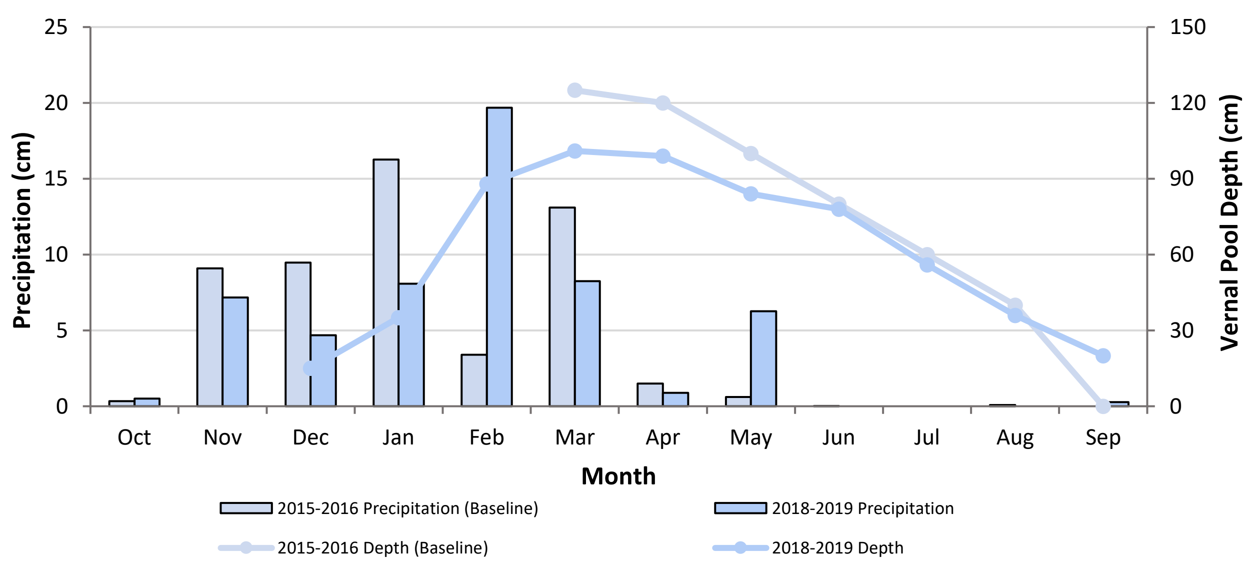

Figure 4-112. Monthly Depth and Precipitation at Pond 56 (Year 2 Post-Mastication) for 2018-2019 Water-Year Compared to Baseline 2015-2016 Water-Year

In below-normal precipitation years, Pond 56 is likely to range from 0-60 cm in depth with a maximum inundation of 0-0.85 acres. No depths or inundations for Pond 56 have been recorded in normal precipitation years. In above-normal precipitation years, Pond 56 could have maximum depths of 125 cm or more and maximum inundation of 5.17 acres or more (see Appendix F Table F-20). Figure 4-113 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-114 illustrates historic and recent inundation areas.

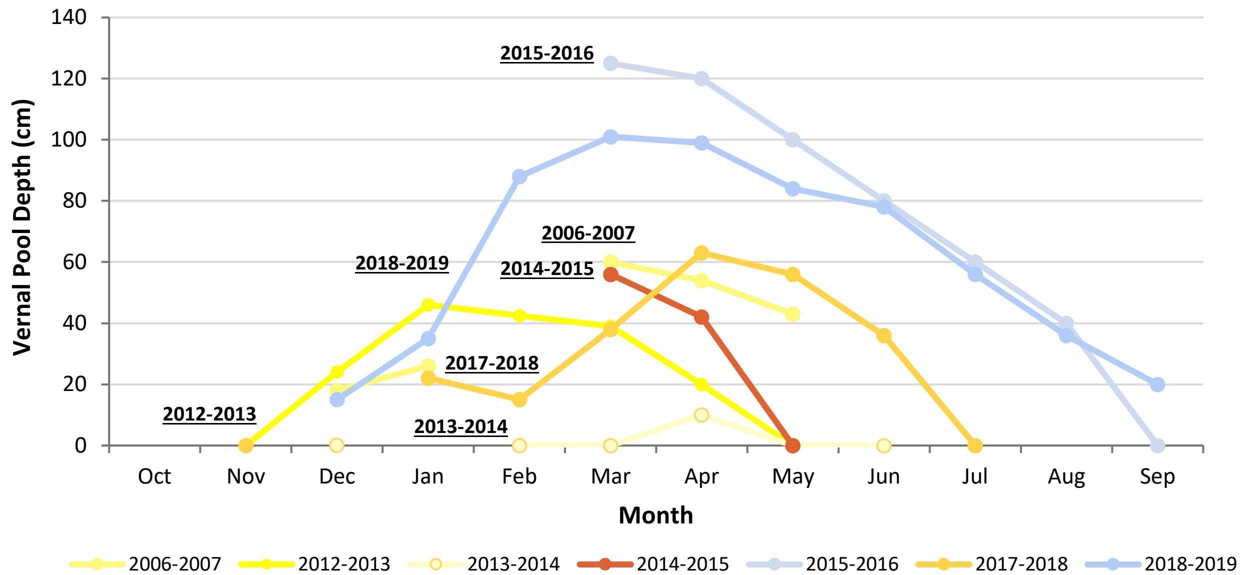

Figure 4-113. Historic Monthly Depths at Pond 56 (Year 2 Post-Mastication). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

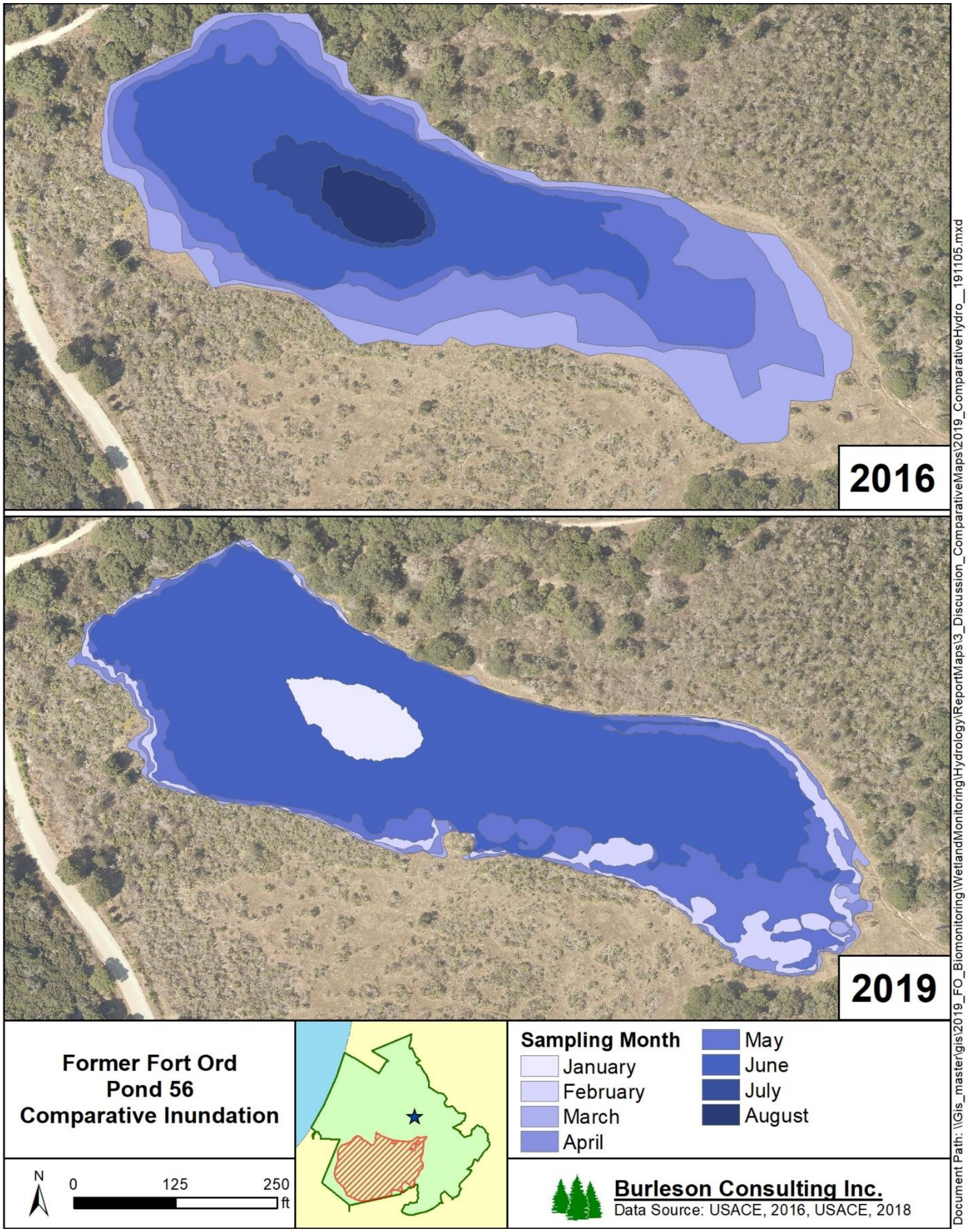

Figure 4-114. Pond 56 (Year 2 Post-Mastication) Inundations for 2015-2016 (above-normal precipitation) and 2018-2019 (above-normal precipitation). Parts of the vernal pool's watershed were masticated in 2017. The vernal pool was in year 2 of monitoring in 2019.

4.20.1.1 *Data Quality Objective 1*

Pond 56 met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 56 provided sufficient depth for CTS (60 cm through March) and fairy shrimp (70 cm through May). Pond 56 likely met the DQO in 2007 and 2016 and partially met it for CTS in 2013 and 2015. The vernal pool did not meet the DQO in 2014. Depths at Pond 56 were above the ranges observed at all reference vernal pools (Ponds 5, 101 East (East), and 997).

4.20.1.2 *Data Quality Objective 2*

Pond 56 was inundated in December and did not dry by the last monitoring event in September. The inundation range was 0.25-5.13 acres with a mean of 3.91 acres. The historic inundations in 2007, 2013, 2015, and 2016 were between 0.05 and 5.17 acres. The 2019 inundations were within this range and similar to 2016. Pond 56 can be expected to fill even in below-normal years (see Figure 4-113). Pond 56 had a similar large inundation range as Pond 5, however Pond 56 held water longer than any of the reference vernal pools.

4.20.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 56, a post-mastication vernal pool, was on track to meet the performance standard for year 2 in 2019. Pond 56 met DQOs 1 and 2 indicating that it provided suitable habitat for CTS and fairy shrimp and was similar to itself in previous monitoring years and reference vernal pools. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.20.2 Vegetation Monitoring

Vegetation data were collected at Pond 56 in 2007, 2015, 2016 and 2019 (Shaw, 2008; Burleson, 2016, 2017). In 2007, data were collected in three zones using a 1.0 m^2 quadrat placed at three locations within each zone and data for all strata were combined for the entire pool to allow for comparison to other years. In 2015, 2016, and 2019, data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2019 and were compared stratum-to-stratum in Table 4-238 as well as visually in Figure 4-115.

Table 4-238. Pond 56 (Year 2 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2019
1	4%	5%
2	6%	19%
3	12%	31%
4	50%	41%
5	22%	0.3%
6	3%	N/A
Upland	3%	4%

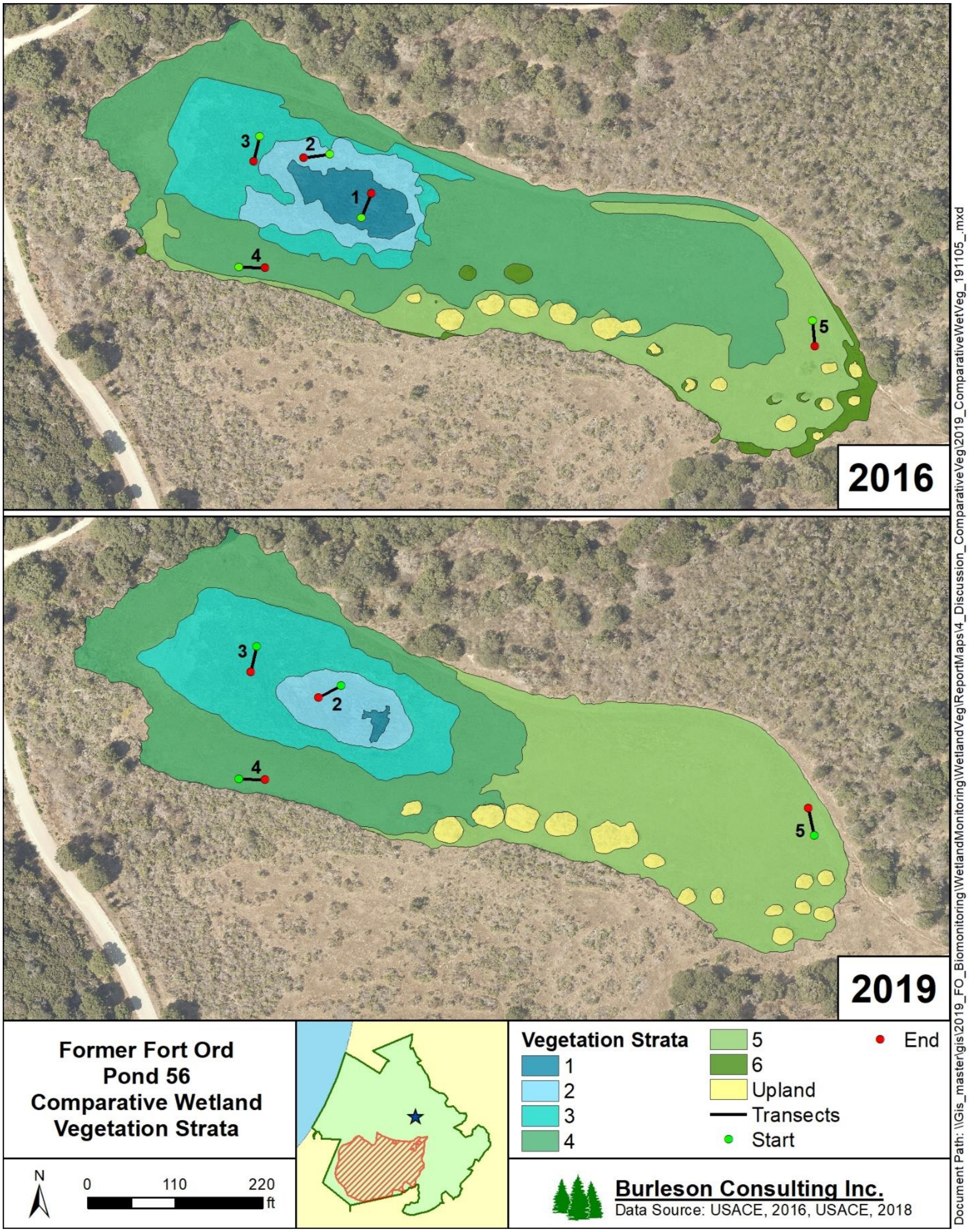

Figure 4-115. Pond 56 (Year 2 Post-Mastication) Vegetation Strata and Transects for 2016 and 2019

Absolute percent vegetative cover has been variable across monitoring years. The vegetative cover in 2019 was within the range of values observed in previous years (see Table 4-239). The absolute percent vegetative cover of Pond 56 was less than values observed at the reference vernal pools while thatch/bare ground was greater (see Table 4-240).

Table 4-239. Pond 56 (Year 2 Post-Mastication) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2007	34.5%	65.6%
2015	74.4%	24.6%
2016	70.2%	26.6%
2019	60.1%	39.9%

Table 4-240. Pond 56 (Year 2 Post-Mastication) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
56	**60.1%**	**39.9%**

Species richness on transects has been variable between years and has slightly decreased between 2007 and 2019 at Pond 56. Species richness on transects was 17, 18, 12, and 15 species in 2007, 2015, 2016, and 2019, respectively, whereas overall basin species richness was 38, 41, and 79 species in 2015, 2016, and 2019, respectively (see Table 4-241 and Appendix B Table B-20). Pond 56 species richness for transects as well as the overall basin was less than the values observed at the reference vernal pools (see Table 4-242Table 4-228 and Appendix G Tables G-27 and G-54).

Species composition at Pond 56 was fairly similar among the monitoring years with differing dominant species between the years. Salt grass (*Distichlis spicata*) and pale spikerush (*Eleocharis macrostachya*) were important species in all years. The dominant species in 2007 was saltgrass, and the dominant species in 2015 was bugle hedge nettle (*Stachys ajugoides*), respectively. In 2016 and 2019 the two dominant species were pale spikerush and brown-headed rush (*Juncus phaeocephalus*), respectively. A complete comparison of species composition observed at Pond 56 in 2007, 2015, 2016, and 2019 can be found in Appendix H. Figure 4-116 shows a subset of this comparison for species observed with a 2% cover or greater.

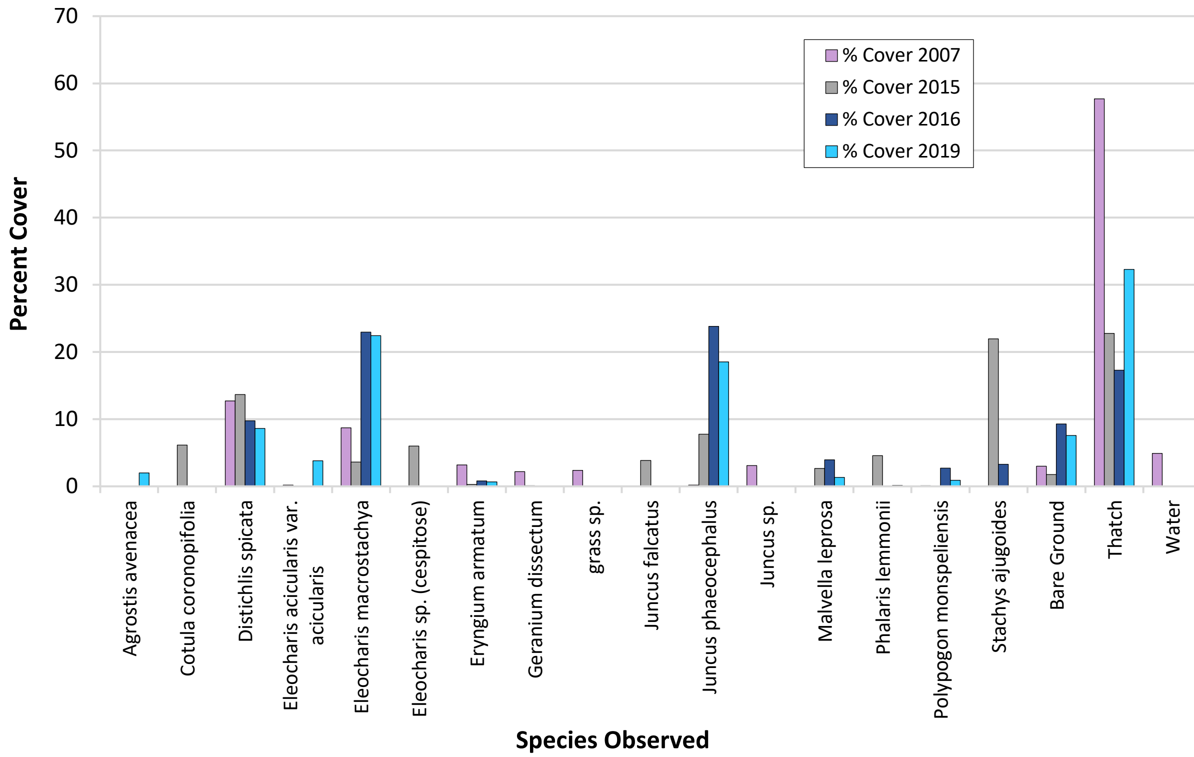

Figure 4-116. Percent Cover of Dominant Species at Pond 56 (Year 2 Post-Mastication)

Native and non-native species richness on Pond 56 transects were within the range of values observed in baseline years (see Table 4-241). Pond 56 native and non-native species richness in 2019 were less than values observed at the reference vernal pools (see Table 4-242). The relative percent cover of native and non-native species varied through time (see Table 4-243). Pond 56 native relative percent cover was greater than the values observed at the reference vernal pools and non-native percent cover was less than reference (see Table 4-244).

Table 4-241. Pond 56 (Year 2 Post-Mastication) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2007	9	6	2
2015	11	6	1
2016	8	4	0
2019	11	4	0

Table 4-242. Pond 56 (Year 2 Post-Mastication) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
56	**11**	**4**	**0**

Table 4-243. Pond 56 (Year 2 Post-Mastication) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2007	75.9%	8.1%	15.9%
2015	80.7%	11.3%	8.1%
2016	95.6%	4.4%	0.0%
2019	94.1%	5.9%	0.0%

Table 4-244. Pond 56 (Year 2 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
56	**94.1%**	**5.9%**	**0.0%**

Wetland and non-wetland species richness on Pond 56 transects were within the range observed in previous baseline years but were less than the values observed at the reference vernal pools (see Table 4-245 and Table 4-246). The relative percent cover of wetland and non-wetland species were within the range observed in previous baseline years (see Table 4-247). The relative percent cover of wetland and species was slightly greater than the values observed at reference vernal pools and the non-wetland cover was slightly less than reference (see Table 4-248).

Table 4-245. Pond 56 (Year 2 Post-Mastication) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2007	6	4	2	2	0	3
2015	5	5	2	1	0	5
2016	5	4	1	2	0	0
2019	5	6	1	1	0	2

Table 4-246. Pond 56 (Year 2 Post-Mastication) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
56	**5**	**6**	**1**	**1**	**0**	**2**

Table 4-247. Pond 56 (Year 2 Post-Mastication) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2007	29.3%	47.0%	0.6%	0.9%	0.0%	22.3%
2015	44.7%	40.4%	2.5%	3.6%	0.0%	8.7%
2016	41.4%	52.9%	0.1%	5.6%	0.0%	0.0%
2019	45.9%	48.2%	0.2%	2.2%	0.0%	3.5%

Table 4-248. Pond 56 (Year 2 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
56	**45.9%**	**48.2%**	**0.2%**	**2.2%**	**0.0%**	**3.5%**

4.20.2.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 56 was dominated by native and wetland plant species during year 2 post-mastication monitoring in 2019. Pond 56 wetland vegetation results were generally within range of baseline and/or reference vernal pools, however native cover in 2019 was greater than baseline and the reference vernal pools.

4.20.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 56, a post-mastication vernal pool, was on track to meet the performance standard for year 2 in 2019. The species composition, richness, and native and wetland species relative abundances were similar to baseline and/or reference vernal pool conditions, however native cover was greater. Pond 56 provided suitable wetland habitat in 2019.

4.20.3 Wildlife Monitoring

Wildlife data were collected at Pond 56 in 2007, 2013, 2014, 2015, 2016, and 2019 (Shaw, 2008; Tetra Tech, 2014, 2015; Burleson, 2016, 2017). California tiger salamander larvae were observed in 2015, 2016, and 2019. Fairy shrimp were detected in 2007, 2013, and 2019. Table 4-249 shows historic wildlife monitoring results.

Table 4-249. Pond 56 (Year 2 Post-Mastication) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2007	Not detected	Moderate (23, 20)
2013	Not detected	Present
2014	Not detected	Not detected
2015	Few – Common (14, 13, 1)	Not detected
2016	Common – Abundant (28, 101)	Not detected
2019	Common (20, 19, 10)	Moderate (22)

4.20.3.1 *Data Quality Objective 1*

Pond 56 provided suitable depth for CTS and fairy shrimp as discussed in Section 4.20.1.1.

4.20.3.2 *Data Quality Objective 4*

California tiger salamanders and fairy shrimp were present at Pond 56 in 2019; therefore, the water quality was adequate to support both species. Compared to other vernal pools and previous Pond 56 data, the water quality data were within normal ranges. The pH ranged from 6.20 in March to 6.92 in June with a mean of 6.54. Temperature ranged from 9.40°C in January to 18.53°C in June with a mean of 14.66°C. Dissolved oxygen ranged from 3.01 mg/L in May to 8.22 mg/L in January with a mean of 6.36 mg/L. Turbidity ranged from 1.5 FNU in April to 11.4 FNU in January with a mean of 5.9 FNU (see Table 3-76).

4.20.3.3 *Data Quality Objective 5*

California tiger salamanders were present in 2019, which was consistent with some baseline surveys. Baseline monitoring results varied where CTS were observed in 2015 and 2016, but were not detected in 2007, 2013, and 2014.

Fairy shrimp were present in 2019, which was consistent with some baseline surveys. Baseline monitoring in 2007 and 2013 yielded detections, while the species was not detected in 2014, 2015, or 2016. It was possible survey timing prevented detection in 2014 through 2016 because surveys occurred later in the year (March through May).

4.20.3.4 *Performance Standard: Wildlife Usage*

Pond 56, a post-mastication vernal pool, was on track to meet the performance standard for year 2. The vernal pool was on track to meet DQOs 1, 4, and 5 and provided suitable CTS and fairy shrimp habitat.

4.20.4 Conclusion

Pond 56, a post-mastication vernal pool, was in year 2 of monitoring in 2019. The vernal pool was on track to meet all of the performance standards (see Table 4-250). Pond 56 will continue to be monitored in the future.

Table 4-250. Success at Pond 56 (Year 2 Post-Mastication) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	On track
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	On track
	DQO 4	On track
	DQO 5	On track

4.21 Pond 60 – Year 2 and Year 1

Pond 60 was monitored in 2019 as a year 2 post-mastication vernal pool and year 1 post-subsurface munitions remediation. Pond 60 was monitored for baseline conditions in 2015 and 2016. Grasses and shrubs in and around Pond 60 were masticated in summer of 2017 to support MEC remediation activities. Pond 60 had intrusive anomaly investigations in 2018. Table 4-251 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 60 (see Figure 4-117). The 2015-2016 and 2018-2019 water-years were above-normal, whereas the 2014-2015 and 2017-2018 water-years were below-normal.

Table 4-251. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year			
	2014-2015	2015-2016	2017-2018	2018-2019
Hydrology	●	●	●	●
Vegetation	●		●	●
Wildlife	●	●	●	●

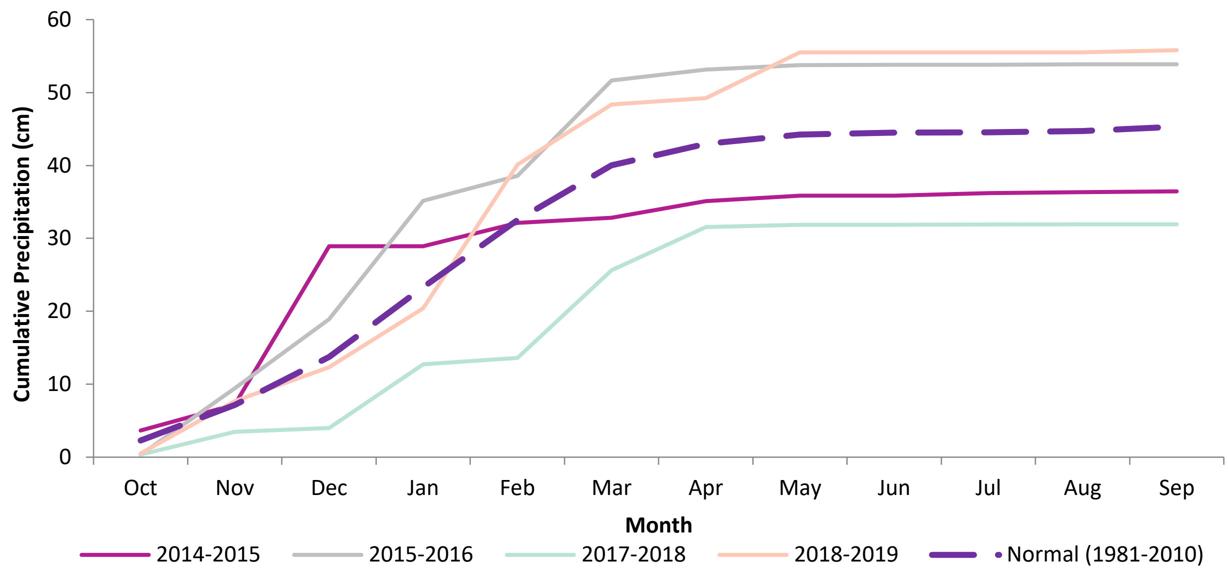

Figure 4-117. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.21.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 60 was 2.48 acres with a maximum depth of approximately 98 cm. The depth and inundation values were within range of the previously recorded values (see Appendix F Table F-21). Pond 60 was inundated from the first recorded monitoring in December and did not dry by the last recorded monitoring in September. Figure 4-118 illustrates the relationship of precipitation and depth at Pond 60 for 2019 as well as baseline in 2016.

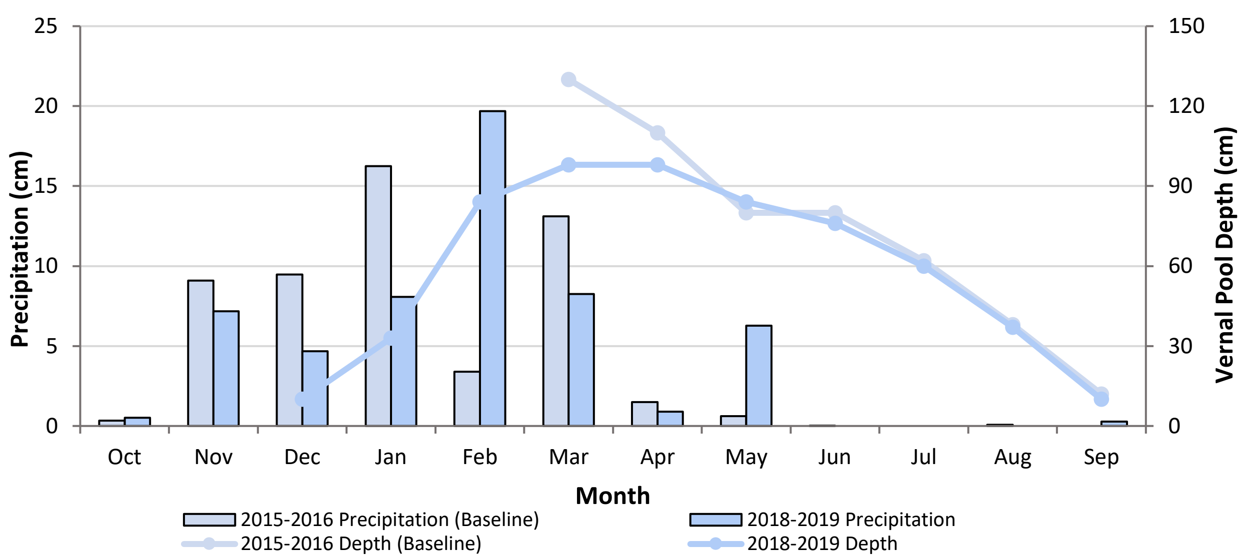

Figure 4-118. Monthly Depth and Precipitation at Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) for 2018-2019 Water-Year Compared to Baseline 2015-2016 Water-Year

In below-normal precipitation years, Pond 60 is likely to range from 0-59 cm in depth with an inundation of 0.02-1.31 acres. No depths or inundations for Pond 60 have been recorded in normal precipitation years. In above-normal precipitation years, Pond 60 could have maximum depths of 130 cm or more and a maximum inundation up to 2.70 acres (see Appendix F Table F-21). Figure 4-119 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-120 illustrates historic and recent inundation areas.

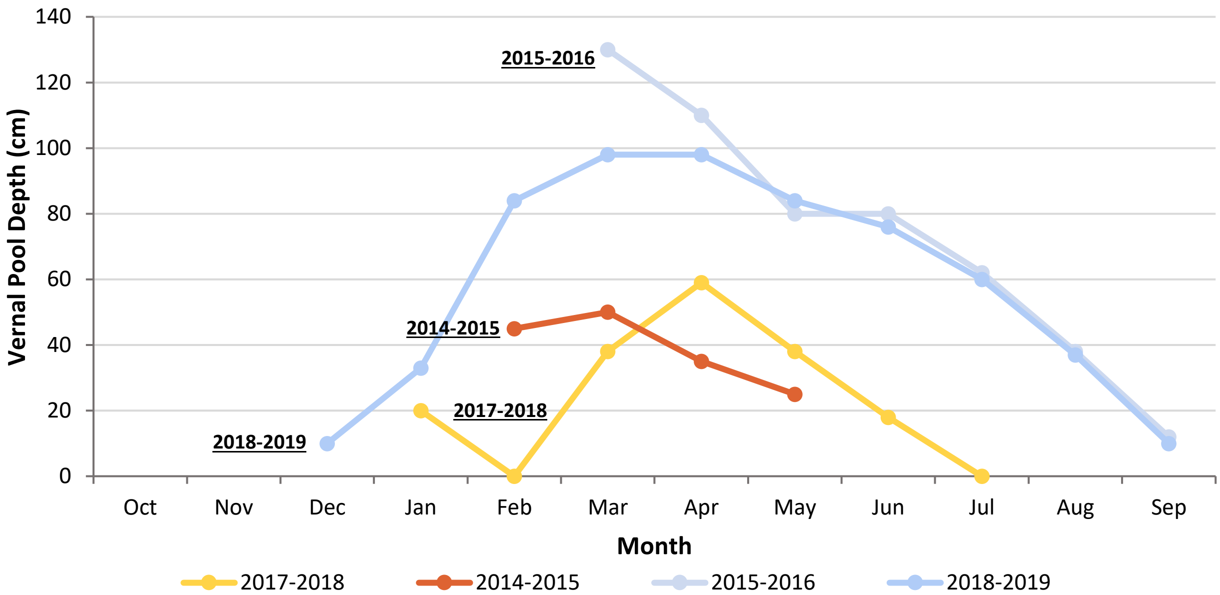

Figure 4-119. Historic Monthly Depths at Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

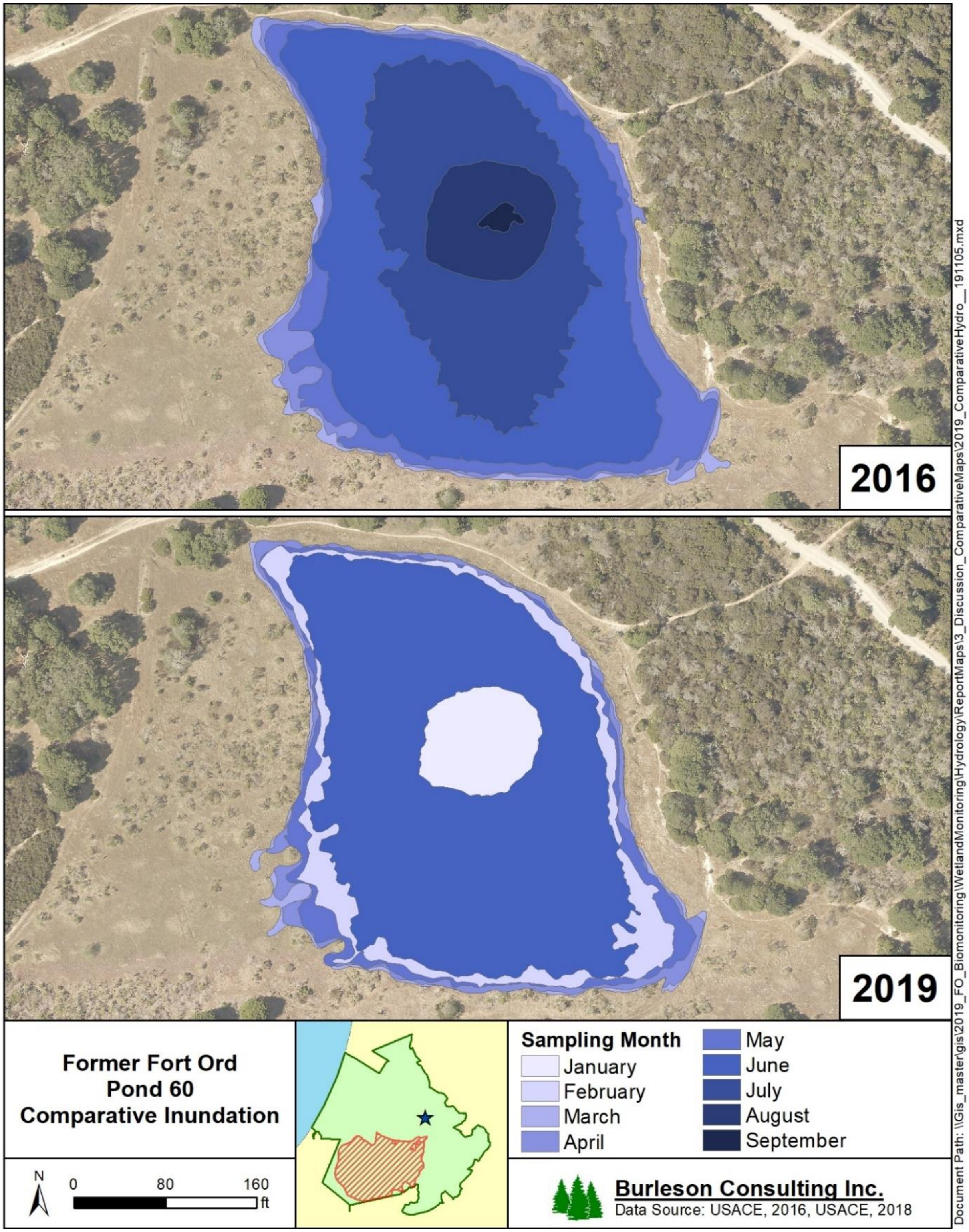

Figure 4-120. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Inundations for 2015-2016 (above-normal precipitation) and 2018-2019 (above-normal precipitation). The vernal pool was masticated in 2017, had subsurface munitions remediation in 2018, and was in year 2 and 1 of monitoring in 2019.

4.21.1.1 *Data Quality Objective 1*

Pond 60 met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 60 provided sufficient depth for CTS (56 cm through March) and for fairy shrimp (68 cm through May). Pond 60 likely met the DQO in 2015 and 2016; although in both years monitoring started in February and April, respectively. In 2015 and 2016, monitoring started later in the season. Depths observed at Pond 60 were above the ranges observed at all reference vernal pools (Ponds 5, 101 East (East), and 997).

4.21.1.2 *Data Quality Objective 2*

Pond 60 had similar inundations in 2019 as previous years. Pond 60 was inundated in December and did not dry by the last monitoring event in September. The inundation range was 0.18-2.48 acres with a mean of 1.91 acres. The historic inundation ranges in 2015 and 2016 were between 0.01 and 2.65 acres. The 2019 inundations were within this range and most similar to 2016. Pond 60 can be expected to fill even in below-normal years (see Figure 4-119). Pond 60 is smaller than reference Ponds 5 and 101 East (East), but larger than Pond 997. Pond 60 had a similar large inundation range as Pond 101 East (East), however Pond 60 held water longer than any of the reference vernal pools.

4.21.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 60, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for year 2 in 2019. Pond 60 met DQO 1 and DQO 2 indicating that it provided suitable habitat for CTS and fairy shrimp and was similar to itself in previous monitoring years and reference vernal pools. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.21.2 Vegetation Monitoring

Vegetation data were collected at Pond 60 in 2015, 2018, and 2019 (Burleson, 2016, 2019). In 2015, 2018, and 2019, data were collected using the methodology described in the Methods section of this report. Data from 2015 and 2019 were compared stratum-to-stratum in Table 4-252 as well as visually in Figure 4-121.

Table 4-252. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2015	2019
1	7%	10%
2	35%	46%
3	3%	20%
4	27%	24%
5	2%	N/A
6	26%	N/A

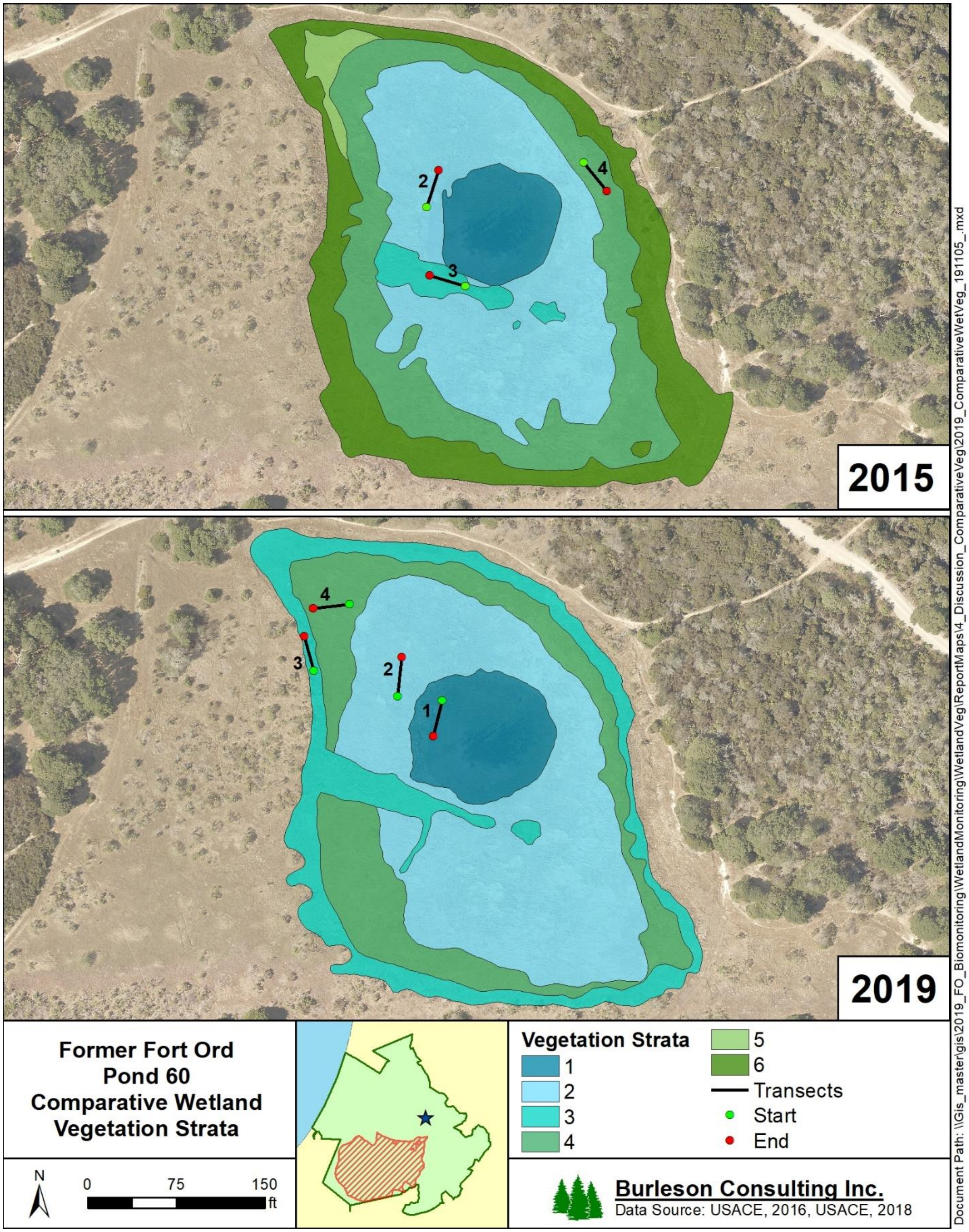

Figure 4-121. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2015 and 2019

Absolute percent vegetative cover decreased between 2015 and 2018 and increased by 2019 (see Table 4-253). The absolute percent vegetative cover of Pond 60 in 2019 was slightly greater than the values observed at the reference vernal pools and thatch/bare ground lower (see Table 4-254).

Table 4-253. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2015	61.8%	38.4%
2018	40.8%	59.7%
2019	77.5%	22.5%

Table 4-254. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
60	**77.5%**	**22.5%**

Species richness increased between 2015 and 2018 and decreased slightly by 2019 at Pond 60. Species richness on transects was 13, 19, and 14 species in 2015, 2018, and 2019, respectively, whereas overall basin species richness was 30, 59, and 46 species, respectively (see Table 4-255 and Appendix B Table B-21). Pond 60 species richness was considerably less than the values observed at the reference vernal pool on transects and for the entire basin (see Table 4-256 and Appendix G Tables G-27 and G-54).

Species composition at Pond 60 was similar in 2015, 2018, and 2019. The dominant species in all years were salt grass (*Distichlis spicata*), brown-headed rush (*Juncus phaeocephalus*), and pale spikerush (*Eleocharis macrostachya*). A complete comparison of species composition observed at Pond 60 in 2015, 2018, and 2019 can be found in Appendix H. Figure 4-122 shows a subset of this comparison for species observed with a 2% cover or greater.

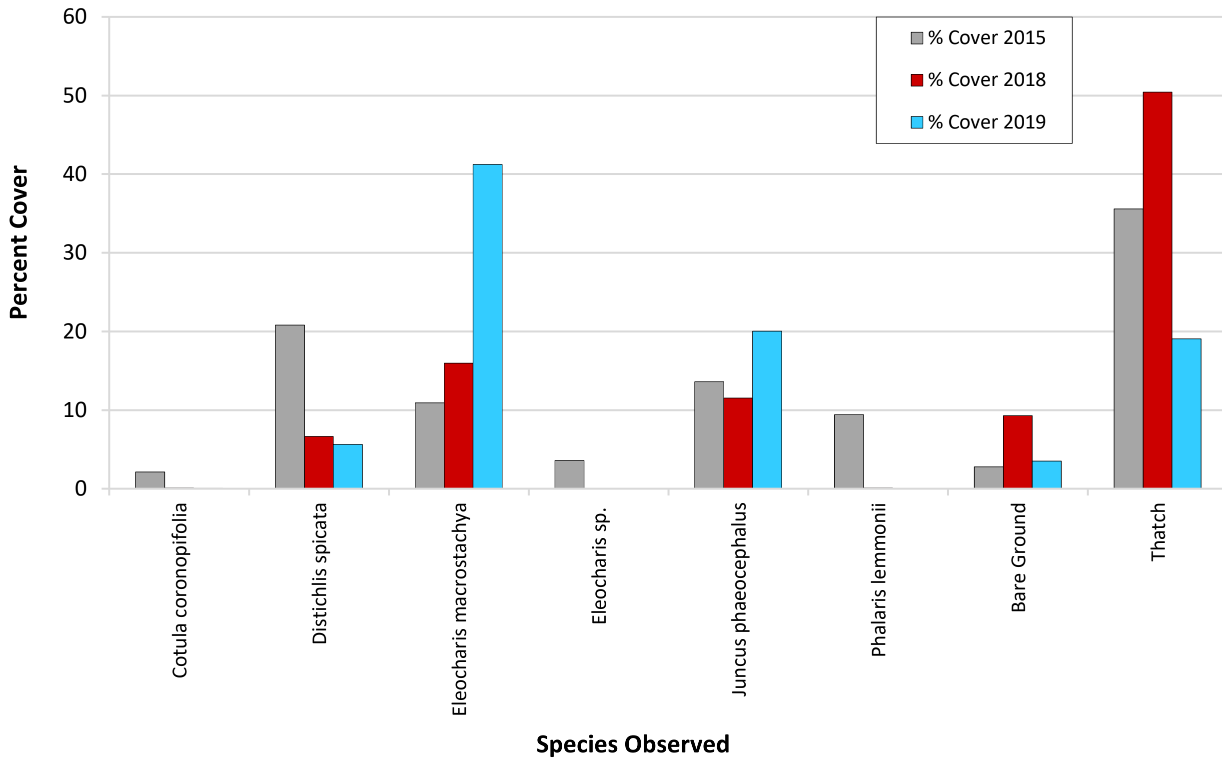

Figure 4-122. Percent Cover of Dominant Species at Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation)

Native and non-native species richness on Pond 60 transects was greater than the values observed in the baseline year but less than values observed in 2018 (see Table 4-255). Pond 60 native and non-native species richness in 2019 were considerably less than the values observed in reference vernal pools (see Table 4-256). The relative percent cover of native and non-native species was very similar to the value observed in the baseline year and slightly less than 2018 (see Table 4-257). Pond 60 relative percent cover of native species was greater than the value observed at the reference vernal pools, whereas the non-native species cover was less than reference (see Table 4-258).

Table 4-255. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2015	4	7	2
2018	10	9	0
2019	7	7	0

Table 4-256. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
60	7	7	0

Table 4-257. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2015	88.5%	5.5%	6.0%
2018	92.8%	7.2%	0.0%
2019	88.3%	11.7%	0.0%

Table 4-258. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
60	88.3%	11.7%	0.0%

Wetland and non-wetland species richness on Pond 60 transects were greater than the values observed in the baseline year but less than values observed in 2018 (see Table 4-259). The wetland and non-wetland species richness at Pond 60 were slightly less than the reference vernal pool values in 2019 (see Table 4-260). Relative percent cover of wetland and non-wetland species increased from 2015 to 2019 (see Table 4-261). The relative percent cover of wetland species was greater than the values observed at the reference vernal pools while non-wetland species cover was less than reference (and Table 4-262).

Table 4-259. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2015	3	4	3	1	0	2
2018	5	6	3	2	1	2
2019	6	4	2	2	0	0

Table 4-260. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
60	**6**	**4**	**2**	**2**	**0**	**0**

Table 4-261. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2015	21.4%	71.4%	0.8%	0.4%	0.0%	6.0%
2018	45.8%	52.1%	0.5%	0.7%	0.1%	0.8%
2019	56.2%	43.5%	0.2%	0.1%	0.0%	0.0%

Table 4-262. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
60	**56.2%**	**43.5%**	**0.2%**	**0.1%**	**0.0%**	**0.0%**

4.21.2.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 60 was dominated by native and wetland plant species during year 2 post-mastication monitoring in 2019. Pond 60 wetland vegetation results were within range of baseline and/or reference vernal pools.

4.21.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 60, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for year 2 in 2019. The species composition, richness, and native and wetland species relative abundances were similar to baseline and reference vernal pool conditions. Pond 60 provided suitable wetland habitat in 2019.

4.21.3 Wildlife Monitoring

Wildlife data were collected at Pond 60 in 2015, 2016, 2018, and 2019 (Burleson, 2016, 2017, 2019). California tiger salamander larvae were observed in 2015, 2016, and 2019. Fairy shrimp were detected in 2019. Table 4-263 shows historic wildlife monitoring results.

Table 4-263. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2015	Common (23, 19, 28)	Not detected
2016	Few – Common (3, 11, 7)	Not detected
2018	Not detected	Not detected
2019	Few – Common (5, 53, 18)	Low (6)

4.21.3.1 *Data Quality Objective 1*

Pond 60 provided suitable depth for CTS and fairy shrimp as discussed in Section 4.21.1.1.

4.21.3.2 *Data Quality Objective 4*

California tiger salamanders and fairy shrimp were present at Pond 60 in 2019; therefore, the water quality was adequate to support both species. Compared to other vernal pools and previous Pond 60 data, the water quality data were within normal ranges. The pH ranged from 6.36 in March to 6.84 in January with a mean of 6.55. Temperature ranged from 9.23°C in February to 20.01°C in June with a mean of 14.16°C. Dissolved oxygen ranged from 4.12 mg/L in May to 9.10 mg/L in February with a mean of 6.10 mg/L. Turbidity range was from 1.2 FNU in January to 67.1 FNU in June with a mean of 15.7 FNU (see Table 3-80).

4.21.3.3 *Data Quality Objective 5*

California tiger salamanders were present in 2019, which is similar to baseline survey years. The species was observed in baseline years 2015 and 2016.

Fairy shrimp were present in 2019, which was inconsistent with previous monitoring. Fairy shrimp were not detected in baseline years 2015 or 2016. It was possible survey event timing prevented detection in 2015 and 2016 because surveys occurred later in the year (March through May).

4.21.3.4 *Performance Standard: Wildlife Usage*

Pond 60, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for year 2. Fairy shrimp were present in 2019 but not baseline, likely because surveys occurred too late in the season in 2015 and 2016. The vernal pool was on track to meet DQOs 1, 4, and 5 and provided suitable CTS and fairy shrimp habitat.

4.21.4 Conclusion

Pond 60, a post-mastication and post-subsurface munitions remediation vernal pool, was in year 2 of monitoring in 2019. The vernal pool was on track to meet all of the performance standards (see Table 4-264). Pond 60 will continue to be monitored in the future.

Table 4-264. Success at Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	On track
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	On track
	DQO 4	On track
	DQO 5	On track

4.22 Pond 61 – Year 2 and Year 1

Pond 61 was monitored in 2019 as a year 2 post-mastication and year 1 post-subsurface munitions remediation vernal pool. Although limited subsurface remediation occurred at this vernal pool in 1999, the Army did not conduct monitoring prior to 2017 and it is assumed that 2017 represents baseline conditions. Less than 50 percent of the watershed of Pond 61 was masticated in the summer of 2017 to support MEC remediation in BLM Area B Subunits B-3 East and B2-A. Pond 61 had intrusive anomaly investigations in 2018. Table 4-265 summarizes the years that monitoring occurred and surveys conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 61 (see Figure 4-123). The 2016-2017 and 2018-2019 water-years were above-normal, whereas the 2017-2018 water-year was below-normal.

Table 4-265. Summary of Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year		
	2016-2017	2017-2018	2018-2019
Hydrology	●	●	●
Vegetation	●	●	●
Wildlife	●		●

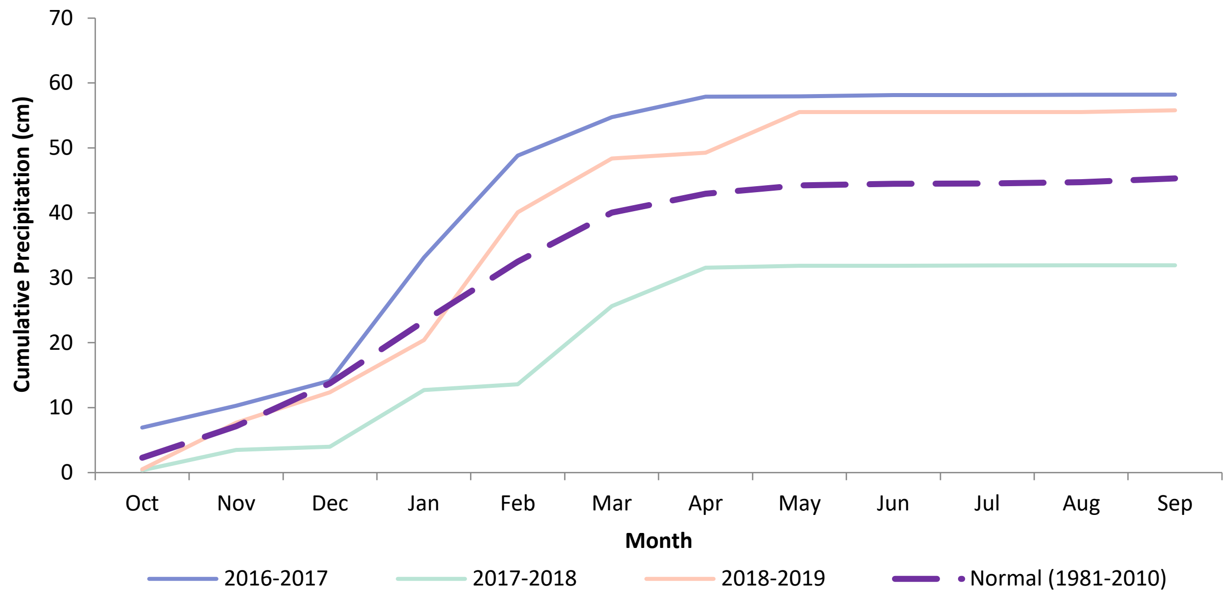

Figure 4-123. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.22.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 61 was 0.12 acres with a maximum depth of approximately 20 cm. The depth and inundation values were within range of the previously recorded values (see Appendix F Table F-20). Pond 61 was inundated from February through April. Figure 4-124 illustrates the relationship of precipitation and depth at Pond 61 for 2019 as well as baseline in 2016.

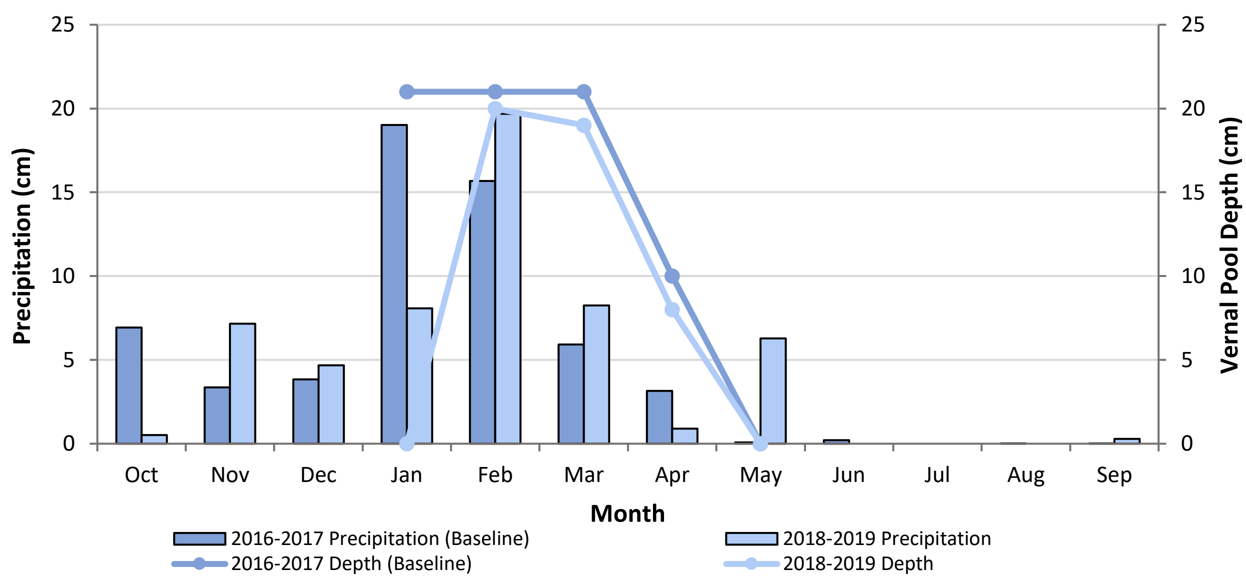

Figure 4-124. Monthly Depth and Precipitation at Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) for 2018-2019 Water-Year Compared to Baseline 2016-2017 Water-Year

In below-normal precipitation years, Pond 61 is likely to remain dry. No depths or inundations for Pond 61 have been recorded in normal precipitation years. In above-normal precipitation years, Pond 61 could have maximum depths of 21 cm or more and a maximum inundation up to 0.70 acres (see Appendix F Table F-22). Figure 4-125 illustrates historic vernal pool depths by month and organized by water-year.

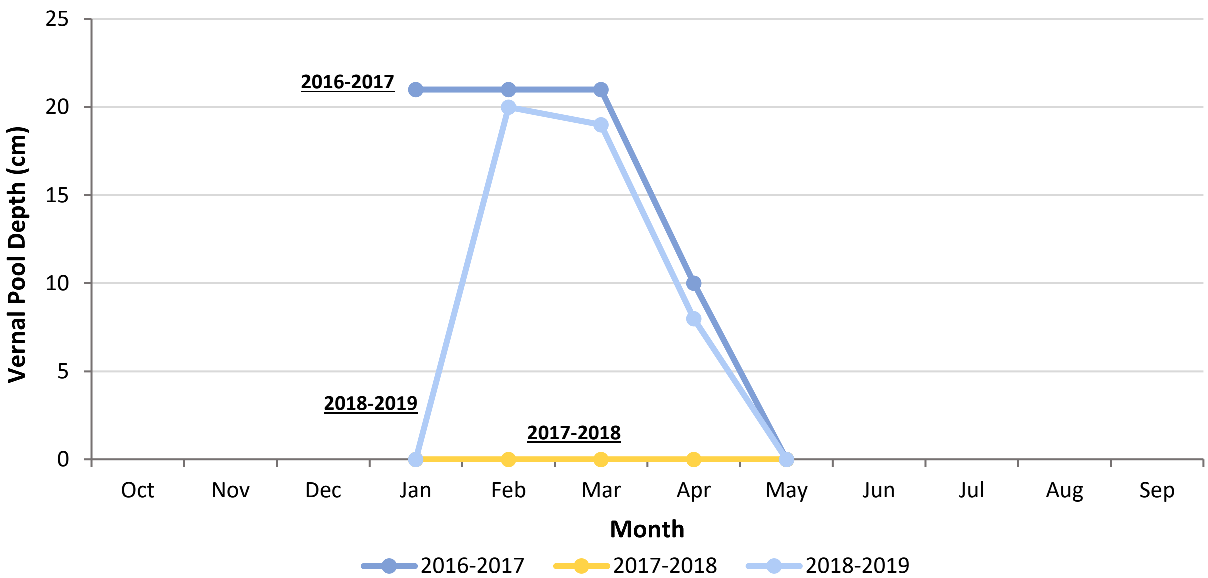

Figure 4-125. Historic Monthly Depths at Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

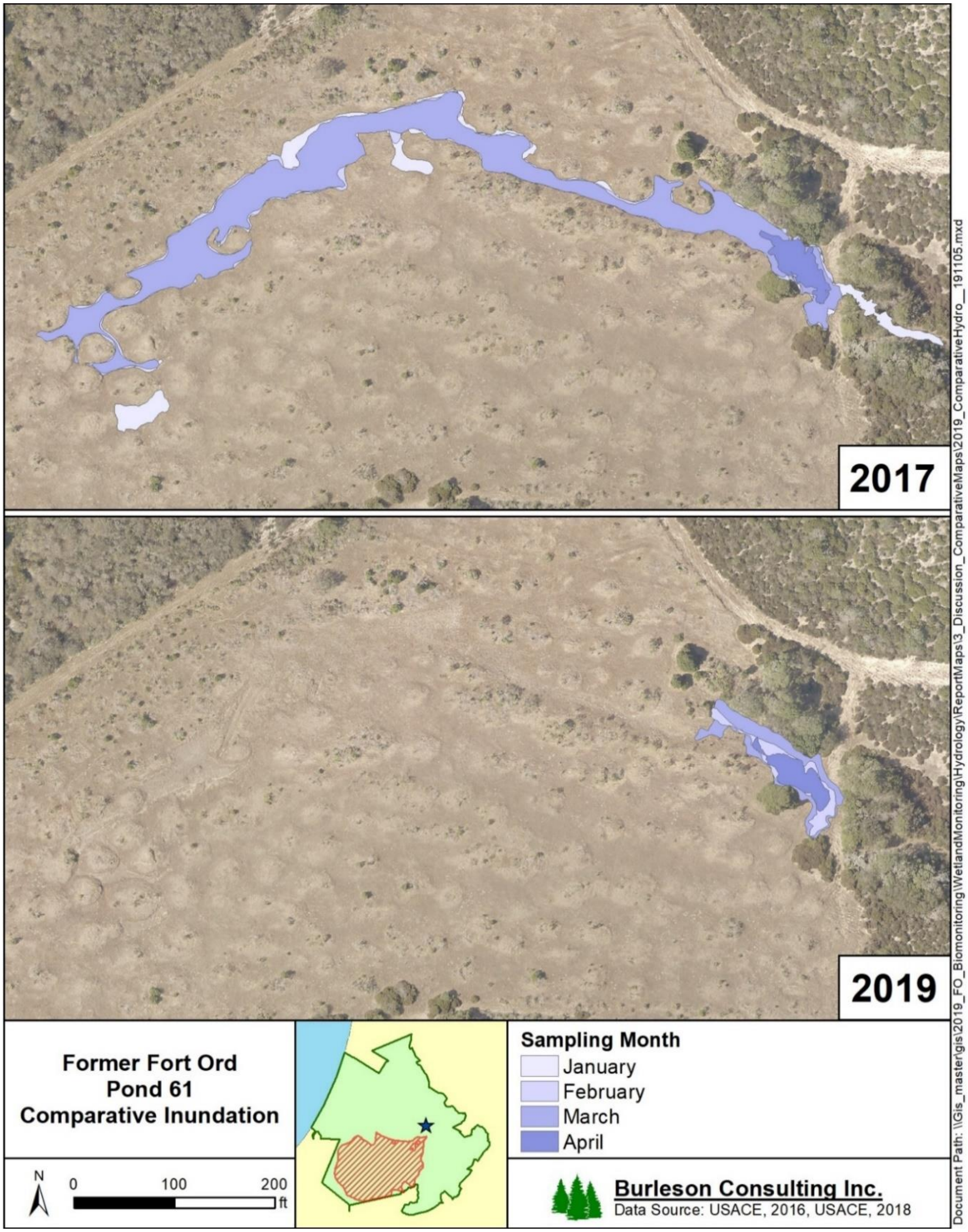

Figure 4-126. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Inundations for 2016-2017 (above-normal precipitation) and 2018-2019 (above-normal precipitation). Vegetation within the watershed was masticated in 2017, and subsurface munitions remediation occurred in 2018. The vernal pool was in years 2 and 1 of monitoring in 2019. Peripheral ponding was present in 2017 and 2019.

4.22.1.1 *Data Quality Objective 1*

Pond 61 did not meet the required average depths of 25 cm from the first rain event through March for CTS or 10 cm for 18 consecutive days through May for fairy shrimp. Pond 61 did not provide sufficient depth for CTS (20 cm through March) or for fairy shrimp (16 cm through April). Despite providing greater than 10 cm depth, the vernal pool was dry by May. In 2017, Pond 61 partially met the DQO for fairy shrimp. In 2019, Pond 61 was similar to reference Pond 997 because both vernal pools did not meet DQO 1.

4.22.1.2 *Data Quality Objective 2*

Pond 61 inundations in 2019 were smaller than the values observed in the baseline year 2017. Pond 61 was inundated February through April 2019 with an inundation range of 0.04-0.12 acres and a mean of 0.07 acres. The historic inundation range in 2017 was between 0.05-0.70 acres. Pond 61 can be expected to fill in above-normal years but is likely to remain dry in a below-normal year. Pond 61 had a similar inundation range and timing as Pond 997, both were inundated February through April and had small inundation areas.

4.22.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 61, a post-mastication and post-subsurface munitions remediation vernal pool, was not on track to meet the performance standard for year 1 and year 2, in 2019. Pond 61 did not meet DQO 1. Evaluation of DQO 2 indicated that Pond 61 was most similar to reference Pond 997. However, Pond 61 was smaller than the values observed in the baseline year of monitoring which is possibly related to 2017 having a greater precipitation than 2018. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standards.

4.22.2 Vegetation Monitoring

Vegetation data were collected at Pond 61 in 2017, 2018, and 2019 (Burleson, 2018, 2019). Baseline vegetation data were collected at Pond 61 in 2017. Data were collected using the methodology described in the Methods section of this report. Data from 2017 and 2019 and were compared stratum-to-stratum in Table 4-266 as well as visually in Figure 4-127**.**

Pond 61 also supports a CCG population, which is represented by stratum 2. The population was mapped and a visual estimate of percent cover was recorded in 2019 to compare to 2017 and 2018 (see Figure 3-48 in Section 3.22.2.1).

Table 4-266. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2017	2019
1	1%	1%
2 (CCG)	5%	4%
3	7%	4%
4	54%	55%
Upland	33%	36%

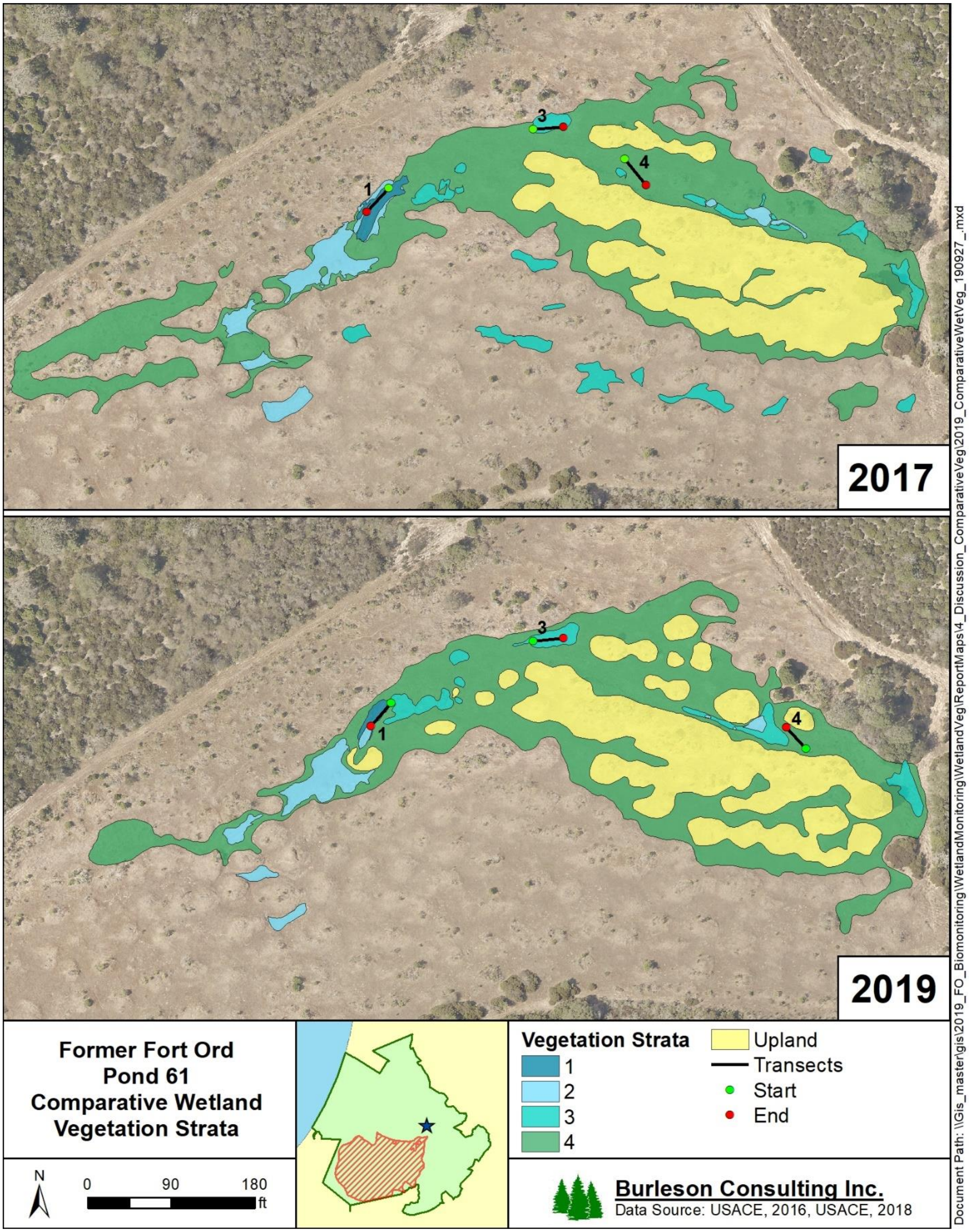

Figure 4-127. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2017 and 2019

Absolute percent vegetative cover decreased between 2017 and 2018, then increased slightly by 2019 (see Table 4-267). Pond 61 vegetative cover was less than the values observed at the reference vernal pools and thatch/bare ground was greater (see Table 4-268).

Table 4-267. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2017	69.4%	32.1%
2018	60.6%	40.8%
2019	66.6%	35.7%

Table 4-268. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
61	66.6%	35.7%

Species richness increased between 2017 and 2019 at Pond 61. Species richness on transects was 25, 41, and 47 species in 2017, 2018, and 2019 respectively, whereas overall basin species richness was 100, 100, and 119 species, respectively (see Table 4-269 and Appendix B Table B-22). Pond 61 species richness was within the range observed on transects at the reference vernal pools and greater than the values observed for the entire basin (see Table 4-270 and Appendix G Tables G-27 and G-54).

Species composition at Pond 61 was different in 2017, 2018 and 2019, however the dominant species were similar. The dominant species in 2017 and 2018 were brown-headed rush (*Juncus phaeocephalus*) and pale spikerush (*Eleocharis macrostachya*), and Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*), respectively. In 2019, the dominant species was brown-headed rush. A complete list of species composition observed during the surveys at Pond 61 in 2017, 2018, and 2019 can be found in Appendix H. Figure 4-128 shows a subset of this comparison for species observed with a 2% cover or greater.

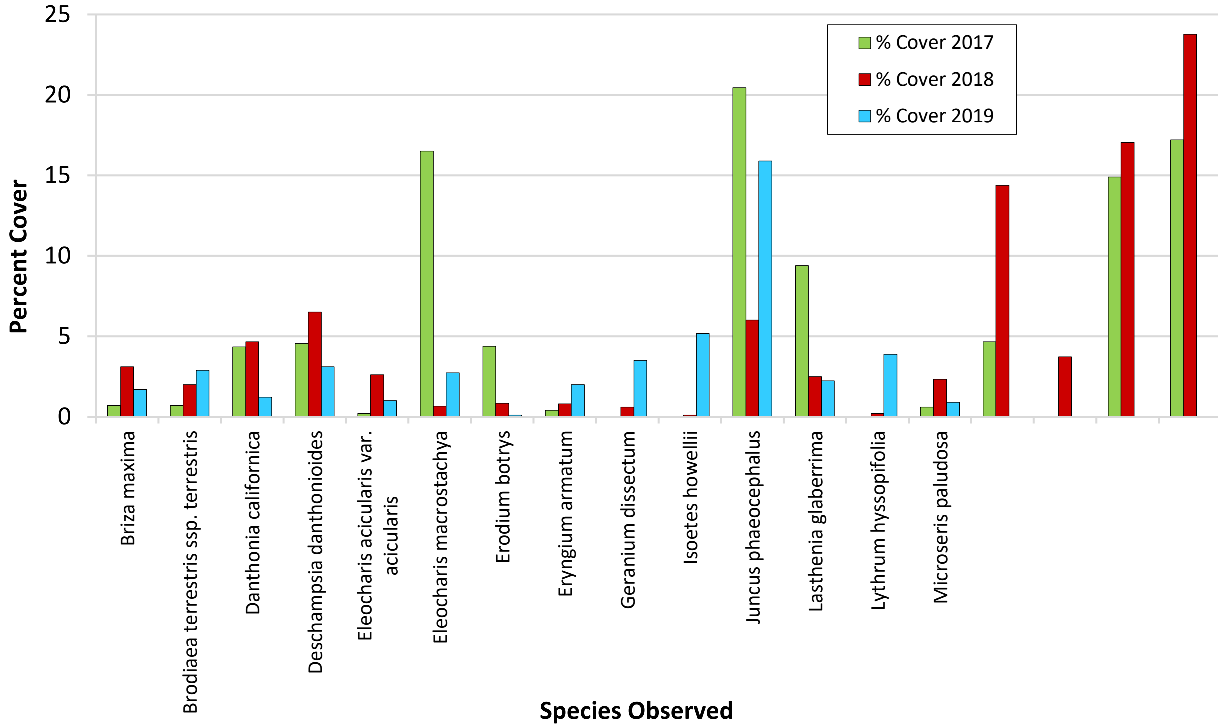

Figure 4-128. Percent Cover of Dominant Species at Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation)

Native and non-native species richness on Pond 61 transects increased between 2017 and 2019 (see Table 4-269). Native species richness was greater than the values observed at the reference vernal pools whereas non-native species richness was less than reference (see Table 4-270). The relative percent cover of native species decreased between 2017 and 2019, whereas the relative percent cover of non-native species increased (see Table 4-271). Pond 61 native relative percent cover was greater than the values observed at the reference vernal pools whereas non-native relative percent cover was less than reference (Table 4-272).

Table 4-269. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2017	15	6	2
2018	24	16	1
2019	32	13	2

Table 4-270. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
61	**32**	**13**	**2**

Table 4-271. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2017	90.3%	9.4%	0.3%
2018	80.1%	19.8%	0.1%
2019	79.0%	18.3%	2.8%

Table 4-272. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
61	**79.0%**	**18.3%**	**2.8%**

Wetland species richness on Pond 61 transects increased between 2017 and 2019, whereas non-wetland was the same as the baseline year (see Table 4-273). Wetland species richness was greater than the values observed at the reference vernal pools whereas non-wetland species richness was less than reference (see Table 4-274). The relative percent cover of wetland and non-wetland species decreased from previous years (see Table 4-275). However, the wetland relative percent cover values were within range of the reference vernal pools and non-wetland cover was less than reference (see Table 4-276).

Table 4-273. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2017	4	6	2	5	0	6
2018	10	10	3	7	1	10
2019	11	11	6	4	1	14

Table 4-274. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
61	**11**	**11**	**6**	**4**	**1**	**14**

Table 4-275. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2017	44.3%	37.6%	6.5%	8.2%	0.0%	3.3%
2018	40.6%	31.7%	9.3%	3.2%	0.5%	14.9%
2019	39.0%	36.8%	3.6%	0.3%	0.3%	19.9%

Table 4-276. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
61	**39.0%**	**36.8%**	**3.6%**	**0.3%**	**0.3%**	**19.9%**

4.22.2.1 *Contra Costa Goldfields*

The area of CCG at Pond 61 decreased slightly from 0.14 acres in 2017 to 0.12 acres in 2018 to 0.11 acres in 2019 (Burleson, 2018, 2019) (see Figure 4-129). The density ranged from 10-65% in 2017, 5-65% in 2018, and 5-85% in 2019. In 1999, 2000, 2002, 2017, and 2018 the CCG population was in similar locations as 2019 and all within the range of 0.09-0.14 acres (HLA, 2000, 2001; MACTEC, 2003; Burleson, 2018, 2019). Results suggest that remedial mastication activities in 2017 and post-subsurface munitions remediation in 2019 did not affect the population. Minor changes in population size can be attributed to natural fluctuation. In future years, pig rooting impacts should be considered when evaluating the CCG at Pond 61. The results for 2019 were recorded prior to the wild pig disturbance at Pond 61.

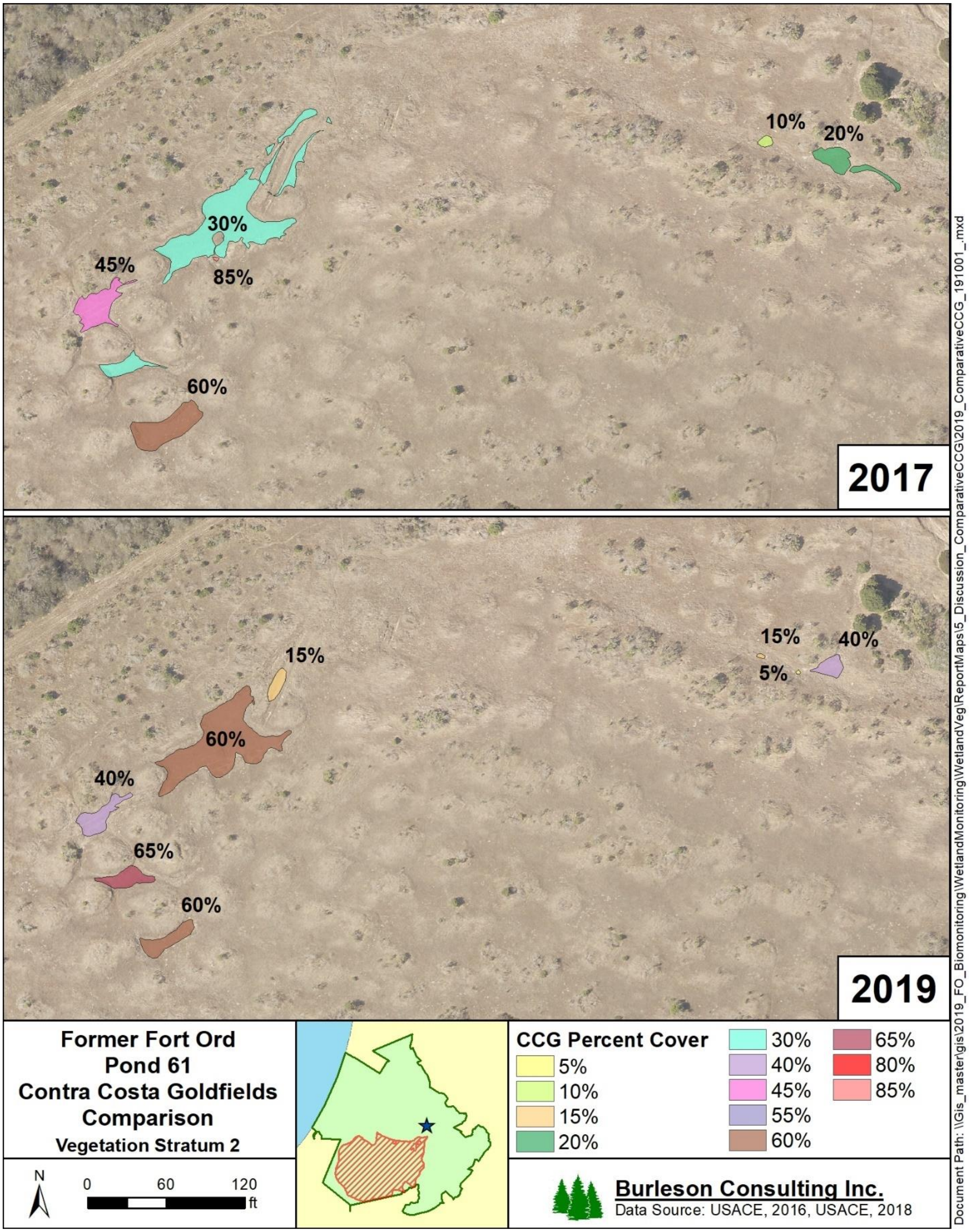

Figure 4-129. Contra Costa Goldfields Populations at Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) in 2017 and 2019

4.22.2.2 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 61 was dominated by native and wetland plant species during year 2 post-mastication monitoring in 2019. Pond 61 wetland vegetation results were generally within range of baseline and/or reference vernal pools. The only exception was native species richness which was greater than baseline and reference vernal pools.

4.22.2.3 *Performance Standard: Plant Cover and Species Diversity*

Pond 61, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for years 2 and 1, respectively, in 2019. The species composition, richness, and native and wetland species relative abundances were similar to baseline and/or reference vernal pool conditions. Native species richness was greater than baseline or reference vernal pool. Pond 61 provided suitable wetland habitat in 2019.

4.22.3 Wildlife Monitoring

Wildlife data were collected at Pond 61 in 2017 and 2019 (Burleson, 2018). California tiger salamander larvae were not observed in either year. Fairy shrimp were detected in 2019. Table 4-277 shows historic wildlife monitoring results.

Table 4-277. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2017	Not detected	Not detected
2019	Not detected	High (162)

4.22.3.1 *Data Quality Objective 1*

Pond 61 did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.22.1.1.

4.22.3.2 *Data Quality Objective 4*

Fairy shrimp were present at Pond 61 in 2019, whereas CTS were not detected. The water quality was adequate. Compared to other vernal pools and previous Pond 61 data, water quality data were within normal ranges. The pH ranged from 6.46 in February to 6.79 in April with a mean of 6.58. Temperature ranged from 9.42°C in February to 14.15°C in April with a mean of 11.99°C. Dissolved oxygen ranged from 5.94 mg/L in March to 9.34 mg/L in February with a mean of 7.10 mg/L. Turbidity ranged from 17.1 FNU in April to 52.3 FNU in February with a mean of 30.2 FNU (see Table 3-84).

4.22.3.3 *Data Quality Objective 5*

California tiger salamanders were not detected in 2019, which was consistent with the baseline survey in 2017 where the species was not detected.

Fairy shrimp were present in 2019, which was not consistent with the baseline survey. Fairy shrimp were not detected in 2017. It was possible survey timing prevented detection in 2017 because surveys occurred later in the year (late March).

4.22.3.4 *Performance Standard: Wildlife Usage*

Pond 61, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for years 1 and 2. Fairy shrimp were present in 2019 but not baseline, likely because surveys occurred too late in the season in 2017. The vernal pool was on track to meet DQOs 4 and 5. Pond 61 had adequate water quality conditions but did not provide suitable habitat for CTS, similar to reference Pond 997. This is consistent with baseline conditions as CTS have not been detected at this vernal pool. Additionally, depths were not suitable for fairy shrimp habitat according to DQO 1; however, the species was present.

4.22.4 Conclusion

Pond 61, a post-mastication and post-subsurface munitions remediation vernal pool, was in years 2 and 1 of monitoring in 2019. The vernal pool was on track to meet the plant cover and species diversity performance standard but was partially on track to meet hydrological conditions and wildlife usage (see Table 4-278). This is due to the vernal pool not providing an average depth appropriate for CTS habitat and drying before the required hydrological conditions for fairy shrimp habitat. However, fairy shrimp were detected in Pond 61 in 2019. Pond 61 will continue to be monitored in the future.

Table 4-278. Success at Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	Not on track*
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	Not on track*
	DQO 4	On track
	DQO 5	On track

*Fairy shrimp and CTS depth requirements were not met in 2019, but fairy shrimp were present.

4.23 Pond 73 – Year 2 and Year 1

Pond 73 was monitored in 2019 as a year 2 post-mastication and year 1 post-subsurface munitions remediation vernal pool. Vegetation within the Pond 73 watershed was masticated in the summer of 2017 to support MEC remediation in BLM Area B Subunit B-3 East. Pond 73 had intrusive anomaly investigations in 2018. Baseline inundation and vegetation surveys were recorded in 2017 but no baseline depth, water quality, or wildlife monitoring has been conducted. Table 4-279 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 73 (see Figure 4-130). The 2016-2017 and 2018-2019 water-years were above-normal, whereas the 2017-2018 water-year was below-normal.

Table 4-279. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year		
	2016-2017	2017-2018	2018-2019
Hydrology	●	●	●
Vegetation	●	●	●
Wildlife		●	●

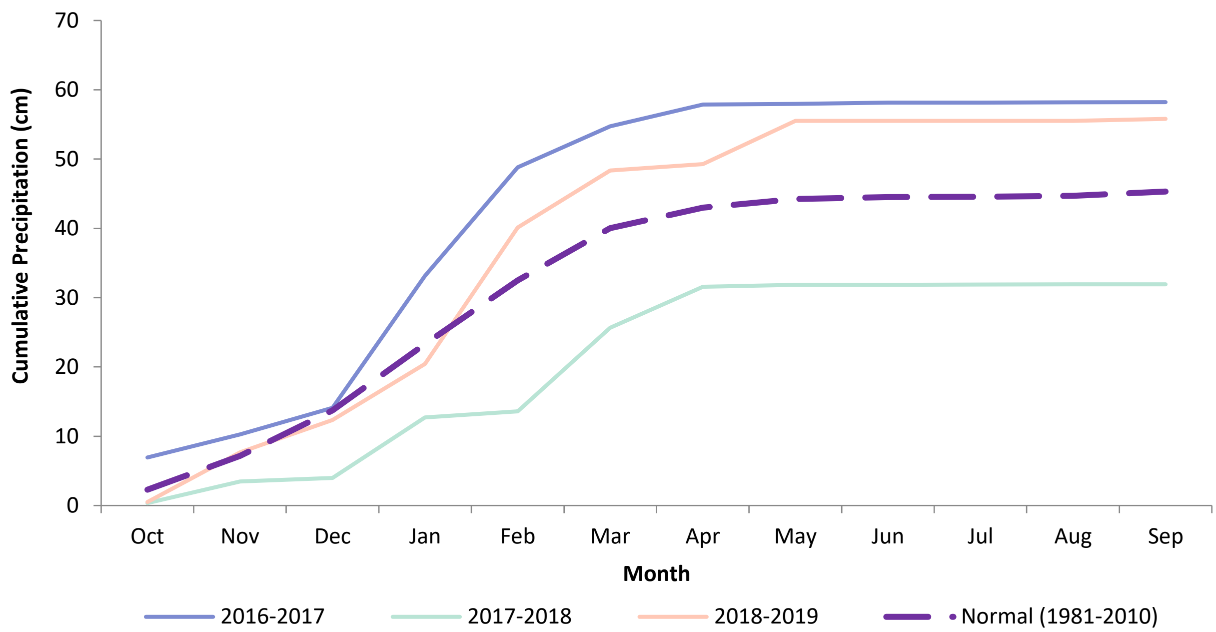

Figure 4-130. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.23.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 73 was 0.85 acres with a maximum depth of approximately 56 cm. The depth and inundation values were the largest recorded at Pond 73 to date (see Appendix F Table F-23). Pond 73 was inundated from February through May. Figure 4-131 illustrates the relationship of precipitation and depth at Pond 73 for 2019 as well as baseline in 2017; however, depth was not recorded in 2017.

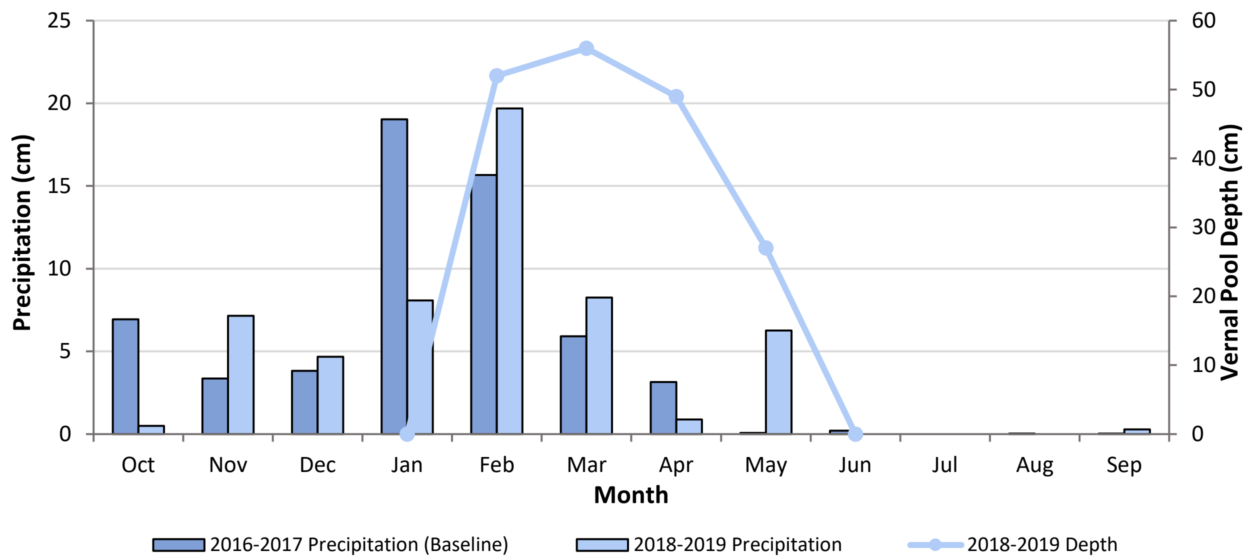

Figure 4-131. Monthly Depth and Precipitation at Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) for 2018-2019 Water-Year Compared to Baseline 2016-2017 Water-Year. Only Precipitation is Illustrated for Baseline Since Depths Were Not Recorded.

In below-normal precipitation years, Pond 73 is likely to range from 0-14 cm in depth with a maximum inundation of 0.001 acres. No depths or inundations for Pond 73 have been recorded in normal precipitation years. In above-normal precipitation years, Pond 73 could have maximum depths of 56 cm or more and a maximum inundation up to 0.85 acres (see Appendix F Table F-23). Figure 4-132 illustrates historic vernal pool depths by month and organized by water-year.

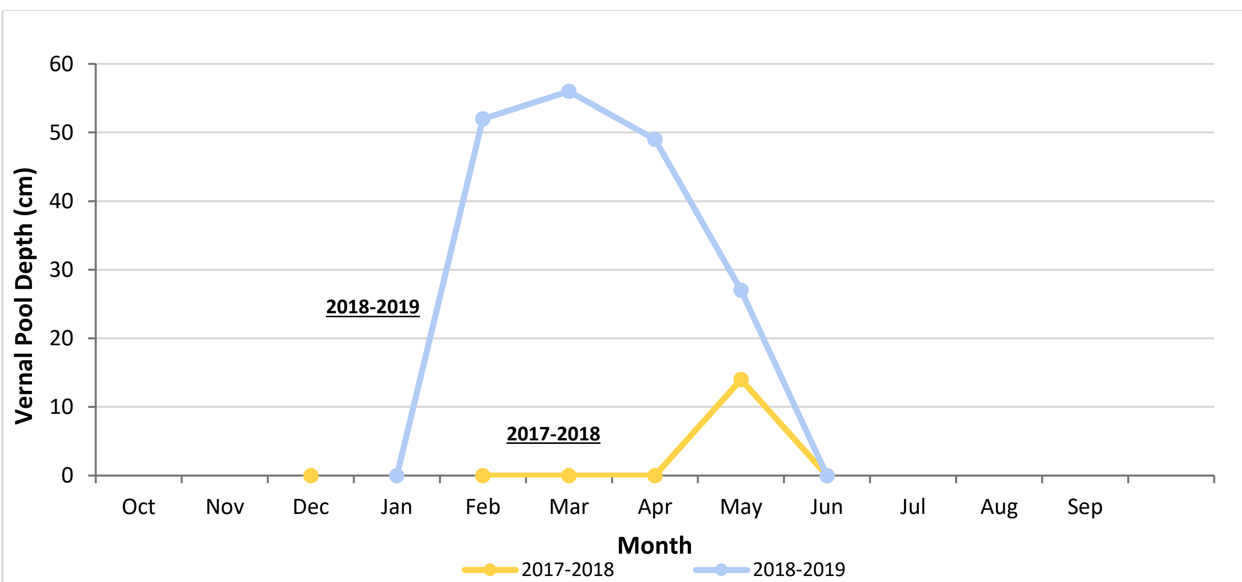

Figure 4-132. Historic Monthly Depths at Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

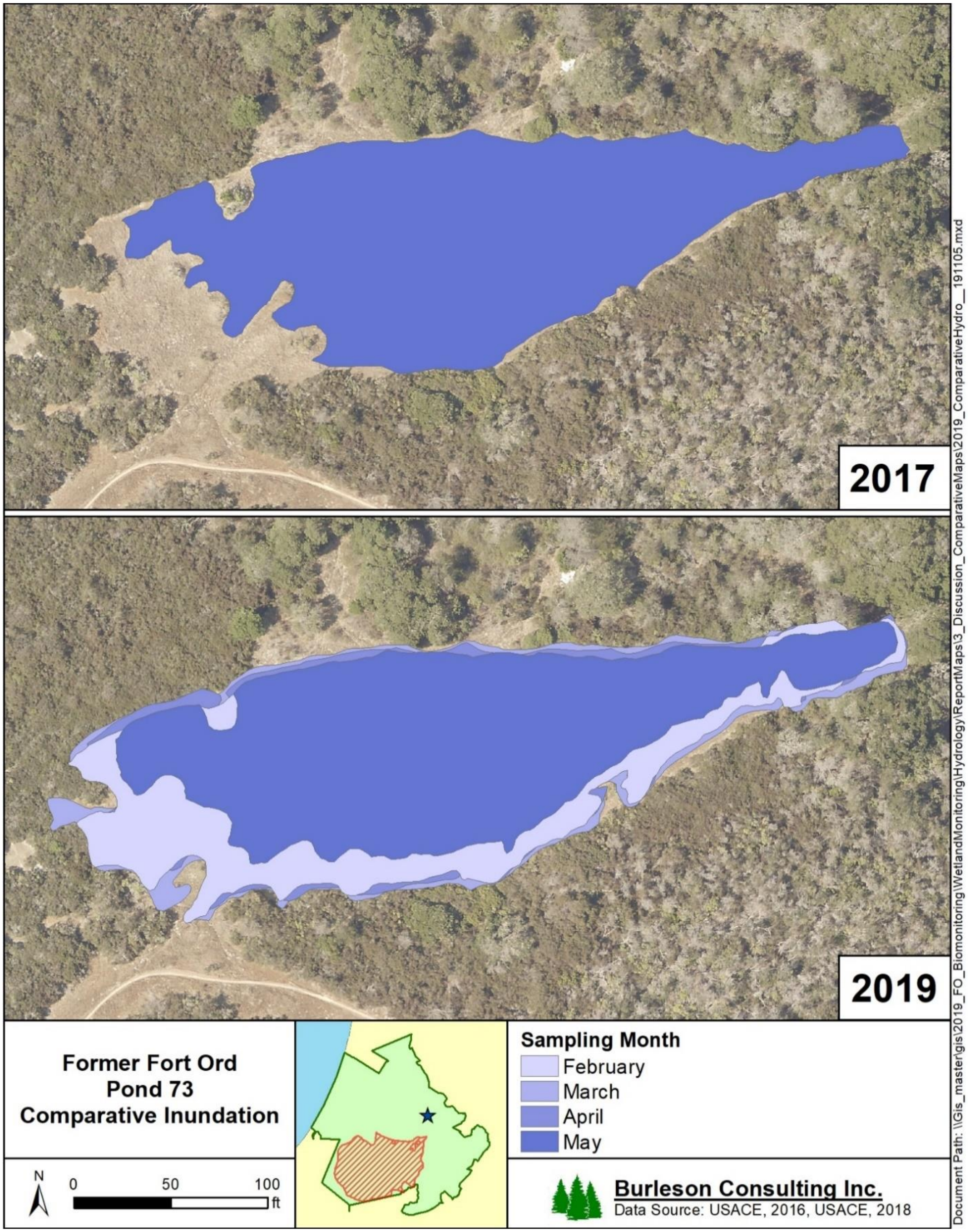

Figure 4-133. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Inundations for 2016-2017 (above-normal precipitation) and 2018-2019 (above-normal precipitation). Parts of the vernal pool watershed were masticated in 2017, and subsurface munitions remediation occurred in 2018. The vernal pool was in years 2 and 1 of monitoring in 2019.

4.23.1.1 *Data Quality Objective 1*

Pond 73 met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 73 provided sufficient depths for both CTS (54 cm through March) and fairy shrimp (46 cm through May). Pond 73 depths were most similar to reference Pond 997 but dried approximately one month later.

4.23.1.2 *Data Quality Objective 2*

Pond 73 had a similar inundation as the recorded value of 0.65 acres in May 2017. Pond 73 was inundated February through May with an inundation range of 0.57-0.85 acres and a mean of 0.73 acres. Pond 73 is a small-medium size vernal pool that is likely to fill in a normal or above-normal water-year. In a below-normal water-year, it is likely to be inundated in a series of small puddles and pools or remain dry. Pond 73 is smaller than reference Ponds 5 and 101 East (East), but larger than Pond 997. Pond 73 held water with similar timing as Pond 101 East (East).

4.23.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 73, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for year 1 and year 2 in 2019. Pond 73 met DQO 1 and DQO 2 indicating that it provided suitable habitat for CTS and fairy shrimp and was similar to itself in previous monitoring years and reference vernal pools. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.23.2 Vegetation Monitoring

Vegetation data were collected at Pond 73 in 2017, 2018, and 2019 (Burleson, 2019). Baseline vegetation data were collected at Pond 73 in 2017 by DD&A and provided by the Army in 2018. Data were collected using the methodology described in the Methods section of this report. Data from 2017 and 2019 were compared stratum-to-stratum in Table 4-281 as well as visually in Figure 4-134.

Table 4-280. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2017	2019
1	9%	6%
2	71%	77%
3	17%	8%
4	-	7%
Upland	3%	2%

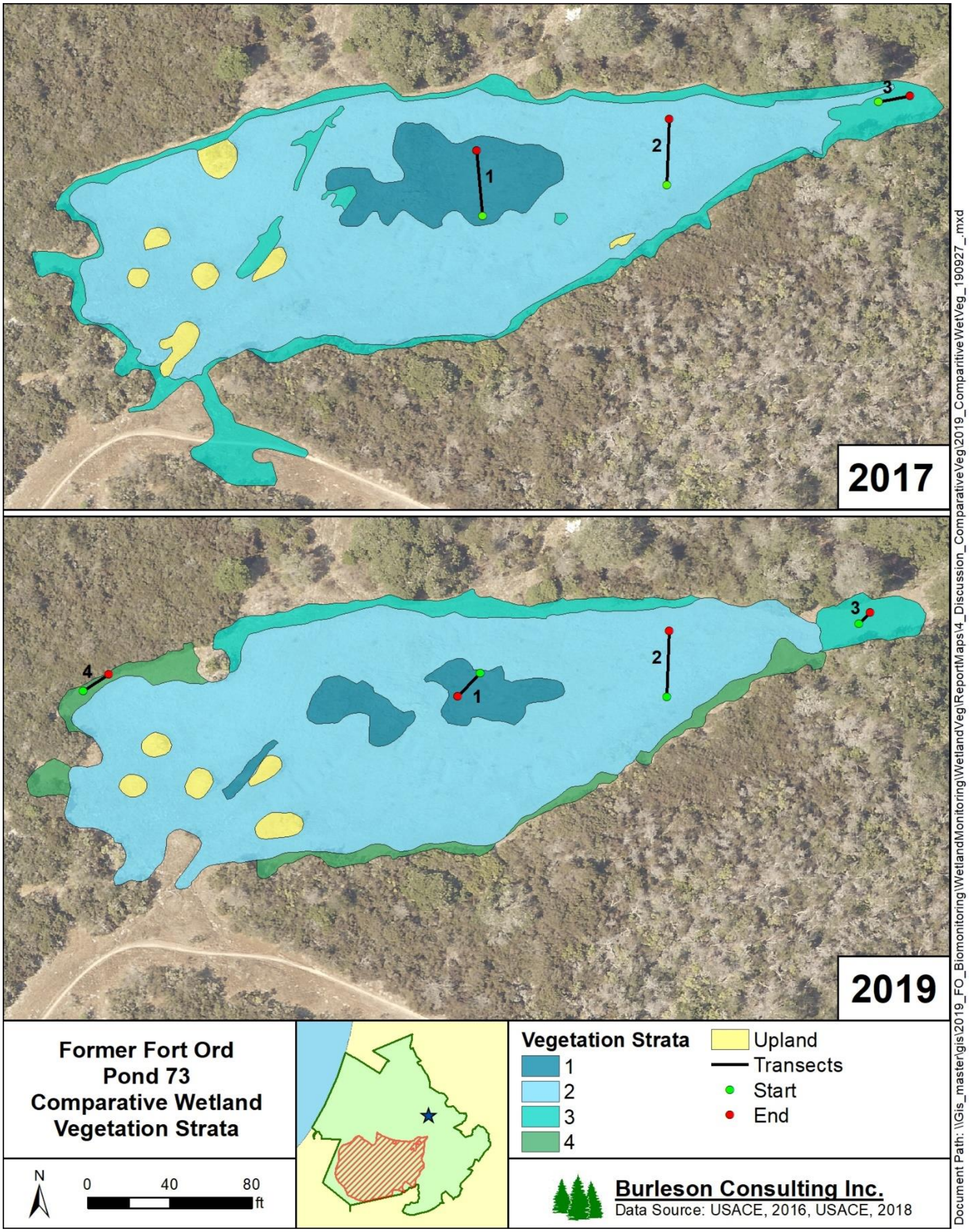

Figure 4-134. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2017 and 2019

The absolute percent vegetative cover decreased between 2017 and 2018 and increased slightly in 2019 (see Table 4-281). Pond 73 vegetative cover was less than the values observed in reference vernal pools with higher thatch/bare ground cover (see Table 4-282).

Table 4-281. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2017	82.6%	16.9%
2018	61.8%	39.7%
2019	65.9%	34.1%

Table 4-282. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
73	**65.9%**	**34.1%**

Species richness increased between 2017 and 2018, and then decreased slightly in 2019 at Pond 73. Species richness on transects was 6, 21, and 17 species in 2017, 2018, and 2019, respectively, whereas overall basin species richness was 49, 68, and 62 species, respectively (see Table 4-283 and Appendix B Table B-23). Pond 73 species richness was less than the values observed at the reference vernal pool on transects and for the entire basin (see Table 4-284 and Appendix G Tables G-27 and G-54).

Species composition at Pond 73 was similar between 2017, 2018, and 2019. The dominant species in all three survey years were brown-headed rush (*Juncus phaeocephalus*) and pale spikerush (*Eleocharis macrostachya*). However, in 2018 and 2019 coyote thistle (*Eryngium armatum*) was a third dominant species. A complete comparison of species composition observed at Pond 73 in 2017, 2018, and 2019 can be found in Appendix H. Figure 4-135 shows a subset of this comparison for species observed with a 2% cover or greater.

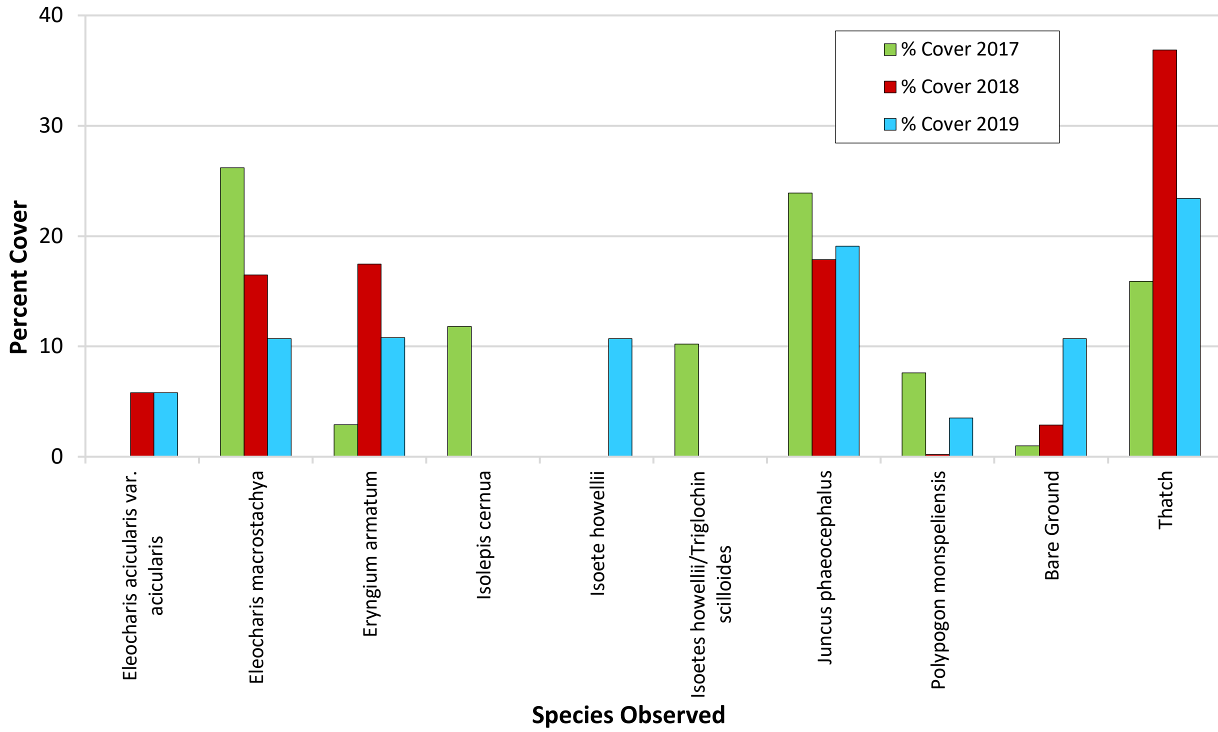

Figure 4-135. Percent Cover of Dominant Species at Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation)

Native and non-native species richness on Pond 73 transects increased between 2017 and 2018 and decreased slightly by 2019 (see Table 4-283). The native and non-native species richness was less than the values observed at reference vernal pools in 2019 (see Table 4-284). The relative percent cover of native and non-native species was very similar to the baseline year (see Table 4-285). Pond 73 relative percent cover was much greater than any of the reference vernal pools and non-native cover was significantly less than reference vernal pools (see Table 4-286).

Table 4-283. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2017	5	1	
2018	15	5	1
2019	14	3	0

Table 4-284. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
73	**14**	**3**	**0**

Table 4-285. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2017	90.8%	9.2%	0.0%
2018	98.9%	1.0%	0.1%
2019	91.9%	8.1%	0.0%

Table 4-286. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
73	**91.9%**	**8.1%**	**0.0%**

Wetland and non-wetland species richness on Pond 73 transects increased between 2017 and 2018 and decreased slightly by 2019 (see Table 4-287). Pond 73 wetland and non-wetland species richness were less than the values observed at the reference vernal pools (see Table 4-288). The relative percent cover of wetland and non-wetland species was similar across years (see Table 4-289). Pond 73 wetland species relative percent cover values were greater than reference vernal pools in 2019, whereas non-wetland species were less than reference vernal pools (see Table 4-290).

Table 4-287. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2017	3	3	0	0	0	0
2018	7	7	2	2	0	3
2019	7	7	1	0	0	2

Table 4-288. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
73	**7**	**7**	**1**	**0**	**0**	**2**

Table 4-289. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2017	58.4%	41.6%	0.0%	0.0%	0.0%	0.0%
2018	40.3%	58.3%	0.4%	0.2%	0.0%	0.8%
2019	46.8%	52.6%	0.1%	0.0%	0.0%	0.5%

Table 4-290. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
73	**46.8%**	**52.6%**	**0.1%**	**0.0%**	**0.0%**	**0.5%**

4.23.2.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 73 was dominated by native and wetland plant species during year 2 post-mastication and year 1 post-subsurface munitions remediation monitoring in 2019. Pond 73 wetland vegetation results were generally within range of baseline and/or reference vernal pools, however absolute vegetative cover in 2019 was less than baseline and the reference vernal pools.

4.23.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 73, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for years 2 and 1, respectively, in 2019. The species composition, richness, and native and wetland species relative abundances were similar to reference vernal pool conditions, however absolute vegetative cover was lower. Pond 73 provided suitable wetland habitat in 2019.

4.23.3 Wildlife Monitoring

Wildlife data were collected at Pond 73 in 2018 and 2019. California tiger salamander larvae were not observed in either year. Fairy shrimp were detected in 2019. No baseline historic wildlife data were available for comparison. Table 4-291 shows historic wildlife monitoring results.

Table 4-291. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2018	Not detected	Not detected
2019	Not detected	Present*

*Fairy shrimp detected during CTS survey, not during the fairy shrimp survey.

4.23.3.1 *Data Quality Objective 1*

Pond 73 provided suitable depth for CTS and fairy shrimp as discussed in Section 4.23.1.1.

4.23.3.2 *Data Quality Objective 4*

Fairy shrimp were present at Pond 73 in 2019, whereas CTS were not detected. The water quality was adequate. Compared to other vernal pools and previous Pond 73 data, the water quality data were within normal ranges. The pH ranged from 6.00 in May to 6.53 in February with a mean of 6.33. Temperature ranged from 9.75°C in February to 15.39°C in May with a mean of 12.89°C. Dissolved oxygen ranged from 2.93 mg/L in April to 9.59 mg/L in February with a mean of 5.54 mg/L. Turbidity ranged from 2.4 FNU in April to 43.5 FNU in February with a mean of 14.8 FNU (see Table 3-88).

4.23.3.3 *Data Quality Objective 5*

California tiger salamanders were not detected in 2019 at Pond 73. This is similar to year 1 post-mastication results; however, no baseline wildlife data were available for comparison.

Fairy shrimp were present in 2019 at Pond 73, which is inconsistent with year 1 post-mastication results where there were no detections. No baseline wildlife data were available for comparison.

4.23.3.4 *Performance Standard: Wildlife Usage*

Pond 73, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for years 1 and 2. The vernal pool was on track to meet DQOs 1, 4, and 5 and provided suitable CTS and fairy shrimp habitat. The vernal pool was only evaluated against the performance standard for year 1 because there were no baseline depth or wildlife data.

4.23.4 Conclusion

Pond 73, a post-mastication and post-subsurface munitions remediation vernal pool, was in years 2 and 1 of monitoring in 2019. The vernal pool was evaluated for DQO 5 against year 1 and reference vernal pools because there were no baseline wildlife data. Pond 73 was on track to meet all of the performance standards (see Table 4-292). Pond 73 will continue to be monitored in the future.

Table 4-292. Success at Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	On track
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	On track
	DQO 4	On track
	DQO 5	On track*

*Only evaluated against year 1, no baseline data.

4.24 Machine Gun Flats – Year 2

Machine Gun Flats was monitored in 2019 as a year 2 post-mastication vernal pool. Machine Gun Flats was monitored for baseline conditions in 1997 and 1998. Previous mastication, MEC remediation and subsurface activities, were conducted in 1999 and 2000 with follow-up monitoring in 2000, 2001, 2002, and 2003 (HLA, 2001; Harding, 2002; MACTEC, 2003, MACTEC, 2004). Vegetation within the watershed of Machine Gun Flats was masticated in the summer of 2017 to support MEC remediation in BLM Area B Subunit B-3 East. No vegetation mastication occurred within the boundary of the maximum inundation area of the Machine Gun Flats vernal pool. Table 4-293 summarizes the years that monitoring occurred and surveys conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Machine Gun Flats (see Figure 4-136). The 1997-1998 and 2018-2019 water-years were above-normal, whereas all other monitoring occurred in below-normal water-years.

Table 4-293. Machine Gun Flats (Year 2 Post-Mastication) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year							
	1996-1997	1997-1998	1999-2000	2000-2001	2001-2002	2002-2003	2017-2018	2018-2019
Hydrology	●	●	●	●	●	●	●	●
Vegetation	●		●	●	●	●		●
Wildlife	●	●	●	●	●	●		●

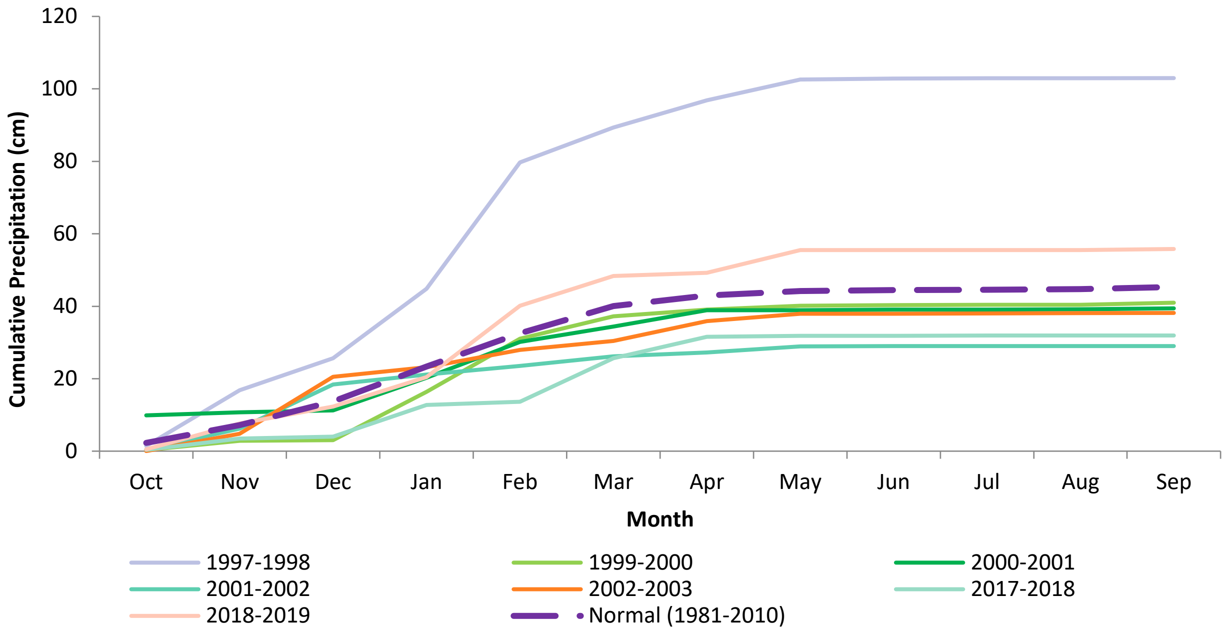

Figure 4-136. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Machine Gun Flats (Year 2 Post-Mastication) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.24.1 Hydrology Monitoring

The 2019 maximum inundation for Machine Gun Flats was 10.45 acres with a maximum depth of approximately 149 cm. The depth and inundation values were within range of the previously recorded values (see Appendix F Table F-24). Machine Gun Flats was inundated from the first recorded monitoring in January and did not dry by the last recorded monitoring in September. Figure 4-137 illustrates the relationship of precipitation and depth at Machine Gun Flats for 2019 as well as baseline in 2000.

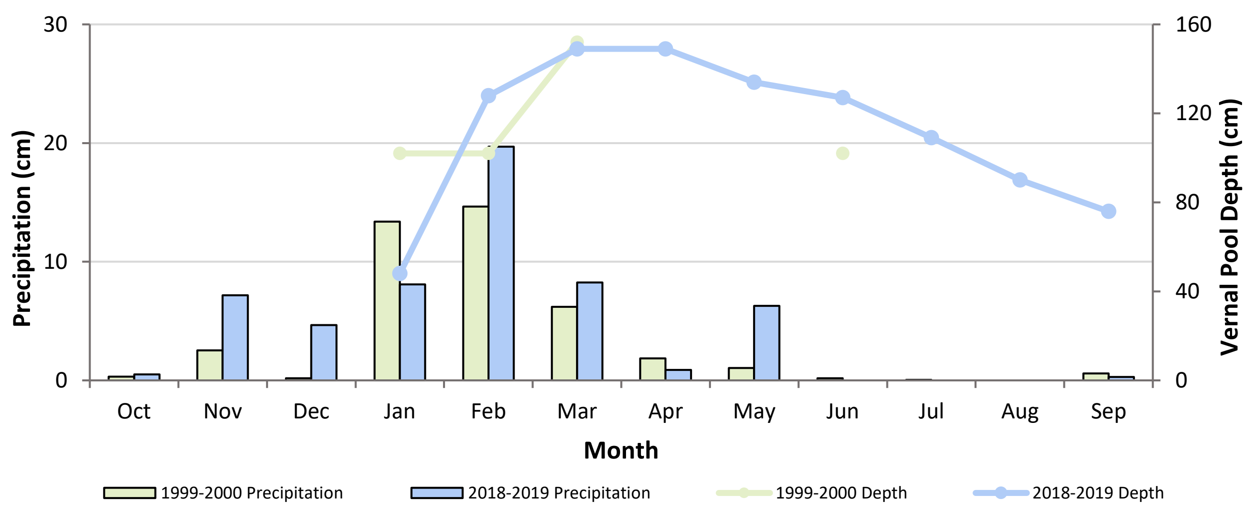

Figure 4-137. Monthly Depth and Precipitation at Machine Gun Flats (Year 2 Post-Mastication) for 2018-2019 Water-Year Compared to Baseline 1999-2000 Water-Year

In below-normal precipitation years, Machine Gun Flats is likely to range from 15-111 cm in depth with a maximum inundation of 8.35 acres. In a normal precipitation year, Machine Gun Flats could have maximum depths at greater than 150 cm and an inundation up to 10.65 acres. In above-normal precipitation years, Machine Gun Flats could have maximum depths of 150 cm or more and a maximum inundation up to 14.75 acres (see Appendix F Table F-24). Figure 4-138 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-139 illustrates historic and recent inundation areas.

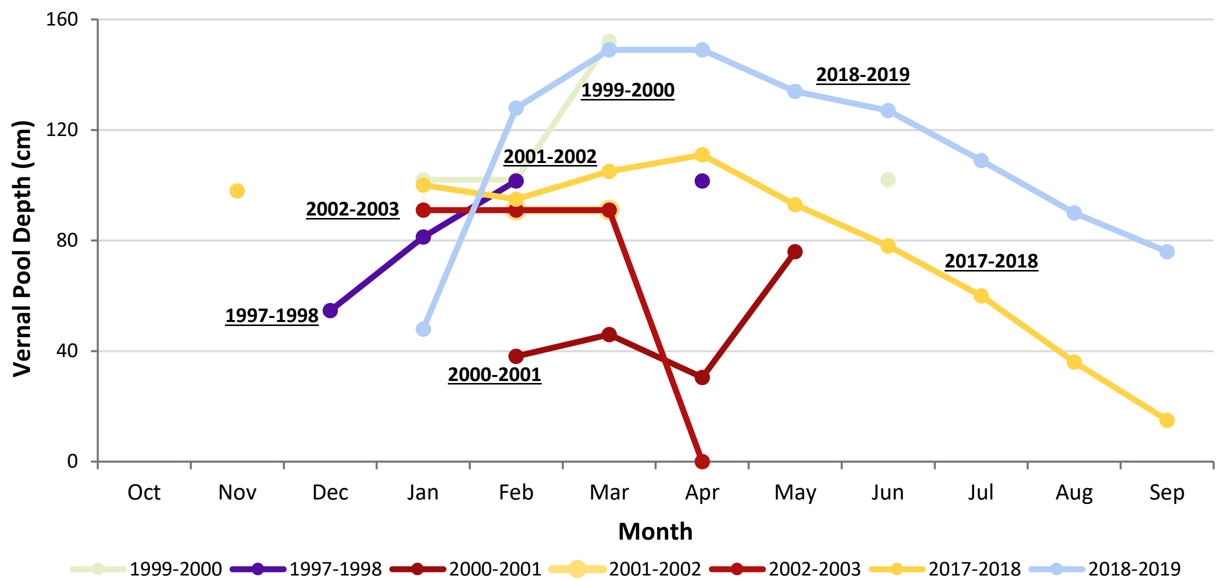

Figure 4-138. Historic Monthly Depths at Machine Gun Flats (Year 2 Post-Mastication). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

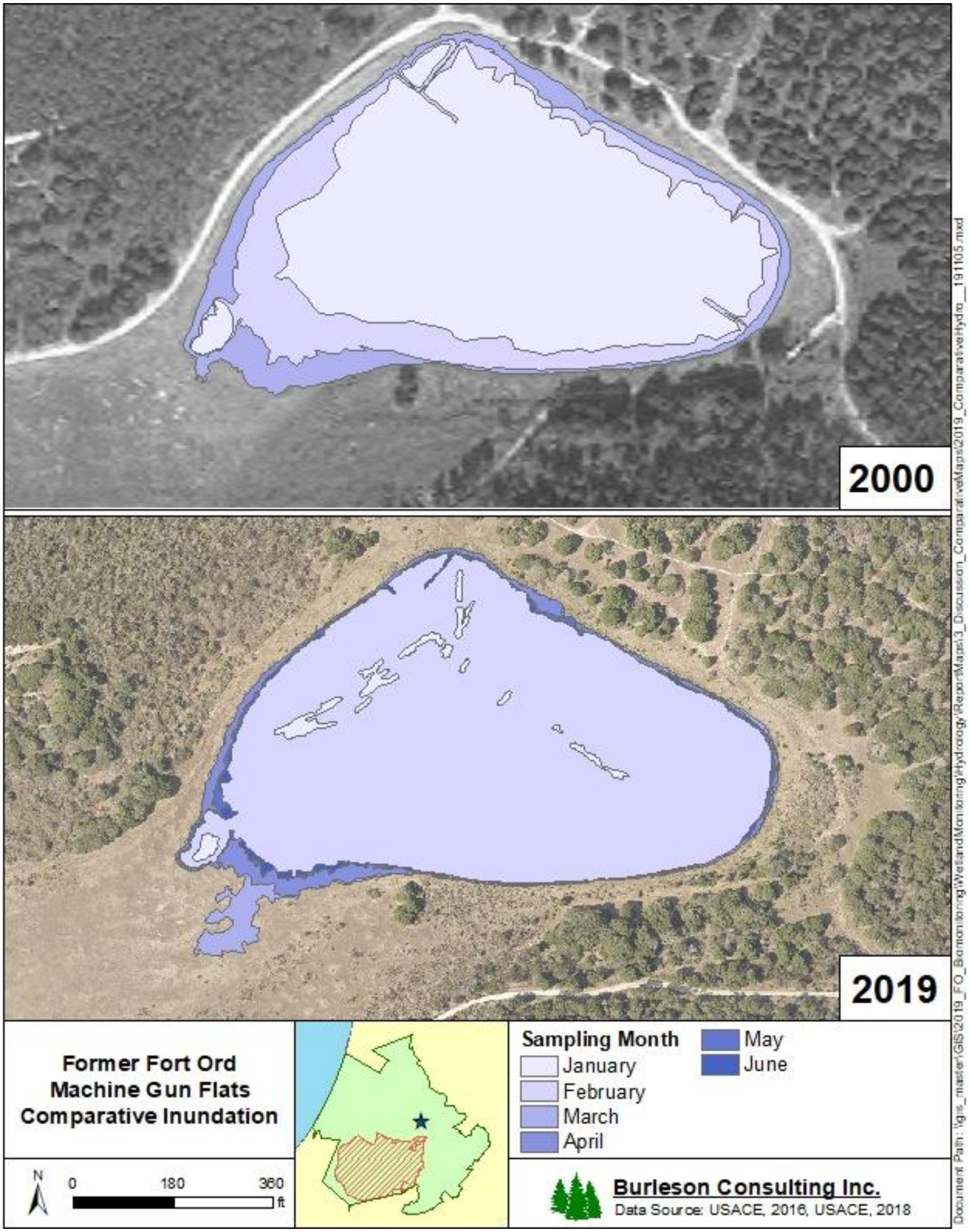

Figure 4-139. Machine Gun Flats (Year 2 Post-Mastication) Inundations for 1999-2000 (normal precipitation) and 2018-2019 (above-normal precipitation). Vegetation within the watershed of the vernal pool was masticated in 2017 and it was in year 2 of monitoring in 2019.

4.24.1.1 *Data Quality Objective 1*

Machine Gun Flats met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Machine Gun Flats provided sufficient depths for CTS (108 cm through March) and fairy shrimp (122 cm through May). Previously recorded depths indicate that DQO 1 was likely met in 1998, 2000, 2001, 2002, and 2003, although monitoring did not continue into May in 1998 and 2002. Machine Gun Flats depths were greater than all reference pools (5, 101 East (East), and 997) observed in 2019.

4.24.1.2 *Data Quality Objective 2*

Machine Gun Flats had similar inundations in 2019 as previous years and was much larger than the reference vernal pools. Machine Gun Flats was inundated throughout the 2019 monitoring year with an inundation range of 0.24-10.45 acres and a mean of 8.24 acres. The historic inundation ranges in 1998 2000, 2001, 2002, and 2003 were between 0.01 and 14.50 acres. The 2019 inundations were within this range and were most similar to 2000. Machine Gun Flats can be expected to stay inundated in normal precipitation years and have a large inundation. However, the vernal pool may be fairly small in below-normal years (see Figure 4-138). Machine Gun Flats was larger than any of the reference vernal pools and did not dry.

4.24.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Machine Gun Flats, a post-mastication vernal pool, was on track to meet the performance standard for year 2 in 2019. Machine Gun Flats met DQO 1 and DQO 2 indicating that it provided suitable habitat for CTS and fairy shrimp and was similar to itself in previous monitoring years and reference vernal pools. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.24.2 Vegetation Monitoring

Vegetation data were collected at Machine Gun Flats in 1997, 2000, 2001, 2002, 2003, and 2019 (HLA, 1997, 2001; Harding ESE, 2002; MACTEC, 2003, 2004). In 1997, 2000, 2001, 2002, and 2003 data were collected along transects in lengths varying from 50 to 241 feet. In 2000, 0.25 m^2 quadrats were placed at intervals ranging from 10 to 20 feet, whereas in 1998, 2001, 2002, and 2003, quadrats were placed at 10-foot intervals. Quadrats were placed at the given intervals, alternating from right to left along the transect. In 1997, 2000, 2001, 2002, and 2003, transects of varying lengths were in areas of representative transitional and emergent habitats. Due to differing methodologies, data for all strata in each respective year before 2019 were combined to compare to 2019.

Absolute percent vegetative cover in 2019 was within the range of values observed in baseline years (see Table 4-294). The absolute percent vegetative cover of at Machine Gun Flats in 2019 was less than the values observed at the reference vernal pools and thatch/bare ground cover was higher (see Table 4-295).

Table 4-294. Machine Gun Flats (Year 2 Post-Mastication) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1997	111.6%	16.7%
2000	111.3%	5.6%
2001	61.7%	39.2%
2002	100.6%	5.1%
2003	106.7%	2.1%
2019	61.4%	38.6%

Table 4-295. Machine Gun Flats (Year 2 Post-Mastication) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
Machine Gun Flats	**61.4%**	**38.6%**

Species richness increased slightly but was fairly similar between 1997 and 2019 at Machine Gun Flats. Species richness on transects was 49, 34, 46, 47, 50, and 52 species in 1997, 1999, 2000, 2001, 2003, and 2019, respectively, whereas overall basin species richness was 131 in 2019 (see Table 4-296 and Appendix B Table B-24). The 1997-2003 surveys were limited to species on the transects and may underrepresent total vernal pool species richness. Machine Gun Flats species richness was greater than the values observed on transects and the entire basin at the reference vernal pools (see Table 4-297 and Appendix G Tables G-27 and G-54).

Species composition at Machine Gun Flats was different among the monitoring years, but the dominant species were generally the same for most years. The dominant species in 1997, 2000, 2001, and 2019, were pale spikerush (*Eleocharis macrostachya*) and brown-headed rush (*Juncus phaeocephalus*). In 2002, the dominant species was *Juncus* sp. and in 2003, the dominant species was smooth cat's-ear (*Hypochaeris glabra*). Beardless wildrye (*Elymus triticoides*) was another important species in 1997 and 2000. A complete comparison of species composition observed at Machine Gun Flats in 1997, 2000, 2001, 2002, 2003, and 2019 can be found in Appendix H. Figure 4-140 shows a subset of this comparison for species observed with a 2% cover or greater.

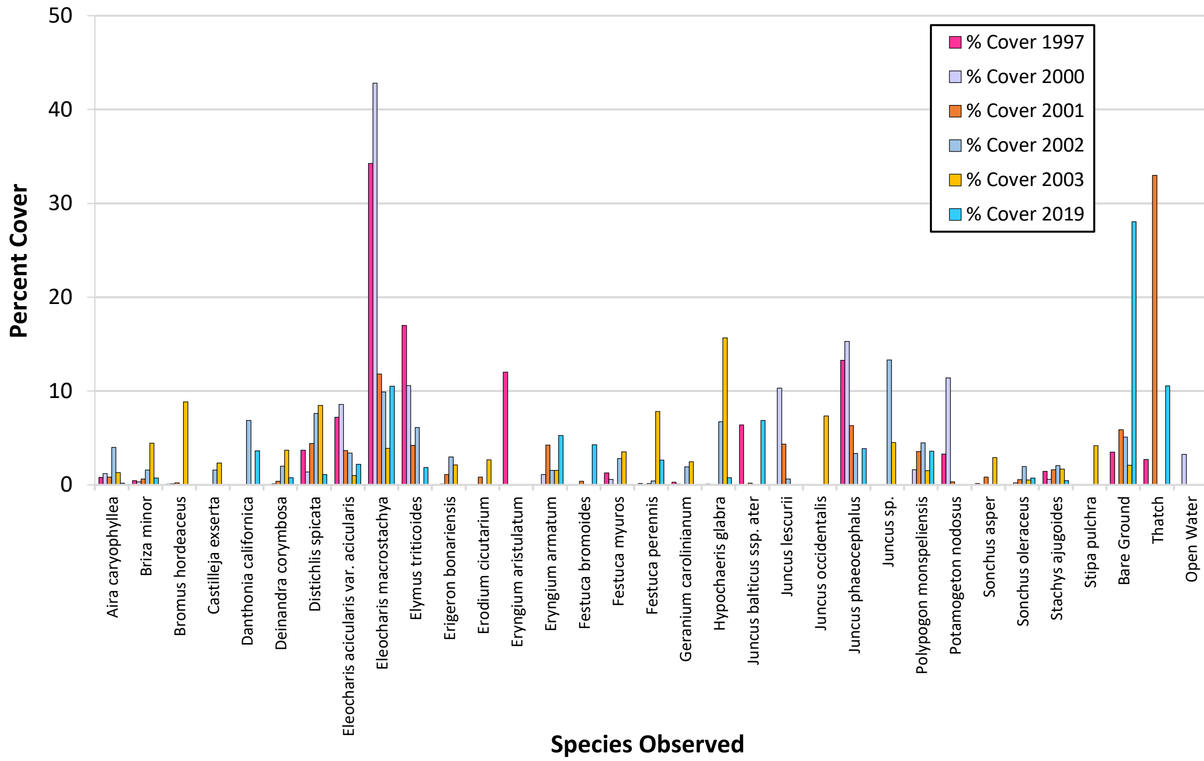

Figure 4-140. Percent Cover of Dominant Species at Machine Gun Flats (Year 2 Post-Mastication)

Native and non-native species richness on Machine Gun Flats transects was variable between years with the highest value for native richness observed in 2019 (see Table 4-296). Machine Gun Flats native species richness in 2019 was greater than the range observed at the reference vernal pools, whereas non-native species richness was within the range of reference (see Table 4-297). The relative percent cover of native and non-native species was within the range of previous baseline years as well as the cover values observed at the reference vernal pools in 2019 (see Table 4-298 and Table 4-299).

Table 4-296. Machine Gun Flats (Year 2 Post-Mastication) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1997	21	24	3
2000	15	19	0
2001	21	23	2
2002	23	21	3
2003	24	25	1
2019	31	21	0

Table 4-297. Machine Gun Flats (Year 2 Post-Mastication) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
Machine Gun Flats	**31**	**21**	**0**

Table 4-298. Machine Gun Flats (Year 2 Post-Mastication) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1997	92.8%	6.3%	0.8%
2000	92.5%	7.5%	0.0%
2001	75.9%	21.9%	2.2%
2002	52.1%	34.0%	13.9%
2003	41.0%	54.7%	4.2%
2019	69.5%	30.5%	0.0%

Table 4-299. Machine Gun Flats (Year 2 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
Machine Gun Flats	**69.5%**	**30.5%**	**0.0%**

Wetland and non-wetland species richness on Machine Gun Flats transects was variable between years with the highest value for wetland species richness observed in 2019 (see Table 4-300). Machine Gun Flats wetland species richness in 2019 was greater than the range observed at the reference vernal pools, whereas non-wetland species richness was within the range of reference (see Table 4-301). The relative percent cover of wetland and non-wetland species was within the range of previous baseline years as well as the cover values observed at the reference vernal pools in 2019 (see Table 4-302 and Table 4-303).

Table 4-300. Machine Gun Flats (Year 2 Post-Mastication) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1997	11	8	7	10	0	13
2000	8	8	7	6	1	4
2001	6	9	8	10	1	12
2002	4	10	8	7	1	17
2003	5	8	7	11	1	18
2019	7	14	8	7	1	15

Table 4-301. Machine Gun Flats (Year 2 Post-Mastication) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
Machine Gun Flats	**7**	**14**	**8**	**7**	**1**	**15**

Table 4-302. Machine Gun Flats (Year 2 Post-Mastication) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1997	54.1%	22.4%	17.0%	3.8%	0.0%	2.7%
2000	58.3%	27.3%	10.7%	2.9%	0.2%	0.6%
2001	28.7%	41.2%	11.9%	11.4%	0.9%	6.0%
2002	17.0%	21.3%	17.0%	13.1%	1.9%	29.6%
2003	7.9%	19.4%	14.1%	20.9%	0.5%	37.2%
2019	24.3%	37.4%	18.7%	5.7%	1.2%	12.7%

Table 4-303. Machine Gun Flats (Year 2 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
Machine Gun Flats	**24.3%**	**37.4%**	**18.7%**	**5.7%**	**1.2%**	**12.7%**

4.24.2.1 *Contra Costa Goldfields*

The area of CCG at Machine Gun Flats decreased dramatically between baseline years (1999, 2000, and 2003) and 2019. The number of recorded CCG individuals in baseline years ranged between 6,426 in 1999 and 74,643 in 2003; however, only one individual CCG was documented in 2019 (see Figure 4-141). The density was relatively low for these areas in 1999 and 2000 and recorded as 2-10% cover (HLA, 2000, 2001).

It is unclear why the CCG population at Machine Gun Flats has decreased but it is unlikely related to remediation activities because the mastication occurred outside of the CCG occupied areas and no other vegetation monitoring results indicate similar decreases following the remediation. Native and wetland vegetation diversity and cover are following trends observed in previous years and the reference vernal pools. Additionally, the species reported as associated with the CCG population in past reports are still present in the area where the single individual was located and areas where historic polygons of CCG have been mapped. The population of CCG however, does not match trends observed at other vernal pools. It is possible that the years from 1999-2003 were particularly favorable for CCG.

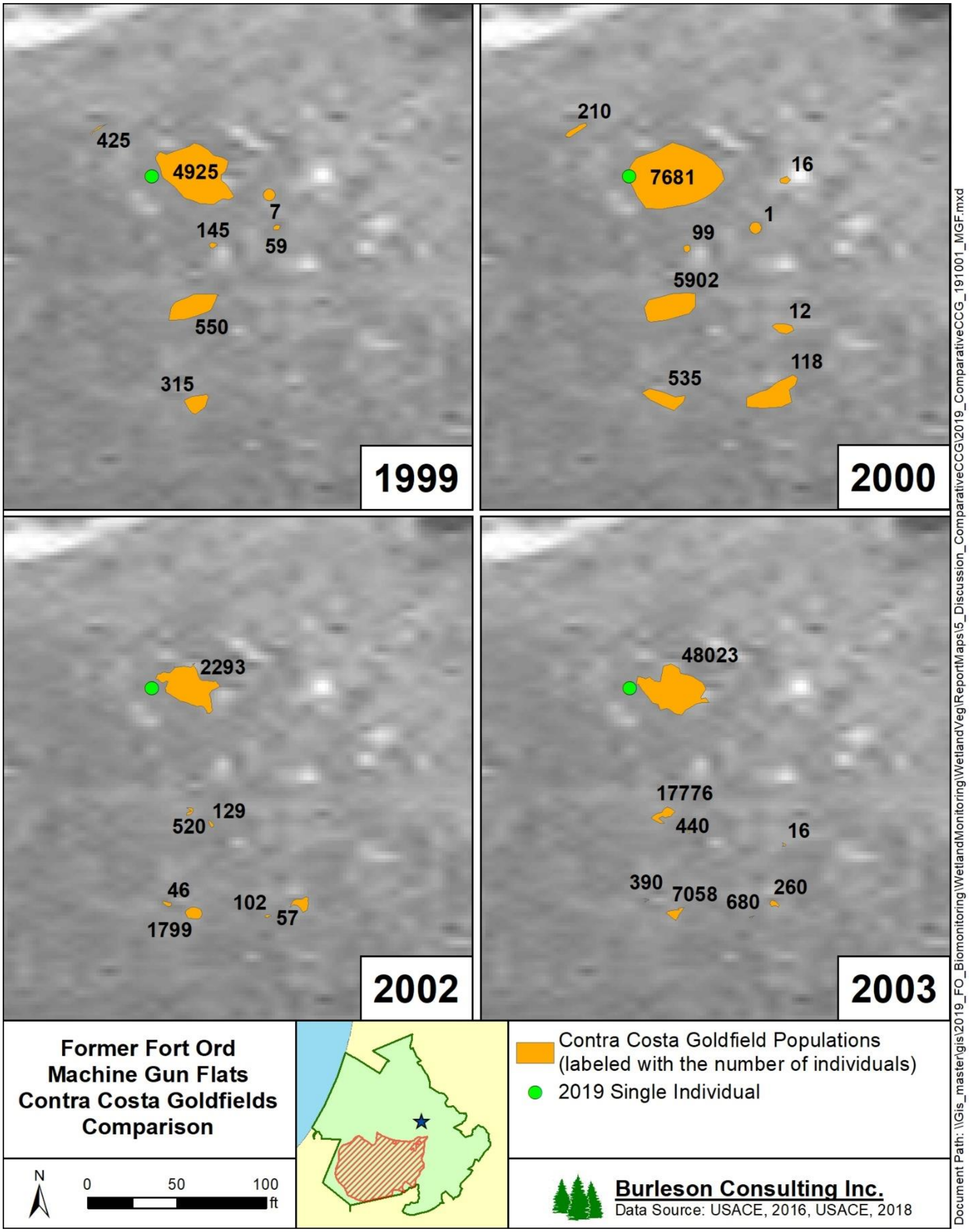

Figure 4-141. Contra Costa Goldfields Populations at Machine Gun Flats (Year 2 Post-Mastication) in 1999, 2000, 2002, 2003, and 2019

4.24.2.2 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations as well as differing methodologies. In 1997, 2000, 2001, 2002, and 2003 the transects were placed in "transitional and emergent habitats" and "sampling characterized wetland-influenced vegetation and associated transitional herbaceous species" which differs from the methods in 2019 which focuses on placing transects within the wetland in representative locations in each stratum (MACTEC, 2003). Vegetative cover at Machine Gun Flats was dominated by native and wetland plant species during year 2 post-mastication monitoring in 2019. Machine Gun Flats wetland vegetation results were generally within range of baseline and/or reference vernal pools, however native species richness in 2019 was greater than baseline and the reference vernal pools. Dramatic changes in the CCG population were observed at Machine Gun Flats. Areas that historically supported thousands of CCG individuals no longer support a robust population. Only one individual was identified in the entire Machine Gun Flats vicinity. It is unlikely that the decreases in observed CCG individuals was related to the remediation effort. This population will be monitored in futures years and a determination made if corrective measures are necessary.

4.24.2.3 *Performance Standard: Plant Cover and Species Diversity*

Machine Gun Flats, a post-mastication vernal pool, was not on track to meet the performance standard for year 2 in 2019. The species composition, richness, and native and wetland species relative abundances were similar to baseline and reference vernal pool conditions, however native species richness was greater. Although Machine Gun Flats provided suitable wetland habitat in 2019, the CCG population is no longer comparable to baseline conditions.

4.24.3 Wildlife Monitoring

Wildlife data were collected at Machine Gun Flats in 1998, 2000, 2001, 2002, 2003, and 2019 (HLA, 1998, 2001; Harding ESE, 2002; MACTEC, 2003, 2004). California tiger salamander larvae were detected in 2003 and 2019. Fairy shrimp were detected in all years. Table 4-304 shows historic wildlife monitoring results.

Table 4-304. Machine Gun Flats (Year 2 Post-Mastication) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998	Not detected	Low - Very High
2000	Not detected	Very High (1260, 1485)
2001	Not detected	Low - Very High (740, 3)
2002	Not detected	Very High (1000s, 1000s)
2003	Present	Very High (10,000s, 1,000s)
2019	Common (11, 61, 40)	Moderate – High (277, 13)

4.24.3.1 *Data Quality Objective 1*

Machine Gun Flats provided suitable depth for CTS and fairy shrimp as discussed in Section 4.24.1.1.

4.24.3.2 *Data Quality Objective 4*

California tiger salamanders and fairy shrimp were present at Machine Gun Flats in 2019; therefore, the water quality was adequate to support both species. Compared to other vernal pools and previous Machine Gun Flats data, the water quality data were within normal ranges. The pH ranged from 6.62 in April and May to 7.29 in June with a mean of 6.88. Temperature ranged from 8.60°C in February to

18.13°C in June with a mean of 13.65°C. Dissolved oxygen ranged from 2.78 mg/L in April to 9.73 mg/L in February with a mean of 6.23 mg/L. Turbidity ranged from 2.8 FNU in April to 178.0 FNU in January with a mean of 42.2 FNU (see Table 3-92).

4.24.3.3 *Data Quality Objective 5*

California tiger salamanders were present in 2019, which was generally inconsistent with baseline surveys. California tiger salamanders were observed in 2003 but were not detected in 1998, 2000, 2001, or 2002.

Fairy shrimp were present in 2019, which was consistent with all previous baseline surveys. Baseline monitoring in 1998, 2000, 2001, 2002, and 2003 yielded detections.

4.24.3.4 *Performance Standard: Wildlife Usage*

Machine Gun Flats, a post-mastication vernal pool, was on track to meet the performance standard for year 2. The vernal pool was on track to meet DQOs 1, 4, and 5 and provided suitable CTS and fairy shrimp habitat.

4.24.4 Conclusion

Machine Gun Flats, a post-mastication vernal pool, was in year 2 of monitoring in 2019. The vernal pool was on track to meet the hydrological conditions and wildlife usage. The plant cover and species diversity performance standard was not met due to a dramatic decrease in the CCG population (see Table 4-305). Machine Gun Flats will continue to be monitored in the future.

Table 4-305. Success at Machine Gun Flats (Year 2 Post-Mastication) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	On track
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	Not on track
Wildlife Usage	DQO 1	On track
	DQO 4	On track
	DQO 5	On track

4.25 Pond 16 – Year 3 and Year 1

Pond 16 was monitored in 2019 as a year 3 post-mastication and year 1 post-subsurface munitions remediation vernal pool. Pond 16 was monitored for baseline conditions in 1992, 1994, 1995, 1996, 2009, and 2015. Vegetation within Pond 16 and immediately around it was masticated in the summer of 2016 in preparation for a prescribed burn in Unit 31. Less than 50 percent of the Pond 16 watershed was masticated and limited vegetation mastication occurred within the inundation area. Pond 16 had intrusive anomaly investigations in 2018. Table 4-306 summarizes the years that monitoring occurred and surveys conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 16 (see Figure 4-142). The 1994-1995, 2016-2017, and 2018-2019 water-years were above-normal, whereas all other monitoring years were normal or below-normal.

Table 4-306. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year								
	1991-1992	1993-1994	1994-1995	1995-1996	2008-2009	2014-2015	2016-2017	2017-2018	2018-2019
Hydrology	●	●	●	●		●	●	●	●
Vegetation		●	●	●		●	●		●
Wildlife	●	●	●	●	●	●			●

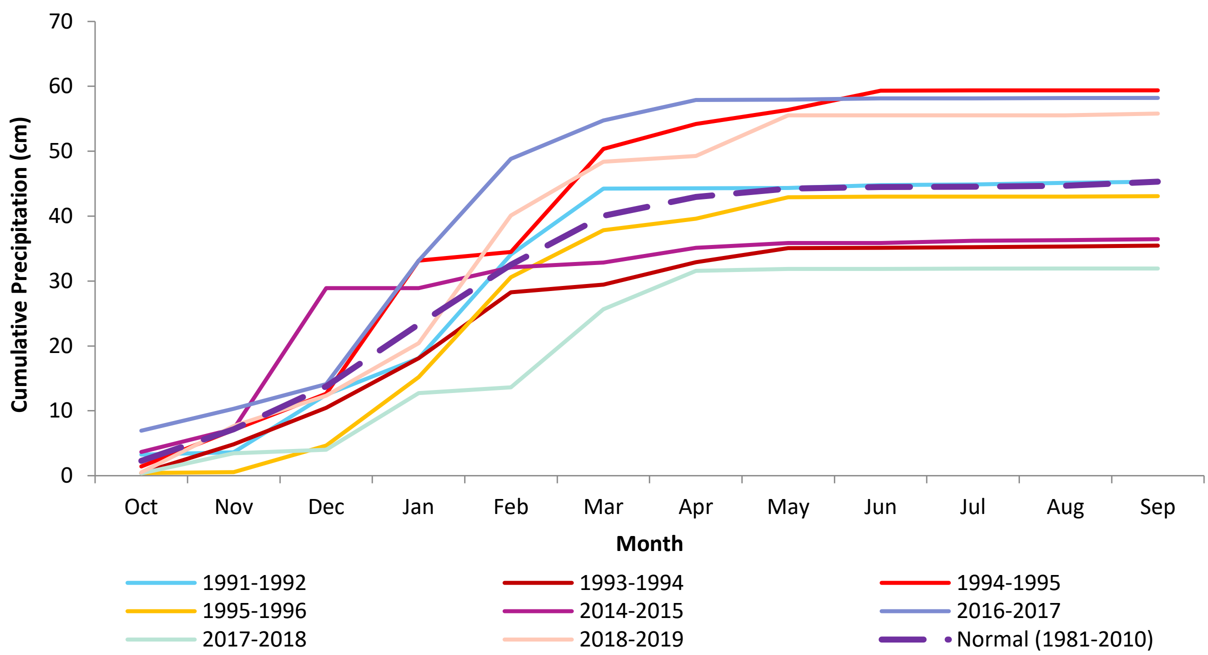

Figure 4-142. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.25.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 16 was 0.74 acres with a maximum depth of approximately 139 cm. The depth and inundation values were within range of the previously recorded values (see Appendix F Table F-25). Pond 16 was inundated beginning in February and did not dry by the last recorded monitoring in September. Figure 4-143 illustrates the relationship of precipitation and depth at Pond 16 for 2019 as well as baseline in 2015.

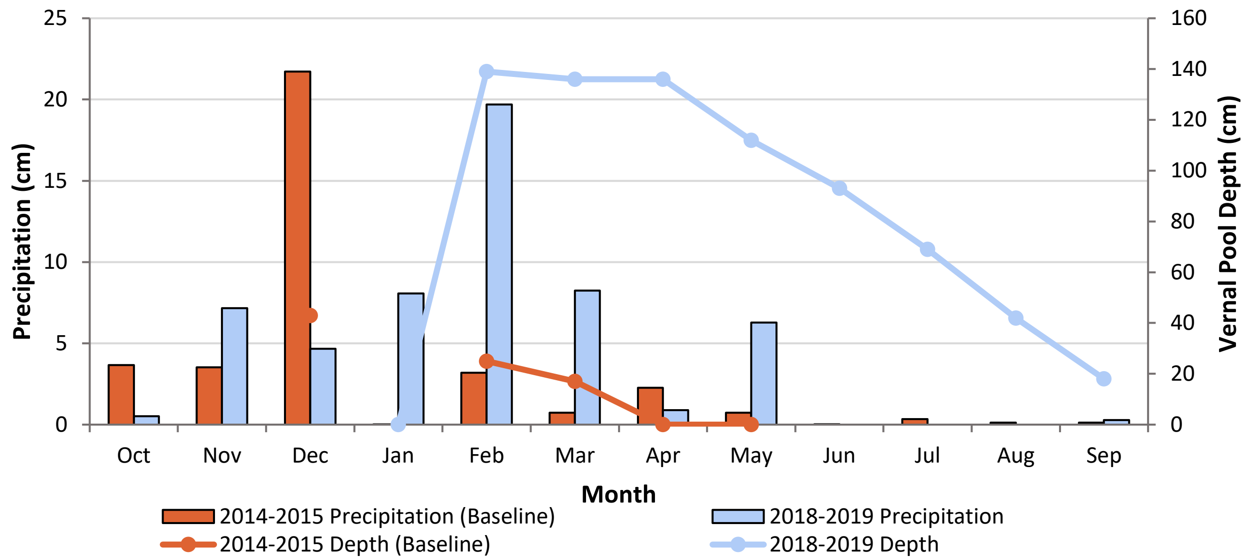

Figure 4-143. Monthly Depth and Precipitation at Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) for 2018-2019 Water-Year Compared to Baseline 2014-2015 Water-Year

In below-normal precipitation years, Pond 16 is likely to range from 0-45 cm in depth with a maximum inundation of 0-0.3 acres. In normal precipitation years, Pond 16 is likely to have a maximum depth of approximately 90 cm. In above-normal precipitation years, Pond 16 could have maximum depths of 144 cm or more and a maximum inundation up to 2.6 acres (see Appendix F Table F-25). Figure 4-144 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-145 illustrates historic and recent inundation areas.

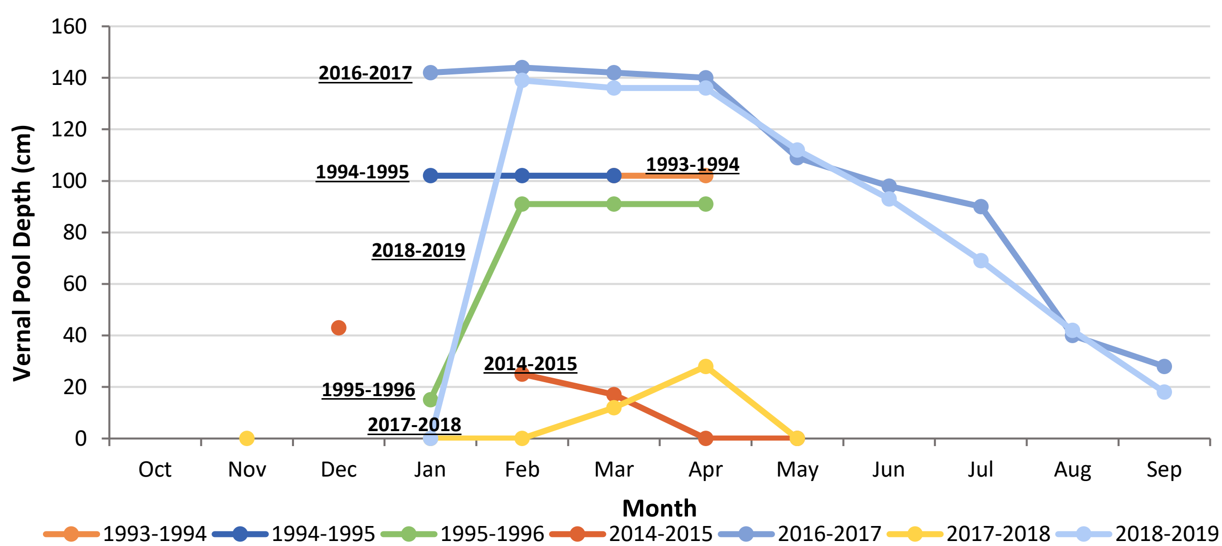

Figure 4-144. Historic Monthly Depths at Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

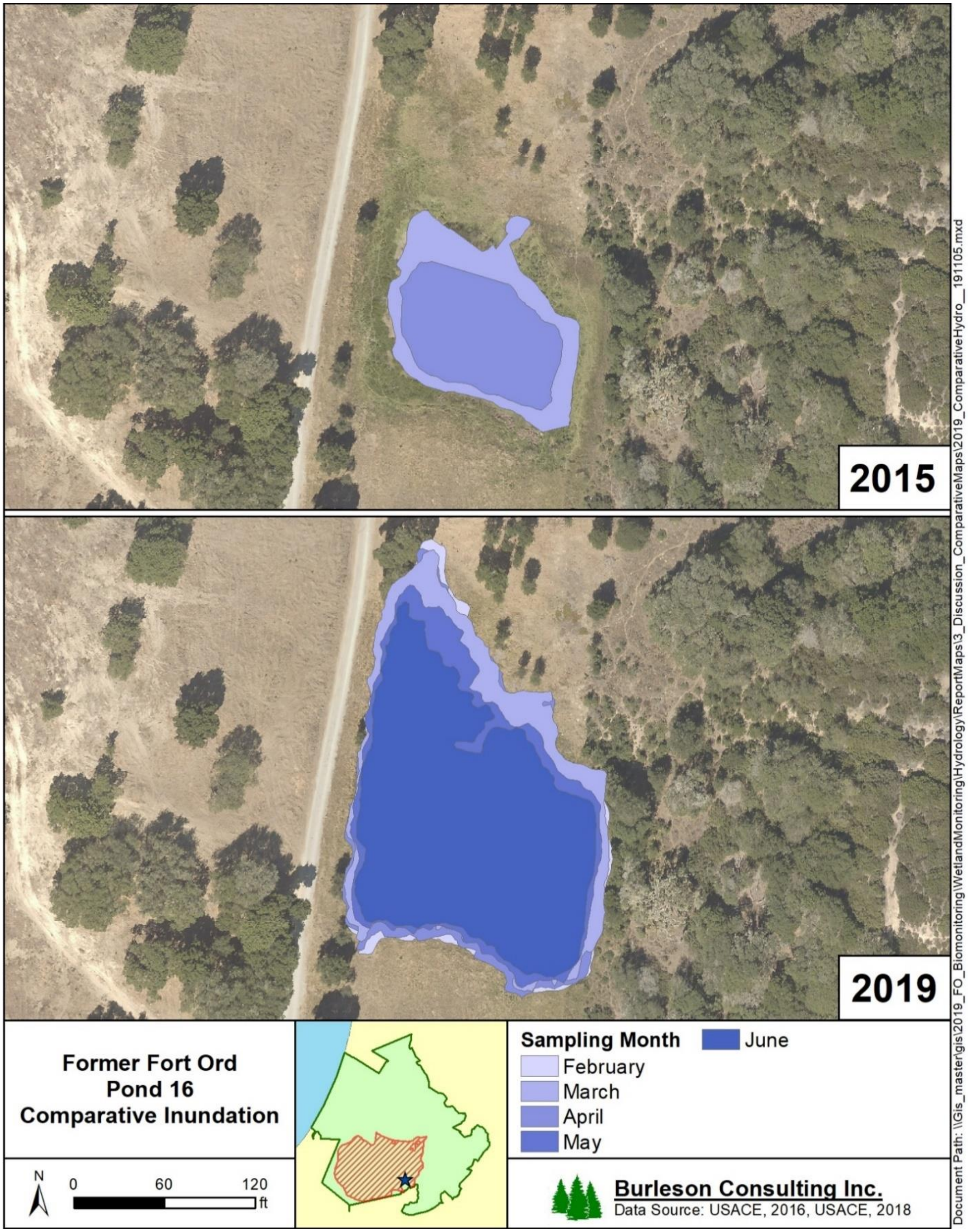

Figure 4-145. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Inundations for 2014-2015 (below-normal precipitation) and 2018-2019 (above-normal precipitation). The vegetation within the watershed and the inundation area was masticated in 2015 and subsurface munitions remediation occurred in 2018. Pond 16 was in years 3 and 1 of monitoring in 2019.

4.25.1.1 *Data Quality Objective 1*

Pond 16 met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 16 provided sufficient depths for both CTS (138 cm through March) and fairy shrimp (131 cm through May). Recorded depths indicate that DQO 1 was likely met in 1994, 1995, 1996, 2015, and 2017, although monitoring did not continue into May in 1994 or 1995. Pond 16 depths were much higher than all reference pools (5, 101 East (East), and 997) observed in 2019.

4.25.1.2 *Data Quality Objective 2*

Pond 16 had similar inundations in 2019 as previous years and the relevant reference vernal pools. Pond 16 was inundated in February and did not dry by the last monitoring event in September. The inundation range was 0.54-0.74 acres and a mean of 0.67 acres. The historic inundation ranges in 2015, 2017, and 2018 were between 0.16 and 2.57 acres. Pond 16 was also inundated in 1994, 1995, and 1996 but inundations were estimated and not included in the comparison due to high variability. Pond 16 can be expected to fill in slightly below-normal water-years. Pond 16 is smaller than reference Ponds 5 and 101 East (East), but larger than Pond 997. Pond 16 held water longer than any of the reference vernal pools.

4.25.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 16, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for years 3 and 1, respectively, in 2019. Pond 16 met DQO 1 and DQO 2 indicating that it provided suitable habitat for CTS and fairy shrimp and was similar to itself in previous monitoring years and reference. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.25.2 Vegetation Monitoring

Vegetation data were collected at Pond 16 in 2015, 2017, and 2019 (Burleson, 2016, 2018). Data from 1994, 1995, and 1996 only represent dominant species and are not included in the following analyses because the data were collected using a different methodology than was used in 2015 and 2017 (Jones and Stokes, 1996). In 2015, 2017, and 2019, data were collected using the methodology described in the Methods section of this report. Data from 2015 and 2019 were compared stratum-to-stratum in Table 4-307 as well as visually in Figure 4-146.

Table 4-307. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2015	2019
1	8%	2%
2	24%	11%
3	44%	22%
4	24%	31%
5	N/A	32%
6	N/A	1%
7	N/A	1%

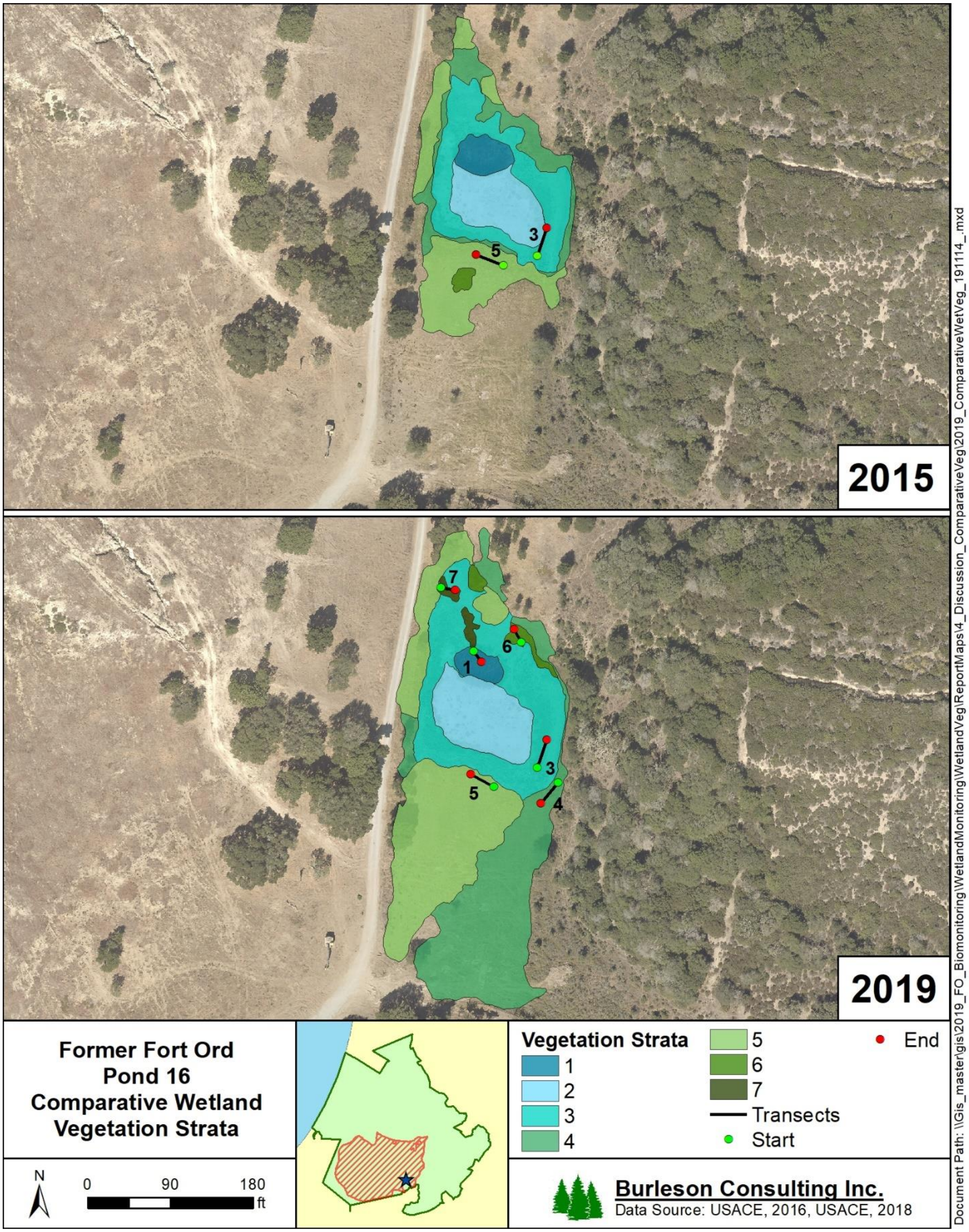

Figure 4-146. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2015 and 2019

Absolute percent vegetative cover increased between 2015 and 2017 and decreased slightly by 2019 (see Table 4-308). The absolute percent vegetative cover was slightly less than the values observed at the reference vernal pools while thatch/bare ground cover was more (see Table 4-309).

Table 4-308. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2015	59.1%	38.8%
2017	77.8%	21.8%
2019	70.6%	29.5%

Table 4-309. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
16	**70.6%**	**29.5%**

Species richness increased between 2015 and 2019 on the transects and decrease slightly in the overall basin in 2019 at Pond 16. Species richness on transects was 8, 24, and 29 species in 2015, 2017, and 2019, respectively, whereas overall basin species richness was 49, 86, and 83 species in 2015, 2017, and 2019, respectively (see Table 4-310 and Appendix B Table B-25). Pond 16 species richness was less than the values observed on transects but was within the ranges observed at the reference vernal pools for the entire basin (see Table 4-311Table 4-228 and Appendix G Tables G-27 and G-54).

Species composition and the dominant species at Pond 16 were similar between the monitoring years. The dominant species in 2015 was whiteroot (*Carex barbarae*) and the dominant species in 2017 and 2019 was pale spike rush (*Eleocharis macrostachya*). Whiteroot and clustered field sedge (*Carex praegracilis*) were also important species in 2017 and 2019. A complete comparison of species composition observed at Pond 16 in 2015, 2017, and 2019 can be found in Appendix H. Figure 4-110 shows a subset of this comparison for species observed with a 2% cover or greater.

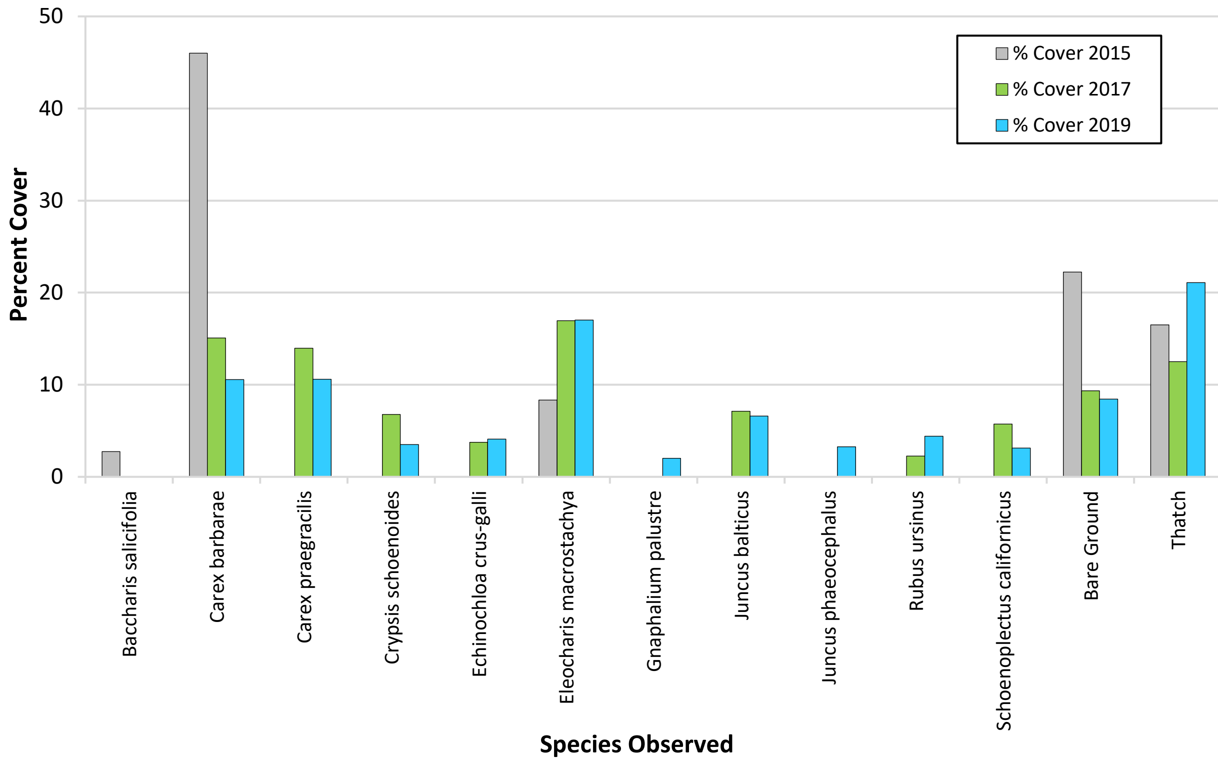

Figure 4-147. Percent Cover of Dominant Species at Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation)

Native and non-native species richness on Pond 16 transects increased between 2015 and 2019 (see Table 4-310). Pond 16 native and non-native species richness in 2019 was less than the range observed at the reference vernal pools (see Table 4-311). The relative percent cover of native species was less than the baseline values but greater than 2017 values, while non-native species was greater than baseline but less than 2017 values (see Table 4-312). Pond 16 native relative percent cover was greater than the values observed at the reference vernal pools in 2019 and the non-native relative percent cover was less than reference (see Table 4-313).

Table 4-310. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2015	5	2	1
2017	13	11	0
2019	17	10	2

Table 4-311. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
16	**17**	**10**	**2**

Table 4-312. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2015	98.2%	1.1%	0.7%
2017	82.9%	17.1%	0.0%
2019	85.2%	14.5%	0.3%

Table 4-313. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
16	**85.2%**	**14.5%**	**0.3%**

Wetland and non-wetland species richness on Pond 16 transects generally increased between 2015 and 2019 (see Table 4-314). Wetland species richness was less than the values observed at the reference vernal pools and non-wetland species richness was within the ranges observed at reference vernal pools (see Table 4-315). The relative percent cover of wetland species decreased between 2015 and 2019 whereas non-wetland species cover increased (see Table 4-316). However, relative percent cover of wetland and non-wetland species were within the ranges observed at the reference vernal pools in 2019 (see Table 4-317).

Table 4-314. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2015	1	3	1	1	0	2
2017	4	5	3	9	1	2
2019	4	6	6	9	0	4

Table 4-315. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
16	**4**	**6**	**6**	**9**	**0**	**4**

Table 4-316. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2015	14.1%	5.2%	77.9%	1.4%	0.0%	1.4%
2017	37.9%	29.4%	24.5%	5.5%	0.4%	2.4%
2019	33.6%	34.1%	21.2%	9.8%	0.0%	1.4%

Table 4-317. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
16	**33.6%**	**34.1%**	**21.2%**	**9.8%**	**0.0%**	**1.4%**

4.25.2.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 16 was dominated by native and wetland plant species during year 3 post-mastication and year 1 post-subsurface munitions remediation monitoring in 2019. Pond 16 wetland vegetation results were within range of baseline vernal pools. Relative percent cover of native species was greater than reference vernal pools, and non-native species cover was less than reference vernal pools.

4.25.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 16, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for years 3 and 1, respectively, in 2019. The species composition, richness, and native and wetland species relative abundances were similar to baseline and reference vernal pool conditions. Pond 16 provided suitable wetland habitat in 2019.

4.25.3 Wildlife Monitoring

Wildlife data were collected at Pond 16 in 1992, 1994, 1995, 1996, 2009, 2015, and 2019 (USACE 1992, Jones & Stokes 1996; Shaw, 2010; Burleson, 2016). California tiger salamander larvae were observed in 2009, 2015, and 2019. Fairy shrimp were detected at Pond 16 in every previous monitoring year except 2015. Table 4-318 shows historic wildlife monitoring results.

Table 4-318. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1992	Not detected	Present
1994	Not detected	Very Low - High
1995	Not detected	Low - High
1996	Not detected	Present
2009	Common	Moderate - High (32, 105)
2015	Few – Common (13, 1)	Not detected
2019	Few – Common (5, 87, 46)	Present*

*Fairy shrimp detected during CTS survey, no fairy shrimp survey was conducted in March due to the presence of CTS eggs.

4.25.3.1 *Data Quality Objective 1*

Pond 16 provided suitable depth for CTS and fairy shrimp as discussed in Section 0.

4.25.3.2 *Data Quality Objective 4*

California tiger salamanders and fairy shrimp were present at Pond 16 in 2019; therefore, the water quality was adequate to support both species. Compared to other vernal pools and previous Pond 16 data, the water quality data were within normal ranges. The pH ranged from 6.15 in April to 6.61 in February with a mean of 6.40. Temperature ranged from 7.33°C in February to 17.94°C in June with a mean of 13.07°C. Dissolved oxygen ranged from 2.75 mg/L in May to 6.68 mg/L in February with a mean of 4.29 mg/L. Turbidity ranged from 60.1 FNU in May to 360.0 FNU in February with a mean of 176.6 FNU (see Table 3-96).

4.25.3.3 *Data Quality Objective 5*

California tiger salamanders were present in 2019. Baseline survey results have been variable. California tiger salamanders were observed in 2009 and 2015, but were not detected in 1992, 1994, 1995, or 1996.

Fairy shrimp were present in 2019, which was consistent with all but one baseline survey. Baseline monitoring in 1992, 1994, 1995, 1996, and 2009 yielded detections, while fairy shrimp were not detected in 2015.

4.25.3.4 *Performance Standard: Wildlife Usage*

Pond 16, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for year 1 and 3. The vernal pool was on track to meet DQOs 1, 4, and 5 and provided suitable CTS and fairy shrimp habitat.

4.25.4 Conclusion

Pond 16, a post-mastication and post-subsurface munitions remediation vernal pool, was in years 3 and 1 of monitoring in 2019. The vernal pool was on track to meet all of the performance standards (see Table 4-319). Pond 16 will continue to be monitored in the future.

Table 4-319. Success at Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	On track
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	On track
	DQO 4	On track
	DQO 5	On track

4.26 Pond 54 – Year 3 and Year 1

Pond 54 was monitored in 2019 as a year 3 post-mastication vernal pool and year 1 post-subsurface munitions remediation. Vegetation within the Pond 54 watershed was masticated in the summer of 2015 in support of MEC remediation in Unit 23. Risk reduction activities in Unit 23 resulted in subsurface munitions remediation in Pond 54 in 2018. All surveys before 2015 are pre-remediation and are considered baseline. Table 4-320 summarizes the years that monitoring and surveys were conducted. The cumulative precipitation graph shows the precipitation for monitoring years at Pond 54 (see Figure 4-148). The 2016-2017 and 2018-2019 water-years were above-normal, whereas water-years 2003-2004, 2008-2009, and 2017-2018 were below-normal.

Table 4-320. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year				
	2003-2004	2008-2009	2016-2017	2017-2018	2018-2019
Hydrology	●		●	●	●
Vegetation	●				●
Wildlife	●	●	●		●

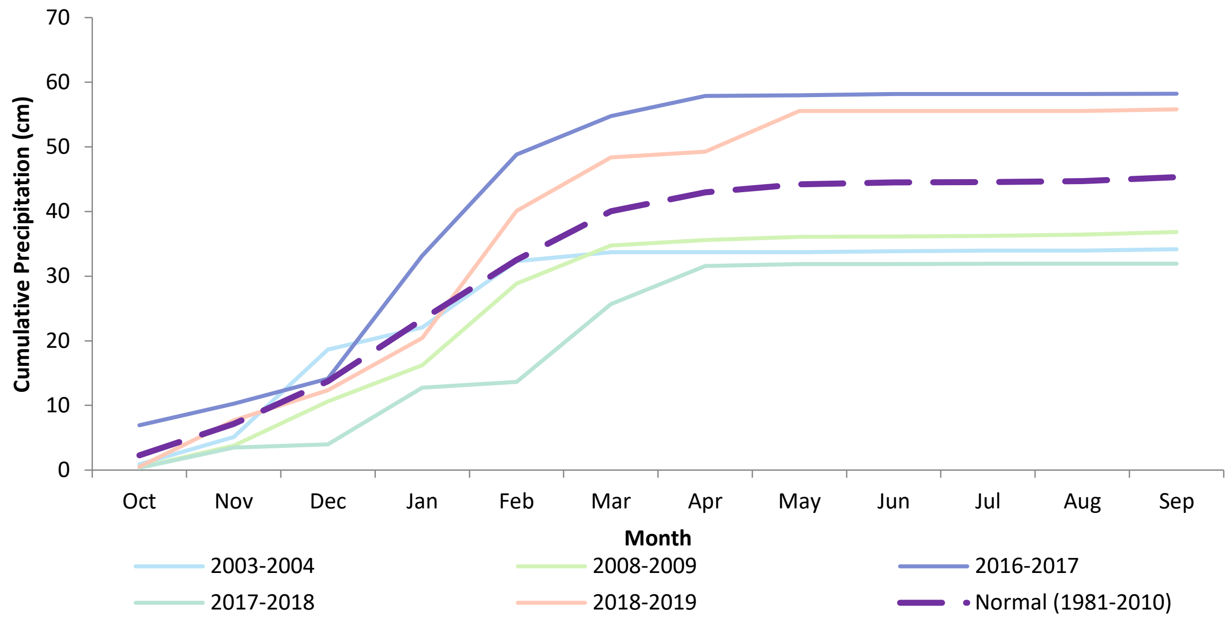

Figure 4-148. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.26.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 54 was 2.00 acres with a maximum depth of approximately 63 cm. The depth and inundation values were within range of previous recorded values (see Appendix F Table F-26). Pond 54 was inundated from the first recorded monitoring in January through June. Figure 4-149 illustrates the relationship of precipitation and depth at Pond 54 for 2019 as well as baseline in 2004.

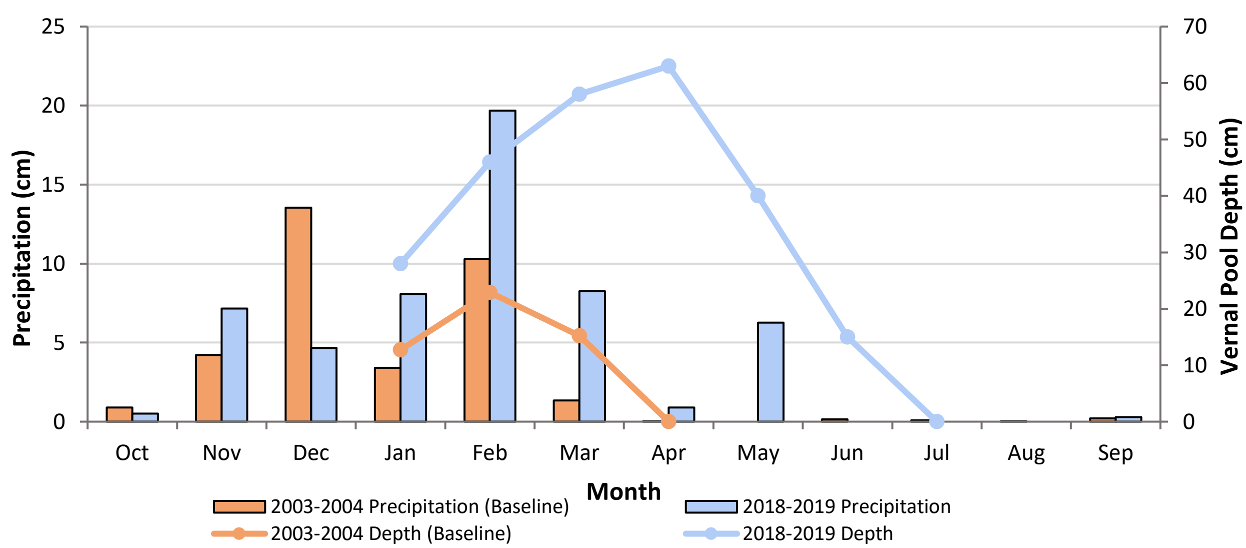

Figure 4-149. Monthly Depth and Precipitation at Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) for 2018-2019 Water-Year Compared to Baseline 2003-2004 Water-Year

In below-normal precipitation years, Pond 54 is likely to range from 0-28 cm in depth with a maximum inundation of 0-1.4 acres. No depths or inundations for Pond 54 have been recorded in normal precipitation years. In above-normal precipitation years, Pond 54 could have maximum depths of 112 cm or more and a maximum inundation of 3.1 acres (see Appendix F Table F-26). Figure 4-150 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-151 illustrates historic and recent inundation areas.

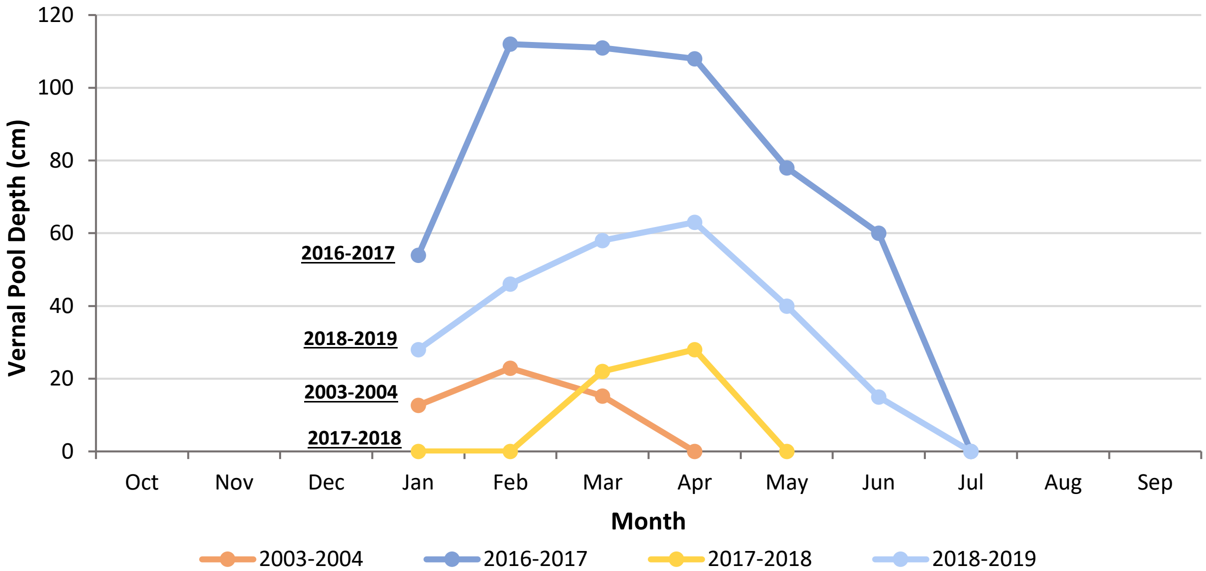

Figure 4-150. Historic Monthly Depths at Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

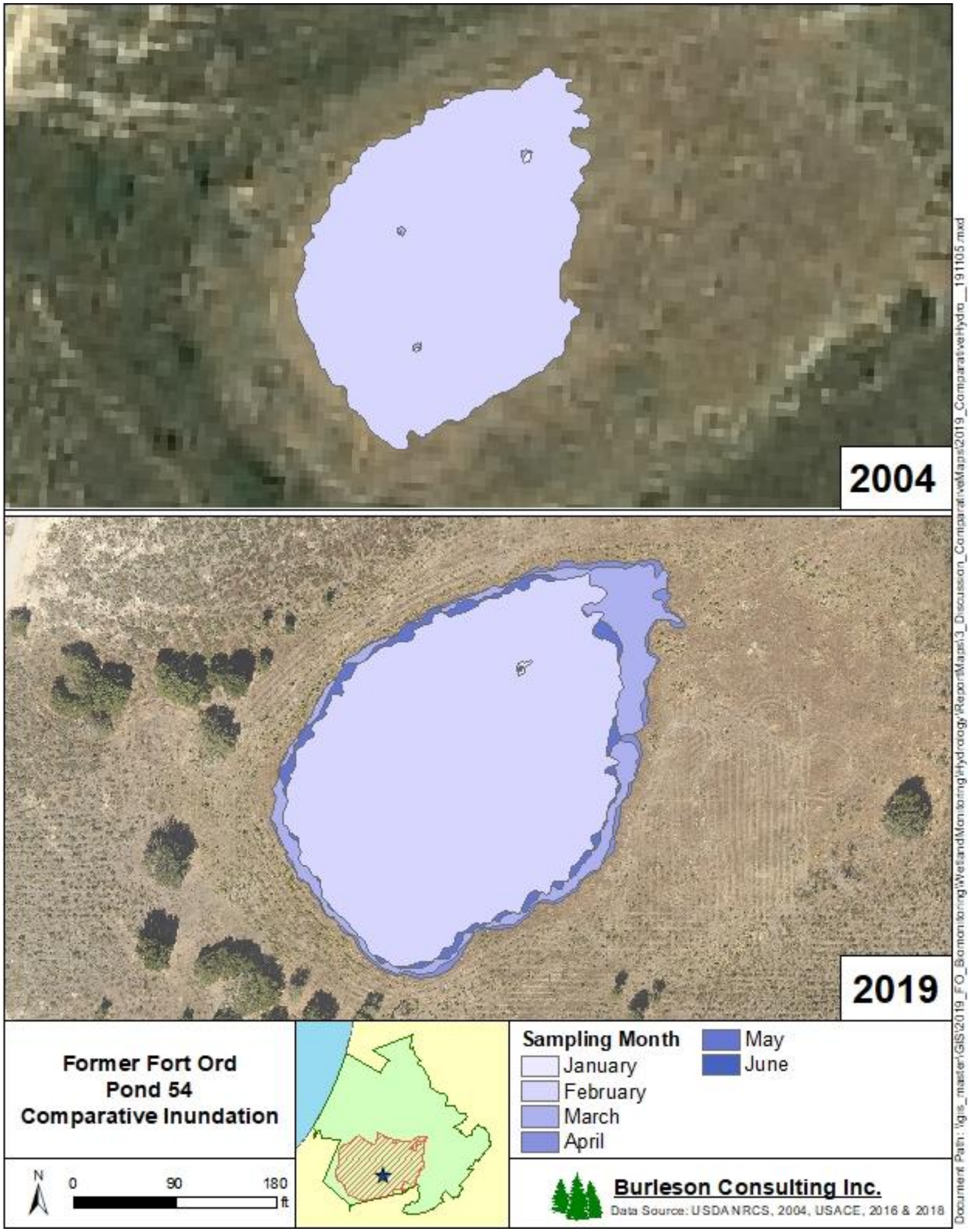

Figure 4-151. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Inundations for 2003-2004 (below-normal precipitation) and 2018-2019 (above-normal precipitation). Vegetation within the Pond 54 watershed was masticated in 2015 and subsurface munitions remediation occurred in 2018. Pond 54 was in year 3 and year 1 of monitoring in 2019.

4.26.1.1 *Data Quality Objective 1*

Pond 54 met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 54 provided sufficient depth for CTS (44 cm through March) and fairy shrimp (47 cm through May). In previous years when data were collected from the first rain event through May, DQO 1 was not met in 2004 but was met in 2017. In 2019, Pond 54 depths were similar to those observed in reference Ponds 5 and 101 East (East).

4.26.1.2 *Data Quality Objective 2*

Pond 54 had similar inundations in 2019 as previous years and the relevant reference vernal pools. Pond 54 was inundated in January through June with an inundation range of 0.0003-2.00 acres and a mean of 1.21 acres. The historic inundation ranges in 2004 and 2017 were between 0.001 and 3.10 acres. The 2019 inundations were within this range and were similar to the January and February 2004 inundations. Pond 54 can be expected to fill in slightly below-normal water-years, although the vernal pool may remain dry in a drought year (see Figure 4-150). Pond 54 had a similar inundation range and timing as Pond 101 East (East), both were inundated January/February through June and had large inundation areas.

4.26.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 54, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for year 3 in 2019. Pond 54 met DQO 1 and DQO 2 indicating that it provided suitable habitat for CTS and fairy shrimp and was similar to itself in previous monitoring years and reference vernal pools. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.26.2 Vegetation Monitoring

Vegetation data were collected at Pond 54 in 2004 and 2019 (MACTEC, 2005). In 2004, data were collected along two transects close to 50 feet in length. Quadrats were placed at 10-foot intervals, alternating from right to left along the transect. Because 2004 data were collected differently than in other years, strata were combined across the vernal pool to allow for comparison to other years.

Absolute percent vegetative cover decreased between 2004 and 2019 and thatch/bare ground cover increased (see Table 4-321). The absolute percent vegetative cover of Pond 54 in 2019 was higher than the values observed at the reference vernal pools and thatch/bare ground cover was lower (see Table 4-322).

Table 4-321. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2004	97.4	2.5
2019	85.5	14.5

Table 4-322. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
54	**85.5%**	**14.5%**

Species richness increased between 2004 and 2019 at Pond 54. Species richness on transects was 12 and 40 species in 2004 and 2019, respectively, whereas overall basin species richness was 79 species in 2019 (see Table 4-323 and Appendix B Table B-26). The 2004 survey was limited to species on the transects and total vernal pool species richness was not recorded. Pond 54 species richness on transects was within the range observed at the reference vernal pools but was less than the values for the entire basin (see Table 4-324 and Appendix G Tables G-27 and G-54).

Species composition at Pond 54 was different among the monitoring years, and the dominant species were different. The dominant species in 2004 was rattail sixweeks grass (*Festuca myuros*). In 2019, the dominant species were brown-headed rush (*Juncus phaeocephalus*), *pale* spikerush (*Eleocharis macrostachya*), and needle spikerush (*Eleocharis acicularis* var. *acicularis*). A complete comparison of species composition observed at Pond 54 in 2004 and 2019 can be found in Appendix H. Figure 4-110 shows a subset of this comparison for species observed with a 2% cover or greater.

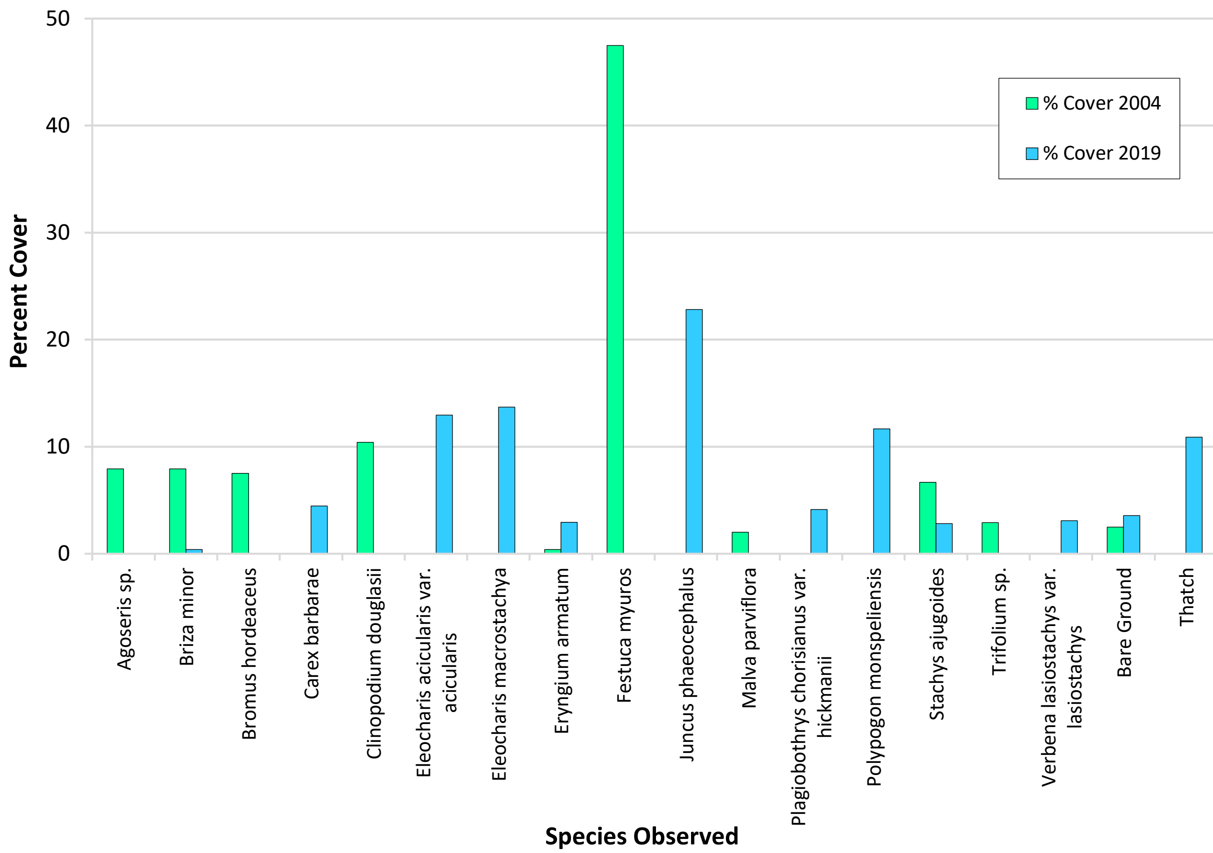

Figure 4-152. Percent Cover of Dominant Species at Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation)

Native and non-native species richness on Pond 54 transects increased between 2004 and 2019 (see Table 4-323). Pond 54 native and non-native species richness was within the range of values observed at the reference vernal pools (see Table 4-324). The relative percent cover of native species was considerably greater than the baseline year, whereas non-native cover was considerably less than baseline (see Table 4-325). Pond 54 native cover was greater than the values observed at the reference vernal pools and non-native cover was less than (see Table 4-326).

Table 4-323. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2004	4	6	2
2019	26	14	0

Table 4-324. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
54	**26**	**14**	**0**

Table 4-325. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2004	19.7%	69.2%	11.1%
2019	82.7%	17.3%	0.0%

Table 4-326. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
54	**82.7%**	**17.3%**	**0.0%**

Wetland and non-wetland species richness on Pond 54 transects increased between 2004 and 2019 and were within the range of values at the reference vernal pools (see Table 4-327 and Table 4-328). The relative percent cover of wetland species was considerably greater than the baseline year and greater than the values observed at reference vernal pools, whereas non-wetland cover was considerably less than baseline and less than reference (see Table 4-329 and Table 4-330).

Table 4-327. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2004	2	1	1	3	0	5
2019	8	9	6	6	1	10

Table 4-328. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
54	**8**	**9**	**6**	**6**	**1**	**10**

Table 4-329. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2004	7.7%	0.4%	8.1%	67.1%	0.0%	16.6%
2019	40.2%	45.6%	10.6%	1.2%	0.3%	2.0%

Table 4-330. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
54	**40.2%**	**45.6%**	**10.6%**	**1.2%**	**0.3%**	**2.0%**

4.26.2.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations as well as differing methodologies. In 2004, the transects were placed in “transitional and emergent habitats” and “sampling characterized wetland-influenced vegetation and associated transitional herbaceous species” which differs from the methods in 2019 which focuses on placing transects within the wetland in representative locations in each stratum (MACTEC, 2004). In 2019, vegetative cover in Pond 54 was dominated by native and wetland plant species during year 3 post-mastication monitoring. Pond 54 wetland vegetation results were generally within range of baseline and/or reference vernal pools, however native cover in 2019 was greater than baseline and the reference vernal pools.

4.26.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 54, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for year 3 in 2019. The species composition, richness, and native and wetland species relative abundances were similar to baseline and/or reference vernal pool conditions, however native cover was greater. Pond 54 provided suitable wetland habitat in 2019.

4.26.3 Wildlife Monitoring

Wildlife data were collected at Pond 54 in 2004, 2009, 2017, and 2019 (MACTEC, 2005; Shaw, 2010, Burleson, 2018). California tiger salamander larvae were not detected in 2004 but were present in 2017 and 2019; CTS eggs were observed in 2009. Fairy shrimp have never been detected. Table 4-331 shows historic wildlife monitoring results.

Table 4-331. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2004	Not detected	Not detected
2009	CTS eggs present; no larvae	Not detected
2017	Few (1, 4, 2)	Not detected
2019	Common (14, 14)	Not detected

4.26.3.1 *Data Quality Objective 1*

Pond 54 provided suitable depth for CTS and fairy shrimp as discussed in Section 4.26.1.1.

4.26.3.2 *Data Quality Objective 4*

Fairy shrimp were not detected in 2019. California tiger salamanders were present at Pond 54 in April and May. The water quality was adequate. Compared to other vernal pools and previous Pond 54 data, the water quality data were within normal ranges. The pH ranged from 5.92 in June to 6.70 in March with a mean of 6.28. Temperature ranged from 9.37°C in February to 20.45°C in June with a mean of 15.18°C. Dissolved oxygen ranged from 4.49 mg/L in May to 11.26 mg/L in March with a mean of 7.22 mg/L. Turbidity ranged from 2.6 FNU in April to 127.0 FNU in January with a mean of 31.0 FNU (see Table 3-100).

4.26.3.3 *Data Quality Objective 5*

California tiger salamanders were present in 2019, which was partially consistent with baseline surveys. California tiger salamander eggs were observed in 2009 (with no larvae detected) and no detections were made in 2004.

Fairy shrimp were not detected in 2019, which was consistent with all previous baseline surveys. Baseline monitoring in 2004 and 2009 yielded no detections.

4.26.3.4 *Performance Standard: Wildlife Usage*

Pond 54, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for year 3. The vernal pool was on track to meet DQOs 1, 4, and 5 and provided suitable CTS and fairy shrimp habitat.

4.26.4 Conclusion

Pond 54, a post-mastication and post-subsurface munitions remediation vernal pool, was in year 3 and year 1 of monitoring in 2019. The vernal pool was on track to meet all of the performance standards (see Table 4-332). Pond 54 will continue to be monitored in the future.

Table 4-332. Success at Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	On track
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	On track
	DQO 4	On track
	DQO 5	On track

4.27 Pond 72 – Year 3

Pond 72 was monitored in 2019 as a year 3 post-mastication and post-subsurface munitions remediation vernal pool. Vegetation in Pond 72 and within its watershed was first masticated in 2011 to support MEC remediation in Unit 11. Vegetation within Pond 72 and its watershed was masticated again in 2015 for preparation for a prescribed burn. No baseline or year 1 monitoring has been conducted at Pond 72. Table 4-333 summarizes the monitoring year and surveys conducted. The cumulative precipitation graph shows the precipitation for all monitoring years (see Figure 4-153). The 2018-2019 water year was above-normal, whereas the 2017-2018 water-year was below-normal.

Table 4-333. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year	
	2017-2018	2018-2019
Hydrology	●	●
Vegetation		●
Wildlife		●

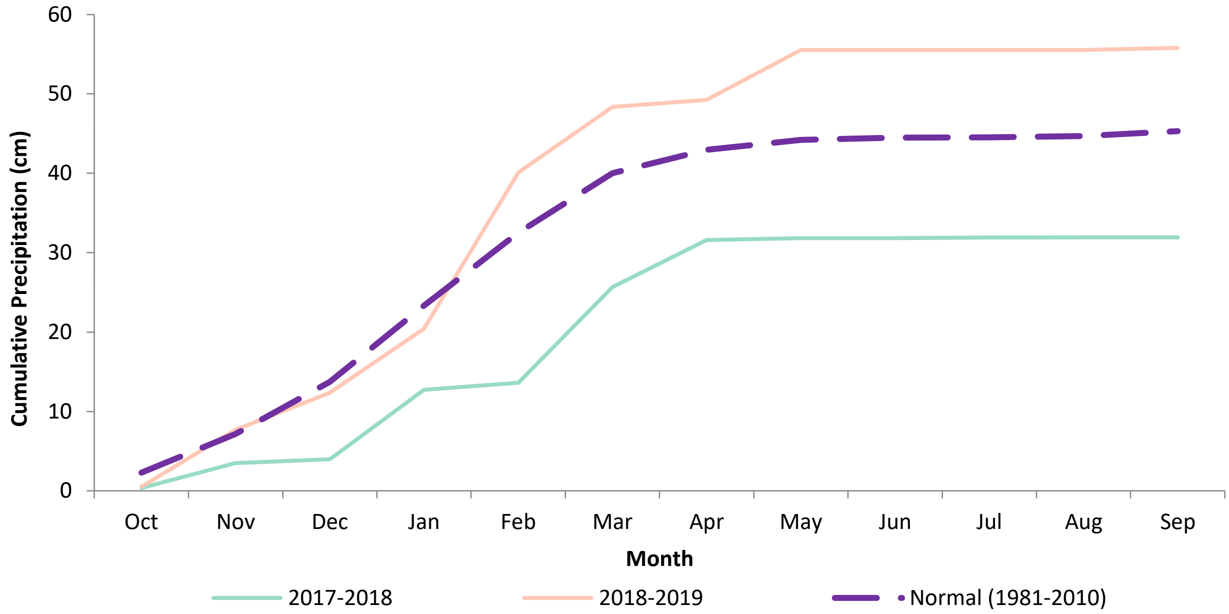

Figure 4-153. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2019; NCDC NOAA, 2019)

4.27.1 Hydrology Monitoring

The 2019 maximum inundation for Pond 72 was 2.28 acres with a maximum depth of approximately 56 cm (see Appendix F Table F-27). No baseline hydrology data were available for comparison; however, the depth and inundation values were greater than the year 2 monitoring results. Pond 72 was inundated from the first recorded monitoring in January through May. Figure 4-154 illustrates the relationship of precipitation and depth at Pond 72 for 2019 as well as year 2 in 2018.

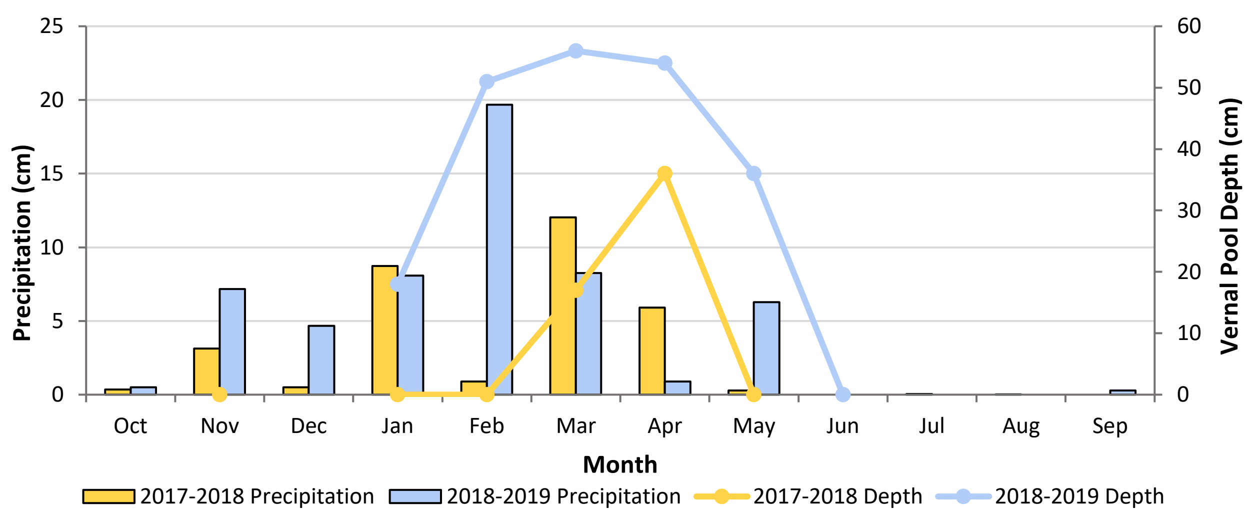

Figure 4-154. Monthly Depth and Precipitation at Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) for 2018-2019 Water-Year Compared to 2017-2018 Water-Year (Year 2). No baseline data were collected.

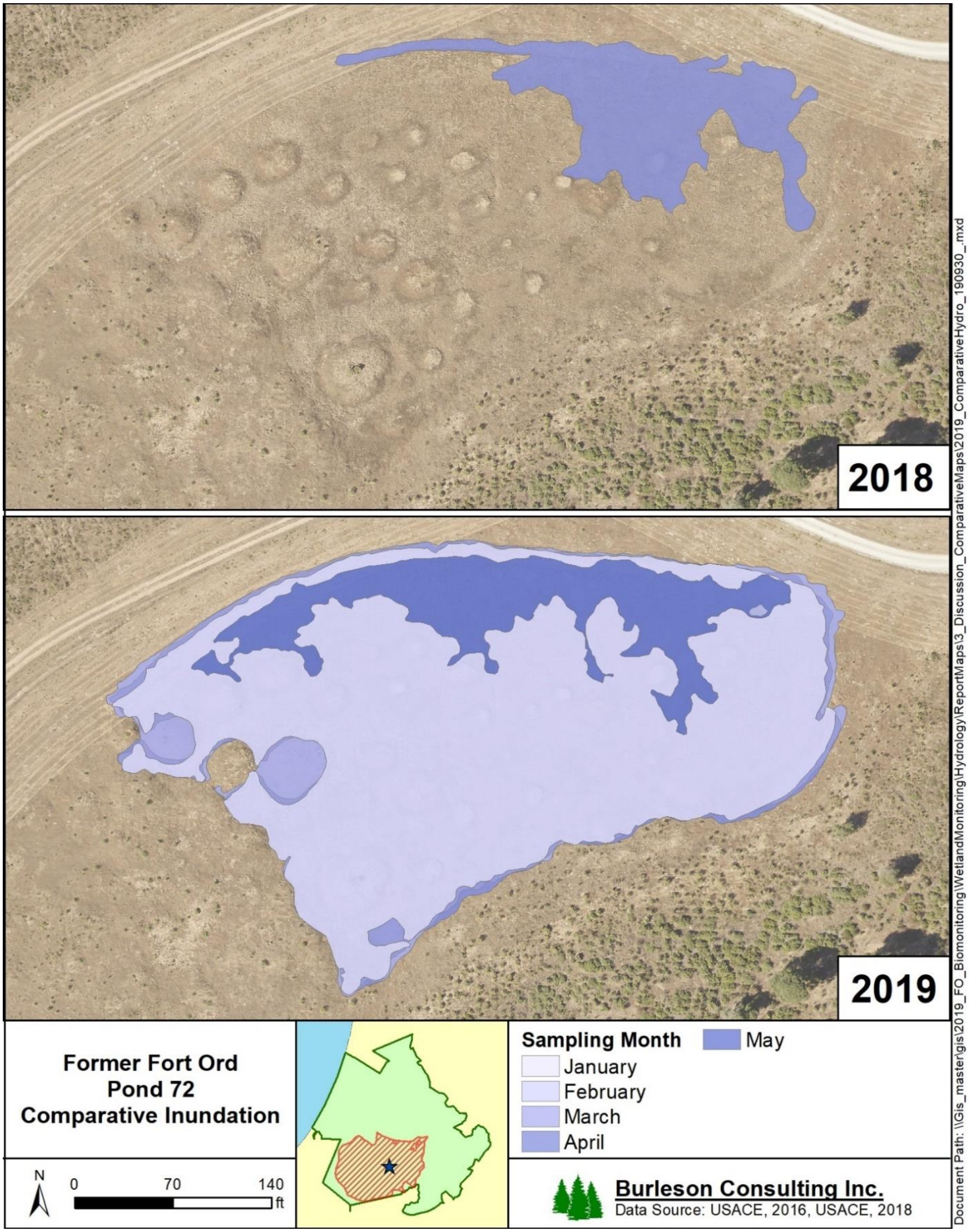

Figure 4-155. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) Inundations for 2017-2018 (below-normal precipitation) and 2018-2019 (above-normal precipitation). Vegetation within the Pond 72 watershed was masticated in 2015 and the vernal pool was in year 3 of monitoring in 2019.

4.27.1.1 *Data Quality Objective 1*

Pond 72 met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 73 provided sufficient depth for both CTS (42 cm through March) and fairy shrimp (43 cm through May). In 2019, Pond 72 depths were most similar to reference Ponds 5 and 101 East (East), but dried approximately one month earlier.

4.27.1.2 *Data Quality Objective 2*

Pond 72 was inundated January through May with an inundation range of 0.002-2.28 acres and a mean of 1.40 acres. No historic baseline inundations were available for comparison. In an above or below-normal water-year, Pond 72 is likely to be inundated. In 2019, Pond 72 was similar to reference Pond 101 East (East) because both held water from January through May/June and had similar large inundation ranges.

4.27.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 72, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for year 3 in 2019. Pond 72 met DQO 1 and DQO 2 indicating that it provided suitable habitat for CTS and fairy shrimp and was similar to the reference vernal pools. No baseline data was available for comparison. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.27.2 Vegetation Monitoring

Vegetation data were collected at Pond 72 in 2019, but not in any other year.

The absolute percent vegetative cover was 77.2% and thatch/bare ground cover was 22.8% in 2019. Pond 72 vegetative cover was slightly greater than the values observed at the reference vernal pools and thatch/bare ground was less than reference values (see Table 4-334).

Table 4-334. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2019

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	76.0%	24.0%
101 East (East)	72.6%	28.6%
997	73.3%	28.6%
72	**77.2%**	**22.8%**

In 2019, 22 species were recorded on the transects and 62 species in the vernal pool basin. Pond 72 species richness on transects and the entire basin were below the values observed at the reference vernal pools (see Table 4-335 and Appendix G Tables G-27 and G-54).

The dominant species in 2019 were brown-headed rush (*Juncus phaeocephalus*), pale spikerush (*Eleocharis macrostachya*), and coyote thistle (*Eryngium armatum*). A complete species composition observed at Pond 72 can be found in Appendix H. Figure 4-110 shows a subset of species observed with a 2% cover or greater.

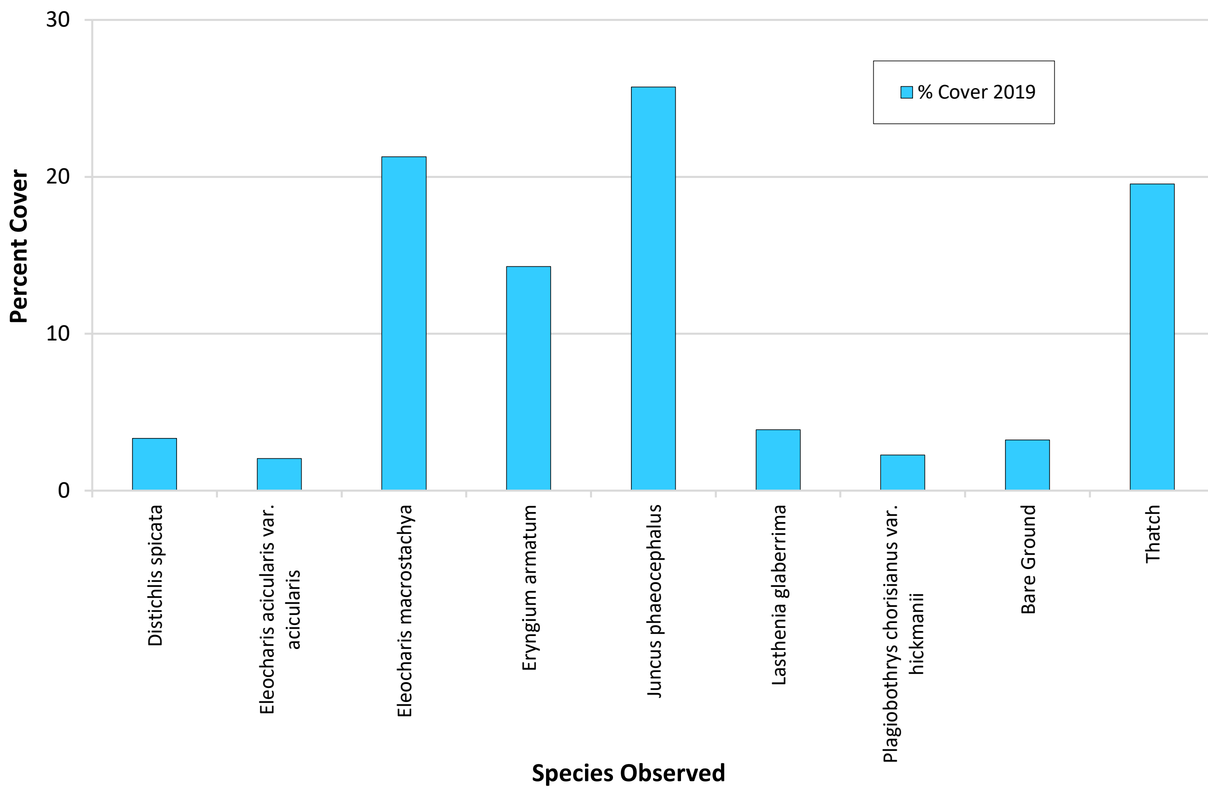

Figure 4-156. Percent Cover of Dominant Species at Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation)

Pond 72 native and non-native species richness in 2019 was less than the range observed at the reference vernal pools (see Table 4-335). Pond 72 relative percent cover of native species was considerably higher than the values observed at reference vernal pools while the non-native cover was considerably lower than reference (see Table 4-336).

Table 4-335. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	21	14	0
101 East (East)	18	19	0
997	27	21	0
72	**16**	**6**	**0**

Table 4-336. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2019

Vernal Pool	Native	Non-Native	Unidentified
5	73.6%	26.4%	0.0%
101 East (East)	64.7%	35.3%	0.0%
997	68.5%	31.5%	0.0%
72	**98.2%**	**1.8%**	**0.0%**

The wetland species richness at Pond 72 was within the ranges observed at the reference vernal pools in 2019, whereas the non-wetland species richness was considerably lower than observed reference vernal pool values (see Table 4-337). Relative percent cover of wetland species was greater than the reference values and non-wetland cover was less than reference (see Table 4-338).

Table 4-337. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	9	4	5	1	11
101 East (East)	4	8	7	7	3	8
997	9	9	6	8	1	15
72	**6**	**9**	**4**	**0**	**0**	**3**

Table 4-338. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2019

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
101 East (East)	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
997	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
72	**38.3%**	**59.6%**	**1.3%**	**0.0%**	**0.0%**	**0.7%**

4.27.2.1 *Data Quality Objective 3*

Vegetative cover in Pond 72 was dominated by native and wetland plant species during year 3 post-mastication monitoring in 2019. There are no baseline data available for comparison. Pond 72 wetland vegetation results were variable, with some metrics within range of reference vernal pools and some considerably higher or lower depending on the metric. Native and non-native species richness was lower than the reference vernal pools; however, the ratio between the two was similar to reference vernal pools. Native and wetland covers were markedly higher than reference, and non-native and non-wetland covers were markedly lower.

4.27.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 72, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for year 3 in 2019. The species composition was similar to reference vernal pools; however, native and non-native species richness was lower, and native and wetland relative covers were higher. Pond 72 provided suitable wetland habitat in 2019.

4.27.3 Wildlife Monitoring

Wildlife data were collected at Pond 72 in 2019. California tiger salamander larvae were present while fairy shrimp were not detected. There is no historic wildlife data. Table 4-339 shows 2019 monitoring results.

Table 4-339. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2019	Common - Abundant (7, 104, 21)	Not present

4.27.3.1 *Data Quality Objective 1*

Pond 72 provided suitable depth for CTS and fairy shrimp as discussed in Section 4.27.1.1.

4.27.3.2 *Data Quality Objective 4*

Fairy shrimp were not detected in 2019. California tiger salamanders were present at Pond 72 in April and May. The water quality was adequate. Compared to other vernal pools and previous Pond 72 data, the water quality data were within normal ranges. The pH ranged from 6.24 in May to 6.75 in March with a mean of 6.45. Temperature ranged from 7.06°C in February to 15.04°C in May with a mean of 12.97°C. Dissolved oxygen ranged from 4.98 mg/L in May to 9.39 mg/L in March with a mean of 7.41 mg/L. Turbidity ranged from 2.6 FNU in May to 101.0 FNU in January with a mean of 28.3 FNU (see Table 3-104).

4.27.3.3 *Data Quality Objective 5*

California tiger salamanders were present in 2019. No prior surveys were conducted at Pond 72.

Fairy shrimp were not detected in 2019. No prior surveys were conducted at Pond 72.

4.27.3.4 *Performance Standard: Wildlife Usage*

Pond 72, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for year 3. The vernal pool was on track to meet DQOs 1, 4, and 5 and provided suitable CTS and fairy shrimp habitat. The vernal pool was only evaluated against the performance standard with consideration to reference vernal pools because there was no baseline wildlife data for Pond 72.

4.27.4 Conclusion

Pond 72, a post-mastication and post-subsurface munitions remediation, was in year 3 of monitoring in 2019. The vernal pool could only be evaluated against reference vernal pools for plant cover and species diversity and wildlife usage because there was no baseline data. For hydrological conditions, Pond 72 was compared to year 2 conditions (see Table 4-340). Pond 72 was on track to meet all of the performance standards. Pond 72 will continue to be monitored in the future.

Table 4-340. Success at Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Hydrological Conditions & Inundation Area	DQO 1	On track
	DQO 2	On track*
Plant Cover & Species Diversity	DQO 3	On track*
Wildlife Usage	DQO 1	On track*
	DQO 4	On track*
	DQO 5	On track*

*No baseline for comparison, only compared to reference vernal pools

5 CONCLUSION

Typical winter rainfall patterns and above-normal precipitation in 2019 allowed generally favorable hydrological, wetland vegetation, and wildlife conditions to occur in the vernal pools. Sixteen of the 20 remediated vernal pools monitored in 2019 were on track to meet all of the performance standards (see Table 5-1).

The hydrological condition and inundation performance standard was met or partially met at 17 of the vernal pools. Ponds 43, 44, and 61, are all historically shallow vernal pools that like reference Pond 997 did not provide depth suitable for CTS and fairy shrimp. Pond 35 and 40 South were partially on track to meeting the performance standard and provided suitable depth for fairy shrimp but not CTS. Regardless of the depth requirements, Ponds 43, 44, 61, 35, and 40 South had fairy shrimp present and CTS were not detected which was consistent with baseline conditions.

Wetland vegetation trends were variable across vernal pools however 19 vernal pools met the performance standard. All vernal pools supported a majority of wetland species and relative percent cover was dominated by wetland species. Native and non-native species richness was variable but decreased on average from 2018 to 2019. Of the 16 vernal pools surveyed in both 2018 and 2019, nine increased in species richness observed on transects, six decreased, and one vernal pool had no change. Variability is expected in vernal pools which have dynamic conditions in response to the amount of precipitation and the resulting hydroperiod (Bauder, 2000; Bauder, 2005; Mulhouse *et al*., 2005; Witham *et al*., 1998). From 2018 to 2019, total vegetative cover increased while cover of thatch and bare ground decreased at 14 out of 16 vernal pools monitored in these years. This was likely due to the above-normal water year that encouraged strong vegetative growth. In addition, the pools held water for longer so that even vernal pools monitored late in the season were surveyed before vegetation dried and turned to thatch.

The 2018-2019 water-year provided favorable conditions for wildlife usage. Vernal pools with depths that did not provide suitable habitat are all vernal pools that are historically small and similar to reference Pond 997. For remediated vernal pools, only Pond 42 and 101 West did not have wildlife presence similar to baseline.

At the request of the agencies following non-detections of fairy shrimp at several vernal pools, early season surveys were completed in 2019 at a selection of vernal pools to be sampled (Burleson 2016; 2017). To prevent potential damage to CTS eggs, only vernal pools that had no recent evidence of supporting CTS were surveyed in January and/or February. Fairy shrimp were detected at all vernal pools where early surveys were conducted and have had historic detections (Ponds 3 North, 3 South, 35, 39, 40 North, 40 South, 43, and 44). Fairy shrimp were also detected in March at the same locations. In 2019, five of these vernal pools had lower abundance of fairy shrimp in March than January or February, two vernal pools had higher abundance in March or April, and one vernal pool had almost identical abundance in February and March. In all of the sampled locations fairy shrimp were detected at all vernal pools that supported that species in the past with the exception of Pond 101 West.

None of the sampled vernal pools in March 2015 nor April 2016 had California fairy shrimp detections. 2015 was an overall below normal water year but had above normal precipitation in November and December of 2014. By the time of wildlife surveys at the end of March in 2015 only a handful of vernal pools held water. 2016 was an above normal water year with above normal precipitation in November, December and January. Although hydrology surveys did not start until March in those years, it is likely that in 2015 and 2016 most vernal pools became inundated in early winter. In years when vernal pools start to fill up during early winter years, fairy shrimp could be completing their lifecycle before March. In a study of large branchiopods endemic to California conducted from 1990-1996, California fairy shrimp took on average 32.9 days to mature, 42.8 days to reproduce, and mean population longevity was 138.7 days (Helm, 1998). Thus, non-detections of fairy shrimp in late March 2015 and April 2016 may have been due to early inundations of the vernal pools which in turn spurred early hatching of the fairy shrimp. While 2019 was also an above normal water year, it was mostly due to extreme precipitation in February, as precipitation in October, December, and January were below normal (Figure 1-5). The hydrologic monitoring in January showed several vernal pools were still dry, while several others had shallow inundation, which suggests that they did not hold water until December or January. In those vernal pools the hatching of fairy shrimp occurred later in the season, resulting in their detections in March and April. In a 2x2 factorial experimental study of vernal pool community structure total abundance of three branchiopod species, including California fairy shrimp, were highest in ambient temperature treatments nine weeks (third week of March) after early inundation treatment, and seven weeks (first week of May) after late inundation treatment (Shin and Kneitel, 2019).

While branchiopod species hatch shortly after inundation, it is unclear if California fairy shrimp display bet-hedging strategies where portion of cysts do not hatch when first hydrated and hatch in later pool fillings or remain dormant (Shin and Kneitel, 2019). Two species of anostracans in southern California were found to display this strategy, which decreases the probability of total reproductive failure in variable environments (Simovich and Hathaway, 1997). While it is possible that California fairy shrimp are capable of such strategy, there is no reason to believe that California fairy shrimp did not hatch in 2015 and 2016, as favorable conditions were likely present earlier in the season.

Favorable conditions may be defined by several water parameters. Shin and Kneitel (2019) found that temperature had a negative impact on California fairy shrimp abundance in both early and late inundation treatments, and the total branchiopod abundance was lowest in late inundation and warm temperature treatments. Conductivity was also significantly higher in both warm and later inundation timing treatments (Shin and Kneitel, 2019). Thus, it is possible that as temperature and conductivity increase in spring months, vernal pools that become inundated later in the season may result in lower hatching rates of California fairy shrimp.

Many of the smaller vernal pools on former Fort Ord are shallow and are often dry by April. In these vernal pools successful hatching of California fairy shrimp will largely depend on the length of the hydroperiod as discussed above. In below-normal water years with rains arriving later in the season some of the vernal pools may not stay inundated for long enough time for successful hatching and reproduction.

The Wetland Plan criterion used to identify suitable fairy shrimp habitat requires that a vernal pool retain an average of 10 cm of water for at least 18 consecutive days, and the DQO 1 requires an average of at least 10 cm through May (Burleson, 2016). The minimum number of days for California fairy shrimp to mature is 16 days (Helm, 1998), thus the criterion of 18 consecutive days of average 10 cm of water is close to the minimum required. However, there were two vernal pools (Ponds 43 and 44) where DQO 1 was not met, but California fairy shrimp were detected. This demonstrates that interpretation of meeting success criteria in remediated vernal pools will need to take into consideration full knowledge of vernal pool hydroperiod dynamics at the former Fort Ord.

The early season surveys may be appropriate in vernal pools where initial follow up surveys do not detect fairy shrimp. Currently, only Pond 101 West did not have detections of California fairy shrimp in post remediation surveys. Early season surveys will be conducted at that vernal pool in the future and will be modified to avoid impacting CTS eggs.

All remediated vernal pools monitored in 2019 were either in year 1, 2, or 3 and will continue to be monitored. None of the vernal pools are required to meet performance standards at this time.

Table 5-1. 2019 Remediated Vernal Pools and Performance Standards Status

Vernal Pool	Monitoring Status	Hydrology		Wetland Vegetation	Wildlife		
		DQO 1 (depth)	DQO 2 (inundation)	DQO 3 (richness and cover)	DQO 1 (depth)	DQO 4 (water quality)	DQO 5 (wildlife presence)
Pond 101 East (West)	Year 1 Post-Mastication	On track	On track	On track	On track	On track	On track
Pond 101 West	Year 1 Post-Mastication	On track	On track	On track	On track	On track	Partial
Pond 41	Year 1 Post-Subsurface Munitions Remediation	On track	On track	On track	On track	On track	On track
Pond 3 North	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	On track	On track	On track	On track	On track	On track
Pond 3 South	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	On track	On track	On track	On track	On track	On track
Pond 39	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	On track	On track	On track	On track	On track	On track
Pond 40 North	Year 2 Post-Burn	On track	On track	On track	On track	On track	On track
Pond 40 South	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	Partial	On track	On track	Partial	On track	On track
Pond 43	Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation	Not on track	On track	On track	Not on track	On track	On track
Pond 35	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	Partial	On track	On track	Partial	On track	On track
Pond 42	Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation	On track	On track	On track	On track	On track	Partial
Pond 44	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	Not on track	On track	On track	Not on track	On track	On track
Pond 56	Year 2 Post-Mastication	On track	On track	On track	On track	On track	On track
Pond 60	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	On track	On track	On track	On track	On track	On track
Pond 61	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	Not on track	On track	On track	Not on track	On track	On track
Pond 73	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	On track	On track	On track	On track	On track	On track*
Machine Gun Flats	Year 2 Post-Mastication	On track	On track	Not on track	On track	On track	On track
Pond 16	Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	On track	On track	On track	On track	On track	On track
Pond 54	Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	On track	On track	On track	On track	On track	On track
Pond 72	Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation	On track*	On track*	On track*	On track*	On track*	On track*

*Only evaluated against reference vernal pools and/or year 1, no baseline data.

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APPENDIX A

Water Quality Results and Inundation Area for Vernal Pools by Month

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Table A-1. Hydrology Results for January Monitoring (1/14/2019-1/22/2019)

Vernal Pool	Monitoring Status	Date	Time	pH	Temperature (˚C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
Pond 5	Reference	1/14/2019	11:50	6.70	11.09	10.16	4.7	4	0.47‡
Pond 101 East (East)	Reference	1/14/2019	11:06	-	-	-	-	DRY	0.00
Pond 997	Reference	1/14/2019	12:56	-	-	-	-	DRY	0.00
Pond 14	Baseline	1/17/2019	8:36	6.39	10.61	4.38	24.1	37	0.05‡
Pond 17	Baseline	1/22/2019	9:54	6.89	6.15	9.97	190.0	15§	0.28‡
Pond 21	Baseline	1/17/2019	10:49	-	-	-	-	2	0.01‡
Pond 103	Baseline	1/16/2019	12:53	-	-	-	-	DRY	0.00
Pond 101 East (West)	Year 1	1/14/2019	10:52	-	-	-	-	DRY	0.00
Pond 101 West	Year 1	1/14/2019	10:56	-	-	-	-	DRY	0.00
Pond 3 North	Year 2, Year 1	1/16/2019	10:20	6.55	12.08	10.04	13.6	14	0.02‡
Pond 3 South	Year 2, Year 1	1/16/2019	10:34	6.71†	12.46†	9.03†	6.9†	10	0.01‡
Pond 39	Year 2, Year 1	1/16/2019	9:17	6.47	10.40	5.91	13.0	43	0.01‡
Pond 40 North	Year 2	1/16/2019	9:52	6.55†	11.57†	10.89†	112.0†	8	0.003‡
Pond 40 South	Year 2, Year 1	1/16/2019	9:46	-	-	-	-	DRY	0.00‡
Pond 43	Year 2, Year 1	1/16/2019	11:43	-	-	-	-	6	0.002‡
Pond 35	Year 2, Year 1	1/16/2019	8:47	-	-	-	-	DRY	0.00
Pond 42	Year 2, Year 1	1/16/2019	11:23	6.84	11.99	9.94	14.8	15	0.03‡
Pond 44	Year 2, Year 1	1/16/2019	11:54	-	-	-	-	DRY	0.00‡
Pond 56	Year 2	1/15/2019	9:27	6.55	9.40	8.22	11.4	35	0.25‡
Pond 60	Year 2, Year 1	1/14/2019	13:43	6.84	11.36	8.47	1.2	33	0.18
Pond 61	Year 2, Year 1	1/15/2019	11:10	-	-	-	-	DRY	0.00‡
Pond 73	Year 2, Year 1	1/14/2019	13:19	-	-	-	-	DRY	0.00‡
Machine Gun Flats	Year 2	1/15/2019	10:06	7.24	9.69	7.90	178.0	48	0.24*
Pond 16	Year 3, Year 1	1/17/2019	12:11	-	-	-	-	DRY	0.00
Pond 54	Year 3, Year 1	1/17/2019	11:21	6.13	12.09	6.62	127.0	28	0.002‡
Pond 72	Year 3, Year 3	1/17/2019	12:34	6.41	13.29	7.16	101.0	18	0.002‡

*No hydrological connectivity between pools. However, both inundation areas were mapped in order to compare to baseline data.
†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.
§Depth not recorded from staff gauge due to placement of gauge in ephemeral stream. Measurement taken at approximate deepest accessible part of vernal pool.

Table A-2. Hydrology Results for February Monitoring (2/11/2019-2/14/2019)

Vernal Pool	Monitoring Status	Date	Time	pH	Temperature (˚C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
Pond 5	Reference	2/13/2019	14:02	6.89	10.55	10.24	8.4	42	4.21‡
Pond 101 East (East)	Reference	2/14/2019	12:45	6.88	14.36	8.94	10.4	47	2.21‡
Pond 997	Reference	2/13/2019	13:10	6.39†	11.79†	10.62†	26†	13	0.11‡
Pond 14	Baseline	2/12/2019	8:43	6.13	7.49	4.49	57.5	58	0.13‡
Pond 17	Baseline	2/12/2019	9:45	6.93	5.82	10.88	290.0	15§	0.37‡
Pond 21	Baseline	2/12/2019	14:00	6.51	10.42	8.60	16.8	16	0.83‡
Pond 101 East (West)	Year 1	2/14/2019	10:45	6.50	11.84	7.61	7.7	70	1.20‡
Pond 101 West	Year 1	2/14/2019	10:30	6.44	13.32	7.45	26.7	54	0.11‡
Pond 41	Year 1	2/14/2019	11:28	6.34	13.03	7.99	3.00	61	1.29‡
Pond 3 North	Year 2, Year 1	2/11/2019	14:10	6.89	8.81	7.80	43.9	61	Connected to 3 South, total 0.86‡
Pond 3 South	Year 2, Year 1	2/11/2019	13:15	6.43	9.99	9.39	26.1	33	Connected to 3 North, total 0.86‡
Pond 39	Year 2, Year 1	2/11/2019	10:56	6.63	7.18	5.26	574.0	50	0.31‡
Pond 40 North	Year 2	2/11/2019	11:54	6.69	7.18	7.99	69.9	82	0.08‡
Pond 40 South	Year 2, Year 1	2/11/2019	11:24	6.55	7.58	7.63	381.0	28	0.22‡
Pond 43	Year 2, Year 1	2/12/2019	15:00	6.83	10.59	8.91	35.0	34	0.06‡
Pond 35	Year 2, Year 1	2/11/2019	10:12	6.91	7.64	8.48	193.0	88	0.42‡
Pond 42	Year 2, Year 1	2/11/2019	14:55	7.14	10.40	8.12	28.2	63	0.54‡
Pond 44	Year 2, Year 1	2/12/2019	15:22	6.71	10.75	8.16	20.3	24	0.18‡
Pond 56	Year 2	2/14/2019	9:45	6.39	11.80	7.66	7.1	88	4.86‡
Pond 60	Year 2, Year 1	2/13/2019	11:22	6.58	9.23	9.10	9.3	84	2.17‡
Pond 61	Year 2, Year 1	2/13/2019	10:40	6.46	9.42	9.34	52.3	20	0.06‡
Pond 73	Year 2, Year 1	2/13/2019	12:25	6.53	9.75	9.59	43.5	52	0.74‡
Machine Gun Flats	Year 2	2/13/2019	9:23	6.77	8.60	9.73	34.5	128	9.42*
Pond 16	Year 3, Year 1	2/12/2019	11:17	6.61	7.33	6.68	360.0	139	0.74‡
Pond 54	Year 3, Year 1	2/12/2019	13:19	6.62	9.37	9.16	12.7	46	1.62‡
Pond 72	Year 3, Year 3	2/12/2019	12:45	6.51	7.06	6.70	9.80	51	2.14‡

*No hydrological connectivity between pools. However, both inundation areas were mapped in order to compare to baseline data

†Water quality probe was on its side for measurements.

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

§Depth not recorded from staff gauge due to placement of gauge in ephemeral stream. Measurement taken at approximate deepest accessible part of vernal pool.

Table A-3. Hydrology Results for March Monitoring (3/4/2019-3/7/2019)

Vernal Pool	Monitoring Status	Date	Time	pH	Temperature (˚C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
Pond 5	Reference	3/7/2019	11:39	6.58	14.10	5.58	1.5	56	4.83‡
Pond 101 East (East)	Reference	3/7/2019	13:14	6.51	14.08	5.48	9.7	56	2.76‡
Pond 997	Reference	3/5/2019	11:05	6.37†	12.61†	9.28†	24.2†	14	0.12‡
Pond 14	Baseline	3/4/2019	12:07	6.08	13.7	4.97	57	59	0.21
Pond 17	Baseline	3/4/2019	13:59	7.38†	12.45†	15.30†	273†	15§	0.36‡
Pond 21	Baseline	3/5/2019	13:23	6.39	13.6	8.83	41.1	19	0.86‡
Pond 101 East (West)	Year 1	3/7/2019	13:48	6.12	14.31	4.48	2.9	76	1.86‡
Pond 101 West	Year 1	3/5/2019	9:07	6.53	13.58	5.13	100	51	0.11‡
Pond 41	Year 1	3/6/2019	11:45	6.70	13.54	7.09	2.1	69	1.43
Pond 3 North	Year 2, Year 1	3/7/2019	9:09	6.62	13.37	5.64	1.7	62	Connected to 3 South, total 1.14‡
Pond 3 South	Year 2, Year 1	3/7/2019	8:49	6.33	12.98	5.60	6.2	35	Connected to 3 North, total 1.14‡
Pond 39	Year 2, Year 1	3/6/2019	13:33	6.38	13.8	4.29	528	50	0.25‡
Pond 40 North	Year 2	3/6/2019	13:00	6.77	14.05	6.91	16.8	81	0.04‡
Pond 40 South	Year 2, Year 1	3/6/2019	13:11	6.80	17.36	9.75	19.2	28	0.11‡
Pond 43	Year 2, Year 1	3/6/2019	10:30	7.05	14.47	8.73	4.4	28	0.05‡
Pond 35	Year 2, Year 1	3/6/2019	13:52	6.84	16.3	5.61	25.7	47	0.19‡
Pond 42	Year 2, Year 1	3/6/2019	10:13	6.85	12.82	7.29	15.3	64	0.59‡
Pond 44	Year 2, Year 1	3/6/2019	10:45	7.07	15.55	9.43	5.1	15	0.02‡
Pond 56	Year 2	3/5/2019	10:08	6.20	14.26	7.38	2.6	101	5.13‡
Pond 60	Year 2, Year 1	3/6/2019	8:21	6.36	12.94	5.85	11.5	98	2.48‡
Pond 61	Year 2, Year 1	3/6/2019	9:32	6.48	12.4	5.94	21.1	19	0.12‡
Pond 73	Year 2, Year 1	3/6/2019	8:50	6.38	12.31	4.97	10.8	56	0.85‡
Machine Gun Flats	Year 2	3/7/2019	10:16	6.72	13.2	6.40	10.2	149	10.45*
Pond 16	Year 3, Year 1	3/5/2019	14:35	6.25	10.85	4.70	259	136	0.73‡
Pond 54	Year 3, Year 1	3/4/2019	15:17	6.70	17.73	11.26	9.1	58	1.95‡
Pond 72	Year 3, Year 3	3/5/2019	15:00	6.75	14.9	9.39	6.3	56	2.28‡

*No hydrological connectivity between pools. However, both inundation areas were mapped in order to compare to baseline data.
†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.
§Depth not recorded from staff gauge due to placement of gauge in ephemeral stream. Measurement taken at approximate deepest accessible part of vernal pool.

Table A-4. Hydrology Results for April Monitoring (4/2/2019-4/9/2019)

Vernal Pool	Monitoring Status	Date	Time	pH	Temperature (˚C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
Pond 5	Reference	4/4/2019	10:25	6.41	14.87	1.71	1.2	53	4.59
Pond 101 East (East)	Reference	4/4/2019	9:45	6.80	14.15	5.63	6.1	53	2.51[‡]
Pond 997	Reference	4/9/2019	10:05	-	-	-	-	2	0.03
Pond 14	Baseline	4/2/2019	9:00	6.34	14.27	3.43	18.5	57	0.17
Pond 17	Baseline	4/2/2019	9:47	6.66[†]	12.02[†]	8.29[†]	462.0[†]	19[§]	0.35[‡]
Pond 21	Baseline	4/2/2019	10:30	6.66	13.2	7.36	30.6	14	0.81[‡]
Pond 101 East (West)	Year 1	4/4/2019	9:21	6.44	14.46	3.89	3.0	71	1.18[‡]
Pond 101 West	Year 1	4/4/2019	8:59	6.68	14.69	4.77	90.8	47	0.09
Pond 41	Year 1	4/2/2019	14:20	6.28	14.20	5.65	0.9	63	1.31[‡]
Pond 3 North	Year 2, Year 1	4/3/2019	10:35	6.64	16.26	5.43	0.3	59	0.27[‡]
Pond 3 South	Year 2, Year 1	4/3/2019	10:19	6.70	15.87	6.91	27.9	33	0.44[‡]
Pond 39	Year 2, Year 1	4/3/2019	8:48	6.52	13.98	4.33	460.0	44	0.01[‡]
Pond 40 North	Year 2	4/3/2019	9:42	6.99	14.80	6.20	6.2	64	0.03
Pond 40 South	Year 2, Year 1	4/3/2019	9:16	6.75	13.63	3.30	3.3	20	0.05[‡]
Pond 43	Year 2, Year 1	4/2/2019	15:02	7.47	20.00	9.93	1.0	19	0.01[‡]
Pond 35	Year 2, Year 1	4/3/2019	8:27	6.81	13.88	2.35	27.4	16	0.01[‡]
Pond 42	Year 2, Year 1	4/3/2019	11:14	6.96	14.51	4.42	1.6	55	0.48[‡]
Pond 44	Year 2, Year 1	4/2/2019	14:43	-	-	-	-	DRY	0.00[‡]
Pond 56	Year 2	4/9/2019	9:15	6.63	16.72	6.47	1.5	99	4.99[‡]
Pond 60	Year 2, Year 1	4/3/2019	12:55	6.39	15.04	4.80	3.1	98	2.43[‡]
Pond 61	Year 2, Year 1	4/3/2019	12:18	6.79[†]	14.15[†]	6.01[†]	17.1[†]	8	0.04[‡]
Pond 73	Year 2, Year 1	4/3/2019	13:20	6.42	14.12	2.93	2.4	49	0.76[‡]
Machine Gun Flats	Year 2	4/3/2019	14:15	6.62	14.97	2.78	2.8	149	10.20[*]
Pond 16	Year 3, Year 1	4/2/2019	12:57	6.15	12.45	3.46	118.0	136	0.73[‡]
Pond 54	Year 3, Year 1	4/2/2019	11:09	6.34	15.88	6.82	2.6	63	2.00[‡]
Pond 72	Year 3, Year 3	4/2/2019	12:22	6.36	14.56	8.83	22.0	54	2.20[‡]

*No hydrological connectivity between pools. However, both inundation areas were mapped in order to compare to baseline data.
†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.
§Depth not recorded from staff gauge due to placement of gauge in ephemeral stream. Measurement taken at approximate deepest accessible part of vernal pool.

Table A-5. Hydrology Results for May Monitoring (5/6/2019-5/9/2019)

Vernal Pool	Monitoring Status	Date	Time	pH	Temperature (˚C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
Pond 5	Reference	5/9/2019	10:14	6.51	17.15	3.80	0.6	37	3.96
Pond 101 East (East)	Reference	5/9/2019	9:23	6.38	16.26	3.09	13	34	1.14
Pond 997	Reference	5/9/2019	10:56	-	-	-	-	DRY	0.00
Pond 14	Baseline	5/6/2019	10:18	6.21	15.11	3.75	5.3	37	0.08
Pond 17	Baseline	5/6/2019	11:19	7.21†	14.14†	9.60†	41†	13§	0.26
Pond 21	Baseline	5/6/2019	12:55	-	-	-	-	DRY	0.00
Pond 101 East (West)	Year 1	5/9/2019	8:34	6.28	15.94	3.97	1.8	46	0.35
Pond 101 West	Year 1	5/8/2019	13:58	6.69†	24.35†	5.40†	202†	10	0.01‡
Pond 41	Year 1	5/7/2019	11:49	6.27	16.13	3.30	1.7	38	0.18‡
Pond 3 North	Year 2, Year 1	5/7/2019	14:11	6.84	18.9	9.20	0.5	40	0.09‡
Pond 3 South	Year 2, Year 1	5/7/2019	13:58	-	-	-	-	9	0.004‡
Pond 39	Year 2, Year 1	5/7/2019	10:33	-	-	-	-	7	-
Pond 40 North	Year 2	5/7/2019	10:56	6.60	17.33	5.40	450	26	0.008‡
Pond 40 South	Year 2, Year 1	5/7/2019	10:40	-	-	-	-	DRY	0.00
Pond 43	Year 2, Year 1	5/7/2019	13:16	-	-	-	-	DRY	0.00
Pond 35	Year 2, Year 1	5/7/2019	10:16	-	-	-	-	DRY	0.00
Pond 42	Year 2, Year 1	5/7/2019	13:30	6.80	17.5	7.36	0.8	34	0.38‡
Pond 56	Year 2	5/8/2019	13:15	6.55	17.24	3.01	2.8	84	4.49‡
Pond 60	Year 2, Year 1	5/8/2019	9:11	6.57	16.37	4.12	2.2	84	2.32
Pond 61	Year 2, Year 1	5/8/2019	8:49	-	-	-	-	DRY	0.00
Pond 73	Year 2, Year 1	5/8/2019	9:55	6.00	15.39	4.66	2.6	27	0.57
Machine Gun Flats	Year 2	5/8/2019	11:18	6.62	17.3	4.51	17.5	134	9.59*
Pond 16	Year 3, Year 1	5/7/2019	8:48	6.56	16.76	2.75	60.1	112	0.63
Pond 54	Year 3, Year 1	5/6/2019	13:38	5.98	15.57	4.49	6.1	40	1.66‡
Pond 72	Year 3, Year 3	5/7/2019	9:30	6.24	15.04	4.98	2.6	36	0.38‡

*No hydrological connectivity between pools. However, both inundation areas were mapped in order to compare to baseline data.
†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.
§Depth not recorded from staff gauge due to placement of gauge in ephemeral stream. Measurement taken at approximate deepest accessible part of vernal pool.

Table A-6. Hydrology Results for June Monitoring (6/6/2019-6/11/2019)

Vernal Pool	Monitoring Status	Date	Time	pH	Temperature (˚C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
Pond 5	Reference	6/6/2019	13:27	7.09	20.32	6.07	13.6	30	3.62
Pond 101 East (East)	Reference	6/6/2019	14:26	7.13	21.92	5.48	79.8	26	0.38
Pond 14	Baseline	6/10/2019	10:44	6.90	16.45	3.09	6.20	24	0.02
Pond 17	Baseline	6/10/2019	11:21	6.91†	21.49†	6.39†	502†	9§	0.19
Pond 101 East (West)	Year 1	6/11/2019	12:43	6.35	23.74	6.35	64.9	23	0.02
Pond 101 West	Year 1	-	-	-	-	-	-	DRY	0.00
Pond 41	Year 1	6/11/2019	8:55	6.45	18.59	8.18	31.4	12	0.002
Pond 3 North	Year 2, Year 1	6/11/2019	11:02	6.27	20.89	7.14	0.9	26	0.05
Pond 3 South	Year 2, Year 1	6/11/2019	10:55	-	-	-	-	DRY	0.00
Pond 39	Year 2, Year 1	6/10/2019	13:40	6.34	30.37	8.20	>1000	14	0.002
Pond 40 North	Year 2	6/10/2019	13:57	-	-	-	-	8	0.003
Pond 42	Year 2, Year 1	6/11/2019	9:27	6.45	19.59	5.36	3.70	20	0.13‡
Pond 44	Year 2, Year 1	-	-	-	-	-	-	DRY	0.00
Pond 56	Year 2	6/6/2019	10:45	6.92	18.53	5.40	10.2	78	3.73‡
Pond 60	Year 2, Year 1	6/11/2019	10:05	6.53	20.01	4.27	67.1	76	1.89
Pond 73	Year 2, Year 1	6/11/2019	10:22	-	-	-	-	DRY	0.00
Machine Gun Flats	Year 2	6/6/2019	11:47	7.29	18.13	6.03	10.4	127	9.52*
Pond 16	Year 3, Year 1	6/10/2019	9:58	6.42	17.94	3.84	86.1	93	0.54
Pond 54	Year 3, Year 1	6/10/2019	12:42	5.92	20.45	4.99	28.6	15	0.0003
Pond 72	Year 3, Year 3	6/10/2019	13:15	-	-	-	-	DRY	0.00

*No hydrological connectivity between pools. However, both inundation areas were mapped in order to compare to baseline data.
†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.
§Depth not recorded from staff gauge due to placement of gauge in ephemeral stream. Measurement taken at approximate deepest accessible part of vernal pool.

Table A-7. Hydrology Results for July Monitoring (7/9/2019)

Vernal Pool	Monitoring Status	Date	Time	pH	Temperature (˚C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
Pond 5	Reference	7/9/2019	15:30	-	-	-	-	25§	-
Pond 101 East (East)	Reference	7/9/2019	16:00	-	-	-	-	DRY	0.00
Pond 14	Baseline	7/9/2019	9:35	-	-	-	-	DRY	0.00
Pond 17	Baseline	7/9/2019	9:59	-	-	-	-	DRY	0.00
Pond 101 East (West)	Year 1	7/9/2019	16:15	-	-	-	-	DRY	0.00
Pond 41	Year 1	7/9/2019	11:40	-	-	-	-	DRY	0.00
Pond 3 North	Year 2, Year 1	7/9/2019	14:45	-	-	-	-	DRY	0.00
Pond 39	Year 2, Year 1	7/9/2019	11:15	-	-	-	-	DRY	0.00
Pond 40 North	Year 2	7/9/2019	11:20	-	-	-	-	DRY	0.00
Pond 42	Year 2, Year 1	7/9/2019	12:56	-	-	-	-	DRY	0.00
Pond 56	Year 2	7/9/2019	14:40	-	-	-	-	56	-
Pond 60	Year 2, Year 1	7/9/2019	13:30	-	-	-	-	60	-
Machine Gun Flats	Year 2	7/9/2019	15:00	-	-	-	-	109	-
Pond 16	Year 3, Year 1	7/9/2019	8:55	-	-	-	-	69	-
Pond 54	Year 3, Year 1	7/9/2019	10:43	-	-	-	-	DRY	0.00

§Depth is an estimate. Decreased visibility due to emergent vegetation.

Table A-8. Hydrology Results for August Monitoring (8/13/2019,8/15/2019)

Vernal Pool	Monitoring Status	Date	Time	pH	Temperature (˚C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
Pond 5	Reference	8/13/2019	14:40	-	-	-	-	DRY	-
Pond 56	Year 2	8/15/2019	9:09	-	-	-	-	36	-
Pond 60	Year 2, Year 1	8/13/2019	13:34	-	-	-	-	37	-
Machine Gun Flats	Year 2	8/13/2019	12:43	-	-	-	-	90	-
Pond 16	Year 3, Year 1	8/13/2019	10:26	-	-	-	-	42	-

Table A-9. Hydrology Results for September Monitoring (9/9/2018)

Vernal Pool	Monitoring Status	Date	Time	pH	Temperature (˚C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
Pond 56	Year 2	9/9/2019	12:40	-	-	-	-	20	-
Pond 60	Year 2, Year 1	9/9/2019	13:50	-	-	-	-	10	-
Machine Gun Flats	Year 2	9/9/2019	12:35	-	-	-	-	76	-
Pond 16	Year 3, Year 1	9/9/2019	11:30	-	-	-	-	18	-

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Fort Ord
WATER QUALITY MONITORING

Date(s): 4/2–4/4, 4/9 Weather Conditions: 4/2 (overcast), 4/3, 4, 4/9 (Sunny, windy) Personnel: ANé, CM

Location	Date	Time	pH	Temp (C)	Specific Cond. (µS/cm)	D/O (mg/L)	Turbidity (FNU)	Comments P.P. = peripheral ponding
3 North (Year 2 Burn) UXO REQ OK TO ENTER CCG	4/3	10:35	6.64	16.26	610	5.43	0.3	Depth: 59cm. PP
3 South (Year 2 Burn) UXO REQ OK TO ENTER CCG	4/3	10:19	6.70	15.87	724	6.91	27.9	Depth: 33cm PP
5 (Reference) NO UXO REQ OK TO ENTER	4/4	10:25	6.41	14.87°C	236	1.71	1.2	Depth 53cm –
14 (Baseline) UXO REQ DO NOT ENTER	4/2	9:00	6.34	14.27°C	301	3.43	18.5	Depth 57cm – meter on side
16 (Year 3 Mastication) UXO REQ OK TO ENTER	4/2	12:57	6.15	12.45	421	3.46	118	Depth: 136cm. PP couldn't reach gauge due to depth
17 (Baseline) UXO REQ DO NOT ENTER	4/2	9:47	6.66	12.02°C	417	8.29	462	Depth 19cm – PP, Dry @ gauge rivulets
21 (Baseline) UXO REQ DO NOT ENTER	4/2	10:30	6.66	13.20°C	195	7.36	30.6	Depth 14cm – P.P. meter on side
35 (Year 2 Mastication) UXO REQ OK TO ENTER	4/3	8:27	6.81	13.88	262	2.35	27.4	Depth: 16cm. P.P.
39 (Year 2 Burn) UXO REQ OK TO ENTER	4/3	8:48	6.52	13.98	105	4.33	460	Depth: 44cm P.P.
40 North (Year 2 Burn) UXO REQ OK TO ENTER	4/3	9:42	6.99	14.80	281	6.20	6.2	Depth: 64cm
40 South (Year 2 Burn) UXO REQ OK TO ENTER	4/3	9:16	6.75	13.63	376	3.30	3.3	Depth: 20cm PP
42 (Year 2 Mastication/Burn) UXO REQ OK TO ENTER	4/3	11:14	6.96	14.51	158	4.42	1.6	Depth: 55cm. PP
43 (Year 2 Burn) UXO REQ OK TO ENTER	4/2	15:02	7.47	20.00	198	9.93	1.0	Depth: 19cm. PP.
44 (Year 2 Mastication) UXO REQ OK TO ENTER	4/2	14:43	—	—	—	—	—	DRY at gauge. PP.
54 (Year 3 Mastication) UXO REQ DO NOT ENTER	4/2	11:09	6.34	15.88°C	162	6.82	2.6	Depth 63cm – P.P. meter on side
56 (Year 2 Mastication) NO UXO REQ OK TO ENTER	4/9	9:15	6.63	16.72	225	6.47	1.5	Depth: 99cm. PP
60 (Year 2 Mastication) NO UXO REQ OK TO ENTER	4/3	12:55	6.39	15.04°C	218	4.80	3.1	Depth 98cm – P.P.
61 (Year 2 Mastication) NO UXO REQ OK TO ENTER CCG	4/3	12:18	6.79	14.15°C	215	6.01	17.1	Depth 8cm – meter on side P.P.
72 (Year 3 Mastication) UXO REQ DO NOT ENTER	4/2	12:22	6.36	14.56	99	8.83	22.0	Depth: 54cm probe on side P.P.
73 (Year 2 Mastication) NO UXO REQ OK TO ENTER	4/3	13:20	6.42	14.12°C	181	2.93	2.4	Depth 49cm – P.P.
103 (Baseline) UXO REQ DO NOT ENTER	4/2	13:44	—	—	—	—	—	DRY
997 (Reference) NO UXO REQ OK TO ENTER CCG	4/9	10:05	—	—	—	—	—	Depth = 2cm. Too shallow for readings.
101 EE (Reference) NO UXO REQ OK TO ENTER	4/4	9:45	6.80	14.15°C	213	5.63	6.1	Depth 53cm – P.P.
101 EW (Year 1 Mastication) NO UXO REQ OK TO ENTER	4/4	9:21	6.44	14.46°C	159	3.89	3.0	Depth 71cm – P.P.
101 W (Year 1 Mastication) NO UXO REQ OK TO ENTER	4/4	8:59	6.68	14.69°C	226	4.77	90.8	Depth 47cm –
MGF (Year 2 Mastication) NO UXO REQ OK TO ENTER CCG	4/3	14:15	6.62	14.97°C	183	2.78	2.8	Depth 149cm – P.P.
41	4/2	14:20	6.28	14.20	101	5.65	0.9	Depth: 63cm. PP

Figure A-1. Example Field Data Collection Sheet

FIELD INSTRUMENT CALIBRATION RECORD

Fort Ord

Calibration Code:		Sheet of
Employee Performing Calibration: ANé, CM		
Instruments:	**Standards:**	**Lot Number and Expiration Date:**
(1) pH meter	pH = 7.00	2627 02/2023
(2) pH meter	pH = 4.00	1929 02/2022 (pm.)
(3) pH meter	pH = 10.00	
(4) pH meter	pH = 6.86 (Blue)	
(5) Specific conductance meter	5,000 µS/cm (Blue)	
(6) Specific conductance meter	______ µS/cm	
(7)		
(8)		
(9)		
(10)		
(11)		

Instrument Calibration Data

Date	Time	Standard Solution	Response As Found	Response As Left	Solution Temp. (C)			Notes
4/4/19	8:30	HI-9828-0	pH= 6.85	6.86				
			Temp.= 13.89	14.11				
		end of day	pH = 6.81					
			Temp.= 15.06					

Review	***Action***
Site Manager/Project Manager ______ Date ______	

01/11/19 01:33 PM

Figure A-2. Example Probe Calibration Sheet for Hanna Instruments 9829 Multiparameter Meter

APPENDIX B

Vegetation Transect Data

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Table B-1. Pond 5 (Reference) Wetland Vegetation Transect Data by Stratum

POND 5			
Date	6/17/2019, 6/20/2019, 8/13/2019		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke, Rachel Spellenberg		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 8/13/2019. Stratum 1 was repeated from 2016 and 2018, strata 2, 3, 4, and 6 were repeated from 2016, 2017, and 2018. Stratum 7 was identified in 2019. Transect 1 was repeated from 2016 and 2018 and Transect 3 was repeated from 2018. Transect 6 was repeated from 2018. Transect 2 was relocated because the previous location was no longer within the correct stratum. Transect 4 was placed in a location similar to 2018 but was shortened to 5 m to fit within the stratum. Transect 7 was established in 2019.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
1	**10 m**	**23%**	ELMA	92	AGAV	1	ELMA	85	ELMA	78	CRTR	1	AGAV	1
			POMO	3	ELMA	90	MALE	2	MALE	6	ELMA	84	CRTR	4
			TH	5	MALE	2	POMO	1	POMO	2	MALE	1	ELMA	77
			BG	0	POMO	1	TH	2	TH	4	POMO	1	POMO	1
					TH	2	BG	10	BG	10	TH	5	TH	5
					BG	4					BG	8	BG	12
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
2	**5 m**	**1%**	DISP	18	CRTR	1	DISP	15
			ELMA	60	DISP	35	ELMA	77
			MALE	1	ELMA	57	POMO	1
			POMO	4	MALE	1	TH	5
			TH	12	POMO	1	BG	2
			BG	5	TH	5		
					BG	0		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
			ACPA	1	BAPI	1	BRMI	48	ACPA	1	ACWR	3	BRMI	30
			ACWR	1	BRMI	30	DISP	10	BAPI	1	BAPI	1	DISP	8
			BAPI	1	DISP	10	ELMA	8	BRMI	25	BRMI	33	ELMA	15
			BRMI	23	ELMA	1	HYRA	4	DAPU	1	DISP	5	ERCA	1
			DISP	6	ERCA	1	LYHY	1	DISP	26	ELMA	3	HYRA	1
			ELMA	1	GAUS	10	POMO	1	ELMA	2	ERCA	1	LYHY	1
			ERCA	1	HYRA	6	PSST	1	GAUS	1	GAUS	1	PLCHh	1
			FEBR	1	JUBA	1	RUCR	1	HYRA	6	GEDI	1	POMO	1
			GAUS	4	LYHY	2	SOOL	1	LYHY	5	JUBUb	1	SOAS	4
			HYRA	2	POMO	2	STAJ	2	LYMI	1	LYAR	1	STAJ	6
			JUBA	1	RUCR	1	TH	20	POMO	1	LYHY	1	TH	30
			JUBUb	1	STAJ	15	BG	3	SOOL	1	PLCHh	1	BG	2
3	**10 m**	**26%**	JUBUc2	1	TH	10			STAJ	10	POMO	1		
			LYHY	1	BG	10			TH	15	RUCR	1		
			LYMI	1					BG	4	SEGL	17		
			POMO	1							SOAS	2		
			PSLU	4							STAJ	5		
			PSST	4							TH	12		
			RUAC	1							BG	10		
			RUCR	1										
			SOAS	1										
			STAJ	3										
			TH	8										
			BG	31										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
			BRMI	18	ACAMa	1	ACAMa	5
			DISP	4	BRMI	7	BRMI	3
			ELACa	1	DISP	2	DISP	2
			ELMA	2	ELMA	3	ERCA	2
			ERCA	1	ERCA	1	JUPH	25
			FEBR	1	GAUS	4	LYAR	1
			GEDI	1	GEDI	1	LYHY	1
			JUPH	8	HYRA	1	POMO	1
			LYHY	1	JUBUb	1	PSST	4
4	**5 m**	**1%**	POMO	1	JUPH	15	RUAC	15
			PSLU	1	LYAR	1	SOAS	1
			PSRA	3	LYHY	1	STAJ	1
			RUAC	4	POMO	1	TH	20
			SEGL	6	PSLU	3	BG	19
			STAJ	2	RUAC	7		
			TH	40	SEGL	5		
			BG	6	SOOL	1		
					TH	20		
					BG	25		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**
6	**10 m**	**45%**	CRTR	2	CRTR	2	CRTR	1	DISP	5	DISP	8	DISP	5
			DISP	8	DISP	4	DISP	4	ELMA	55	ELMA	45	ELMA	60
			ELMA	25	ELMA	35	ELMA	50	MALE	1	JUPH	1	JUPH	1
			POMO	45	POMO	50	JUPH	1	POMO	35	POMO	40	POMO	28
			TH	19	TH	9	MALE	1	TH	4	TH	6	TH	6
			BG	1	BG	0	POMO	35	BG	0	BG	0	BG	0
							RUCR	1						
							TH	7						
							BG	0						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**
7	**10 m**	**4%**	DISP	1	DISP	2	DISP	1	ELMA	25	ELMA	5	DISP	3
			ELACa	1	ELMA	25	ELMA	30	JUBA	30	JUBA	35	ELMA	22
			ELMA	6	GEDI	1	JUBA	19	TH	25	TH	40	JUBA	30
			JUBA	40	JUBA	35	TH	35	BG	20	BG	20	TH	30
			LYHY	3	TH	17	BG	15					BG	15
			TH	10	BG	20								
			BG	39										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 5 2019 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI	*Isoetes howellii*	Howell's quillwort	ISHO
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Juncus balticus*	Baltic rush	JUBA
Acmispon parviflorus	hill lotus	ACPA	*Juncus bufonius* var. *bufonius*	common toad rush	JUBUB
Acmispon strigosus	strigose lotus	ACST	*Juncus bufonius* var. *congestus*	clustered toad rush	JUBUC2
Acmispon wrangelianus	Chilean trefoil	ACWR	*Juncus phaeocephalus*	brown-headed rush	JUPH
Agrostis avenacea	Pacific bent grass	AGAV	*Logfia gallica*	narrowleaf cottonrose	LOGA
Agrostis pallens	seashore bent grass	AGPA	*Lupinus bicolor*	miniature lupine	LUBI
Aira caryophyllea	silvery hair-grass	AICA	*Luzula comosa*	Pacific woodrush	LUCO6
Avena barbata	slender wild oat	AVBA	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Baccharis glutinosa	marsh baccharis	BAGL	*Lysimachia minima*	chaffweed	LYMI
Baccharis pilularis	coyote brush	BAPI	*Lythrum hyssopifolia*	grass poly	LYHY
Briza maxima	rattlesnake grass	BRMA	*Madia elegans*	common madia	MAEL
Briza minor	annual quaking grass	BRMI	*Madia gracilis*	gumweed	MAGR
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Madia sativa*	coast tarweed	MASA
Bromus diandrus	ripgut grass	BRDI	*Malvella leprosa*	alkali mallow	MALE
Bromus hordeaceus	soft chess	BRHO	*Oxalis corniculata*	creeping woodsorrel	OXCO
Carduus pycnocephalus	Italian thistle	CAPY	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
Carpobrotus edulis	ice plant	CAED	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3	*Plantago coronopus*	cut-leaved plantain	PLCO
Centaurea melitensis	Maltese star-thistle	CEME	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Cirsium brevistylum	Indian thistle	CIBR	*Pseudognaphalium californicum*	California everlasting	PSCA
Cirsium vulgare	bull thistle	CIVU	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Clarkia purpurea ssp. *quadrivulnera*	winecup clarkia	CLPUQ	*Pseudognaphalium ramosissimum*	pink everlasting	PSRA
Clinopodium douglasii	yerba buena	CLDO	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Conium maculatum	poison hemlock	COMA	*Quercus agrifolia*	coast live oak	QUAG
Cotula coronopifolia	brass buttons	COCO	*Rumex acetosella*	sheep sorrel	RUAC
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Rumex crispus*	curly dock	RUCR
Cressa truxillensis	spreading alkaliweed	CRTR	*Rumex salicifolius*	willow dock	RUSA
Cyperus eragrostis	tall cyperus	CYER	*Sanicula crassicaulis*	Pacific sanicle	SACR
Danthonia californica	California oat grass	DACA	*Schoenoplectus californicus*	California bulrush	SCCA
Daucus pusillus	rattlesnake weed	DAPU	*Senecio glomeratus*	cutleaf burnweed	SEGL
Deinandra corymbosa	coastal tarweed	DECO	*Silene gallica*	small-flower catchfly	SIGA
Deschampsia danthonioides	annual hair grass	DEDA	*Solanum americanum*	small-flowered nightshade	SOAM
Diplacus aurantiacus	sticky monkey flower	DIAU	*Sonchus asper*	prickly sow thistle	SOAS
Distichlis spicata	salt grass	DISP	*Sonchus oleraceus*	common sow thistle	SOOL
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Stachys ajugoides*	bugle hedge nettle	STAJ
Eleocharis macrostachya	pale spikerush	ELMA	*Torilis arvensis*	tall sock destroyer	TOAR
Elymus triticoides	beardless wild rye	ELTR3	*Toxicodendron diversilobum*	poison oak	TODI
Epilobium ciliatum	fringed willowherb	EPCI	*Trifolium barbigerum*	bearded clover	TRBA
Erigeron canadensis	horseweed	ERCA	*Trifolium dubium*	little hop clover	TRDU
Erodium botrys	long-beaked filaree	ERBO	*Trifolium microcephalum*	small head clover	TRMI
Eryngium armatum	coyote thistle	ERAR12	*Trifolium variegatum*	variegated clover	TRVA
Euthamia occidentalis	western goldenrod	EUOC	*Triglochin scilloides*	flowering quillwort	TRSC
Festuca bromoides	brome fescue	FEBR	*Verbena lasiostachys* var. *lasiostachys*	western vervain	VELAL
Gamochaeta ustulata	purple cudweed	GAUS	*Zeltnera davyi*	Davy's centaury	ZEDA
Geranium dissectum	cut-leaved geranium	GEDI	**Groundcover Codes**		
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO	BG	Bare Ground	
Hypochaeris glabra	smooth cat's-ear	HYGL	TH	Thatch/Duff/Algae	
Hypochaeris radicata	rough cat's-ear	HYRA	AL	Algae	

Table B-2. Pond 101 East (East) (Reference) Wetland Vegetation Transect Data by Stratum

POND 101 East (East)			
Date	6/14/2019, 7/17/2019		
Surveying Personnel	Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at time of 7/17/19 survey. Stratum 2 was repeated from 2016 and 2018, whereas strata 5 and 6 were repeated from 2017 and 2018. Transect 2 was repeated from 2018. Transects 5 and 6 were repeated from 2017 and 2018.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	**10 m**	**34%**	ELMA	35	ELMA	71	AGAV	3	AGAV	1	AGAV	2	AGAV	1
			LYHY	1	LYHY	2	ELMA	65	ELMA	70	ELMA	65	ELMA	70
			MALE	2	MALE	1	LYHY	5	LYHY	3	LYHY	2	LYHY	4
			POMO	45	POMO	5	MALE	5	POMO	10	MALE	2	MALE	1
			RUCR	1	RUCR	1	POMO	2	TH	20	POMO	12	POMO	12
			TH	15	TH	10	TH	20	BG	0	TH	25	TH	20
			BG	1	BG	10	BG	0			BG	0	BG	0
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**104**	**TOTAL**	**108**	**TOTAL**	**108**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
5	**10 m**	**46%**	ACAMa	4	ACAMa	2	ACAMa	25	ACAMa	35	ACAMa	2	ACAMa	1
			AGAV	1	AGAV	1	AGAV	1	AGAV	3	AGAV	3	AGAV	6
			AGLAV	1	BRMI	18	BRMI	17	BRMI	6	ERBO	1	BRMI	1
			BRMI	19	ERBO	1	ERCA	6	ERCA	10	ERCA	8	ELACa	1
			ERBO	1	ERCA	3	FEBR	1	JUPH	1	JUPH	1	ERCA	18
			ERCA	2	HECUo	1	HYRA	1	PSLU	1	LYAR	1	JUPH	2
			HYRA	1	HYGL	1	LYAR	3	PSST	1	POMO	1	POMO	1
			LYAR	2	LYAR	1	LYHY	1	RUAC	15	PSLU	1	PSLU	6
			POMO	1	MASA	1	POMO	1	STAJ	4	PSST	1	PSST	4
			RUAC	20	PSLU	4	PSLU	2	TRMI	7	RUAC	25	RUAC	18
			STAJ	10	PSST	5	PSST	1	VISAs	4	STAJ	7	SOOL	1
			TRMI	17	RUAC	23	RUAC	17	TH	10	TRMI	1	STAJ	7
			TRVA	1	STAJ	6	STAJ	1	BG	3	VISAs	8	TRMI	6
			VISAs	8	TRMI	10	TRMI	4			TH	20	VISAs	4
			TH	10	TRVA	1	TRVA	1			BG	20	TH	15
			BG	2	VISAs	1	VISAs	5					BG	9
					TH	3	TH	10						
					BG	18	BG	3						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
6	**10 m**	**20%**	ACAMa	2	CAPR	40	CIVU	3	CAPR	3	JUBA	44	JUBA	55
			CAPR	10	ERCA	1	JUBA	10	DISP	1	RUCR	1	RUCR	1
			ERCA	1	GEDI	1	RUAC	25	JUBA	35	TH	55	RUSA	4
			HYGL	2	JUBA	1	VELAl	20	RUAC	5	BG	0	TH	40
			JUBA	1	RUAC	25	VISAn	3	VELAl	10			BG	0
			PSST	1	SOAS	3	TH	39	VISAn	1				
			RUAC	10	VISAn	5	BG	0	TH	45				
			SIGA	1	TH	22			BG	0				
			VISAn	5	BG	2								
			TH	22										
			BG	45										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 101 East (East) 2019 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Agrostis avenacea	Pacific bent grass	AGAV	*Lythrum hyssopifolia*	grass poly	LYHY
Agrostis exarata	spike bent grass	AGEX	*Madia elegans*	common madia	MAEL
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV	*Madia sativa*	coast tarweed	MASA
Agrostis pallens	seashore bent grass	AGPA	*Malvella leprosa*	alkali mallow	MALE
Aira caryophyllea	silvery hair-grass	AICA	*Nuttallanthus texanus*	blue toadflax	NUTE
Anthriscus caucalis	bur chervil	ANCA14	*Petrorhagia dubia*	hairypink	PEDU
Avena barbata	slender wild oat	AVBA	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
Baccharis glutinosa	marsh baccharis	BAGL	*Plantago lanceolata*	English plantain	PLLA
Baccharis pilularis	coyote brush	BAPI	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Briza maxima	rattlesnake grass	BRMA	*Potentilla rivalis*	brook cinquefoil	PORI
Briza minor	annual quaking grass	BRMI	*Pseudognaphalium californicum*	California everlasting	PSCA
Bromus diandrus	ripgut grass	BRDI	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Bromus hordeaceus	soft chess	BRHO	*Pseudognaphalium ramosissimum*	pink everlasting	PSRA
Carex praegracilis	clustered field sedge	CAPR	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Cirsium brevistylum	Indian thistle	CIBR	*Rubus ursinus*	California blackberry	RUUR
Cirsium quercetorum	brownie thistle	CIQU2	*Rumex acetosella*	sheep sorrel	RUAC
Cirsium vulgare	bull thistle	CIVU	*Rumex crispus*	curly dock	RUCR
Conium maculatum	poison hemlock	COMA	*Rumex salicifolius*	willow dock	RUSA
Cyperus eragrostis	tall cyperus	CYER	*Senecio glomeratus*	cutleaf burnweed	SEGL
Drymocallis glandulosa var. *wrangelliana*	sticky cinquefoil	DRGLW	*Silene gallica*	small-flower catchfly	SIGA
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Solanum americanum*	small-flowered nightshade	SOAM
Eleocharis macrostachya	pale spikerush	ELMA	*Sonchus asper*	prickly sow thistle	SOAS
Elymus triticoides	beardless wild rye	ELTR3	*Sonchus oleraceus*	common sow thistle	SOOL
Epilobium ciliatum ssp. *watsonii*	willow herb	EPCIW	*Stachys ajugoides*	bugle hedge nettle	STAJ
Erigeron canadensis	horseweed	ERCA	*Stachys bullata*	California hedge nettle	STBU
Erodium botrys	long-beaked filaree	ERBO	*Toxicodendron diversilobum*	poison oak	TODI
Erodium cicutarium	redstem filaree	ERCI	*Trifolium angustifolium*	narrow-leaved clover	TRAN
Euthamia occidentalis	western goldenrod	EUOC	*Trifolium barbigerum*	bearded clover	TRBA
Festuca bromoides	brome fescue	FEBR	*Trifolium campestre*	hop clover	TRCA5
Festuca perennis	Italian rye grass	FEPE	*Trifolium depauperatum*	sack clover	TRDE
Geranium dissectum	cut-leaved geranium	GEDI	*Trifolium fucatum*	bull clover	TRFU
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO	*Trifolium gracilentum*	pin point clover	TRGR
Heterotheca grandiflora	telegraph weed	HEGR	*Trifolium microcephalum*	small head clover	TRMI
Hordeum brachyantherum	meadow barley	HOBR	*Trifolium variegatum*	variegated clover	TRVA
Hypochaeris glabra	smooth cat's-ear	HYGL	*Triodanis biflora*	Venus' looking glass	TRBI2
Hypochaeris radicata	rough cat's-ear	HYRA	*Verbena lasiostachys* var. *lasiostachys*	western vervain	VELAL
Juncus balticus	Baltic rush	JUBA	*Veronica peregrina* ssp. *xalapensis*	speedwell	VEPEX
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	*Vicia sativa* ssp. *nigra*	common vetch	VISAN
Juncus bufonius var. *congestus*	clustered toad rush	JUBUC2	*Vicia sativa* ssp. *sativa*	spring vetch	VISAS
Juncus phaeocephalus	brown-headed rush	JUPH	**Groundcover Codes**		
Lonicera involucrata var. *ledebourii*	black twinberry	LOINL	BG	Bare Ground	
Lupinus bicolor	miniature lupine	LUBI	TH	Thatch/Duff	
Lupinus nanus	sky lupine	LUNA	AL	Algae	

Table B-3. Pond 997 (Reference) Wetland Vegetation Transect Data by Stratum

POND 997			
Date	5/10/2019		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at the time of 5/10/2019 survey. Strata 1, 2, and 3 were repeated from 2017 and 2018, whereas stratum 5 was repeated from 2018. Transects 1 and 3 were repeated from 2017 and 2018. Transect 5 was repeated from 2018. Stratum 2 consisted of CCG and no transects were placed in this stratum. An upland stratum was mapped and occupied 1% relative cover of wetland but was not included in the cover data.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
1	10 m	7%	CIQU	1	ERAR12	20	CRAQ	1	CIQU	1	CIQU	1	CIQU	1
			ELACa	4	ISHO	2	CIQU	1	CRAQ	1	CRAQ	2	CRAQ	1
			ELMA	2	JUPH	2	ERAR12	12	ELACa	3	ELACa	3	ELMA	2
			ERAR12	25	LYHY	5	ISHO	4	ELMA	1	ELMA	1	ERAR12	22
			LYHY	10	LYMI	1	JUPH	3	ERAR12	27	ERAR12	15	ISHO	1
			LYMI	1	PLCHh	20	LYHY	3	ISHO	2	ISHO	1	LYHY	4
			PLCHh	15	POMO	30	LYMI	1	LAGL3	1	LYHY	1	LYMI	1
			POMO	15	PSCH	10	PLCHh	8	LYHY	2	LYMI	1	PLCHh	18
			PSCH	3	TH	10	POMO	25	LYMI	1	PLCHh	18	POMO	25
			TH	4	BG	10	PSCH	15	PLCHh	15	POMO	18	PSCH	4
			BG	20			TH	20	POMO	18	PSCH	4	TH	15
							BG	10	PSCH	5	TH	25	BG	8
									TH	15	BG	10		
									BG	18				
			TOTAL	**100**	**TOTAL**	**110**	**TOTAL**	**103**	**TOTAL**	**110**	**TOTAL**	**100**	**TOTAL**	**102**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
3	10 m	45%	AICA	1	AICA	1	AICA	1	ACAMa	1	ACAMa	1	ACAMa	2
			BRMA	6	BRMA	6	BRMA	2	AICA	1	AICA	3	AICA	4
			BRMI	4	BRMI	3	BRMI	3	BRHO	1	BRMI	4	BRMA	1
			BRTEt	1	DACA	2	CAAMa3	5	BRMA	1	BRTEt	1	BRMI	6
			CAAMa3	1	ERAR12	30	DACA	3	BRMI	7	DECO	2	BRTEt	1
			ERAR12	12	ERBO	2	ERAR12	30	BRTEt	1	ERAR12	2	DECO	2
			ERBO	1	FEMY	1	ERBO	1	DACA	1	ERBO	2	ERAR12	10
			FEMY	1	GEDI	1	HYGL	5	DECO	6	FEBR	1	ERBO	1
			GEDI	1	HYGL	1	ISCA	4	ERBO	1	GEDI	1	FEBR	1
			HYGL	2	ISCA	2	ISCE	1	FEBR	1	HYGL	1	GEDI	1
			ISCA	2	ISCE	6	JUBUb	7	HYGL	2	JUBUb	2	HYGL	1
			ISCE	1	JUBUb	6	JUPH	1	ISCA	1	JUCA	1	ISCA	1
			JUBUb	10	JUCA	1	LYHY	2	ISCE	1	JUPH	4	ISCE	1
			JUCA	1	JUPH	3	LYMI	7	JUBUb	2	LYHY	1	JUBUb	4
			LYHY	20	LYHY	4	MIPA	1	JUCA	1	LYMI	2	JUCA	1
			LYMI	1	LYMI	1	TH	22	JUPH	5	MAGR	25	JUPH	1
			PLCO	1	MASA	1	BG	5	LOGA	1	MASA	20	LYAR	1
			TH	18	TH	24			LYAR	1	MIPA	1	LYHY	12
			BG	15	BG	5			LYHY	8	RUAC	4	LYMI	1
									LYMI	1	TH	15	MAGR	25
									MASA	24	BG	8	MIPA	1
									MIPA	2			RUAC	1
									RUAC	3			SIBE	1
									SIGA	1			TH	20
									TRIX	1			BG	4
									TH	20				
									BG	5				
			TOTAL	**99**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**101**	**TOTAL**	**104**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
5	10 m	45%	AICA	1	ACAMa	1	AICA	1	BRMA	3	BRMA	2	BRMA	4
			BRMA	4	BAPI	1	BRMA	3	BRMI	2	BRMI	3	BRMI	3
			BRMI	1	BRMA	2	BRMI	4	BRTEt	1	CAAMa3	1	ERAR12	1
			ERBO	1	BRMI	3	DECO	2	DECO	1	ERBO	1	GEDI	1
			GAPO	1	CAAMa3	1	ERBO	1	ERBO	1	GEDI	2	HYGL	2
			GEDI	1	ERAR12	1	GAPO	1	GEDI	1	HYGL	5	JUPH	56
			HYGL	1	GAPO	1	GEDI	1	HYGL	3	JUPH	58	LYHY	1
			ISHO	1	GEDI	1	HYGL	3	ISCA	1	LYHY	4	POMO	1
			JUPH	24	HYGL	2	ISHO	1	ISHO	1	TH	20	SOOL	1
			LOGA	1	JUPH	35	JUBUb	1	JUBUb	1	BG	4	TH	25
			LYAR	3	LYAR	2	JUPH	43	JUPH	46			BG	5
			LYHY	1	LYHY	7	LYAR	1	LYAR	1				
			LYMI	2	LYMI	1	LYHY	8	LYHY	4				
			MAGR	10	MASA	6	TH	20	SOAS	1				
			PLLA	5	MIPA	3	BG	10	SOOL	1				
			PSST	1	PLLA	1			TH	12				
			SEGL	1	SIBE	1			BG	20				
			SOOL	1	SOAS	1								
			TH	30	SOOL	1								
			BG	10	TH	20								
					BG	12								
			TOTAL	**100**	**TOTAL**	**103**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 997 2019 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI	*Juncus phaeocephalus*	brown-headed rush	JUPH
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Koeleria macrantha*	June grass	KOMA
Acmispon parviflorus	hill lotus	ACPA	*Lasthenia conjugens*	Contra Costa goldfields	LACO
Aira caryophyllea	silvery hair-grass	AICA	*Lasthenia glaberrima*	smooth goldfields	LAGL3
Avena barbata	slender wild oat	AVBA	*Leptosiphon parviflorus*	variable linanthus	LEPA
Baccharis pilularis	coyote brush	BAPI	*Logfia gallica*	narrowleaf cottonrose	LOGA
Briza maxima	rattlesnake grass	BRMA	*Luzula comosa*	Pacific woodrush	LUCO6
Briza minor	annual quaking grass	BRMI	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Lysimachia minima*	chaffweed	LYMI
Bromus diandrus	ripgut grass	BRDI	*Lythrum hyssopifolia*	grass poly	LYHY
Bromus hordeaceus	soft chess	BRHO	*Madia gracilis*	gumweed	MAGR
Calystegia subacaulis ssp. *subacaulis*	hill morning glory	CASUS	*Madia sativa*	coast tarweed	MASA
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3	*Microseris paludosa*	marsh microseris	MIPA
Chlorogalum pomeridianum	wavyleaf soap plant	CHPO	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Cicendia quadrangularis	timwort	CIQU	*Plantago coronopus*	cut-leaved plantain	PLCO
Cirsium quercetorum	brownie thistle	CIQU2	*Plantago lanceolata*	English plantain	PLLA
Cotula coronopifolia	brass buttons	COCO	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Danthonia californica	California oat grass	DACA	*Pseudognaphalium ramosissimum*	pink everlasting	PSRA
Deinandra corymbosa	coastal tarweed	DECO	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Diplacus aurantiacus	sticky monkey flower	DIAU	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Quercus agrifolia*	coast live oak	QUAG
Eleocharis macrostachya	pale spikerush	ELMA	*Ranunculus californicus*	California buttercup	RACA
Elymus glaucus	blue wild-rye	ELGL	*Rumex acetosella*	sheep sorrel	RUAC
Erigeron canadensis	horseweed	ERCA	*Salvia mellifera*	black sage	SAME
Erodium botrys	long-beaked filaree	ERBO	*Senecio glomeratus*	cutleaf burnweed	SEGL
Eryngium armatum	coyote thistle	ERAR12	*Sidalcea malviflora* ssp. *malviflora*	checkerbloom	SIMAM
Festuca bromoides	brome fescue	FEBR	*Silene gallica*	small-flower catchfly	SIGA
Festuca myuros	rattail sixweeks grass	FEMY	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Festuca perennis	Italian rye grass	FEPE	*Soliva sessilis*	South American soliva	SOSE
Frangula californica	California coffeeberry	FRCA12	*Sonchus asper*	prickly sow thistle	SOAS
Galium aparine	goose grass	GAAP	*Sonchus oleraceus*	common sow thistle	SOOL
Galium porrigens	climbing bedstraw	GAPO	*Stachys ajugoides*	bugle hedge nettle	STAJ
Gamochaeta ustulata	purple cudweed	GAUS	*Stipa cernua*	nodding needle grass	STCE
Geranium dissectum	cut-leaved geranium	GEDI	*Taraxia ovata*	sun cups	TAOV
Horkelia cuneata var. *cuneata*	wedge-leaved horkelia	HOCUC	*Toxicodendron diversilobum*	poison oak	TODI
Hypochaeris glabra	smooth cat's-ear	HYGL	*Trifolium barbigerum*	bearded clover	TRBA
Hypochaeris radicata	rough cat's-ear	HYRA	*Trifolium willdenovii*	tomcat clover	TRWI
Isoetes howellii	Howell's quillwort	ISHO	*Zeltnera davyi*	Davy's centaury	ZEDA
Isolepis carinata	keeled bulrush	ISCA	**Groundcover Codes**		
Isolepis cernua	low bulrush	ISCE	BG	Bare Ground	
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	TH	Thatch/Duff	
Juncus capitatus	dwarf rush	JUCA	AL	Algae	

Table B-4. Pond 14 (Baseline) Wetland Vegetation Transect Data by Stratum

POND 14			
Date	6/5/2019, 6/19/2019		
Surveying Personnel	Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 6/19/2019 survey. Strata and transects 1 through 4 were repeated from 2016.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
1	10 m	17%	ELMA	90	ELMA	87	ELMA	80	ELMA	70	ELMA	90	ELMA	47
			TH	0	TH	8	TH	15	TH	10	TH	5	TH	48
			BG	10	BG	5	BG	5	BG	20	BG	5	BG	5
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
2	5 m	10%	BRHO	1	ELMA	42	ELMA	76
			ELMA	51	ELTR3	35	ELTR3	4
			ELTR3	30	HOBR	1	FEBR	1
			PLCHh	1	PHLE	1	GEDI	1
			RUCR	2	RUCR	1	HOBR	1
			TH	15	GEDI	1	MALE	1
			BG	0	TH	20	PHLE	1
					BG	0	TH	15
							BG	0
			TOTAL	**100**	**TOTAL**	**101**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
			AICA	1	ACMI	1	AICA	2	AICA	1	ACMI	2	ACMI	4
			BRMI	1	AICA	2	BRHO	1	BRDI	1	AICA	1	AICA	1
			BRTEt	1	BRHO	1	BRMI	2	BRMI	1	BRDI	2	BRDI	1
			ELTR3	3	BRMI	2	BRTEt	2	BRTEt	1	BRHO	1	BRHO	5
			FEBR	1	BRTEt	1	CADEd	1	ELTR3	2	BRMI	1	BRMI	2
			GEDI	2	FEBR	1	ELTR3	1	FEBR	1	ELTR3	1	BRTEt	1
			JUPH	53	GEDI	1	GEDI	1	GEDI	2	GEDI	3	ELTR3	1
			LYAR	1	HYGL	1	HYGL	1	HYGL	1	JUPH	40	ERBO	1
			LYMI	1	JUPH	63	JUPH	70	JUPH	61	*Madia* sp.	5	FEBR	1
3	**10 m**	**36%**	MAGR	5	LUCO6	1	LUCO6	1	MAGR	3	TH	44	GAUS	1
			TH	30	MAGR	7	MAGR	3	RACA	1	BG	0	GEDI	4
			BG	1	RACA	1	MIPA	1	TH	25			HYGL	1
					TH	15	TH	12	BG	0			JUPH	34
					BG	3	BG	2					LYAR	1
													Madia sp.	4
													MAGR	1
													TH	35
													BG	2
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
			BRHO	1	BRDI	1	BRHO	1	BRMI	1	BRDI	1	BRMI	1
			BRTEt	1	BRHO	1	ELMA	1	FEBR	2	BRTEt	1	BRTEt	2
			ELMA	4	BRMI	1	ELTR3	12	FEPE	1	ELMA	1	DECO	1
			ELTR3	2	DECO	1	FEBR	1	GEDI	1	ELTR3	6	FEBR	1
			FEBR	1	ELTR3	8	FEPE	1	HYRA	1	FEBR	1	FEPE	2
			FEPE	20	FEBR	1	GEDI	1	JUPH	55	FEPE	2	HYGL	1
			GEDI	1	FEPE	7	HYGL	1	LYHY	1	GEDI	1	JUBUb	1
			HYGL	1	HYGL	1	JUPH	45	MAGR	1	HYGL	1	JUPH	34
4	**10 m**	**37%**	JUPH	40	JUOC	2	LYHY	1	MALE	7	JUPH	55	LYAR	1
			LYHY	3	JUPH	37	MAGR	1	MASA	4	MAGR	1	LYHY	1
			MALE	3	LYHY	1	MALE	1	MIPA	3	MALE	2	MAGR	1
			MASA	5	MALE	6	MASA	4	TH	21	MASA	3	MALE	1
			TRVA	1	MASA	1	RACA	1	BG	2	RACA	1	MASA	12
			TH	15	TH	28	TH	28			TH	22	PLCHh	1
			BG	2	BG	4	BG	1			BG	2	TH	25
													BG	15
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 14 2019 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI	*Microseris douglasii*	Douglas' silverpuffs	MIDO
Aira caryophyllea	silvery hair-grass	AICA	*Microseris paludosa*	marsh microseris	MIPA
Avena barbata	slender wild oat	AVBA	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
Baccharis pilularis	coyote brush	BAPI	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Briza minor	annual quaking grass	BRMI	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Pseudognaphalium californicum*	California everlasting	PSCA
Bromus diandrus	ripgut grass	BRDI	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Bromus hordeaceus	soft chess	BRHO	*Pseudognaphalium ramosissimum*	pink everlasting	PSRA
Castilleja densiflora ssp. *densiflora*	dense flower owl's clover	CADED	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Chlorogalum pomeridianum	wavyleaf soap plant	CHPO	*Quercus agrifolia*	coast live oak	QUAG
Clarkia purpurea ssp. *quadrivulnera*	winecup clarkia	CLPUQ	*Ranunculus californicus*	California buttercup	RACA
Cotula coronopifolia	brass buttons	COCO	*Rumex acetosella*	sheep sorrel	RUAC
Danthonia californica	California oat grass	DACA	*Rumex crispus*	curly dock	RUCR
Deinandra corymbosa	coastal tarweed	DECO	*Rumex pulcher*	fiddle dock	RUPU
Diplacus aurantiacus	sticky monkey flower	DIAU	*Rumex salicifolius*	willow dock	RUSA
Eleocharis macrostachya	pale spikerush	ELMA	*Salvia mellifera*	black sage	SAME
Elymus triticoides	beardless wild rye	ELTR3	*Senecio glomeratus*	cutleaf burnweed	SEGL
Erodium botrys	long-beaked filaree	ERBO	*Sidalcea malviflora* ssp. *malviflora*	checkerbloom	SIMAM
Festuca bromoides	brome fescue	FEBR	*Silene gallica*	small-flower catchfly	SIGA
Festuca perennis	Italian rye grass	FEPE	*Silybum marianum*	milk thistle	SIMA
Gamochaeta ustulata	purple cudweed	GAUS	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Geranium dissectum	cut-leaved geranium	GEDI	*Sonchus asper*	prickly sow thistle	SOAS
Hordeum brachyantherum	meadow barley	HOBR	*Sonchus oleraceus*	common sow thistle	SOOL
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	HOMAG	*Stachys ajugoides*	bugle hedge nettle	STAJ
Hypochaeris glabra	smooth cat's-ear	HYGL	*Stachys bullata*	California hedge nettle	STBU
Hypochaeris radicata	rough cat's-ear	HYRA	*Taraxia ovata*	sun cups	TAOV
Juncus bufonius var. bufonius	common toad rush	JUBUB	*Trifolium barbigerum*	bearded clover	TRBA
Juncus occidentalis	western rush	JUOC	*Trifolium microcephalum*	small head clover	TRMI
Juncus phaeocephalus	brown-headed rush	JUPH	*Trifolium variegatum*	variegated clover	TRVA
Luzula comosa	Pacific woodrush	LUCO6	*Triteleia ixioides*	coast pretty face	TRIX
Lysimachia arvensis	scarlet pimpernel	LYAR	*Zeltnera davyi*	Davy's centaury	ZEDA
Lythrum hyssopifolia	grass poly	LYHY	**Groundcover Codes**		
Madia elegans	common madia	MAEL	BG	Bare Ground	
Madia gracilis	gumweed	MAGR	TH	Thatch/Duff	
Madia sativa	coast tarweed	MASA	AL	Algae	
Malvella leprosa	alkali mallow	MALE			

Table B-5. Pond 17 (Baseline) Wetland Vegetation Transect Data by Stratum

POND 17			
Date	6/4/2019, 6/19/2019		
Surveying Personnel	Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at time of 7/17/2019 survey. Strata 1 through 6 were identified as new strata in 2019. The transects within strata 3 through 6 were established in 2019. No transects were placed within strata 1 and 2 due to the height and density of vegetation; instead, visual cover estimates were conducted to assess vegetative cover. AL = algal mat			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
3	**10 m**	**5%**	CYER	1	ELMA	45	ELMA	60	ELMA	50	ELMA	60	ELMA	65
			ELMA	25	TH	55	TH	40	FEPE	1	TH	36	POMO	1
			JUPH	1	BG	0	BG	0	AL	5	BG	4	AL	2
			AL	6					TH	41			TH	31
			TH	64					BG	3			BG	1
			BG	3										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
4	**10 m**	**14%**	BOFL3	30	BOFL3	36	BOFL3	15	CYER	3	CYER	10	ELMA	4
			POMO	23	CYER	1	CYER	12	FEPE	1	ELMA	2	FEPE	1
			AL	40	FEPE	1	FEPE	1	POMO	40	FEPE	2	LYHY	1
			TH	5	POMO	12	POMO	18	RUCR	1	LYHY	15	POMO	55
			BG	2	AL	40	AL	32	AL	10	POMO	30	AL	12
					TH	8	TH	20	TH	44	AL	16	TH	22
					BG	2	BG	2	BG	1	TH	21	BG	5
											BG	4		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
5	10 m	9%	BRHO	1	BRHO	1	BRHO	1	BRHO	1	BRHO	1	BRHO	1
			BRMI	1	CYER	4	BRMI	8	FEPE	22	BRMI	1	BRMI	1
			ELMA	30	ELMA	2	CYER	1	JUBUb	1	CYER	20	ELMA	30
			FEPE	30	FEPE	49	FEPE	32	JUBUc2	1	DACA	1	FEPE	8
			GEDI	1	HOMAg	3	GEDI	1	LYHY	30	FEPE	22	LYAR	1
			LASA	1	LYHY	5	JUBUc2	1	RUCR	6	GEDI	1	LYHY	7
			LYAR	1	RUCR	2	LYHY	12	TRVA	1	HOMAg	4	TRVA	5
			LYHY	1	TRVA	30	RUCR	2	TH	3	JUBUb	2	VIVIv	2
			POMO	1	TH	3	RUSA	1	BG	35	LYHY	15	TH	15
			TRVA	25	BG	1	TRVA	1			MAEL	2	BG	30
			TH	20			TH	4			PLCO	1		
			BG	0			BG	36			RUCR	2		
											SOAS	1		
											TRVA	8		
											TH	4		
											BG	18		
			TOTAL	**112**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**103**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
6	5 m	52%	BAPI	4	BAPI	15	BAPI	2
			BRMI	1	FEBR	2	ELGL	1
			GEDI	1	GEDI	1	GEDI	1
			JUPA	1	JUPA	20	JUPA	40
			JUPH	60	JUPH	3	JUPH	8
			LYAR	1	RUUR	15	LYHY	2
			TH	12	TH	32	RUUR	6
			BG	20	BG	12	TH	37
							BG	3
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 17 2019 Species List

Species Name	Common Name	Species Code
Acmispon americanus var. americanus	Spanish lotus	ACAMA
Acmispon parviflorus	hill lotus	ACPA
Aira caryophyllea	silvery hair-grass	AICA
Avena barbata	slender wild oat	AVBA
Baccharis pilularis	coyote brush	BAPI
Bolboschoenus fluviatilis	river bulrush	BOFL3
Briza minor	annual quaking grass	BRMI
Bromus diandrus	ripgut grass	BRDI
Bromus hordeaceus	soft chess	BRHO
Callitriche marginata	California water-starwort	CAMA
Carex harfordii	Harford's sedge	CAHA4
Carex praegracilis	clustered field sedge	CAPR
Carpobrotus edulis	ice plant	CAED
Cerastium glomeratum	sticky mouse-ear chickweed	CEGL
Cirsium vulgare	bull thistle	CIVU
Clarkia purpurea ssp. quadrivulnera	winecup clarkia	CLPUQ
Cotula coronopifolia	brass buttons	COCO
Cyperus eragrostis	tall cyperus	CYER
Danthonia californica	California oat grass	DACA
Diplacus aurantiacus	sticky monkey flower	DIAU
Drymocallis glandulosa var. wrangelliana	sticky cinquefoil	DRGLW
Eleocharis macrostachya	pale spikerush	ELMA
Epilobium ciliatum ssp. watsonii	willow herb	EPCIW
Erigeron canadensis	horseweed	ERCA
Festuca bromoides	brome fescue	FEBR
Festuca perennis	Italian rye grass	FEPE
Galium aparine	goose grass	GAAP
Gamochaeta ustulata	purple cudweed	GAUS
Geranium dissectum	cut-leaved geranium	GEDI
Hordeum marinum ssp. gussoneanum	Mediterranean barley	HOMAG
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris glabra	smooth cat's-ear	HYGL
Isoetes howellii	Howell's quillwort	ISHO
Juncus balticus	Baltic rush	JUBA
Juncus bufonius var. bufonius	common toad rush	JUBUB
Juncus bufonius var. congestus	clustered toad rush	JUBUC2
Juncus effusus	common rush	JUEF
Juncus occidentalis	western rush	JUOC
Juncus patens	spreading rush	JUPA
Juncus phaeocephalus	brown-headed rush	JUPH
Lactuca saligna	willowleaf lettuce	LASA
Logfia gallica	narrowleaf cottonrose	LOGA
Lupinus arboreus	yellow bush lupine	LUAR
Lupinus bicolor	miniature lupine	LUBI
Lythrum hyssopifolia	grass poly	LYHY
Madia elegans	common madia	MAEL
Madia gracilis	gumweed	MAGR
Madia sativa	coast tarweed	MASA
Medicago polymorpha	California burclover	MEPO
Pentagramma triangularis ssp. triangularis	goldback fern	PETRT
*Persicaria punctata**	dotted smartweed	PEPU18
Plantago coronopus	cut-leaved plantain	PLCO
Pogogyne zizyphoroides	Sacramento mesa mint	POZI
Polypogon monspeliensis	rabbitfoot grass	POMO
Potentilla sp.		
Pseudognaphalium californicum	California everlasting	PSCA
Pseudognaphalium luteoalbum	weedy cudweed	PSLU
Pseudognaphalium stramineum	cottonbatting plant	PSST
Pteridium aquilinum var. pubescens	western bracken fern	PTAQP
Quercus agrifolia	coast live oak	QUAG
Rubus ursinus	California blackberry	RUUR
Rumex acetosella	sheep sorrel	RUAC
Rumex crispus	curly dock	RUCR
Rumex salicifolius	willow dock	RUSA
Salix laevigata	red willow	SALA3
Sanicula crassicaulis	Pacific sanicle	SACR
Schoenoplectus californicus	California bulrush	SCCA
Silene gallica	small-flower catchfly	SIGA
Sonchus oleraceus	common sow thistle	SOOL
Toxicodendron diversilobum	poison oak	TODI
Trifolium barbigerum	bearded clover	TRBA
Trifolium dubium	little hop clover	TRDU
Trifolium hirtum	rose clover	TRHI
Trifolium microcephalum	small head clover	TRMI
Trifolium variegatum	variegated clover	TRVA
Triglochin scilloides	flowering quillwort	TRSC
Typha latifolia	broad-leaved cattail	TYLA
Vicia sativa ssp. nigra	common vetch	VISAN
Vicia sativa ssp. sativa	spring vetch	VISAS
Vicia villosa ssp. villosa	hairy vetch	VIVIV
Zeltnera davyi	Davy's centaury	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

*Plant listed as Calibrachoa parviflora on USDA PLANTS and non-native, but native on Jepson eFlora and CalFlora.

Table B-6. Pond 21 (Baseline) Wetland Vegetation Transect Data by Stratum

POND 21			
Date	5/22/2019		
Surveying Personnel	Kayti Christianson		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at time of 5/22/2019 survey. Strata 1 and 2 were identified and corresponding transect were established in 2019. An upland stratum was mapped and occupied 2% relative cover of wetland but was not included in the cover data.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
			DEDA	20	CIQU	1	DEDA	1
			ELACa	2	DEDA	8	ELACa	1
			ELMA	4	ELACa	1	ELMA	12
			ERAR12	25	ELMA	8	ERAR12	50
			JUPH	3	ERAR12	35	LAGL3	2
			LAGL3	20	LAGL3	9	LYHY	1
1	**5 m**	**27%**	PLCHh	2	LYHY	1	LYMI	1
			POMO	10	LYMI	1	MALE	2
			TH	13	MALE	1	PLCHh	4
			BG	1	PLCHh	3	POMO	8
					POMO	2	TH	6
					TH	20	BG	12
					BG	10		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
			BRHO	1	BRHO	1	BRMI	1	BRMI	6	BRHO	1	BRHO	2
			BRMI	1	BRMI	1	ELACa	1	ELACa	5	BRMI	1	BRMI	1
			ELACa	2	ELACa	1	ELMA	2	ELMA	1	ELACa	4	ELACa	10
			ELMA	3	ELMA	7	FEBR	1	FEBR	1	ELMA	3	ELMA	5
			ERAR12	1	FEBR	1	HOBRb	2	GEDI	1	ERAR12	3	FEBR	2
			FEBR	2	GEDI	2	ISHO	15	HOBRb	3	FEBR	1	GEDI	6
			GEDI	10	HOBRb	2	JUPH	30	HYGL	2	GEDI	1	HOBRb	1
			HOBRb	1	JUPH	50	LAGL3	3	ISHO	2	JUPH	25	JUPH	51
			JUPH	47	LAGL3	1	LYMI	2	JUPH	30	LAGL3	1	LAGL3	1
2	**10 m**	**71%**	LAGL3	2	LYMI	1	PHLE	2	LAGL3	4	LYMI	2	PLCHh	1
			MALE	1	PHLE	2	PLCHh	2	LYHY	2	PLCHh	20	TH	10
			PHLE	1	PLCHh	1	POMO	1	LYMI	3	RACA	3	BG	10
			POMO	2	POMO	3	RACA	1	PHLE	1	TH	15		
			RACA	1	RACA	4	TH	2	PLCHh	1	BG	20		
			TH	5	TH	3	BG	35	RUAC	1				
			BG	20	BG	20			RACA	2				
									TH	6				
									BG	29				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 21 2019 Species List

Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA
Acmispon parviflorus	hill lotus	ACPA
Aira caryophyllea	silvery hair-grass	AICA
Avena barbata	slender wild oat	AVBA
Baccharis pilularis	coyote brush	BAPI
Briza minor	annual quaking grass	BRMI
Bromus hordeaceus	soft chess	BRHO
Carex barbarae	whiteroot	CABA
Cicendia quadrangularis	timwort	CIQU
Crassula aquatica	aquatic pygmy-weed	CRAQ
Danthonia californica	California oat grass	DACA
Deinandra corymbosa	coastal tarweed	DECO
Deschampsia danthonioides	annual hair grass	DEDA
Drymocallis glandulosa	sticky cinquefoil	DRGL
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa
Eleocharis macrostachya	pale spikerush	ELMA
Eryngium armatum	coyote thistle	ERAR12
Festuca bromoides	brome fescue	FEBR
Gamochaeta ustulata	purple cudweed	GAUS
Geranium dissectum	cut-leaved geranium	GEDI
Heterocodon rariflorum	western pearlflower	HERA
Hordeum brachyantherum ssp. *brachyantherum*	meadow barley	HOBRB
Hordeum depressum	alkali barley	HODE
Horkelia cuneata	wedge-leaved horkelia	HOCU
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
Isoetes howellii	Howell's quillwort	ISHO
Juncus bufonius var. *bufonius*	common toad rush	JUBUB
Juncus bufonius var. *congestus*	clustered toad rush	JUBUC2
Juncus occidentalis	western rush	JUOC
Juncus patens	spreading rush	JUPA
Juncus phaeocephalus	brown-headed rush	JUPH
Lasthenia glaberrima	smooth goldfields	LAGL3
Luzula comosa	Pacific woodrush	LUCO6
Lysimachia arvensis	scarlet pimpernel	LYAR
Lysimachia minima	chaffweed	LYMI
Lythrum hyssopifolia	grass poly	LYHY
Madia exigua	small tarweed	MAEX
Madia gracilis	gumweed	MAGR
Madia sativa	coast tarweed	MASA
Malvella leprosa	alkali mallow	MALE
Phalaris lemmonii	Lemmon's canary grass	PHLE
Plagiobothrys chorisianus var. *hickmanii*	Hickman's popcornflower	PLCHH
Pogogyne zizyphoroides	Sacramento mesa mint	POZI
Polypogon monspeliensis	rabbitfoot grass	POMO
Ranunculus californicus	California buttercup	RACA
Rumex acetosella	sheep sorrel	RUAC
Rumex salicifolius	willow dock	RUSA
Sisyrinchium bellum	western blue-eyed grass	SIBE
Sonchus asper	prickly sow thistle	SOAS
Stachys ajugoides	bugle hedge nettle	STAJ
Taraxia ovata	sun cups	TAOV
Trifolium albopurpureum	rancheria clover	TRAL5
Trifolium barbigerum	bearded clover	TRBA
Trifolium depauperatum	sack clover	TRDE
Trifolium microcephalum	small head clover	TRMI
Trifolium variegatum	variegated clover	TRVA
Verbena lasiostachys	western vervain	VELA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

Table B-7. Pond 103 (Baseline) Wetland Vegetation Species List for 2019

POND 103			
Date	6/19/2019		
Surveying Personnel	Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Vegetation monitoring consisted of a species list for the historic vernal pool basin and photo points. Vegetative strata were not mapped and transects were not placed because the area did not hold water or support wetland vegetation.			

Pond 103 2019 Species List		
Species Name	**Common Name**	**Species Code**
Achillea millefolium	common yarrow	ACMI
Aira caryophyllea	silvery hair-grass	AICA
Arctostaphylos montereyensis	Monterey manzanita	ARMO
Arctostaphylos pumila	sandmat manzanita	ARPU
Arctostaphylos tomentosa	woolly leaf manzanita	ARTO
Baccharis pilularis	coyote brush	BAPI
Briza maxima	rattlesnake grass	BRMA
Briza minor	annual quaking grass	BRMI
Bromus diandrus	ripgut grass	BRDI
Bromus hordeaceus	soft chess	BRHO
Cerastium glomeratum	sticky mouse-ear chickweed	CEGL
Chorizanthe diffusa	diffuse spineflower	CHDI3
Cirsium vulgare	bull thistle	CIVU
Clinopodium douglasii	yerba buena	CLDO
Corethrogyne filaginifolia	common sandaster	COFI
Deinandra corymbosa	coastal tarweed	DECO
Elymus glaucus	blue wild-rye	ELGL
Festuca bromoides	brome fescue	FEBR
Frangula californica	California coffeeberry	FRCA12
Galium porrigens	climbing bedstraw	GAPO
Garrya elliptica	coast silk tassel	GAEL
Heteromeles arbutifolia	toyon	HEAR
Horkelia cuneata	wedge-leaved horkelia	HOCU
Logfia gallica	narrowleaf cottonrose	LOGA
Lysimachia arvensis	scarlet pimpernel	LYAR
Madia exigua	small tarweed	MAEX
Navarretia hamata ssp. parviloba	hooked navarretia	NAHAP
Navarretia mellita	skunk navarretia	NAME
Petrorhagia dubia	hairypink	PEDU
Pseudognaphalium ramosissimum	pink everlasting	PSRA
Sanicula crassicaulis	Pacific sanicle	SACR
Sisyrinchium bellum	western blue-eyed grass	SIBE
Stipa cernua	nodding needle grass	STCE
Stipa pulchra	purple needle grass	STPU
Symphoricarpos mollis	creeping snowberry	SYMO
Zeltnera davyi	Davy's centaury	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

Table B-8. Pond 101 East (West) (Year 1 Post-Mastication) Wetland Vegetation Transect Data by Stratum

POND 101 East (West)			
Date	6/11/2019, 6/14/2019, 7/23/2019		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at time of 7/23/2019 survey. Strata 1, 2, 3, 4, and 5 were repeated from 2016, 2017, and 2018. Stratum 6 was repeated from 2017 and 2018. Stratum 8 was new in 2019. Transects 2, and 5 were repeated from 2016, 2017, and 2018. Transect 4 was repeated from 2017 and 2018. Transects 1, 3, and 6 were relocated to areas with more representative vegetative composition. Transect 8 was established in 2019.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
1	5 m	0.3%	ALSA	1	ALSA	1	AGAV	1
			ELACa	1	ELACa	15	ALSA	1
			ELMA	30	ELMA	3	VELAl	1
			GNPA	1	GNPA	1	ELMA	45
			LYHY	1	LYHY	1	LYHY	1
			MALE	20	MALE	25	MALE	10
			POMO	4	POAVd	1	POAVd	1
			VELAl	3	POMO	25	POMO	2
			TH	14	VELAl	1	TH	35
			BG	25	TH	20	BG	3
					BG	7		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	10 m	52%	AGAV	1	ELACa	10	AGAV	1	ELMA	35	AGAV	1	AGAV	1
			ELMA	66	ELMA	51	ALSA	1	LAGL3	25	DEDA	1	ALSA	1
			LAGL3	2	LAGL3	1	ELMA	34	PLCHh	1	ELMA	25	ELMA	25
			PHLE	1	PHLE	1	LAGL3	20	POMO	3	LAGL3	39	LAGL3	30
			POMO	2	PLCHh	2	LYHY	1	TH	35	PLCHh	1	RUCR	1
			TH	25	POMO	3	PLCHh	3	BG	1	POMO	3	TH	37
			BG	3	RUCR	1	POMO	5			TH	30	BG	5
					TH	30	TH	30			BG	0		
					BG	1	BG	5						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**
3	**10 m**	**10%**	DEDA	3	ELMA	2	DISP	2	DISP	13	ELMA	1	ELMA	3
			DISP	2	ERAR12	45	ELMA	2	ELMA	1	ERAR12	3	ERAR12	5
			ELMA	2	FEPE	1	ERAR12	40	ERAR12	2	FEPE	2	FEPE	2
			ERAR12	5	HECUo	8	FEPE	1	FEPE	1	HECUo	1	HECUo	5
			FEPE	2	LYHY	4	JUPH	11	HECUo	3	ISHO	4	ISHO	6
			HECUo	8	LYMI	1	LYHY	4	JUBA	1	LAGL3	4	LAGL3	2
			JUBUb	1	PLCHh	4	LYMI	1	JUPH	5	LYHY	1	LYHY	1
			LYHY	12	POMO	19	PLCHh	18	LAGL3	1	LYMI	1	PLCHh	42
			LYMI	1	TH	6	POMO	3	LYHY	1	PLCHh	65	POMO	5
			PLCHh	20	BG	10	TH	10	LYMI	1	POMO	1	RUCR	1
			PLCO	8			BG	8	PLCHh	46	PSST	1	TH	18
			POMO	13					POMO	1	RUCR	1	BG	10
			PSLU	1					STAJ	13	TH	8		
			RUCR	1					TH	6	BG	7		
			STAJ	5					BG	5				
			TRVA	2										
			TH	10										
			BG	4										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**
4	**10 m**	**11%**	BRHO	1	BRMI	2	BRHO	1	BRMI	1	BRHO	1	AGAV	3
			BRMI	2	FEBR	16	BRMI	4	FEBR	20	BRMI	1	ELMA	2
			DISP	2	HECUo	2	FEBR	10	JUBA	1	FEBR	3	FEBR	2
			FEBR	14	JUBA	1	GAUS	2	LYHY	1	HECUo	4	GEDI	1
			JUBA	1	JUPH	1	HECUo	6	MAGR	10	HYGL	1	HYGL	1
			JUPH	1	LYAR	1	HYGL	1	MASA	45	JUPH	3	JUPH	10
			MAGR	30	LYHY	1	JUBA	2	POMO	1	LYHY	1	LYHY	1
			MASA	29	MAGR	28	LYHY	1	PSLU	1	MAGR	3	MAGR	4
			POMO	2	MASA	29	MAGR	15	RUAC	2	MASA	49	MASA	41
			RUAC	6	POMO	1	MASA	41	VISAn	4	POMO	2	POMO	5
			VISAn	4	RUAC	3	POMO	1	VISAs	3	RUAC	20	RUAC	20
			TH	6	TRMI	4	RUAC	4	TH	7	TRMI	3	STAJ	1
			BG	2	VISAn	2	VISAn	1	BG	4	VISAn	3	VISAs	2
					VISAs	2	TH	5			VISAs	3	TH	6
					TH	6	BG	6			TH	3	BG	1
					BG	1					BG	0		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
5	10 m	20%	BRMI	1	BRMI	2	ELACa	18	BRMI	4	BRMI	1	BRMI	1
			ELACa	1	ELACa	15	ELMA	4	ELACa	6	ELACa	5	ELACa	1
			ELMA	2	ELMA	3	FEBR	4	ELMA	8	ELMA	3	ELMA	2
			FEBR	1	FEBR	3	FEPE	54	FEBR	4	FEBR	25	FEBR	44
			FEPE	73	FEPE	50	GEDI	1	FEPE	44	FEPE	27	FEPE	10
			HYGL	1	GEDI	1	HYRA	2	GEDI	1	GEDI	1	GEDI	1
			LYHY	5	HYRA	2	LYHY	2	HYGL	3	HYGL	10	HYGL	2
			RUCR	1	LYHY	1	LYMI	1	JUBUb	1	JUBUb	4	LYHY	1
			TRVA	1	SOOL	1	RUCR	1	LYHY	7	LYAR	1	MASA	8
			TH	12	TH	20	TH	10	LYMI	2	LYHY	1	STAJ	1
			BG	2	BG	2	BG	3	SOOL	1	SOOL	1	TH	25
									TRBA	1	TH	15	BG	4
									TH	15	BG	6		
									BG	3				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
6	5 m	5%	BRMI	1	ACAMa	6	ACAMa	1
			DISP	1	BRMI	10	BRMI	15
			FEBR	2	FEBR	2	FEBR	15
			HYGL	3	HYGL	1	JUBA	1
			JUBA	1	JUBUb	1	JUPH	25
			JUPH	25	JUPH	34	LYHY	1
			LYHY	1	LYHY	1	PLCO	1
			PLCO	5	RUAC	6	POMO	1
			RUAC	15	VISAs	1	RUAC	4
			STAJ	1	TH	30	SOOL	1
			TH	40	BG	8	VISAs	2
			BG	5			TH	25
							BG	8
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
8	**5 m**	**2%**	BRMI	1	BRMI	1	BRMI	2
			ELACa	2	ELACa	1	DISP	1
			ELMA	5	ELMA	8	ELACa	2
			EUOC	25	EUOC	15	ELMA	8
			FEBR	1	LYHY	10	EUOC	4
			FEPE	1	PLCHh	3	FEPE	1
			HOBRb	1	POMO	22	JUBUb	4
			JUBA	5	*Pseudognphalium* sp.	1	JUPH	1
			JUPH	3	RUCR	1	LYHY	6
			LYHY	6	TRVA	1	MALE	1
			PLCHh	1	TH	35	POMO	34
			POMO	15	BG	2	*Pseudognphalium* sp.	1
			TH	33			SOOL	1
			BG	1			TRVA	1
							TH	30
							BG	3
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 101 East (West) 2019 Species List

Species Name	Common Name	Species Code
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA
Acmispon parviflorus	hill lotus	ACPA
Agrostis avenacea	Pacific bent grass	AGAV
Aira caryophyllea	silvery hair-grass	AICA
Alopecurus saccatus	Pacific foxtail	ALSA
Avena barbata	slender wild oat	AVBA
Baccharis pilularis	coyote brush	BAPI
Briza maxima	rattlesnake grass	BRMA
Briza minor	annual quaking grass	BRMI
Bromus diandrus	ripgut grass	BRDI
Bromus hordeaceus	soft chess	BRHO
Carex praegracilis	clustered field sedge	CAPR
Cotula coronopifolia	brass buttons	COCO
Cynodon dactylon	Bermuda grass	CYDA
Cyperus eragrostis	tall cyperus	CYER
Deinandra corymbosa	coastal tarweed	DECO
Deschampsia danthonioides	annual hair grass	DEDA
Distichlis spicata	salt grass	DISP
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa
Eleocharis macrostachya	pale spikerush	ELMA
Elymus glaucus	blue wild-rye	ELGL
Epilobium brachycarpum	tall annual willowherb	EPBR
Erigeron canadensis	horseweed	ERCA
Erodium botrys	long-beaked filaree	ERBO
Eryngium armatum	coyote thistle	ERAR12
Euthamia occidentalis	western goldenrod	EUOC
Festuca bromoides	brome fescue	FEBR
Festuca myuros	rattail sixweeks grass	FEMY
Festuca perennis	Italian rye grass	FEPE
Gamochaeta ustulata	purple cudweed	GAUS
Geranium dissectum	cut-leaved geranium	GEDI
Gnaphalium palustre	lowland cudweed	GNPA
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO
Hordeum brachyantherum ssp. *brachyantherum*	meadow barley	HOBRB
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	HOMAG
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
Isoetes howellii	Howell's quillwort	ISHO
Juncus balticus	Baltic rush	JUBA
Juncus bufonius var. *bufonius*	common toad rush	JUBUB
Juncus hesperius	bog rush	JUHE
Juncus patens	spreading rush	JUPA
Juncus phaeocephalus	brown-headed rush	JUPH
Lasthenia glaberrima	smooth goldfields	LAGL3
Layia platyglossa	tidy-tips	LAPL
Lupinus arboreus	yellow bush lupine	LUAR
Lupinus bicolor	miniature lupine	LUBI
Lupinus nanus	sky lupine	LUNA
Lysimachia arvensis	scarlet pimpernel	LYAR
Lysimachia minima	chaffweed	LYMI
Lythrum hyssopifolia	grass poly	LYHY
Madia elegans	common madia	MAEL
Madia sativa	coast tarweed	MASA
Malvella leprosa	alkali mallow	MALE
Medicago polymorpha	California burclover	MEPO
Phalaris lemmonii	Lemmon's canary grass	PHLE
Plagiobothrys chorisianus var. *hickmanii*	Hickman's popcornflower	PLCHH
Plantago coronopus	cut-leaved plantain	PLCO
Plantago lanceolata	English plantain	PLLA
Polygonum aviculare ssp. *depressum*	prostrate knotweed	POAVD
Polypogon monspeliensis	rabbitfoot grass	POMO
Pseudognaphalium luteoalbum	weedy cudweed	PSLU
Pseudognaphalium stramineum	cottonbatting plant	PSST
Quercus agrifolia	coast live oak	QUAG
Rorippa curvisiliqua	western yellowcress	ROCU
Rumex acetosella	sheep sorrel	RUAC
Rumex crispus	curly dock	RUCR
Rumex salicifolius	willow dock	RUSA
Senecio glomeratus	cutleaf burnweed	SEGL
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Stachys ajugoides	bugle hedge nettle	STAJ
Toxicodendron diversilobum	poison oak	TODI
Trifolium angustifolium	narrow-leaved clover	TRAN
Trifolium barbigerum	bearded clover	TRBA
Trifolium campestre	hop clover	TRCA5
Trifolium depauperatum	sack clover	TRDE
Trifolium dubium	little hop clover	TRDU
Trifolium microcephalum	small head clover	TRMI
Trifolium variegatum	variegated clover	TRVA
Triglochin scilloides	flowering quillwort	TRSC
Verbena lasiostachys var. *lasiostachys*	western vervain	VELAL
Vicia sativa ssp. *nigra*	common vetch	VISAN
Vicia sativa ssp. *sativa*	spring vetch	VISAS
Vicia villosa ssp. *villosa*	hairy vetch	VIVIV
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

Table B-9. Pond 101 West (Year 1 Post-Mastication) Wetland Vegetation Transect Data by Stratum

POND 101 West			
Date	5/31/2019, 7/5/2019		
Surveying Personnel	Kayti Christianson, Julia Fields		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at time of 7/5/2019 survey. Strata 1 and 2 were repeated from 2016. Stratum 3 was a new stratum. Transect 1 was relocated to an area with more representative vegetative composition. Transect 2 was relocated because the previous location was no longer within the correct stratum. Transect 3 was established in 2019.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
1	10 m	33%	ELACa	3	ELACa	1	ELMA	5	ELMA	8	COCO	1	DEDA	1
			ELMA	6	ELMA	1	EUOC	8	EUOC	5	DEDA	2	ELMA	1
			EUOC	4	LAGL3	35	LAGL3	24	LAGL3	30	ELMA	1	HECUo	3
			LAGL3	5	PLCHh	35	LYHY	1	LYHY	1	LAGL3	6	ISHO	3
			PLCHh	48	POMO	9	PLCHh	40	PLCHh	38	PLCHh	75	LAGL3	5
			POMO	4	RUCR	2	RUCR	15	POMO	1	POMO	2	PLCHh	40
			RUCR	3	TRSC	2	TRSC	1	ROCU	3	RUCR	4	POMO	38
			TRSC	10	TH	5	TH	3	RUCR	6	TH	1	RUCR	2
			TH	2	BG	10	BG	3	TRSC	1	BG	8	TH	4
			BG	15					TH	2			BG	3
									BG	5				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	10 m	62%	BRMI	1	BRMI	2	BRMI	2	AICA	1	BRHO	1	BRMI	2
			DISP	3	COCO	1	DISP	3	BAPI	1	BRMI	3	DISP	1
			ELMA	2	DISP	7	FEBR	8	BRMI	3	DACA	2	ELACa	4
			FEBR	7	ELMA	2	FEPE	2	DISP	2	DISP	2	FEBR	20
			FEPE	1	FEBR	25	GEDI	2	FEBR	11	FEBR	21	FEPE	1
			HOBR	1	FEPE	1	HYGL	1	FEPE	4	FEPE	3	GEDI	1
			HOMAg	10	GEDI	1	HYRA	2	GEDI	2	GEDI	1	HOBR	1
			JUBUb	1	HOBR	1	JUBUb	1	HOBR	1	HOBR	2	HYGL	2
			LYAR	1	JUBUb	1	LYHY	3	HYGL	1	HYGL	1	HYRA	1
			LYHY	3	LYHY	4	MAGR	54	HYRA	2	HYRA	2	JUBUb	19
			MAGR	35	MAGR	20	PLCHh	1	LYHY	1	JUBUb	2	LYHY	2
			PLCHh	1	PLCHh	8	POMO	1	LYMI	1	LYHY	2	MAGR	25
			PLCO	1	PLCO	1	RUAC	3	MAGR	45	MAGR	36	PLCHh	1
			POMO	1	TRVA	6	RUSA	8	RUAC	15	PLCHh	1	PLCO	2
			RUSA	5	TH	8	SOOL	1	SOOL	2	PLCO	1	POMO	3
			TRBA	1	BG	12	TRMI	2	VISAs	1	POMO	3	RUAC	1
			TRVA	2			TRVA	2	TH	4	RUAC	3	VELAl	1
			VISAs	2			VISAs	3	BG	3	SOOL	1	TH	12
			TH	20			TH	3			TH	11	BG	1
			BG	2			BG	1			BG	2		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**103**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
3	5 m	5%	COCO	2	COCO	1	COCO	1
			ELMA	65	ELMA	72	ELMA	50
			HECUo	15	HECUo	3	LAGL3	1
			LAGL3	2	LYHY	2	LYHY	12
			LYHY	1	POMO	2	POMO	2
			PLCHh	1	TH	15	RUCR	2
			POMO	1	BG	5	TH	15
			RUCR	2			BG	17
			TH	7				
			BG	4				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 101 West 2019 Species List					
Species Name	**Common Name**	**Species Code**	**Species Name**	**Common Name**	**Species Code**
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Acmispon parviflorus	hill lotus	ACPA	*Lysimachia minima*	chaffweed	LYMI
Aira caryophyllea	silvery hair-grass	AICA	*Lythrum hyssopifolia*	grass poly	LYHY
Avena barbata	slender wild oat	AVBA	*Madia elegans*	common madia	MAEL
Baccharis pilularis	coyote brush	BAPI	*Madia gracilis*	gumweed	MAGR
Briza maxima	rattlesnake grass	BRMA	*Madia sativa*	coast tarweed	MASA
Briza minor	annual quaking grass	BRMI	*Medicago polymorpha*	California burclover	MEPO
Bromus diandrus	ripgut grass	BRDI	*Melilotus indicus*	Indian sweetclover	MEIN
Bromus hordeaceus	soft chess	BRHO	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Callitriche marginata	California water-starwort	CAMA	*Plantago coronopus*	cut-leaved plantain	PLCO
Carex praegracilis	clustered field sedge	CAPR	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Clarkia purpurea ssp. *quadrivulnera*	winecup clarkia	CLPUQ	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Cortaderia jubata	jubata grass	COJU2	*Quercus agrifolia*	coast live oak	QUAG
Cotula coronopifolia	brass buttons	COCO	*Rorippa curvisiliqua*	western yellowcress	ROCU
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Rumex acetosella*	sheep sorrel	RUAC
Cyperus eragrostis	tall cyperus	CYER	*Rumex crispus*	curly dock	RUCR
Danthonia californica	California oat grass	DACA	*Rumex salicifolius*	willow dock	RUSA
Deschampsia danthonioides	annual hair grass	DEDA	*Senecio glomeratus*	cutleaf burnweed	SEGL
Distichlis spicata	salt grass	DISP	*Silene gallica*	small-flower catchfly	SIGA
Elatine californica	California waterwort	ELCA	*Sonchus asper*	prickly sow thistle	SOAS
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Sonchus oleraceus*	common sow thistle	SOOL
Eleocharis macrostachya	pale spikerush	ELMA	*Stachys ajugoides*	bugle hedge nettle	STAJ
Elymus triticoides	beardless wild rye	ELTR3	*Taraxia ovata*	sun cups	TAOV
Euthamia occidentalis	western goldenrod	EUOC	*Toxicodendron diversilobum*	poison oak	TODI
Festuca bromoides	brome fescue	FEBR	*Trifolium angustifolium*	narrow-leaved clover	TRAN
Festuca perennis	Italian rye grass	FEPE	*Trifolium barbigerum*	bearded clover	TRBA
Geranium dissectum	cut-leaved geranium	GEDI	*Trifolium campestre*	hop clover	TRCA5
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO	*Trifolium dubium*	little hop clover	TRDU
Hordeum brachyantherum	meadow barley	HOBR	*Trifolium microcephalum*	small head clover	TRMI
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	HOMAG	*Trifolium variegatum*	variegated clover	TRVA
Hypochaeris glabra	smooth cat's-ear	HYGL	*Triglochin scilloides*	flowering quillwort	TRSC
Hypochaeris radicata	rough cat's-ear	HYRA	*Triphysaria pusilla*	little owl's clover	TRPU
Isoetes howellii	Howell's quillwort	ISHO	*Verbena lasiostachys* var. *lasiostachys*	western vervain	VELAL
Juncus balticus	Baltic rush	JUBA	*Vicia sativa* ssp. *nigra*	common vetch	VISAN
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	*Vicia sativa* ssp. *sativa*	spring vetch	VISAS
Juncus occidentalis	western rush	JUOC	**Groundcover Codes**		
Juncus phaeocephalus	brown-headed rush	JUPH	BG	Bare Ground	
Lasthenia glaberrima	smooth goldfields	LAGL3	TH	Thatch/Duff	
Lupinus bicolor	miniature lupine	LUBI	AL	Algae	

Table B-10. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 41			
Date	6/12/2019		
Surveying Personnel	Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation	40		
Floating Vegetation	0		
Submerged Vegetation	30		
Open Water	30		Depth on 6/12/2019: 12 cm
Notes			
Pond was inundated 12 cm at the time of 6/12/19 survey. Inundated area 0.1% of basin boundary. Strata and transects 1 through 3 were repeated from 2016. Stratum 4 was identified in 2019 and the subsequent transect was established. An upland stratum was mapped and occupied 3% relative cover of wetland but was not included in the cover data.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
1	**10 m**	**23%**	ELACa	4	ELACa	4	ELACa	6	ELACa	4	DEDA	1	DEDA	1
			ELMA	53	ELMA	36	ELMA	45	ELMA	20	ELACa	20	ELACa	25
			PHLE	1	MALE	1	PHLE	1	PHLE	2	ELMA	6	ELMA	7
			PLCHh	1	PHLE	1	POMO	3	PLCHh	1	ISHO	2	JUPH	7
			POMO	20	POMO	2	TH	30	POMO	44	LAGL3	6	LAGL3	10
			TH	20	TH	25	BG	15	TH	25	PHLE	1	PLCHh	7
			BG	1	BG	31			BG	4	PLCHh	4	POMO	35
											POMO	49	TH	8
											STAJ	1	BG	0
											TH	10		
											BG	0		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	**10 m**	**52%**	DEDA	1	ELACa	20	ELACa	2	ELMA	20	ELACa	20	ELACa	23
			ELACa	25	ELMA	25	ELMA	20	ELACa	2	ELMA	30	ELMA	18
			ELMA	15	FEBR	1	GEDI	8	FEBR	1	ERAR12	6	ERAR12	30
			GEDI	2	GEDI	10	JUPH	2	GEDI	2	LAGL3	8	LAGL3	2
			JUPH	1	JUPH	1	LAGL3	1	MALE	3	PHLE	1	PHLE	1
			LAGL3	6	LAGL3	1	PHLE	1	PHLE	2	PLCHh	12	PLCHh	8
			PHLE	4	MALE	1	PLCHh	44	PLCHh	15	POMO	8	POMO	2
			PLCHh	1	PHLE	6	POMO	6	POMO	8	RUCR	1	STAJ	6
			POMO	1	PLCHh	2	STAJ	9	STAJ	35	STAJ	4	TH	10
			STAJ	25	POMO	2	TH	6	TH	12	TH	10	BG	0
			TH	20	STAJ	15	BG	1	BG	0	BG	0		
			BG	0	TH	15								
					BG	1								
			TOTAL	**101**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
3	10 m	16%	BRMI	2	BRMI	1	BRMI	1	BRMI	1	BRMI	4	AICA	1
			ELACa	1	ELACa	2	ELACa	2	BRHO	1	ERAR12	5	BRHO	1
			GEDI	2	ELMA	2	ELMA	1	CAAMa3	1	ERBO	1	BRMI	1
			ISHO	2	ERAR12	1	ERAR12	25	ELMA	1	FEBR	1	CAAMa3	1
			JUPH	50	GEDI	3	ERBO	1	ERAR12	2	GEDI	4	ERAR12	1
			LYMI	1	JUPH	40	GEDI	2	ERBO	1	JUPH	45	ERBO	1
			MALE	1	LYMI	1	JUPH	32	GEDI	5	MALE	2	FEBR	1
			PLCHh	1	MALE	1	LYHY	1	JUPH	26	MASA	2	ISHO	2
			POMO	2	PLCHh	2	LYMI	2	LYHY	1	STAJ	4	JUPH	25
			SOOL	1	POMO	1	MALE	2	LYMI	1	TH	32	LYHY	1
			STAJ	1	STAJ	2	PLCHh	3	MALE	2	BG	0	LYMI	1
			TH	36	TH	44	POMO	1	MASA	2			MALE	1
			BG	0	BG	0	STAJ	3	PLCHh	1			MASA	5
							TH	20	STAJ	7			POMO	1
							BG	4	TH	45			STAJ	20
									BG	3			TH	32
													BG	5
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
4	10 m	6%	DACA	35	AICA	1	BRMI	1	AGPA	8	BRMI	1	AICA	1
			ERAR12	3	BRMI	1	BRTEt	2	BRMI	1	DACA	37	BRMI	8
			ERCA	1	DACA	45	CAAMa3	1	DACA	48	ERAR12	7	CAAMa3	1
			FEBR	1	ELMA	1	DACA	45	FEBR	1	ERBO	1	DACA	28
			GEDI	2	ERAR12	6	ERAR12	1	GEDI	1	GAAP	1	ERAR12	4
			HYGL	1	GEDI	3	GEDI	2	HYGL	2	GEDI	2	ERBO	1
			TH	57	HYGL	2	HYGL	1	STAJ	2	JUPH	2	FEBR	1
			BG	0	LUCO6	1	JUPH	1	TH	35	LYHY	1	HYGL	1
					MASA	1	STAJ	10	BG	2	ZEDA	1	ISHO	1
					TH	37	TH	34			TH	37	JUPH	1
					BG	2	BG	2			BG	10	LYAR	1
													LYHY	1
													LYMI	1
													STAJ	3
													TH	15
													BG	32
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 41 2019 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI	*Juncus phaeocephalus*	brown-headed rush	JUPH
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Lasthenia glaberrima*	smooth goldfields	LAGL3
Agoseris grandiflora var. *grandiflora*	large-flowered agoseris	AGGRG	*Luzula comosa*	Pacific woodrush	LUCO6
Agrostis pallens	seashore bent grass	AGPA	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Aira caryophyllea	silvery hair-grass	AICA	*Lysimachia minima*	chaffweed	LYMI
Alopecurus saccatus	Pacific foxtail	ALSA	*Lythrum hyssopifolia*	grass poly	LYHY
Baccharis pilularis	coyote brush	BAPI	*Madia elegans*	common madia	MAEL
Briza maxima	rattlesnake grass	BRMA	*Madia exigua*	small tarweed	MAEX
Briza minor	annual quaking grass	BRMI	*Madia gracilis*	gumweed	MAGR
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Madia sativa*	coast tarweed	MASA
Bromus diandrus	ripgut grass	BRDI	*Malvella leprosa*	alkali mallow	MALE
Bromus hordeaceus	soft chess	BRHO	*Oxalis corniculata*	creeping woodsorrel	OXCO
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
Clinopodium douglasii	yerba buena	CLDO	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Cotula coronopifolia	brass buttons	COCO	*Plantago coronopus*	cut-leaved plantain	PLCO
Danthonia californica	California oat grass	DACA	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Daucus pusillus	rattlesnake weed	DAPU	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Deinandra corymbosa	coastal tarweed	DECO	*Pseudognaphalium ramosissimum*	pink everlasting	PSRA
Deschampsia danthonioides	annual hair grass	DEDA	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Drymocallis glandulosa var. *wrangelliana*	sticky cinquefoil	DRGLW	*Quercus agrifolia*	coast live oak	QUAG
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Rumex acetosella*	sheep sorrel	RUAC
Eleocharis macrostachya	pale spikerush	ELMA	*Rumex crispus*	curly dock	RUCR
Elymus glaucus	blue wild-rye	ELGL	*Rumex salicifolius*	willow dock	RUSA
Elymus triticoides	beardless wild rye	ELTR3	*Senecio glomeratus*	cutleaf burnweed	SEGL
Erigeron canadensis	horseweed	ERCA	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Erodium botrys	long-beaked filaree	ERBO	*Sonchus asper*	prickly sow thistle	SOAS
Eryngium armatum	coyote thistle	ERAR12	*Sonchus oleraceus*	common sow thistle	SOOL
Festuca bromoides	brome fescue	FEBR	*Stachys ajugoides*	bugle hedge nettle	STAJ
Galium aparine	goose grass	GAAP	*Stipa pulchra*	purple needle grass	STPU
Galium porrigens	climbing bedstraw	GAPO	*Toxicodendron diversilobum*	poison oak	TODI
Gamochaeta ustulata	purple cudweed	GAUS	*Trifolium barbigerum*	bearded clover	TRBA
Geranium dissectum	cut-leaved geranium	GEDI	*Triglochin scilloides*	flowering quillwort	TRSC
Heterocodon rariflorum	western pearlflower	HERA	*Triodanis biflora*	Venus' looking glass	TRBI2
Heteromeles arbutifolia	toyon	HEAR	*Verbena lasiostachys* var. *lasiostachys*	western vervain	VELAL
Hypochaeris glabra	smooth cat's-ear	HYGL	*Zeltnera davyi*	Davy's centaury	ZEDA
Hypochaeris radicata	rough cat's-ear	HYRA	**Groundcover Codes**		
Isoetes howellii	Howell's quillwort	ISHO	BG	Bare Ground	
Juncus balticus	Baltic rush	JUBA	TH	Thatch/Duff	
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	AL	Algae	
Juncus bufonius var. *congestus*	clustered toad rush	JUBUC2			

Table B-11. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 3 North			
Date	7/16/2019		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			

Notes

Pond was dry at the time of the 7/16/2019 survey. Strata 2 through 4 were repeated from 2015 and 2018. Stratum 1 was mapped in previous years but was not present in 2019. Transect 2 was repeated from 2015 and 2018, whereas Transect 3 was relocated to an area with more representative vegetative composition. Stratum 4 consisted of CCG and no transects were placed in this stratum.

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	**10 m**	**14%**	COCO	1	ELMA	72	ELMA	69	ELMA	48	COCO	1	ELACa	2
			ELMA	70	PLCHh	1	PLCHh	1	ERAR12	5	ELMA	35	ELMA	35
			JUPH	1	POMO	6	POMO	15	LYHY	1	ERAR12	4	ERAR12	20
			POMO	8	SCCA	1	TH	5	PLCHh	1	GAUS	1	JUPH	2
			TH	5	TH	15	BG	10	POMO	15	JUPH	1	PLCHh	1
			BG	15	BG	5			TH	20	LYHY	1	POMO	15
									BG	10	POMO	30	TH	15
											TH	22	BG	10
											BG	5		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
3	**10 m**	**43%**	BRMI	1	ELACa	6	ELACa	5	ELMA	3	ELMA	1	ERAR12	2
			ELACa	10	ELMA	2	ELMA	1	ERAR12	28	ERAR12	1	FEPE	1
			ERAR12	2	ERAR12	15	ERAR12	40	FEPE	1	FEPE	1	JUBUb	1
			FEPE	2	FEPE	1	FEPE	1	JUBUb	1	HOMAg	1	JUPH	20
			JUBUb	7	JUBUb	10	JUBUb	2	JUPH	18	JUBUb	3	LYHY	1
			JUPH	2	JUBUc2	1	JUPH	2	LYHY	2	JUPH	1	PLCO	18
			LYHY	4	JUPH	1	LYHY	2	PLCO	2	LYHY	11	POMO	25
			MAGR	3	LYHY	6	PLCO	5	POMO	12	PLCO	16	TH	17
			MASA	6	MAGR	1	POMO	5	TH	16	POMO	40	BG	15
			PLCO	13	PLCO	20	PSCH	1	BG	17	TH	5		
			POMO	2	POMO	2	TRVA	8			BG	20		
			TRAN	4	TRVA	4	TH	12						
			VISAn	2	TH	11	BG	16						
			TH	36	BG	20								
			BG	6										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 3 North 2019 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI	*Leptosiphon parviflorus*	variable linanthus	LEPA
Acmispon americanus var. americanus	Spanish lotus	ACAMA	*Logfia filaginoides*	California cottonrose	LOFI
Acmispon parviflorus	hill lotus	ACPA	*Logfia gallica*	narrowleaf cottonrose	LOGA
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV	*Lupinus bicolor*	miniature lupine	LUBI
Aira caryophyllea	silvery hair-grass	AICA	*Luzula comosa*	Pacific woodrush	LUCO6
Allium hickmanii	Hickman's onion	ALHI	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Avena barbata	slender wild oat	AVBA	*Lysimachia minima*	chaffweed	LYMI
Baccharis pilularis	coyote brush	BAPI	*Lythrum hyssopifolia*	grass poly	LYHY
Briza minor	annual quaking grass	BRMI	*Madia exigua*	small tarweed	MAEX
Brodiaea terrestris ssp. terrestris	dwarf brodiaea	BRTET	*Madia gracilis*	gumweed	MAGR
Bromus diandrus	ripgut grass	BRDI	*Madia sativa*	coast tarweed	MASA
Bromus hordeaceus	soft chess	BRHO	*Microseris paludosa*	marsh microseris	MIPA
Callitriche heterophylla var. bolanderi	Bolander's water starwort	CAHEB	*Parentucellia viscosa*	yellow glandweed	PAVI3
Calochortus uniflorus	pink star-tulip	CAUN	*Plagiobothrys chorisianus var. hickmanii*	Hickman's popcornflower	PLCHH
Carpobrotus chilensis	sea fig	CACH	*Plantago coronopus*	cut-leaved plantain	PLCO
Castilleja ambigua ssp. ambigua	Johnny-Nip	CAAMA3	*Pogogyne zizyphoroides*	Sacramento mesa mint	POZI
Centaurea melitensis	Maltese star-thistle	CEME	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Cicendia quadrangularis	timwort	CIQU	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Cotula coronopifolia	brass buttons	COCO	*Psilocarphus tenellus*	slender woolly-marbles	PSTE
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Rumex crispus*	curly dock	RUCR
Danthonia californica	California oat grass	DACA	*Sanicula crassicaulis*	Pacific sanicle	SACR
Daucus pusillus	rattlesnake weed	DAPU	*Schoenoplectus californicus*	California bulrush	SCCA
Deinandra corymbosa	coastal tarweed	DECO	*Sidalcea malviflora ssp. malviflora*	checkerbloom	SIMAM
Deschampsia danthonioides	annual hair grass	DEDA	*Silene gallica*	small-flower catchfly	SIGA
Drymocallis glandulosa	sticky cinquefoil	DRGL	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Eleocharis acicularis var. acicularis	needle spikerush	ELACa	*Sonchus asper*	prickly sow thistle	SOAS
Eleocharis macrostachya	pale spikerush	ELMA	*Sonchus oleraceus*	common sow thistle	SOOL
Erodium botrys	long-beaked filaree	ERBO	*Spergularia rubra*	red sand-spurrey	SPRU
Eryngium armatum	coyote thistle	ERAR12	*Stipa pulchra*	purple needle grass	STPU
Festuca myuros	rattail sixweeks grass	FEMY	*Taraxia ovata*	sun cups	TAOV
Festuca perennis	Italian rye grass	FEPE	*Trifolium angustifolium*	narrow-leaved clover	TRAN
Gamochaeta ustulata	purple cudweed	GAUS	*Trifolium barbigerum*	bearded clover	TRBA
Geranium dissectum	cut-leaved geranium	GEDI	*Trifolium campestre*	hop clover	TRCA5
Heliotropium curassavicum var. oculatum	Chinese pusley	HECUO	*Trifolium depauperatum*	sack clover	TRDE
Hordeum brachyantherum	meadow barley	HOBR	*Trifolium dubium*	little hop clover	TRDU
Hordeum marinum ssp. gussoneanum	Mediterranean barley	HOMAG	*Trifolium microcephalum*	small head clover	TRMI
Hypochaeris glabra	smooth cat's-ear	HYGL	*Trifolium variegatum*	variegated clover	TRVA
Hypochaeris radicata	rough cat's-ear	HYRA	*Triglochin scilloides*	flowering quillwort	TRSC
Isoetes howellii	Howell's quillwort	ISHO	*Triteleia hyacinthina*	white brodiaea	TRHY3
Isolepis carinata	keeled bulrush	ISCA	*Vicia sativa ssp. nigra*	common vetch	VISAN
Juncus bufonius var. bufonius	common toad rush	JUBUB	*Vicia sativa ssp. sativa*	spring vetch	VISAS
Juncus bufonius var. congestus	clustered toad rush	JUBUC2	*Zeltnera davyi*	Davy's centaury	ZEDA
Juncus capitatus	dwarf rush	JUCA	**Groundcover Codes**		
Juncus occidentalis	western rush	JUOC	BG	Bare Ground	
Juncus phaeocephalus	brown-headed rush	JUPH	TH	Thatch/Duff	
Lasthenia conjugens	Contra Costa goldfields	LACO	AL	Algae	
Lasthenia glaberrima	smooth goldfields	LAGL3			

Table B-12. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 3 South			
Date	5/29/2019, 6/19/2019		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at the time of the 6/19/2019 survey. Strata 1 through 4 were repeated from 2016 and 2018. Transect 1 was repeated, whereas Transects 2 through 4 were relocated to an area with more representative vegetative composition. Stratum 5 was a new stratum consisting of CCG and no transects were placed in this stratum. An upland stratum was mapped and occupied 6% relative cover of wetland but was not included in the cover data.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
1	**10 m**	**22%**	CRAQ	2	COCO	1	CRAQ	1	BRTEt	1	ELMA	10	ELMA	25
			DEDA	1	CRAQ	3	DEDA	1	DEDA	1	ERAR12	30	ERAR12	5
			ELACa	1	DEDA	1	ELACa	2	ELACa	1	JUPH	1	LAGL3	6
			ELMA	12	ELACa	1	ELMA	20	ELMA	2	LAGL3	4	PLCHh	3
			ERAR12	10	ELMA	3	ERAR12	15	ERAR12	44	LYHY	1	POMO	15
			JUPH	1	ERAR12	8	JUPH	2	JUPH	1	PLCHh	3	TH	42
			LYHY	1	JUPH	15	LAGL3	1	LAGL3	1	POMO	8	BG	4
			LYMI	1	LYHY	1	LYHY	1	LYHY	1	TH	23		
			PLCHh	1	LYMI	1	PLCHh	4	LYMI	1	BG	20		
			PLCO	1	PLCHh	1	POMO	13	PLCHh	1				
			POMO	30	POMO	7	TH	25	POMO	6				
			TH	15	TH	18	BG	15	TH	10				
			BG	24	BG	40			BG	30				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
			BRMI	2	BRMI	1	BRMI	1	BRMI	1	BRMI	2	BRMI	2
			BRTEt	1	BRTEt	1	BRTEt	1	BRTEt	1	BRTEt	2	BRTEt	3
			CAAMa3	1	DECO	7	DECO	7	DECO	2	CAAMa3	2	CAAMa3	1
			DACA	8	FEBR	1	FEBR	1	FEBR	1	DECO	4	DACA	8
			DECO	4	FEPE	1	FEPE	1	GEDI	1	HYGL	1	DECO	3
			ERAR12	2	GEDI	1	GEDI	1	HYGL	1	ISCE	1	FEPE	1
			ERBO	1	HYGL	1	HYGL	1	ISCE	1	JUBUb	1	GEDI	1
			FEBR	1	ISCE	1	ISCE	3	JUPH	63	JUPH	46	HYGL	1
			GEDI	1	ISHO	1	JUPH	56	LYHY	2	LYHY	2	ISCA	1
			ISCE	1	JUBUb	1	LYHY	2	LYMI	1	LYMI	1	JUBUo	1
			JUBUb	1	JUPH	53	LYMI	2	MALE	1	MALE	2	JUCA	1
2	**10 m**	**20%**	JUPH	40	LYHY	3	MALE	2	PLCO	1	MIPA	1	JUPH	40
			LYHY	2	LYMI	2	MIPA	1	POMO	1	POMO	1	LYHY	4
			LYMI	3	MALE	2	POMO	1	SIGA	1	TRDE	1	LYMI	1
			MIPA	1	MIPA	1	TH	6	TH	2	TRVA	5	MALE	1
			PLCO	1	POMO	1	BG	14	BG	20	TH	3	PLCO	1
			POMO	1	TRDE	2					BG	25	POMO	2
			RACA	1	TH	5							RACA	1
			TH	3	BG	15							SIGA	1
			BG	25									TRVA	2
													TH	3
													BG	21
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
			BRMI	2	BRMI	3	ACMI	1	BRMI	1	ACMI	2	ACMI	1
			BRTEt	5	BRTEt	2	BRMI	1	BRTEt	1	BRHO	1	AICA	1
			CAUN	1	DACA	3	BRTEt	2	CAAMa3	1	BRMI	4	BRMI	1
			DECO	35	DECO	22	CAAMa3	2	CAUN	1	BRTEt	1	CAAMa3	1
			FEBR	1	FEBR	1	DACA	35	DACA	30	CAUN	1	CAUN	1
			GEDI	1	GEDI	1	DECO	15	DECO	3	DACA	26	DACA	30
			HYGL	1	JUPH	1	FEBR	1	GEDI	2	DECO	7	DECO	3
			HYRA	1	LYAR	1	GEDI	1	HYGL	1	GAUS	1	ERBO	1
			JUPH	2	LYHY	21	HYGL	1	JUBUo	1	GAUS	13	GEDI	1
			LOGA	1	LYMI	2	JUPH	1	JUPH	1	GEDI	1	HYGL	1
3	**10 m**	**47%**	LYHY	1	PLER	1	LOGA	2	LOGA	2	HYRA	1	JUPH	4
			PLER	1	SIMAm	4	LYAR	1	LYAR	4	JUPH	10	LYHY	6
			PSCH	1	ZEDA	1	LYHY	7	LYHY	12	LOGA	2	LYMI	1
			TH	12	TH	2	LYMI	1	LYMI	1	LYAR	4	PLCO	2
			BG	35	BG	35	SIMAm	1	SIMAm	10	LYHY	2	PLER	1
							TRHY3	1	SOOL	1	SIGA	1	TH	5
							TH	4	TRHY3	1	SIMAm	2	BG	40
							BG	23	TH	4	TRDE	1		
									BG	23	TRVA	1		
											TH	20		
											BG	1		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**102**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
4	10 m	5%	BRDI	1	BRMI	1	BRMI	1	BRHO	1	BRHO	1	BRMI	1
			BRHO	1	ELMA	1	BRTEt	1	BRMI	1	BRMI	1	BRTEt	2
			BRMI	1	ERCA	1	DECO	1	BRTEt	1	BRTEt	1	DACA	10
			BRTEt	2	FEBR	1	ELMA	3	DACA	4	DACA	1	DECO	1
			DECO	1	FEPE	53	FEBR	1	DECO	4	DECO	2	ELMA	2
			ELMA	5	GEDI	5	FEPE	10	ELMA	40	ELMA	4	FEBR	6
			FEPE	65	HYGL	5	GEDI	3	ERCA	1	FEBR	5	FEPE	28
			GEDI	3	JUPH	3	HYGL	1	FEBR	2	FEPE	19	GEDI	8
			HOBR	1	LYHY	3	JUPH	4	FEPE	23	GEDI	20	HYGL	2
			JUPH	3	MA sp.	1	LYHY	3	GEDI	2	HYGL	1	JUPH	8
			LYAR	3	MALE	3	*Madia* sp.	2	HYGL	1	HYRA	2	LYHY	1
			LYHY	1	SIGA	1	MALE	2	HYRA	2	JUPH	8	MALE	3
			MALE	1	TH	15	SIGA	1	JUPH	1	LYHY	1	RACA	3
			POMO	1	BG	7	TRDU	1	LYHY	4	MALE	1	SIGA	1
			SIGA	1			ZEDA	1	MALE	1	MIPA	1	SOOL	2
			SOOL	1			TH	25	MIPA	1	RACA	2	TRBA	1
			TH	10			BG	40	RACA	1	SIGA	1	TRVA	2
			BG	3					SIGA	1	SOOL	15	TH	15
									SOOL	2	TH	10	BG	4
									TH	5	BG	4		
									BG	2				
			TOTAL	**104**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 3 South 2019 Species List

Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA
Acmispon parviflorus	hill lotus	ACPA
Adenostoma fasciculatum	chamise	ADFA
Agrostis exarata	spike bent grass	AGEX
Aira caryophyllea	silvery hair-grass	AICA
Allium hickmanii	Hickman's onion	ALHI
Arctostaphylos hookeri	Hooker's manzanita	ARHO
Avena barbata	slender wild oat	AVBA
Baccharis pilularis	coyote brush	BAPI
Briza maxima	rattlesnake grass	BRMA
Briza minor	annual quaking grass	BRMI
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET
Bromus diandrus	ripgut grass	BRDI
Bromus hordeaceus	soft chess	BRHO
Calochortus uniflorus	pink star-tulip	CAUN
Carpobrotus edulis	ice plant	CAED
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3
Castilleja attenuata	valley tassels	CAAT
Centaurea melitensis	Maltese star-thistle	CEME
Cicendia quadrangularis	timwort	CIQU
Cirsium brevistylum	Indian thistle	CIBR
Cotula coronopifolia	brass buttons	COCO
Crassula aquatica	aquatic pygmy-weed	CRAQ
Danthonia californica	California oat grass	DACA
Deinandra corymbosa	coastal tarweed	DECO
Deschampsia danthonioides	annual hair grass	DEDA
Drymocallis glandulosa	sticky cinquefoil	DRGL
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa
Eleocharis macrostachya	pale spikerush	ELMA
Elymus triticoides	beardless wild rye	ELTR3
Erigeron canadensis	horseweed	ERCA
Erodium botrys	long-beaked filaree	ERBO
Eryngium armatum	coyote thistle	ERAR12
Festuca bromoides	brome fescue	FEBR
Festuca myuros	rattail sixweeks grass	FEMY
Festuca perennis	Italian rye grass	FEPE
Gamochaeta ustulata	purple cudweed	GAUS
Geranium dissectum	cut-leaved geranium	GEDI
Heteromeles arbutifolia	toyon	HEAR
Hordeum brachyantherum ssp. *brachyantherum*	meadow barley	HOBRB
Horkelia cuneata	wedge-leaved horkelia	HOCU
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
Isoetes howellii	Howell's quillwort	ISHO
Isolepis carinata	keeled bulrush	ISCA
Isolepis cernua	low bulrush	ISCE
Juncus balticus	Baltic rush	JUBA
Juncus bufonius var. *bufonius*	common toad rush	JUBUB
Juncus bufonius var. *congestus*	clustered toad rush	JUBUC2
Juncus bufonius var. *occidentalis*	round-fruited toad rush	JUBUO
Juncus capitatus	dwarf rush	JUCA
Juncus occidentalis	western rush	JUOC
Juncus phaeocephalus	brown-headed rush	JUPH
Lasthenia conjugens	Contra Costa goldfields	LACO
Lasthenia glaberrima	smooth goldfields	LAGL3
Logfia gallica	narrowleaf cottonrose	LOGA
Lysimachia arvensis	scarlet pimpernel	LYAR
Lysimachia minima	chaffweed	LYMI
Lythrum hyssopifolia	grass poly	LYHY
Madia exigua	small tarweed	MAEX
Madia gracilis	gumweed	MAGR
Madia sativa	coast tarweed	MASA
Malvella leprosa	alkali mallow	MALE
Microseris paludosa	marsh microseris	MIPA
Navarretia hamata ssp. parviloba	hooked navarretia	NAHAP
Navarretia mellita	skunk navarretia	NAME
Petrorhagia dubia	hairypink	PEDU
Phalaris lemmonii	Lemmon's canary grass	PHLE
Plagiobothrys chorisianus var. *hickmanii*	Hickman's popcornflower	PLCHH
Plantago coronopus	cut-leaved plantain	PLCO
Plantago erecta	California plantain	PLER
Plantago lanceolata	English plantain	PLLA
Polypogon monspeliensis	rabbitfoot grass	POMO
Pseudognaphalium luteoalbum	weedy cudweed	PSLU
Pseudognaphalium stramineum	cottonbatting plant	PSST
Psilocarphus chilensis	round woolly-marbles	PSCH
Ranunculus californicus	California buttercup	RACA
Rubus ursinus	California blackberry	RUUR
Rumex acetosella	sheep sorrel	RUAC
Rumex crispus	curly dock	RUCR
Senecio glomeratus	cutleaf burnweed	SEGL
Sidalcea malviflora ssp. *malviflora*	checkerbloom	SIMAM
Silene gallica	small-flower catchfly	SIGA
Sisyrinchium bellum	western blue-eyed grass	SIBE
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Spergularia villosa	hairy sand-spurrey	SPVI
Stipa pulchra	purple needle grass	STPU
Taraxia ovata	sun cups	TAOV
Tribolium obliterum	capetown grass	TROB
Trifolium angustifolium	narrow-leaved clover	TRAN
Trifolium barbigerum	bearded clover	TRBA
Trifolium campestre	hop clover	TRCA5
Trifolium depauperatum	sack clover	TRDE
Trifolium dubium	little hop clover	TRDU
Trifolium microcephalum	small head clover	TRMI
Trifolium variegatum	variegated clover	TRVA
Trifolium willdenovii	tomcat clover	TRWI
Triphysaria pusilla	little owl's clover	TRPU
Triteleia hyacinthina	white brodiaea	TRHY3
Triteleia ixioides	coast pretty face	TRIX
Vicia sativa ssp. nigra	common vetch	VISAN
Vicia sativa ssp. *sativa*	spring vetch	VISAS
Zeltnera davyi	Davy's centaury	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

Table B-13. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 39			
Date	5/28/2019, 6/19/2019		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by the 6/19/2019 survey. Stratum 1 and 3 were repeated from 2016 and 2018. Strata 2 was repeated from 2016, and stratum 4 was repeated from 2018. Transect 1 was rotated slightly to stay within the boundary of stratum 1 and a new start point was established. Transect 3 was repeated from 2018. Transects 2 and 4 were relocated because the previous location was no longer within the correct stratum. An upland stratum was mapped and occupied 5% relative cover of wetland but was not included in the cover data.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
1	5 m	6%	ELACa	40	ELACa	24	COCO	1
			ELMA	15	ELMA	40	ELACa	10
			JUPH	1	TH	30	ELMA	60
			LYHY	1	BG	6	PLCHh	1
			PLCHh	2			POMO	1
			POMO	3			TH	22
			TRSC	2			BG	5
			TH	24				
			BG	12				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
2	5 m	7%	AICA	1	BRTEt	2	BRMI	1
			BRMI	1	DACA	1	DACA	2
			BRTEt	1	DEDA	5	ELACa	2
			DACA	5	ELACa	5	ELMA	4
			ELMA	25	ELMA	6	ERAR12	6
			ERAR12	35	ERAR12	25	FEBR	17
			FEBR	1	FEPE	1	FEPE	3
			FEPE	1	GEDI	1	GEDI	2
			GEDI	2	*Hordeum* sp.	1	HYGL	1
			JUBUb	1	JUBUb	1	JUPH	10
			LYHY	2	JUEF	1	LYHY	1
			MAGR	1	JUOC	1	POMO	17
			PLCO	1	JUPH	25	TRAN	1
			POMO	1	LYHY	1	TH	30
			SOOL	1	MIPA	1	BG	3
			TAOV	2	PLCO	3		
			TRAN	1	POMO	5		
			TRDU	1	VISAs	1		
			TH	13	TH	10		
			BG	4	BG	4		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
3	**10 m**	**34%**	BRHO	1	DACA	2	BRHO	1	BRHO	1	DACA	1	ACAMa	1
			BRMI	1	FEBR	2	BRTEt	2	DACA	1	DECO	4	BRDI	2
			DACA	46	FEPE	37	DACA	15	FEBR	1	FEBR	2	BRHO	1
			DECO	1	GEDI	4	FEBR	1	FEPE	59	FEPE	53	ERBO	2
			ERBO	1	MAGR	7	FEPE	42	GEDI	4	GEDI	5	FEPE	50
			FEBR	2	PLCO	8	GEDI	3	LYHY	1	HYGL	1	GEDI	2
			FEPE	2	TAOV	3	LYAR	1	PLCO	6	JUBUc2	1	JUPH	15
			GEDI	1	VISAs	1	MAEL	1	VISAs	1	LYHY	1	MAGR	1
			HYGL	1	TH	35	MAGR	1	TH	25	TH	30	SOOL	1
			JUBUb	1	BG	1	PLCO	2	BG	1	BG	2	VISAs	7
			JUOC	8			VISAs	1					TH	25
			LYHY	1			TH	30					BG	0
			MAGR	3			BG	0						
			PLCO	15										
			SOOL	1										
			VISAs	1										
			ZEDA	1										
			TH	10										
			BG	3										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**107**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
4	**10 m**	**48%**	ACAMa	1	ACAMa	2	ACAMa	1	ACPA	1	ACPA	6	ACPA	8
			ACPA	1	AICA	1	BRMI	1	AICA	1	AICA	1	AICA	1
			BRMI	1	BRHO	1	DACA	6	BRDI	1	BRHO	1	BRHO	1
			DACA	12	BRMI	1	ERBO	1	BRMI	1	BRMI	1	BRMI	1
			ERBO	1	DACA	4	GEDI	1	DACA	9	CADEd	2	BRTEt	1
			FEBR	1	FEBR	1	JUPH	3	ERBO	1	DACA	30	CADEd	1
			GEDI	1	GEDI	1	PLCO	7	FEBR	1	ERBO	1	DACA	28
			JUBUb	1	HYGL	1	SIGA	1	GEDI	1	HYGL	1	FEBR	2
			JUPH	2	JU sp.	2	TRAN	31	HYGL	1	JUBUb	1	HYGL	1
			LYHY	1	JUPH	4	TH	45	JUBUb	1	JUOC	1	JUBUc2	1
			PLCO	12	PLCO	5	BG	3	JUOC	1	LYAR	1	JUOC	1
			SIGA	1	SIGA	1			LYAR	1	PLCO	5	LYAR	1
			TRAN	40	TRAN	35			MAGR	3	SIMAm	8	MAEX	1
			TH	10	TH	16			PLCO	2	TAOV	1	MAGR	1
			BG	15	BG	25			TAOV	1	TRAN	35	PLCO	3
									TRAN	61	TRMI	1	SIMAm	12
									TRDU	8	VISAs	1	TRAN	28
									TH	5	TH	5	TRDU	1
									BG	0	BG	1	VISAs	1
													TH	5
													BG	1
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**103**	**TOTAL**	**100**

Pond 39 2019 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI	Lupinus nanus	sky lupine	LUNA
Acmispon americanus var. americanus	Spanish lotus	ACAMA	Luzula comosa	Pacific woodrush	LUCO6
Acmispon parviflorus	hill lotus	ACPA	Lysimachia arvensis	scarlet pimpernel	LYAR
Aira caryophyllea	silvery hair-grass	AICA	Lysimachia minima	chaffweed	LYMI
Arctostaphylos hookeri	Hooker's manzanita	ARHO	Lythrum hyssopifolia	grass poly	LYHY
Avena barbata	slender wild oat	AVBA	Madia elegans	common madia	MAEL
Baccharis pilularis	coyote brush	BAPI	Madia exigua	small tarweed	MAEX
Briza maxima	rattlesnake grass	BRMA	Madia gracilis	gumweed	MAGR
Briza minor	annual quaking grass	BRMI	Madia sativa	coast tarweed	MASA
Brodiaea terrestris ssp. terrestris	dwarf brodiaea	BRTET	Medicago polymorpha	California burclover	MEPO
Bromus diandrus	ripgut grass	BRDI	Microseris paludosa	marsh microseris	MIPA
Bromus hordeaceus	soft chess	BRHO	Plagiobothrys chorisianus var. hickmanii	Hickman's popcornflower	PLCHH
Castilleja densiflora ssp. densiflora	dense flower owl's clover	CADED	Plantago coronopus	cut-leaved plantain	PLCO
Centaurea melitensis	Maltese star-thistle	CEME	Plantago lanceolata	English plantain	PLLA
Cerastium glomeratum	sticky mouse-ear chickweed	CEGL	Pogogyne zizyphoroides	Sacramento mesa mint	POZI
Cicendia quadrangularis	timwort	CIQU	Polypogon monspeliensis	rabbitfoot grass	POMO
Cotula coronopifolia	brass buttons	COCO	Psilocarphus chilensis	round woolly-marbles	PSCH
Cynosurus echinatus	bristly dogtail grass	CYEC	Quercus agrifolia	coast live oak	QUAG
Danthonia californica	California oat grass	DACA	Ranunculus californicus	California buttercup	RACA
Daucus pusillus	rattlesnake weed	DAPU	Rumex acetosella	sheep sorrel	RUAC
Deinandra corymbosa	coastal tarweed	DECO	Rumex crispus	curly dock	RUCR
Deschampsia danthonioides	annual hair grass	DEDA	Rumex salicifolius	willow dock	RUSA
Drymocallis glandulosa var. wrangelliana	sticky cinquefoil	DRGLW	Sidalcea malviflora ssp. malviflora	checkerbloom	SIMAM
Eleocharis acicularis var. acicularis	needle spikerush	ELACa	Silene gallica	small-flower catchfly	SIGA
Eleocharis macrostachya	pale spikerush	ELMA	Sisyrinchium bellum	western blue-eyed grass	SIBE
Elymus glaucus	blue wild-rye	ELGL	Sonchus asper	prickly sow thistle	SOAS
Erodium botrys	long-beaked filaree	ERBO	Sonchus oleraceus	common sow thistle	SOOL
Eryngium armatum	coyote thistle	ERAR12	Spergula arvensis	corn spurry	SPAR
Festuca bromoides	brome fescue	FEBR	Stachys ajugoides	bugle hedge nettle	STAJ
Festuca perennis	Italian rye grass	FEPE	Stipa pulchra	purple needle grass	STPU
Galium murale	tiny bedstraw	GAMU4	Taraxia ovata	sun cups	TAOV
Gamochaeta ustulata	purple cudweed	GAUS	Trifolium albopurpureum	rancheria clover	TRAL5
Gastridium phleoides	nit grass	GAPH	Trifolium angustifolium	narrow-leaved clover	TRAN
Geranium dissectum	cut-leaved geranium	GEDI	Trifolium barbigerum	bearded clover	TRBA
Hordeum brachyantherum	meadow barley	HOBR	Trifolium campestre	hop clover	TRCA5
Hordeum marinum ssp. gussoneanum	Mediterranean barley	HOMAG	Trifolium depauperatum	sack clover	TRDE
Hordeum sp.			Trifolium dubium	little hop clover	TRDU
Horkelia cuneata	wedge-leaved horkelia	HOCU	Trifolium microcephalum	small head clover	TRMI
Hypochaeris glabra	smooth cat's-ear	HYGL	Trifolium variegatum	variegated clover	TRVA
Hypochaeris radicata	rough cat's-ear	HYRA	Triglochin scilloides	flowering quillwort	TRSC
Juncus bufonius var. bufonius	common toad rush	JUBUB	Triphysaria pusilla	little owl's clover	TRPU
Juncus bufonius var. congestus	clustered toad rush	JUBUC2	Triteleia hyacinthina	white brodiaea	TRHY3
Juncus capitatus	dwarf rush	JUCA	Triteleia ixioides	coast pretty face	TRIX
Juncus effusus	common rush	JUEF	Vicia hirsuta	hairy vetch	VIHI
Juncus falcatus	falcate rush	JUFA	Vicia sativa ssp. nigra	common vetch	VISAN
Juncus occidentalis	western rush	JUOC	Vicia sativa ssp. sativa	spring vetch	VISAS
Juncus phaeocephalus	brown-headed rush	JUPH	Zeltnera davyi	Davy's centaury	ZEDA
Juncus sp.			**Groundcover Codes**		
Lasthenia glaberrima	smooth goldfields	LAGL3	BG	Bare Ground	
Logfia gallica	narrowleaf cottonrose	LOGA	TH	Thatch/Duff	
Lupinus bicolor	miniature lupine	LUBI	AL	Algae	

Table B-14. Pond 40 North (Year 2 Post-Burn) Wetland Vegetation Transect Data by Stratum

POND 40 North			
Date	6/25/2019		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at the time of the 6/25/2019 survey. Stratum 2 was repeated from 2015 and 2018, whereas stratum 3 was repeated from 2015 and stratum 4 was repeated from 2018. Stratum 1 from 2015 consisted of a monotypic stand of California bulrush. This species was not present in 2019. Transect 2 was repeated from 2018. Transect 3 was relocated because the previous location was no longer within the correct stratum. Transect 4 were relocated to an area with more representative vegetative composition.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
2	5 m	21%	COCO	2	COCO	6	COCO	1
			ELMA	35	ELMA	35	ELMA	50
			GAUS	1	GAUS	1	GAUS	1
			LYHY	8	LYHY	2	LYHY	1
			PLCO	5	PLCO	4	PLCO	2
			POMO	1	POMO	1	POMO	1
			RUCR	1	PSCH	2	PSCH	3
			SOOL	1	SOOL	1	TH	36
			TH	26	TH	25	BG	5
			BG	20	BG	23		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
3	5 m	33%	ELMA	1	ELACa	4	BRTEt	1
			ERAR12	21	ELMA	2	ELMA	4
			JUPH	20	ERAR12	35	ERAR12	10
			LYHY	2	JUPH	1	ERCA	1
			PLCO	16	LYHY	1	JUPH	4
			TH	25	PLCO	23	PLCO	35
			BG	15	POMO	1	POMO	1
					PSCH	1	TH	30
					VIHI	1	BG	14
					TH	10		
					BG	21		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
4	**5 m**	**46%**	BRHO	1	BRMI	1	BRMI	1
			BRMI	1	HYGL	1	HYGL	1
			FEPE	1	JUPH	42	JUPH	40
			GEDI	1	LYHY	2	LYHY	1
			JUPH	60	MAGR	1	MAGR	2
			LYHY	2	PLCO	12	PLCO	8
			MAGR	6	TH	36	TH	42
			PLCO	1	BG	5	BG	5
			RUCR	1				
			TH	25				
			BG	4				
			TOTAL	**103**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 40 North 2019 Species List

Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI
Adenostoma fasciculatum	chamise	ADFA
Aira caryophyllea	silvery hair-grass	AICA
Avena barbata	slender wild oat	AVBA
Baccharis pilularis	coyote brush	BAPI
Briza minor	annual quaking grass	BRMI
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET
Bromus hordeaceus	soft chess	BRHO
Cotula coronopifolia	brass buttons	COCO
Cynosurus echinatus	bristly dogtail grass	CYEC
Deinandra corymbosa	coastal tarweed	DECO
Deschampsia danthonioides	annual hair grass	DEDA
Drymocallis glandulosa var. *wrangelliana*	sticky cinquefoil	DRGLW
Eleocharis acicularis	needle spikerush	ELAC
Eleocharis macrostachya	pale spikerush	ELMA
Elymus glaucus	blue wild-rye	ELGL
Erigeron canadensis	horseweed	ERCA
Eryngium armatum	coyote thistle	ERAR12
Festuca bromoides	brome fescue	FEBR
Festuca perennis	Italian rye grass	FEPE
Gamochaeta ustulata	purple cudweed	GAUS
Geranium dissectum	cut-leaved geranium	GEDI
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
Juncus bufonius var. *bufonius*	common toad rush	JUBUB
Juncus bufonius var. *congestus*	clustered toad rush	JUBUC2
Juncus bufonius var. *occidentalis*	round-fruited toad rush	JUBUO
Juncus capitatus	dwarf rush	JUCA
Juncus occidentalis	western rush	JUOC
Juncus phaeocephalus	brown-headed rush	JUPH
Lupinus nanus	sky lupine	LUNA
Luzula comosa	Pacific woodrush	LUCO6
Lysimachia arvensis	scarlet pimpernel	LYAR
Lysimachia minima	chaffweed	LYMI
Lythrum hyssopifolia	grass poly	LYHY
Madia elegans	common madia	MAEL
Madia gracilis	gumweed	MAGR
Madia sativa	coast tarweed	MASA
Microseris paludosa	marsh microseris	MIPA
Plagiobothrys chorisianus var. *hickmanii*	Hickman's popcornflower	PLCHH
Plantago coronopus	cut-leaved plantain	PLCO
Plantago lanceolata	English plantain	PLLA
Polypogon monspeliensis	rabbitfoot grass	POMO
Pseudognaphalium luteoalbum	weedy cudweed	PSLU
Psilocarphus chilensis	round woolly-marbles	PSCH
Ranunculus californicus	California buttercup	RACA
Rumex crispus	curly dock	RUCR
Senecio glomeratus	cutleaf burnweed	SEGL
Silene gallica	small-flower catchfly	SIGA
Sonchus oleraceus	common sow thistle	SOOL
Toxicodendron diversilobum	poison oak	TODI
Trifolium angustifolium	narrow-leaved clover	TRAN
Trifolium barbigerum	bearded clover	TRBA
Trifolium dubium	little hop clover	TRDU
Trifolium microcephalum	small head clover	TRMI
Triglochin scilloides	flowering quillwort	TRSC
Vicia hirsuta	hairy vetch	VIHI
Vicia sativa ssp. sativa	spring vetch	VISAS
Zeltnera davyi	Davy's centaury	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

Table B-15. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 40 South			
Date	5/15/2019		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at the time of the 5/15/2019 survey. Strata 1 through 3 were repeated from 2016 and 2018. Transects 1 and 2 were repeated, whereas Transect 3 was relocated to an area with more representative vegetative composition.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
1	5 m	10%	BRMI	1	BRMI	1	ELACa	5
			ELMA	55	ELACa	1	ELMA	4
			JUPH	2	ELMA	5	FEPE	1
			LYHY	1	LYHY	1	PLCHh	45
			LYMI	1	LYMI	1	PLCO	5
			PLCHh	1	PLCHh	65	TH	35
			PLCO	3	PLCO	8	BG	5
			POMO	7	POMO	5		
			TH	17	TH	10		
			BG	12	BG	5		
			TOTAL	**100**	**TOTAL**	**102**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
2	5 m	44%	ACAMa	2	ACAMa	5	ACAMa	4
			AICA	1	AICA	1	AICA	1
			BRHO	1	BRHO	1	BRHO	1
			BRMI	2	BRMI	1	BRMI	1
			ERBO	1	ERBO	1	ERBO	1
			FEBR	1	FEMY	1	FEMY	1
			GEDI	1	HYGL	20	HYGL	15
			HYGL	11	JUBUb	1	JUPH	23
			JUCA	2	JUCA	1	PLCO	32
			JUPH	40	JUPH	30	RUAC	2
			PLCO	1	PLCO	10	SIGA	1
			RUAC	1	SIGA	2	TRAN	2
			SIGA	1	VISAn	1	TRDU	3
			SOOL	1	TH	5	VISAn	2
			TRAN	1	BG	20	TH	6
			TH	3			BG	15
			BG	30				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**110**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
3	10 m	46%	BRDI	1	BRDI	1	BRDI	1	ACPA	1	BRMI	1	ACPA	2
			BRHO	1	DECO	3	BRHO	1	AVBA	1	DACA	6	AICA	1
			DECO	2	FEBR	1	BRMI	1	BRHO	1	ELMA	1	BRMI	1
			ERBO	1	FEPE	50	BRTEt	1	BRMI	1	FEBR	1	DACA	5
			FEBR	1	GEDI	5	DECO	2	BRTEt	5	FEPE	1	FEBR	1
			FEPE	40	HYGL	4	ELMA	2	DACA	20	GEDI	5	FEPE	1
			GEDI	6	LYAR	1	FEPE	33	FEBR	1	JUOC	18	GEDI	4
			HYGL	1	MAEL	6	GEDI	6	FEPE	3	MAGR	5	JUOC	17
			HYRA	1	MAGR	1	HYGL	15	GEDI	2	TRAN	7	MAEL	5
			JUBUc2	1	VISAn	12	HYRA	1	HYGL	2	TRDU	33	MAGR	7
			JUOC	1	TH	15	MAEL	5	JUOC	1	VISAn	2	PLCO	4
			LYAR	1	BG	1	MAGR	1	MAGR	20	TH	18	TAOV	2
			MAGR	15			TRDU	1	TRAN	2	BG	2	TRAN	27
			MAEX	1			VISAn	8	TRDU	25			VISAn	8
			TRDU	5			TH	20	VISAn	1			TH	12
			TRGR	1			BG	2	TH	10			BG	4
			VISAn	2					BG	4				
			TH	14										
			BG	5										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**101**

Pond 40 South 2019 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI	*Luzula comosa*	Pacific woodrush	LUCO6
Acmispon americanus var. americanus	Spanish lotus	ACAMA	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Acmispon parviflorus	hill lotus	ACPA	*Lysimachia minima*	chaffweed	LYMI
Acmispon wrangelianus	Chilean trefoil	ACWR	*Lythrum hyssopifolia*	grass poly	LYHY
Aira caryophyllea	silvery hair-grass	AICA	*Madia elegans*	common madia	MAEL
Avena barbata	slender wild oat	AVBA	*Madia exigua*	small tarweed	MAEX
Baccharis pilularis	coyote brush	BAPI	*Madia gracilis*	gumweed	MAGR
Briza minor	annual quaking grass	BRMI	*Microseris paludosa*	marsh microseris	MIPA
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Bromus diandrus	ripgut grass	BRDI	*Plantago coronopus*	cut-leaved plantain	PLCO
Bromus hordeaceus	soft chess	BRHO	*Plantago lanceolata*	English plantain	PLLA
Calochortus uniflorus	pink star-tulip	CAUN	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Castilleja densiflora ssp. *densiflora*	dense flower owl's clover	CADED	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Centaurea melitensis	Maltese star-thistle	CEME	*Ranunculus californicus*	California buttercup	RACA
Corethrogyne filaginifolia	common sandaster	COFI	*Rumex acetosella*	sheep sorrel	RUAC
Danthonia californica	California oat grass	DACA	*Rumex crispus*	curly dock	RUCR
Deinandra corymbosa	coastal tarweed	DECO	*Rumex salicifolius*	willow dock	RUSA
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Sidalcea malviflora* ssp. *malviflora*	checkerbloom	SIMAM
Eleocharis macrostachya	pale spikerush	ELMA	*Silene gallica*	small-flower catchfly	SIGA
Elymus glaucus	blue wild-rye	ELGL	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Erodium botrys	long-beaked filaree	ERBO	*Sonchus oleraceus*	common sow thistle	SOOL
Eryngium armatum	coyote thistle	ERAR12	*Stipa pulchra*	purple needle grass	STPU
Eschscholzia californica	California poppy	ESCA	*Taraxia ovata*	sun cups	TAOV
Festuca bromoides	brome fescue	FEBR	*Toxicodendron diversilobum*	poison oak	TODI
Festuca myuros	rattail sixweeks grass	FEMY	*Trifolium albopurpureum*	rancheria clover	TRAL5
Festuca perennis	Italian rye grass	FEPE	*Trifolium angustifolium*	narrow-leaved clover	TRAN
Gamochaeta ustulata	purple cudweed	GAUS	*Trifolium barbigerum*	bearded clover	TRBA
Geranium dissectum	cut-leaved geranium	GEDI	*Trifolium depauperatum*	sack clover	TRDE
Heliotropium curassavicum var. oculatum	Chinese pusley	HECUO	*Trifolium dubium*	little hop clover	TRDU
Hordeum brachyantherum	meadow barley	HOBR	*Trifolium gracilentum*	pin point clover	TRGR
Hypochaeris glabra	smooth cat's-ear	HYGL	*Trifolium microcephalum*	small head clover	TRMI
Hypochaeris radicata	rough cat's-ear	HYRA	*Trifolium variegatum*	variegated clover	TRVA
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	*Triteleia ixioides*	coast pretty face	TRIX
Juncus bufonius var. congestus	clustered toad rush	JUBUC2	*Vicia sativa*	spring vetch	VISA
Juncus capitatus	dwarf rush	JUCA	*Vicia sativa ssp. nigra*	common vetch	VISAN
Juncus occidentalis	western rush	JUOC	**Groundcover Codes**		
Juncus phaeocephalus	brown-headed rush	JUPH	BG	Bare Ground	
Logfia gallica	narrowleaf cottonrose	LOGA	TH	Thatch/Duff	
Lupinus nanus	sky lupine	LUNA	AL	Algae	

Table B-16. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 43			
Date	5/13/2019, 5/14/2019		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at the time of the 5/14/2019 survey. All three strata were repeated from 2016 and 2018. Transects 1 and 3 were repeated. Transect 2 was extended from 5 m to 10 m and was relocated to an area with more representative vegetative composition.			

Transect #	**Transect Length**	**Relative % Cover of Wetland**	**Quadrat #1**		**Quadrat #2**		**Quadrat #3**		**Quadrat #4**		**Quadrat #5**		**Quadrat #6**	
			Species	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**
1	**10 m**	**19%**	BRMI	1	CIQU	1	CIQU	1	CIQU	1	CIQU	1	CIQU	1
			BRTEt	1	CRAQ	3	CRAQ	1	CRAQ	1	CRAQ	1	CRAQ	1
			CIQU	1	DEDA	5	DEDA	1	DEDA	1	DEDA	1	DEDA	1
			DECO	4	ELACa	5	ELACa	2	ELACa	2	ELACa	4	ELACa	2
			DEDA	15	ERAR12	3	ERAR12	10	ERAR12	7	ERAR12	8	ERAR12	5
			ERAR12	1	JUPH	8	JUPH	5	JUPH	1	JUBUb	1	JUPH	4
			JUBUb	1	LYHY	1	LYHY	1	LYHY	1	JUPH	3	LYMI	1
			JUCA	1	LYMI	1	PLCHh	30	LYMI	1	LYMI	1	PLCHh	4
			JUPH	4	PLCHh	30	POMO	8	PLCHh	12	PLCHh	9	POMO	15
			LYAR	1	POMO	10	POZI	17	POMO	27	POMO	10	POZI	6
			LYHY	1	POZI	6	PSCH	2	POZI	5	POZI	6	PSCH	2
			LYMI	2	PSCH	1	TH	4	PSCH	1	TH	40	TH	28
			Madia sp.	1	TH	6	BG	18	TH	40	BG	15	BG	28
			PLCHh	20	BG	20			BG	20				
			POMO	20										
			POZI	1										
			SOAS	1										
			TAOV	1										
			TH	3										
			BG	20										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**120**	**TOTAL**	**100**	**TOTAL**	**98**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	10 m	67%	BRMI	1	BRTEt	1	BRTEt	11	BRTEt	1	BRTEt	2	AICA	1
			BRTEt	10	CIQU	1	CIQU	1	CIQU	1	CIQU	1	BRHO	7
			CIQU	1	DEDA	5	DACA	1	CRAQ	1	ELACa	1	BRMI	1
			DACA	2	ELACa	1	DECO	1	DEDA	1	ERAR12	3	FEBR	1
			DEDA	3	ERAR12	25	DEDA	2	ERAR12	12	ISHO	1	NAME	1
			ELACa	1	ISHO	6	ELACa	11	JUCA	1	JUPH	45	PLCHh	1
			ERAR12	7	JUCA	1	ERAR12	5	JUPH	55	LYHY	2	POMO	5
			JUCA	1	JUOC	1	ISHO	2	LYHY	3	LYMI	1	TRMI	1
			JUPH	8	JUPH	13	JUCA	1	LYMI	1	PLCHh	1	TH	81
			LYHY	1	LYHY	1	JUPH	22	PLCHh	6	POMO	25	BG	1
			LYMI	3	LYMI	4	LYHY	3	POMO	1	POZI	1		
			PLCHh	5	PLCHh	1	LYMI	3	POZI	1	PSCH	2		
			POMO	20	POMO	15	POMO	14	PSCH	2	TH	9		
			POZI	1	POZI	1	POZI	2	TH	3	BG	6		
			PSCH	5	PSCH	4	PSCH	3	BG	13				
			TH	11	TH	10	TRSC	1						
			BG	20	BG	10	TH	11						
							BG	6						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**102**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
3	5 m	14%	ACAMa	2	ACAMa	8	ACAMa	1
			BRHO	1	AICA	1	AGLAV	1
			BRMI	1	BRHO	1	AICA	1
			BRTEt	1	BRMI	1	BRHO	1
			DACA	28	DACA	18	BRMI	1
			DECO	3	FEBR	1	CIQU	1
			ERAR12	1	GEDI	1	DACA	2
			FEBR	1	HYGL	1	DECO	1
			GAUS	1	ISCA	1	DEDA	1
			GEDI	1	JUBUb	1	ERAR12	7
			HYGL	1	JUCA	2	FEBR	2
			ISCA	1	JUPH	2	GEDI	1
			JUBUb	1	LYHY	1	HYGL	1
			JUCA	1	LYMI	1	JUBUb	1
			JUPH	3	MAGR	1	JUCA	1
			LUCO6	1	PLCO	1	JUPH	1
			LYAR	1	POMO	1	LOFI	1
			LYMI	1	PSCH	1	LYMI	1
			MAGR	4	TRDU	20	PLCHh	2
			POMO	1	TRPU	2	PLER	1
			SOAS	1	TH	8	PSCH	1
			TAOV	2	BG	25	TAOV	1
			TRDU	1			TRDU	1
			TRPU	1			TROB	3
			TH	5			ZEDA	1
			BG	35			TH	20
							BG	44
			TOTAL	**100**	**TOTAL**	**99**	**TOTAL**	**100**

Pond 43 2019 Species List

Species Name	Common Name	Species Code
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA
Acmispon strigosus	strigose lotus	ACST
Adenostoma fasciculatum	chamise	ADFA
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV
Agrostis exarata	spike bent grass	AGEX
Agrostis microphylla	small-leaf bent grass	AGMI3
Aira caryophyllea	silvery hair-grass	AICA
Arctostaphylos pumila	sandmat manzanita	ARPU
Arctostaphylos tomentosa	woolly leaf manzanita	ARTO
Baccharis pilularis	coyote brush	BAPI
Briza minor	annual quaking grass	BRMI
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET
Bromus diandrus	ripgut grass	BRDI
Bromus hordeaceus	soft chess	BRHO
Calandrinia breweri	Brewer's redmaids	CABR
Castilleja attenuata	valley tassels	CAAT
Ceanothus dentatus	dwarf ceanothus	CEDE
Ceanothus rigidus	Monterey ceanothus	CERI
Chlorogalum pomeridianum	wavyleaf soap plant	CHPO
Cicendia quadrangularis	timwort	CIQU
Clarkia sp.		
Crassula aquatica	aquatic pygmy-weed	CRAQ
Crassula connata	pygmy-weed	CRCO
Crassula tillaea	moss pygmy-weed	CRTI
Crocanthemum scoparium	peak rush-rose	CRSC
Danthonia californica	California oat grass	DACA
Daucus pusillus	rattlesnake weed	DAPU
Deinandra corymbosa	coastal tarweed	DECO
Deschampsia danthonioides	annual hair grass	DEDA
Diplacus aurantiacus	sticky monkey flower	DIAU
Eleocharis acicularis var. acicularis	needle spikerush	ELACa
Elymus glaucus	blue wild-rye	ELGL
Erigeron canadensis	horseweed	ERCA
Eriophyllum confertiflorum	golden yarrow	ERCO
Eryngium armatum	coyote thistle	ERAR12
Festuca bromoides	brome fescue	FEBR
Festuca myuros	rattail sixweeks grass	FEMY
Festuca octoflora	sixweeks grass	FEOC
Gamochaeta ustulata	purple cudweed	GAUS
Garrya elliptica	coast silk tassel	GAEL
Geranium dissectum	cut-leaved geranium	GEDI
Heteromeles arbutifolia	toyon	HEAR
Horkelia cuneata	wedge-leaved horkelia	HOCU
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
Isoetes howellii	Howell's quillwort	ISHO
Isolepis carinata	keeled bulrush	ISCA
Isolepis cernua	low bulrush	ISCE
Juncus bufonius var. *bufonius*	common toad rush	JUBUB
Juncus bufonius var. congestus	clustered toad rush	JUBUC2
Juncus capitatus	dwarf rush	JUCA
Juncus occidentalis	western rush	JUOC
Juncus phaeocephalus	brown-headed rush	JUPH
Lasthenia glaberrima	smooth goldfields	LAGL3
Lepechinia calycina	pitcher sage	LECA
Logfia filaginoides	California cottonrose	LOFI
Logfia gallica	narrowleaf cottonrose	LOGA
Luzula comosa	Pacific woodrush	LUCO6
Lysimachia arvensis	scarlet pimpernel	LYAR
Lysimachia minima	chaffweed	LYMI
Lythrum hyssopifolia	grass poly	LYHY
Madia exigua	small tarweed	MAEX
Madia gracilis	gumweed	MAGR
Madia sativa	coast tarweed	MASA
Microseris paludosa	marsh microseris	MIPA
Navarretia hamata ssp. *parviloba*	hooked navarretia	NAHAP
Navarretia mellita	skunk navarretia	NAME
Nuttallanthus texanus	blue toadflax	NUTE
Plagiobothrys chorisianus var. *hickmanii*	Hickman's popcornflower	PLCHH
Plantago coronopus	cut-leaved plantain	PLCO
Plantago erecta	California plantain	PLER
Pogogyne zizyphoroides	Sacramento mesa mint	POZI
Polygala californica	California milkwort	POCA5
Polypogon monspeliensis	rabbitfoot grass	POMO
Primula clevelandii	Padre's shooting star	PRCL
Pseudognaphalium luteoalbum	weedy cudweed	PSLU
Pseudognaphalium ramosissimum	pink everlasting	PSRA
Pseudognaphalium stramineum	cottonbatting plant	PSST
Psilocarphus chilensis	round woolly-marbles	PSCH
Quercus agrifolia	coast live oak	QUAG
Ribes malvaceum	chaparral currant	RIMA
Salix sp.		
Scutellaria tuberosa	Danny's skullcap	SCTU2
Senecio glomeratus	cutleaf burnweed	SEGL
Senecio vulgaris	common groundsel	SEVU
Silene gallica	small-flower catchfly	SIGA
Sisyrinchium bellum	western blue-eyed grass	SIBE
Soliva sessilis	South American soliva	SOSE
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Spergularia rubra	red sand-spurrey	SPRU
Taraxia ovata	sun cups	TAOV
Toxicodendron diversilobum	poison oak	TODI
Tribolium obliterum	capetown grass	TROB
Trifolium barbigerum	bearded clover	TRBA
Trifolium dubium	little hop clover	TRDU
Trifolium gracilentum	pin point clover	TRGR
Trifolium microcephalum	small head clover	TRMI
Trifolium variegatum	variegated clover	TRVA
Trifolium willdenovii	tomcat clover	TRWI
Triglochin scilloides	flowering quillwort	TRSC
Triphysaria pusilla	little owl's clover	TRPU
Zeltnera davyi	Davy's centaury	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

Table B-17. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 35			
Date	5/8/2019		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at the time of the 5/8/2019 survey. Strata 1 through 3 were repeated from 2016 and 2018. Stratum 4 was repeated from 2018. Transects 1 and 2 were repeated from 2016 and 2018, while Transect 3 was relocated and shortened to 5 m to remain within the associated stratum. Transect 4 was repeated from 2018.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
			CRAQ	1	COCO	1	COCO	1	COCO	3	COCO	5	COCO	4
			DEDA	1	CRAQ	1	ELMA	1	CRAQ	1	ELMA	1	ELMA	1
			LYHY	2	ELMA	1	LYHY	3	ELMA	1	LYHY	2	LYHY	8
			PLCHh	60	LYHY	5	PLCHh	69	LYHY	3	PLCHh	85	PLCHh	85
			PLCO	14	PLCHh	75	PLCO	15	PLCHh	85	PLCO	1	PLCO	5
1	**10 m**	**13%**	PSCH	8	PLCO	2	PSCH	5	PLCO	4	PSCH	3	PSCH	2
			TRSC	1	PSCH	4	TH	1	PSCH	7	TH	1	TH	1
			TH	3	TRSC	1	BG	5	TH	1	BG	6	BG	3
			BG	10	TH	1			BG	2				
					BG	9								
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**107**	**TOTAL**	**104**	**TOTAL**	**109**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
			DEDA	1	PLCO	25	DEDA	1	BRTEt	3	LYHY	1	LYHY	1
			LYHY	1	DEDA	1	ELMA	1	ELMA	1	PLCO	25	PLCHh	1
			PLCO	10	LYHY	1	LYHY	1	FEPE	1	PSCH	4	PLCO	20
			PSCH	3	PLCHh	1	PLCO	35	LYHY	1	TH	35	PSCH	2
2	**10 m**	**29%**	TH	30	PSCH	2	PSCH	3	PLCO	36	BG	35	TH	25
			BG	55	TH	55	TH	35	PSCH	4			BG	51
					BG	15	BG	24	TH	28				
									BG	26				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
3	5 m	5%	HOBR	30	FEPE	2	FEPE	4
			PLCHh	1	HOBR	40	HOBR	46
			PLCO	7	LYHY	1	PLCO	15
			PSCH	1	PLCHh	2	PSCH	4
			TH	59	PLCO	4	TH	30
			BG	2	PSCH	2	BG	1
					RUAC	1		
					TH	47		
					BG	1		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
4	10 m	53%	AVBA	1	AICA	1	AICA	1	ACPA	1	BRHO	1	BRHO	1
			BRHO	1	BRHO	1	BRHO	1	BRTEt	1	FEPE	64	DEDA	4
			BRTEt	1	BRMI	1	BRMI	1	ERBO	1	GEDI	2	FEPE	37
			ERBO	5	BRTEt	1	BRTEt	1	FEPE	35	TRAN	1	GEDI	4
			FEBR	1	DACA	2	DACA	5	GEDI	2	TH	30	HOBR	1
			FEPE	1	ERBO	20	ERBO	15	LYHY	1	BG	2	PLCO	3
			HYGL	1	FEBR	1	FEPE	4	PLCO	35			RUCR	2
			TRAN	8	FEPE	3	PLCO	3	PSCH	1			TRAN	1
			TH	51	HYGL	1	TRAN	50	RUAC	1			TH	46
			BG	30	TRAN	30	TH	10	TRAN	2			BG	1
					TH	25	BG	9	TH	18				
					BG	14			BG	2				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 35 2019 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI	*Juncus occidentalis*	western rush	JUOC
Acmispon parviflorus	hill lotus	ACPA	*Juncus phaeocephalus*	brown-headed rush	JUPH
Acmispon wrangelianus	Chilean trefoil	ACWR	*Lasthenia glaberrima*	smooth goldfields	LAGL3
Aira caryophyllea	silvery hair-grass	AICA	*Leptosiphon parviflorus*	variable linanthus	LEPA
Arctostaphylos pumila	sandmat manzanita	ARPU	*Lupinus bicolor*	miniature lupine	LUBI
Avena barbata	slender wild oat	AVBA	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Baccharis pilularis	coyote brush	BAPI	*Lysimachia minima*	chaffweed	LYMI
Briza minor	annual quaking grass	BRMI	*Lythrum hyssopifolia*	grass poly	LYHY
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Madia exigua*	small tarweed	MAEX
Bromus diandrus	ripgut grass	BRDI	*Madia gracilis*	gumweed	MAGR
Bromus hordeaceus	soft chess	BRHO	*Medicago polymorpha*	California burclover	MEPO
Callitriche heterophylla	water starwort	CAHE	*Navarretia squarrosa*	skunkweed	NASQ
Cardionema ramosissimum	sand mat	CARA	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
Castilleja densiflora ssp. *densiflora*	dense flower owl's clover	CADED	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Centaurea melitensis	Maltese star-thistle	CEME	*Plantago coronopus*	cut-leaved plantain	PLCO
Cerastium glomeratum	sticky mouse-ear chickweed	CEGL	*Plantago lanceolata*	English plantain	PLLA
Cicendia quadrangularis	timwort	CIQU	*Pogogyne zizyphoroides*	Sacramento mesa mint	POZI
Cotula coronopifolia	brass buttons	COCO	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Cyperus eragrostis	tall cyperus	CYER	*Quercus agrifolia*	coast live oak	QUAG
Danthonia californica	California oat grass	DACA	*Rumex acetosella*	sheep sorrel	RUAC
Deinandra corymbosa	coastal tarweed	DECO	*Rumex crispus*	curly dock	RUCR
Deschampsia danthonioides	annual hair grass	DEDA	*Senecio glomeratus*	cutleaf burnweed	SEGL
Eleocharis macrostachya	pale spikerush	ELMA	*Silene gallica*	small-flower catchfly	SIGA
Elymus glaucus	blue wild-rye	ELGL	*Sonchus asper*	prickly sow thistle	SOAS
Elymus triticoides	beardless wild rye	ELTR3	*Spergularia rubra*	red sand-spurrey	SPRU
Erodium botrys	long-beaked filaree	ERBO	*Stachys ajugoides*	bugle hedge nettle	STAJ
Eryngium armatum	coyote thistle	ERAR12	*Taraxia ovata*	sun cups	TAOV
Eschscholzia californica	California poppy	ESCA	*Trifolium angustifolium*	narrow-leaved clover	TRAN
Festuca bromoides	brome fescue	FEBR	*Trifolium barbigerum*	bearded clover	TRBA
Festuca perennis	Italian rye grass	FEPE	*Trifolium depauperatum*	sack clover	TRDE
Gamochaeta ustulata	purple cudweed	GAUS	*Trifolium dubium*	little hop clover	TRDU
Geranium dissectum	cut-leaved geranium	GEDI	*Trifolium gracilentum*	pin point clover	TRGR
Geranium sp.			*Trifolium variegatum*	variegated clover	TRVA
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO	*Triglochin scilloides*	flowering quillwort	TRSC
Heterotheca grandiflora	telegraph weed	HEGR	*Vicia hirsuta*	hairy vetch	VIHI
Hordeum brachyantherum	meadow barley	HOBR	*Vicia sativa* ssp. *nigra*	common vetch	VISAN
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	HOMAG	**Groundcover Codes**		
Hypochaeris glabra	smooth cat's-ear	HYGL	BG	Bare Ground	
Isoetes howellii	Howell's quillwort	ISHO	TH	Thatch/Duff	
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	AL	Algae	
Juncus capitatus	dwarf rush	JUCA			

Table B-18. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 42			
Date	7/16/2019		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at time of the 7/16/2019 survey. Strata 1 through 4 were repeated from 2017 and 2018. Stratum 5 was new in 2019. Transect 1 was relocated to an area with more representative vegetative composition. Transect 2 was repeated from 2017, whereas Transects 3 and 4 was repeated from 2017 and 2018. Transect 5 was established in 2019. An upland stratum was mapped and occupied 18% relative cover of wetland but was not included in the cover data.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
1	**5 m**	**3%**	ELACa	60	ELACa	51	ELACa	65
			ERAR12	12	ERAR12	1	ERAR12	1
			JUPH	5	JUPH	6	JUPH	10
			LAGL3	2	LAGL3	3	LAGL3	2
			PLCHh	1	PLCHh	1	PLCHh	2
			TH	20	POMO	1	POMO	1
			BG	0	TH	35	TH	19
					BG	2	BG	0
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
2	**5 m**	**3%**	COCO	1	COCO	3	COCO	5
			ELMA	45	ELMA	50	ELACa	15
			POMO	30	LAGL3	1	ELMA	35
			TH	23	PLCHh	2	ERAR12	2
			BG	1	POMO	20	JUPH	2
					PSCH	2	LAGL3	15
					TH	21	LYHY	1
					BG	1	POMO	1
							TH	22
							BG	2
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
3	10 m	44%	BRTEt	1	DEDA	2	DEDA	1	DEDA	1	BRTEt	1	DEDA	1
			ELACa	40	ELACa	21	ELACa	15	ELACa	25	DEDA	1	ELACa	36
			ERAR12	25	ERAR12	46	ERAR12	25	ERAR12	40	ELACa	10	ERAR12	18
			JUPH	3	JUPH	1	JUPH	20	JUPH	8	ERAR12	20	JUPH	15
			LAGL3	8	LAGL3	3	LAGL3	1	PLCHh	1	JUPH	29	LAGL3	4
			PLCHh	1	LYHY	1	LYHY	1	POMO	2	LYHY	1	LYHY	1
			POMO	1	PLCHh	1	PLCHh	1	TH	17	POMO	1	PLCHh	1
			TH	17	POMO	1	POMO	1	BG	6	TH	29	TH	22
			BG	4	TH	16	TH	15			BG	8	BG	2
					BG	8	BG	20						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
4	5 m	14%	AICA	1	AICA	1	AICA	1
			BRMI	1	AVBA	1	BRMI	1
			DACA	40	BRMI	1	DACA	2
			DECO	12	DACA	15	DECO	30
			FEMY	1	DECO	8	FEMY	1
			GAPH	1	FEMY	1	GAPH	2
			JUBUb	10	GAPH	2	JUBUb	10
			JUCA	2	JUBUb	3	JUBUc2	1
			LYAR	1	JUCA	1	JUCA	2
			LYHY	1	LOFI	1	LOFI	1
			TH	5	LYAR	2	LYAR	4
			BG	25	LYHY	1	LYHY	1
					PLER	1	ZEDA	1
					PSCH	1	TH	40
					TRDU	1	BG	3
					ZEDA	1		
					TH	14		
					BG	45		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
5	5 m	18%	COCO	10	COCO	25	COCO	65
			POMO	35	POMO	50	POMO	20
			TH	50	TH	20	TH	12
			BG	5	BG	5	BG	3
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 42 2019 Species List

Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI
Adenostoma fasciculatum	chamise	ADFA
Agrostis avenacea	Pacific bent grass	AGAV
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV
Agrostis pallens	seashore bent grass	AGPA
Aira caryophyllea	silvery hair-grass	AICA
Arctostaphylos hookeri	Hooker's manzanita	ARHO
Arctostaphylos pumila	sandmat manzanita	ARPU
Avena barbata	slender wild oat	AVBA
Baccharis pilularis	coyote brush	BAPI
Briza maxima	rattlesnake grass	BRMA
Briza minor	annual quaking grass	BRMI
Brodiaea terrestris ssp. terrestris	dwarf brodiaea	BRTET
Castilleja ambigua ssp. ambigua	Johnny-Nip	CAAMA3
Ceanothus thyrsiflorus var. griseus	Carmel ceanothus	CETHG
Centaurea melitensis	Maltese star-thistle	CEME
Chlorogalum pomeridianum	wavyleaf soap plant	CHPO
Cirsium brevistylum	Indian thistle	CIBR
Cotula coronopifolia	brass buttons	COCO
Danthonia californica	California oat grass	DACA
Deinandra corymbosa	coastal tarweed	DECO
Deschampsia danthonioides	annual hair grass	DEDA
Diplacus aurantiacus	sticky monkey flower	DIAU
Elatine californica	California waterwort	ELCA
Eleocharis acicularis var. acicularis	needle spikerush	ELACa
Eleocharis macrostachya	pale spikerush	ELMA
Elymus glaucus	blue wild-rye	ELGL
Erigeron canadensis	horseweed	ERCA
Eryngium armatum	coyote thistle	ERAR12
Festuca myuros	rattail sixweeks grass	FEMY
Gamochaeta ustulata	purple cudweed	GAUS
Gastridium phleoides	nit grass	GAPH
Geranium dissectum	cut-leaved geranium	GEDI
Heterocodon rariflorum	western pearlflower	HERA
Horkelia cuneata var. cuneata	wedge-leaved horkelia	HOCUC
Hypochaeris glabra	smooth cat's-ear	HYGL
Iris douglasiana	Douglas iris	IRDO
Juncus bufonius var. bufonius	common toad rush	JUBUB
Juncus bufonius var. congestus	clustered toad rush	JUBUC2
Juncus capitatus	dwarf rush	JUCA
Juncus occidentalis	western rush	JUOC
Juncus phaeocephalus	brown-headed rush	JUPH
Lasthenia glaberrima	smooth goldfields	LAGL3
Logfia filaginoides	California cottonrose	LOFI
Lysimachia arvensis	scarlet pimpernel	LYAR
Lysimachia minima	chaffweed	LYMI
Lythrum hyssopifolia	grass poly	LYHY
Madia sativa	coast tarweed	MASA
Microseris paludosa	marsh microseris	MIPA
Perideridia kelloggii	Kellogg's yampah	PEKE
Phalaris lemmonii	Lemmon's canary grass	PHLE
Plagiobothrys chorisianus var. hickmanii	Hickman's popcornflower	PLCHH
Plantago coronopus	cut-leaved plantain	PLCO
Plantago erecta	California plantain	PLER
Poa secunda	Nevada blue grass	POSE
Polypogon monspeliensis	rabbitfoot grass	POMO
Primula sp.		
Pseudognaphalium luteoalbum	weedy cudweed	PSLU
Psilocarphus chilensis	round woolly-marbles	PSCH
Quercus agrifolia	coast live oak	QUAG
Rubus ursinus	California blackberry	RUUR
Rumex salicifolius	willow dock	RUSA
Salix sp.		
Senecio glomeratus	cutleaf burnweed	SEGL
Senecio sylvaticus	woodland ragwort	SESY
Sisyrinchium bellum	western blue-eyed grass	SIBE
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Spiranthes romanzoffiana	hooded lady's tresses	SPRO
Stachys ajugoides	bugle hedge nettle	STAJ
Toxicodendron diversilobum	poison oak	TODI
Trifolium angustifolium	narrow-leaved clover	TRAN
Trifolium dubium	little hop clover	TRDU
Trifolium microcephalum	small head clover	TRMI
Trifolium microdon	thimble clover	TRMI5
Triglochin scilloides	flowering quillwort	TRSC
Zeltnera davyi	Davy's centaury	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

Table B-19. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 44			
Date	5/14/2019		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at the time of the 5/14/2019 survey. Strata 1 and 3 were repeated from 2016 and 2018, whereas stratum 4 was repeated from 2018. Transects 1 was repeated from 2018, Transect 3 was repeated from 2016 and 2018, whereas Transect 4 was relocated to an area with more representative vegetative composition. Pig rooting was also observed within Stratum 1 at Pond 44. The area was mapped and photo documented. An upland stratum was mapped and occupied 14% relative cover of wetland but was not included in the cover data.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
1	5 m	52%	AGLAV	1	AGLAV	1	AGLAV	4
			BRMI	1	BRMI	1	BRTEt	1
			BRTEt	5	BRTEt	2	CRAQ	1
			CIQU	1	CIQU	1	DEDA	1
			ELACa	20	DEDA	1	ELACa	10
			ERAR12	40	ELACa	20	ERAR12	15
			GEDI	1	ERAR12	15	ISHO	2
			ISHO	5	HECUo	1	JUBUb	1
			JUCA	1	ISHO	5	LYHY	2
			LAGL3	3	JUCA	1	LYMI	3
			LYHY	1	LAGL3	1	PLCHh	10
			LYMI	1	LYHY	4	PLER	1
			PLCHh	3	LYMI	2	POMO	8
			POMO	1	PLCHh	4	POZI	1
			POZI	1	POMO	1	PSCH	3
			PSCH	1	POZI	1	TRDU	2
			TRDU	1	PSCH	2	TH	5
			TH	10	TRDU	6	BG	30
			BG	3	TRVA	4		
					TH	12		
					BG	15		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
3	5 m	27%	ACPA	1	ACPA	1	ACPA	1
			AICA	1	AICA	1	AICA	1
			BRMA	1	BAPI	2	BRMI	1
			BRTEt	1	BRMA	1	DACA	20
			DACA	35	BRMI	1	DECO	1
			DECO	1	BRTEt	1	ELACa	1
			ERAR12	2	DACA	12	ERBO	1
			ERBO	1	DECO	1	GEDI	1
			HYGL	1	ERAR12	4	HYGL	1
			JUBUb	1	ERBO	1	JUBUb	2
			LYAR	4	FEBR	1	JUCA	1
			LYMI	1	HYGL	1	LOFI	1
			MAGR	8	JUBUb	1	LYAR	3
			PLCO	2	JUCA	1	LYHY	2
			TRDU	6	JUOC	1	LYMI	1
			TRPU	2	LUCO6	1	MAGR	3
			TH	5	LYAR	3	PLCO	10
			BG	26	LYMI	1	SIGA	1
					MAGR	7	TAOV	1
					PLCO	3	TRDU	8
					SOOL	1	TRPU	1
					TAOV	1	TH	8
					TRDU	7	BG	30
					TRPU	1		
					TH	8		
					BG	37		
			TOTAL	**99**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
4	5 m	7%	BRMI	1	BRMI	1	BRMI	1
			BRTEt	10	BRTEt	5	BRTEt	11
			ELACa	3	CIQU	1	ELACa	2
			ERAR12	6	ELACa	4	ERAR12	20
			GEDI	1	ERAR12	5	GEDI	1
			HYGL	1	GEDI	2	HYGL	1
			JUCA	1	HYGL	1	ISHO	1
			JUPH	45	JUCA	1	JUBUb	1
			PLCHh	1	JUPH	20	JUCA	1
			PLCO	1	LAGL3	1	JUPH	15
			POMO	1	LYHY	5	LYHY	3
			POZI	1	LYMI	1	LYMI	1
			PSCH	1	PLCHh	1	*Madia* sp.	1
			TRDU	2	POMO	1	PLCHh	1
			TH	10	POZI	1	PLCO	1
			BG	15	PSCH	5	POMO	2
					TRDU	1	PSCH	1
					TH	19	TRDU	4
					BG	25	TH	17
							BG	15
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 44 2019 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Acmispon parviflorus	hill lotus	ACPA	*Logfia filaginoides*	California cottonrose	LOFI
Adenostoma fasciculatum	chamise	ADFA	*Lupinus concinnus*	bajada lupine	LUCO
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV	*Luzula comosa*	Pacific woodrush	LUCO6
Aira caryophyllea	silvery hair-grass	AICA	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Arctostaphylos hookeri	Hooker's manzanita	ARHO	*Lysimachia minima*	chaffweed	LYMI
Arctostaphylos sp.			*Lythrum hyssopifolia*	grass poly	LYHY
Avena barbata	slender wild oat	AVBA	*Madia exigua*	small tarweed	MAEX
Baccharis pilularis	coyote brush	BAPI	*Madia gracilis*	gumweed	MAGR
Briza maxima	rattlesnake grass	BRMA	*Madia sativa*	coast tarweed	MASA
Briza minor	annual quaking grass	BRMI	*Microseris paludosa*	marsh microseris	MIPA
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Bromus diandrus	ripgut grass	BRDI	*Plantago coronopus*	cut-leaved plantain	PLCO
Bromus hordeaceus	soft chess	BRHO	*Plantago erecta*	California plantain	PLER
Castilleja attenuata	valley tassels	CAAT	*Pogogyne zizyphoroides*	Sacramento mesa mint	POZI
Chlorogalum pomeridianum	wavyleaf soap plant	CHPO	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Cicendia quadrangularis	timwort	CIQU	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Crassula tillaea	moss pygmy-weed	CRTI	*Quercus agrifolia*	coast live oak	QUAG
Crocanthemum scoparium	peak rush-rose	CRSC	*Ribes malvaceum*	chaparral currant	RIMA
Danthonia californica	California oat grass	DACA	*Rumex acetosella*	sheep sorrel	RUAC
Deinandra corymbosa	coastal tarweed	DECO	*Silene gallica*	small-flower catchfly	SIGA
Deschampsia danthonioides	annual hair grass	DEDA	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Sonchus oleraceus*	common sow thistle	SOOL
Erodium botrys	long-beaked filaree	ERBO	*Taraxia ovata*	sun cups	TAOV
Eryngium armatum	coyote thistle	ERAR12	*Toxicodendron diversilobum*	poison oak	TODI
Festuca bromoides	brome fescue	FEBR	*Trifolium angustifolium*	narrow-leaved clover	TRAN
Galium porrigens	climbing bedstraw	GAPO	*Trifolium barbigerum*	bearded clover	TRBA
Gamochaeta ustulata	purple cudweed	GAUS	*Trifolium campestre*	hop clover	TRCA5
Geranium dissectum	cut-leaved geranium	GEDI	*Trifolium dubium*	little hop clover	TRDU
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO	*Trifolium gracilentum*	pin point clover	TRGR
Horkelia cuneata	wedge-leaved horkelia	HOCU	*Trifolium microcephalum*	small head clover	TRMI
Hypochaeris glabra	smooth cat's-ear	HYGL	*Trifolium variegatum*	variegated clover	TRVA
Hypochaeris radicata	rough cat's-ear	HYRA	*Trifolium willdenovii*	tomcat clover	TRWI
Isoetes howellii	Howell's quillwort	ISHO	*Triphysaria pusilla*	little owl's clover	TRPU
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	*Zeltnera davyi*	Davy's centaury	ZEDA
Juncus capitatus	dwarf rush	JUCA	**Groundcover Codes**		
Juncus occidentalis	western rush	JUOC	BG	Bare Ground	
Juncus phaeocephalus	brown-headed rush	JUPH	TH	Thatch/Duff	
Lasthenia glaberrima	smooth goldfields	LAGL3	AL	Algae	

Table B-20. Pond 56 (Year 2 Post-Mastication) Wetland Vegetation Transect Data by Stratum

POND 56			
Date	7/10/2019, 8/15/2019, 9/9/2019		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke, Rachel Spellenberg		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation	90	ELMA	
Floating Vegetation	2	PEAM	
Submerged Vegetation			
Open Water	8		
Notes			
Pond was inundated 20 cm at the staff gauge at the time of the 9/9/2019. Inundated area 5% of basin boundary. Strata 2 through 5 were repeated from 2015 and 2016. Transects 3 and 4 were repeated from 2016, whereas Transects 2 and 5 were relocated to an area with more representative vegetative composition. An upland stratum was mapped and occupied 4% relative cover of wetland but was not included in the cover data.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	**10 m**	**19%**	ELMA	30	ELMA	45	ELMA	50	ELMA	55	ELMA	50	ELMA	60
			TH	40	TH	35	TH	35	TH	25	TH	35	TH	25
			BG	30	BG	20	BG	15	BG	20	BG	15	BG	15
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
3	**10 m**	**31%**	DISP	27	DISP	30	DISP	25	DISP	30	DISP	35	DISP	30
			ELACa	2	ELACa	1	ELACa	2	ELMA	45	ELMA	30	ELACa	1
			ELMA	35	ELMA	44	ELMA	53	RUCR	1	JUPH	5	ELMA	40
			RUCR	1	JUPH	2	TH	20	TH	20	TH	30	JUPH	2
			TH	25	RUCR	1	BG	0	BG	4	BG	0	TH	25
			BG	10	TH	20							BG	2
					BG	2								
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
4	**10 m**	**41%**	DISP	3	ELACa	1	DISP	10	DISP	4	DISP	8	DISP	5
			JUPH	76	ELMA	1	ELACa	1	ELACa	1	ELACa	1	ELACa	1
			PHLE	1	ISHO	2	ISHO	8	ISHO	1	ELMA	1	ISHO	2
			TH	20	JUPH	48	JUPH	44	JUPH	41	ERAR12	10	JUPH	45
			BG	0	STAJ	3	PHLE	1	LYHY	1	ISHO	1	POMO	1
					TH	45	POMO	1	PHLE	1	JUPH	26	TH	46
					BG	0	TH	35	POMO	9	POMO	2	BG	0
							BG	0	TH	42	STAJ	1		
									BG	0	TH	50		
											BG	0		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
5	**10 m**	**0.3%**	AGAV	4	AGAV	5	AGAV	2	AGAV	10	AGAV	15	AGAV	12
			ERAR12	2	ELACa	1	BRTEt	1	ELACa	25	BRTEt	1	ELACa	20
			JUPH	25	ISHO	1	ELACa	2	JUPH	20	ELACa	32	JUPH	20
			LYHY	2	JUPH	44	ERAR12	4	LYHY	2	ISHO	2	LYHY	2
			MALE	10	LYHY	1	JUPH	37	LYMI	1	JUPH	10	MALE	1
			POMO	2	MALE	4	LYHY	1	MALE	3	LYHY	3	POMO	1
			TH	30	POMO	1	MALE	9	POMO	2	LYMI	1	TH	40
			BG	25	TH	33	POMO	1	TH	37	MALE	5	BG	4
					BG	10	TH	37	BG	0	POMO	2		
							BG	6			TH	25		
											BG	4		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 56 2019 Species List

Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI
Acmispon americanus var. americanus	Spanish lotus	ACAMA
Agrostis avenacea	Pacific bent grass	AGAV
Aira caryophyllea	silvery hair-grass	AICA
Baccharis pilularis	coyote brush	BAPI
Briza maxima	rattlesnake grass	BRMA
Briza minor	annual quaking grass	BRMI
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET
Bromus hordeaceus	soft chess	BRHO
Castilleja ambigua	Johnny-Nip	CAAM
Cotula coronopifolia	brass buttons	COCO
Danthonia californica	California oat grass	DACA
Daucus pusillus	rattlesnake weed	DAPU
Deinandra corymbosa	coastal tarweed	DECO
Deschampsia danthonioides	annual hair grass	DEDA
Diplacus aurantiacus	sticky monkey flower	DIAU
Distichlis spicata	salt grass	DISP
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa
Eleocharis macrostachya	pale spikerush	ELMA
Elymus glaucus	blue wild-rye	ELGL
Elymus triticoides	beardless wild rye	ELTR3
Erigeron canadensis	horseweed	ERCA
Erodium botrys	long-beaked filaree	ERBO
Eryngium armatum	coyote thistle	ERAR12
Euthamia occidentalis	western goldenrod	EUOC
Festuca perennis	Italian rye grass	FEPE
Gamochaeta ustulata	purple cudweed	GAUS
Gastridium phleoides	nit grass	GAPH
Geranium dissectum	cut-leaved geranium	GEDI
Heterocodon rariflorum	western pearlflower	HERA
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
Isoetes howellii	Howell's quillwort	ISHO
Juncus balticus	Baltic rush	JUBA
Juncus bufonius var. *bufonius*	common toad rush	JUBUB
Juncus bufonius var. *congestus*	clustered toad rush	JUBUC2
Juncus capitatus	dwarf rush	JUCA
Juncus phaeocephalus	brown-headed rush	JUPH
Lasthenia glaberrima	smooth goldfields	LAGL3
Leptosiphon parviflorus	variable linanthus	LEPA
Logfia filaginoides	California cottonrose	LOFI
Logfia gallica	narrowleaf cottonrose	LOGA
Lysimachia arvensis	scarlet pimpernel	LYAR
Lysimachia minima	chaffweed	LYMI
Lythrum hyssopifolia	grass poly	LYHY
Madia elegans	common madia	MAEL
Madia sativa	coast tarweed	MASA
Malvella leprosa	alkali mallow	MALE
Oxalis corniculata	creeping woodsorrel	OXCO
Persicaria amphibia	water smartweed	PEAM
Phalaris lemmonii	Lemmon's canary grass	PHLE
Plagiobothrys chorisianus var. *hickmanii*	Hickman's popcornflower	PLCHH
Plantago coronopus	cut-leaved plantain	PLCO
Plantago erecta	California plantain	PLER
Polypogon monspeliensis	rabbitfoot grass	POMO
Pseudognaphalium luteoalbum	weedy cudweed	PSLU
Pseudognaphalium ramosissimum	pink everlasting	PSRA
Pseudognaphalium stramineum	cottonbatting plant	PSST
Psilocarphus chilensis	round woolly-marbles	PSCH
Quercus agrifolia	coast live oak	QUAG
Ranunculus californicus	California buttercup	RACA
Rumex acetosella	sheep sorrel	RUAC
Rumex crispus	curly dock	RUCR
Senecio glomeratus	cutleaf burnweed	SEGL
Sidalcea malviflora ssp. *malviflora*	checkerbloom	SIMAM
Silene gallica	small-flower catchfly	SIGA
Sisyrinchium bellum	western blue-eyed grass	SIBE
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Spiranthes romanzoffiana	hooded lady's tresses	SPRO
Stachys ajugoides	bugle hedge nettle	STAJ
Stipa cernua	nodding needle grass	STCE
Toxicodendron diversilobum	poison oak	TODI
Trifolium angustifolium	narrow-leaved clover	TRAN
Trifolium campestre	hop clover	TRCA5
Trifolium dubium	little hop clover	TRDU
Trifolium variegatum	variegated clover	TRVA
Vicia sativa ssp. *nigra*	common vetch	VISAN
Zeltnera davyi	Davy's centaury	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

Table B-21. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 60			
Date	7/23/2019, 9/9/2019		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water	100		
Notes			
Pond was inundated 10 cm at the time of the 9/9/2019 survey. Inundated area 0.1% of basin boundary. Strata 1 through 4 were repeated from 2015 and 2018. Transects 1 and 2 were repeated from 2018, while Transect 3 was relocated because the previous location was no longer within the correct stratum. Transect 4 was relocated to an area with more representative vegetative composition.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
1	10 m	10%	ELMA	54	ELMA	88	ELMA	84	ELMA	45	ELMA	55	ELMA	85
			MALE	1	TH	10	DISP	1	TH	35	TH	30	TH	10
			TH	40	BG	2	TH	10	BG	20	BG	15	BG	5
			BG	5			BG	5						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	10 m	46%	DISP	8	DISP	10	DISP	10	DISP	15	DISP	15	DISP	10
			ELMA	65	ELMA	68	ELMA	62	ELMA	57	ELMA	52	ELMA	68
			TH	25	TH	20	JUPH	1	JUPH	1	JUPH	2	JUPH	1
			BG	2	BG	2	TH	25	TH	25	TH	30	TH	20
							BG	2	BG	2	BG	1	BG	1
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
3	10 m	20%	BRMI	1	BRMI	1	DISP	2	DISP	2	BRMI	1	DISP	5
			JUPH	59	DISP	2	ELACa	1	ELACa	2	DISP	4	JUPH	84
			LYHY	4	ELACa	2	JUPH	76	JUPH	75	ISHO	1	LYHY	1
			POMO	1	JUPH	63	LYHY	3	LYHY	1	JUPH	74	TH	10
			PSLU	1	LYHY	8	POMO	2	POMO	1	LYHY	1	BG	0
			SOAS	1	POMO	1	STAJ	1	STAJ	1	POMO	1		
			STAJ	15	PSLU	1	TH	10	TH	15	RUCR	1		
			TH	15	STAJ	2	BG	5	BG	3	STAJ	1		
			BG	3	TH	10					TH	15		
					BG	10					BG	1		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
4	**10 m**	**24%**	DISP	5	COCO	1	DISP	15	DISP	7	DISP	8	DISP	10
			ELMA	52	DISP	6	ELMA	40	ELMA	37	ELMA	26	ELACa	2
			JUPH	3	ELMA	20	JUPH	1	JUPH	6	JUPH	20	ELMA	32
			POMO	15	JUPH	15	POMO	30	POMO	35	POMO	30	POMO	40
			TH	25	POMO	35	STAJ	3	TH	15	STAJ	1	STAJ	1
			BG	0	STAJ	2	TH	11	BG	0	TH	15	TH	15
					TH	21	BG	0			BG	0	BG	0
					BG	0								
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 60 2019 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Lysimachia minima*	chaffweed	LYMI
Agrostis avenacea	Pacific bent grass	AGAV	*Lythrum hyssopifolia*	grass poly	LYHY
Baccharis pilularis	coyote brush	BAPI	*Madia sativa*	coast tarweed	MASA
Briza maxima	rattlesnake grass	BRMA	*Malvella leprosa*	alkali mallow	MALE
Briza minor	annual quaking grass	BRMI	*Microseris paludosa*	marsh microseris	MIPA
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Cotula coronopifolia	brass buttons	COCO	*Plantago coronopus*	cut-leaved plantain	PLCO
Deinandra corymbosa	coastal tarweed	DECO	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Diplacus aurantiacus	sticky monkey flower	DIAU	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Distichlis spicata	salt grass	DISP	*Pseudognaphalium ramosissimum*	pink everlasting	PSRA
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Eleocharis macrostachya	pale spikerush	ELMA	*Rubus ursinus*	California blackberry	RUUR
Elymus triticoides	beardless wild rye	ELTR3	*Rumex acetosella*	sheep sorrel	RUAC
Erigeron canadensis	horseweed	ERCA	*Rumex crispus*	curly dock	RUCR
Eryngium armatum	coyote thistle	ERAR12	*Senecio glomeratus*	cutleaf burnweed	SEGL
Euthamia occidentalis	western goldenrod	EUOC	*Sidalcea malviflora* ssp. *malviflora*	checkerbloom	SIMAM
Festuca perennis	Italian rye grass	FEPE	*Sonchus asper*	prickly sow thistle	SOAS
Galium porrigens	climbing bedstraw	GAPO	*Sonchus oleraceus*	common sow thistle	SOOL
Gamochaeta ustulata	purple cudweed	GAUS	*Stachys ajugoides*	bugle hedge nettle	STAJ
Heterocodon rariflorum	western pearlflower	HERA	*Zeltnera davyi*	Davy's centaury	ZEDA
Hypochaeris glabra	smooth cat's-ear	HYGL	**Groundcover Codes**		
Isoetes howellii	Howell's quillwort	ISHO	BG	Bare Ground	
Juncus phaeocephalus	brown-headed rush	JUPH	TH	Thatch/Duff	
Lysimachia arvensis	scarlet pimpernel	LYAR	AL	Algae	

Table B-22. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 61			
Date	5/13/2019, 6/6/2019		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			

Notes

Pond was dry by the time of the 6/6/19 survey. Strata 1 through 4 were repeated from 2017 and 2018. Transect 1 was repeated from 2018, whereas Transect 3 was repeated from 2017 and 2018. Transect 4 was relocated because the previous location was no longer within the correct stratum. Stratum 2 consisted of CCG and no transect was placed in this stratum. Figure 3 47 illustrates the extent and density of the populations at Pond 61. Pig rooting was also observed within Strata 1, 2, and 3 at Pond 61. The area was mapped and photo documented. An upland stratum was mapped and occupied 36% relative cover of wetland but was not included in the cover data.

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
1	10 m	1%	BRTEt	2	ELMA	10	BRTEt	2	AGLAV	1	AGLAV	1	BRTEt	2
			ELMA	6	ISHO	12	CRAQ	1	BRTEt	2	BRMI	1	CRAQ	1
			ISHO	31	LAGL3	6	ELMA	15	CAMA	1	BRTEt	1	DEDA	1
			LAGL3	4	LYMI	1	ISHO	15	ELACa	1	CRAQ	1	ELMA	10
			PLCHh	1	PLCHh	1	LAGL3	2	ELMA	6	DEDA	1	ISHO	9
			POMO	1	POMO	1	LYHY	1	ISHO	16	ELACa	4	JUPH	2
			TH	50	TH	30	PLCHh	1	JUPH	1	ELMA	2	LAGL3	1
			BG	5	BG	39	POMO	2	LAGL3	7	ISHO	10	LYHY	15
							Pseudognaphlium sp.	1	LYHY	2	JUPH	2	LYMI	1
							TRSC	2	PLCHh	1	LAGL3	1	MIPA	1
							TH	33	POMO	1	LYHY	10	PLCHh	2
							BG	25	POZI	1	LYMI	1	POMO	3
									TH	8	MIPA	1	POZI	4
									BG	52	PLCHh	2	PSCH	3
											PLER	1	TH	35
											POMO	5	BG	10
											POZI	4		
											PSCH	15		
											TH	12		
											BG	25		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
			BRMI	3	BRTEt	3	BRTEt	20	BRTEt	12	DEDA	10	BRTEt	1
			BRTEt	2	CIQU	1	CIQU	1	DEDA	23	ERAR12	10	DEDA	13
			DEDA	1	CRAQ	1	DEDA	6	ERAR12	6	JUPH	26	ELACa	5
			GEDI	1	DEDA	1	ERAR12	2	JUPH	2	LAGL3	3	ERAR12	10
			JUPH	30	ELACa	5	JUPH	18	LAGL3	8	LYHY	2	GEDI	2
			LYHY	10	JUPH	1	LAGL3	4	LYHY	1	PLCHh	28	JUPH	25
			LYMI	1	LAGL3	2	LYHY	8	LYMI	1	TH	20	LAGL3	2
3	**10 m**	**4%**	MIPA	2	LYHY	10	LYMI	1	PLCHh	15	BG	1	LYHY	3
			PLCHh	9	LYMI	1	MIPA	1	POZI	1			LYMI	1
			POMO	1	PLCHh	80	PLCHh	15	TH	30			PLCHh	20
			PSCH	3	POMO	1	POMO	1	BG	1			POZI	1
			TRVA	1	PSCH	2	PSCH	2					TH	15
			TH	6	TH	2	TH	17					BG	2
			BG	30	BG	1	BG	4						
			TOTAL	**100**	**TOTAL**	**111**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
			BRMA	15	BRMA	4	BRMA	2	AVBA	1	BRMA	2	ACAMa	1
			BRMI	1	BRMI	1	BRMI	1	BRMA	2	BRMI	1	ACMI	1
			BRTEt	1	ERAR12	3	BRTEt	1	BRMI	1	BRTEt	1	AICA	1
			DACA	10	GEDI	8	GEDI	20	BRTEt	2	DACA	6	BRMA	5
			ERBO	1	HYGL	1	HYGL	1	CAAMa3	1	ELACa	1	BRMI	1
			GAUS	1	JUPH	46	JUPH	45	DACA	5	ERAR12	1	DACA	1
			GEDI	1	LYAR	1	LYAR	1	GEDI	15	GEDI	10	ELACa	2
			HYGL	2	LYHY	1	MAGR	2	HYGL	2	JUPH	30	ERAR12	4
			ISCA	2	MAGR	7	MIPA	2	JUPH	25	LYHY	1	GEDI	6
			JUBUb	1	PLCHh	1	SOOL	1	LYAR	1	LYMI	1	HYGL	2
			JUCA	1	POMO	1	TH	20	LYHY	2	MAGR	2	JUPH	18
			JUPH	15	TH	20	BG	4	LYMI	1	MIPA	3	LYHY	1
4	**10 m**	**55%**	LUCO6	1	BG	6			MAGR	2	POMO	1	MASA	15
			LYAR	5					MIPA	3	SOOL	1	MAGR	1
			LYHY	3					PLCHh	1	TH	36	MIPA	2
			MASA	3					SOOL	1	BG	3	PLCHh	1
			MIPA	1					TH	27			POMO	3
			Pseudognaphlium sp.	1					BG	8			SOOL	1
			RACA	1									TH	24
			SIBE	1									BG	10
			SIGA	1										
			TH	7										
			BG	25										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 61 2019 Species List

Species Name	Common Name	Species Code
Acaena pinnatifida var. *californica*	California acaena	ACPIC
Achillea millefolium	common yarrow	ACMI
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA
Acmispon parviflorus	hill lotus	ACPA
Adenostoma fasciculatum	chamise	ADFA
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV
Agrostis pallens	seashore bent grass	AGPA
Aira caryophyllea	silvery hair-grass	AICA
Allium hickmanii	Hickman's onion	ALHI
Arctostaphylos tomentosa	woolly leaf manzanita	ARTO
Avena barbata	slender wild oat	AVBA
Avena fatua	wild oat	AVFA
Baccharis pilularis	coyote brush	BAPI
Briza maxima	rattlesnake grass	BRMA
Briza minor	annual quaking grass	BRMI
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET
Bromus carinatus	California brome	BRCA
Bromus diandrus	ripgut grass	BRDI
Bromus hordeaceus	soft chess	BRHO
Calochortus uniflorus	pink star-tulip	CAUN
Calystegia subacaulis ssp. subacaulis	hill morning glory	CASUS
Carduus pycnocephalus	Italian thistle	CAPY
Callitriche marginata	California water-starwort	CAMA
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3
Castilleja densiflora	dense flower owl's clover	CADE
Centaurea melitensis	Maltese star-thistle	CEME
Cerastium glomeratum	sticky mouse-ear chickweed	CEGL
Chlorogalum pomeridianum	wavyleaf soap plant	CHPO
Cicendia quadrangularis	timwort	CIQU
Cirsium quercetorum	brownie thistle	CIQU2
Clarkia purpurea ssp. *quadrivulnera*	winecup clarkia	CLPUQ
Corethrogyne filaginifolia	common sandaster	COFI
Cotula coronopifolia	brass buttons	COCO
Crassula aquatica	aquatic pygmy-weed	CRAQ
Crocanthemum scoparium	peak rush-rose	CRSC
Danthonia californica	California oat grass	DACA
Deinandra corymbosa	coastal tarweed	DECO
Deschampsia danthonioides	annual hair grass	DEDA
Dichelostemma capitatum ssp. *capitatum*	bluedicks	DICAC
Diplacus aurantiacus	sticky monkey flower	DIAU
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa
Eleocharis macrostachya	pale spikerush	ELMA
Elymus glaucus	blue wild-rye	ELGL
Erodium botrys	long-beaked filaree	ERBO
Erodium cicutarium	redstem filaree	ERCI
Eryngium armatum	coyote thistle	ERAR12
Eschscholzia californica	California poppy	ESCA
Festuca bromoides	brome fescue	FEBR
Festuca perennis	Italian rye grass	FEPE
Galium aparine	goose grass	GAAP
Galium porrigens	climbing bedstraw	GAPO
Gamochaeta ustulata	purple cudweed	GAUS
Geranium dissectum	cut-leaved geranium	GEDI
Heteromeles arbutifolia	toyon	HEAR
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	HOMAG
Horkelia cuneata var. *cuneata*	wedge-leaved horkelia	HOCUC
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
Isoetes howellii	Howell's quillwort	ISHO
Isolepis carinata	keeled bulrush	ISCA
Juncus bufonius var. *bufonius*	common toad rush	JUBUB
Juncus capitatus	dwarf rush	JUCA
Juncus occidentalis	western rush	JUOC
Juncus phaeocephalus	brown-headed rush	JUPH
Koeleria macrantha	June grass	KOMA
Lasthenia conjugens	Contra Costa goldfields	LACO
Lasthenia glaberrima	smooth goldfields	LAGL3
Leptosiphon parviflorus	variable linanthus	LEPA
Logfia gallica	narrowleaf cottonrose	LOGA
Lupinus concinnus	bajada lupine	LUCO
Lupinus nanus	sky lupine	LUNA
Luzula comosa	Pacific woodrush	LUCO6
Lysimachia arvensis	scarlet pimpernel	LYAR
Lysimachia minima	chaffweed	LYMI
Lythrum hyssopifolia	grass poly	LYHY
Madia gracilis	gumweed	MAGR
Madia sativa	coast tarweed	MASA
Melica californica	California melic	MECA
Microseris paludosa	marsh microseris	MIPA
Phalaris lemmonii	Lemmon's canary grass	PHLE
Plagiobothrys chorisianus var. *hickmanii*	Hickman's popcornflower	PLCHH
Plantago coronopus	cut-leaved plantain	PLCO
Plantago erecta	California plantain	PLER
Plantago lanceolata	English plantain	PLLA
Pogogyne zizyphoroides	Sacramento mesa mint	POZI
Polypogon monspeliensis	rabbitfoot grass	POMO
Primula clevelandii var. *patula*	Padre's shooting star	PRCLP
Pseudognaphalium californicum	California everlasting	PSCA
Pseudognaphalium ramosissimum	pink everlasting	PSRA
Pseudognaphalium stramineum	cottonbatting plant	PSST
Psilocarphus chilensis	round woolly-marbles	PSCH
Quercus agrifolia	coast live oak	QUAG
Ranunculus californicus	California buttercup	RACA
Rumex acetosella	sheep sorrel	RUAC
Rumex crispus	curly dock	RUCR
Sanicula arctopoides	footsteps of spring	SAAR9
Sanicula crassicaulis	Pacific sanicle	SACR
Senecio glomeratus	cutleaf burnweed	SEGL
Sidalcea malviflora ssp. *malviflora*	checkerbloom	SIMAM
Silene gallica	small-flower catchfly	SIGA
Sisyrinchium bellum	western blue-eyed grass	SIBE
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Stachys ajugoides	bugle hedge nettle	STAJ
Stipa cernua	nodding needle grass	STCE
Taraxia ovata	sun cups	TAOV
Toxicodendron diversilobum	poison oak	TODI
Trifolium barbigerum	bearded clover	TRBA
Trifolium campestre	hop clover	TRCA5
Trifolium depauperatum	sack clover	TRDE
Trifolium dubium	little hop clover	TRDU
Trifolium microcephalum	small head clover	TRMI
*Trifolium polyodon**	Pacific Grove clover	TRPO3
Trifolium variegatum	variegated clover	TRVA
Triglochin scilloides	flowering quillwort	TRSC
Triteleia hyacinthina	white brodiaea	TRHY3
Vicia sativa ssp. *sativa*	spring vetch	VISAS
Vicia villosa ssp. *varia*	winter vetch	VIVIV8
Zeltnera davyi	Davy's centaury	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

*USDA Plants has *Trifolium polydon* as a synonym for *Trifolium variegatum*. For TRPO3, the wetland indicator status is only available for Arid West, not Western Mountains, Valleys, and Coast.

Table B-23. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 73			
Date	6/18/2019		
Surveying Personnel	Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			

Notes

Pond was dry at the time of the 6/18/2019 survey. Strata 1 and 2 were repeated from 2017 and 2018, whereas stratum 3 was repeated from 2017 and stratum 4 was repeated from 2018. Transect 1 was repeated from 2018 and Transect 2 was repeated from 2017. Transects 3 and 4 were relocated to areas with more representative vegetative composition. An upland stratum was mapped and occupied 2% relative cover of wetland but was not included in the cover data.

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
1	5 m	6%	ELMA	45	ELMA	74	DEDA	1
			ELACa	25	LAGL3	1	ELACa	10
			PLCHh	1	PLCHh	1	ELMA	41
			POMO	3	POMO	1	LAGL3	1
			TH	20	TH	20	PLCHh	1
			BG	6	BG	3	POMO	1
							TH	40
							BG	5
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	10 m	77%	BRTEt	1	DEDA	1	BRTEt	1	DEDA	1	DEDA	1	DEDA	1
			DEDA	1	ELACa	8	DEDA	1	ELACa	6	ELACa	6	ELACa	5
			ELACa	8	ERAR12	18	ELACa	4	ERAR12	8	ERAR12	3	ERAR12	8
			ELMA	1	ISHO	4	ERAR12	8	ISHO	4	ISHO	1	ISHO	1
			ERAR12	1	JUPH	28	ISHO	1	JUPH	49	JUPH	60	JUPH	62
			ISHO	5	LYHY	2	JUPH	47	PLCHh	2	LAGL3	5	LAGL3	1
			JUPH	20	LYMI	1	LYHY	1	POMO	6	LYHY	1	PLCHh	1
			LYHY	15	PLCHh	3	PLCHh	2	TH	20	PLCHh	2	POMO	1
			PLCHh	1	POMO	1	POMO	10	BG	4	POMO	2	TH	15
			POMO	3	TH	30	TH	20			TH	15	BG	5
			TH	29	BG	4	BG	5			BG	4		
			BG	15										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
3	5 m	8%	DEDA	1	CRAQ	1	ELACa	6
			ELACa	5	ELACa	1	ERAR12	2
			ERAR12	3	ERAR12	4	ISHO	47
			ISHO	53	ISHO	45	JUPH	3
			JUPH	4	JUPH	2	LYHY	1
			LYHY	2	LYHY	1	PLCHh	1
			PLCHh	1	PLCHh	2	POMO	4
			POMO	3	POMO	8	TH	30
			TH	24	PSCH	1	BG	6
			BG	4	TH	30		
					BG	5		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
4	5 m	7%	BRTEt	1	BRMI	1	BRTEt	1
			DEDA	1	ELACa	1	ELACa	2
			ERAR12	35	ERAR12	39	ERAR12	33
			JUBUb	1	JUBUb	1	JUBUb	1
			JUPH	6	JUPH	2	JUPH	4
			LYHY	1	LYHY	1	LYHY	1
			POMO	2	LYMI	1	LYMI	1
			TH	38	POMO	2	POMO	6
			BG	15	PSCH	1	PSCH	1
					ZEDA	1	TH	10
					TH	10	BG	40
					BG	40		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 73 2019 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV	*Lysimachia minima*	chaffweed	LYMI
Aira caryophyllea	silvery hair-grass	AICA	*Lythrum hyssopifolia*	grass poly	LYHY
Avena barbata	slender wild oat	AVBA	*Madia gracilis*	gumweed	MAGR
Baccharis pilularis	coyote brush	BAPI	*Madia sativa*	coast tarweed	MASA
Briza maxima	rattlesnake grass	BRMA	*Microseris paludosa*	marsh microseris	MIPA
Briza minor	annual quaking grass	BRMI	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3	*Plantago coronopus*	cut-leaved plantain	PLCO
Cotula coronopifolia	brass buttons	COCO	*Plantago erecta*	California plantain	PLER
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Pogogyne zizyphoroides*	Sacramento mesa mint	POZI
Danthonia californica	California oat grass	DACA	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Deinandra corymbosa	coastal tarweed	DECO	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Deschampsia danthonioides	annual hair grass	DEDA	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Rumex acetosella*	sheep sorrel	RUAC
Eleocharis macrostachya	pale spikerush	ELMA	*Rumex crispus*	curly dock	RUCR
Elymus triticoides	beardless wild rye	ELTR3	*Salix* sp.		
Erigeron canadensis	horseweed	ERCA	*Senecio glomeratus*	cutleaf burnweed	SEGL
Eryngium armatum	coyote thistle	ERAR12	*Silene gallica*	small-flower catchfly	SIGA
Festuca bromoides	brome fescue	FEBR	*Sonchus asper*	prickly sow thistle	SOAS
Festuca myuros	rattail sixweeks grass	FEMY	*Sonchus oleraceus*	common sow thistle	SOOL
Gamochaeta ustulata	purple cudweed	GAUS	*Spiranthes romanzoffiana*	hooded lady's tresses	SPRO
Geranium dissectum	cut-leaved geranium	GEDI	*Taraxia ovata*	sun cups	TAOV
Heterocodon rariflorum	western pearlflower	HERA	*Toxicodendron diversilobum*	poison oak	TODI
Hypochaeris glabra	smooth cat's-ear	HYGL	*Trifolium barbigerum*	bearded clover	TRBA
Hypochaeris radicata	rough cat's-ear	HYRA	*Trifolium variegatum*	variegated clover	TRVA
Isoetes howellii	Howell's quillwort	ISHO	*Triglochin scilloides*	flowering quillwort	TRSC
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	*Triteleia ixioides*	coast pretty face	TRIX
Juncus bufonius var. *congestus*	clustered toad rush	JUBUC2	*Zeltnera davyi*	Davy's centaury	ZEDA
Juncus capitatus	dwarf rush	JUCA	**Groundcover Codes**		
Juncus occidentalis	western rush	JUOC	BG	Bare Ground	
Juncus phaeocephalus	brown-headed rush	JUPH	TH	Thatch/Duff	
Lasthenia glaberrima	smooth goldfields	LAGL3	AL	Algae	

Table B-24. Machine Gun Flats (Year 2 Post-Mastication) Wetland Vegetation Transect Data by Stratum

Machine Gun Flats			
Date	6/13/2019, 8/13/2019, 9/9/2019		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke, Rachel Spellenberg		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation	35	ELMA	
Floating Vegetation	45	PEAM	
Submerged Vegetation			
Open Water	20		
Notes			
Machine Gun Flats was inundated 76 cm at the time of the 9/9/2019 survey. Inundated area 0.3% of basin boundary. Strata 1 through 8 were identified and corresponding transect were established in 2019.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	10 m	61%	AGAV	1	COCO	3	DISP	1	ELMA	85	DISP	2	DISP	1
			DISP	2	DISP	4	ELACa	2	JUBA	1	ELACa	3	ELACa	6
			ELMA	68	ELMA	48	ELMA	35	PEAM	5	ELMA	79	ELMA	60
			LYHY	1	JUPH	2	JUPH	1	TH	4	POMO	1	TH	8
			POMO	6	LYHY	2	PEAM	4	BG	5	TH	3	BG	25
			TH	20	POMO	2	POMO	1			BG	12		
			BG	2	TRSC	1	TH	28						
					TH	8	BG	28						
					BG	30								
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
3	5 m	0.4%	BRMI	1	BRMI	2	AGAV	1
			ELTR3	1	ELTR3	1	BRMI	1
			ERCA	1	ERCA	1	DECO	3
			FEPE	1	HYRA	1	HYRA	4
			HYRA	1	LYHY	8	JUBAa	1
			LYHY	12	MALE	18	LYHY	8
			MALE	25	MASA	4	MALE	12
			MASA	2	PLCO	3	MASA	15
			PLCO	1	POMO	44	PLCO	6
			POMO	40	PSST	1	POMO	32
			TH	12	TH	15	PSLU	1
			BG	3	BG	2	PSST	1
							SEGL	1
							TH	12
							BG	2
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
4	**10 m**	**8%**	DISP	4	DISP	8	DECO	1	BRMI	1	BRMI	2	BRMI	2
			ERAR12	8	ERAR12	6	DISP	3	DECO	2	DECO	12	DECO	6
			GEDI	2	FEPE	1	ERAR12	15	ERAR12	7	DISP	4	DISP	6
			HYGL	2	HYGL	1	ERBO	1	ERBO	1	ERAR12	3	ERAR12	55
			JUPH	38	JUPH	51	GEDI	1	FEPE	1	ERBO	1	FEPE	1
			PHLE	1	MALE	1	HYGL	7	GEDI	1	FEBR	1	GEDI	1
			SOOL	5	SOOL	1	JUPH	10	HYGL	2	FEPE	1	JUPH	2
			STAJ	5	STAJ	1	LYHY	1	JUPH	8	GEDI	1	LIBI5	2
			TH	35	TH	30	MALE	2	LYHY	1	JUPH	4	LYHY	1
			BG	0	BG	0	PLCHh	1	RUCR	1	LYHY	1	MALE	3
							PSLU	1	SOOL	4	MALE	6	SOOL	2
							STAJ	2	STAJ	1	SOOL	4	STAJ	5
							TH	54	TH	70	STAJ	2	TH	13
							BG	1	BG	0	TH	57	BG	1
											BG	1		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
5	**5 m**	**2%**	DISP	1	DISP	1	DISP	2
			GEDI	1	ELACa	15	JUBAa	63
			JUBAa	45	JUBAa	30	TH	35
			JUPH	2	LYHY	3	BG	0
			MALE	1	TH	36		
			TH	50	BG	15		
			BG	0				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
6	**5 m**	**1%**	DISP	1	AGAV	1	AGAV	1
			ELACa	2	ELACa	15	ELACa	30
			EUOC	19	ELMA	4	EUOC	7
			JUBAa	35	EUOC	10	JUBAa	40
			LYHY	2	JUBAa	28	LYHY	1
			POMO	1	LYHY	1	POMO	1
			TH	25	POMO	1	TH	17
			BG	15	TH	25	BG	3
					BG	15		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
7	**10 m**	**10%**	AICA	2	AICA	1	AICA	3	BRMI	1	CAAMa3	7	AGLAV	2
			BRMI	1	BRMI	3	BRMI	3	CAAMa3	2	ERAR12	8	AICA	1
			BRTEt	1	CAAMa3	5	CAAMa3	1	ELACa	3	FEBR	1	BRMI	1
			CAAMa3	12	ERAR12	30	DECO	1	ERAR12	12	JUCA	1	CAAMa3	1
			CLPUq	1	FEBR	1	ERAR12	3	FEBR	1	JUPH	3	ERAR12	7
			DACA	1	FEPE	1	FEBR	1	JUBUb	1	LYHY	1	JUCA	1
			ERAR12	5	HYGL	1	JUBUb	1	JUCA	1	LYMI	1	JUPH	3
			FEBR	2	JUCA	1	JUCA	1	JUPH	8	PLCO	10	LYHY	1
			GAUS	1	JUPH	1	JUPH	1	LYHY	1	ZEDA	1	LYMI	1
			HYGL	1	LYHY	1	LYHY	1	PLCO	15	TH	17	PLCO	7
			JUBUb	1	PLCO	2	PLCO	25	ZEDA	1	BG	50	PSCH	1
			JUCA	2	TH	48	ZEDA	1	TH	20			TH	14
			JUPH	2	BG	5	TH	40	BG	34			BG	60
			LYAR	1			BG	18						
			LYHY	1										
			TH	51										
			BG	15										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
8	**10 m**	**15%**	BRMI	1	BRMI	2	DACA	30	BRMI	1	BRMI	1	BRMI	2
			BRTEt	1	BRTEt	1	FEBR	26	DACA	40	DACA	20	DACA	15
			FEBR	36	CAAMa3	1	FEPE	20	DECO	1	DECO	1	DECO	1
			FEPE	30	DACA	25	HYGL	1	FEBR	21	FEBR	6	ERAR12	20
			HYGL	2	ERAR12	11	LYHY	1	FEPE	10	FEPE	4	ERBO	1
			LIBI5	10	FEBR	20	TH	20	HYGL	3	HYGL	3	FEBR	37
			LYHY	1	FEPE	22	BG	2	LIBI5	1	JUPH	1	FEPE	3
			TH	15	HYGL	1			LYAR	1	TH	61	HYGL	3
			BG	4	JUCA	1			LYHY	1	BG	3	JUPH	1
					JUPH	1			TH	20			LYHY	1
					LYHY	1			BG	1			TH	14
					LYMI	1							BG	2
					TH	10								
					BG	3								
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
9	5 m	2%	ELTR3	25	ELACa	2	BRMI	1
			ERCA	8	ELTR3	15	ELACa	1
			HYRA	1	ERCA	8	ELTR3	25
			JUBAa	3	FEBR	1	ERCA	8
			LYAR	1	GEDI	1	HYRA	1
			LYHY	1	HYRA	4	JUBAa	2
			RUAC	1	LYAR	12	JUBUc2	2
			SOOL	4	LYHY	2	LYAR	4
			TH	56	SOOL	4	LYHY	1
			BG	0	TH	31	NUTE	1
					BG	20	PSLU	3
							PSRA	2
							PSST	3
							RUCR	1
							SEGL	5
							SOOL	2
							TH	35
							BG	3
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Machine Gun Flats 2019 Species List

Species Name	Common Name	Species Code
Acaena pinnatifida var. *californica*	California acaena	ACPIC
Achillea millefolium	common yarrow	ACMI
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA
Agrostis avenacea	Pacific bent grass	AGAV
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV
Aira caryophyllea	silvery hair-grass	AICA
Allium hickmanii	Hickman's onion	ALHI
Arctostaphylos hookeri	Hooker's manzanita	ARHO
Avena barbata	slender wild oat	AVBA
Baccharis pilularis	coyote brush	BAPI
Briza maxima	rattlesnake grass	BRMA
Briza minor	annual quaking grass	BRMI
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET
Bromus diandrus	ripgut grass	BRDI
Bromus hordeaceus	soft chess	BRHO
Calandrinia ciliata	red maids	CACI
Calochortus sp.		
Carduus pycnocephalus	Italian thistle	CAPY
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3
Castilleja attenuata	valley tassels	CAAT
Castilleja densiflora ssp. *densiflora*	dense flower owl's clover	CADED
Castilleja exserta	purple owl's-clover	CAEX
Centaurea melitensis	Maltese star-thistle	CEME
Cicendia quadrangularis	timwort	CIQU
Cirsium brevistylum	Indian thistle	CIBR
Cirsium quercetorum	brownie thistle	CIQU2
Cirsium vulgare	bull thistle	CIVU
Clarkia purpurea ssp. *quadrivulnera*	winecup clarkia	CLPUQ
Conium maculatum	poison hemlock	COMA
Cotula coronopifolia	brass buttons	COCO
Cyperus eragrostis	tall cyperus	CYER
Danthonia californica	California oat grass	DACA
Deinandra corymbosa	coastal tarweed	DECO
Deschampsia danthonioides	annual hair grass	DEDA
Diplacus aurantiacus	sticky monkey flower	DIAU
Distichlis spicata	salt grass	DISP
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa
Eleocharis macrostachya	pale spikerush	ELMA
Elymus glaucus	blue wild-rye	ELGL
Elymus triticoides	beardless wild rye	ELTR3
Erigeron canadensis	horseweed	ERCA
Erodium botrys	long-beaked filaree	ERBO
Erodium cicutarium	redstem filaree	ERCI
Eryngium armatum	coyote thistle	ERAR12
Eschscholzia californica	California poppy	ESCA
Euthamia occidentalis	western goldenrod	EUOC
Festuca bromoides	brome fescue	FEBR
Festuca myuros	rattail sixweeks grass	FEMY
Festuca perennis	Italian rye grass	FEPE
Fragaria vesca	woodland strawberry	FRVE
Galium aparine	goose grass	GAAP
Galium porrigens	climbing bedstraw	GAPO
Gamochaeta ustulata	purple cudweed	GAUS
Geranium dissectum	cut-leaved geranium	GEDI
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO
Hirschfeldia incana	shortpod mustard	HIIN3
Hordeum brachyantherum ssp. *brachyantherum*	meadow barley	HOBRB
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	HOMAG
Horkelia cuneata	wedge-leaved horkelia	HOCU
Hypericum perforatum ssp. *perforatum*	Klamathweed	HYPEP
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
Isoetes howellii	Howell's quillwort	ISHO
Isolepis carinata	keeled bulrush	ISCA
Juncus balticus	Baltic rush	JUBA
Juncus bufonius var. *bufonius*	common toad rush	JUBUB
Juncus bufonius var. *occidentalis*	round-fruited toad rush	JUBUO
Juncus capitatus	dwarf rush	JUCA
Juncus effusus	common rush	JUEF
Juncus occidentalis	western rush	JUOC
Juncus patens	spreading rush	JUPA
Juncus phaeocephalus	brown-headed rush	JUPH
Lactuca serriola	prickly lettuce	LASE
Leptosiphon parviflorus	variable linanthus	LEPA
Linum bienne	pale flax	LIBI5
Logfia gallica	narrowleaf cottonrose	LOGA
Lupinus bicolor	miniature lupine	LUBI
Luzula comosa	Pacific woodrush	LUCO6
Lysimachia arvensis	scarlet pimpernel	LYAR
Lysimachia minima	chaffweed	LYMI
Lythrum hyssopifolia	grass poly	LYHY
Madia gracilis	gumweed	MAGR
Madia sativa	coast tarweed	MASA
Malvella leprosa	alkali mallow	MALE
Microseris paludosa	marsh microseris	MIPA
Oxalis corniculata	creeping woodsorrel	OXCO
Oxalis pes-caprae	Bermuda buttercup	OXPE
Persicaria amphibia	water smartweed	PEAM
Persicaria maculosa	lady's thumb	PEMA
Phalaris lemmonii	Lemmon's canary grass	PHLE
Plagiobothrys chorisianus var. *hickmanii*	Hickman's popcornflower	PLCHH
Plantago coronopus	cut-leaved plantain	PLCO
Plantago erecta	California plantain	PLER
Plantago lanceolata	English plantain	PLLA
Polypogon monspeliensis	rabbitfoot grass	POMO
Pseudognaphalium californicum	California everlasting	PSCA
Pseudognaphalium luteoalbum	weedy cudweed	PSLU
Pseudognaphalium ramosissimum	pink everlasting	PSRA
Pseudognaphalium stramineum	cottonbatting plant	PSST
Quercus agrifolia	coast live oak	QUAG
Ranunculus californicus	California buttercup	RACA
Rorippa curvisiliqua	western yellowcress	ROCU
Rorippa palustris ssp. *palustris*	bog yellow cress	ROPAP
Rubus ursinus	California blackberry	RUUR
Rumex acetosella	sheep sorrel	RUAC
Rumex crispus	curly dock	RUCR
Rumex fueginus	golden dock	RUFU
Rumex salicifolius	willow dock	RUSA
Senecio glomeratus	cutleaf burnweed	SEGL
Sidalcea malviflora ssp. *malviflora*	checkerbloom	SIMAM
Silene gallica	small-flower catchfly	SIGA
Sisyrinchium bellum	western blue-eyed grass	SIBE
Solanum americanum	small-flowered nightshade	SOAM
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Spiranthes romanzoffiana	hooded lady's tresses	SPRO
Stachys ajugoides	bugle hedge nettle	STAJ
Stipa cernua	nodding needle grass	STCE
Taraxia ovata	sun cups	TAOV
Toxicodendron diversilobum	poison oak	TODI
Trifolium angustifolium	narrow-leaved clover	TRAN
Trifolium barbigerum	bearded clover	TRBA
Trifolium depauperatum	sack clover	TRDE
Trifolium dubium	little hop clover	TRDU
Trifolium microcephalum	small head clover	TRMI
Trifolium variegatum	variegated clover	TRVA
Triteleia ixioides	coast pretty face	TRIX
Verbena lasiostachys var. *lasiostachys*	western vervain	VELAL
Vicia sativa ssp. *sativa*	spring vetch	VISAS
Vicia villosa ssp. *villosa*	hairy vetch	VIVIV
Zeltnera davyi	Davy's centaury	ZEDA

Groundcover Codes	
BG	Bare Ground
TH	Thatch/Duff
AL	Algae

Table B-25. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 16

Date	7/23/2019, 9/9/2019		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation	40	ELMA (15), SCCA (3), TH (22)	
Floating Vegetation	25	AL	
Submerged Vegetation	1	CEDE	
Open Water	35		

Notes

Pond was inundated 18 cm at the time of the 9/9/2019 survey. The inundated area was 11% of basin boundary. Strata 5 through 7 were repeated from 2017. Transects 1, 5, and 6 were repeated from 2017, whereas Transect 3 was repeated from 2015. Transect 4 was relocated to an area with more representative vegetative composition while Transect 7 was relocated because the previous location was no longer within the correct stratum.

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
1	**5 m**	**2%**	CIVU	6	ELMA	1	CIVU	1
			GNPA	5	GNPA	15	ELMA	1
			HECUo	8	HECUo	6	GNPA	1
			PSLU	15	PSLU	20	HECUo	5
			SCCA	26	SCCA	33	PSLU	1
			TH	5	TH	5	SCCA	25
			BG	35	BG	20	SOAM	1
							TH	5
							BG	60
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
3	**10 m**	**22%**	ELMA	63	ELMA	70	ELMA	75	ELMA	80	ELMA	75	ELMA	50
			TH	35	GNPA	1	GNPA	1	GNPA	1	GNPA	3	GNPA	15
			BG	2	TH	26	MALE	1	TH	14	POMO	1	POMO	6
					BG	3	TH	20	BG	5	TH	17	TH	19
							BG	3			BG	4	BG	10
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
4	10 m	31%	ACMI	2	BRMI	1	CAPR	57	CAPR	70	CAPR	70	CAPR	36
			BRHO	1	CAPR	5	ELMA	1	GEDI	1	CIVU	1	CIVU	3
			CAPR	48	HYGL	1	ERCA	1	JUPH	6	ELTR3	2	ERCA	1
			CIVU	6	JUBA	15	JUBA	1	PEGA	2	ERCA	1	JUBA	2
			JUBA	2	JUPH	42	JUPH	18	TH	20	GNPA	2	*Madia* sp.	3
			JUPH	20	POMO	1	PSLU	1	BG	1	JUBA	2	RUUR	40
			RUUR	4	TH	25	TH	20			JUPH	2	TH	15
			STAJ	1	BG	10	BG	1			*Madia* sp.	2	BG	0
			TH	15							RUUR	8		
			BG	1							SOEL	1		
											TH	10		
											BG	3		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**104**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
5	10 m	32%	CABA	40	CABA	50	CABA	55	CABA	50	CABA	46	CABA	44
			GNPA	1	RUUR	1	JUBA	1	RUUR	4	RUUR	20	RUUR	14
			RUUR	25	SOEL	5	RUUR	3	TH	43	SOEL	4	SOEL	22
			SOEL	2	TH	44	SOEL	5	BG	3	TH	30	TH	20
			TH	32	BG	0	TH	33			BG	0	BG	0
			BG	0			BG	3						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
6	5 m	1%	CIVU	1	ELMA	2	ELMA	4
			ELMA	3	JUBA	55	JUBA	55
			GNPA	2	*Pseudognaphalium* sp.	1	TH	40
			JUBA	45	TH	39	BG	1
			RUCR	3	BG	3		
			TH	26				
			BG	20				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
7	5 m	1%	CRSC2	40	CRSC2	52	CIVU	1
			ECCR	30	ECCR	25	CRSC2	3
			ELMA	15	ELMA	5	ECCR	56
			GNPA	2	TH	3	ELMA	15
			TH	3	BG	15	GNPA	5
			BG	10			TH	5
							BG	15
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 16 2019 Species List

Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI
Acmispon americanus var. americanus	Spanish lotus	ACAMA
Agrostis exarata	spike bent grass	AGEX
Agrostis pallens	seashore bent grass	AGPA
Aira caryophyllea	silvery hair-grass	AICA
Anthriscus caucalis	bur chervil	ANCA14
Artemisia douglasiana	mugwort	ARDO
Avena barbata	slender wild oat	AVBA
Baccharis pilularis	coyote brush	BAPI
Briza maxima	rattlesnake grass	BRMA
Briza minor	annual quaking grass	BRMI
Bromus diandrus	ripgut grass	BRDI
Bromus hordeaceus	soft chess	BRHO
Carduus pycnocephalus	Italian thistle	CAPY
Carex barbarae	whiteroot	CABA
Carex harfordii	Harford's sedge	CAHA4
Carex praegracilis	clustered field sedge	CAPR
Carpobrotus edulis	ice plant	CAED
Cerastium glomeratum	sticky mouse-ear chickweed	CEGL
Ceratophyllum demersum	dwarf ceanothus	CEDE
Cirsium vulgare	bull thistle	CIVU
Conium maculatum	poison hemlock	COMA
Crypsis schoenoides	swamp pricklegrass	CRSC2
Cryptantha clevelandii	Cleveland's cryptantha	CRCL
Cyperus eragrostis	tall cyperus	CYER
Deschampsia cespitosa ssp. cespitosa	tufted hair grass	DECEC2
Drymocallis glandulosa var. wrangelliana	sticky cinquefoil	DRGLW
Echinochloa crus-galli	barnyard grass	ECCR
Eleocharis macrostachya	pale spikerush	ELMA
Elymus glaucus	blue wild-rye	ELGL
Elymus triticoides	beardless wild rye	ELTR3
Erigeron canadensis	horseweed	ERCA
Festuca bromoides	brome fescue	FEBR
Galium aparine	goose grass	GAAP
Gamochaeta ustulata	purple cudweed	GAUS
Geranium dissectum	cut-leaved geranium	GEDI
Gnaphalium palustre	lowland cudweed	GNPA
Heliotropium curassavicum var. oculatum	Chinese pusley	HECUO
Helminthotheca echioides	bristly oxtongue	HEEC
Heterotheca grandiflora	telegraph weed	HEGR
Horkelia cuneata var. cuneata	wedge-leaved horkelia	HOCUC
Hypericum anagalloides	creeping St. John's wort	HYAN
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
Juncus balticus	Baltic rush	JUBA
Juncus bufonius var. bufonius	common toad rush	JUBUB
Juncus bufonius var. congestus	clustered toad rush	JUBUC2
Juncus effusus	common rush	JUEF
Juncus phaeocephalus	brown-headed rush	JUPH
Logfia gallica	narrowleaf cottonrose	LOGA
Lupinus arboreus	yellow bush lupine	LUAR
Luzula comosa	Pacific woodrush	LUCO6
Lysimachia arvensis	scarlet pimpernel	LYAR
Lythrum hyssopifolia	grass poly	LYHY
Madia sativa	coast tarweed	MASA
Malvella leprosa	alkali mallow	MALE
Navarretia hamata ssp. parviloba	hooked navarretia	NAHAP
Navarretia mellita	skunk navarretia	NAME
Perideridia gairdneri	Gairdner's yampah	PEGA
Plantago coronopus	cut-leaved plantain	PLCO
Polypogon monspeliensis	rabbitfoot grass	POMO
Pseudognaphalium luteoalbum	weedy cudweed	PSLU
Pseudognaphalium stramineum	cottonbatting plant	PSST
Pteridium aquilinum var. pubescens	western bracken fern	PTAQP
Quercus agrifolia	coast live oak	QUAG
Rosa californica	California wild rose	ROCA
Rubus ursinus	California blackberry	RUUR
Rumex acetosella	sheep sorrel	RUAC
Rumex crispus	curly dock	RUCR
Rumex salicifolius	willow dock	RUSA
Schoenoplectus californicus	California bulrush	SCCA
Senecio glomeratus	cutleaf burnweed	SEGL
Silene gallica	small-flower catchfly	SIGA
Silybum marianum	milk thistle	SIMA
Solanum americanum	small-flowered nightshade	SOAM
Solidago elongata	West Coast Canada goldenrod	SOEL
Solidago velutina ssp. californica	California goldenrod	SOVEC
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Stachys ajugoides	bugle hedge nettle	STAJ
Toxicodendron diversilobum	poison oak	TODI
Vicia sativa ssp. nigra	common vetch	VISAN
Zeltnera davyi	Davy's centaury	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

Table B-26. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 54			
Date	6/4/2019, 6/26/2019		
Surveying Personnel	Julia Fields, Elena Loke, Kayti Christianson		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation	65		
Floating Vegetation	30		
Submerged Vegetation	0		
Open Water	5		Depth on 6/4/2019: 34 cm
Notes			
Pond was dry at the time of 6/26/19 survey. Pond 54 has not historically been surveyed for wetland vegetation, strata 1 through 4 were identified and the correspond transects established in 2019. An upland stratum was mapped and occupied 1% relative cover of wetland but was not included in the cover data.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
1	10 m	55%	DEDA	1	ELACa	8	ELACa	5	CAMA	1	ELACa	3	ELACa	3
			ELACa	5	ELMA	45	ELMA	40	ELACa	10	ELMA	35	ELMA	39
			ELMA	50	ERAR12	1	ERAR12	1	ELMA	33	ERAR12	3	ERAR12	5
			GEDI	1	JUPH	40	JUPH	37	ERAR12	1	ISHO	2	ISHO	1
			JUPH	34	LYHY	1	POMO	1	GEDI	1	JUPH	35	JUPH	35
			PHLE	2	POMO	1	STAJ	6	JUPH	36	LYHY	1	PLCHh	1
			PLCHh	1	TH	2	TH	5	LYHY	1	PHLE	1	POMO	1
			POMO	2	BG	2	BG	5	PHLE	1	PLCHh	1	STAJ	1
			TH	3					PLCHh	1	POMO	5	TH	10
			BG	1					POMO	1	STAJ	3	BG	4
									STAJ	6	TH	8		
									TH	4	BG	3		
									BG	4				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	10 m	11%	ELACa	40	CRAQ	1	ELMA	3	ELACa	10	DEDA	2	DEDA	1
			ELMA	4	ELACa	20	HOBR	1	ELMA	2	ELACa	55	ELACa	4
			LYMI	1	ELMA	3	JUPH	25	JUPH	1	ELMA	4	ELMA	8
			PLCHh	1	HOBR	1	LYHY	1	LYHY	1	JUPH	4	HOBR	1
			POMO	23	LYMI	8	LYMI	1	LYMI	2	LYMI	3	JUPH	2
			STAJ	10	PHLE	2	PHLE	1	PLCHh	35	PLCHh	5	LYMI	1
			TH	20	PLCHh	22	PLCHh	12	POMO	44	POMO	20	PLCHh	8
			BG	1	POMO	34	POMO	45	STAJ	1	STAJ	2	POMO	59
					TH	8	RUCR	2	TH	3	TH	4	STAJ	6
					BG	1	STAJ	4	BG	1	BG	1	TH	8
							TH	4					BG	2
							BG	1						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
3	**10 m**	**31%**	AICA	1	ACMI	2	BRDI	2	ELACa	15	ELACa	2	ELACa	10
			BRMI	4	BRMI	1	BRMI	2	ERAR12	5	ELMA	5	ELMA	17
			ELACa	35	ELACa	15	ELACa	32	GAUS	1	ERAR12	25	ERAR12	12
			GEDI	2	ERAR12	9	ERBO	1	JUPH	32	JUBUc2	1	JUPH	43
			JUPH	42	JUPH	56	FEBR	1	LYHY	1	JUBUo	1	POMO	1
			LYHY	2	LYAR	1	GAUS	2	POMO	1	JUPH	25	TH	15
			POMO	3	LYHY	2	JUPH	32	TH	35	POMO	1	BG	2
			STAJ	4	POMO	1	LYHY	1	BG	10	TH	35		
			TH	5	STAJ	1	LYMI	1			BG	5		
			BG	2	TH	4	SOOL	2						
					BG	8	STAJ	15						
							TH	6						
							BG	3						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
4	**5 m**	**2%**	ACMI	2	ACAMa	1	ACPA	1
			BRMI	1	ACMI	1	AICA	1
			CABA	20	AICA	1	CABA	40
			CIVU	1	BAPI	1	DAPU	3
			DAPU	6	CABA	34	ERCA	5
			ERCA	3	DAPU	4	GEDI	1
			GEDI	1	DECO	1	HERA	1
			HYGL	1	ERCA	3	LYAR	6
			LYAR	10	GEDI	2	PSRA	4
			POMO	1	LYAR	3	SOOL	1
			PSRA	1	POMO	1	VELAI	10
			SOAS	1	SOOL	2	TH	20
			SOOL	1	VELAI	25	BG	7
			VELAI	30	TH	15		
			TH	15	BG	6		
			BG	6				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 54 2019 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI	*Juncus bufonius* var. *bufonius*	common toad rush	JUBUB
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Juncus bufonius* var. *congestus*	clustered toad rush	JUBUC2
Acmispon parviflorus	hill lotus	ACPA	*Juncus bufonius* var. *occidentalis*	round-fruited toad rush	JUBUO
Aira caryophyllea	silvery hair-grass	AICA	*Juncus phaeocephalus*	brown-headed rush	JUPH
Avena barbata	slender wild oat	AVBA	*Juncus torreyi*	Torrey's rush	JUTO
Baccharis pilularis	coyote brush	BAPI	*Lasthenia glaberrima*	smooth goldfields	LAGL3
Briza minor	annual quaking grass	BRMI	*Logfia gallica*	narrowleaf cottonrose	LOGA
Bromus diandrus	ripgut grass	BRDI	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Bromus hordeaceus	soft chess	BRHO	*Lysimachia minima*	chaffweed	LYMI
Callitriche marginata	California water-starwort	CAMA	*Lythrum hyssopifolia*	grass poly	LYHY
Carex barbarae	whiteroot	CABA	*Madia sativa*	coast tarweed	MASA
Carex harfordii	Harford's sedge	CAHA4	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Centaurea melitensis	Maltese star-thistle	CEME	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Cicendia quadrangularis	timwort	CIQU	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Cirsium vulgare	bull thistle	CIVU	*Pseudognaphalium ramosissimum*	pink everlasting	PSRA
Clinopodium douglasii	yerba buena	CLDO	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Convolvulus arvensis	field bindweed	COAR4	*Ranunculus californicus*	California buttercup	RACA
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Rumex acetosella*	sheep sorrel	RUAC
Cyperus eragrostis	tall cyperus	CYER	*Rumex crispus*	curly dock	RUCR
Danthonia californica	California oat grass	DACA	*Rumex salicifolius*	willow dock	RUSA
Daucus pusillus	rattlesnake weed	DAPU	*Senecio glomeratus*	cutleaf burnweed	SEGL
Deinandra corymbosa	coastal tarweed	DECO	*Sidalcea malviflora* ssp. *malviflora*	checkerbloom	SIMAM
Deschampsia danthonioides	annual hair grass	DEDA	*Silene gallica*	small-flower catchfly	SIGA
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Eleocharis macrostachya	pale spikerush	ELMA	*Sonchus asper*	prickly sow thistle	SOAS
Elymus glaucus	blue wild-rye	ELGL	*Sonchus oleraceus*	common sow thistle	SOOL
Elymus triticoides	beardless wild rye	ELTR3	*Stachys ajugoides*	bugle hedge nettle	STAJ
Erigeron canadensis	horseweed	ERCA	*Toxicodendron diversilobum*	poison oak	TODI
Erodium botrys	long-beaked filaree	ERBO	*Trifolium albopurpureum*	rancheria clover	TRAL5
Eryngium armatum	coyote thistle	ERAR12	*Trifolium barbigerum*	bearded clover	TRBA
Festuca bromoides	brome fescue	FEBR	*Trifolium microcephalum*	small head clover	TRMI
Gamochaeta ustulata	purple cudweed	GAUS	*Trifolium variegatum*	variegated clover	TRVA
Geranium dissectum	cut-leaved geranium	GEDI	*Triglochin scilloides*	flowering quillwort	TRSC
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO	*Verbena lasiostachys* var. *lasiostachys*	western vervain	VELAL
Heterocodon rariflorum	western pearlflower	HERA	*Veronica peregrina* ssp. *xalapensis*	speedwell	VEPEX
Hordeum brachyantherum	meadow barley	HOBR	*Zeltnera davyi*	Davy's centaury	ZEDA
Horkelia cuneata	wedge-leaved horkelia	HOCU	**Groundcover Codes**		
Hypochaeris glabra	smooth cat's-ear	HYGL	BG	Bare Ground	
Hypochaeris radicata	rough cat's-ear	HYRA	TH	Thatch/Duff	
Isoetes howellii	Howell's quillwort	ISHO	AL	Algae	
Juncus balticus ssp. *ater*	Baltic rush	JUBAa			

Table B-27. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 72

Date	5/30/2019
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke

Vegetation Type	% Cover	Species	Notes
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			

Notes

Pond 72 had small isolated areas of inundation within the vernal pool basin at the time of survey but was dry at the staff gauge. Pond 72 has not historically been surveyed for wetland vegetation, strata 1 through 3 were identified and the correspond transects established in 2019. An upland stratum was mapped and occupied 6% relative cover of wetland but was not included in the cover data.

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
1	**10 m**	**48%**	DISP	3	DISP	9	ELMA	60	DISP	5	DISP	9	DISP	12
			ELMA	38	ELACa	3	DISP	7	ELMA	65	ELMA	53	ELMA	31
			ERAR12	4	ELMA	64	ELACa	1	HOBRb	4	HOBRb	1	HOBRb	1
			HOBRb	1	HOBRb	2	HOBRb	1	JUPH	2	LAGL3	4	JUPH	1
			JUPH	5	JUPH	3	JUPH	4	LAGL3	1	PHLE	1	LAGL3	40
			LAGL3	1	LAGL3	1	LAGL3	1	PLCHh	4	PLCHh	6	PLCHh	2
			PLCHh	3	PLCHh	10	PLCHh	10	RACA	1	RACA	3	TH	12
			TH	40	TH	7	POZI	1	TH	15	TH	20	BG	1
			BG	5	BG	1	TH	10	BG	3	BG	3		
							BG	5						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	**10 m**	**28%**	BRMI	1	BRTEt	1	DEDA	2	DISP	2	DEDA	1	DISP	2
			DEDA	2	CIQU	1	DISP	2	ELACa	3	DISP	1	ELACa	2
			DISP	1	DEDA	11	ELACa	5	ELMA	17	ELACa	8	ELMA	13
			ELACa	2	DISP	2	ELMA	10	ERAR12	35	ELMA	22	ERAR12	55
			ELMA	8	ELACa	11	ERAR12	35	JUPH	14	ERAR12	25	HOBRb	1
			ERAR12	60	ELMA	2	HOBRb	1	LAGL3	7	JUPH	10	JUPH	8
			JUPH	5	ERAR12	41	JUPH	13	LYMI	1	LAGL3	3	LAGL3	3
			LAGL3	4	JUPH	2	LAGL3	3	PHLE	1	LYMI	1	PLCHh	1
			LYMI	1	LAGL3	2	LYMI	1	PLCHh	1	PLCHh	1	TH	10
			PLCHh	1	LYMI	1	PLCHh	1	TH	15	TH	20	BG	5
			POMO	2	PLCHh	1	TH	15	BG	4	BG	8		
			TH	12	POMO	11	BG	12						
			BG	1	TH	12								
					BG	2								
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
3	**10 m**	**18%**	DISP	1	DISP	1	ELTR3	8	DISP	1	DISP	1	DISP	1
			JUPH	78	ELTR3	4	FEBR	1	GEDI	1	GEDI	1	ELACa	2
			LYHY	1	GEDI	2	GEDI	3	JUPH	77	JUPH	73	ERAR12	2
			TH	20	JUPH	60	JUPH	58	TH	20	TH	25	GEDI	1
			BG	0	LYAR	1	TH	25	BG	1	BG	0	JUPH	50
					TH	30	BG	5					TH	44
					BG	2							BG	0
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 72 2019 Species List					
Species Name	**Common Name**	**Species Code**	**Species Name**	**Common Name**	**Species Code**
Achillea millefolium	common yarrow	ACMI	*Juncus bufonius* var. *bufonius*	common toad rush	JUBUB
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Juncus bufonius* var. *congestus*	clustered toad rush	JUBUC2
Acmispon parviflorus	hill lotus	ACPA	*Juncus bufonius* var. *occidentalis*	round-fruited toad rush	JUBUO
Aira caryophyllea	silvery hair-grass	AICA	*Juncus kelloggii*	Kellogg's dwarf rush	JUKE
Avena barbata	slender wild oat	AVBA	*Juncus phaeocephalus*	brown-headed rush	JUPH
Baccharis pilularis	coyote brush	BAPI	*Lasthenia glaberrima*	smooth goldfields	LAGL3
Briza minor	annual quaking grass	BRMI	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Lysimachia minima*	chaffweed	LYMI
Bromus diandrus	ripgut grass	BRDI	*Lythrum hyssopifolia*	grass poly	LYHY
Bromus hordeaceus	soft chess	BRHO	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
Callitriche heterophylla	water starwort	CAHE	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3	*Pogogyne zizyphoroides*	Sacramento mesa mint	POZI
Castilleja densiflora ssp. *densiflora*	dense flower owl's clover	CADED	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Cicendia quadrangularis	timwort	CIQU	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Danthonia californica	California oat grass	DACA	*Ranunculus californicus*	California buttercup	RACA
Deinandra corymbosa	coastal tarweed	DECO	*Rumex acetosella*	sheep sorrel	RUAC
Deschampsia danthonioides	annual hair grass	DEDA	*Rumex salicifolius*	willow dock	RUSA
Distichlis spicata	salt grass	DISP	*Sidalcea malviflora* ssp. *malviflora*	checkerbloom	SIMAM
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Silene gallica*	small-flower catchfly	SIGA
Eleocharis macrostachya	pale spikerush	ELMA	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Elymus triticoides	beardless wild rye	ELTR3	*Sonchus oleraceus*	common sow thistle	SOOL
Erodium botrys	long-beaked filaree	ERBO	*Stachys ajugoides*	bugle hedge nettle	STAJ
Eryngium armatum	coyote thistle	ERAR12	*Taraxia ovata*	sun cups	TAOV
Festuca bromoides	brome fescue	FEBR	*Trifolium barbigerum*	bearded clover	TRBA
Gamochaeta ustulata	purple cudweed	GAUS	*Trifolium microcephalum*	small head clover	TRMI
Geranium dissectum	cut-leaved geranium	GEDI	*Trifolium variegatum*	variegated clover	TRVA
Heterocodon rariflorum	western pearlflower	HERA	*Triglochin scilloides*	flowering quillwort	TRSC
Heterotheca grandiflora	telegraph weed	HEGR	*Vicia sativa* ssp. *sativa*	spring vetch	VISAS
Hordeum brachyantherum ssp. *brachyantherum*	meadow barley	HOBRB	**Groundcover Codes**		
Hypochaeris glabra	smooth cat's-ear	HYGL	BG	Bare Ground	
Hypochaeris radicata	rough cat's-ear	HYRA	TH	Thatch/Duff	
Juncus balticus	Baltic rush	JUBA	AL	Algae	

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APPENDIX C

Stratum Cover by Vernal Pool

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Table C-1. Pond 5 (Reference) Wetland Vegetation Cover by Stratum

POND 5			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**23%**	AGAV	0.3
		CRTR	0.8
		ELMA	84.3
		MALE	1.8
		POMO	1.5
		TH	3.8
		BG	7.3
		TOTAL	**100.0**
2	**1%**	CRTR	0.3
		DISP	22.7
		ELMA	64.7
		MALE	0.7
		POMO	2.0
		TH	7.3
		BG	2.3
		TOTAL	**100.0**

POND 5			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**26%**	ACPA	0.3
		ACWR	0.7
		BAPI	0.7
		BRMI	31.5
		DAPU	0.2
		DISP	10.8
		ELMA	5.0
		ERCA	0.7
		FEBR	0.2
		GAUS	2.7
		GEDI	0.2
		HYRA	3.2
		JUBA	0.3
		JUBUb	0.3
		JUBUc2	0.2
		LYAR	0.2
		LYHY	1.8
		LYMI	0.3
		PLCHh	0.3
		POMO	1.2
		PSLU	0.7
		PSST	0.8
		RUAC	0.2
		RUCR	0.7
		SEGL	2.8
		SOAS	1.2
		SOOL	0.3
		STAJ	6.8
		TH	15.8
		BG	10.0
		TOTAL	**100.0**

Table C-1 (continued). Pond 5 (Reference) Wetland Vegetation Cover by Stratum

POND 5			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	1%	ACAMa	2.0
		BRMI	9.3
		DISP	2.7
		ELACa	0.3
		ELMA	1.7
		ERCA	1.3
		FEBR	0.3
		GAUS	1.3
		GEDI	0.7
		HYRA	0.3
		JUBUb	0.3
		JUPH	16.0
		LYAR	0.7
		LYHY	1.0
		POMO	1.0
		PSLU	1.3
		PSRA	1.0
		PSST	1.3
		RUAC	8.7
		SEGL	3.7
		SOAS	0.3
		SOOL	0.3
		STAJ	1.0
		TH	26.7
		BG	16.7
		TOTAL	**100.0**

POND 5			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
6	45%	CRTR	0.8
		DISP	5.7
		ELMA	45.0
		JUPH	0.5
		MALE	0.3
		POMO	38.8
		RUCR	0.2
		TH	8.5
		BG	0.2
		TOTAL	**100.0**
7	4%	DISP	1.2
		ELACa	0.2
		ELMA	18.8
		GEDI	0.2
		JUBA	31.5
		LYHY	0.5
		TH	26.2
		BG	21.5
		TOTAL	**100.0**

Table C-2. Pond 101 East (East) (Reference) Wetland Vegetation Cover by Stratum

POND 101 East (East)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
2	**34%**	AGAV	1.2
		ELMA	62.7
		LYHY	2.8
		MALE	1.8
		POMO	14.3
		RUCR	0.3
		TH	18.3
		BG	1.8
		TOTAL	**103.3**
5	**46%**	ACAMa	11.5
		AGAV	2.5
		AGLAV	0.2
		BRMI	10.2
		ELACa	0.2
		ERBO	0.5
		ERCA	7.8
		FEBR	0.2
		HECUo	0.2
		HYGL	0.2
		HYRA	0.3
		JUPH	0.7
		LYAR	1.2
		LYHY	0.2
		MASA	0.2
		POMO	0.7
		PSLU	2.3
		PSST	2.0
		RUAC	19.7
		SOOL	0.2
		STAJ	5.8
		TRMI	7.5
		TRVA	0.5
		VISAs	5.0
		TH	11.3
		BG	9.2
		TOTAL	**100.0**

POND 101 East (East)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
6	**20%**	ACAMa	0.3
		CAPR	8.8
		CIVU	0.5
		DISP	0.2
		ERCA	0.3
		GEDI	0.2
		HYGL	0.3
		JUBA	24.3
		PSST	0.2
		RUAC	10.8
		RUCR	0.3
		RUSA	0.7
		SIGA	0.2
		SOAS	0.5
		VELAI	5.0
		VISAn	2.3
		TH	37.2
		BG	7.8
		TOTAL	**100.0**

Table C-3. Pond 997 (Reference) Wetland Vegetation Cover by Stratum

POND 997			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	7%	CIQU	0.8
		CRAQ	0.8
		ELAC	0.0
		ELMA	1.0
		ERAR12	20.2
		ISHO	1.7
		JUPH	0.8
		LAGL3	0.2
		LYHY	4.2
		LYMI	1.0
		PLCHh	15.7
		POMO	21.8
		PSCH	6.8
		TH	14.8
		BG	12.7
		TOTAL	**102.5**
2 (CCG)	**2%**	-	-

POND 997			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	45%	ACAMa	0.7
		AICA	1.8
		BRHO	0.2
		BRMA	2.7
		BRMI	4.5
		BRTEt	0.7
		CAAMa3	1.0
		DACA	1.0
		DECO	1.7
		ERAR12	14.0
		ERBO	1.3
		FEBR	0.5
		FEMY	0.3
		GEDI	0.7
		HYGL	2.0
		ISCA	1.7
		ISCE	1.7
		JUBUb	5.2
		JUCA	0.8
		JUPH	2.3
		LOGA	0.2
		LYAR	0.3
		LYHY	7.8
		LYMI	2.2
		MAGR	8.3
		MASA	7.5
		MIPA	0.8
		PLCO	0.2
		RUAC	1.3
		SIBE	0.2
		SIGA	0.2
		TRIX	0.2
		TH	19.8
		BG	7.0
		TOTAL	**100.7**

Table C-3 (continued). Pond 997 (Reference) Wetland Vegetation Cover by Stratum

POND 997			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
5	**45%**	ACAMa	0.2
		AICA	0.3
		BAPI	0.2
		BRMA	3.0
		BRMI	2.7
		BRTEt	0.2
		CAAMa3	0.3
		DECO	0.5
		ERAR12	0.3
		ERBO	0.7
		GAPO	0.5
		GEDI	1.2
		HYGL	2.7
		ISCA	0.2
		ISHO	0.5
		JUBUb	0.3
		JUPH	43.7
		LOGA	0.2
		LYAR	1.2
		LYHY	4.2
		LYMI	0.5
		MAGR	1.7
		MASA	1.0
		MIPA	0.5
		PLLA	1.0
		POMO	0.2
		PSST	0.2
		SEGL	0.2
		SIBE	0.2
		SOAS	0.3
		SOOL	0.7
		TH	21.2
		BG	10.2
		TOTAL	**100.5**
Upland	**1%**	-	-

Table C-4. Pond 14 (Baseline) Wetland Vegetation Cover by Stratum

POND 14			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**17%**	ELMA	77.3
		TH	14.3
		BG	8.3
		TOTAL	**100.0**
2	**10%**	BRHO	0.3
		ELMA	56.3
		ELTR3	23.0
		FEBR	0.3
		GEDI	0.3
		HOBR	0.7
		MALE	0.3
		PHLE	0.7
		PLCHh	0.3
		RUCR	1.0
		TH	16.7
		BG	0.0
		TOTAL	**100.0**

POND 14			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**36%**	ACMI	1.2
		AICA	1.3
		BRDI	0.7
		BRHO	1.3
		BRMI	1.5
		BRTEt	1.0
		CADEd	0.2
		ELTR3	1.3
		ERBO	0.2
		FEBR	0.7
		GAUS	0.2
		GEDI	2.2
		HYGL	0.7
		JUPH	53.5
		LUCO6	0.3
		LYAR	0.3
		LYMI	0.2
		MA sp.	1.5
		MAGR	3.2
		MIPA	0.2
		RACA	0.3
		TH	26.8
		BG	1.3
		TOTAL	**100.0**

Table C-4 (continued). Pond 14 (Baseline) Wetland Vegetation Cover by Stratum

POND 14			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	37%	BRDI	0.3
		BRHO	0.5
		BRMI	0.5
		BRTEt	0.7
		DECO	0.3
		ELMA	1.0
		ELTR3	4.7
		FEBR	1.2
		FEPE	5.5
		GEDI	0.7
		HYGL	0.8
		HYRA	0.2
		JUBUb	0.2
		JUOC	0.3
		JUPH	44.3
		LYAR	0.2
		LYHY	1.2
		MAGR	0.7
		MALE	3.3
		MASA	4.8
		MIPA	0.5
		PLCHh	0.2
		RACA	0.3
		TRVA	0.2
		TH	23.2
		BG	4.3
		TOTAL	**100.0**

Table C-5. Pond 17 (Baseline) Wetland Vegetation Cover by Stratum

POND 17			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**18%**	TYLA	40.0
		BOFL	15.0
		TH	35.0
		BG	10.0
		TOTAL	**100.0**
2	**2%**	SCCA	60.0
		TH	25.0
		BG	15.0
		TOTAL	**100.0**
3	**5%**	CYER	0.2
		ELMA	50.8
		FEPE	0.2
		JUPH	0.2
		POMO	0.2
		AL	2.2
		TH	44.5
		BG	1.8
		TOTAL	**100.0**
4	**14%**	BOFL	0.0
		CYER	4.3
		ELMA	1.0
		FEPE	1.0
		LYHY	2.7
		POMO	29.7
		RUCR	0.2
		AL	25.0
		TH	20.0
		BG	2.7
		TOTAL	**86.5**

POND 17			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
5	**9%**	BRHO	1.0
		BRMI	1.8
		CYER	4.2
		DACA	0.2
		ELMA	10.3
		FEPE	27.2
		GEDI	0.5
		HOMAg	1.2
		JUBUb	0.5
		JUBUc2	0.3
		LASA	0.2
		LYAR	0.3
		LYHY	11.7
		MAEL	0.3
		PLCO	0.2
		POMO	0.2
		RUCR	2.0
		RUSA	0.2
		SOAS	0.2
		TRVA	11.7
		VIVIv	0.3
		TH	8.2
		BG	20.0
		TOTAL	**102.5**
6	**52%**	BAPI	7.0
		BRMI	0.3
		ELGL	0.3
		FEBR	0.7
		GEDI	1.0
		JUPA	20.3
		JUPH	23.7
		LYAR	0.3
		LYHY	0.7
		RUUR	7.0
		TH	27.0
		BG	11.7
		TOTAL	**100.0**

Table C-6. Pond 21 (Baseline) Wetland Vegetation Cover by Stratum

POND 21			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**27%**	CIQU	0.3
		DEDA	9.7
		ELACa	1.3
		ELMA	8.0
		ERAR12	36.7
		JUPH	1.0
		LAGL3	10.3
		LYHY	0.7
		LYMI	0.7
		MALE	1.0
		PLCHh	3.0
		POMO	6.7
		TH	13.0
		BG	7.7
		TOTAL	**100.0**

POND 21			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
2	**71%**	BRHO	0.8
		BRMI	1.8
		ELACa	3.8
		ELMA	3.5
		ERAR12	0.7
		FEBR	1.3
		GEDI	3.3
		HOBRb	1.5
		HYGL	0.3
		ISHO	2.8
		JUPH	38.8
		LAGL3	2.0
		LYHY	0.3
		LYMI	1.3
		MALE	0.2
		PHLE	1.0
		PLCHh	4.2
		POMO	1.0
		RACA	1.8
		RUAC	0.2
		TH	6.8
		BG	22.3
		TOTAL	**100.0**
Upland	**2%**	-	-

Table C-7. Pond 101 East (West) (Year 1 Post-Mastication) Wetland Vegetation Cover by Stratum

POND 101 East (West)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**0.3%**	AGAV	0.3
		ALSA	1.0
		ELACa	5.3
		ELMA	26.0
		GNPA	0.7
		LYHY	1.0
		MALE	18.3
		POAVd	0.7
		POMO	10.3
		VELAl	1.7
		BG	11.7
		TH	23.0
		TOTAL	**100.0**
2	**52%**	AGAV	0.7
		ALSA	0.3
		DEDA	0.2
		ELACa	1.7
		ELMA	39.3
		LAGL3	19.5
		LYHY	0.2
		PHLE	0.3
		PLCHh	1.2
		POMO	2.7
		RUCR	0.3
		TH	31.2
		BG	2.5
		TOTAL	**100.0**

POND 101 East (West)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**10%**	DEDA	0.5
		DISP	2.8
		ELMA	1.8
		ERAR12	16.7
		FEPE	1.5
		HECUo	4.2
		ISHO	1.7
		JUBA	0.2
		JUBUb	0.2
		JUPH	2.7
		LAGL3	1.2
		LYHY	3.8
		LYMI	0.8
		PLCHh	32.5
		PLCO	1.3
		POMO	7.0
		PSLU	0.2
		PSST	0.2
		RUCR	0.5
		STAJ	3.0
		TRVA	0.3
		TH	9.7
		BG	7.3
		TOTAL	**100.0**

Table C-7 (continued). Pond 101 East (West) (Year 1 Post-Mastication) Wetland Vegetation Cover by Stratum

POND 101 East (West)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**11%**	AGAV	0.5
		BRHO	0.5
		BRMI	1.7
		DISP	0.3
		ELMA	0.3
		FEBR	10.8
		GAUS	0.3
		GEDI	0.2
		HECUo	2.0
		HYGL	0.5
		JUBA	0.8
		JUPH	2.5
		LYAR	0.2
		LYHY	0.8
		MAGR	15.0
		MASA	39.0
		POMO	2.0
		PSLU	0.2
		RUAC	9.2
		STAJ	0.2
		TRMI	1.2
		VISAn	2.3
		VISAs	1.7
		TH	5.5
		BG	2.3
		TOTAL	**100.0**

POND 101 East (West)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
5	**20%**	BRMI	1.5
		ELACa	7.7
		ELMA	3.7
		FEBR	13.5
		FEPE	43.0
		GEDI	0.8
		HYGL	2.7
		HYRA	0.7
		JUBUb	0.8
		LYAR	0.2
		LYHY	2.8
		LYMI	0.5
		MASA	1.3
		RUCR	0.3
		SOOL	0.5
		STAJ	0.2
		TRBA	0.2
		TRVA	0.2
		TH	16.2
		BG	3.3
		TOTAL	**100.0**
6	**5%**	ACAMa	2.3
		BRMI	8.7
		DISP	0.3
		FEBR	6.3
		HYGL	1.3
		JUBA	0.7
		JUBUb	0.3
		JUPH	28.0
		LYHY	1.0
		PLCO	2.0
		POMO	0.3
		RUAC	8.3
		SOOL	0.3
		STAJ	0.3
		VISAs	1.0
		TH	31.7
		BG	7.0
		TOTAL	**100.0**

Table C-7 (continued). Pond 101 East (West) (Year 1 Post-Mastication) Wetland Vegetation Cover by Stratum

POND 101 East (West)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
8	2%	BRMI	1.3
		DISP	0.3
		ELACa	1.7
		ELMA	7.0
		EUOC	14.7
		FEBR	0.3
		FEPE	0.7
		HOBRb	0.3
		JUBA	1.7
		JUBUb	1.3
		JUPH	1.3
		LYHY	7.3
		MALE	0.3
		PLCHh	1.3
		POMO	23.7
		PS sp.	0.7
		RUCR	0.3
		SOOL	0.3
		TRVA	0.7
		TH	32.7
		BG	2.0
		TOTAL	**100.0**

Table C-8. Pond 101 West (Year 1 Post-Mastication) Wetland Vegetation Cover by Stratum

POND 101 West			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	33%	COCO	0.2
		DEDA	0.5
		ELACa	0.7
		ELMA	3.7
		EUOC	2.8
		HECUo	0.5
		ISHO	0.5
		LAGL3	17.5
		LYHY	0.3
		PLCHh	46.0
		POMO	9.0
		ROCU	0.5
		RUCR	5.3
		TRSC	2.3
		TH	2.8
		BG	7.3
		TOTAL	**100.0**

POND 101 West			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
2	62%	AICA	0.2
		BAPI	0.2
		BRHO	0.2
		BRMI	2.2
		COCO	0.2
		DACA	0.3
		DISP	3.0
		ELACa	0.7
		ELMA	0.7
		FEBR	15.3
		FEPE	2.0
		GEDI	1.2
		HOBR	1.0
		HOMAg	1.7
		HYGL	0.8
		HYRA	1.2
		JUBUb	4.0
		LYAR	0.2
		LYHY	2.5
		LYMI	0.2
		MAGR	35.8
		PLCHh	2.0
		PLCO	0.8
		POMO	1.3
		RUAC	3.7
		RUSA	2.2
		SOOL	0.7
		TRBA	0.2
		TRMI	0.3
		TRVA	1.7
		VELAl	0.2
		VISAs	1.0
		TH	9.7
		BG	3.5
		TOTAL	**100.5**

Table C-8 (continued). Pond 101 West (Year 1 Post-Mastication) Wetland Vegetation Cover by Stratum

POND 101 West			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**5%**	COCO	1.3
		ELMA	62.3
		HECUo	6.0
		LAGL3	1.0
		LYHY	5.0
		PLCHh	0.3
		POMO	1.7
		RUCR	1.3
		TH	12.3
		BG	8.7
		TOTAL	**100.0**

Table C-9. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 41			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**23%**	DEDA	0.3
		ELACa	10.5
		ELMA	27.8
		ISHO	0.3
		JUPH	1.2
		LAGL3	2.7
		MALE	0.2
		PHLE	1.0
		PLCHh	2.2
		POMO	25.5
		STAJ	0.2
		TH	19.7
		BG	8.5
		TOTAL	**100.0**
2	**52%**	DEDA	0.2
		ELACa	15.3
		ELMA	21.3
		ERAR12	6.0
		FEBR	0.3
		GEDI	3.7
		JUPH	0.7
		LAGL3	3.0
		MALE	0.7
		PHLE	2.5
		PLCHh	13.7
		POMO	4.5
		RUCR	0.2
		STAJ	15.7
		TH	12.2
		BG	0.3
		TOTAL	**100.2**

POND 41			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**16%**	AICA	0.2
		BRHO	0.3
		BRMI	1.7
		CAAMa3	0.3
		ELACa	0.8
		ELMA	0.7
		ERAR12	5.7
		ERBO	0.7
		FEBR	0.3
		GEDI	2.7
		ISHO	0.7
		JUPH	36.3
		LYHY	0.5
		LYMI	1.0
		MALE	1.5
		MASA	1.5
		PLCHh	1.2
		POMO	0.8
		SOOL	0.2
		STAJ	6.2
		TH	34.8
		BG	2.0
		TOTAL	**100.0**

Table C-9 (continued). Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 41			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**6%**	AGPA	1.3
		AICA	0.3
		BRMI	2.0
		BRTEt	0.3
		CAAMa3	0.3
		DACA	39.7
		ELMA	0.2
		ERAR12	3.5
		ERBO	0.3
		ERCA	0.2
		FEBR	0.5
		GAAP	0.2
		GEDI	1.7
		HYGL	1.2
		ISHO	0.2
		JUPH	0.7
		LUCO6	0.2
		LYAR	0.2
		LYHY	0.3
		LYMI	0.2
		MASA	0.2
		STAJ	2.5
		ZEDA	0.2
		TH	35.8
		BG	8.0
		TOTAL	**100.0**
Upland	**3%**	**-**	**-**

Table C-10. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 3 North			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
2	**14%**	COCO	0.3
		ELACa	0.3
		ELMA	54.8
		ERAR12	4.8
		GAUS	0.2
		JUPH	0.7
		LYHY	0.3
		PLCHh	0.7
		POMO	14.8
		SCCA	0.2
		TH	13.7
		BG	9.2
		TOTAL	**100.0**

POND 3 North			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**43%**	BRMI	0.2
		ELACa	3.5
		ELMA	1.2
		ERAR12	14.7
		FEPE	1.2
		HOMAg	0.2
		JUBUb	4.0
		JUBUc2	0.2
		JUPH	7.3
		LYHY	4.3
		MAGR	0.7
		MASA	1.0
		PLCO	12.3
		POMO	14.3
		PSCH	0.2
		TRAN	0.7
		TRVA	2.0
		VISAn	0.3
		TH	16.2
		BG	15.7
		TOTAL	**100.0**
4 (CCG)	**43%**	-	-

Table C-11. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 3 South			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	22%	BRTEt	0.2
		COCO	0.2
		CRAQ	1.0
		DEDA	0.7
		ELACa	0.8
		ELMA	12.0
		ERAR12	18.7
		JUPH	3.3
		LAGL3	2.0
		LYHY	0.8
		LYMI	0.5
		PLCHh	2.2
		PLCO	0.2
		POMO	13.2
		TH	22.2
		BG	22.2
		TOTAL	**100.0**

POND 3 South			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
2	20%	BRMI	1.5
		BRTEt	1.5
		CAAMa3	0.7
		DACA	2.7
		DECO	4.5
		ERAR12	0.3
		ERBO	0.2
		FEBR	0.7
		FEPE	0.5
		GEDI	0.8
		HYGL	0.8
		ISCA	0.2
		ISCE	1.2
		ISHO	0.2
		JUBUb	0.5
		JUBUo	0.2
		JUCA	0.2
		JUPH	49.7
		LYHY	2.5
		LYMI	1.7
		MALE	1.3
		MIPA	0.7
		PLCO	0.5
		POMO	1.2
		RACA	0.3
		SIGA	0.3
		TRDE	0.5
		TRVA	1.2
		TH	3.7
		BG	20.0
		TOTAL	**99.7**

Table C-11 (continued). Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 3 South			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**47%**	ACMI	0.5
		AICA	0.2
		BRHO	0.2
		BRMI	2.0
		BRTEt	1.7
		CAAMa3	0.7
		CAUN	1.0
		DACA	20.7
		DECO	14.2
		ERBO	0.2
		FEBR	0.3
		GAUS	2.3
		GEDI	1.2
		HYGL	0.7
		HYRA	0.3
		JUBUo	0.3
		JUPH	3.2
		LOGA	1.2
		LYAR	1.7
		LYHY	8.2
		LYMI	0.8
		PLCO	0.3
		PLER	0.5
		PSCH	0.2
		SIGA	0.2
		SIMAm	2.8
		SOOL	0.3
		TRHY3	0.8
		ZEDA	0.2
		TH	11.0
		BG	22.3
		TOTAL	**100.0**

POND 3 South			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**5%**	BRDI	0.2
		BRHO	0.5
		BRMI	1.0
		BRTEt	1.2
		DACA	2.5
		DECO	1.5
		ELMA	9.2
		ERCA	0.3
		FEBR	2.5
		FEPE	33.0
		GEDI	6.8
		HOBR	0.2
		HYGL	1.7
		HYRA	0.7
		JUPH	4.5
		LYAR	0.5
		LYHY	2.2
		MA sp.	0.5
		MALE	1.8
		MIPA	0.3
		POMO	0.2
		RACA	1.0
		SIGA	1.0
		SOOL	3.3
		TRDU	0.2
		TRBA	0.2
		TRVA	0.3
		ZEDA	0.2
		TH	13.3
		BG	10.0
		TOTAL	**100.7**
5 (CCG)	**0.2%**	-	-
Upland	**6%**	-	-

Table C-12. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 39			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	6%	COCO	0.3
		ELACa	24.7
		ELMA	38.3
		JUPH	0.3
		LYHY	0.3
		PLCHh	1.0
		POMO	1.3
		TRSC	0.7
		TH	25.3
		BG	7.7
		TOTAL	**100.0**

POND 39			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
2	7%	AICA	0.3
		BRMI	0.7
		BRTEt	1.0
		DACA	2.7
		DEDA	1.7
		ELACa	2.3
		ELMA	11.7
		ERAR12	22.0
		FEBR	6.0
		FEPE	1.7
		GEDI	1.7
		HO sp.	0.3
		HYGL	0.3
		JUBUb	0.7
		JUEF	0.3
		JUOC	0.3
		JUPH	11.7
		LYHY	1.3
		MAGR	0.3
		MIPA	0.3
		PLCO	1.3
		POMO	7.7
		SOOL	0.3
		TAOV	0.7
		TRAN	0.7
		TRDU	0.3
		VISAs	0.3
		TH	17.7
		BG	3.7
		TOTAL	**100.0**

Table C-12 (continued). Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 39			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**34%**	ACAMa	0.2
		BRDI	0.3
		BRHO	0.7
		BRMI	0.2
		BRTEt	0.3
		DACA	10.8
		DECO	0.8
		ERBO	0.5
		FEBR	1.3
		FEPE	40.5
		GEDI	3.2
		HYGL	0.3
		JUBUb	0.2
		JUBUc2	0.2
		JUOC	1.3
		JUPH	2.5
		LYAR	0.2
		LYHY	0.5
		MAEL	0.2
		MAGR	2.0
		PLCO	5.2
		SOOL	0.3
		TAOV	0.5
		VISAs	1.8
		ZEDA	0.2
		TH	25.8
		BG	1.2
		TOTAL	**101.2**

POND 39			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**48%**	ACAMa	0.7
		ACPA	2.7
		AICA	0.7
		BRDI	0.2
		BRHO	0.5
		BRMI	1.0
		BRTEt	0.2
		CADEd	0.5
		DACA	14.8
		ERBO	0.7
		FEBR	0.8
		GEDI	0.7
		HYGL	0.7
		JU sp.	0.3
		JUBUb	0.5
		JUBUc2	0.2
		JUOC	0.5
		JUPH	1.5
		LYAR	0.5
		LYHY	0.2
		MAEX	0.2
		MAGR	0.7
		PLCO	5.7
		SIGA	0.5
		SIMAm	3.3
		TAOV	0.3
		TRAN	38.3
		TRDU	1.5
		TRMI	0.2
		VISAs	0.3
		TH	14.3
		BG	7.5
		TOTAL	**100.5**
Upland	**5%**	-	-

Table C-13. Pond 40 North (Year 2 Post-Burn) Wetland Vegetation Cover by Stratum

POND 40 North			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
2	**21%**	COCO	3.0
		ELMA	40.0
		GAUS	1.0
		LYHY	3.7
		PLCO	3.7
		POMO	1.0
		PSCH	1.7
		RUCR	0.3
		SOOL	0.7
		TH	29.0
		BG	16.0
		TOTAL	**100.0**
3	**33%**	BRTEt	0.3
		ELACa	1.3
		ELMA	2.3
		ERAR12	22.0
		ERCA	0.3
		JUPH	8.3
		LYHY	1.0
		PLCO	24.7
		POMO	0.7
		PSCH	0.3
		VIHI	0.3
		TH	21.7
		BG	16.7
		TOTAL	**100.0**

POND 40 North			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**46%**	BRHO	0.3
		BRMI	1.0
		FEPE	0.3
		GEDI	0.3
		HYGL	0.7
		JUPH	47.3
		LYHY	1.7
		MAGR	3.0
		PLCO	7.0
		RUCR	0.3
		TH	34.3
		BG	4.7
		TOTAL	**101.0**

Table C-14. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 40 South			
Stratum	Relative % Cover of Wetland	Species	% Cover
1	10%	BRMI	0.7
		ELACa	2.0
		ELMA	21.3
		FEPE	0.3
		JUPH	0.7
		LYHY	0.7
		LYMI	0.7
		PLCHh	37.0
		PLCO	5.3
		POMO	4.0
		TH	20.7
		BG	7.3
		TOTAL	**100.7**
2	44%	ACAMa	3.7
		AICA	1.0
		BRHO	1.0
		BRMI	1.3
		ERBO	1.0
		FEBR	0.3
		FEMY	0.7
		GEDI	0.3
		HYGL	15.3
		JUBUb	0.3
		JUCA	1.0
		JUPH	31.0
		PLCO	14.3
		RUAC	1.0
		SIGA	1.3
		SOOL	0.3
		TRAN	1.0
		TRDU	1.0
		VISAn	1.0
		TH	4.7
		BG	21.7
		TOTAL	**103.3**

POND 40 South			
Stratum	Relative % Cover of Wetland	Species	% Cover
3	46%	ACPA	0.5
		AICA	0.2
		AVBA	0.2
		BRDI	0.5
		BRHO	0.5
		BRMI	0.7
		BRTEt	1.0
		DACA	5.2
		DECO	1.2
		ELMA	0.5
		ERBO	0.2
		FEBR	0.8
		FEPE	21.3
		GEDI	4.7
		HYGL	3.7
		HYRA	0.3
		JUBUc2	0.2
		JUOC	6.2
		LYAR	0.3
		MAEL	2.7
		MAEX	0.2
		MAGR	8.2
		PLCO	0.7
		TAOV	0.3
		TRAN	6.0
		TRDU	10.7
		TRGR	0.2
		VISAn	5.5
		TH	14.8
		BG	3.0
		TOTAL	**100.2**

Table C-15. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 43			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**19%**	BRMI	0.2
		BRTEt	0.2
		CIQU	1.0
		CRAQ	1.2
		DECO	0.7
		DEDA	4.0
		ELACa	2.5
		ERAR12	5.7
		JUBUb	0.3
		JUCA	0.2
		JUPH	4.2
		LYAR	0.2
		LYHY	0.7
		LYMI	1.0
		MA sp.	0.2
		PLCHh	17.5
		POMO	15.0
		POZI	6.8
		PSCH	1.0
		SOAS	0.2
		TAOV	0.2
		TH	20.2
		BG	20.2
		TOTAL	**102.7**

POND 43			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
2	**67%**	AICA	0.2
		BRHO	1.2
		BRMI	0.3
		BRTEt	4.2
		CIQU	0.8
		CRAQ	0.2
		DACA	0.5
		DECO	0.2
		DEDA	1.8
		ELACa	2.3
		ERAR12	8.7
		FEBR	0.2
		ISHO	1.5
		JUCA	0.7
		JUOC	0.2
		JUPH	23.8
		LYHY	1.7
		LYMI	2.0
		NAME	0.2
		PLCHh	2.3
		POMO	13.3
		POZI	1.0
		PSCH	2.7
		TRMI	0.2
		TRSC	0.2
		TH	20.8
		BG	9.3
		TOTAL	**100.3**

Table C-15 (continued). Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 43			
Stratum	Relative % Cover of Wetland	Species	% Cover
3	14%	ACAMa	3.7
		AGLAV	0.3
		AICA	0.7
		BRHO	1.0
		BRMI	1.0
		BRTEt	0.3
		CIQU	0.3
		DACA	16.0
		DECO	1.3
		DEDA	0.3
		ERAR12	2.7
		FEBR	1.3
		GAUS	0.3
		GEDI	1.0
		HYGL	1.0
		ISCA	0.7
		JUBUb	1.0
		JUCA	1.3
		JUPH	2.0
		LOFI	0.3
		LUCO6	0.3
		LYAR	0.3
		LYHY	0.3
		LYMI	1.0
		MAGR	1.7
		PLCHh	0.7
		PLCO	0.3
		PLER	0.3
		POMO	0.7
		PSCH	0.7
		SOAS	0.3
		TAOV	1.0
		TRDU	7.3
		TROB	1.0
		TRPU	1.0

POND 43			
Stratum	Relative % Cover of Wetland	Species	% Cover
3 (cont.)	14%	ZEDA	0.3
		TH	11.0
		BG	34.7
		TOTAL	**99.7**

Table C-16. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 35			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**13%**	COCO	2.3
		CRAQ	0.5
		DEDA	0.2
		ELMA	0.8
		LYHY	3.8
		PLCHh	76.5
		PLCO	6.8
		PSCH	4.8
		TRSC	0.3
		TH	1.3
		BG	5.8
		TOTAL	**103.3**
2	**29%**	BRTEt	0.5
		DEDA	0.5
		ELMA	0.3
		FEPE	0.2
		LYHY	1.0
		PLCHh	0.3
		PLCO	25.2
		PSCH	3.0
		TH	34.7
		BG	34.3
		TOTAL	**100.0**
3	**5%**	HOBR	38.7
		FEPE	2.0
		LYHY	0.3
		PLCHh	1.0
		PLCO	8.7
		PSCH	2.3
		RUAC	0.3
		TH	45.3
		BG	1.3
		TOTAL	**100.0**

POND 35			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**53%**	ACPA	0.2
		AICA	0.3
		AVBA	0.2
		BRHO	0.8
		BRMI	0.3
		BRTEt	0.7
		DACA	1.2
		DEDA	0.7
		ERBO	6.8
		FEBR	0.3
		FEPE	24.0
		GEDI	1.3
		HOBR	0.2
		HYGL	0.3
		LYHY	0.2
		PLCO	1.0
		PSCH	0.2
		RUAC	0.2
		RUCR	0.3
		TRAN	15.3
		TH	30.0
		BG	9.7
		TOTAL	**94.2**

Table C-17. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 42			
Stratum	Relative % Cover of Wetland	Species	% Cover
1	3%	ELACa	58.7
		ERAR12	4.7
		JUPH	7.0
		LAGL3	2.3
		PLCHh	1.3
		POMO	0.7
		TH	24.7
		BG	0.7
		TOTAL	**100.0**
2	3%	COCO	3.0
		ELACa	5.0
		ELMA	43.3
		ERAR12	0.7
		JUPH	0.7
		LAGL3	5.3
		LYHY	0.3
		PLCHh	0.7
		POMO	17.0
		PSCH	0.7
		TH	22.0
		BG	1.3
		TOTAL	**100.0**
3	44%	BRTEt	0.3
		DEDA	1.0
		ELACa	24.5
		ERAR12	29.0
		JUPH	12.7
		LAGL3	2.7
		LYHY	0.7
		PLCHh	0.8
		POMO	1.0
		TH	19.3
		BG	8.0
		TOTAL	**100.0**

POND 42			
Stratum	Relative % Cover of Wetland	Species	% Cover
4	14%	AICA	1.0
		AVBA	0.3
		BRMI	1.0
		DACA	19.0
		DECO	16.7
		FEMY	1.0
		GAPH	1.7
		JUBUb	7.7
		JUBUc2	0.3
		JUCA	1.7
		LOFI	0.7
		LYAR	2.3
		LYHY	1.0
		PLER	0.3
		PSCH	0.3
		TRDU	0.3
		ZEDA	0.7
		TH	19.7
		BG	24.3
		TOTAL	**100.0**
5	18%	COCO	33.3
		POMO	35.0
		TH	27.3
		BG	4.3
		TOTAL	**100.0**
Upland	18%	-	-

Table C-18. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 44			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	52%	AGLAV	2.0
		BRMI	0.7
		BRTEt	2.7
		CIQU	0.7
		CRAQ	0.3
		DEDA	0.7
		ELACa	16.7
		ERAR12	23.3
		GEDI	0.3
		HECUo	0.3
		ISHO	4.0
		JUBUb	0.3
		JUCA	0.7
		LAGL3	1.3
		LYHY	2.3
		LYMI	2.0
		PLCHh	5.7
		PLER	0.3
		POMO	3.3
		POZI	1.0
		PSCH	2.0
		TRDU	3.0
		TRVA	1.3
		TH	9.0
		BG	16.0
		TOTAL	**100.0**

POND 44			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	27%	ACPA	1.0
		AICA	1.0
		BAPI	0.7
		BRMA	0.7
		BRMI	0.7
		BRTEt	0.7
		DACA	22.3
		DECO	1.0
		ELACa	0.3
		ERAR12	2.0
		ERBO	1.0
		FEBR	0.3
		GEDI	0.3
		HYGL	1.0
		JUBUb	1.3
		JUCA	0.7
		JUOC	0.3
		LOFI	0.3
		LUCO6	0.3
		LYAR	3.3
		LYHY	0.7
		LYMI	1.0
		MAGR	6.0
		PLCO	5.0
		SIGA	0.3
		SOOL	0.3
		TAOV	0.7
		TRDU	7.0
		TRPU	1.3
		TH	7.0
		BG	31.0
		TOTAL	**99.7**

Table C-18 (continued). Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 44			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**7%**	BRMI	1.0
		BRTEt	8.7
		CIQU	0.3
		ELACa	3.0
		ERAR12	10.3
		GEDI	1.3
		HYGL	1.0
		ISHO	0.3
		JUBUb	0.3
		JUCA	1.0
		JUPH	26.7
		LAGL3	0.3
		LYHY	2.7
		LYMI	0.7
		MA sp.	0.3
		PLCHh	1.0
		PLCO	0.7
		POMO	1.3
		POZI	0.7
		PSCH	2.3
		TRDU	2.3
		TH	15.3
		BG	18.3
		TOTAL	**100.0**
Upland	**14%**	-	-

Table C-19. Pond 56 (Year 2 Post-Mastication) Wetland Vegetation Cover by Stratum

POND 56			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**5%**	-	-
2	**19%**	ELMA	48.3
		TH	32.5
		BG	19.2
		TOTAL	**100.0**
3	**31%**	DISP	29.5
		ELACa	1.0
		ELMA	41.2
		JUPH	1.5
		RUCR	0.5
		TH	23.3
		BG	3.0
		TOTAL	**100.0**
4	**41%**	DISP	5.0
		ELACa	0.8
		ELMA	0.3
		ERAR12	1.7
		ISHO	2.3
		JUPH	46.7
		LYHY	0.2
		PHLE	0.5
		POMO	2.2
		STAJ	0.7
		TH	39.7
		BG	0.0
		TOTAL	**100.0**

POND 56			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
5	**0.3%**	AGAV	8.0
		BRTEt	0.3
		ELACa	13.3
		ERAR12	1.0
		ISHO	0.5
		JUPH	26.0
		LYHY	1.8
		LYMI	0.3
		MALE	5.3
		POMO	1.5
		TH	33.7
		BG	8.2
		TOTAL	**100.0**
Upland	**4%**	-	-

Table C-20. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 60			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**10%**	DISP	0.2
		ELMA	68.5
		MALE	0.2
		TH	22.5
		BG	8.7
		TOTAL	**100.0**
2	**46%**	DISP	11.3
		ELMA	62.0
		JUPH	0.8
		TH	24.2
		BG	1.7
		TOTAL	**100.0**
3	**20%**	BRMI	0.5
		DISP	2.5
		ELACa	0.8
		ISHO	0.2
		JUPH	71.8
		LYHY	3.0
		POMO	1.0
		PSLU	0.3
		RUCR	0.2
		SOAS	0.2
		STAJ	3.3
		TH	12.5
		BG	3.7
		TOTAL	**100.0**

POND 60			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**24%**	COCO	0.2
		DISP	8.5
		ELACa	0.3
		ELMA	34.5
		JUPH	7.5
		POMO	30.8
		STAJ	1.2
		TH	17.0
		BG	0.0
		TOTAL	**100.0**

Table C-21. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 61			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**1%**	AGLAV	0.3
		BRMI	0.2
		BRTEt	1.5
		CAMA	0.2
		CRAQ	0.5
		DEDA	0.3
		ELACa	0.8
		ELMA	8.2
		ISHO	15.5
		JUPH	0.8
		LAGL3	3.5
		LYHY	4.7
		LYMI	0.5
		MIPA	0.3
		PLCHh	1.3
		PLER	0.2
		POMO	2.2
		POZI	1.5
		PS sp.	0.2
		PSCH	3.0
		TRSC	0.3
		TH	28.0
		BG	26.0
		TOTAL	**100.0**
2 (CCG)	**4%**	-	-

POND 61			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**4%**	BRMI	0.5
		BRTEt	6.3
		CIQU	0.3
		CRAQ	0.2
		DEDA	9.0
		ELACa	1.7
		ERAR12	4.7
		GEDI	0.5
		JUPH	17.0
		LAGL3	3.2
		LYHY	5.7
		LYMI	0.8
		MIPA	0.5
		PLCHh	27.8
		POMO	0.5
		POZI	0.3
		PSCH	1.2
		TRVA	0.2
		TH	15.0
		BG	6.5
		TOTAL	**101.8**

Table C-21 (continued). Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 61			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**55%**	ACAMa	0.2
		ACMI	0.2
		AICA	0.2
		AVBA	0.2
		BRMA	5.0
		BRMI	1.0
		BRTEt	0.8
		CAAMa3	0.2
		DACA	3.7
		ELACa	0.5
		ERAR12	1.3
		ERBO	0.2
		GAUS	0.2
		GEDI	10.0
		HYGL	1.3
		ISCA	0.3
		JUBUb	0.2
		JUCA	0.2
		JUPH	29.8
		LUCO6	0.2
		LYAR	1.3
		LYHY	1.3
		LYMI	0.3
		MAGR	2.3
		MASA	3.0
		MIPA	1.8
		PLCHh	0.5
		POMO	0.8
		PS sp.	0.2
		RACA	0.2
		SIBE	0.2
		SIGA	0.2
		SOOL	0.7
		TH	22.3
		BG	9.3
		TOTAL	**100.0**
Upland	**36%**	-	-

Table C-22. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 73			
Stratum	Relative % Cover of Wetland	Species	% Cover
1	6%	DEDA	0.3
		ELACa	11.7
		ELMA	53.3
		LAGL3	0.7
		PLCHh	1.0
		POMO	1.7
		TH	26.7
		BG	4.7
		TOTAL	**100.0**
2	77%	BRTEt	0.3
		DEDA	1.0
		ELACa	6.2
		ELMA	0.2
		ERAR12	7.7
		ISHO	2.7
		JUPH	44.3
		LAGL3	1.0
		LYHY	3.2
		LYMI	0.2
		PLCHh	1.8
		POMO	3.8
		TH	21.5
		BG	6.2
		TOTAL	**100.0**
3	8%	CRAQ	0.3
		DEDA	0.3
		ELACa	4.0
		ERAR12	3.0
		ISHO	48.3
		JUPH	3.0
		LYHY	1.3
		PLCHh	1.3
		POMO	5.0
		PSCH	0.3
		TH	28.0
		BG	5.0
		TOTAL	**100.0**

POND 73			
Stratum	Relative % Cover of Wetland	Species	% Cover
4	7%	BRMI	0.3
		BRTEt	0.7
		DEDA	0.3
		ELACa	1.0
		ERAR12	35.7
		JUBUb	1.0
		JUPH	4.0
		LYHY	1.0
		LYMI	0.7
		POMO	3.3
		PSCH	0.7
		ZEDA	0.3
		TH	19.3
		BG	31.7
		TOTAL	**100.0**
Upland	**2%**	-	-

Table C-23. Machine Gun Flats (Year 2 Post-Mastication) Wetland Vegetation Cover by Stratum

Machine Gun Flats			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**0.3%**	PEAM	45.0
		ELMA	35.0
2	**61%**	AGAV	0.2
		COCO	0.5
		DISP	1.7
		ELACa	1.8
		ELMA	62.5
		JUBA	0.2
		JUPH	0.5
		LYHY	0.5
		PEAM	1.5
		POMO	1.7
		TRSC	0.2
		TH	11.8
		BG	17.0
		TOTAL	**100.0**
3	**0.4%**	AGAV	0.3
		BRMI	1.3
		DECO	1.0
		ELTR3	0.7
		ERCA	0.7
		FEPE	0.3
		HYRA	2.0
		JUBAa	0.3
		LYHY	9.3
		MALE	18.3
		MASA	7.0
		PLCO	3.3
		POMO	38.7
		PSLU	0.3
		PSST	0.7
		SEGL	0.3
		TH	13.0
		BG	2.3
		TOTAL	**100.0**

Machine Gun Flats			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**8%**	BRMI	0.8
		DECO	3.5
		DISP	4.2
		ERAR12	15.7
		ERBO	0.5
		FEBR	0.2
		FEPE	0.7
		GEDI	1.0
		HYGL	2.0
		JUPH	18.8
		LIBI5	0.3
		LYHY	0.7
		MALE	2.0
		PHLE	0.2
		PLCHh	0.2
		PSLU	0.2
		RUCR	0.2
		SOOL	2.7
		STAJ	2.7
		TH	43.2
		BG	0.5
		TOTAL	**100.0**
5	**2%**	DISP	1.3
		ELACa	5.0
		GEDI	0.3
		JUBAa	46.0
		JUPH	0.7
		LYHY	1.0
		MALE	0.3
		TH	40.3
		BG	5.0
		TOTAL	**100.0**

Table C-23 (continued). Machine Gun Flats (Year 2 Post-Mastication) Wetland Vegetation Cover by Stratum

Machine Gun Flats			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
6	**1%**	AGAV	0.7
		DISP	0.3
		ELACa	15.7
		ELMA	1.3
		EUOC	12.0
		JUBAa	34.3
		LYHY	1.3
		POMO	1.0
		TH	22.3
		BG	11.0
		TOTAL	**100.0**
7	**10%**	AGLAV	0.3
		AICA	1.2
		BRMI	1.5
		BRTEt	0.2
		CAAMa3	4.7
		CLPUq	0.2
		DACA	0.2
		DECO	0.2
		ELACa	0.5
		ERAR12	10.8
		FEBR	1.0
		FEPE	0.2
		GAUS	0.2
		HYGL	0.3
		JUBUb	0.5
		JUCA	1.2
		JUPH	3.0
		LYAR	0.2
		LYHY	1.0
		LYMI	0.3
		PLCO	9.8
		PSCH	0.2
		ZEDA	0.5
		TH	31.7
		BG	30.3
		TOTAL	**100.0**

Machine Gun Flats			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
8	**15%**	BRMI	1.2
		BRTEt	0.3
		CAAMa3	0.2
		DACA	21.7
		DECO	0.5
		ERAR12	5.2
		ERBO	0.2
		FEBR	24.3
		FEPE	14.8
		HYGL	2.2
		JUCA	0.2
		JUPH	0.5
		LIBI5	1.8
		LYAR	0.2
		LYHY	0.8
		LYMI	0.2
		TH	23.3
		BG	2.5
		TOTAL	**100.0**
9	**2%**	BRMI	0.3
		ELACa	1.0
		ELTR3	21.7
		ERCA	8.0
		FEBR	0.3
		GEDI	0.3
		HYRA	2.0
		JUBAa	1.7
		JUBUc2	0.7
		LYAR	5.7
		LYHY	1.3
		NUTE	0.3
		PSLU	1.0
		PSRA	0.7
		PSST	1.0
		RUAC	0.3
		RUCR	0.3
		SEGL	1.7
		SOOL	3.3
		TH	40.7
		BG	7.7
		TOTAL	**100.0**

Table C-24. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 16			
Stratum	Relative % Cover of Wetland	Species	% Cover
1	2%	CIVU	2.3
		ELMA	0.7
		GNPA	7.0
		HECUo	6.3
		PSLU	12.0
		SCCA	28.0
		SOAM	0.3
		TH	5.0
		BG	38.3
		TOTAL	**100.0**
3	22%	ELMA	68.8
		GNPA	3.5
		MALE	0.2
		POMO	1.2
		TH	21.8
		BG	4.5
		TOTAL	**100.0**
4	31%	ACMI	0.3
		BRHO	0.2
		BRMI	0.2
		CAPR	47.7
		CIVU	1.7
		ELMA	0.2
		ELTR3	0.3
		ERCA	0.5
		GEDI	0.2
		GNPA	0.3
		HYGL	0.2
		JUBA	3.7
		JUPH	14.7
		MA sp.	0.8
		PEGA	0.3
		POMO	0.2
		PSLU	0.2
		RUUR	8.7
		SOEL	0.2
		STAJ	0.2
		TH	17.5
		BG	2.7
		TOTAL	**100.7**

POND 16			
Stratum	Relative % Cover of Wetland	Species	% Cover
5	32%	CABA	47.5
		GNPA	0.2
		JUBA	0.2
		RUUR	11.2
		SOEL	6.3
		TH	33.7
		BG	1.0
		TOTAL	**100.0**
6	1%	CIVU	0.3
		ELMA	3.0
		GNPA	0.7
		JUBA	51.7
		PS sp.	0.3
		RUCR	1.0
		TH	35.0
		BG	8.0
		TOTAL	**100.0**
7	1%	CIVU	0.3
		CRSC2	31.7
		ECCR	37.0
		ELMA	11.7
		GNPA	2.3
		TH	3.7
		BG	13.3
		TOTAL	**100.0**

Table C-25. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 54			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	55%	CAMA	0.2
		DEDA	0.2
		ELACa	5.7
		ELMA	40.3
		ERAR12	1.8
		GEDI	0.3
		ISHO	0.5
		JUPH	36.2
		LYHY	0.5
		PHLE	0.7
		PLCHh	0.7
		POMO	1.8
		STAJ	2.7
		TH	5.3
		BG	3.2
		TOTAL	**100.0**
2	11%	CRAQ	0.2
		DEDA	0.5
		ELACa	21.5
		ELMA	4.0
		HOBR	0.5
		JUPH	5.3
		LYHY	0.3
		LYMI	2.7
		PHLE	0.5
		PLCHh	13.8
		POMO	37.5
		RUCR	0.3
		STAJ	3.8
		TH	7.8
		BG	1.2
		TOTAL	**100.0**

POND 54			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	31%	ACMI	0.3
		AICA	0.2
		BRDI	0.3
		BRMI	1.2
		ELACa	18.2
		ELMA	3.7
		ERAR12	8.5
		ERBO	0.2
		FEBR	0.2
		GAUS	0.5
		GEDI	0.3
		JUBUc2	0.2
		JUBUo	0.2
		JUPH	38.3
		LYAR	0.2
		LYHY	1.0
		LYMI	0.2
		POMO	1.2
		SOOL	0.3
		STAJ	3.3
		TH	16.7
		BG	5.0
		TOTAL	**100.0**

Table C-25 (continued). Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 54			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**2%**	ACAMa	0.3
		ACMI	1.0
		ACPA	0.3
		AICA	0.7
		BAPI	0.3
		BRMI	0.3
		CABA	31.3
		CIVU	0.3
		DAPU	4.3
		DECO	0.3
		ERCA	3.7
		GEDI	1.3
		HERA	0.3
		HYGL	0.3
		LYAR	6.3
		POMO	0.7
		PSRA	1.7
		SOAS	0.3
		SOOL	1.3
		VELAl	21.7
		TH	16.7
		BG	6.3
		TOTAL	**100.0**
Upland	**1%**	-	-

Table C-26. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 72			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**48%**	DISP	7.5
		ELACa	0.7
		ELMA	51.8
		ERAR12	0.7
		HOBRb	1.7
		JUPH	2.5
		LAGL3	8.0
		PHLE	0.2
		PLCHh	5.8
		POZI	0.2
		RACA	0.7
		TH	17.3
		BG	3.0
		TOTAL	**100.0**
2	**28%**	BRMI	0.2
		BRTEt	0.2
		CIQU	0.2
		DEDA	2.7
		DISP	1.7
		ELACa	5.2
		ELMA	12.0
		ERAR12	41.8
		HOBRb	0.3
		JUPH	8.7
		LAGL3	3.7
		LYMI	0.8
		PHLE	0.2
		PLCHh	1.0
		POMO	2.2
		TH	14.0
		BG	5.3
		TOTAL	**100.0**

POND 72			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**18%**	DISP	0.8
		ELACa	0.3
		ELTR3	2.0
		ERAR12	0.3
		FEBR	0.2
		GEDI	1.3
		JUPH	66.0
		LYAR	0.2
		LYHY	0.2
		TH	27.3
		BG	1.3
		TOTAL	**100.0**
Upland	**6%**	-	-

APPENDIX D

CTS and Aquatic Invertebrate Data from Aquatic Surveys at Vernal Pools Monitored in 2019

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Table D-1. CTS Aquatic Survey Results for Vernal Pools Monitored in 2019 at Former Fort Ord

Vernal Pool	Sampling Date	# of Larvae Observed	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
5	3/15/2019	0	-	-	-	-	-	-	-	1 hr 50 mins†
	4/17/2019	165	30	50	31-91	40, 44	27	14-50	25	7 hrs 30 mins
	5/14/2019	46	30	65	46-85	57, 64, 70, 71	35	23-44	31,37	5 hrs 30 mins
101 East (East)	3/11/2019§	38	30	15	12-27	14,15	-	-	-	4 hrs
	4/18/2019	212	30	72	47-105	60, 65, 74, 85, 88, 91	39	24-60	31	3 hrs 32 mins
	5/14/2019	225	30	85	57-115	76	46	27-62	45	2 hrs 5 mins
997	3/15/2019	0	-	-	-	-	-	-	-	12 mins
14	3/15/2019	0	-	-	-	-	-	-	-	34 mins
	4/16/2019	0	-	-	-	-	-	-	-	24 mins
	5/15/2019	0	-	-	-	-	-	-	-	4 mins
17	3/13/2019	0	-	-	-	-	-	-	-	23 mins
	4/16/2019	29	29	34	24-43	27, 31, 34, 36, 40	20	15-29	19	1 hr 21 mins
	5/15/2019	4	4	57	36-65	N/A	31	18-41	N/A	42 mins
21	3/13/2019	0	-	-	-	-	-	-	-	1 hr 3 mins
	4/16/2019	4	4	55	52-56	56	31	29-33	N/A	54 mins
103	NS	-	-	-	-	-	-	-	-	-
101 East (West)	3/11/2019§	56	30	14	10-18	12	N/A	N/A	N/A	3 hrs
	4/18/2019	132	30	68	43-86	56, 77, 78	34	19-44	42	2 hrs 20 mins
	5/14/2019	144	30	97	59-118	107, 111	51	31-67	52, 60	1 hr 30 mins

Table D-1. CTS Aquatic Survey Results for Vernal Pools Monitored in 2019 at Former Fort Ord

Vernal Pool	Sampling Date	# of Larvae Observed	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
101 West	3/11/2019§	32	30	16	12-20	15,17	-	-	-	1 hr
	4/16/2019	106	30	61	44-77	55, 60	33	22-42	32	54 mins
41	3/14/2019§	2	2	16	15-16	N/A	N/A	N/A	N/A	2 hrs 57 mins
	4/16/2019	13	13	66	56-79	N/A	34	28-41	30	2 hrs 5 mins
	5/14/2019	9	9	105	88-118	N/A	55	44-64	NA	20 mins
3 North	3/13/2019	0	-	-	-	-	-	-	-	20 mins
	4/16/2019	0	-	-	-	-	-	-	-	30 mins
	5/13/2019	0	-	-	-	-	-	-	-	13 mins
3 South	3/13/2019	0	-	-	-	-	-	-	-	40 mins
	4/16/2019	0	-	-	-	-	-	-	-	41 mins
39	3/12/2019	0	-	-	-	-	-	-	-	10 mins
	4/15/2019	0	-	-	-	-	-	-	-	3 mins
40 North	3/12/2019	0	-	-	-	-	-	-	-	21 mins
	4/15/2019	0	-	-	-	-	-	-	-	9 mins
	5/13/2019	0	-	-	-	-	-	-	-	6 mins
40 South	3/12/2019	0	-	-	-	-	-	-	-	5 mins
	4/15/2019	0	-	-	-	-	-	-	-	1 min
43	3/12/2019	0	-	-	-	-	-	-	-	9 mins
35	3/12/2019	0	-	-	-	-	-	-	-	30 mins
42	3/12/2019	0	-	-	-	-	-	-	-	50 mins
	4/15/2019	0	-	-	-	-	-	-	-	37 mins
	5/13/2019	0	-	-	-	-	-	-	-	27 mins

Table D-1. CTS Aquatic Survey Results for Vernal Pools Monitored in 2019 at Former Fort Ord

Vernal Pool	Sampling Date	# of Larvae Observed	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
44	3/12/2019	0	-	-	-	-	-	-	-	10 mins
56	3/14/2019§	20	20	23	18-29	21	-	-	-	5 hrs 40 mins
	4/17/2019	19	19	38	22-85	31	20	11-51	14	3 hrs 45 mins
	5/13/2019	10	10	66	48-106	N/A	36	26-58	27, 29	3 hrs 45 mins
60	3/13/2019§	5	5	19	10-24	N/A	-	-	-	4 hrs 21 mins
	4/15/2019	53	30	36	27-48	29	19	12-25	20, 22, 23	3 hrs 48 mins
	5/13/2019	18	18	60	47-81	59, 61	31	23-43	30	2 hrs 40 mins
61	3/15/2019	0	-	-	-	-	-	-	-	24 mins
73	3/14/2019	0	-	-	-	-	-	-	-	2 hrs
	4/15/2019	0	-	-	-	-	-	-	-	1 hr 57 mins
	5/13/2019	0	-	-	-	-	-	-	-	35 mins
Machine Gun Flats	3/12/2019§	11	11	22	14-36	22	23	23	NA	7 hrs
	4/17/2019	61	30	47	22-76	55	24	13-37	27	7 hrs
	5/15/2019	40	30	62	36-88	66	34	18-44	28, 40	6 hrs 50 mins
16	3/14/2019§	5	5	15	14-16	15, 16	-	-	-	1 hr 40 mins†
	4/18/2019	87	30	56	32-81	46	34	16-48	28, 37	2 hrs 12 mins†
	5/16/2019	46	30	107	81-121	108	54	41-62	52, 55, 56, 57, 58	2 hrs
54	3/13/2019	0	-	-	-	-	-	-	-	1 hr 54 mins
	4/16/2019	14	14	42	27-65	29, 38, 50	24	15-41	18	1 hr 34 mins
	5/16/2019	14	14	83	62-107	72	46	33-58	50, 58	4 mins

Table D-1. CTS Aquatic Survey Results for Vernal Pools Monitored in 2019 at Former Fort Ord

Vernal Pool	Sampling Date	# of Larvae Observed	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
72	3/14/2019§	7	5	22	20-24	20	-	-	-	2 hrs 8 mins
	4/16/2019	104	30	59	40-83	49, 67, 72	34	21-50	41	2 hrs 32 mins
	5/16/2019	21	21	72	62-87	69	36	29-45	35, 37, 38	14 mins

*The mean was rounded to the nearest whole number
†Did not complete CTS survey due to CTS egg presence
‡SVL measurements are for one individual, all other CTS larvae were too small for accurate infield measurements
§SVL not measured, CTS larvae were too small for accurate infield measurements

Table D-2. Aquatic Invertebrates Observed During Aquatic Surveys at Vernal Pools Monitored in 2019

Vernal Pool	Aquatic Invertebrate																	
	CA Fairy Shrimp	Clam Shrimp (Order Conchostraca)	Water Flea (Order Cladocera)	Seed Shrimp (Order Ostracoda)	Copepods (Order Eucopepoda)	Scuds	Mayfly Larvae (Order Ephemeroptera)	Dragonfly Larvae (Order Anisoptera)	Damselfly Larvae (Order Zygoptera)	Backswimmer (Family Corixidae)	Waterboatmen (Family Corixidae)	Predaceous Diving Beetle (Family Dytiscidae)	Giant Water Bug (Family Belostomatidae)	Water Scorpion (Family Nepidae)	Mosquito (Family Culicidae)	Water Scavenger Beetle (Family Hydrophilidae)	Dipteran Larvae (Order Diptera)	Snail
5	●	●	●	●	●	-	●	●	●	●	●	●	-	-	●	●	●	●
101 East (East)	●	●	●	●	●	-	●	●	●	●	●	●	-	-	●	●	●	●
997	-	-	●	●	●	-	-	-	-	-	-	●	-	-	●	●	●	-
14	-	●	●	●	●	-	●	-	-	●	●	●	-	-	●	●	●	-
17	-	-	●	●	●	-	-	-	●	●	●	●	-	-	●	●	●	-
21	-	●	●	●	●	-	-	-	-	-	●	●	-	-	●	●	●	-
103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
101 East (West)	●	●	●	●	●	-	●	●	●	●	●	●	-	-	●	●	●	●
101 West	-	●	●	●	●	-	●	●	-	●	●	●	-	-	●	-	●	-
41	●	●	●	●	●	-	●	●	●	●	●	●	-	-	●	●	●	-
3 North	●	●	●	●	●	-	●	●	-	●	●	●	-	-	●	●	●	●
3 South	●	-	●	●	●	-	●	●	●	●	●	●	-	-	●	●	●	-
39	●	●	●	●	●	-	●	-	-	●	●	●	-	-	●	●	●	-
40 North	●	●	●	●	●	-	●	-	-	●	●	●	-	-	●	-	●	-

Table D-2. Aquatic Invertebrates Observed During Aquatic Surveys at Vernal Pools Monitored in 2019

Vernal Pool	Aquatic Invertebrate																	
	CA Fairy Shrimp	Clam Shrimp (Order Conchostraca)	Water Flea (Order Cladocera)	Seed Shrimp (Order Ostracoda)	Copepods (Order Eucopepoda)	Scuds	Mayfly Larvae (Order Ephemeroptera)	Dragonfly Larvae (Order Anisoptera)	Damselfly Larvae (Order Zygoptera)	Backswimmer (Family Corixidae)	Waterboatmen (Family Corixidae)	Predaceous Diving Beetle (Family Dytiscidae)	Giant Water Bug (Family Belostomatidae)	Water Scorpion (Family Nepidae)	Mosquito (Family Culicidae)	Water Scavenger Beetle (Family Hydrophilidae)	Dipteran Larvae (Order Diptera)	Snail
40 South	●	-	●	●	●	-	●	-	-	-	-	●	-	-	●	●	●	-
43	●	-	-	●	●	-	-	-	-	-	●	-	-	-	●	-	●	-
35	●	●	●	●	●	-	-	-	-	-	●	●	-	-	●	-	●	-
42	●	●	●	●	●	-	●	●	-	●	●	●	-	-	●	●	●	-
44	●	-	●	●	●	-	-	-	-	-	●	●	-	-	●	-	●	-
56	●	●	●	●	●	-	●	●	●	●	●	●	-	-	●	-	●	●
60	●	●	●	●	●	-	●	●	●	●	●	●	-	-	●	●	●	●
61	●	-	●	●	-	-	-	-	-	-	●	●	-	-	●	●	●	-
73	●	●	●	●	●	-	●	●	-	●	●	●	-	-	●	●	●	-
Machine Gun Flats	●	●	●	●	●	-	●	●	●	●	●	●	●	-	●	●	●	●
16	●	●	●	●	●	-	●	-	●	●	●	●	-	-	●	-	●	●
54	-	●	●	●	●	-	●	-	-	●	●	●	-	-	●	●	●	-
72	-	●	●	●	●	-	-	●	●	●	●	●	-	-	●	●	●	-

Table D-3. Fairy Shrimp Aquatic Survey Results for Vernal Pools Monitored in 2019 at Former Fort Ord

Vernal Pool	Sampling Date	Abundance (# of Individuals)
5	3/15/2019	Present*
	4/17/2019	Low (3)
	5/14/2019	Not detected
101 East (East)	3/11/2019	Moderate (32)
	4/18/2019	Not detected
	5/14/2019	Not detected
997	3/15/2019	Not detected
14	1/24/2019	Not detected
	2/21/2019	Not detected
	3/13/2019	Not detected
	4/16/2019	Not detected
	5/15/2019	Not detected
17	1/24/2019	Not detected
	2/21/2019	Not detected
	3/13/2019	Not detected
	4/16/2019	Not detected
	5/15/2019	Not detected

Table D-3. Fairy Shrimp Aquatic Survey Results for Vernal Pools Monitored in 2019 at Former Fort Ord

Vernal Pool	Sampling Date	Abundance (# of Individuals)
21	2/21/2019	Not detected
	3/13/2019	Not detected
	4/16/2019	Not detected
101 East (West)	3/11/2019	High (181)
	4/18/2019	Not detected
	5/14/2019	Not detected
101 West	3/11/2019	Not detected
	4/16/2019	Not detected
41	3/14/2019	High (122)
	4/16/2019	Low (6)
	5/14/2019	Not detected
3 North	1/24/2019	Moderate (36)
	2/19/2019	Moderate (72)
	3/13/2019	Low (3)
	4/16/2019	Not detected
	5/13/2019	Not detected

Table D-3. Fairy Shrimp Aquatic Survey Results for Vernal Pools Monitored in 2019 at Former Fort Ord

Vernal Pool	Sampling Date	Abundance (# of Individuals)
3 South	1/24/2019	Moderate (21)
	2/19/2019	Moderate (44)
	3/13/2019	Low (5)
	4/16/2019	Not detected
39	1/24/2019	Moderate (71)
	2/19/2019	Moderate (37)
	3/12/2019	Low (7)
	4/15/2019	Not detected
40 North	2/19/2019	High (121)
	3/12/2019	Moderate (57)
	4/15/2019	High (259)
	5/13/2019	Not detected
40 South	2/19/2019	Moderate (13)
	3/12/2019	Moderate (12)
	4/15/2019	Not detected
43	2/20/2019	High (135)
	3/12/2019	High (210)

Table D-3. Fairy Shrimp Aquatic Survey Results for Vernal Pools Monitored in 2019 at Former Fort Ord

Vernal Pool	Sampling Date	Abundance (# of Individuals)
35	2/19/2019	Moderate (74)
	3/12/2019	Moderate (50)
42	3/12/2019	High (217)
	4/15/2019	Not detected
	5/13/2019	Not detected
44	2/20/2019	Very High (650)
	3/12/2019	Very High (370)
56	3/14/2019	Moderate (22)
	4/17/2019	Not detected
	5/13/2019	Not detected
60	3/13/2019	Low (6)
	4/15/2019	Not detected
	5/13/2019	Not detected
61	3/13/2019	High (162)
73	2/21/2019	Not detected
	3/14/2019	Present*
	4/15/2019	Not detected
	5/13/2019	Not detected

Table D-3. Fairy Shrimp Aquatic Survey Results for Vernal Pools Monitored in 2019 at Former Fort Ord

Vernal Pool	Sampling Date	Abundance (# of Individuals)
Machine Gun Flats	3/12/2019	High (277)
	4/17/2019	Moderate (13)
	5/15/2019	Not detected
16	3/14/2019	Present*
	5/16/2019	Not detected
54	3/12/2019	Not detected
	4/17/2019	Not detected
	5/15/2019	Not detected
72	1/24/2019	Not detected
	2/21/2019	Not detected
	3/14/2019	Not detected
	4/15/2019	Not detected

*Fairy shrimp detected during CTS survey, no fairy shrimp survey was conducted in March due to the presence of CTS eggs.

APPENDIX E

Site Photos

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Figure E-1. Pond 5 (Reference): Hydrology Photo Point on 3/7/2019

Figure E-2. Pond 5 (Reference): Vegetation Photo Point 1 on 6/20/2019

Figure E-3. Pond 5 (Reference): Vegetation Photo Point 2 on 6/20/2019

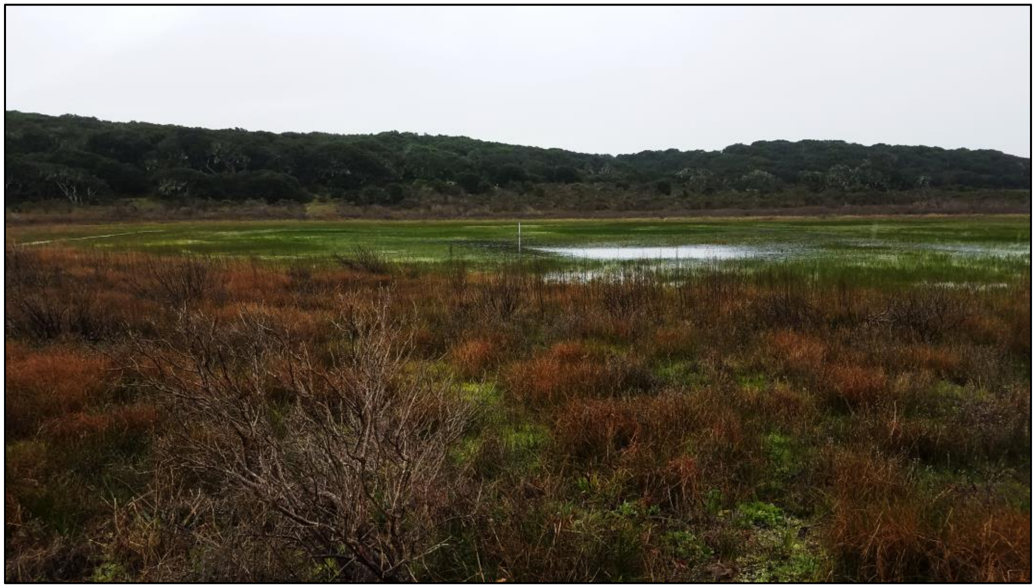

Figure E-4. Pond 101 East (East) (Reference): Hydrology Photo Point 1 on 3/7/2019

Figure E-5. Pond 101 East (East) (Reference): Hydrology Photo Point 2 on 3/7/2019

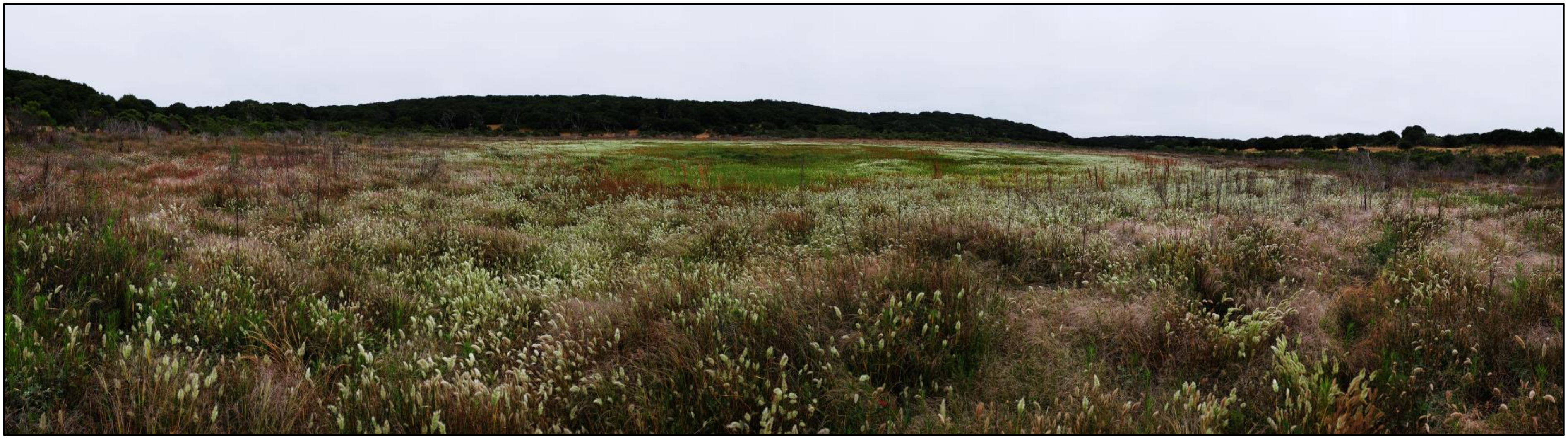

Figure E-6. Pond 101 East (East) (Reference): Vegetation Photo Point on 6/14/2019

Figure E-7. Pond 997 (Reference): Hydrology Photo Point 1 on 3/5/2019

Figure E-8. Pond 997 (Reference): Hydrology Photo Point 2 on 3/5/2019

Figure E-9. Pond 997 (Reference): Vegetation Photo Point on 5/10/2019

Figure E-10. Pond 14 (Baseline): Hydrology Photo Point 1 on 3/4/2019

Figure E-11. Pond 14 (Baseline): Hydrology Photo Point 2 on 3/4/2019

Figure E-12. Pond 14 (Baseline): Vegetation Photo Point on 6/5/2019

Figure E-13. Pond 17 (Baseline): Hydrology Photo Point 1 on 3/4/2019

Figure E-14. Pond 17 (Baseline): Hydrology Photo Point 2 on 3/4/2019

Figure E-15. Pond 17 (Baseline): Vegetation Photo Point on 6/4/2019

Figure E-16. Pond 21 (Baseline): Hydrology Photo Point 1 on 3/5/2019

Figure E-17. Pond 21 (Baseline): Hydrology Photo Point 2 on 3/5/2019

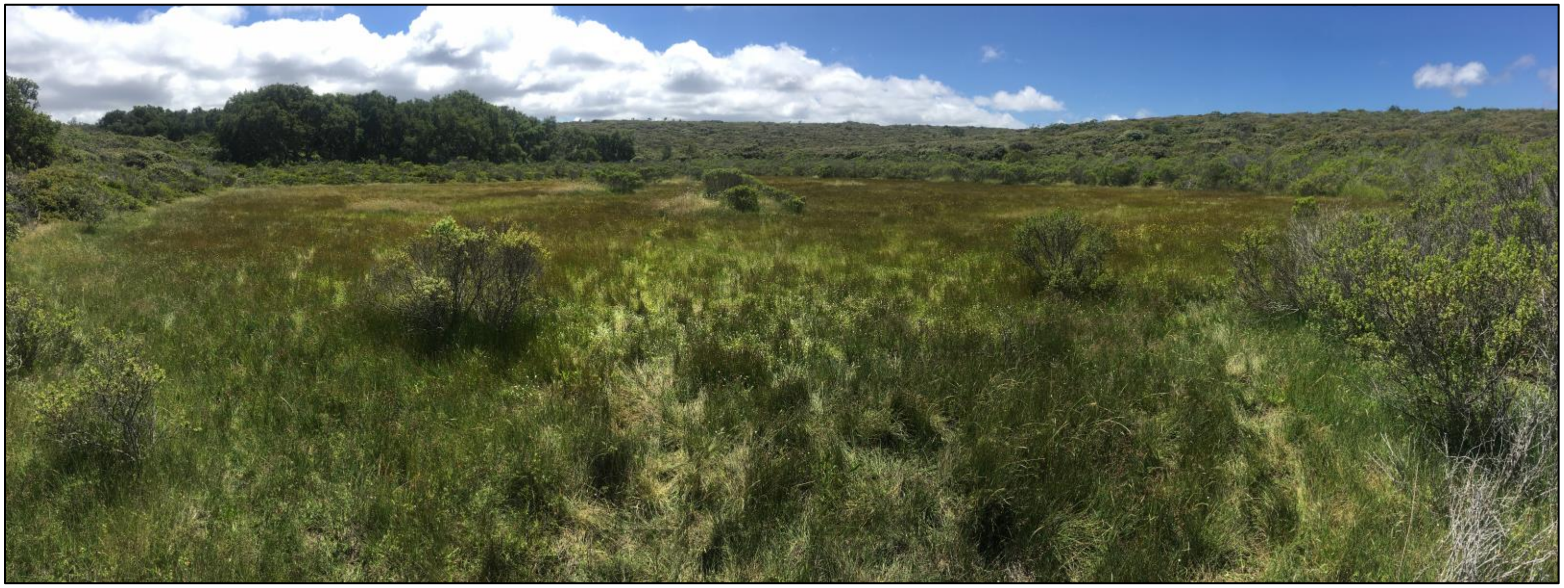

Figure E-18. Pond 21 (Baseline): Vegetation Photo Point on 5/20/2019

Figure E-19. Pond 103 (Baseline): Photo Point on 2/14/2019

Figure E-20. Pond 101 East (West) (Year 1 Post-Mastication): Hydrology Photo Point on 3/7/2019

Figure E-21. Pond 101 East (West) (Year 1 Post-Mastication): Vegetation Photo Point on 6/14/2019

Figure E-22. Pond 101 West (Year 1 Post-Mastication): Hydrology Photo Point on 3/5/2019

Figure E-23. Pond 101 West (Year 1 Post-Mastication): Vegetation Photo Point on 5/31/2019

Figure E-24. Pond 41 (Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 1 on 3/6/2019

Figure E-25. Pond 41 (Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 2 on 3/6/2019

Figure E-26. Pond 41 (Year 1 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 6/12/2019

Figure E-27. California tiger salamander (*Ambystoma californiense)* at Pond 41 (Year 1 Post-Subsurface Munitions Remediation) on 5/14/2019

Figure E-28. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 1 on 3/7/2019

Figure E-29. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 2 on 3/7/2019

Figure E-30. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 7/16/2019

Figure E-31. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 1 on 2/11/2019

Figure E-32. Pond 3 South (Year 1 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Hydrology Photo Point 2 on on 2/11/2019

Figure E-33. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation): Vegetation Photo Point 1 on 5/30/2019

Figure E-34. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation): Vegetation Photo Point 2 on 5/30/2019

Figure E-35. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 1 on 3/6/2019

Figure E-36. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 2 on 3/6/2019

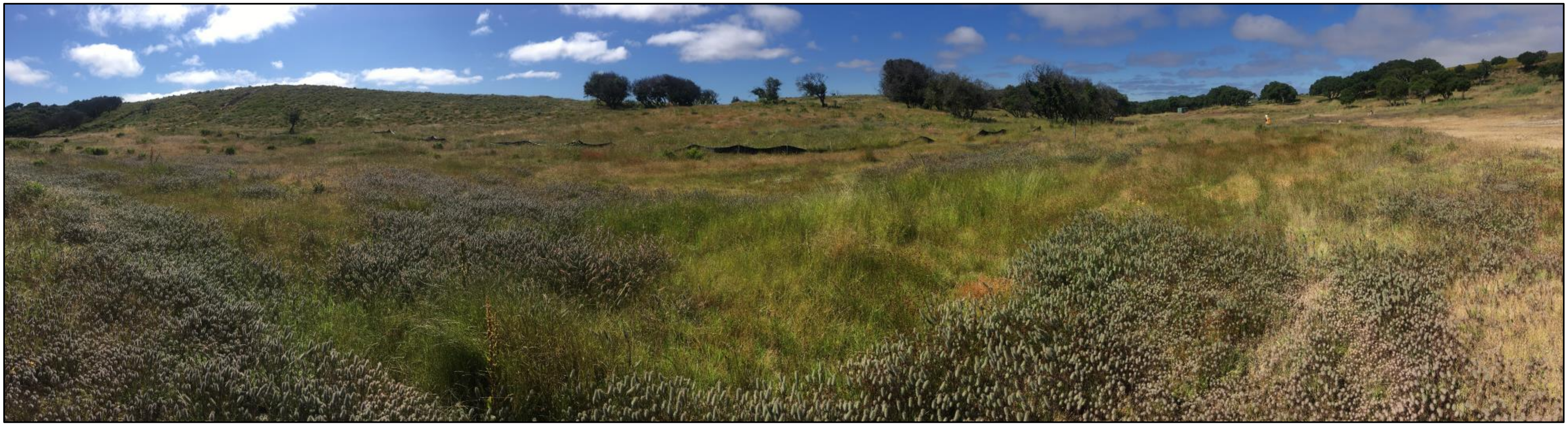

Figure E-37. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 5/28/2019

Figure E-38. Pond 40 North (Year 2 Post-Burn): Hydrology Photo Point on 3/6/2019

Figure E-39. Pond 40 North (Year 2 Post-Burn): Vegetation Photo Point on 6/25/2019

Figure E-40. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 1 on 3/6/2019

Figure E-41. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 2 on 3/6/2019

Figure E-42. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation): Vegetation Photo Point 1 on 5/16/2019

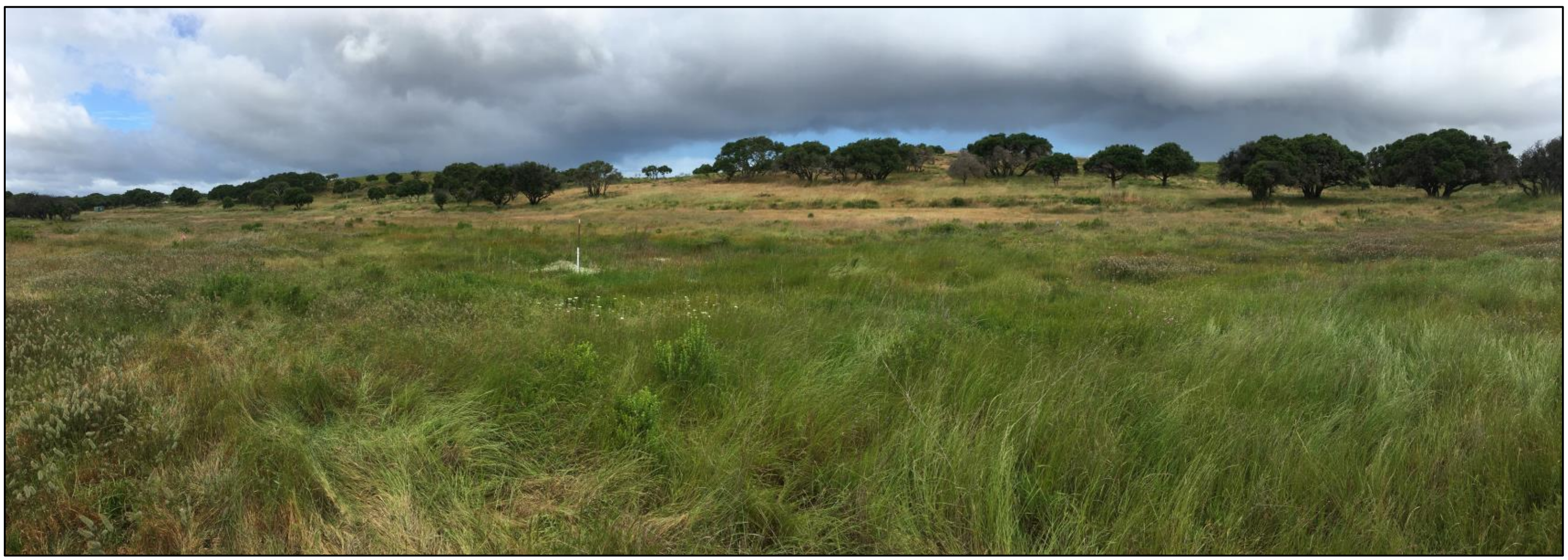

Figure E-43. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation): Vegetation Photo Point 2 on 5/16/2019

Figure E-44. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point on 3/6/2019

Figure E-45. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Photo Point on 5/14/2019

Figure E-46. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 1 on 2/11/2019

Figure E-47. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 2 on 2/11/2019

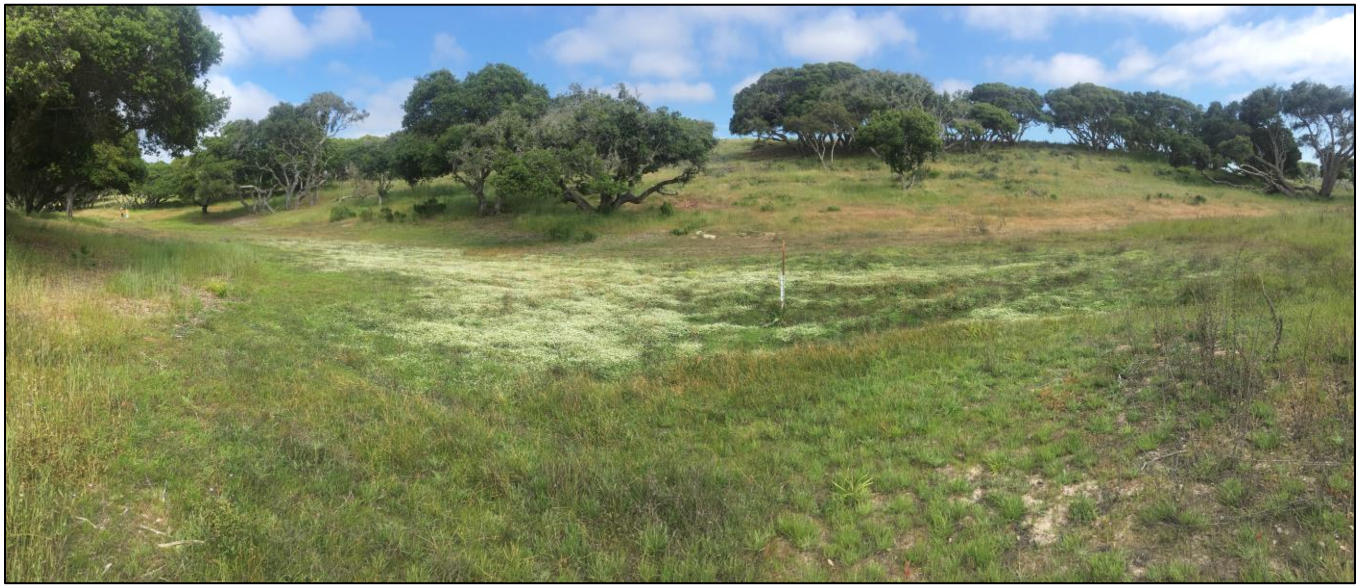

Figure E-48. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 5/8/2019

Figure E-49. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point on 3/6/2019

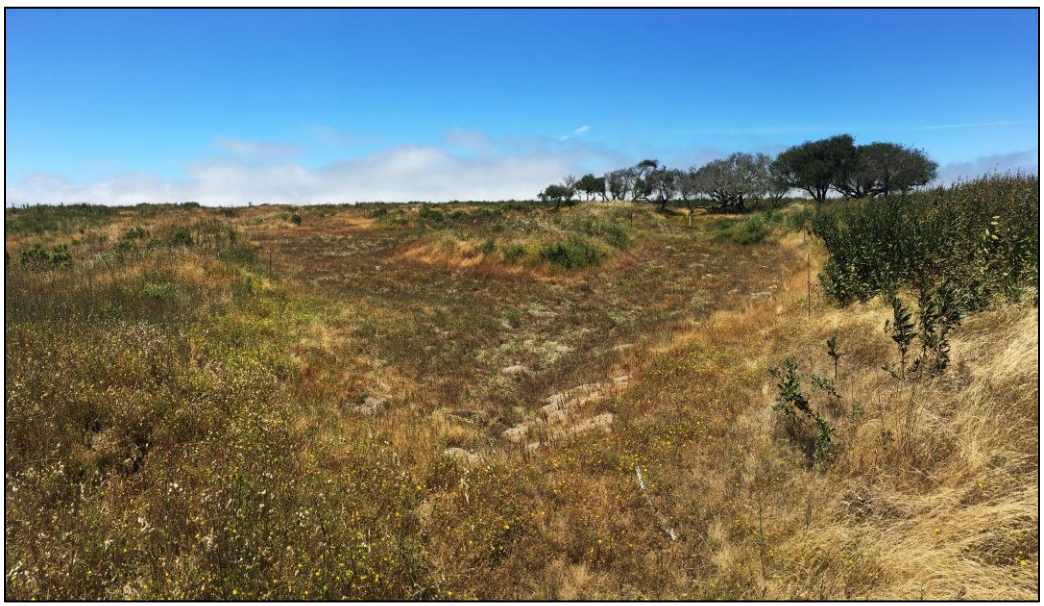

Figure E-50. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 7/16/2019

Figure E-51. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 1 on 3/6/2019

Figure E-52. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 2 on 3/6/2019

Figure E-53. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 5/14/2019

Figure E-54. California linderiella (*Linderiella occidentalis)* at Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) on 3/12/2019

Figure E-55. Pig Damage at Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) on 5/14/2019

Figure E-56. Pond 56 (Year 2 Post-Mastication): Hydrology Photo Point on 4/9/2019

Figure E-57. Pond 56 (Year 2 Post-Mastication): Vegetation Photo Point on 7/10/2019

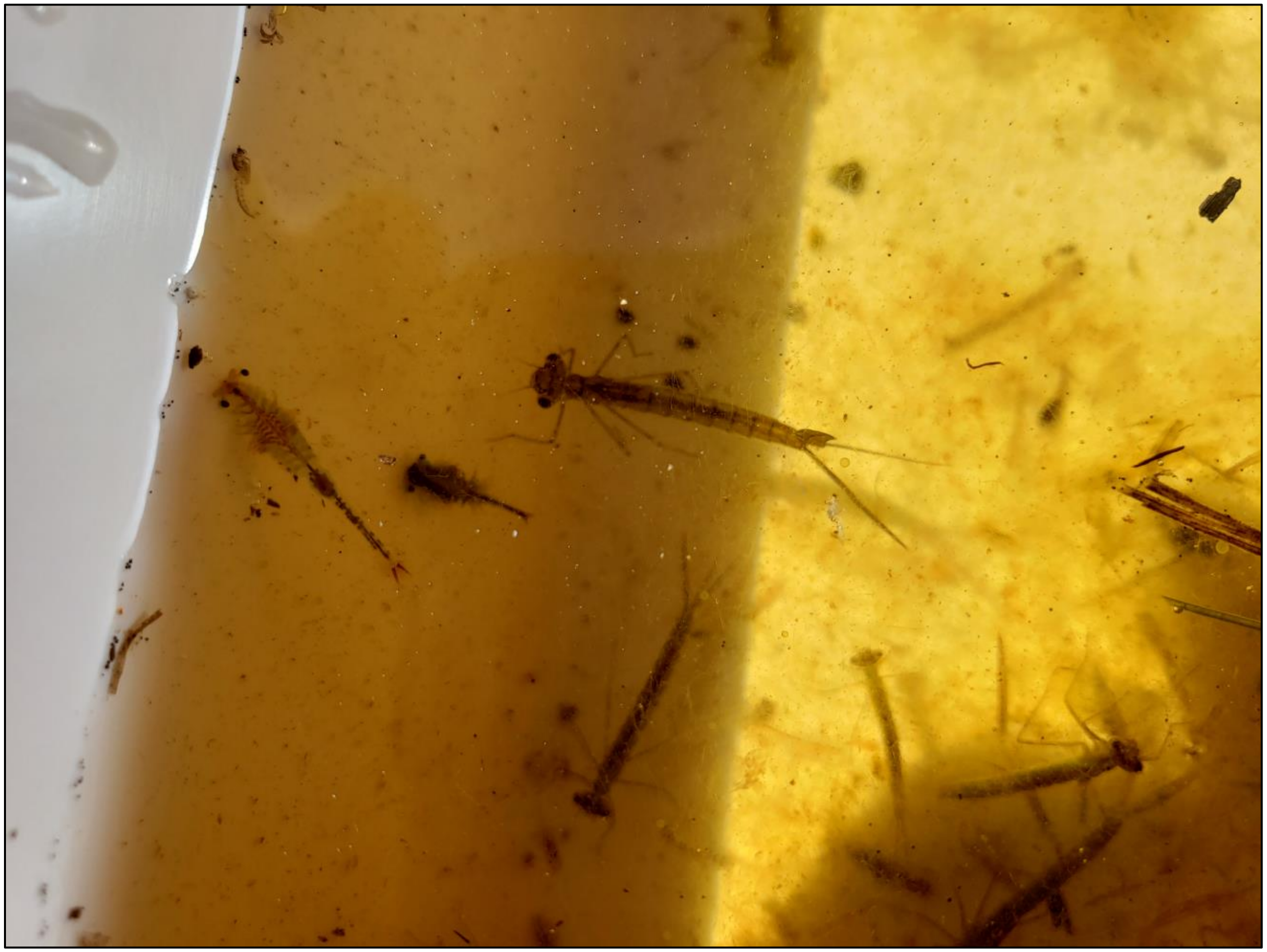

Figure E-58. California linderiella (*Linderiella occidentalis)* at Pond 56 (Year 2 Post-Mastication) on 3/14/2019

Figure E-59. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point on 4/3/2019

Figure E-60. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 8/13/2019

Figure E-61. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 1 on 3/6/2019

Figure E-62. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 2 on 3/6/2019

Figure E-63. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Vegetation Photo Point 1 on 5/9/2019

Figure E-64. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Vegetation Photo Point 2 on 5/9/2019

Figure E-65. Contra Costa goldfields (*Lasthenia conjugens)* at Pond 61 Year 2 Post-Mastication, Year 1 Post-Post-Subsurface Munitions Remediation) on 5/2/2019

Figure E-66. Pig damage at Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) on 6/6/2019

Figure E-67. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Munitions Remediation): Hydrology Photo Point 1 on 3/6/2019

Figure E-68. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 2 on 3/6/2019

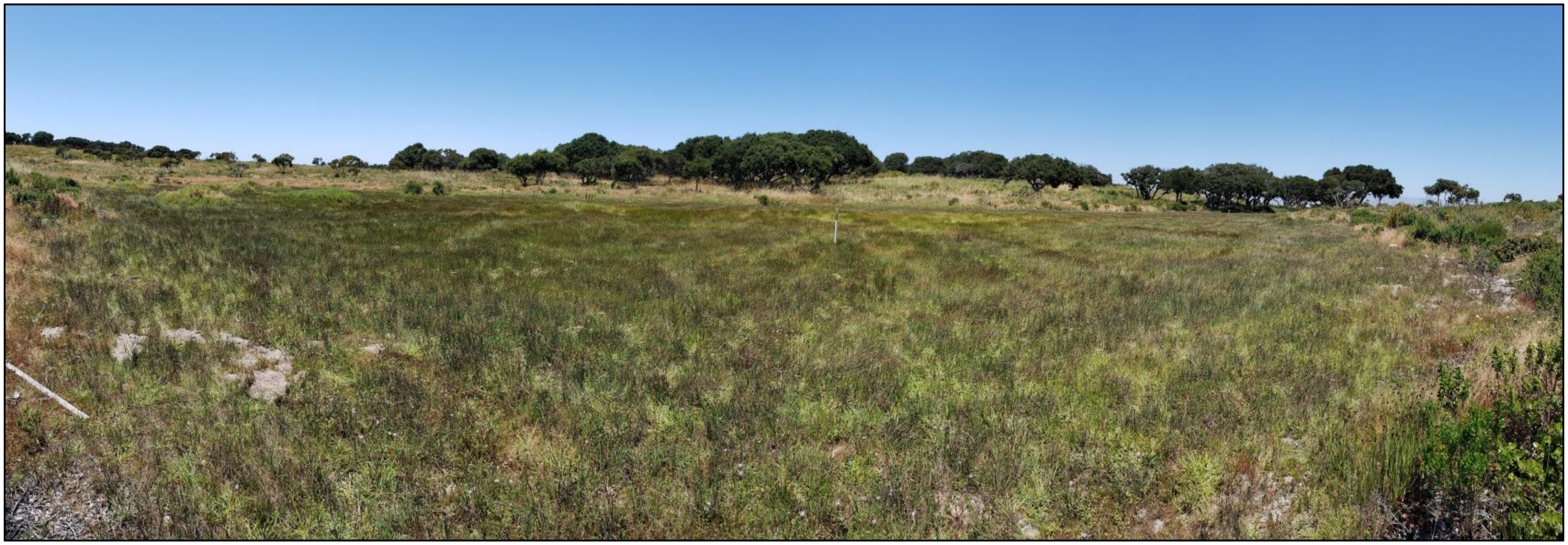

Figure E-69. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 6/18/2019

Figure E-70. Machine Gun Flats (Year 2 Post-Mastication): Hydrology Photo Point 1 on 3/7/2019

Figure E-71. Machine Gun Flats (Year 2 Post-Mastication): Hydrology Photo Point 2 on 3/7/2019

Figure E-72. Machine Gun Flats (Year 2 Post-Mastication): Vegetation Photo Point 1 on 6/13/2019

Figure E-73. Machine Gun Flats (Year 2 Post-Mastication): Vegetation Photo Point 2 on 6/13/2019

Figure E-74. California tiger salamander (*Ambystoma californiense)* at Machine Gun Flats (Year 2 Post-Mastication) on 4/17/2019

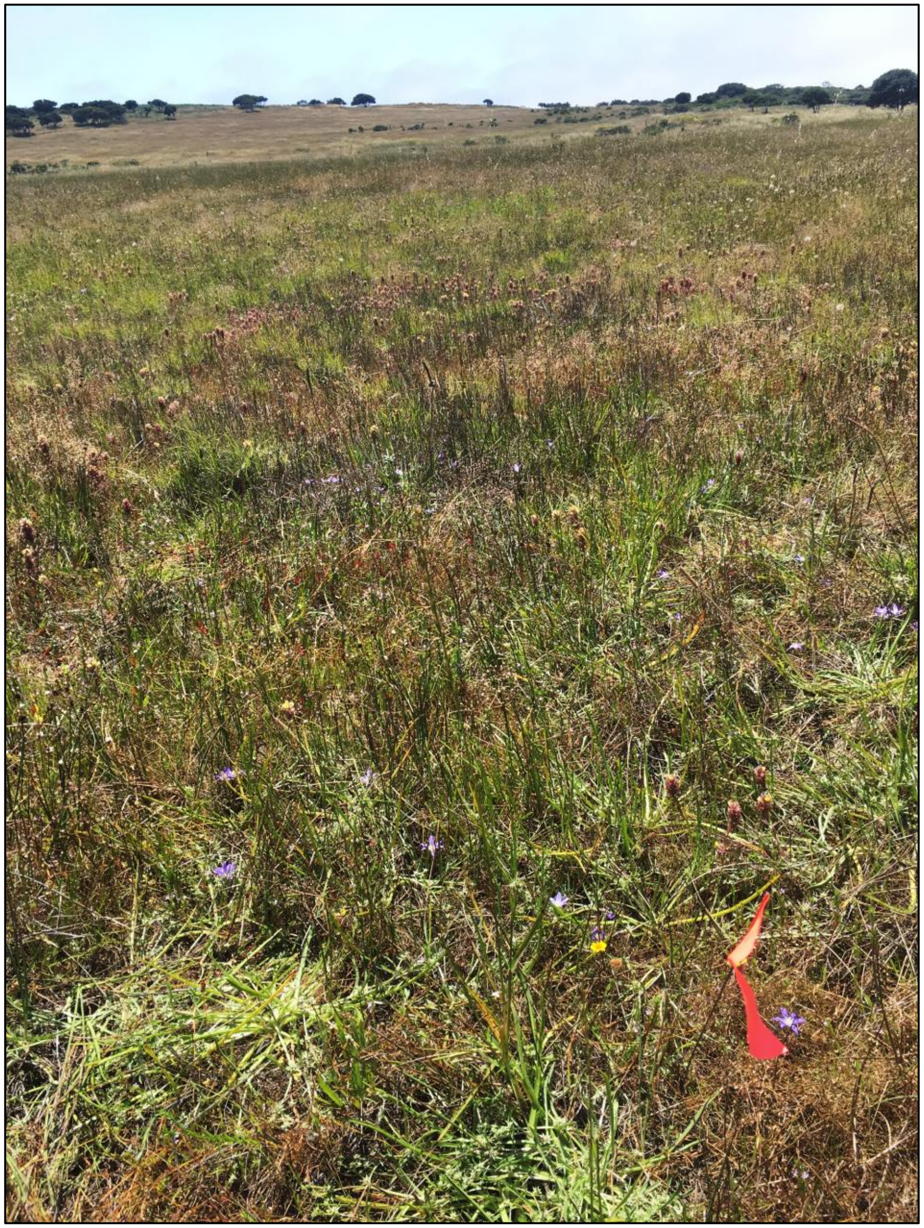

Figure E-75. Single Contra Costa goldfield (*Lasthenia conjugens)* at Machine Gun Flats (Year 2 Post-Mastication) on 5/31/2019

Figure E-76. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 1 on 4/2/2019

Figure E-77. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 2 on 4/2/2019

Figure E-78. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 7/23/2019

Figure E-79. California tiger salamander (*Ambystoma californiense*) egg at Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) on 4/18/2019

Figure E-80. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 1 on 3/4/2019

Figure E-81. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Hydrology Photo Point 2 on 3/4/2019

Figure E-82. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 6/3/2019

Figure E-83. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation): Hydrology Photo Point on 3/5/2019

Figure E-84. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 5/30/2019
Year 3 Post-Subsurface Munitions Remediation

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APPENDIX F

Historic Hydrology Monitoring Results for Reference and Remediated Vernal Pools

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Table F-1. Pond 5 (Reference) Historic Hydrology Results on Former Fort Ord from 1994-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
1993-1994	3/29/1994	-	17.00	-	-	31	2.75
	4/13/1994	-	20.00	-	-	20	-
1994-1995	1/11/1995	-	16.00	-	-	28	0.17
	1/26/1995	-	14.00	-	-	43	0.52
	2/10/1995	-	15.00	-	-	51	0.50
	2/24/1995	-	13.00	-	-	51	0.52
	3/10/1995	-	-	-	-	76	1.72
	3/24/1995	-	22.00	-	-	>100	6.89
1995-1996	1/3/1996	-	-	-	-	DRY	-
	1/18/1996	-	-	-	-	5	-
	1/31/1996	-	-	-	-	5	-
	2/14/1996	-	-	-	-	15	-
	2/29/1996	-	-	-	-	28	-
	3/14/1996	-	-	-	-	38	-
	3/28/1996	-	-	-	-	38	-
	4/11/1996	-	-	-	-	15	-
	4/25/1996	-	-	-	-	13	-
	5/9/1996	-	-	-	-	DRY	-
2006-2007	12/1/2006	-	-	-	-	DRY	-
	1/23/2007	-	-	-	-	DRY	-
	3/6/2007	7.20	-	-	5.1 (NTU)	17	1.58
2012-2013	11/26/2012	-	-	-	-	DRY	-
	12/19/2012	-	-	-	-	DRY§	0.01
	1/22/2013	-	-	-	-	11	0.91
	2/25/2013	-	-	-	-	DRY	0.00
	3/15/2013	-	-	-	-	DRY	0.00
	4/12/2013	-	-	-	-	DRY	0.00
	5/10/2013	-	-	-	-	DRY	0.00
2013-2014	12/11/2013	-	-	-	-	DRY	0.00
	2/18/2014	-	-	-	-	DRY	0.00
	3/17/2014	-	-	-	-	DRY	0.00
	4/7/2014	-	-	-	-	DRY	0.00
	5/6/2014	-	-	-	-	DRY	0.00
	6/3/2014	-	-	-	-	DRY	0.00

§Depth approximately 10 cm in two small puddles immediately west of staff gauge.

Table F-1. Pond 5 (Reference) Historic Hydrology Results on Former Fort Ord from 1994-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2015-2016	4/5/2016	6.41	25.06	6.91	63.4	no gauge, ~100	5.33
	4/19/2016	6.51	20.27	5.73	23.8	no gauge, ~100	5.14
	5/9/2016	6.45	17.99	7.3	19.6	no gauge, ~100	4.86
	6/8/2016	6.48	21.32	0.34	17.7	no gauge, ~80	4.44
	7/7/2016	6.37	23.01	6.65	83.2	no gauge, ~60	3.19
	8/10/2016	6.85	16.37	0.97	295.0	4	0.36
	9/12/2016	-	-	-	-	DRY	0.00
2016-2017	1/25/2017	6.09	8.94	2.13	4.0	58	5.32
	2/27/2017	6.24	11.77	4.52	6.4	gauge submerged, ~130	7.78
	3/23/2017	6.54	15.30	1.55	8.3	gauge submerged, ~130	7.30
	4/20/2017	6.38	17.22	0.00	5.9	gauge submerged, ~130	7.24
	5/25/2017	6.28	21.85	2.73	4.5	110	6.49
	6/20/2017	7.12	24.16	3.54	7.4	98	5.74
	7/28/2017	-	-	-	-	94	-
	8/16/2017	-	-	-	-	57	-
	9/6/2017	-	-	-	-	45	-
2017-2018	11/20/2017	-	-	-	-	18	-
	1/15/2018	7.12	12.56	6.54	16.6	22	2.95
	2/23/2018	7.12	6.00	5.27	39.2	15	1.85
	3/21/2018	7.01	11.76	6.65	4.7	22	3.01
	4/18/2018	7.29	20.68	7.09	40.6	22	2.85
	5/22/2018	-	-	-	-	DRY	0.00‡

Table F-1. Pond 5 (Reference) Historic Hydrology Results on Former Fort Ord from 1994-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2018-2019	1/14/2019	6.70	11.09	10.16	4.7	4	0.47‡
	2/13/2019	6.89	10.55	10.24	8.4	42	4.21‡
	3/7/2019	6.58	14.10	5.58	1.5	56	4.83‡
	4/4/2019	6.41	14.87	1.71	1.2	53	4.59
	5/9/2019	6.51	17.15	3.80	0.6	37	3.96
	6/6/2019	7.09	20.32	6.07	13.6	30	3.62
	7/9/2019	-	-	-	-	25§	-
	8/13/2019	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.
§Depth is an estimate. Decreased visibility due to emergent vegetation.

Pond 5 was monitored ten years between 1994 and 2019. Pond 5 is a reference vernal pool and no remediation has occurred. The historic data and precipitation are summarized below:

- 1993-1994 (Jones & Stokes, 1996)
  - In a precipitation year below-normal, Pond 5 held water during both monitoring events in March and April with a maximum recorded inundation of 2.75 acres. The temperatures were within a normal range.
  - Yearly cumulative precipitation 13.96 inches
  - Data collected only in March and April
  - Inundated during both monitoring events
  - Recorded inundation maximum 2.75 acres in March
  - Depth range 20-31 cm, mean 26
  - temperature 17°-20° C, mean 18.5° C
- 1994-1995 (Jones & Stokes, 1996)
  - In a water-year that was above-normal, Pond 5 was inundated by January monitoring and stayed inundated through March. Pond 5 inundation area was large compared to other monitored years and filled to 6.89 acres with a maximum depth of 102 cm. The temperature fluctuated greatly, which can be expected.
  - Yearly cumulative precipitation 23.38 inches
  - Data collected January-March, six monitoring events
  - Inundated during all monitoring events
  - Inundation range 0.17-6.89 acres, mean 1.72 acres
  - Depth range 28->100 cm, mean 58 cm
  - temperature range 13°-22° C, mean 16° C
- 1995-1996 (Jones & Stokes, 1996)
  - In a water-year that was approximately normal, ponding occurred from January-May. The maximum depth was much lower than the previous year but similar to the 1993-1994 water-year.
  - Yearly cumulative precipitation 16.96 inches

  - Data collected January-May, ten monitoring events
  - Inundated mid-January to early-May
  - No inundation area recorded
  - Depth range 5-38 cm, mean 20 cm
  - No water quality data collected
- 2006-2007 (Shaw, 2008)
  - In a below-normal rain year, Pond 5 was inundated to 1.58 acres. The pH at Pond 5 was neutral and the turbidity was relatively low.
  - Yearly cumulative precipitation 10.13 inches
  - Data collected December-March, three monitoring events
  - Some inundation in March, which comprised an area of 1.58 acres
  - Depth 17 cm
  - One water quality sample 7.20 pH, 5.1 FNU turbidity
- 2012-2013 (Tetra Tech, 2014)
  - In a drought year with below-normal precipitation, Pond 5 was only inundated in December and January and was a fraction of the size with a maximum inundation of 0.91 acres.
  - Drought year with yearly cumulative precipitation of 11.17 inches
  - Data collected November-May, seven monitoring events
  - Inundated in December and January
  - Inundation range 0.01-0.91 acres, mean 0.46 acres
  - Depth 11 cm, only one depth recorded
  - No water quality data collected
- 2013-2014 (Tetra Tech, 2015)
  - In a dry, consecutive drought year Pond 5 did not fill.
  - Consecutive drought year with yearly cumulative precipitation 9.33 inches
  - Data collected December-June, six monitoring events
  - Dry though the entire monitoring season
- 2015-2016 (Burleson, 2017)
  - In a consecutive drought with precipitation above-normal, Pond 5 was inundated from the first recorded monitoring in April through August. The maximum inundation area was 5.33 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was higher on average than some of the other large vernal pools, however, Pond 5 was often monitored in the late afternoon. Dissolved oxygen had a large range. Turbidity was low on average with a few high readings at the end of the season. It is likely that Pond 5 was inundated earlier in the water-year and maximum inundation was most likely not captured. It should be noted that data collection did not start with the first storm or inundation.
  - Consecutive drought year with yearly cumulative precipitation 21.21 inches
  - Data collected April-September, seven monitoring events
  - Inundated April through August
  - Inundation range 0.36-5.33 acres, mean 3.89 acres
  - Depth range 4-100 cm, mean 74 cm
  - pH range 6.37-6.85, mean 6.51
  - temperature range 16.4°-25.1° C, mean 20.7° C
  - dissolved oxygen range 0.34-7.30 mg/L, mean 4.65 mg/L
  - turbidity range 17.7-295.0 FNU, mean 83.8 FNU

- 2016-2017 (Burleson, 2018)
    - After the end of a historic drought with precipitation above-normal, Pond 5 was inundated from the first recorded monitoring in January through September (Pond 5 did not dry by last recorded monitoring in September). The maximum inundation area was 7.78 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord, with a few high readings in the middle of the season. Dissolved oxygen had a small range, with moderate levels. Turbidity was low on average.
    - Yearly cumulative precipitation 22.92 inches
    - Data collected January - September, nine monitoring events
    - Inundated January through September (pond did not dry at last reading in September)
    - Inundation range 5.32-7.78 acres, mean 6.65 acres
    - Depth range 45-~130 cm, mean 95 cm
    - pH range 6.09-7.12, mean 6.44
    - temperature range 8.9°-24.2° C, mean 16.5° C
    - dissolved oxygen range 0.00-4.52 mg/L, mean 2.41 mg/L
    - turbidity range 4.0-8.3 FNU, mean 6.1 FNU
- 2017-2018 (Burleson, 2019)
    - In a below-normal water-year, Pond 5 was inundated from the first recorded monitoring in January through April. The maximum inundation area was 3.01 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range, with moderate levels. Turbidity was low on average.
    - Yearly cumulative precipitation 12.57 inches
    - Data collected November - May, six monitoring events
    - Inundated November through April
    - Inundation range 1.85-3.01 acres, mean 2.66 acres
    - Depth range 15-22 cm, mean 20 cm
    - pH range 7.01-7.29, mean 7.14
    - temperature range 6.00°-20.68° C, mean 12.75° C
    - dissolved oxygen range 5.27-7.09 mg/L, mean 6.39mg/L
    - turbidity range 4.7-40.6 FNU, mean 25.3 FNU
- 2018-2019
    - In an above-normal water-year, Pond 5 was inundated from the first recorded monitoring in January through July. The maximum inundation area was 4.83 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range, with moderate levels. Turbidity was low on average.
    - Yearly cumulative precipitation 21.97 inches
    - Data collected January - August, eight monitoring events
    - Inundated January through July
    - Inundation range 0.47-4.83 acres, mean 3.61 acres
    - Depth range 4-56 cm, mean 35 cm
    - pH range 6.41-7.09, mean 6.70
    - temperature range 10.55°-20.32° C, mean 14.68° C
    - dissolved oxygen range 1.71-10.24 mg/L, mean 6.26 mg/L
    - turbidity range 0.6-13.6 FNU, mean 5.0 FNU

Table F-2. Pond 101 East (East) (Reference) Historic Hydrology Results on Former Fort Ord from 2001-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2000-2001	Feb	-	-	-	-	36[¥]	1.47
	Mar	6.30	-	-	-	>46[¥]	1.26
	Apr	6.81	-	-	-	>5[¥]	0.36
	May	-	-	-	-	-	0.24
2006-2007	Dec	-	-	-	-	DRY	0.00
	Jan	-	-	-	-	DRY	0.00
	Mar	7.61	-	-	6.1 (NTU)	20	0.32
	Apr	-	-	-	-	DRY	0.00
	May	-	-	-	-	DRY	0.00
	June	-	-	-	-	DRY	0.00
2012-2013	11/26/2012	-	-	-	-	DRY[§]	0.00
	12/19/2012	-	-	-	-	DRY[§]	0.00
	1/22/2013	-	-	-	-	11[§]	0.08
	2/25/2013	-	-	-	-	DRY[§]	0.00
	3/15/2013	-	-	-	-	DRY[§]	0.00
	4/12/2013	-	-	-	-	DRY[§]	0.00
	5/10/2013	-	-	-	-	DRY[§]	0.00
2013-2014	12/11/2014	-	-	-	-	DRY[§]	0.00
	2/18/2014	-	-	-	-	DRY[§]	0.00
	3/17/2014	-	-	-	-	DRY[§]	0.00
	4/7/2014	-	-	-	-	DRY[§]	0.00
	5/6/2014	-	-	-	-	DRY[§]	0.00
	6/3/2014	-	-	-	-	DRY[§]	0.00
2014-2015	3/18/2015	-	-	-	-	DRY	0.00
	4/16/2015	-	-	-	-	DRY	0.00
	5/28/2015	-	-	-	-	DRY	0.00
2015-2016	4/5/2016	6.44	17.1	7.93	138.0	68	3.24
	4/19/2016	6.38	22.7	6.50	112.0	68	3.13
	5/9/2016	7.07	23.0	6.92	106.0	55	2.77
	6/8/2016	6.49	23.0	4.36	53.0	32	1.23
	7/7/2016	-	-	-	-	DRY	0.00

¥In 2000-2001, depths were recorded for Waterbody 53, which includes the currently named ponds of Pond 101 West, Pond 101 East (West), and 101 East (East). It is unknown which pond was sampled for depth.
§No staff gauge. Cannot access ponds to measure depth due to potential for subsurface unexploded ordnance and other hazards. Depths are estimations.

Table F-2. Pond 101 East (East) (Reference) Historic Hydrology Results on Former Fort Ord from 2001-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2016-2017	1/24/2017	5.50	10.0	1.95	1.9	~155, gauge submerged	Connected to 101 East (West), total 5.02
	2/27/2017	6.23	12.2	3.68	21.8	~160, gauge submerged	Connected to 101 East (West), total 9.37
	3/20/2017	6.23	15.3	1.07	39.2	~160, gauge submerged	Connected to 101 East (West), total 8.89
	4/20/2017	6.49	17.3	0.00	43.2	~160, gauge submerged	Connected to 101 East (West), total 9.38
	5/25/2017	6.89	19.0	2.38	4.0	~160, gauge submerged	6.52
	6/21/2017	6.91	20.1	3.58	10.7	~150, gauge submerged	5.57
	7/28/2017	-	-	-	-	100	-
	8/16/2017	-	-	-	-	95	-
	9/6/2017	-	-	-	-	77	-
2017-2018	11/20/2017	-	-	-	-	44	-
	1/19/2018	6.82	11.92	0.21	63.0	44	2.09
	2/16/2018	6.80	10.94	4.45	114.0	-	1.44
	3/21/2018	6.97	12.62	3.35	40.8	40	1.86
	4/17/2018	7.12	21.88	10.03	99.4	40	1.67
	5/22/2018	6.42	13.55	15.25	1000.0	14	0.04
	6/19/2018	-	-	-	-	DRY	0.00
2018-2019	1/14/2019	-	-	-	-	DRY	0.00
	2/14/2019	6.88	14.36	8.94	10.4	47	2.21‡
	3/7/2019	6.51	14.08	5.48	9.7	56	2.76‡
	4/4/2019	6.80	14.15	5.63	6.1	53	2.51‡
	5/9/2019	6.38	16.26	3.09	13.0	34	1.14
	6/6/2019	7.13	21.92	5.48	79.8	26	0.38
	7/9/2019	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 101 East (East) was monitored nine years between 2001 and 2019. Pond 101 East (East) is a reference vernal pool and no remediation has occurred. The historic data and precipitation are summarized below:

- 2000-2001 (Harding ESE, 2002)
  - In a year with early storms followed by below-normal precipitation, Pond 101 East (East) was recorded as inundated from February through May with a maximum inundation of 1.47 acres. The water quality results indicate a slightly acidic to neutral pH.
  - Early storms with cumulative precipitation below-normal (15.52 inches)
  - Data collected in January-May, five monitoring events
  - Inundated for all monitoring events
  - Inundation range 0.24-1.61 acres, mean 0.92 acres
  - Depth range 2-18 cm, mean 11.3 cm
  - Water quality data was collected twice, pH 6.3-6.81, mean 6.56
- 2006-2007 (Shaw, 2008)
  - In a below-normal water-year, Pond 101 East (East) was inundated only in the month of March. The water quality results indicated a slightly alkaline pH.
  - Cumulative precipitation was below-normal (10.13 inches)
  - Data collected from December-June, 6 monitoring events
  - Inundated only in March to 0.32 acres and 20 cm depth
  - Inundation area was not recorded
  - pH 7.61
- 2012-2013 (Tetra Tech, 2014)
  - In a dry consecutive drought year with below-normal cumulative precipitation, Pond 101 East (East) is thought to have held water briefly in January. It is unconfirmed if the brief inundation was at Pond 101 East (West) or 101 East (East) since the data were documented under Pond 101 East, with no further signification of East or West.
  - Consecutive drought year with cumulative precipitation below-normal (11.17 inches)
  - Data collected November-May, seven monitoring events
  - Inundated in January, 0.08 acres
  - Depth 11 cm in January
  - No water quality data collected
- 2013-2014 (Tetra Tech, 2015)
  - In a dry consecutive drought year with below-normal cumulative precipitation, Pond 101 East (East) did not hold water the entire year.
  - Consecutive drought year with cumulative precipitation below-normal (9.33 inches)
  - Data collected December-June, six monitoring events
  - Dry in all monitoring events
  - No water quality data collected
- 2014-2015 (Burleson, 2016)
  - In a dry consecutive drought year with below-normal cumulative precipitation, Pond 101 East (East) did not hold water.
  - Consecutive drought year with early storms above-normal and cumulative precipitation slightly below-normal (14.35 inches)
  - Data collected March to May, three monitoring events
  - Dry in all monitoring events
  - No water quality data collected

- 2015-2016 (Burleson, 2017)
  - In a consecutive drought year with cumulative precipitation above-normal, Pond 101 East (East) held water from April-June. Water quality results indicated a slightly acidic to neutral pH, normal temperatures, moderate to high dissolved oxygen and moderate turbidity. It should be noted that data collection did not start with the first storms or inundation. Maximum inundation could have been missed.
  - Drought year with cumulative precipitation above-normal (21.21 inches)
  - Data collected April-July, five monitoring events
  - Inundated from April-June
  - Inundation range 1.23-3.24 acres, mean 2.59 acres
  - Depth range 32-68 cm, mean 56 cm
  - pH range 6.38-7.07, mean 6.60
  - temperature range 17.1°-23.0° C, mean 21.4° C
  - dissolved oxygen range 4.36-7.93 mg/L, mean 6.43 mg/L
  - turbidity range 106-553 FNU, mean 227 FNU
- 2016-2017 (Burleson, 2018)
  - After the end of a historic drought with precipitation above-normal, Pond 101 East (East) was inundated from the first recorded monitoring in January through September (Pond 101EE did not dry at last recorded monitoring in September). The maximum inundation area was 9.374 acres (101EE was connected to 101EW). Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range, with moderate levels. Turbidity had a large range, with moderate levels.
  - Yearly cumulative precipitation 22.92 inches
  - Data collected January - September, nine monitoring events
  - Inundated January through September (pond did not dry by last recorded monitoring in September)
  - Inundation range 5.02-9.40 acres, mean 7.46 acres (pond was connected to 101 East (West) for range and mean values)
  - Depth range 77-~160 cm, mean 135 cm
  - pH range 5.5-6.91, mean 6.38
  - temperature range 10.0°-20.1° C, mean 15.7° C
  - dissolved oxygen range 0.0-3.68 mg/L, mean 2.11 mg/L
  - turbidity range 1.9-43.2 FNU, mean 20.13 FNU
- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 101 East (East) was inundated from the first recorded monitoring in January through May. The maximum inundation area was 2.09 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a large range. Turbidity had a large range, with an out-of-range reading in May.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected November - June, seven monitoring events
  - Inundated January through May
  - Inundation range 0.04-2.09 acres, mean 1.42 acres
  - Depth range 14-48 cm, mean 38 cm
  - pH range 6.42-7.12, mean 6.83
  - temperature range 10.94°-21.88° C, mean 14.18° C
  - dissolved oxygen range 0.21-15.25 mg/L, mean 6.66 mg/L

  - turbidity range 40.8-1000 FNU, mean 263.44 FNU
- 2018-2019
  - In an above-normal water-year, Pond 101 East (East) was inundated from the second recorded monitoring in February through June. The maximum inundation area was 2.76 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range with moderate levels. Turbidity had a large range with moderate levels.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - July, seven monitoring events
  - Inundated February through June
  - Inundation range 0.38-2.76 acres, mean 1.80 acres
  - Depth range 26-56 cm, mean 43 cm
  - pH range 6.38-7.13, mean 6.74
  - temperature range 14.08°-21.92° C, mean 16.15° C
  - dissolved oxygen range 3.09-8.94 mg/L, mean 5.72 mg/L
  - turbidity range 6.1-79.8 FNU, mean 23.8 FNU

Table F-3. Pond 997 (Reference) Historic Hydrology Results on Former Fort Ord from 2017-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2016-2017	1/25/2017	6.40	10.22	7.17	25.6	13	0.33
	2/27/2017	6.78	16.94	12.20	14.1	15	0.23
	3/23/2017	6.43	12.99	7.88	72.4	12	0.10
	4/19/2017	7.07	25.42	7.14†	25.5†	6	0.02
	5/24/2017	-	-	-	-	DRY	0.00
2017-2018	1/19/2018	-	-	-	-	DRY	0.00
	2/23/2018	-	-	-	-	DRY	0.00
	3/20/2018	-	-	-	-	DRY	0.00
	4/18/2018	-	-	-	-	DRY	0.00
2018-2019	1/14/2019	-	-	-	-	DRY	0.00
	2/13/2019	6.39†	11.79†	10.62†	26.0†	13	0.11‡
	3/5/2019	6.37†	12.61†	9.28†	24.2†	14	0.12‡
	4/9/2019	-	-	-	-	2	0.03
	5/9/2019	-	-	-	-	DRY	0.00

†Water quality probe was horizontal for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 997 was monitored three years between 2017 and 2019. Pond 997 is a reference vernal pool and no remediation has occurred. The historic data and precipitation are summarized below:

- 2016-2017 (Burleson, 2018)
  - After the end of a historic drought with precipitation above-normal, Pond 997 was inundated from the first recorded monitoring in January through April. The maximum inundation area was 0.33 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range, with moderate levels. Turbidity had a large range, with moderate levels.
  - Yearly cumulative precipitation 22.92 inches
  - Data collected January - May, five monitoring events
  - Inundated January through April
  - Inundation range 0.02-0.33 acres, mean 0.17 acres
  - Depth range 6-15 cm, mean 12 cm
  - pH range 6.40-7.07, mean 6.67
  - temperature range 10.2°-25.4° C, mean 16.4° C
  - dissolved oxygen range 7.14-12.20 mg/L, mean 8.60 mg/L
  - turbidity range 14.1-72.4 FNU, mean 34.4 FNU
- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 997 did not hold water.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected January - April, four monitoring events

  - Dry in all monitoring events
  - No water quality data collected
- 2018-2019
  - In an above-normal water-year, Pond 997 was inundated from the second recorded monitoring in February through April. The maximum inundation area was 0.12 acres. Water quality was within normal ranges. Water quality data were collected in February and March. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range, with moderate levels. Turbidity had a small range, with moderate levels.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January through May, five monitoring events
  - Inundated February through April
  - Inundation range 0.03-0.12 acres, mean 0.09 acres
  - Depth range 2-14 cm, mean 10 cm
  - pH range 6.37-6.39, mean 6.38
  - temperature range 11.79°-12.61° C, mean 12.20° C
  - dissolved oxygen range 9.28-10.62 mg/L, mean 9.95 mg/L
  - turbidity range 24.2-26.0 FNU, mean 25.1 FNU

Table F-4. Pond 14 (Baseline) Historic Hydrology Results on Former Fort Ord from 1992-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
1991-1992	3/27/1992	-	17	-	-	45	-
1998-1999	1/13/1999	-	-	-	-	DRY	-
	2/17/1999	-	-	-	-	32	0.12
	3/25/1999	-	-	-	-	32	0.12
	4/20/1999	7.14	-	-	53 (NTU)	33	0.12
2015-2016	4/5/2016	6.56	14.89	3.88	64	45	0.14
	4/18/2016	6.44	18.63	3.71	83.3	40	0.09
	5/10/2016	6.69	15.39	4.74	158	26	0.08
	6/8/2016	-	-	-	-	DRY	0.00
2018-2019	1/17/2019	6.39	10.61	4.38	24.1	37	0.05‡
	2/12/2019	6.13	7.49	4.49	57.5	58	0.13‡
	3/4/2019	6.08	13.70	4.97	57.0	59	0.21‡
	4/2/2019	6.34†	14.27†	3.43†	18.5†	57	0.17
	5/6/2019	6.21†	15.11†	3.75†	5.3†	37	0.08
	6/10/2019	6.90†	16.45†	3.09†	6.20†	24	0.02
	7/9/2019	-	-	-	-	DRY	0.00

† Water quality probe was on its side for measurements.
‡ Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 14 was monitored four years between 1992 and 2019 (all for baseline). The historic data and precipitation are summarized below:

- 1991-1992 (Jones & Stokes, 1992)
  - In a year with near-normal precipitation, Pond 14 was surveyed once in March 1992. It should be noted that data collection did not start with the first storms or inundation.
  - Yearly cumulative precipitation near-normal (17.84 inches)
  - Data collected March, one monitoring event
  - Inundated March
  - Depth 45 cm
  - temperature 17˚C
  - pH, turbidity, and dissolved oxygen data were not collected
- 1998-1999 (HLA, 1999)
  - In a year with near-normal precipitation following an El Niño year, Pond 14 held water from January-April. Water quality data were only collected in April.
  - Yearly cumulative precipitation near-normal (16.31 inches)
  - Data collected January-April, four monitoring events
  - Inundated February through April
  - Inundation for three monitoring events, 0.12 acres
  - Depth range 32-33 cm, mean 24 cm
  - pH in April 7.14

  - turbidity in April 53 NTU
  - temperature and dissolved oxygen data were not collected
- 2015-2016 (Burleson, 2017)
  - In a consecutive drought year with cumulative precipitation above-normal, Pond 14 held water from April-May. Water quality results had a slightly acidic to neutral pH, normal temperature, low to moderate dissolved oxygen, and low to moderate turbidity. It should be noted that data collection did not start with the first storms or inundation. Maximum inundation could have been missed.
  - Drought year with cumulative precipitation above-normal (21.21 inches)
  - Data collected April-June, four monitoring events
  - Inundated April through May
  - Inundation range 0.08-0.14 acres, mean 0.10 acres
  - Depth range 26-45 cm, mean 37 cm
  - pH range 6.44-6.69, mean 6.56
  - temperature range 14.9°-18.6° C, mean 16.3° C
  - dissolved oxygen range 3.71-4.74 mg/L, mean 4.11 mg/L
  - turbidity range 64-158 FNU, mean 102 FNU
- 2018-2019
  - In an above-normal water-year, Pond 14 was inundated from the first recorded monitoring in January through June. The maximum inundation area was 0.21 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range. Turbidity had a small range, with moderate levels.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - July, seven monitoring events
  - Inundated January through June
  - Inundation range 0.02-0.21 acres, mean 0.11 acres
  - Depth range 24-59 cm, mean 45 cm
  - pH range 6.08-6.90, mean 6.34
  - temperature range 7.49°-16.45° C, mean 12.94° C
  - dissolved oxygen range 3.09-4.97 mg/L, mean 4.02 mg/L
  - turbidity range 5.3-57.5 FNU, mean 28.1 FNU

Table F-5. Pond 17 (Baseline) Historic Hydrology Results on Former Fort Ord from 1992-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
1991-1992	3/25/1992	-	17	-	extreme[¤]	~61-76	-
1993-1994	3/15/1994	-	-	-	-	20	-
	3/29/1994	-	-	-	-	25	-
	4/13/1994	-	-	-	-	10	-
1994-1995	1/11/1995	-	-	-	-	28	-
	1/26/1995	-	-	-	-	25	-
	2/10/1995	-	-	-	-	41	-
	2/24/1995	-	-	-	-	18	-
	3/10/1995	-	-	-	-	53	-
	3/24/1995	-	-	-	-	25	-
1995-1996	1/3/1996	-	-	-	-	8	-
	1/18/1996	-	-	-	-	15	-
	1/31/1996	-	-	-	-	25	-
	2/14/1996	-	-	-	-	10	-
	2/29/1996	-	-	-	-	10	-
	3/14/1996	-	-	-	-	5	-
	3/28/1996	-	-	-	-	25	-
	4/11/1996	-	-	-	-	5	-
	4/25/1996	-	-	-	-	DRY	-
	5/9/1996	-	-	-	-	DRY	-
2018-2019	1/22/2019	6.89	6.15	9.97	190.0	15[§]	0.28[‡]
	2/12/2019	6.93	5.82	10.88	290.0	15[§]	0.37[‡]
	3/4/2019	7.38[†]	12.45[†]	15.30[†]	273.0[†]	15[§]	0.36[‡]
	4/2/2019	6.66[†]	12.02[†]	8.29[†]	462.0[†]	19[§]	0.35[‡]
	5/6/2019	7.21	14.14	9.60	41.0[†]	13[§]	0.26
	6/10/2019	6.91[†]	21.49[†]	6.39[†]	502.0[†]	9[§]	0.19
	7/9/2019	-	-	-	-	DRY	0.00

¤ In 1991-1992, turbidity was measured qualitatively.
†Water quality probe was on side for measurements.
‡Peripheral ponding was observed but was not mapped. as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.
§Depth not recorded from staff gauge due to placement of gauge in ephemeral stream. Measurement taken at approximate deepest accessible part of vernal pool.

Pond 17 was monitored five years between 1992 and 2019 (all for baseline). The historic data and precipitation are summarized below:

- 1991-1992 (Jones & Stokes, 1992)
  - In a year with near-normal precipitation, Pond 17 was surveyed once in March 1992. It should be noted that data collection did not start with the first storms or inundation.

   - Yearly cumulative precipitation near-normal (17.84 inches)
   - Data collected March, one monitoring event
   - Inundated March
   - Depth range ~61-76 cm
   - temperature 17˚C
   - pH, turbidity, and dissolved oxygen data were not collected
- 1993-1994 (Jones & Stokes, 1996)
   - In a water-year that was below-normal, Pond 17 held water during three monitoring events in March and April.
   - Yearly cumulative precipitation 13.96 inches
   - Data collected in March and April, three monitoring events
   - Inundated during all monitoring events
   - No inundation areas recorded
   - Depth range 10-20 cm, mean 19 cm
   - No water quality data were collected
- 1994-1995 (Jones & Stokes, 1996)
   - In a water-year that was above-normal, Pond 17 was inundated by January monitoring and stayed inundated through March.
   - Yearly cumulative precipitation 23.38 inches
   - Data collected January-March, six monitoring events
   - Inundated during all monitoring events
   - No inundation areas recorded
   - Depth range 18-53 cm, mean 32 cm
   - No water quality data were collected
- 1995-1996 (Jones & Stokes, 1996)
   - In a water-year that was approximately normal, Pond 17 was inundated from January to April. The maximum depth was lower but similar to previous years.
   - Yearly cumulative precipitation 16.96 inches
   - Data collected January-May, ten monitoring events
   - Inundated early-January to mid-April
   - No inundation areas recorded
   - Depth range 5-25 cm, mean 10 cm
   - No water quality data collected
- 2018-2019
   - In an above-normal water-year, Pond 17 was inundated from the first recorded monitoring in January through June. The maximum inundation area was 0.37 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range. Turbidity had a wide range, with levels above 100 FNU for all months except May.
   - Yearly cumulative precipitation 21.97 inches
   - Data collected January - July, seven monitoring events
   - Inundated January through June
   - Inundation range 0.19-0.37 acres, mean 0.30 acres
   - Depth range 9-19 cm, mean 14 cm
   - pH range 6.66-7.38, mean 7.00
   - temperature range 5.82°-21.49° C, mean 12.01° C
   - dissolved oxygen range 6.39-15.30 mg/L, mean 10.07 mg/L

- turbidity range 41-502 FNU, mean 293 FNU

Table F-6. Pond 21 (Baseline) Historic Hydrology Results on Former Fort Ord from 1992-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
1991-1992	3/27/1992	-	15	-	slight[x]	20	-
1998-1999	1/12/1999	6.8	-	-	5 (NTU)	23	0.29
	2/16/1999	-	-	-	-	36	0.34
	3/25/1999	5.7	-	-	5 (NTU)	36	0.94
	4/20/1999	8.15	-	-	24 (NTU)	36	0.94
2006-2007	Dec	-	-	-	-	DRY	-
	Jan	-	-	-	-	DRY	-
	March	-	-	-	-	DRY	-
	April	-	-	-	-	DRY	-
	May	-	-	-	-	DRY	-
	June	-	-	-	-	DRY	-
2018-2019	1/17/2019	-	-	-	-	2	0.01‡
	2/12/2019	6.51	10.42	8.60	16.8	16	0.83‡
	3/5/2019	6.39†	13.6†	8.83†	41.1†	19	0.86‡
	4/2/2019	6.66†	13.2†	7.36†	30.6†	14	0.81‡
	5/6/2019	-	-	-	-	DRY	0.00

[x] In 1991-1992, turbidity was measured qualitatively.
†Water quality probe was on side for measurements.
‡Peripheral ponding was observed but was not mapped. as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 21 was monitored four years between 1992 and 2019 (all for baseline). The historic data and precipitation are summarized below:

- 1991-1992 (Jones & Stokes, 1992)
  - In a year with near-normal precipitation, Pond 21 was surveyed once in March 1992. It should be noted that data collection did not start with the first storms or inundation.
  - Yearly cumulative precipitation near-normal (17.84 inches)
  - Data collected March, one monitoring event
  - Inundated March
  - Depth 20 cm
  - temperature 15˚C
  - pH, turbidity, and dissolved oxygen data were not collected
- 1998-1999 (HLA, 1999)
  - In a year with near-normal precipitation following an El Niño year, Pond 21 held water from January-April. The maximum inundation area was 0.94 acres. Water quality was within normal ranges. Slightly basic to slightly acidic pH values were observed. Turbidity had a small range, with moderate levels. Temperature and dissolved oxygen were not measured.
  - Yearly cumulative precipitation near-normal (16.31 inches)
  - Data collected January-April, four monitoring events

  - Inundated January through April
  - Inundation range 0.29-0.94 acres, mean 0.63 acres
  - Depth range 23-36 cm, mean 32 cm
  - pH range 5.7-8.15, mean 6.88
  - turbidity range 5-24 NTU, mean 11 NTU
  - temperature and dissolved oxygen data were not collected
- 2006-2007 (Shaw, 2008)
  - In a below-normal rain year, Pond 21 did not hold water.
  - Yearly cumulative precipitation 10.13 inches
  - Data collected December to June, six monitoring events
  - Dry in all monitoring events
  - No water quality data collected
- 2018-2019
  - In an above-normal water-year, Pond 21 was inundated from the first recorded monitoring in January through April. The maximum inundation area was 0.86 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range. Turbidity had a small range, with moderate levels.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - May, six monitoring events
  - Inundated January through April
  - Inundation range 0.01-0.86 acres, mean 0.63 acres
  - Depth range 2-19 cm, mean 13 cm
  - pH range 6.39-6.66, mean 6.52
  - temperature range 10.42°-13.60° C, mean 12.41° C
  - dissolved oxygen range 7.36-8.83 mg/L, mean 8.26 mg/L
  - turbidity range 16.8-41.1 FNU, mean 29.5 FNU

Table F-7. Pond 103 (Baseline) Historic Hydrology Results on Former Fort Ord from 1992-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
1991-1992	4/20/1992	-	23	-	extreme[¤]	152	-
2018-2019	1/16/2019	-	-	-	-	DRY	0.00
	2/14/2019	-	-	-	-	DRY	0.00
	3/4/2019	-	-	-	-	DRY	0.00
	4/2/2019	-	-	-	-	DRY	0.00
	5/7/2019	-	-	-	-	DRY	0.00
	6/2019	-	-	-	-	DRY	0.00

[¤] In 1991-1992, turbidity was measured qualitatively.

Pond 103 was monitored two years between 1992 and 2019 (both for baseline). No staff gauge is present at Pond 103. The area was described in 1992 as an "excavated ditch" with habitat conditions that were "heavily disturbed, barb wire, lumber, graded around area." There was no evidence of the area having held water in recent years, and the area supports dominate upland maritime chaparral rather than wetland vernal pool habitat. The historic data and precipitation are summarized below:

- 1991-1992 (Jones & Stokes, 1992)
  - In a year with near-normal precipitation, Pond 103 was surveyed once in April 1992. It should be noted that data collection did not start with the first storms or inundation.
  - Yearly cumulative precipitation near-normal (17.84 inches)
  - Data collected April, one monitoring event
  - Inundated April
  - Depth 152 cm
  - temperature 23˚C
  - turbidity extreme (measured qualitatively)
  - pH and dissolved oxygen data were not collected
- 2018-2019
  - In an above-normal water-year, Pond 103 did not hold water. No staff gauge is present at Pond 103.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - June, six monitoring events
  - Dry in all monitoring events
  - No water quality data collected

Table F-8. Pond 101 East (West) (Year 1 Post-Mastication) Historic Hydrology Results on Former Fort Ord from 1992-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
1991-1992	4/20/1992	-	24	-	slight[x]	91	5**
2000-2001	1/12/2001	-	-	-	-[ɣ]	-	-
	2/12/2001-2/13/2001	-	-	-	-	36 [ɣ]	0.11
	3/26/2001	-	-	-	-	>46 [ɣ]	0.14
	4/18/2001-4/19/2001	-	-	-	-	>5 [ɣ]	-
	5/23/2001-5/24/2001	-	-	-	-	- [ɣ]	-
2006-2007	-	-	-	-	-	DRY	0.00
2014-2015	3/18/2015	-	-	-	-	DRY	0.00
	4/16/2015	-	-	-	-	DRY	0.00
	5/28/2015	-	-	-	-	DRY	0.00
2015-2016	4/5/2016	6.43	13.95	0.0	5.7	70	1.89
	4/19/2016	6.67	23.28	6.4	204.0	58	0.20
	5/9/2016	6.22	17.22	2.9	77.1	54	0.67
	6/8/2016	6.55	22.9	3.4	525.0	20	0.07
	7/7/2016	-	-	-	-	DRY	0.00
2016-2017	1/24/2017	5.81	10.61	1.99	13.7	79	Connected to 101 East (East), total 5.02
	2/27/2017	6.21	10.39	6.18	10.8	88	Connected to 101 East (East), total 9.37
	3/20/2017	6.13	14.67	5.80	2.8	84	Connected to 101 East (East), total 8.87
	4/20/2017	6.10	15.27	5.28	10.0	86	Connected to 101 East (East), total 9.38
	5/25/2017	6.02	18.65	1.68	36.6	74	0.95
	6/21/2017	6.53	26.63	2.97	79.8	18	0.17
	7/27/2017	-	-	-	-	DRY	0.00
2017-2018	1/19/2018	-	-	-	-	DRY	0.00
	2/21/2018	-	-	-	-	DRY	0.00
	3/21/2018	6.62	13.58	3.09	39.5	16	0.004
	4/17/2018	7.20	21.74	10.95	16.6	24	0.09
	5/21/2018	-	-	-	-	DRY	0.00

Table F-8. Pond 101 East (West) (Year 1 Post-Mastication) Historic Hydrology Results on Former Fort Ord from 1992-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2018-2019	1/14/2019	-	-	-	-	DRY	0.00
	2/14/2019	6.50	11.84	7.61	7.7	70	1.20‡
	3/7/2019	6.12	14.31	4.48	2.9	76	1.86‡
	4/4/2019	6.44	14.46	3.89	3.0	71	1.18‡
	5/9/2019	6.28	15.94	3.97	1.8	46	0.35
	6/11/2019	6.35	23.74	6.35	64.9	23	0.02
	7/9/2019	-	-	-	-	DRY	0.00

ˇ In 1991-1992, turbidity was measured qualitatively.
** The 1991-1992 acreage includes Ponds 101 East (East) and 101 East (West).
ˠ In 2000-2001, depths were recorded for Waterbody 53, which includes the ponds currently named Pond 101 West, Pond 101 East (West), and 101 East (East). It is unknown which pond was sampled for depth.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 101 East (West) was monitored eight years between 1992 and 2019. Mastication activities occurred in 2018. Pond 101 East (West) is a post-mastication vernal pool and was in year 1 of monitoring in 2019. It should be noted that Pond 101 East (West) was previously considered a reference vernal pool. The historic data and precipitation are summarized below:

- 1991-1992 (Jones & Stokes, 1992)
  - In a year with near-normal precipitation, Pond 101 East (West) was surveyed once in April 1992. It should be noted that data collection did not start with the first storms or inundation.
  - Yearly cumulative precipitation near-normal (17.84 inches)
  - Data collected April, one monitoring event
  - Inundated April, 5 acres (acreage includes Pond 101 East (East))
  - Depth 91 cm
  - temperature 24˚C
  - pH, turbidity, and dissolved oxygen data were not collected
- 2000-2001 (Harding ESE, 2002)
  - In a year with early storms followed by below-normal precipitation, Pond 101 East (West) was recorded as inundated 0.11 acres in February and March as part of the Pond 101 complex
  - Early storms with cumulative precipitation below-normal (15.52 inches)
  - Data collected January-May, five monitoring events
  - Inundated for two monitoring events, 0.11 acres and 0.14 acres
  - No water quality data collected
- 2006-2007 (Shaw, 2008)
  - In a below-normal water-year, Pond 101 East (West) was not inundated
  - Cumulative precipitation was below-normal (10.13 inches)
  - No water quality data collected specifically for 101 East (West)

- 2014-2015 (Burleson, 2016)
  - In a dry consecutive drought year with below-normal precipitation, Pond 101 East (West) did not hold water.
  - Early storms pushed early cumulative precipitation above-normal while total yearly cumulative precipitation fell below-normal (14.35 inches)
  - Data collected March to May, three monitoring events
  - Dry in all monitoring events
  - No water quality data collected
- 2015-2016 (Burleson, 2017)
  - In a consecutive drought year with cumulative precipitation above-normal, Pond 101 East (West) held water from April-June. Water quality results had a slightly acidic to neutral pH, normal temperature, low to moderate dissolved oxygen, and low to moderate turbidity. It should be noted that data collection did not start with the first storms or inundation. Maximum inundation could have been missed.
  - Drought year with cumulative precipitation above-normal (21.21 inches)
  - Data collected April-July, five monitoring events
  - Inundated April through June
  - Inundation range 0.07-1.89 acres, mean 0.71 acres
  - Depth range 20-70 cm, mean 51 cm
  - pH range 6.22-6.67, mean 6.47
  - temperature range 14.0°-23.3° C, mean 19.3° C
  - dissolved oxygen range 0.00-6.40 mg/L, mean 3.18 mg/L
  - turbidity range 5.7-525.0 FNU, mean 203 FNU
- 2016-2017 (Burleson, 2018)
  - After the end of a historic drought with precipitation above-normal, Pond 101 East (West) was inundated from the first recorded monitoring in January through June. The maximum inundation area was 9.37 acres (101EW was connected to 101EE). Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range, with moderate levels. Turbidity had a small range, with moderate levels.
  - Yearly cumulative precipitation 22.92 inches
  - Data collected January - July, seven monitoring events
  - Inundated January through June
  - Inundation range 0.17-9.37 acres, mean 5.63 acres (pond connected to 101EE for upper range value and mean acreage)
  - Depth range 18-88 cm, mean 72 cm
  - pH range 5.81-6.53, mean 6.13
  - temperature range 10.4°-26.6° C, mean 16.0° C
  - dissolved oxygen range 1.68-6.18 mg/L, mean 3.98 mg/L
  - turbidity range 2.8-79.8 FNU, mean 25.6 FNU
- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 101 East (West) was inundated for the third and fourth monitoring in March and April, respectively, but was dry in January, February, and May. The maximum inundation area was 0.09 acres. Water quality was within normal ranges. Neutral pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a wide range. Turbidity had a small range, with moderate levels.

    - Yearly cumulative precipitation 12.57 inches
    - Data collected January - May, five monitoring events
    - Inundated March and April
    - Inundation range 0.004-0.09 acres, mean 0.05 acres
    - Depth range 16-24 cm, mean 20 cm
    - pH range 6.62-7.20, mean 6.91
    - temperature range 13.58°-21.74° C, mean 17.66° C
    - dissolved oxygen range 3.09-10.95 mg/L, mean 7.02 mg/L
    - turbidity range 16.6-39.5 FNU, mean 28.1 FNU
- 2018-2019
    - In an above-normal water-year, Pond 101 East (West) was inundated from the second recorded monitoring in February through June. The maximum inundation area was 1.86 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range. Turbidity had a large range, with moderate levels.
    - Yearly cumulative precipitation 21.97 inches
    - Data collected January - July, seven monitoring events
    - Inundated February through June
    - Inundation range 0.02-1.86 acres, mean 0.92 acres
    - Depth range 23-76 cm, mean 57 cm
    - pH range 6.12-6.50, mean 6.34
    - temperature range 11.84°-23.74° C, mean 16.06° C
    - dissolved oxygen range 3.89-7.61 mg/L, mean 5.26 mg/L
    - turbidity range 1.8-64.9 FNU, mean 16.1 FNU

Table F-9. Pond 101 West (Year 1 Post-Mastication) Historic Hydrology Results on Former Fort Ord from 2001-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2000-2001	2/12/2001-2/13/2001	-	-	-	-	36 [¥]	0.05
	3/26/2001	-	-	-	-	>46 [¥]	0.06
	4/18/2001-4/19/2001	-	-	-	-	>5 [¥]	-
2014-2015	3/18/2015	-	-	-	-	10[§]	0.01
	4/16/2015	-	-	-	-	DRY	0.00
	5/28/2015	-	-	-	-	DRY	0.00
2015-2016	4/5/2016	6.53	14.85	0.00	36.7	43	0.09
	4/18/2016	6.45	17.46	0.00	354.0	33	0.05
	5/9/2016	-	-	-	-	DRY	0.00
2018-2019	1/14/2019	-	-	-	-	DRY	0.00
	2/14/2019	6.44	13.32	7.45	26.7	54	0.11[‡]
	3/5/2019	6.53	13.58	5.13	100.0	51	0.11[‡]
	4/4/2019	6.68	14.69	4.77	90.8	47	0.09
	5/8/2019	6.69[†]	24.35[†]	5.40[†]	202.0[†]	10	0.01[‡]
	6/2019	-	-	-	-	DRY	0.00

¥In 2000-2001, depths were recorded for Waterbody 53, which includes the currently named ponds of Pond 101 West, Pond 101 East (West), and 101 East (East). It is unknown which pond was sampled for depth.
§No staff gauge. Cannot access ponds to measure depth due to potential for subsurface unexploded ordnance and other hazards. Depths are estimations.
†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 101 West was monitored four years between 2001 and 2019. Mastication activities occurred in 2018. Pond 101 West is a post-mastication vernal pool and was in year 1 of monitoring in 2019. The historic data and precipitation are summarized below:

- 2000-2001 (Harding ESE, 2002)
  - In a year with early storms followed by below-normal precipitation, Pond 101 West was recorded as inundated 0.05 acres in February
  - Early storms with cumulative precipitation below-normal (15.52 inches)
  - Data collected January-May, five monitoring events
  - Inundated for two monitoring events, 0.05 acres and 0.06 acres
  - Depth range 5-46 cm, mean 29 cm
  - No water quality data collected
- 2014-2015 (Burleson, 2016)
  - In a dry consecutive drought year with below-normal precipitation, Pond 101 West held water only in March. It should be noted that data collection did not start with the first storms or inundation. Maximum inundation could have been missed.

  - Early storms pushed early cumulative precipitation above-normal while total yearly cumulative precipitation fell below-normal (14.35 inches)
  - Data collected March to May, three monitoring events
  - Inundated in March, 0.01 acres
  - Depth in March 10 cm
  - No water quality data collected
- 2015-2016 (Burleson, 2017)
  - In a consecutive drought year with cumulative precipitation above-normal, Pond 101 West held water in April. Water quality results had a slightly acidic pH, normal temperature, and low dissolved oxygen. Turbidity had a high reading in during the mid-April monitoring event. It should be noted that data collection did not start with the first storms or inundation. Maximum inundation could have been missed.
  - Drought year with cumulative precipitation above-normal (21.21 inches)
  - Data collected April-May, three monitoring events
  - Inundated in April
  - Inundation range 0.05-0.09 acres, mean 0.07 acres
  - Depth range 33-43 cm, mean 38 cm
  - pH range 6.45-6.53, mean 6.49
  - temperature range 14.85°-17.46° C, mean 16.16° C
  - dissolved oxygen 0.00 mg/L
  - turbidity range 36.7-354.0 FNU, mean 195.4 FNU
- 2018-2019
  - In an above-normal water-year, Pond 101 West was inundated from the second recorded monitoring in February through May. The maximum inundation area was 0.11 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range. Turbidity had a wide range, with high March and May readings.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - June, six monitoring events
  - Inundated February through May
  - Inundation range 0.01-0.11 acres, mean 0.08 acres
  - Depth range 10-54 cm, mean 41 cm
  - pH range 6.44-6.69, mean 6.59
  - temperature range 13.32°-24.35° C, mean 16.49° C
  - dissolved oxygen range 4.77-7.45 mg/L, mean 5.69 mg/L
  - turbidity range 26.7-202.0 FNU, mean 104.9 FNU

Table F-10. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Historic Hydrology Results on Former Fort Ord from 1997-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
1997-1998	Dec	7.53	-	-	25 (NTU)	52	1.45
	Jan	-	-	-	3.48 (NTU)	61	1.70
	Feb	7.48	-	-	3.82 (NTU)	102	2.13
	April	-	-	-		>127	2.13
2014-2015	2/24/2015					DRY	0.00
	3/18/2015	-	-	-	-	DRY	0.00
	4/16/2015	-	-	-	-	DRY	0.00
	5/28/2015	-	-	-	-	DRY	0.00
2015-2016	4/4/2016	6.56	12.64	2.40	124.0	60	1.44
	4/18/2016	6.73	14.73	1.58	15.8	46	1.28
	5/9/2016	6.79	15.01	1.75	54.3	34	0.33
	6/7/2016	-	-	-		DRY	0.00
2018-2019	2/14/2019	6.34	13.03	7.99	3.00	61	1.29‡
	3/6/2019	6.70	13.54	7.09	2.1	69	1.43
	4/2/2019	6.28	14.20	5.65	0.9	63	1.31‡
	5/7/2019	6.27	16.13	3.30	1.7	38	0.18‡
	6/11/2019	6.45	18.59	8.18	31.4	12	0.002
	7/9/2019	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 41 was monitored four years between 1997 and 2019. Munitions remediation activities occurred in 2018. Pond 41 is a post-subsurface munitions remediation vernal pool and was in year 1 of monitoring in 2019. The historic data and precipitation are summarized below:

- 1997-1998 (HLA, 1998)
  - In an El Niño year with yearly cumulative precipitation significantly above-normal, Pond 41 held water December through April. Turbidity and pH were the only water quality parameters collected in December and February.
  - El Niño year with yearly cumulative precipitation above-normal (40.54 inches)
  - Data collected December-April, four monitoring events
  - Inundated from December through April
  - Inundation range 1.45-2.13 acres, mean 1.85 acres
  - Depth range 52 - >127 cm, mean 85 cm
  - pH range 7.48-7.53, mean 7.51
    turbidity range 3.48-25.0 NTU, mean 1.08 NTU

- 2014-2015 (Burleson, 2016)
  - In a dry consecutive drought year with below-normal precipitation, Pond 41 did not hold water.
  - Early storms pushed early cumulative precipitation above-normal while total yearly cumulative precipitation fell below-normal (14.35 inches)
  - Data collected February to May, four monitoring events
  - Dry in all monitoring events
  - No water quality data collected
- 2015-2016 (Burleson, 2017)
  - In a consecutive drought year with cumulative precipitation above-normal, Pond 41 held water from April-May. Water quality results had a slightly acidic pH, normal temperature, low dissolved oxygen, and low to moderate turbidity. It should be noted that data collection did not start with the first storms or inundation. Maximum inundation could have been missed.
  - Drought year with cumulative precipitation above-normal (21.21 inches)
  - Data collected April-June, four monitoring events
  - Inundated April through May
  - Inundation range 0.33-1.44 acres, mean 1.02 acres
  - Depth range 34-60 cm, mean 47 cm
  - pH range 6.56-6.79, mean 6.69
  - temperature range 12.64°-15.01° C, mean 14.13° C
  - dissolved oxygen range 1.58-2.40 mg/L, mean 1.91 mg/L
  - turbidity range 15.8-124.0 FNU, mean 64.7 FNU
- 2018-2019
  - In an above-normal water-year, Pond 41 was inundated from the first recorded monitoring in February through June. The maximum inundation area was 1.43 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range. Turbidity had a small range, with low levels.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected February through July, six monitoring events
  - Inundated February through June
  - Inundation range 0.18-1.43 acres, mean 0.84 acres
  - Depth range 12-69 cm, mean 49 cm
  - pH range 6.27-6.70, mean 6.41
  - temperature range 13.03°-18.59° C, mean 15.10° C
  - dissolved oxygen range 3.30-8.18 mg/L, mean 6.44 mg/L
  - turbidity range 0.9-31.4 FNU, mean 7.8 FNU

Table F-11. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Historic Hydrology Results on Former Fort Ord from 1997-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
1997-1998	Jan	-	-	-	26.9 (NTU)	55	0.34
	Feb	7.57-7.95	-	-	40.1 (NTU)	46	0.38
	Apr		-	-	-	48	0.38
2014-2015	2/24/2015	-	-	-	-	~40§	-
	3/18/2015	-	-	-	-	30§	0.07
	4/16/2015	7.60	26.30	11.80	104.0 (NTU)	15§	0.03
	5/28/2015	-	-	-	-	DRY	0.00
2015-2016	3/31/2016	6.75	18.40	5.61	56.7	54	0.22
	4/19/2016	6.12	15.50	3.67	45.4	45	0.11
	5/9/2016	6.28	15.56	2.11	9.6	29	0.07
	6/7/2016	6.07	18.71	3.88	24.2	16	0.03
	7/7/2016	-	-	-	-	DRY	0.00
2017-2018	1/16/2018	-	-	-	-	DRY	0.00
	2/20/2018	-	-	-	-	DRY	0.00
	3/19/2018	6.27	11.33	8.75	57.4	10	0.02
	4/16/2018	6.61	13.33	7.60	5.3	24	0.05
	5/21/2018	-	-	-	-	DRY	0.00
2018-2019	1/16/2019	6.55	12.08	10.04	13.6	14	0.02‡
	2/11/2019	6.89	8.81	7.80	43.9	61	Connected to 3 South, total 0.86‡
	3/7/2019	6.62	13.37	5.64	1.7	62	Connected to 3 South, total 1.14‡
	4/3/2019	6.64	16.26	5.43	0.3	59	0.27‡
	5/7/2019	6.84	18.90	9.20	0.5	40	0.09‡
	6/11/2019	6.27	20.89	7.14	0.9	26	0.05
	7/9/2019	-	-	-	-	DRY	0.00

§No staff gauge. Cannot access ponds to measure depth due to potential for subsurface unexploded ordnance and other hazards. Depths are estimations.

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 3 North was monitored five years between 1997 and 2019. Burn activities occurred in 2017 and munitions remediation activities occurred in 2018. In 2019, Pond 3 North was in year 2 of monitoring for post-burn and year 1 for post-subsurface munitions remediation. The historic data and precipitation are summarized below:

- 1997-1998 (HLA, 1998)
  - In an El Niño year with yearly cumulative precipitation significantly above-normal, Pond 3 North held water January through April. Turbidity and pH were the only water quality parameters collected in January and February.
  - El Niño year with yearly cumulative precipitation above-normal (40.54 inches)
  - Data collected January-April, three monitoring events
  - Inundated from January through April
  - Inundation range 0.34-0.38 acres, mean 0.37 acres
  - Depth range 46-55 cm, mean 50 cm
  - pH range 7.57-7.95
    turbidity range 26.9-40.1 NTU, mean 33.5 NTU
- 2014-2015 (Burleson, 2016)
  - In a dry consecutive drought year with below-normal precipitation, Pond 3 North was inundated February through May. Water quality data were collected only in April.
  - Early storms pushed early cumulative precipitation above-normal while total yearly cumulative precipitation fell below-normal (14.35 inches)
  - Data collected February to May, four monitoring events
  - Inundated February to May
  - Inundation range 0.03-0.07 acres, mean 0.05 acres
  - Depth range 15-~40 cm, mean ~28 cm (depths are estimations)
  - Water quality data were collected only in April
  - pH 7.6
  - temperature 26.3° C
  - dissolved oxygen 11.8 mg/L
  - turbidity 104 NTU
- 2015-2016 (Burleson, 2017)
  - In a consecutive drought with precipitation above-normal, Pond 3 North was inundated from the first recorded monitoring in March through June. The maximum inundation area was 0.22 acres. Water quality was within normal ranges. Slightly acidic to neutral pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range. Turbidity was low on average. It is likely that Pond 3 North was inundated earlier in the water-year and maximum inundation was most likely not captured. It should be noted that data collection did not start with the first storm or inundation.
  - Consecutive drought year with yearly cumulative precipitation 21.21 inches
  - Data collected March-July, five monitoring events
  - Inundated March through June
  - Inundation range 0.03-0.22 acres, mean 0.11 acres
  - Depth range 16-54 cm, mean 36 cm
  - pH range 6.07-6.75, mean 6.31
  - temperature range 15.50°-18.71° C, mean 17.04° C
  - dissolved oxygen range 2.11-5.61 mg/L, mean 3.82 mg/L
  - turbidity range 9.6-56.7 FNU, mean 34.0 FNU
- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 3 North was not inundated until March and April. The maximum inundation area was 0.05 acres. Water quality was within normal ranges. Slightly acidic to neutral pH values were observed. Temperature was within normal

averages for Fort Ord. Dissolved oxygen had a small range, with moderate levels. Turbidity had a moderate range, with low levels.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected January - May, five monitoring events
  - Inundated March and April
  - Inundation range 0.02-0.05 acres, mean 0.03 acres
  - Depth range 10-24 cm, mean 17 cm
  - pH range 6.27-6.61, mean 6.44
  - temperature range 11.33°-13.33° C, mean 12.33° C
  - dissolved oxygen range 7.60-8.75 mg/L, mean 8.18 mg/L
  - turbidity range 5.3-57.4 FNU, mean 31.5 FNU
- 2018-2019
  - In an above-normal water-year, Pond 3 North was inundated from the first recorded monitoring in January through June. The maximum inundation area was 1.14 acres (pond was connected to 3 South). Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range, with low levels. Turbidity had a moderate range, with low levels.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - July, seven monitoring events
  - Inundated January through June
  - Inundation range 0.02-1.14 acres, mean 0.41 acres (pond connected to 3 South for upper range value and mean acreage)
  - Depth range 26-62 cm, mean 44 cm
  - pH range 6.27-6.89, mean 6.64
  - temperature range 8.81°-20.89° C, mean 15.05° C
  - dissolved oxygen range 5.43-10.04 mg/L, mean 7.54 mg/L
  - turbidity range 0.3-43.9 FNU, mean 10.2 FNU

Table F-12. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Historic Hydrology Results on Former Fort Ord from 1997-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
1997-1998	Dec	7.89	-	-	43.0-60.0 (NTU)	32	0.69
	Jan	-	-	-	27.1 (NTU)	32	0.71
	Feb	7.40-7.70	-	-	45.5 (NTU)	30	0.78
	Apr	-	-	-	-	33	0.78
2014-2015	3/18/2015	-	-	-	-	DRY	0.00
	4/16/2015	-	-	-	-	DRY	0.00
	5/28/2015	-	-	-	-	DRY	0.00
2015-2016	3/31/2016	7.00	16.42	9.87	12.2	30	0.52
	4/19/2016	6.38	14.44	4.00	10.2	30	0.41
	5/9/2016	6.39	13.85	1.31	4.0	11	0.01
	6/7/2016	-	-	-	-	DRY	0.00
2017-2018	1/16/2018	-	-	-	-	DRY	0.00
	2/20/2018	-	-	-	-	DRY	0.00
	3/19/2018	-	-	-	-	DRY	0.00
	4/16/2018	7.13	15.67	8.75	77.7	8	0.001‡
	5/21/2018	-	-	-	-	DRY	0.00
2018-2019	1/16/2019	6.71†	12.46†	9.03†	6.9†	10	0.01‡
	2/11/2019	6.43	9.99	9.39	26.1	33	Connected to 3 North, total 0.86‡
	3/7/2019	6.33	12.98	5.60	6.2	35	Connected to 3 North, total 1.14‡
	4/3/2019	6.70	15.87	6.91	27.9	33	0.44‡
	5/7/2019	-	-	-	-	9	0.004‡
	6/11/2019	-	-	-	-	DRY	0.00

†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 3 South was monitored five years between 1997 and 2019. Burn activities occurred in 2017 and munitions remediation activities occurred in 2018. In 2019, Pond 3 South was in year 2 of monitoring for post-burn and year 1 for post-subsurface munitions remediation. The historic data and precipitation are summarized below:

- 1997-1998 (HLA, 1998)
  - In an El Niño year with yearly cumulative precipitation significantly above-normal, Pond 3 South held water December through April. Turbidity and pH the only water quality parameters collected.
  - El Niño year with yearly cumulative precipitation above-normal (40.54 inches)

- Data collected December-April, four monitoring events
- Inundated from December through April
- Inundation range 0.69-0.78 acres, mean 0.74 acres
- Depth range 31-33 cm, mean 32 cm
- pH range 7.40-7.89, mean 7.66
  turbidity range 27.1-60 NTU, mean 43.9 NTU

- 2014-2015 (Burleson, 2016)
  - In a dry consecutive drought year with below-normal precipitation, Pond 3 South did not hold water. No water quality data were collected.
  - Early storms pushed early cumulative precipitation above-normal while total yearly cumulative precipitation fell below-normal (14.35 inches)
  - Data collected March to May, three monitoring events
  - Dry during all monitoring events
- 2015-2016 (Burleson, 2017)
  - In a consecutive drought with precipitation above-normal, Pond 3 South was inundated from the first recorded monitoring in March through June. The maximum inundation area was 0.52 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range. Turbidity was low on average. It is likely that Pond 3 South was inundated earlier in the water-year and maximum inundation was most likely not captured. It should be noted that data collection did not start with the first storm or inundation.
  - Consecutive drought year with yearly cumulative precipitation 21.21 inches
  - Data collected March-June, four monitoring events
  - Inundated March through May
  - Inundation range 0.01-0.52 acres, mean 0.31 acres
  - Depth range 11-30 cm, mean 24 cm
  - pH range 6.38-7.00, mean 6.59
  - temperature range 13.85°-16.42° C, mean 14.90° C
  - dissolved oxygen range 1.31-9.87 mg/L, mean 5.06 mg/L
  - turbidity range 4.0-12.2 FNU, mean 8.8 FNU
- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 3 South was inundated only in April. The maximum inundation area was 0.001 acres. Water quality was collected in April and was within normal ranges. Neutral pH value, temperature within normal averages for Fort Ord, moderate dissolved oxygen, and low turbidity were observed.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected January - May, five monitoring events
  - Inundated April
  - Inundation 0.001 acres
  - Depth 8 cm
  - pH 7.13
  - temperature 15.67° C
  - dissolved oxygen 8.75 mg/L
  - turbidity 77.7 FNU

- 2018-2019
  - In an above-normal water-year, Pond 3 South was inundated from the first recorded monitoring in January through May. The maximum inundation area was 1.14 acres (pond was connected to 3 North). Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range. Turbidity was low on average.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - June, six monitoring events
  - Inundated January through May
  - Inundation range 0.004-1.14 acres, mean 0.49 acres (pond connected to 3 North for upper range value and mean acreage)
  - Depth range 9-35 cm, mean 24 cm
  - pH range 6.33-6.71, mean 6.54
  - temperature range 9.99°-15.87° C, mean 12.83° C
  - dissolved oxygen range 5.60-9.39 mg/L, mean 7.73 mg/L
  - turbidity range 6.2-27.9 FNU, mean 16.8 FNU

Table F-13. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Historic Hydrology Results on Former Fort Ord from 1997-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
1997-1998	Dec	7.58-7.95	-	-	>100.0 (NTU)	36	0.24
	Jan	-	-	-	27.0-204.0 (NTU)	35	0.44
	Feb	7.57-8.00	-	-	48.7 (NTU)	48	0.49
	April	-	-	-	-	48	0.49
2014-2015	2/24/2015	-	-	-	-	DRY	0.00
	3/18/2015	-	-	-	-	DRY	0.00
	4/16/2015	-	-	-	-	DRY	0.00
	5/28/2015	-	-	-	-	DRY	0.00
2015-2016	3/31/2016	6.31	13.85	2.25	177.0	38§	0.03
	4/19/2016	6.37	11.31	2.29	23.8	36§	0.01
	5/9/2016	-	-	-		DRY	0.00
2017-2018	11/20/2017	-	-	-	-	DRY	0.00
	1/16/2018	5.94	11.78	2.36	43.1	15	0.002
	2/20/2018	-	-	-	-	DRY	0.00
	3/19/2018	6.51	8.35	4.59	142.0	38	0.01
	4/16/2018	6.21	12.68	5.81	66.2	34	0.01
	5/21/2018	-	-	-	-	DRY	0.00
2018-2019	12/13/2018	-	-	-	-	25	-
	1/16/2019	6.47	10.40	5.91	13.0	43	0.01‡
	2/11/2019	6.63	7.18	5.26	574.0	50	0.31‡
	3/6/2019	6.38	13.80	4.29	528.0	50	0.25‡
	4/3/2019	6.52	13.98	4.33	460.0	44	0.01‡
	5/7/2019	-	-	-	-	7	-
	6/10/2019	6.34	30.37	8.20	>1000	14	0.002
	7/9/2019	-	-	-	-	DRY	0.00

§ A second gauge was added in 2017 at the deepest point of the pool. A difference of 30 cm was measured between the prior gauge and new gauge in 2018. Depths in 2016 were adjusted to reflect the offset.

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 39 was monitored five years between 1997 and 2019. Burn activities occurred in 2017 and munitions remediation activities occurred in 2018. In 2019, Pond 39 was in year 2 of monitoring for post-burn and year 1 for post-subsurface munitions remediation. The historic data and precipitation are summarized below:

- 1997-1998 (HLA, 1998)
  - In an El Niño year with yearly cumulative precipitation significantly above-normal, Pond 39 held water December through April. Turbidity and pH were the only water quality parameters collected.
  - El Niño year with yearly cumulative precipitation above-normal (40.54 inches)
  - Data collected December-April, four monitoring events
  - Inundated from December through April
  - Inundation range 0.24-0.49 acres, mean 0.41 acres
  - Depth range 35-48 cm, mean 42 cm
  - pH range 7.57-8.00, mean 7.78
    turbidity range 27.0-204.0 NTU, mean 95.0 NTU
- 2014-2015 (Burleson, 2016)
  - In a dry consecutive drought year with below-normal precipitation, Pond 39 remained dry. No water quality data were collected.
  - Early storms pushed early cumulative precipitation above-normal while total yearly cumulative precipitation fell below-normal (14.35 inches)
  - Data collected February to May, four monitoring events
  - No water quality data were collected
- 2015-2016 (Burleson, 2017)
  - In a consecutive drought with precipitation above-normal, Pond 39 was inundated from the first recorded monitoring in March and April and was dry by May monitoring. The maximum inundation area was 0.03 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range. Turbidity had a moderate reading in March and a low reading in April. It is likely that Pond 39 was inundated earlier in the water-year and maximum inundation was most likely not captured. It should be noted that data collection did not start with the first storm or inundation.
  - Consecutive drought year with yearly cumulative precipitation 21.21 inches
  - Data collected March - May, three monitoring events
  - Inundated March through May
  - Inundation range 0.01-0.03 acres, mean 0.02 acres
  - Depth range 6-8 cm, mean 7 cm
  - pH range 6.31-6.37, mean 6.34
  - temperature range 11.31°-13.85° C, mean 12.58° C
  - dissolved oxygen range 2.25-2.29 mg/L, mean 2.27 mg/L
  - turbidity range 23.8-177.0 FNU, mean 100.4 FNU
- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 39 was inundated in January, March, and April, but was dry in February and May. The maximum inundation area was 0.01 acres. Water quality was within normal ranges. Moderately to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range and relatively low. Turbidity had moderate to low levels.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected November - May, six monitoring events
  - Inundated January, March, and April
  - Inundation range 0.002-0.01 acres, mean 0.01 acres
  - Depth range 15-38 cm, mean 29 cm
  - pH range 5.94-6.51, mean 6.22

- temperature range 8.35°-12.68° C, mean 10.94° C
- dissolved oxygen range 2.36-5.81 mg/L, mean 4.25 mg/L
- turbidity range 43.1-142.0 FNU, mean 83.8 FNU

- 2018-2019
    - In an above-normal water-year, Pond 39 was inundated from the first recorded monitoring in January through June. The maximum inundation area was 0.31 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord, with a high reading in June. Dissolved oxygen had a small range and relatively low. Turbidity had moderate levels with a high reading in June.
    - Yearly cumulative precipitation 21.97 inches
    - Data collected December - July, eight monitoring events
    - Inundated January through June
    - Inundation range 0.002-0.31 acres, mean 0.12 acres
    - Depth range 7-50 cm, mean 33 cm
    - pH range 6.34-6.63, mean 6.47
    - temperature range 7.18°-30.37° C, mean 15.15° C
    - dissolved oxygen range 4.29-8.20 mg/L, mean 5.60 mg/L
    - turbidity range 13->1000 FNU, mean 393.8 FNU

Table F-14. Pond 40 North (Year 2 Post-Burn) Historic Hydrology Results on Former Fort Ord from 2015-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2014-2015	3/18/2015	-	-	-	-	10-15§	0.01
	4/16/2015	-	-	-	-	DRY	0.00
	5/28/2015	-	-	-	-	DRY	0.00
2017-2018	1/16/2018	-	-	-	-	DRY	0.00
	2/20/2018	-	-	-	-	DRY	0.00
	3/19/2018	6.18	6.67	9.12	141.0	8	0.01
	4/16/2018	6.36	11.72	7.62	64.2	9	0.01
	5/21/2018	-	-	-	-	DRY	0.00
2018-2019	1/16/2019	6.55†	11.57†	10.89†	112.0†	8	0.003‡
	2/11/2019	6.69	7.18	7.99	69.9	82	0.08‡
	3/6/2019	6.77	14.05	6.91	16.8	81	0.04‡
	4/3/2019	6.99	14.80	6.20	6.2	64	0.03
	5/7/2019	6.60	17.33	5.40	450.0	26	0.008‡
	6/10/2019	-	-	-	-	8	0.003
	7/9/2019	-	-	-	-	DRY	0.00

§No staff gauge. Cannot access ponds to measure depth due to potential for subsurface unexploded ordnance and other hazards. Depths are estimations.
†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 40 North was monitored three years between 2015 and 2019. Burn activities occurred in 2017. Pond 40 North is a post-burn vernal pool and was in year 2 of monitoring in 2019. The historic data and precipitation are summarized below:

- 2014-2015 (Burleson, 2016)
  - In a dry, consecutive drought year with cumulative precipitation below-normal, Pond 40 North only held water in March and was dry by April. It is likely that Pond 40 North was inundated earlier in the water-year and maximum inundation was most likely not captured. It should be noted that data collection did not start with the first storm or inundation. No water quality data were collected.
  - Consecutive drought year with yearly cumulative precipitation 14.35 inches
  - Data collected March-May, three monitoring events
  - Depth 10-15 cm in March (no staff gauge because of limited access to ponds)
  - No water quality data collected
- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 40 North was inundated in March and April. The maximum inundation area was 0.01 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages. Dissolved oxygen had a small range. Turbidity had moderate levels, with a high reading in March.

  - Yearly cumulative precipitation 12.57 inches
  - Data collected January - May, five monitoring events
  - Inundated March and April
  - Inundation range 0.005-0.007 acres, mean 0.006 acres
  - depth range 8-9 cm, mean 9 cm
  - pH range 6.18-6.36, mean 6.27
  - temperature range 6.67°-11.72° C, mean 9.20° C
  - dissolved oxygen range 7.62-9.12 mg/L, mean 8.37 mg/L
  - turbidity range 64.2-141.0 FNU, mean 102.6 FNU
- 2018-2019
  - In an above-normal water-year, Pond 40 North was inundated from the first monitoring event in January through June. The maximum inundation area was 0.08 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages. Dissolved oxygen had a small range, with low levels. Turbidity had moderate levels, with high readings in January and May.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - July, seven monitoring events
  - Inundated January through June
  - Inundation range 0.003-0.08 acres, mean 0.03 acres
  - depth range 8-82 cm, mean 45 cm
  - pH range 6.55-6.99, mean 6.72
  - temperature range 7.18°-17.33° C, mean 12.99° C
  - dissolved oxygen range 5.40-10.89 mg/L, mean 7.48 mg/L
  - turbidity range 6.2-450.0 FNU, mean 131.0 FNU

Table F-15. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Historic Hydrology Results on Former Fort Ord from 1997-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
1997-1998	Dec	8.67	-	-	>100.0 (NTU)	27	0.12
	Jan	-	-	-	27.0 (NTU)	27	0.21
	Feb	7.60	-	-	50.4 (NTU)	32	0.21
	April	-	-	-	-	33	0.21
2014-2015	3/18/2015	-	-	-	-	DRY	0.00
	4/16/2015	-	-	-	-	DRY	0.00
	5/28/2015	-	-	-	-	DRY	0.00
2015-2016	3/31/2016	6.71	16.59	0.08	84.6	20	0.08
	4/19/2016	-	-	-	-	DRY	0.00
2016-2017	1/23/2017	6.36	10.26	1.83	135.0	29	0.30
	2/28/2017	6.79	6.61	11.62	56.1	31	0.61
	3/22/2017	6.47	13.50	4.88	596.0	34	0.96
	4/18/2017	6.57	16.58	4.81	37.6	28	0.12
	5/25/2017	-	-	-	-	DRY	0.00
2017-2018	1/16/2018	-	-	-	-	DRY	0.00
	2/20/2018	-	-	-	-	DRY	0.00
	3/19/2018	-	-	-	-	DRY	0.00
	4/16/2018	-	-	-	-	DRY	0.00
2018-2019	1/16/2019	-	-	-	-	DRY	0.00‡
	2/11/2019	6.55	7.58	7.63	381.0	28	0.22‡
	3/6/2019	6.80	17.36	9.75	19.2	28	0.11‡
	4/3/2019	6.75	13.63	3.30	3.3	20	0.05‡
	5/7/2019	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 40 South was monitored six years between 1997 and 2019. Burn activities occurred in 2017 and munitions remediation activities occurred in 2018. In 2019, Pond 40 South was in year 2 of monitoring for post-burn and year 1 for post-subsurface munitions remediation. The historic data and precipitation are summarized below:

- 1997-1998 (HLA, 1998)
  - In an El Niño year with yearly cumulative precipitation significantly above-normal, Pond 40 South held water through April. Turbidity and pH were collected December through February.
  - El Niño year with yearly cumulative precipitation above-normal (40.54 inches)
  - Data collected December-April, four monitoring events
  - Inundated from December through April
  - Inundation range 0.12-0.21 acres, mean 0.19 acres

- Depth range 27-33 cm, mean 30 cm
- pH range 7.60-8.67, mean 8.14
  turbidity range 27- >100 NTU, mean 59.1 NTU

- 2014-2015 (Burleson, 2016)
  - In a dry, consecutive drought year with cumulative precipitation below-normal, Pond 40 South did not fill.
  - Consecutive drought year with yearly cumulative precipitation 14.35 inches
  - Data collected March-May, three monitoring events
  - Dry though the entire monitoring season
- 2015-2016 (Burleson, 2017)
  - In a consecutive drought year with cumulative precipitation above-normal, Pond 40 South held water through March. Water quality data were collected once, in March. It is likely that Pond 40 South was inundated earlier in the water-year and maximum inundation was not captured. It should be noted that data collection did not start with the first storm or inundation.
  - Drought year with cumulative precipitation above-normal (21.21 inches)
  - Data collected March-April, two monitoring events
  - Inundated from March-April
  - Inundation 0.08 acres in March
  - Depth 20 cm in March
  - pH 6.71 in March
  - temperature 16.59° C
  - dissolved oxygen 0.08 mg/L
  - turbidity range 84.6 FNU
- 2016-2017 (Burleson, 2018)
  - After the end of a historic drought with precipitation above-normal, Pond 40 South was inundated from the first recorded monitoring in January through May. The maximum inundation area was 0.96 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a large range. Turbidity was moderate on average, with a few high readings in January and March.
  - Yearly cumulative precipitation 22.92 inches
  - Data collected January - May, five monitoring events
  - Inundated January through April
  - Inundation range 0.12-0.96 acres, mean 0.50 acres
  - Depth range 28-34 cm, mean 31 cm
  - pH range 6.36-6.79, mean 6.55
  - temperature range 6.6°-16.6° C, mean 11.7° C
  - dissolved oxygen range 1.83-11.62 mg/L, mean 5.79 mg/L
    turbidity range 37.6-596.0 FNU, mean 206.2 FNU
- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 40 South did not hold water. No water quality data were collected.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected January - April, four monitoring events
  - Dry during all monitoring events
  - No water quality data were collected

- 2018-2019
  - In an above-normal water-year, Pond 40 South was inundated from the second recorded monitoring in February through April. Peripheral ponding not hydrologically connected to the staff gauge was observed in January. The maximum inundation area was 0.22 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range with low levels. Turbidity was moderate on average, with a high reading in February.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - May, five monitoring events
  - Inundated February through April
  - Inundation range 0.05-0.22 acres, mean 0.12 acres
  - Depth range 20-28 cm, mean 25 cm
  - pH range 6.55-6.80, mean 6.70
  - temperature range 7.58°-17.36° C, mean 12.86° C
  - dissolved oxygen range 3.30-9.75 mg/L, mean 6.89 mg/L
  - turbidity range 3.3-381.0 FNU, mean 134.5 FNU

Table F-16. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Historic Hydrology Results on Former Fort Ord from 1997-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
1997-1998	Dec	9.72	-	-	75.0 (NTU)	24	0.04
	Jan	-	-	-	5.5 (NTU)	29	0.04
	Feb	7.31	-	-	10.7 (NTU)	36	0.04
	Apr	-	-	-	-	36	0.04
1999-2000	1/26/2000	-	-	-	-	25	0.04
2014-2015	3/18/2015	-	-	-	-	DRY	0.00
	4/16/2015	-	-	-	-	DRY	0.00
	5/28/2015	-	-	-	-	DRY	0.00
2015-2016	4/4/2016	6.46	15.35	4.56	33.5	18	0.02
	4/19/2016	-	-	-	-	DRY	0.00
2017-2018	1/16/2018	-	-	-	-	DRY	0.00
	2/20/2018	-	-	-	-	DRY	0.00
	3/19/2018	-	-	-	-	DRY	0.00
	4/16/2018	-	-	-	-	DRY	0.00
2018-2019	1/16/2019	-	-	-	-	6	0.002‡
	2/12/2019	6.83	10.59	8.91	35.0	34	0.06‡
	3/6/2019	7.05	14.47	8.73	4.4	28	0.05‡
	4/2/2019	7.47	20.00	9.93	1.0	19	0.01‡
	5/7/2019	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 43 was monitored six years between 1997 and 2019. Burn activities occurred in 2017 and munitions remediation activities occurred in 2018. In 2019, Pond 43 was in year 2 of monitoring for post-burn and year 1 for post-subsurface munitions remediation. The historic data and precipitation are summarized below:

- 1997-1998 (HLA, 1998)
  - In an El Niño year with yearly cumulative precipitation significantly above-normal, Pond 43 held water through April. Turbidity and pH were collected December through February.
  - El Niño year with yearly cumulative precipitation above-normal (40.54 inches)
  - Data collected December-April, four monitoring events
  - Inundated from December through April
  - Inundation 0.04 acres during all monitoring events
  - Depth range 24-36 cm, mean 31 cm
  - pH range 7.31-9.72, mean 8.52
  - turbidity range 5.45-75 NTU, mean 30.4 NTU

- 1999-2000 (Harding Lawson Associates, 2001)
  - In a precipitation year below-normal, Pond 43 held water in January. No water quality data were collected.
  - Yearly cumulative precipitation 16.13 inches
  - Data collected only in January, one monitoring event
  - Inundated January
  - Inundation 0.04 acres in January
  - Depth 25.4 cm in January
  - No water quality data were collected
- 2014-2015 (Burleson, 2016)
  - In a dry, consecutive drought year with cumulative precipitation below-normal, Pond 43 did not fill.
  - Consecutive drought year with yearly cumulative precipitation 14.35 inches
  - Data collected March-May, three monitoring events
  - Dry though the entire monitoring season
- 2015-2016 (Burleson, 2017)
  - In a consecutive drought year with cumulative precipitation above-normal, Pond 43 held water through the first monitoring in early April and was dry by mid-April. Water quality data were collected once, in early April. It is likely that Pond 43 was inundated earlier in the water-year and maximum inundation was not captured. It should be noted that data collection did not start with the first storm or inundation.
  - Drought year with cumulative precipitation above-normal (21.21 inches)
  - Data collected April, two monitoring events
  - Inundated first monitoring in April
  - Inundation 0.02 acres in early April
  - Depth 18 cm in early April
  - pH 6.46 in early April
  - temperature 15.35° C in early April
  - dissolved oxygen 4.56 mg/L in early April
  - turbidity range 33.5 FNU in early April
- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 43 did not hold water. No water quality data were collected.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected January - April, four monitoring events
  - Dry during all monitoring events
  - No water quality data were collected
- 2018-2019
  - In an above-normal water-year, Pond 43 was inundated from the first recorded monitoring in January through April. The maximum inundation area was 0.06 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range with low levels. Turbidity was moderate.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - May, five monitoring events
  - Inundated January through April
  - Inundation range 0.002-0.06 acres, mean 0.03 acres
  - Depth range 6-34 cm, mean 22 cm

- pH range 6.83-7.47, mean 7.12
- temperature range 10.59°-20.00° C, mean 15.02° C
- dissolved oxygen range 8.73-9.93 mg/L, mean 9.19 mg/L
- turbidity range 1.0-35.0 FNU, mean 13.5 FNU

Table F-17. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Historic Hydrology Results on Former Fort Ord from 1992-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
1991-1992	3/27/1992	-	18	-	extreme[x]	91	-
1993-1994	3/15/1994	-	-	-	-	46	0.2
	3/29/1994	-	-	-	-	61	-
	4/13/1994-4/14/1994	-	-	-	-	33	-
1994-1995	1/11/1995	-	-	-	-	76	-
	1/26/1995	-	-	-	-	102	-
	2/10/1995	-	-	-	-	51	-
	2/24/1995	-	-	-	-	38	-
	3/10/1995	-	-	-	-	>102	-
	3/24/1995	-	-	-	-	>102	-
1995-1996	1/3/1996	-	-	-	-	3	-
	1/18/1996	-	-	-	-	5	-
	1/31/1996	-	-	-	-	41	-
	2/14/1996	-	-	-	-	41	-
	2/29/1996	-	-	-	-	>91	-
	3/14/1996	-	-	-	-	>91	-
	3/28/1996	-	-	-	-	33	-
	4/11/1996	-	-	-	-	DRY	-
	4/25/1996	-	-	-	-	DRY	-
	5/9/1996	-	-	-	-	DRY	-
2014-2015	2/24/2015	-	-	-	-	DRY	0.00
	3/18/2015	-	-	-	-	DRY	0.00
	4/16/2015	-	-	-	-	DRY	0.00
	5/28/2015	-	-	-	-	DRY	0.00
2015-2016	3/31/2016	6.76	17.76	0.00	230.0	5	0.001
	4/19/2016	-	-	-	-	DRY	0.00
2017-2018	1/16/2018	-	-	-	-	DRY	0.00
	2/20/2018	-	-	-	-	DRY	0.00
	3/19/2018	-	-	-	-	DRY	0.00
	4/16/2018	-	-	-	-	DRY	0.00

[x] In 1991-1992, turbidity was measured qualitatively.

Table F-17. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Historic Hydrology Results on Former Fort Ord from 1992-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2018-2019	1/16/2019	-	-	-	-	DRY	0.00
	2/11/2019	6.91	7.64	8.48	193.0	88	0.42‡
	3/6/2019	6.84	16.30	5.61	25.7	47	0.19‡
	4/3/2019	6.81	13.88	2.35	27.4	16	0.01‡
	5/7/2019	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 35 was monitored eight years between 1992 and 2019. Mastication activities occurred in 2017 and munitions remediation activities occurred in 2018. In 2019, Pond 35 was in year 2 of monitoring for post-burn and year 1 for post-subsurface munitions remediation. The historic data and precipitation are summarized below:

- 1991-1992 (Jones & Stokes, 1992)
  - In a year with near-normal precipitation, Pond 35 was surveyed once in March 1992. It should be noted that data collection did not start with the first storms or inundation.
  - Yearly cumulative precipitation near-normal (17.84 inches)
  - Data collected March, one monitoring event
  - Inundated March
  - Depth 91 cm
  - temperature 18˚C
  - pH, turbidity, and dissolved oxygen data were not collected
- 1993-1994 (Jones & Stokes, 1996)
  - In a precipitation year below-normal, Pond 35 held water during both monitoring events in March and April. No water quality data were collected.
  - Yearly cumulative precipitation 13.96 inches
  - Data collected in March and April, two monitoring events
  - Inundated during both monitoring events
  - No inundation areas recorded
  - depth range 33.02-60.96 cm, mean 46.57
  - No water quality data collected
- 1994-1995 (Jones & Stokes, 1996)
  - In a water-year that was above-normal, Pond 35 was inundated by January monitoring and stayed inundated through March. No water quality data were collected
  - Yearly cumulative precipitation 23.38 inches
  - Data collected January-March, six monitoring events
  - Inundated during all monitoring events
  - No inundation areas recorded
  - depth range 38.10 - >101.6 cm, mean 78.32 cm
  - No water quality data collected

- 1995-1996 (Jones & Stokes, 1996)
  - In a water-year that was approximately normal, Pond 35 was inundated from the first monitoring in January through March. The maximum depth was lower than the previous year but similar to the 1993-1994 water-year.
  - Yearly cumulative precipitation 16.96 inches
  - Data collected January-May, ten monitoring events
  - Inundated January to March
  - No inundation area recorded
  - depth range 2.58- >91.44 cm, mean 43.54 cm
  - no water quality data collected
- 2014-2015 (Burleson, 2016)
  - In a dry, consecutive drought year with cumulative precipitation below-normal, Pond 35 did not fill.
  - Consecutive drought year with yearly cumulative precipitation 14.35 inches
  - Data collected February-May, four monitoring events
  - Dry though the entire monitoring season
- 2015-2016 (Burleson, 2017)
  - In a consecutive drought with precipitation above-normal, Pond 35 was inundated only for March monitoring. The maximum inundation area was 0.001 acres. Water quality data were collected once in March and were within normal ranges. Neutral pH value, moderate temperature, low dissolved oxygen, and medium turbidity were observed. It should be noted that data collection did not start with the first storm or inundation.
  - Consecutive drought year with yearly cumulative precipitation 21.21 inches
  - Data collected March-April, two monitoring events
  - Inundated in March
  - Inundation 0.001 acres
  - depth 5 cm
  - pH 6.76
  - temperature range 17.76° C
  - dissolved oxygen 0.0 mg/L
  - turbidity 230.0 FNU
- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 35 did not hold water.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected January-April, four monitoring events
  - Dry in all monitoring events
  - No water quality data collected
- 2018-2019
  - In an above-normal water-year, Pond 35 was inundated from the second recorded monitoring in February through April. The maximum inundation area was 0.42 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range with low levels. Turbidity was moderate, with a high reading in February.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - May, five monitoring events
  - Inundated February through April
  - Inundation range 0.01-0.42 acres, mean 0.21 acres
  - Depth range 16-88 cm, mean 50 cm

- pH range 6.81-6.91, mean 6.85
- temperature range 7.64°-16.30° C, mean 12.61° C
- dissolved oxygen range 2.35-8.48 mg/L, mean 5.48 mg/L
- turbidity range 25.7-193.0 FNU, mean 82.0 FNU

Table F-18. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation)
Historic Hydrology Results on Former Fort Ord from 1997-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
1997-1998	Dec	8.90	-	-	40.0 (NTU)	68	0.46
	Jan	-	-	-	4.5-5.0 (NTU)	75	0.77
	Feb	7.40	-	-	3.0 (NTU)	76	0.96
	April	-	-	-	-	74	0.96
1999-2000	1/26/2000	-	-	-	-	41	0.46
	2/23/2000	-	-	-	-	-	0.69
	3/13/2000	5.91	-	-	2.42 (NTU)	>76	0.82
	6/15/2000	-	-	-	-	20	0.01
2000-2001	1/12/2001	-	-	-	-	41	0.34
	3/26/2001	6.30	-	-	-	46	0.11
	4/18/2001-4/19/2001	7.40	-	-	-	15	-
	5/23/2001-5/24/2001	0.00	-	-	-	DRY	0.00
2001-2002	1/23/2002	-	-	-	10.8 (NTU)	18	0.07
	2/25/2002	-	-	-	12.0 (NTU)	13	0.04
	3/27/2002	0.00	-	-	0	DRY	0.00
	4/17/2002	0.00	-	-	0	DRY	0.00
	5/1/2002	0.00	-	-	0	DRY	0.00
2002-2003	1/28/2003	6.30	-	-	16.0 (NTU)	25	0.11
	2/24/2003	-	-	-	-	15	0.05
	3/29/2003	-	-	-	-	DRY	0.000
2014-2015	3/18/2015	-	-	-	-	DRY	0.00
	4/16/2015	-	-	-	-	DRY	0.00
	5/28/2015	-	-	-	-	DRY	0.00
2016-2017	1/23/2017	6.47	10.36	2.60	51.3	58	0.52
	2/28/2017	6.86	9.39	6.55	2.0	76	0.81
	3/22/2017	6.08	13.28	4.26	>1000	72	0.77
	4/18/2017	6.97	16.53	11.15	57.3	62	0.58
	5/25/2017	5.97	17.60	5.27	60.1	38	0.30
	6/15/2017	5.54	17.01	2.63	70.4	~28ǂ	0.34
	7/7/2017	-	-	-	-	DRY	0.00

ǂDecreased visibility due to emergent vegetation.

Table F-18. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation)
Historic Hydrology Results on Former Fort Ord from 1997-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2017-2018	1/15/2018	6.82	18.26	0.65	93.9	5	0.001
	2/20/2018	-	-	-	-	DRY	0.00
	3/19/2018	6.78	15.61	6.85	40.3	13	0.02‡
	4/16/2018	6.79	12.18	8.69	16.1	24	0.24
	5/21/2018	-	-	-	-	DRY	0.00
2018-2019	1/16/2019	6.84	11.99	9.94	14.8	15	0.03‡
	2/11/2019	7.14	10.40	8.12	28.2	63	0.54‡
	3/6/2019	6.85	12.82	7.29	15.3	64	0.59‡
	4/3/2019	6.96	14.51	4.42	1.6	55	0.48‡
	5/7/2019	6.80	17.50	7.36	0.8	34	0.38‡
	6/11/2019	6.45	19.59	5.36	3.7	20	0.13‡
	7/9/2019	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 42 was monitored nine years between 1997 and 2019. Burn activities occurred in October 2017 and mastication and munitions remediation activities occurred in the summer of 2018. In 2019, Pond 42 was in year 2 of monitoring for post-mastication and post-burn and year 1 for post-subsurface munitions remediation. All years prior to 2018 are baseline. The historic data and precipitation are summarized below:

- 1997-1998 (HLA, 1998)
  - In an El Niño year with yearly cumulative precipitation significantly above-normal, Pond 42 held water through April. Turbidity and pH were collected December through February.
  - El Niño year with yearly cumulative precipitation above-normal (40.54 inches)
  - Data collected December-April, four monitoring events
  - Inundated from December through April
  - Inundation range 0.46-0.96 acres, mean 0.79 acres
  - Depth range 68->76 cm, mean 73 cm
  - pH range 7.40-8.90, mean 8.15
    turbidity range 3.0-40.0 NTU, mean 15.9 NTU
- 1999-2000 (Harding Lawson Associates, 2001)
  - In a precipitation year below-normal, Pond 42 held water from January through June with a maximum recorded inundation of 0.82 acres. Water quality data were only collected once, in March.
  - Yearly cumulative precipitation 16.13 inches
  - Data collected January-June, four monitoring events
  - Inundated January through April
  - Inundation range 0.01-0.82 acres, mean 0.49 acres

  - Inundated January through April
  - Inundation range 0.01-0.82 acres, mean 0.49 acres
  - Depth range 20- >76 cm, mean 46 cm
  - pH 5.91 in March
  - turbidity 2.42 NTU in March
- 2000-2001 (Harding ESE, 2002)
  - In a precipitation year below-normal, Pond 42 held water from January through April with a maximum recorded inundation of 0.11 acres. Water quality data were only collected twice.
  - Yearly cumulative precipitation 15.52 inches
  - Data collected January- May, five monitoring events
  - Inundated January through April
  - Inundation range 0.11-0.34, mean 0.15 acres
  - Depth range 15-46 cm, mean 34 cm
  - pH range 6.30-7.40, mean 6.85
- 2001-2002 (Mactec, 2003)
  - In a precipitation year below-normal, Pond 42 held water from January through April with a maximum recorded inundation of 0.07 acres. Turbidity was the only water quality parameter measured.
  - Yearly cumulative precipitation 11.42 inches
  - Data collected January-May, five monitoring events
  - Inundated January through February
  - Inundation range 0.04-0.07 acres, mean 0.06 acres
  - Depth range 13-18 cm, mean 16 cm
  - Turbidity range 10.8-12.0 NTU, mean 11.4 NTU
- 2002-2003 (Mactec, 2004)
  - In a precipitation year below-normal, Pond 42 held water from January through April with a maximum recorded inundation of 0.11 acres. Water quality data were only collected once, in January.
  - Yearly cumulative precipitation 15.02 inches
  - Data collected January-March, three monitoring events
  - Inundated January through February
  - Inundation range 0.05-0.11 acres, mean 0.08 acres
  - Depth range 15-25 cm, mean 20 cm
  - pH 6.3 in January
  - turbidity 16.0 NTU in January
- 2014-2015 (Burleson, 2016)
  - In a dry, consecutive drought year with cumulative precipitation below-normal, Pond 42 did not fill.
  - Consecutive drought year with yearly cumulative precipitation 14.35 inches
  - Data collected March-May, three monitoring events
  - Dry through the entire monitoring season
- 2016-2017 (Burleson, 2018)
  - After the end of a historic drought with precipitation above-normal, Pond 42 was inundated from the first recorded monitoring in January through July. The maximum inundation area was 0.806 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord.

Dissolved oxygen had a small range, with moderate levels. Turbidity had a large range, with a very high reading in March.
- Yearly cumulative precipitation 22.92 inches
- Data collected January - July, seven monitoring events
- Inundated January through June
- Inundation range 0.30-0.81 acres, mean 0.55 acres
- Depth range ~28-76 cm, mean 56 cm
- pH range 5.54-6.97, mean 6.32
- temperature range 9.4°-17.6° C, mean 14.0° C
- dissolved oxygen range 2.60-11.15 mg/L, mean 5.41 mg/L
- turbidity range 2.0 - >1000 FNU, mean 206.9 FNU

- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 42 held water for the January, March, and April monitoring, but was dry in February and May. The maximum inundation area was 0.24 acres. Water quality was within normal ranges. Neutral pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a large range and turbidity had a small range, with moderate levels.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected January - May, five monitoring events
  - Inundated January, March-April
  - Inundation range 0.001-0.24 acres, mean 0.09 acres
  - Depth range 5-24 cm, mean 14 cm
  - pH range 6.78-6.82, mean 6.80
  - temperature range 12.18°-18.26° C, mean 15.35° C
  - dissolved oxygen range 0.65-8.69 mg/L, mean 5.40 mg/L
  - turbidity range 16.1-93.9 FNU, mean 50.1 FNU
- 2018-2019
  - In an above-normal water-year, Pond 42 was inundated from the first recorded monitoring in January through June. The maximum inundation area was 0.59 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen and turbidity had small ranges, with moderate levels.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - July, seven monitoring events
  - Inundated January through June
  - Inundation range 0.03-0.59 acres, mean 0.36 acres
  - Depth range 15-64 cm, mean 42 cm
  - pH range 6.45-7.14, mean 6.84
  - temperature range 10.40°-19.59° C, mean 14.47° C
  - dissolved oxygen range 4.42-9.94 mg/L, mean 7.08 mg/L
  - turbidity range 0.8-28.2 FNU, mean 10.7 FNU

Table F-19. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Historic Hydrology Results on Former Fort Ord from 1997-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
1997-1998	Dec	8.15	-	-	60.0 (NTU)	25	0.19
	Jan	-	-	-	2.9 (NTU)	31	0.19
	Feb	7.50	-	-	3.8 (NTU)	37	0.19
	Apr	-	-	-	-	33	0.19
2014-2015	2/24/2015	-	-	-	-	DRY	0.00
	3/18/2015	-	-	-	-	DRY	0.00
	4/16/2015	-	-	-	-	DRY	0.00
	5/28/2015	-	-	-	-	DRY	0.00
2015-2016	4/4/2016	6.54	16.94	5.34	23.0	0 at gauge, 8.9 max	0.03
	4/19/2016	-	-	-	-	DRY	0.00
2017-2018	1/18/2018	-	-	-	-	DRY	0.00
	2/20/2018	-	-	-	-	DRY	0.00
	3/19/2018	-	-	-	-	DRY	0.00
	4/16/2018	-	-	-	-	DRY	0.00‡
2018-2019	1/16/2019	-	-	-	-	DRY	0.00‡
	2/12/2019	6.71	10.75	8.16	20.3	24	0.18‡
	3/6/2019	7.07†	15.55†	9.43†	5.1†	15	0.02‡
	4/2/2019	-	-	-	-	DRY	0.00‡

†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 44 was monitored five years between 1997 and 2019. Mastication activities occurred in 2017 and munitions remediation occurred in 2018. In 2019, Pond 44 was in year 2 for post-mastication and year 1 for post-subsurface munitions remediation. Pond 44 is a post-mastication vernal pool and was in year 2 of monitoring in 2019. The historic data and precipitation are summarized below:

- 1997-1998 (HLA, 1998)
  - In an El Niño year with yearly cumulative precipitation significantly above-normal, Pond 44 held water December through February. Turbidity and pH were collected December through February.
  - El Niño year with yearly cumulative precipitation above-normal (40.54 inches)
  - Data collected December-April, four monitoring events
  - Inundated from December through April
  - Inundation 0.19 acres
  - Depth range 25-37 cm, mean 31 cm
  - pH range 7.50-8.15, mean 7.83
  - turbidity range 2.9-60.0 NTU, mean 22.2 NTU

- 2014-2015 (Burleson, 2016)
  - In a dry, consecutive drought year with cumulative precipitation below-normal, Pond 44 did not fill.
  - Consecutive drought year with yearly cumulative precipitation 14.35 inches
  - Data collected February-May, four monitoring events
  - Dry though the entire monitoring season
  - No water quality data were collected
- 2015-2016 (Burleson, 2017)
  - In a consecutive drought with precipitation above-normal, Pond 44 was inundated only for the first April monitoring. The maximum inundation area was 0.031 acres. Water quality data were collected during the first April monitoring, and were within normal ranges. A slightly acidic pH value, moderate temperature, low dissolved oxygen, and low turbidity were observed. It should be noted that data collection did not start with the first storm or inundation.
  - Consecutive drought year with yearly cumulative precipitation 21.21 inches
  - Data collected April, two monitoring events
  - Inundated in first April monitoring
  - Inundation 0.03 acres
  - depth 0 cm at gauge, maximum depth 8.9 cm
  - pH 6.54
  - temperature range 16.94° C
  - dissolved oxygen 5.34 mg/L
  - turbidity 23.0 FNU
- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 44 help water only in peripheral puddles the were not have surface hydrological connectively to the staff gauge.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected January-April, four monitoring events
  - Dry in all monitoring events
  - No water quality data collected
- 2018-2019
  - In an above-normal water-year, Pond 44 was inundated only for February and March. Peripheral ponding that was not hydrologically connected to the staff gauge was observed in January and April. The maximum inundation area was 0.18 acres. Water quality data were collected in February and March and were within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen and turbidity had small ranges, with moderate levels.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - April, four monitoring events
  - Inundated February and March
  - Inundation range 0.02-0.18 acres, mean 0.10 acres
  - Depth range 15-24 cm, mean 20 cm
  - pH range 6.71-7.07, mean 6.89
  - temperature range 10.75°-15.55° C, mean 13.15° C
  - dissolved oxygen range 8.16-9.43 mg/L, mean 8.80 mg/L
  - turbidity range 5.1-20.3 FNU, mean 12.7 FNU

Table F-20. Pond 56 (Year 2 Post-Mastication) Historic Hydrology Results on Former Fort Ord from 2006-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2006-2007	12/1/2006	-	-	-	-	18	-
	1/23/2007	-	-	-	-	26	-
	3/6/2007	6.78	-	-	9.8 (NTU)	60	0.46
	4/9/2007	-	-	-	-	54	-
	5/7/2007	-	-	-	-	43	-
2012-2013	11/26/2012	-	-	-	-	DRY	0.00
	12/19/2012	-	-	-	-	24	0.05
	1/22/2013	-	-	-	-	46	0.30
	2/25/2013	6.60	10.30	11.34	11.6 (NTU)	43	0.23
	3/15/2013	6.31	12.90	12.48	22.7 (NTU)	39	0.18
	4/12/2013	-	-	-	-	20	0.002
	5/10/2013	-	-	-	-	DRY	0.00
2013-2014	12/11/2013	-	-	-	-	DRY	0.00
	2/18/2014	-	-	-	-	DRY	0.00
	3/17/2014	-	-	-	-	DRY	0.00
	4/7/2014	-	-	-	-	10	0.00045
	5/6/2014	-	-	-	-	DRY	0.00
	6/3/2014	-	-	-	-	DRY	0.00
2014-2015	3/18/2015	-	-	-	-	56	0.42
	4/16/2015	6.20	21.10	5.80	153.0 (NTU)	42	0.27
	5/28/2015	-	-	-	-	DRY	0.00
2015-2016	4/4/2016	6.54	16.27	0.50	28.6	125	5.17
	4/19/2016	6.67	18.90	2.23	375.0	120	4.21
	5/9/2016	6.63	16.09	3.24	16.9	100	3.11
	6/7/2016	6.16	20.76	3.55	57.4	80	2.29
	7/8/2016	6.23	18.04	6.27	44.0	60	0.42
	8/10/2016	6.64	16.03	10.56	16.3	40	0.19
	9/12/2016	-	-	-	-	DRY	0.00
2017-2018	11/20/2017	-	-	-	-	DRY	0.00
	1/16/2018	5.96	12.02	3.22	46.2	22	0.08
	2/20/2018	6.95	13.2	15.00	333.0	15	0.01
	3/19/2018	7.03	10.79	9.75	8.3	38	0.25
	4/17/2018	6.65	12.94	2.15	12.0	63	0.85
	5/21/2018	6.38	14.75	2.56	1.5	56	0.31
	6/19/2018	6.58	25.56	4.08	0.0	36	0.11
	7/19/2018	-	-	-	-	DRY	0.00

Table F-20. Pond 56 (Year 2 Post-Mastication) Historic Hydrology Results on Former Fort Ord from 2006-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2018-2019	12/13/2018	-	-	-	-	15	-
	1/15/2019	6.55	9.40	8.22	11.4	35	0.25‡
	2/14/2019	6.39	11.80	7.66	7.1	88	4.86‡
	3/5/2019	6.20	14.26	7.38	2.6	101	5.13‡
	4/9/2019	6.63	16.72	6.47	1.5	99	4.99‡
	5/8/2019	6.55	17.24	3.01	2.8	84	4.49‡
	6/6/2019	6.92	18.53	5.40	10.2	78	3.73‡
	7/9/2019	-	-	-	-	56	-
	8/15/2019	-	-	-	-	36	-
	9/9/2019	-	-	-	-	20	-

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 56 was monitored seven years between 2006 and 2019. Mastication activities occurred in 2017. Pond 56 is a post-mastication vernal pool and was in year 2 of monitoring in 2019. The historic data and precipitation are summarized below:

- 2006-2007 (Shaw, 2008)
  - In a below-normal rain year, Pond 56 was inundated to 0.46 acres. The pH was neutral and the turbidity was relatively low.
  - Yearly cumulative precipitation 10.13 inches
  - Data collected December-May, five monitoring events
  - Inundation only measured in March, 0.46 acres
  - depth range 18-60 cm, mean 40 cm
  - pH 6.78
  - turbidity 9.8 NTU
- 2012-2013 (Tetra Tech, 2014)
  - In a drought year with below-normal precipitation, Pond 56 was inundated December through April with a maximum inundation of 0.30 acres.
  - Drought year with yearly cumulative precipitation of 11.17 inches
  - Data collected November-May, seven monitoring events
  - Inundated in December through April
  - Inundation range 0.002-0.30 acres, mean 0.10 acres
  - depth range 20-46 cm, mean 34 cm
  - Water quality data were collected in March
  - pH 6.31
  - temperature 11.9° C
  - dissolved oxygen 2.43 mg/L
  - turbidity 22.7 NTU

- 2013-2014 (Tetra Tech, 2015)
  - In a dry, consecutive drought year Pond 56 only held water in April. No water quality data were collected.
  - Consecutive drought year with yearly cumulative precipitation 9.33 inches
  - Data collected December-June, six monitoring events
  - Inundated only in April
  - Inundation 0.00045 acres
  - depth 10 cm
  - No water quality data collected
- 2014-2015 (Burleson, 2016)
  - In a dry consecutive drought year with below-normal precipitation, Pond 56 was inundated March and April. Water quality data were collected only in April.
  - Early storms pushed early cumulative precipitation above-normal while total yearly Cumulative precipitation fell below-normal (14.35 inches)
  - Data collected March - May, three monitoring events
  - Inundated March to April
  - Inundation range 0.27-0.42 acres, mean 0.35 acres
  - depth range 42-56 cm, mean 49 cm
  - Water quality data were collected only in April
  - pH 6.20
  - temperature 21.10° C
  - dissolved oxygen 5.80 mg/L
  - turbidity 153 NTU
- 2015-2016 (Burleson, 2017)
  - In a consecutive drought with precipitation above-normal, Pond 56 was inundated from the first recorded monitoring in April through August. The maximum inundation area was 2.20 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a moderate range. Turbidity was low on average with a high reading in February. It is likely that Pond 56 was inundated earlier in the water-year and maximum inundation was most likely not captured. It should be noted that data collection did not start with the first storm or inundation.
  - Consecutive drought year with yearly cumulative precipitation 21.21 inches
  - Data collected April-September, seven monitoring events
  - Inundated April through August
  - Inundation range 0.19-5.17 acres, mean 2.56 acres
  - depth range 40-125 cm, mean 88 cm
  - pH range 6.16-6.67, mean 6.48
  - temperature range 16.03°-20.76° C, mean 17.68° C
  - dissolved oxygen range 0.50-10.56 mg/L, mean 4.39 mg/L
  - turbidity range 16.3-375 FNU, mean 89.7 FNU
- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 56 was inundated from the first recorded monitoring in January through July. The maximum inundation area was 0.85 acres. Water quality was within normal ranges. Neutral to moderately acidic pH values were observed. Temperature was within normal averages for Fort Ord with one relatively high reading in June. Dissolved oxygen had a large range, with moderate levels. Turbidity had low levels, with a moderate high reading in February.

  - Yearly cumulative precipitation 12.57 inches
  - Data collected November, January - July, eight monitoring events
  - Inundated January through June
  - Inundation range 0.01-0.85 acres, mean 0.27 acres
  - Depth range 15-63 cm, mean 38 cm
  - pH range 5.96-7.03, mean 6.59
  - temperature range 10.79°-25.56° C, mean 14.88° C
  - dissolved oxygen range 2.15-15 mg/L, mean 6.13 mg/L
  - turbidity range 0.0-333 FNU, mean 66.8 FNU
- 2018-2019
  - In an above-normal water-year, Pond 56 was inundated from the first recorded monitoring in December through September. The maximum inundation area was 5.13 acres. Water quality was within normal ranges. Moderately acidic pH values were observed. Temperature was within normal averages for Fort Ord with one relatively high reading in June. Dissolved oxygen had a small range, with low levels. Turbidity had low levels.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected December – September, ten monitoring events
  - Inundated January through September
  - Inundation range 0.25-5.13 acres, mean 3.91 acres
  - Depth range 15-101 cm, mean 61 cm
  - pH range 6.20-6.92, mean 6.54
  - temperature range 9.40°-18.53° C, mean 14.66° C
  - dissolved oxygen range 3.01-8.22 mg/L, mean 6.36 mg/L
  - turbidity range 1.5-11.4 FNU, mean 5.9 FNU

Table F-21. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Historic Hydrology Results on Former Fort Ord from 2015-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2014-2015	2/24/2015	-	-	-	-	~45§	-
	3/18/2015	-	-	-	-	>50§	1.31
	4/16/2015	6.40	25.70	8.90	238.0 (NTU)	~35§	0.27
	5/28/2015	-	-	-	-	~25§	0.14
2015-2016	4/4/2016	6.35	15.03	0.00	7.6	130	2.65
	4/19/2016	6.39	18.27	2.64	51.0	110	2.57
	5/9/2016	6.36	15.75	2.16	27.2	80	2.44
	6/7/2016	6.18	22.50	3.66	46.8	80	2.13
	7/7/2016	6.58	20.15	4.61	70.3	62	1.04
	8/10/2016	6.32	26.38	10.86	246.0	38	0.22
	9/12/2016	7.41	19.34	3.68	415.0	12	0.01
	10/11/2016	-	-	-	-	DRY	0.00
2017-2018	1/18/2018	6.29	11.00	3.60	25.7	20	0.07
	2/22/2018	-	-	-	-	DRY	0.00
	3/19/2018	6.40	14.82	8.71	12.1	38	0.20
	4/17/2018	6.33	11.36	3.66†	1.2	59	0.77
	5/21/2018	6.36	14.99	5.01	7.6	38	0.19
	6/19/2018	6.74	28.26	8.41	0.0	18	0.02
	7/19/2018	-	-	-	-	DRY	0.00
2018-2019	12/12/2018	-	-	-	-	10	-
	1/14/2019	6.84	11.36	8.47	1.2	33	0.18
	2/13/2019	6.58	9.23	9.10	9.3	84	2.17‡
	3/6/2019	6.36	12.94	5.85	11.5	98	2.48‡
	4/3/2019	6.39	15.04	4.80	3.1	98	2.43‡
	5/8/2019	6.57	16.37	4.12	2.2	84	2.32
	6/11/2019	6.53	20.01	4.27	67.1	76	1.89
	7/9/2019	-	-	-	-	60	-
	8/13/2019	-	-	-	-	37	-

§No staff gauge. Cannot access ponds to measure depth due to potential for subsurface unexploded ordnance and other hazards. Depths are estimations.
†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 60 was monitored four years between 2015 and 2019. Mastication activities occurred in 2017. Pond 60 was in year 2 of monitoring for post-mastication and year 1 for post-subsurface munitions remediation in 2019. The historic data and precipitation are summarized below:

- 2014-2015 (Burleson, 2016)
  - In a dry consecutive drought year with below-normal precipitation, Pond 60 was inundated February through May, and did not dry by the last monitoring in May. Water quality data were collected only in April.
  - Early storms pushed early cumulative precipitation above-normal while total yearly Cumulative precipitation fell below-normal (14.35 inches)
  - Data collected February to May, four monitoring events
  - Inundated February to May (did not dry by last monitoring event in May)
  - Inundation range 0.14-1.31 acres, mean 0.57 acres
  - depth range ~25- >50 cm, mean 39 cm (depths are estimations)
  - Water quality data were collected only in April
  - pH 6.40
  - temperature 25.70° C
  - dissolved oxygen 8.90 mg/L
  - turbidity 238 NTU
- 2015-2016 (Burleson, 2017)
  - In a consecutive drought with precipitation above-normal, Pond 60 was inundated from the first recorded monitoring in April through September. The maximum inundation area was 2.646 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a moderate range. Turbidity was low on average with a few high readings in August and September. It is likely that Pond 60 was inundated earlier in the water-year and maximum inundation was most likely not captured. It should be noted that data collection did not start with the first storm or inundation.
  - Consecutive drought year with yearly cumulative precipitation 21.21 inches
  - Data collected April - October, eight monitoring events
  - Inundated April through September
  - Inundation range 0.01-2.65 acres, mean 1.58 acres
  - depth range 12-130 cm, mean 73 cm
  - pH range 6.18-7.41, mean 6.51
  - temperature range 15.03°-26.38° C, mean 19.63° C
  - dissolved oxygen range 0.00-10.86 mg/L, mean 3.94 mg/L
  - turbidity range 7.6-415 FNU, mean 123.4 FNU
- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 60 was inundated from the first recorded monitoring in January through July. The maximum inundation area was 0.77 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord with a relatively high temperature in June. Dissolved oxygen had a small range, with moderate levels. Turbidity had low levels.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected January - July, seven monitoring events
  - Inundated January, and March through June
  - Inundation range 0.02-0.77 acres, mean 0.25 acres
  - Depth range 18-59 cm, mean 35 cm
  - pH range 6.29-6.74, mean 6.42
  - temperature range 11.00°-28.26° C, mean 16.09° C
  - dissolved oxygen range 3.60-8.71 mg/L, mean 5.88 mg/L

  - turbidity range 00.0-25.7 FNU, mean 9.32 FNU
- 2018-2019
  - In an above-normal water-year, Pond 60 was inundated from the first recorded monitoring in December through September. The maximum inundation area was 2.48 acres. Water quality was within normal ranges.
  - Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord with a relatively high temperature in June. Dissolved oxygen had a small range, with moderate levels. Turbidity had moderate range, with low levels.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected December - September, ten monitoring events
  - Inundated January through September
  - Inundation range 0.18-2.48 acres, mean 1.91 acres
  - Depth range 10-98 cm, mean 59 cm
  - pH range 6.36-6.84, mean 6.55
  - temperature range 9.23°-20.01° C, mean 14.16° C
  - dissolved oxygen range 4.12-9.10 mg/L, mean 6.10 mg/L
  - turbidity range 1.2-67.1 FNU, mean 15.7 FNU

Table F-22. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Historic Hydrology Results on Former Fort Ord from 2017-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2016-2017	1/24/2017	5.61	7.00	1.76	59.1	21	0.70
	2/28/2017	6.66	11.13	10.54	31.3	21	0.52
	3/22/2017	6.16	15.89	4.08	76.7	21	0.62
	4/19/2017	6.48	12.26	4.31	28.8	10	0.05
	5/25/2017	-	-	-	-	DRY	0.00
2017-2018	1/16/2018	-	-	-	-	DRY	0.00
	2/20/2018	-	-	-	-	DRY	0.00
	3/19/2018	-	-	-	-	DRY	0.00‡
	4/17/2018	-	-	-	-	DRY	0.00‡
2018-2019	1/15/2019	-	-	-	-	DRY	0.00‡
	2/13/2019	6.46	9.42	9.34	52.3	20	0.06‡
	3/6/2019	6.48	12.40	5.94	21.1	19	0.12‡
	4/3/2019	6.79†	14.15†	6.01†	17.1†	8	0.04‡
	5/8/2019	-	-	-	-	DRY	0.00

†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 61 was monitored three years between 2016 and 2019. Mastication activities occurred in 2017 and munitions remediation activities occurred in 2018. In 2019, Pond 61 was in year 2 of monitoring for post-mastication and year 1 for post-subsurface munitions remediation. The historic data and precipitation are summarized below:

- 2016-2017 (Burleson, 2018)
  - After the end of a historic drought with precipitation above-normal, Pond 61 was inundated from the first recorded monitoring in January through April. The maximum inundation area was 0.695 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range, with moderate levels. Turbidity had a large range, with moderate levels.
  - Yearly cumulative precipitation 22.92 inches
  - Data collected January - May, five monitoring events
  - Inundated January through April
  - Inundation range 0.05-0.70 acres, mean 0.47 acres
  - Depth range 10-21 cm, mean 18 cm
  - pH range 5.61-6.66, mean 6.23
  - temperature range 7.0°-15.9° C, mean 11.6° C
  - dissolved oxygen range 1.76-10.54 mg/L, mean 5.17 mg/L
  - turbidity range 28.8-76.7 FNU, mean 48.98 FNU

- 2017-2018 (Burleson, 2019)
    - In a below-normal water-year, Pond 60 did not hold water. No water quality data were collected.
    - Yearly cumulative precipitation 12.57 inches
    - Data collected January - April, four monitoring events
    - Dry in all monitoring events
    - No water quality data collected
- 2018-2019
    - In an above-normal water-year, Pond 61 was inundated from the second recorded monitoring in February through April. Peripheral ponding that was not hydrologically connected to the staff gauge was observed in January. The maximum inundation area was 0.12 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range, with moderate levels. Turbidity had a small range, with moderate levels.
    - Yearly cumulative precipitation 21.97 inches
    - Data collected January - May, five monitoring events
    - Inundated February through April
    - Inundation range 0.04-0.12 acres, mean 0.07 acres
    - Depth range 8-20 cm, mean 16 cm
    - pH range 6.46-6.79, mean 6.58
    - temperature range 9.42°-14.15° C, mean 11.99° C
    - dissolved oxygen range 5.94-9.34 mg/L, mean 7.10 mg/L
    - turbidity range 17.1-52.3 FNU, mean 30.2 FNU

Table F-23. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Historic Hydrology Results on Former Fort Ord from 2017-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2016-2017	5/15/2017	-	-	-	-	-	0.636
2017-2018	11/20/2017	-	-	-	-	DRY	0.00
	1/18/2018	-	-	-	-	DRY	0.00
	2/22/2018	-	-	-	-	DRY	0.00
	3/19/2018	-	-	-	-	DRY	0.00
	4/17/2018	6.33	11.33	5.63	9.5	14	0.001‡
	5/21/2018	-	-	-	-	DRY	0.00
2018-2019	1/14/2019	-	-	-	-	DRY	0.00‡
	2/13/2019	6.53	9.75	9.59	43.5	52	0.74‡
	3/6/2019	6.38	12.31	4.97	10.8	56	0.85‡
	4/3/2019	6.42	14.12	2.93	2.4	49	0.76‡
	5/8/2019	6.00	15.39	4.66	2.6	27	0.57
	6/11/2019	-	-	-	-	DRY	0.00

‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 73 was monitored three years between 2017 and 2019. Mastication activities occurred in 2017 and munitions remediation activities occurred in 2018. In 2019, Pond 73 was in year 2 of monitoring for post-mastication and year 1 for post-subsurface munitions remediation. The historic data and precipitation are summarized below:

- 2016-2017 (Burleson, 2018)
  - After the end of a historic drought with precipitation above-normal, Pond 73 was monitored once for inundation in May with an area of 0.636 acres. No depth or water quality data were collected.
  - Yearly cumulative precipitation 22.92 inches
  - Data collected in May, one monitoring event
  - Inundated January through April
  - Inundation 0.636 acres
- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 73 was inundated only in April. The maximum inundation area was 0.001 acres. Water quality data were collected in April.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected November, January - May, six monitoring events
  - Inundated in April
  - Inundation 0.001 acres
  - Depth 14 cm
  - pH 6.33
  - temperature 11.33° C
  - dissolved oxygen 5.63mg/L

  - turbidity 9.5 FNU
- 2018-2019
  - In an above-normal water-year, Pond 73 was inundated from the second recorded monitoring in February through May. Peripheral ponding that was not hydrologically connected to the staff gauge was observed in January. The maximum inundation area was 0.85 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range, with low levels. Turbidity had a large range, with low to moderate levels.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - June, six monitoring events
  - Inundated February through May
  - Inundation range 0.57-0.85 acres, mean 0.73 acres
  - Depth range 27-56 cm, mean 46 cm
  - pH range 6.00-6.53, mean 6.33
  - temperature range 9.75°-15.39° C, mean 12.89° C
  - dissolved oxygen range 2.93-9.59 mg/L, mean 5.54 mg/L
  - turbidity range 2.4-43.5 FNU, mean 14.8 FNU

Table F-24. Machine Gun Flats (Year 2 Post-Mastication) Historic Hydrology Results on Former Fort Ord from 1997-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
1996-1997	June	7.38	-	-	7 inches (Secchi disk reading)	-	-
1997-1998	Dec	7.48-7.98	-	-	44.0-87.0 (NTU)	55	10.62
	Jan	-	-	-	13.5 (NTU)	81	11.80
	Feb	7.25-7.50	-	-	15.1 (NTU)	102	14.75
	Apr	-	-	-	-	102	14.75
1999-2000	1/26/2000	-	-	-	-	>102	7.16
	2/23/2000	-	-	-	-	>102	9.42
	3/13/2000	5.64	-	-	28.1 (NTU)	>152	10.65
	6/15/2000	-	-	-	-	>102	9.00
2000-2001	2/12/2001-2/13/2001	-	-	-	-	38	6.40
	3/26/2001	6.70	-	-	-	>46	6.85
	4/18/2001-4/19/2001	7.50	-	-	-	30	6.01
	5/23/2001-5/24/2001	7.86	-	-	-	>76	0.093
2001-2002	1/23/2002	-	-	-	57.2 (NTU)	-	3.49
	2/25/2002	-	-	-	71.0 (NTU)	>91	2.03
	3/27/2002	6.88	-	-	150.0 (NTU)	>91	0.09
	4/17/2002	7.20	-	-	180.0 (NTU)	-	0.01
2002-2003	1/29/2003	6.13	-	-	11.8 (NTU)	>91	4.44
	2/24/2003	-	-	-	-	>91	4.27
	3/29/2003	6.89	-	-	126.0 (NTU)	>91	0.07
	5/1/2003	-	-	-	0.0	DRY	0.00
2017-2018	11/20/2017	-	-	-	-	98	-
	1/15/2018	7.02	11.14	3.40	18.5	100	7.84*
	2/23/2018	7.33	8.55	4.65	6.2	95	7.26*
	3/21/2018	7.17	11.83	6.20	18.7	105	8.33*
	4/18/2018	6.84	13.80	3.56	7.8	111	8.34*
	5/24/2018	6.84	14.98	5.26	4.8	93	4.93*
	6/19/2018	7.06	22.99	2.70	0.0	78	0.06
	7/19/2018	-	-	-	-	60	0.04
	8/20/2018	-	-	-	-	36	0.02
	9/19/2018	-	-	-	-	15	0.01

Table F-24. Machine Gun Flats (Year 2 Post-Mastication) Historic Hydrology Results on Former Fort Ord from 1997-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2018-2019	1/15/2019	7.24	9.69	7.90	178.0	48	0.24*
	2/13/2019	6.77	8.60	9.73	34.5	128	9.42*
	3/7/2019	6.72	13.20	6.40	10.2	149	10.45*
	4/3/2019	6.62	14.97	2.78	2.8	149	10.20*
	5/8/2019	6.62	17.30	4.51	17.5	134	9.59*
	6/6/2019	7.29	18.13	6.03	10.4	127	9.52*
	7/9/2019	-	-	-	-	109	-
	8/13/2019	-	-	-	-	90	-
	9/9/2019	-	-	-	-	76	-

*No hydrological connectivity between pools. However, both inundation areas were mapped in order to compare to baseline data.

Machine Gun Flats was monitored eight years between 1997 and 2019. Mastication activities occurred in 2017. The water-years 1996-1997 and 1997-1998 are baseline, while all other years are post-remediation. Machine Gun Flats is a post-mastication vernal pool and was in year 2 of monitoring in 2019. The historic data and precipitation are summarized below:

- 1996-1997 (HLA, 1997)
  - The water-year was above-normal prior to February but fell to approximately normal by the end of the season. Machine Gun Flats was only monitored for pH and turbidity in June. No depths or inundation areas were recorded.
  - Yearly cumulative precipitation 17.45 inches (0.4 in below-normal)
  - Data collected in June, one monitoring event
  - pH 7.38 in June
  - turbidity was 7 inches, based on Secchi disk reading in June
- 1997-1998 (HLA, 1998)
  - In an El Niño year with yearly cumulative precipitation significantly above-normal, Machine Gun Flats held water December through April. Turbidity and pH were collected December through February.
  - El Niño year with yearly cumulative precipitation above-normal (40.54 inches)
  - Data collected December-April, four monitoring events
  - Inundated from December through April
  - Inundation range 10.62-14.75 acres, mean 12.98 acres
  - Depth range 54.61-101.6 cm, mean 84.77 cm
  - pH range 7.25-7.98, mean 7.55
  - turbidity range 13.5-87 NTU, mean 39.9 NTU
- 1999-2000 (Harding Lawson Associates, 2001)
  - In a precipitation year below-normal, Machine Gun Flats held water from January through June with a maximum recorded inundation of 10.65 acres. Water quality data were only collected once, in March.
  - Yearly cumulative precipitation 16.13 inches
  - Data collected January-March and June, four monitoring events

- Inundated January through June
- Inundation range 7.16-10.65 acres, mean 9.06 acres
- Depth range >101.6 - >152.4 cm, mean 114.3 cm
- pH 5.74 in March
- turbidity 28.1 NTU in March

- 2000-2001 (Harding ESE, 2002)
  - In a precipitation year below-normal, Machine Gun Flats held water from February through May with a maximum recorded inundation of 6.85 acres. pH was the only water quality data parameter measured. Slightly acidic pH values were observed. It is likely that Machine Gun Flats was inundated earlier in the water-year and maximum inundation was most likely not captured. It should be noted that data collection did not start with the first storm or inundation.
  - Yearly cumulative precipitation 15.52 inches
  - Data collected February- May, four monitoring events
  - Inundated February through May
  - Inundation range 0.09-6.85 acres, mean 4.84 acres
  - Depth range 30- >76 cm, mean 48 cm
  - pH range 6.70-7.86, mean 7.35
- 2001-2002 (Mactec, 2003)
  - In a precipitation year below-normal, Machine Gun Flats held water from January through April with a maximum recorded inundation of 3.49 acres. Turbidity and pH were the only water quality parameters measured.
  - Yearly cumulative precipitation 11.42 inches
  - Data collected January-April, four monitoring events
  - Inundated January through April
  - Inundation range 0.10-3.49 acres, mean 1.41 acres
  - Depth range 15-61 cm, mean 30 cm
  - pH range 6.88-7.20, mean 7.04
  - Turbidity range 57.2-180.0 NTU, mean 114.6 NTU
- 2002-2003 (Mactec, 2004)
  - In a precipitation year below-normal, Machine Gun Flats held water from January through March with a maximum recorded inundation of 4.44 acres. Turbidity and pH were the only water quality parameters measured in January and March. It should be noted that depth data were not collected in April and it is possible that the vernal pool was still inundated before drying in May.
  - Yearly cumulative precipitation 15.02 inches
  - Data collected January-May, four monitoring events
  - Inundated January through March
  - Inundation range 0.07-4.44 acres, mean 2.93 acres
  - Depth 91 cm
  - pH range 6.13-6.89, mean 6.51
  - turbidity range 11.8-126.0 NTU, mean 45.9 NTU
- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Machine Gun Flats was inundated from the first recorded monitoring in January through September. The maximum inundation area was 8.34 acres. Water quality was within normal ranges. Neutral pH values were observed. Temperature was within normal averages for Fort Ord, with a higher reading in June. Dissolved oxygen had a small range, with moderate levels. Turbidity had low levels.

  - Yearly cumulative precipitation 12.57 inches
  - Data collected November, January - August, nine monitoring events
  - Inundated January through September
  - Inundation range 0.01-8.34 acres, mean 4.60 acres
  - Depth range 15-111 cm, mean 86 cm
  - pH range 6.84-7.33, mean 7.04
  - temperature range 8.55°-22.99° C, mean 13.88° C
  - dissolved oxygen range 2.70-6.20 mg/L, mean 4.30 mg/L
  - turbidity range 0.0-18.7 FNU, mean 9.33 FNU
- 2018-2019
  - In an above-normal water-year, Machine Gun Flats was inundated from the first recorded monitoring in January through September. The maximum inundation area was 10.45 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord, with higher readings in May and June. Dissolved oxygen had a small range, with low levels. Turbidity had a large range, with moderate levels.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - September, nine monitoring events
  - Inundated January through September
  - Inundation range 0.24-10.45 acres, mean 8.24 acres
  - Depth range 48-149 cm, mean 112 cm
  - pH range 6.62-7.29 mean 6.88
  - temperature range 8.60°-18.13° C, mean 13.65° C
  - dissolved oxygen range 2.78-9.73 mg/L, mean 6.23 mg/L
  - turbidity range 2.8-178.0 FNU, mean 42.2 FNU

Table F-25. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Historic Hydrology Results on Former Fort Ord from 1992-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
1991-1992	3/26/1992	-	20	-	extreme[x]	91	-
1993-1994	3/15/1994	-	-	-	-	>102	-
	3/29/1994	-	-	-	-	>102	-
	4/13/1994	-	-	-	-	>102	-
1994-1995	1/11/1995	-	-	-	-	>102	-
	1/26/1995	-	-	-	-	>102	-
	2/10/1995	-	-	-	-	>102	-
	2/24/1995	-	-	-	-	>102	-
	3/10/1995	-	-	-	-	>102	-
	3/24/1995	-	-	-	-	>102	-
1995-1996	1/3/1996	-	-	-	-	15	-
	1/31/1996	-	-	-	-	>91	-
	2/14/1996	-	-	-	-	>91	-
	2/29/1996	-	-	-	-	>91	-
	3/14/1996	-	-	-	-	>91	-
	3/28/1996	-	-	-	-	>91	-
	4/11/1996	-	-	-	-	>91	-
	4/25/1996	-	-	-	-	>91	-
2014-2015	12/22/2014-12/23/2014	-	-	-	-	~43*	-
	2/24/2015	-	-	-	-	~45*	-
	3/18/2015	-	-	-	-	20-30*	0.27
	4/16/2015	6.40	18.30	13.90	572.0 (NTU)	15-20*	0.16
	5/28/2015	-	-	-	-	DRY	0.00
2016-2017	1/23/2017	6.84	8.87	1.80	188.0	142	1.29
	2/21/2017	6.09	12.42	4.87	584.0	144	2.57
	3/22/2017	6.22	13.45	0.66	182.0	142	2.17
	4/18/2017	6.78	14.40	0.05	66.6	140	0.80
	5/25/2017	6.96	18.64	1.55	33.8	109	0.57
	6/21/2017	6.98	19.97	1.40	121.0	98	0.51
	7/27/2017	-	-	-	-	90	-
	8/15/2017	-	-	-	-	40	-
	9/6/2017	-	-	-	-	28	-
2017-2018	11/20/2017	-	-	-	-	DRY	0.00
	1/18/2018	-	-	-	-	DRY	0.00
	2/22/2018	-	-	-	-	DRY	0.00
	3/20/2018	6.65†	10.24†	5.29†	140.0†	12	0.11
	4/16/2018	6.10	17.99	8.43	33.8	28	0.26
	5/22/2018	-	-	-	-	DRY	0.00

[x] In 1991-1992, turbidity was measured qualitatively.

* No staff gauge. Cannot access ponds to measure depth due to potential for subsurface unexploded ordnance and other hazards. Depths are estimations.

Table F-25. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Historic Hydrology Results on Former Fort Ord from 1992-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2018-2019	1/17/2019	-	-	-	-	DRY	0.00
	2/12/2019	6.61	7.33	6.68	360.0	139	0.74‡
	3/5/2019	6.25	10.85	4.70	259.0	136	0.73‡
	4/2/2019	6.15	12.45	3.46	118.0	136	0.73‡
	5/7/2019	6.56	16.76	2.75	60.1	112	0.63
	6/10/2019	6.42	17.94	3.84	86.1	93	0.54
	7/9/2019	-	-	-	-	69	-
	8/13/2019	-	-	-	-	42	-
	9/9/2019	-	-	-	-	18	-

†Water quality probe was horizontal for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 16 was monitored eight years between 1992 and 2019. Mastication activities occurred in 2016 and munitions remediation activities occurred in 2018. In 2019, Pond 16 was in year 3 of monitoring for post-mastication and year 1 for post-subsurface munitions remediation. The historic data and precipitation are summarized below:

- 1991-1992 (Jones & Stokes, 1992)
  - In a year with near-normal precipitation, Pond 16 was surveyed once in March 1992. It should be noted that data collection did not start with the first storms or inundation.
  - Yearly cumulative precipitation near-normal (17.84 inches)
  - Data collected March, one monitoring event
  - Inundated March
  - Depth 91 cm
  - temperature 20˚C
  - pH, turbidity, and dissolved oxygen data were not collected
- 1993-1994 (Jones & Stokes, 1996)
  - In a precipitation year below-normal, Pond 16 held water during both monitoring events in March and April.
  - Yearly cumulative precipitation 13.96 inches
  - Data collected in March and April, three monitoring events
  - Inundated during all monitoring events
  - No inundation areas recorded
  - Depth during all monitoring events >102 cm
  - No water quality data were collected
- 1994-1995 (Jones & Stokes, 1996)
  - In a water-year that was above-normal, Pond 16 was inundated by January monitoring and stayed inundated through March.
  - Yearly cumulative precipitation 23.38 inches
  - Data collected January-March, six monitoring events
  - Inundated during all monitoring events

  - No inundation areas recorded
  - Depth during all monitoring events >102 cm
  - No water quality data were collected
- 1995-1996 (Jones & Stokes, 1996)
  - In a water-year that was approximately normal, Pond 16 was inundated from January to April. The maximum depth was lower but similar to previous years.
  - Yearly cumulative precipitation 16.96 inches
  - Data collected January-April, eight monitoring events
  - Inundated early-January to late-April
  - No inundation areas recorded
  - Depth range 15- >91 cm, mean 73 cm
  - No water quality data collected
- 2014-2015 (Burleson, 2016)
  - In a consecutive drought year with cumulative precipitation below-normal, Pond 16 was inundated at the first survey in April and held water through April. Maximum inundation was 0.27 acres. Water quality data were collected once, in April.
  - Consecutive drought year with yearly cumulative precipitation of 14.35 inches
  - Data collected December - May, five monitoring events
  - Inundated December - April
  - Inundation range 0-0.27 acres, mean 0.14 acres
  - Depth range ~15-~45 cm, mean ~26 cm
  - pH 6.4 in April
  - temperature 18.3°C in April
  - dissolved oxygen 13.9 mg/L in April
  - turbidity 572 NTU in April
- 2016-2017 (Burleson, 2018)
  - After the end of a historic drought with precipitation above-normal, Pond 16 was inundated from the first recorded monitoring in January through September (pond did not dry by last recorded monitoring in September). The maximum inundation area was 2.57 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord, with a few high readings in the middle of the season. Dissolved oxygen had a small range, with moderate levels. Turbidity had a large range, with high readings at the beginning of the season.
  - Yearly cumulative precipitation 22.92 inches
  - Data collected January - September, nine monitoring events
  - Inundated January through September (pond did not dry by last recorded monitoring in September)
  - Inundation range 0.51-2.57 acres, mean 1.32 acres
  - Depth range 28-144 cm, mean 104 cm
  - pH range 6.09-6.98, mean 6.65
  - temperature range 8.9°-20.0° C, mean 14.6° C
  - dissolved oxygen range 0.05-4.87 mg/L, mean 1.72 mg/L
  - turbidity range 33.8-584.0 FNU, mean 195.9 FNU
- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 16 was inundated in March and April. The maximum inundation area was 0.26 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal

range for Fort Ord. Dissolved oxygen had a small range and moderate levels. Turbidity had moderate levels.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected November, January - May, six monitoring events
  - Inundated March and April
  - Inundation range 0.11-0.26 acres, mean 0.18 acres
  - depth range 12-28 cm, mean 20 cm
  - pH range 6.10-6.65, mean 6.38
  - temperature range 10.24°-17.99° C, mean 14.12° C
  - dissolved oxygen range 5.29-8.43 mg/L, mean 6.86 mg/L
  - turbidity range 33.8-140 FNU, mean 86.9 FNU
- 2018-2019
  - In an above-normal water-year, Pond 16 was inundated from the second recorded monitoring in February through September. The maximum inundation area was 0.74 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal range for Fort Ord, with higher readings in May and June. Dissolved oxygen had a small range and low levels. Turbidity had a moderate range, with high readings in February, March, and April.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - September, six monitoring events
  - Inundated February through September
  - Inundation range 0.54-0.74 acres, mean 0.67 acres
  - Depth range 18-139 cm, mean 93 cm
  - pH range 6.15-6.61, mean 6.40
  - temperature range 7.33°-17.94° C, mean 13.07° C
  - dissolved oxygen range 2.75-6.68 mg/L, mean 4.29 mg/L
  - turbidity range 60.1-360.0 FNU, mean 176.6 FNU

Table F-26. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Historic Hydrology Results on Former Fort Ord from 2004-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2003-2004	January	7.12	-	-	120.0 (NTU)	13	0.001
	February	7.42	-	-	143.7 (NTU)	23	1.37
	March	6.83	-	-	1000.0 (NTU)	15	0.003
	April	-	-	-	-	DRY	0.00
2016-2017	1/23/2017	6.64	10.13	2.82	8.4	54	1.60
	2/28/2017	6.63	8.26	4.92	5.3	112	3.09
	3/22/2017	6.51	13.78	0.04	29.7	111	3.10
	4/18/2017	6.85	15.06	5.55	37.6	108	2.95
	5/25/2017	6.69	17.32	6.08	69.3	78	2.21
	6/21/2017	6.98	23.28	7.22	10.5	~60[ǂ]	1.90
	7/31/2017	-	-	-	-	DRY	0.00
2017-2018	1/18/2018	-	-	-	-	DRY	0.00
	2/22/2018	-	-	-	-	DRY	0.00
	3/20/2018	6.19	10.07	3.82	35.2	22	0.001
	4/16/2018	6.47	12.90	13.76	24.1	28	0.003
	5/22/2018	-	-	-	-	DRY	0.00
2018-2019	1/17/2019	6.13	12.09	6.62	127.0	28	0.002[‡]
	2/12/2019	6.62	9.37	9.16	12.7	46	1.62[‡]
	3/4/2019	6.70	17.73	11.26	9.1	58	1.95[‡]
	4/2/2019	6.34[†]	15.88[†]	6.82[†]	2.6[†]	63	2.00[‡]
	5/6/2019	5.98	15.57	4.49	6.1	40	1.66[‡]
	6/10/2019	5.92	20.45	4.99	28.6	15	0.0003
	7/9/2019	-	-	-	-	DRY	0.00

ǂDecreased visibility due to emergent vegetation.
†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 54 was monitored four years between 2004 and 2019. Mastication activities occurred in 2015. In 2019, Pond 54 was in year 3 of monitoring for post-mastication and year 1 for post-subsurface munitions remediation. The historic data and precipitation are summarized below:

- 2003-2004 (Mactec, 2005)
  - In a below-normal water year, Pond 54 was inundated from the first recorded monitoring in January through March. The maximum inundation area was 1.37 acres. Water quality was within normal ranges, with slightly acidic pH values and relatively high turbidity. Temperature and dissolved oxygen were not measured.

  - Yearly cumulative precipitation 13.45 inches
  - Data collected January - April, four monitoring events
  - Inundated January through March
  - Inundation range 0.00-1.37 acres, mean 0.34 acres
  - Depth range 13-23 cm, mean 17 cm
  - pH range 6.83-7.42, mean 7.12
  - turbidity range 120-1000 NTU, mean 421 NTU
- 2016-2017 (Burleson, 2018)
  - After the end of a historic drought with precipitation above-normal, Pond 54 was inundated from the first recorded monitoring in January through July. The maximum inundation area was 3.10 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a wide range, with moderate levels. Turbidity had a moderate range.
  - Yearly cumulative precipitation 22.92 inches
  - Data collected January - July, seven monitoring events
  - Inundated January through June
  - Inundation range 1.60-3.10 acres, mean 2.47 acres
  - Depth range 54-112 cm, mean 87 cm
  - pH range 6.51-6.98, mean 6.72
  - temperature range 8.3°-23.3° C, mean 14.6° C
  - dissolved oxygen range 0.04-7.22 mg/L, mean 4.44 mg/L
  - turbidity range 5.3-69.3 FNU, mean 26.8 FNU
- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 54 was inundated in March and April. The maximum inundation area was 0.003 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal ranges for Fort Ord. Dissolved oxygen had a large range. Turbidity had low levels.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected January - May, five monitoring events
  - Inundated March and April
  - Inundation range 0.001-0.003 acres, mean 0.002 acres
  - Depth range 22-28 cm, mean 25 cm
  - pH range 6.19-6.47, mean 6.33
  - temperature range 10.07°-12.90° C, mean 11.49° C
  - dissolved oxygen range 3.82-13.76 mg/L, mean 8.79 mg/L
  - turbidity range 24.1-35.2 FNU, mean 29.7 FNU
- 2018-2019
  - In an above-normal water-year, Pond 54 was inundated from the first recorded monitoring in January through June. The maximum inundation area was 2.00 acres. Water quality was within normal ranges. Moderately to slightly acidic pH values were observed. Temperature was within normal ranges for Fort Ord, with a high reading in June. Dissolved oxygen had a small range with low levels. Turbidity was low on average, with a high reading in January.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - July, seven monitoring events
  - Inundated January through June
  - Inundation range 0.0003-2.00 acres, mean 1.21 acres

- Depth range 15-63 cm, mean 42 cm
- pH range 5.92-6.70, mean 6.28
- temperature range 9.37°-20.45° C, mean 15.18° C
- dissolved oxygen range 4.49-11.26 mg/L, mean 7.22 mg/L
- turbidity range 2.6-127.0 FNU, mean 31.0 FNU

Table F-27. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) Historic Hydrology Resultson Former Fort Ord from 2018-2019

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
2017-2018	11/20/2018	-	-	-	-	DRY	0.00
	1/18/2018	-	-	-	-	DRY	0.00
	2/22/2018	-	-	-	-	DRY	0.00
	3/20/2018	6.37	10.12	2.51	292	17	0.001‡
	4/16/2018	6.53	12.85	11.86	12.1	36	0.36
	5/22/2018	-	-	-	-	DRY	0.00
2018-2019	1/17/2019	6.41	13.29	7.16	101.0	18	0.002‡
	2/12/2019	6.51	7.06	6.70	9.8	51	2.14‡
	3/5/2019	6.75†	14.90†	9.39†	6.3†	56	2.28‡
	4/2/2019	6.36	14.56	8.83	22.0	54	2.20‡
	5/7/2019	6.24	15.04	4.98	2.6	36	0.38‡
	6/10/2019	-	-	-	-	DRY	0.00

†Water quality probe was on its side for measurements.
‡Peripheral ponding was observed but was not mapped as there was no surface hydrological connectivity between the peripheral ponding and location of the staff gauge.

Pond 72 was monitored two years between 2018 and 2019. Mastication activities occurred in 2015. Pond 72 was in year 3 of monitoring for post-mastication and year 3 for post-subsurface munitions remediation in 2019. There are no other historic wetland monitoring data. The historic data and precipitation are summarized below:

- 2017-2018 (Burleson, 2019)
  - In a below-normal water-year, Pond 72 was inundated in March and April. The maximum inundation area was 0.36 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a large range. Turbidity had moderate levels, with a high reading in March.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected November, January - May, six monitoring events
  - Inundated March and April
  - Inundation range 0.001-0.36 acres, mean 0.18 acres
  - depth range 17-36 cm, mean 27 cm
  - pH range 6.37-6.53, mean 6.45
  - temperature range 10.12°-12.85° C, mean 11.49° C
  - dissolved oxygen range 2.51-11.86 mg/L, mean 7.19 mg/L
  - turbidity range 12.1-292.0 FNU, mean 152.1 FNU
- 2018-2019
  - In an above-normal water-year, Pond 72 was inundated from the first recorded monitoring in January through May. The maximum inundation area was 2.28 acres. Water quality was within normal ranges. Slightly acidic pH values were observed.

Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range, with low levels. Turbidity had moderate levels, with a high reading in January.

- Yearly cumulative precipitation 21.97 inches
- Data collected January - June, six monitoring events
- Inundated January through May
- Inundation range 0.002-2.28 acres, mean 1.40 acres
- depth range 18-56 cm, mean 43 cm
- pH range 6.24-6.75, mean 6.45
- temperature range 7.06°-15.04° C, mean 12.97° C
- dissolved oxygen range 4.98-9.39 mg/L, mean 7.41 mg/L
- turbidity range 2.6-101.0 FNU, mean 28.3 FNU

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APPENDIX G

Vegetation Species Richness of Native and Non-Native Species and Wetland Indicator Category by Vernal Pool

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Table G-1. Pond 5 (Reference) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 5			
Stratum	Native	Non-Native	Unidentified
1	3	2	0
2	4	1	0
3	15	13	0
4	11	12	0
6	5	2	0
7	4	2	0
Basin Total	**62**	**32**	**0**

Table G-2. Pond 101 East (East) (Reference) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 101 East (East)			
Stratum	Native	Non-Native	Unidentified
2	2	4	0
5	11	13	0
6	8	8	0
Basin Total	**51**	**33**	**0**

Table G-3. Pond 997 (Reference) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 997			
Stratum	Native	Non-Native	Unidentified
1	11	2	0
3	16	16	0
5	17	14	0
Basin Total	**54**	**28**	**0**

Table G-4. Pond 14 (Baseline) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 14			
Stratum	Native	Non-Native	Unidentified
1	1	0	0
2	6	4	0
3	12	9	0
4	14	10	0
Basin Total	**42**	**25**	**0**

Table G-5. Pond 17 (Baseline) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 17			
Stratum	Native	Non-Native	Unidentified
1	2	0	0
2	1	0	0
3	3	2	0
4	3	4	0
5	8	13	0
6	5	5	0
Basin Total	**50**	**31**	**0**

Table G-6. Pond 21 (Baseline) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 21			
Stratum	Native	Non-Native	Unidentified
1	10	2	0
2	12	8	0
Basin Total	**46**	**13**	**0**

Table G-7. Pond 101 East (West) (Year 1 Post-Mastication) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 101 East (West)			
Stratum	Native	Non-Native	Unidentified
1	6	4	0
2	7	4	0
3	15	5	1
4	10	13	0
5	8	10	0
6	6	9	0
8	11	7	1
Basin Total	**49**	**36**	**0**

Table G-8. Pond 101 West (Year 1 Post-Mastication) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 101 West			
Stratum	Native	Non-Native	Unidentified
1	10	4	0
2	15	17	0
3	4	4	0
Basin Total	**43**	**31**	**0**

Table G-9. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 41			
Stratum	Native	Non-Native	Unidentified
1	10	1	0
2	10	4	0
3	11	9	0
4	15	8	0
Basin Total	**54**	**21**	**0**

Table G-10. Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 3 North			
Stratum	Native	Non-Native	Unidentified
2	7	3	0
3	10	8	0
Basin Total	**57**	**32**	**0**

Table G-11. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 3 South			
Stratum	Native	Non-Native	Unidentified
1	10	4	0
2	17	11	0
3	15	14	0
4	14	14	0
Basin Total	**67**	**38**	**0**

Table G-12. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 39			
Stratum	Native	Non-Native	Unidentified
1	5	3	0
2	13	13	1
3	13	13	0
4	14	15	1
Basin Total	**57**	**39**	**2**

Table G-13. Pond 40 North (Year 2 Post-Burn) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 40 North			
Stratum	Native	Non-Native	Unidentified
2	3	6	0
3	7	4	0
4	2	8	0
Basin Total	**33**	**26**	**0**

Table G-14. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 40 South			
Stratum	Native	Non-Native	Unidentified
1	5	5	0
2	3	16	0
3	12	16	0
Basin Total	**47**	**28**	**0**

Table G-15. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 43			
Stratum	Native	Non-Native	Unidentified
1	15	6	0
2	18	7	0
3	22	14	0
Basin Total	**76**	**26**	**1**

Table G-16. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 35			
Stratum	Native	Non-Native	Unidentified
1	6	3	0
2	5	3	0
3	3	4	0
4	6	14	0
Basin Total	**48**	**30**	**1**

Table G-17. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 42			
Stratum	Native	Non-Native	Unidentified
1	5	1	0
2	7	3	0
3	7	2	0
4	8	9	0
5	0	2	0
Basin Total	**53**	**23**	**1**

Table G-18. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 44			
Stratum	Native	Non-Native	Unidentified
1	17	6	0
3	15	14	0
4	13	8	0
Basin Total	**50**	**24**	**0**

Table G-19. Pond 56 (Year 2 Post-Mastication) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 56			
Stratum	Native	Non-Native	Unidentified
2	1	0	0
3	5	1	0
4	8	2	0
5	7	3	0
Basin Total	**50**	**29**	**0**

Table G-20. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 60			
Stratum	Native	Non-Native	Unidentified
1	3	0	0
2	3	0	0
3	5	6	0
4	5	2	0
Basin Total	**30**	**16**	**0**

Table G-21. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 61			
Stratum	Native	Non-Native	Unidentified
1	17	3	1
3	14	4	0
4	19	13	1
Basin Total	**83**	**36**	**0**

Table G-22. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 73			
Stratum	Native	Non-Native	Unidentified
1	5	1	0
2	10	2	0
3	8	2	0
4	9	3	0
Basin Total	**40**	**21**	**1**

Table G-23. Machine Gun Flats (Year 2 Post-Mastication) Vegetation Species Richness of Native and Non-Native Species by Stratum

Machine Gun Flats			
Stratum	Native	Non-Native	Unidentified
1	7	4	0
2	7	9	0
3	8	11	0
4	5	2	0
5	5	3	0
6	14	9	0
7	7	9	0
8	8	11	0
Basin Total	**85**	**45**	**1**

Table G-24. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 16			
Stratum	Native	Non-Native	Unidentified
1	5	2	0
3	3	1	0
4	13	7	0
5	5	0	0
6	3	2	1
7	2	3	0
Basin Total	**49**	**34**	**0**

Table G-25. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 54			
Stratum	Native	Non-Native	Unidentified
1	10	3	0
2	10	3	0
3	10	10	0
4	11	9	0
Basin Total	**55**	**24**	**0**

Table G-26. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 72			
Stratum	Native	Non-Native	Unidentified
1	11	0	0
2	13	2	0
3	5	4	0
Basin Total	**44**	**18**	**0**

Table G-27. Vegetation Species Richness of Native and Non-Native Species within Entire Vernal Pool Basin at Vernal Pools Monitored in 2019

Vernal Pool	Native	Non-Native	Unidentified	Total
5	62	32	0	94
101 East (East)	51	33	0	84
997	54	28	0	82
14	42	25	0	67
17	50	31	0	81
21	46	13	0	59
103	25	11	0	36
101 East (West)	49	36	0	85
101 West	43	31	0	74
41	54	21	0	75
3 North	57	32	0	89
3 South	67	38	0	105
39	57	39	2	98
40 North	33	26	0	59
40 South	47	28	0	75
43	76	26	1	103
35	48	30	1	79
42	53	23	0	76
44	50	24	0	74
56	50	29	0	79
60	30	16	0	46
61	83	36	0	119
73	40	21	1	62
Machine Gun Flats	85	45	1	131
16	49	34	0	83
54	55	24	0	79
72	44	18	0	62

Table G-28. Pond 5 (Reference) Number of Wetland Plants by Indicator Category by Stratum

Pond 5						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	1	2	0	1	0	1
2	1	3	0	1	0	0
3	4	7	4	4	1	8
4	4	5	3	4	1	6
6	1	4	1	1	0	0
7	3	2	0	0	0	1
Basin Total	**11**	**18**	**13**	**15**	**2**	**35**

Table G-29. Pond 101 East (East) (Reference) Number of Wetland Plants by Indicator Category by Stratum

Pond 101 East (East)						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
2	2	1	1	1	0	1
5	3	4	5	4	2	6
6	0	4	3	4	1	4
Basin Total	**5**	**18**	**13**	**13**	**4**	**31**

Table G-30. Pond 997 (Reference) Number of Wetland Plants by Indicator Category by Stratum

Pond 997						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	7	6	0	0	0	0
3	3	6	5	6	0	12
5	3	7	3	4	1	13
Basin Total	**11**	**13**	**10**	**15**	**1**	**32**

Table G-31. Pond 14 (Baseline) Number of Wetland Plants by Indicator Category by Stratum

Pond 14						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	1	0	0	0	0	0
2	2	2	2	2	0	2
3	0	2	5	4	0	10
4	3	3	6	3	0	9
Basin Total	**5**	**11**	**14**	**9**	**2**	**26**

Table G-32. Pond 17 (Baseline) Number of Wetland Plants by Indicator Category by Stratum

Pond 17						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	2	0	0	0	0	0
2	1	0	0	0	0	0
3	1	3	1	0	0	0
4	3	2	2	0	0	0
5	2	5	8	3	0	3
6	1	2	2	2	0	3
Basin Total	**12**	**15**	**11**	**13**	**3**	**27**

Table G-33. Pond 21 (Baseline) Number of Wetland Plants by Indicator Category by Stratum

Pond 21						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	5	6	0	1	0	0
2	6	6	2	3	0	3
Basin Total	**9**	**16**	**12**	**8**	**0**	**14**

Table G-34. Pond 101 East (West) (Year 1 Post-Mastication) Number of Wetland Plants by Indicator Category by Stratum

Pond 101 East (West)						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	3	3	2	1	0	1
2	5	4	1	0	0	1
3	6	8	5	0	0	2
4	3	5	3	2	2	8
5	4	3	5	1	1	4
6	2	5	2	1	2	3
8	4	7	4	1	1	2
Basin Total	**10**	**19**	**13**	**14**	**3**	**26**

Table G-35. Pond 101 West (Year 1 Post-Mastication) Number of Wetland Plants by Indicator Category by Stratum

Pond 101 West						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	9	3	1	0	0	1
2	5	7	9	4	2	5
3	5	1	1	0	0	1
Basin Total	**13**	**14**	**13**	**9**	**3**	**22**

Table G-36. Pond 41 (Year 1 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 41						
Stratum	OBL	FACW	FAC	FACU	UPL	NL
1	6	4	0	1	0	0
2	5	5	1	1	0	2
3	6	5	1	4	1	3
4	4	4	4	4	1	6
Basin Total	**9**	**15**	**12**	**13**	**2**	**24**

Table G-37 Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 3 North						
Stratum	OBL	FACW	FAC	FACU	UPL	NL
2	6	3	0	0	0	1
3	3	6	5	0	1	3
Basin Total	**14**	**18**	**16**	**10**	**3**	**28**

Table G-38. Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 3 South						
Stratum	OBL	FACW	FAC	FACU	UPL	NL
1	7	5	1	0	0	1
2	4	7	7	3	0	7
3	1	7	5	5	1	10
4	2	4	6	5	1	10
Basin Total	**10**	**22**	**16**	**16**	**3**	**38**

Table G-39. Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 39						
Stratum	OBL	FACW	FAC	FACU	UPL	NL
1	6	2	0	0	0	0
2	3	7	4	2	2	9
3	1	4	5	2	2	12
4	1	5	5	4	1	14
Basin Total	**9**	**17**	**15**	**15**	**3**	**39**

Table G-40. Pond 40 North (Year 2 Post-Burn) Number of Wetland Plants by Indicator Category by Stratum

Pond 40 North						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
2	3	2	2	0	1	1
3	3	4	1	1	0	2
4	1	4	2	2	0	1
Basin Total	**6**	**12**	**10**	**9**	**2**	**20**

Table G-41. Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 40 South						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	4	3	3	0	0	0
2	0	2	2	7	2	6
3	1	2	5	5	1	14
Basin Total	**4**	**14**	**13**	**12**	**3**	**29**

Table G-42. Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 43						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	5	8	2	2	0	4
2	7	8	4	3	0	3
3	3	9	5	5	0	14
Basin Total	**10**	**16**	**14**	**12**	**1**	**50**

Table G-43. Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 35						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	6	2	1	0	0	0
2	3	2	2	0	0	1
3	2	2	2	1	0	0
4	1	3	5	4	0	7
Basin Total	**11**	**13**	**11**	**12**	**1**	**31**

Table G-44. Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 42						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	3	3	0	0	0	0
2	6	4	0	0	0	0
3	4	4	0	0	0	1
4	1	3	3	5	0	5
5	1	1	0	0	0	0
Basin Total	**9**	**16**	**7**	**13**	**2**	**30**

Table G-45. Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 44						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	7	8	2	2	0	4
3	2	4	5	4	1	13
4	6	7	2	2	0	4
Basin Total	**7**	**13**	**9**	**8**	**1**	**36**

Table G-46. Pond 56 (Year 2 Post-Mastication) Number of Wetland Plants by Indicator Category by Stratum

Pond 56						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
2	1	0	0	0	0	0
3	2	3	1	0	0	0
4	5	5	0	0	0	0
5	3	4	0	1	0	2
Basin Total	**8**	**17**	**12**	**15**	**2**	**25**

Table G-47. Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 60						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	1	1	0	1	0	0
2	1	2	0	0	0	0
3	4	4	2	1	0	0
4	4	3	0	0	0	0
Basin Total	**7**	**10**	**8**	**6**	**1**	**14**

Table G-48. Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 61						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	10	6	1	0	0	4
3	6	7	2	0	0	3
4	4	7	5	4	1	12
Basin Total	**13**	**18**	**15**	**15**	**3**	**55**

Table G-49. Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 73						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	4	2	0	0	0	0
2	6	5	0	0	0	1
3	5	5	0	0	0	0
4	2	7	1	0	0	2
Basin Total	**10**	**14**	**11**	**7**	**1**	**19**

Table G-50. Machine Gun Flats (Year 2 Post-Mastication) Number of Wetland Plants by Indicator Category by Stratum

Machine Gun Flats						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
2	5	4	0	0	0	2
3	1	3	5	3	0	4
4	3	5	3	2	1	5
5	2	3	0	1	0	1
6	3	4	0	0	0	1
7	2	7	5	2	0	7
8	1	4	4	2	0	5
9	2	3	5	3	1	5
Basin Total	**9**	**27**	**18**	**25**	**2**	**50**

Table G-51. Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 16						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	2	2	0	2	0	1
3	1	2	0	1	0	0
4	2	6	3	6	0	3
5	0	2	1	2	0	0
6	1	2	1	1	0	1
7	2	1	1	1	0	0
Basin Total	**7**	**13**	**16**	**16**	**3**	**28**

Table G-52. Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 54						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	7	5	0	0	0	1
2	6	6	1	0	0	0
3	4	6	2	3	1	4
4	0	1	5	5	1	8
Basin Total	**11**	**21**	**13**	**12**	**1**	**21**

Table G-53. Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 72						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	5	5	1	0	0	0
2	4	9	1	0	0	1
3	2	3	2	0	0	2
Basin Total	**10**	**20**	**9**	**6**	**2**	**15**

Table G-54. Wetland Plants by Indicator Category within Entire Vernal Pool Basin at Vernal Pools Monitored in 2019

Number of Wetland Plants Observed at Vernal Pools Monitored in 2019							
Vernal Pool	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**	**Total**
5	11	18	13	15	2	35	94
101 East (East)	5	18	13	13	4	31	84
997	11	13	10	15	1	32	82
14	5	11	14	9	2	26	67
17	12	15	11	13	3	27	81
21	9	16	12	8	0	14	59
103	0	1	3	8	0	24	36
101 East (West)	10	19	13	14	3	26	85
101 West	13	14	13	9	3	22	74
41	9	15	12	13	2	24	75
3 North	14	18	16	10	3	28	89
3 South	10	22	16	16	3	38	105
39	9	17	15	15	3	39	98
40 North	6	12	10	9	2	20	59
40 South	4	14	13	12	3	29	75
43	10	16	14	12	1	50	103
35	11	13	11	12	1	31	79
42	9	16	7	13	2	30	77
44	7	13	9	8	1	36	74
56	8	17	12	15	2	25	79
60	7	10	8	6	1	14	46
61	13	18	15	15	3	55	119
73	10	14	11	7	1	19	62
Machine Gun Flats	9	27	18	25	2	50	131
16	7	13	16	16	3	28	83
54	11	21	13	12	1	21	79
72	10	20	9	6	2	15	62

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APPENDIX H

Species Composition of Follow-Up Wetland Vegetation Monitoring by Vernal Pool

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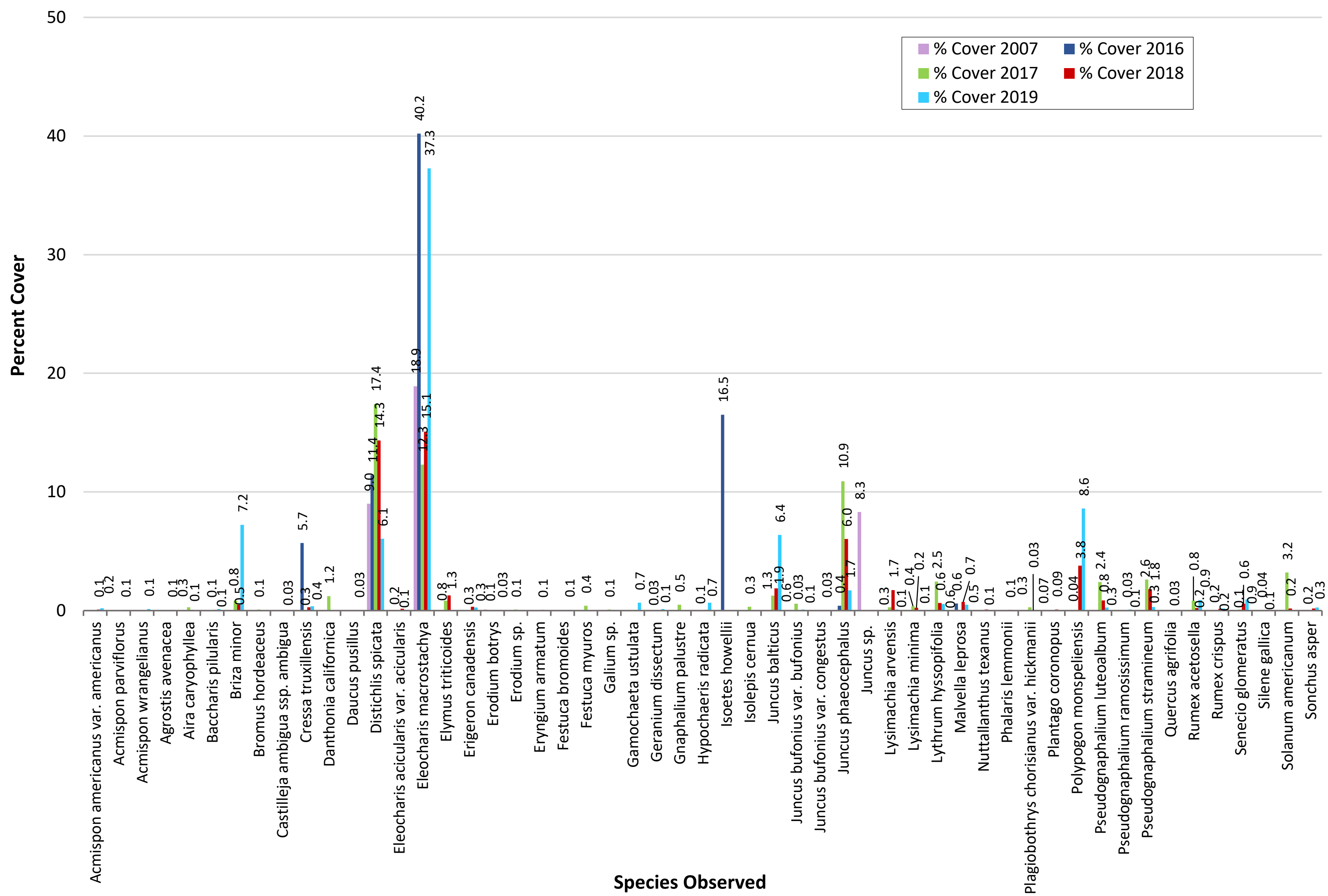


Figure H-1. Comparison Graph of Percent Cover by Wetland Plant Species for 2007, 2016, 2017, 2018, and 2019 at Pond 5 (Reference)

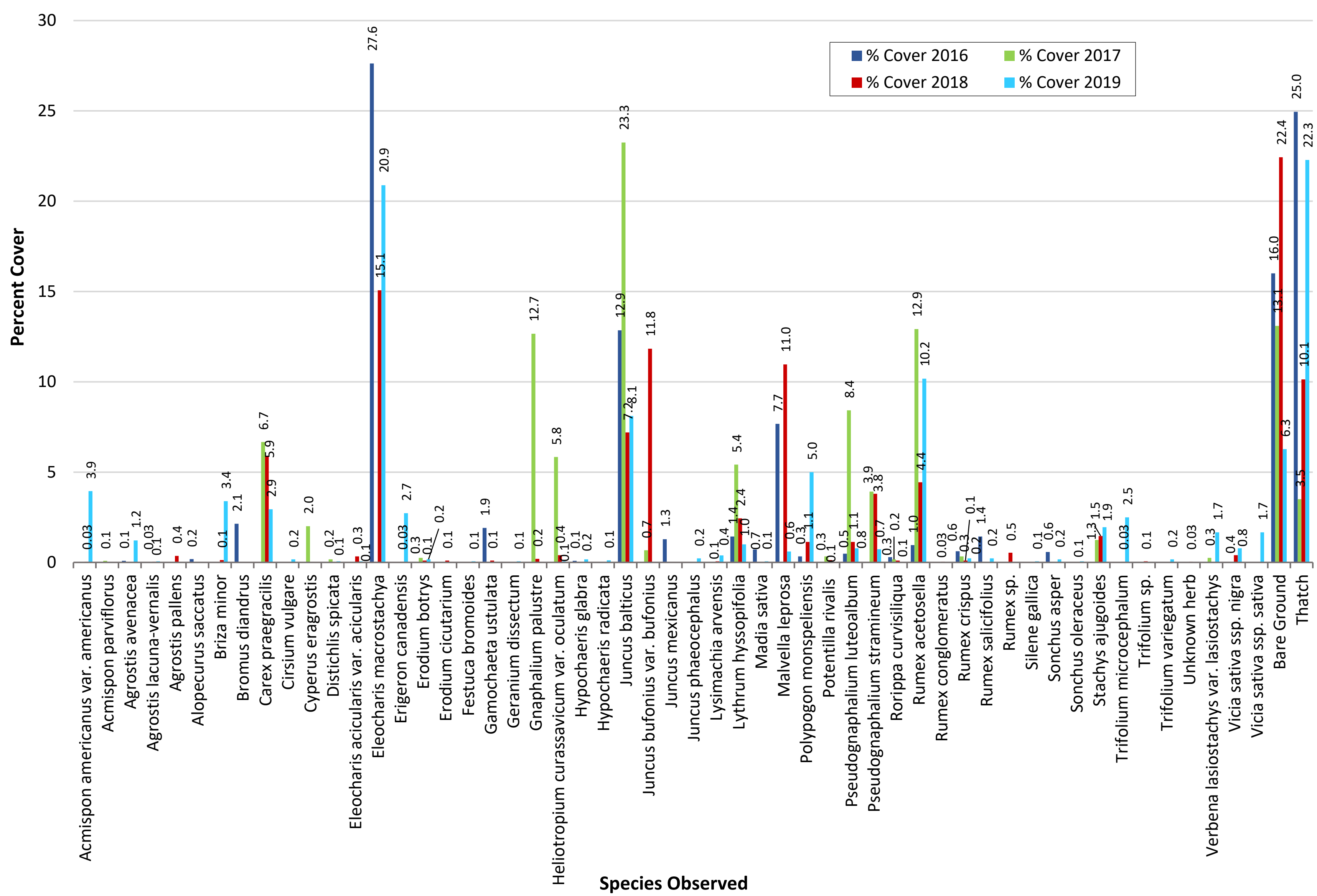


Figure H-2. Comparison Graph of Percent Cover by Wetland Plant Species for 2016, 2017, 2018, and 2019 at Pond 101 East (East) (Reference)

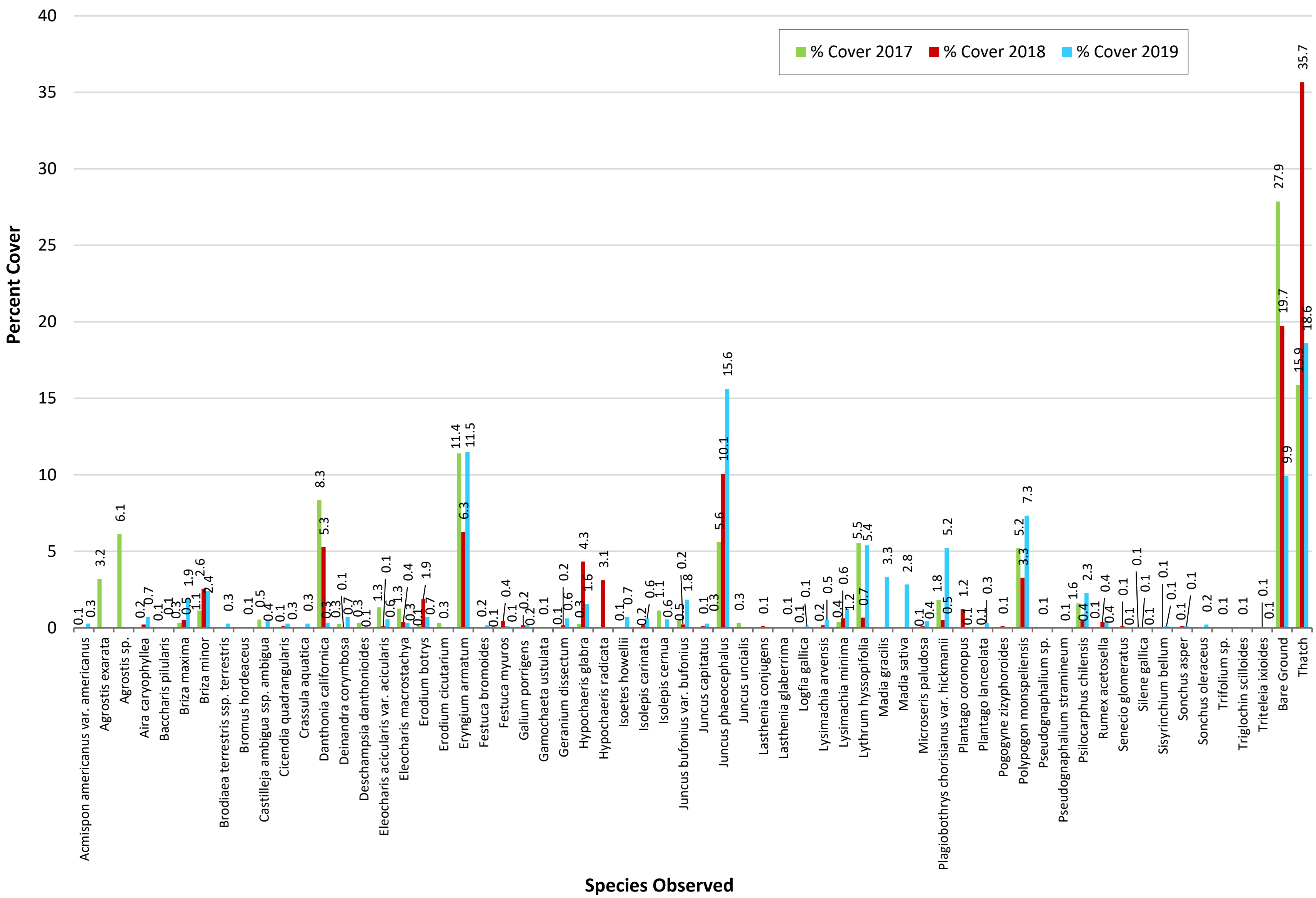


Figure H-3. Comparison Graph of Percent Cover by Wetland Plant Species for 2017, 2018, and 2019 at Pond 997 (Reference)

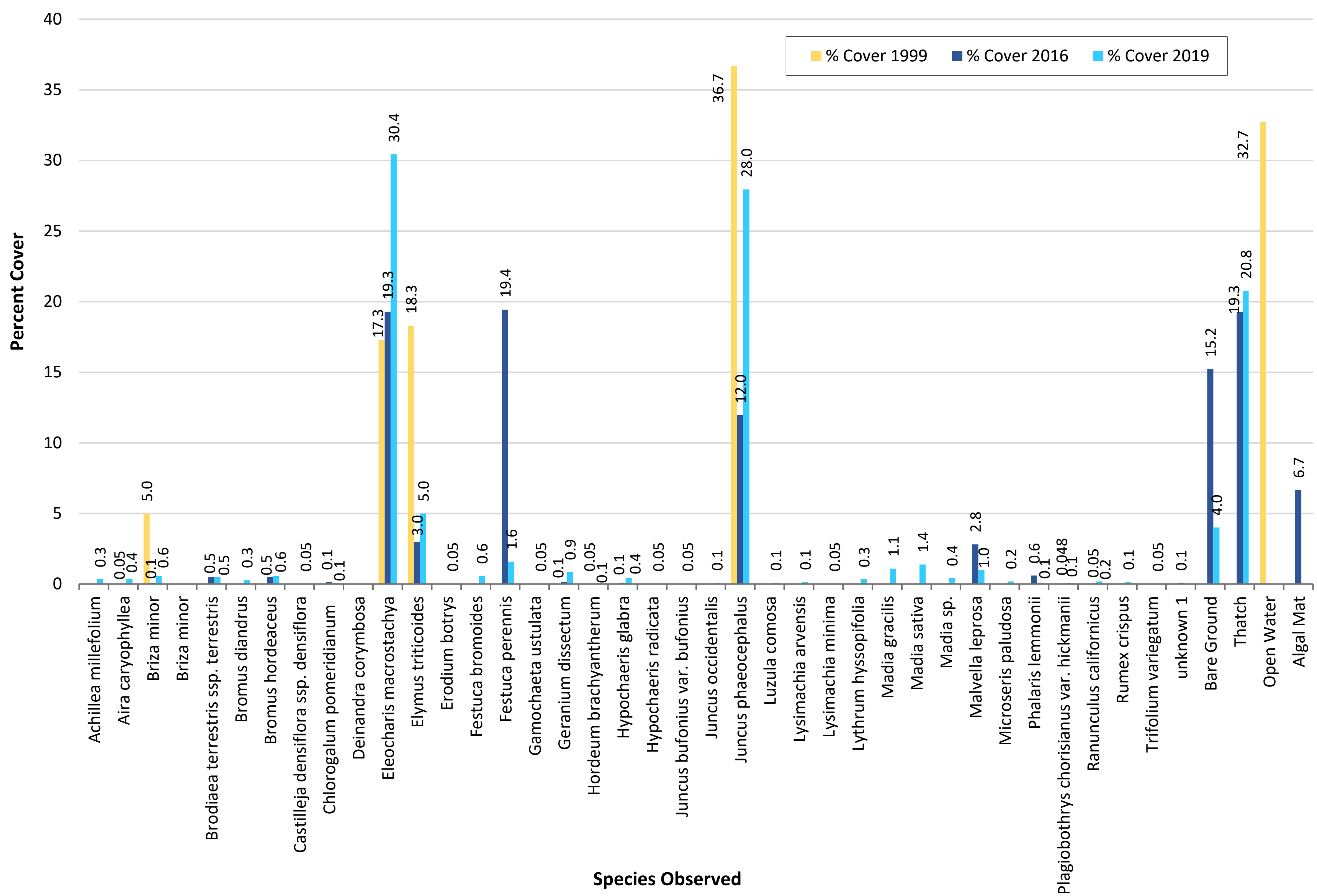


Figure H-4. Comparison Graph of Percent Cover by Wetland Plant Species for 1999, 2016, and 2019 at Pond 14 (Baseline)

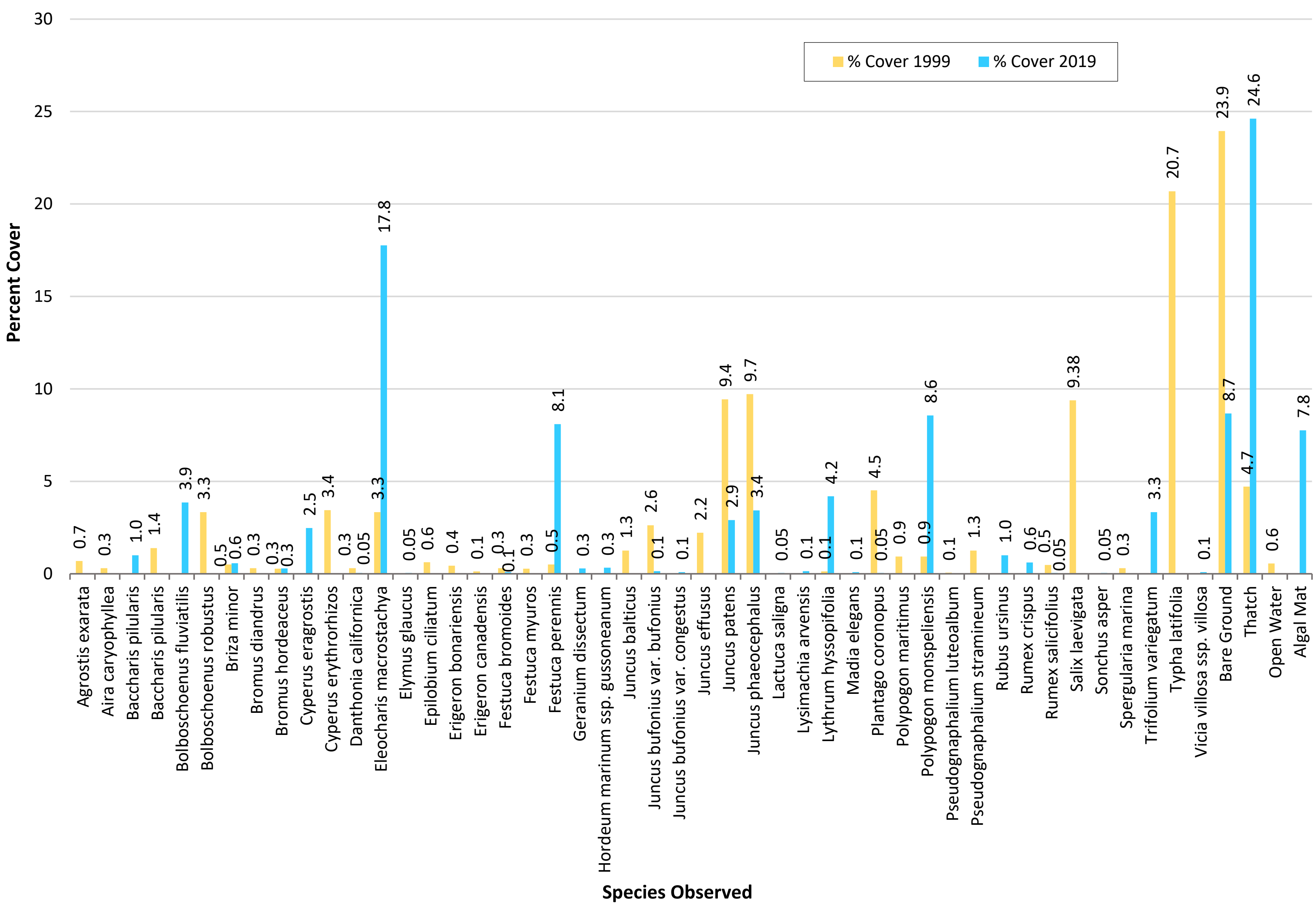


Figure H-5. Comparison Graph of Percent Cover by Wetland Plant Species for 1999 and 2019 at Pond 17 (Baseline)

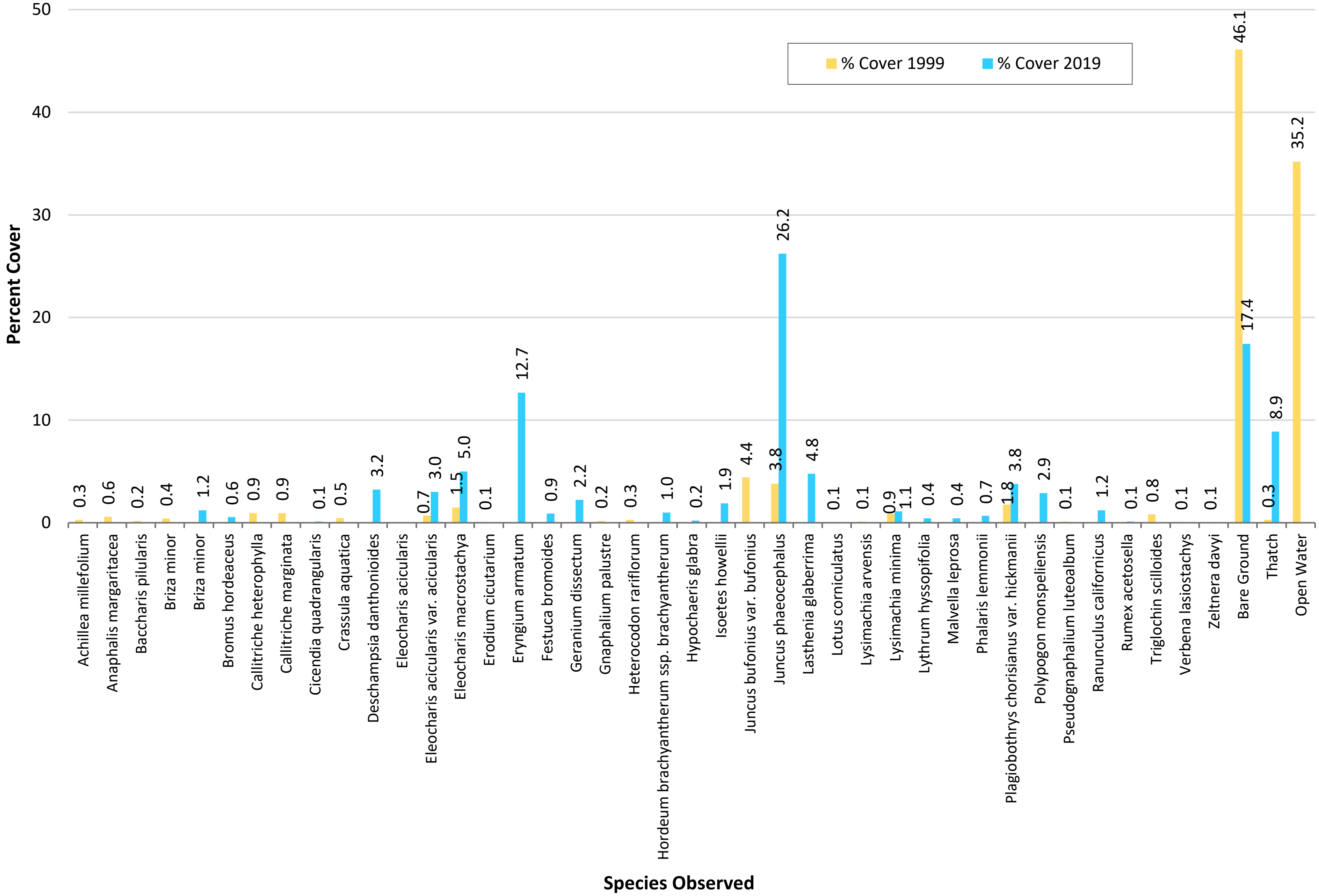


Figure H-6. Comparison Graph of Percent Cover by Wetland Plant Species for 1999 and 2019 at Pond 21 (Baseline)

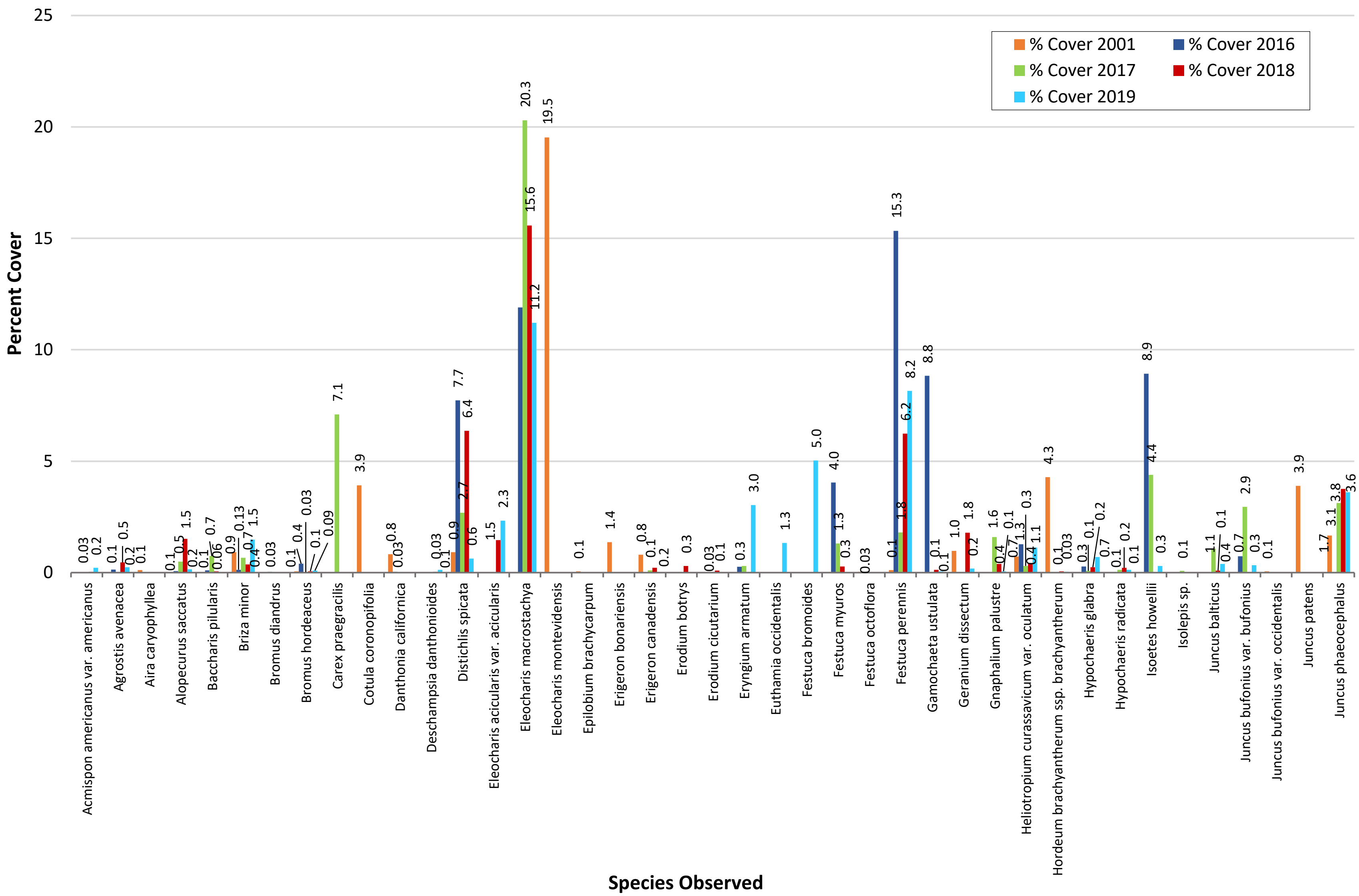


Figure H-7. Comparison Graph of Percent Cover by Wetland Plant Species for 2001, 2016, 2017, 2018, and 2019 at Pond 101 East (West) (Year 1 Post-Mastication)

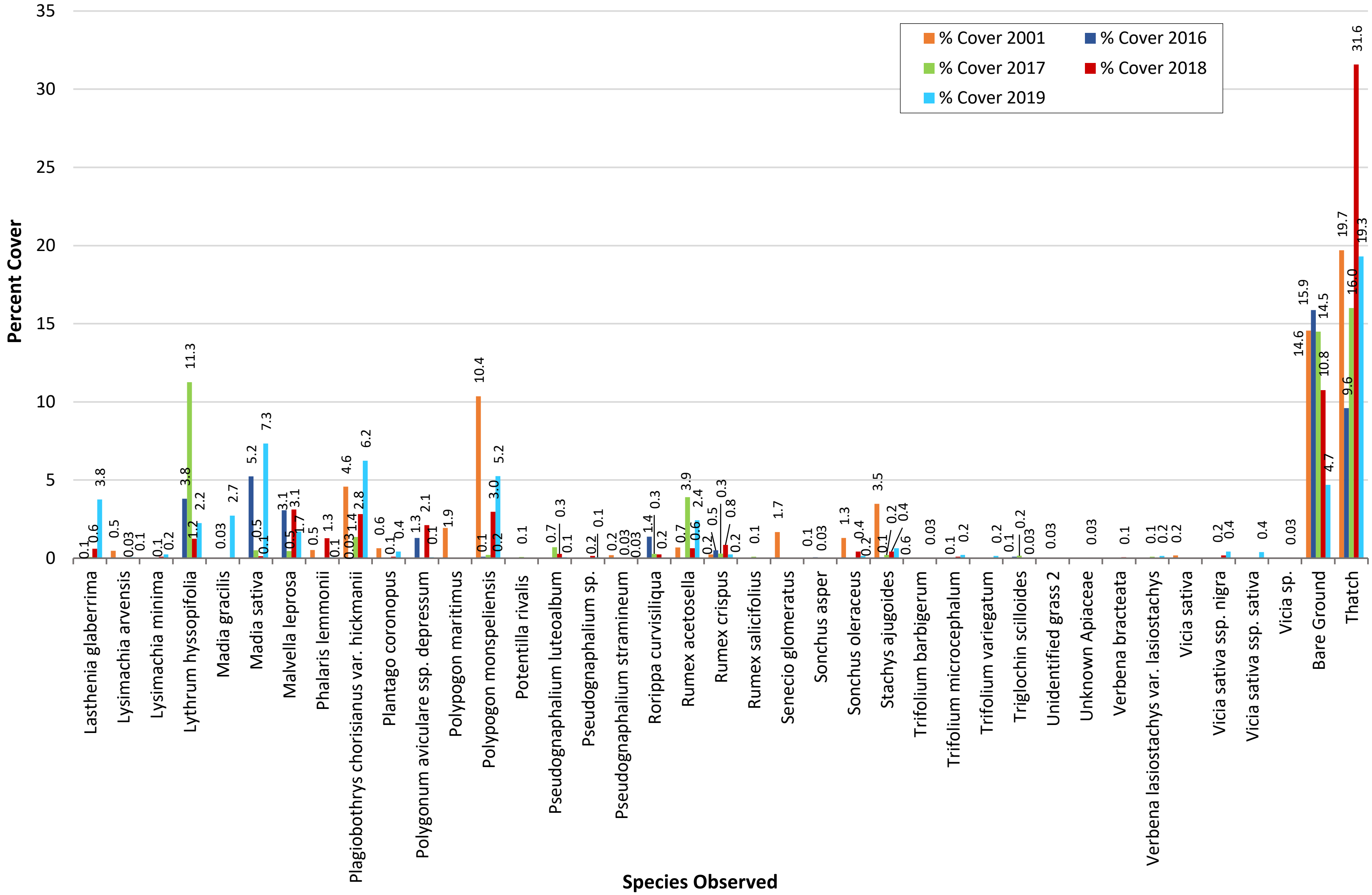


Figure H-7 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 2001, 2016, 2017, 2018, and 2019 at Pond 101 East (West) (Year 1 Post-Mastication)

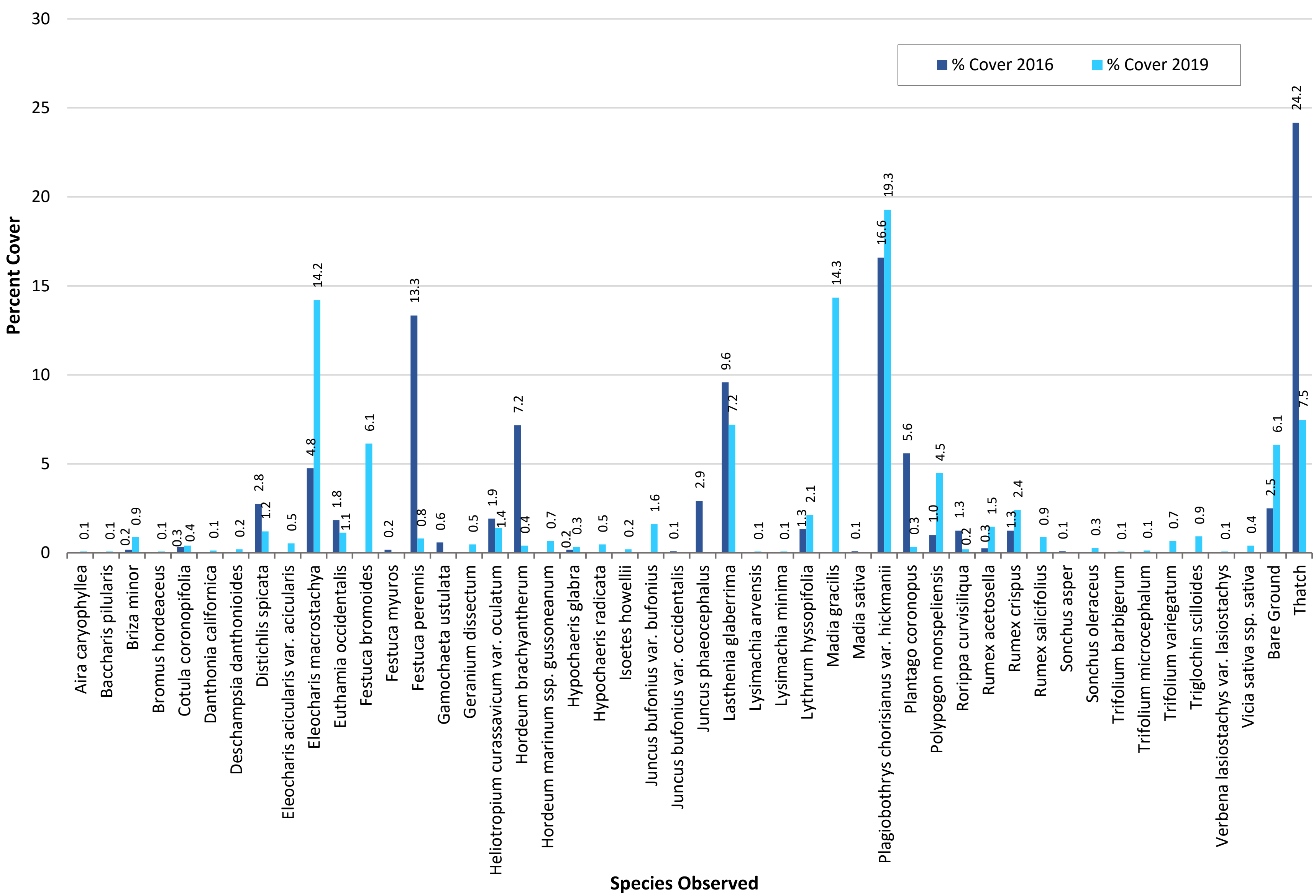


Figure H-8. Comparison Graph of Percent Cover by Wetland Plant Species for 2016 and 2019 at Pond 101 West (Year 1 Post-Mastication)

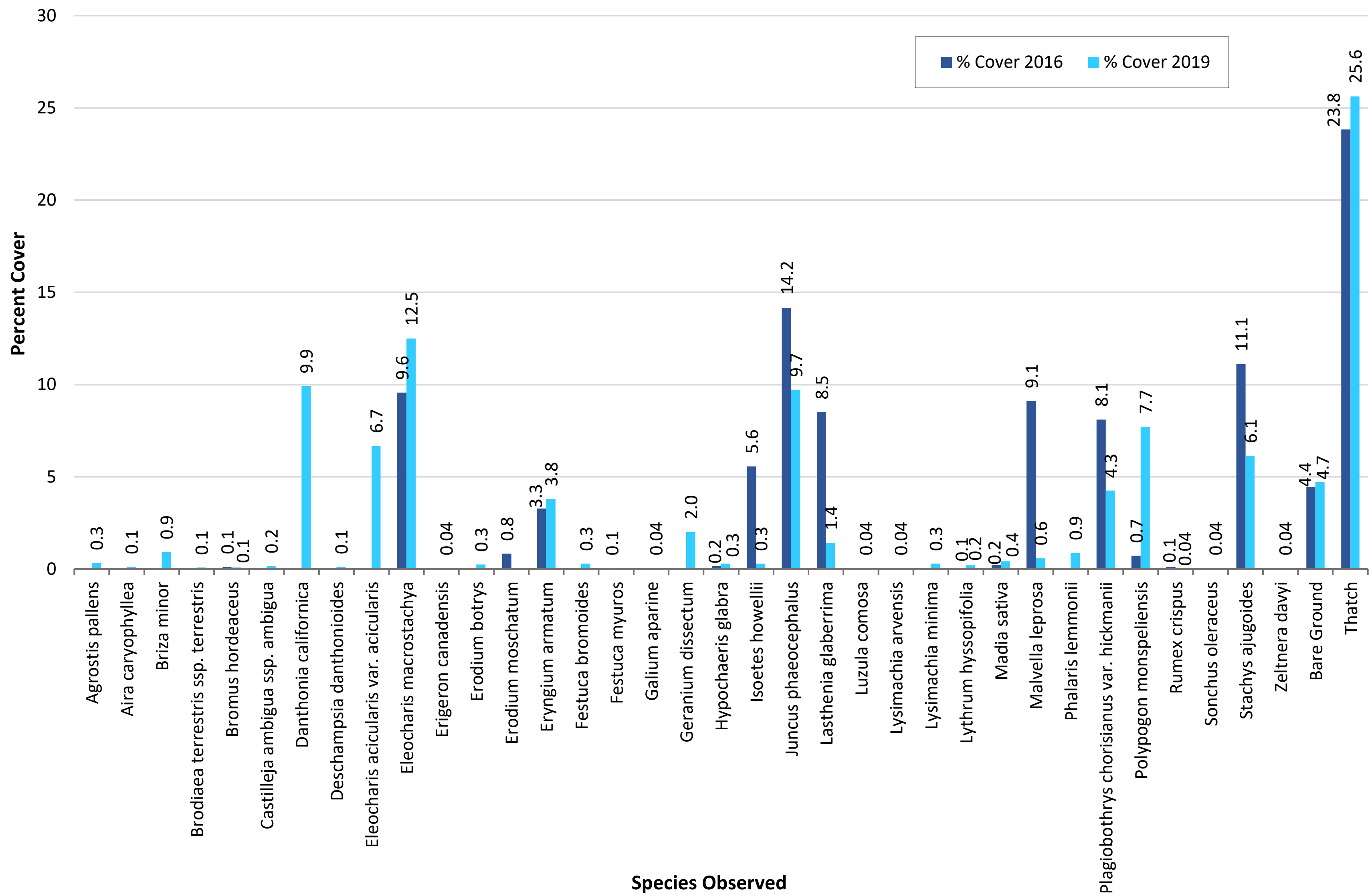


Figure H-9. Comparison Graph of Percent Cover by Wetland Plant Species for 2016 and 2019 at Pond 41 (Year 1 Post-Subsurface Munitions Remediation)

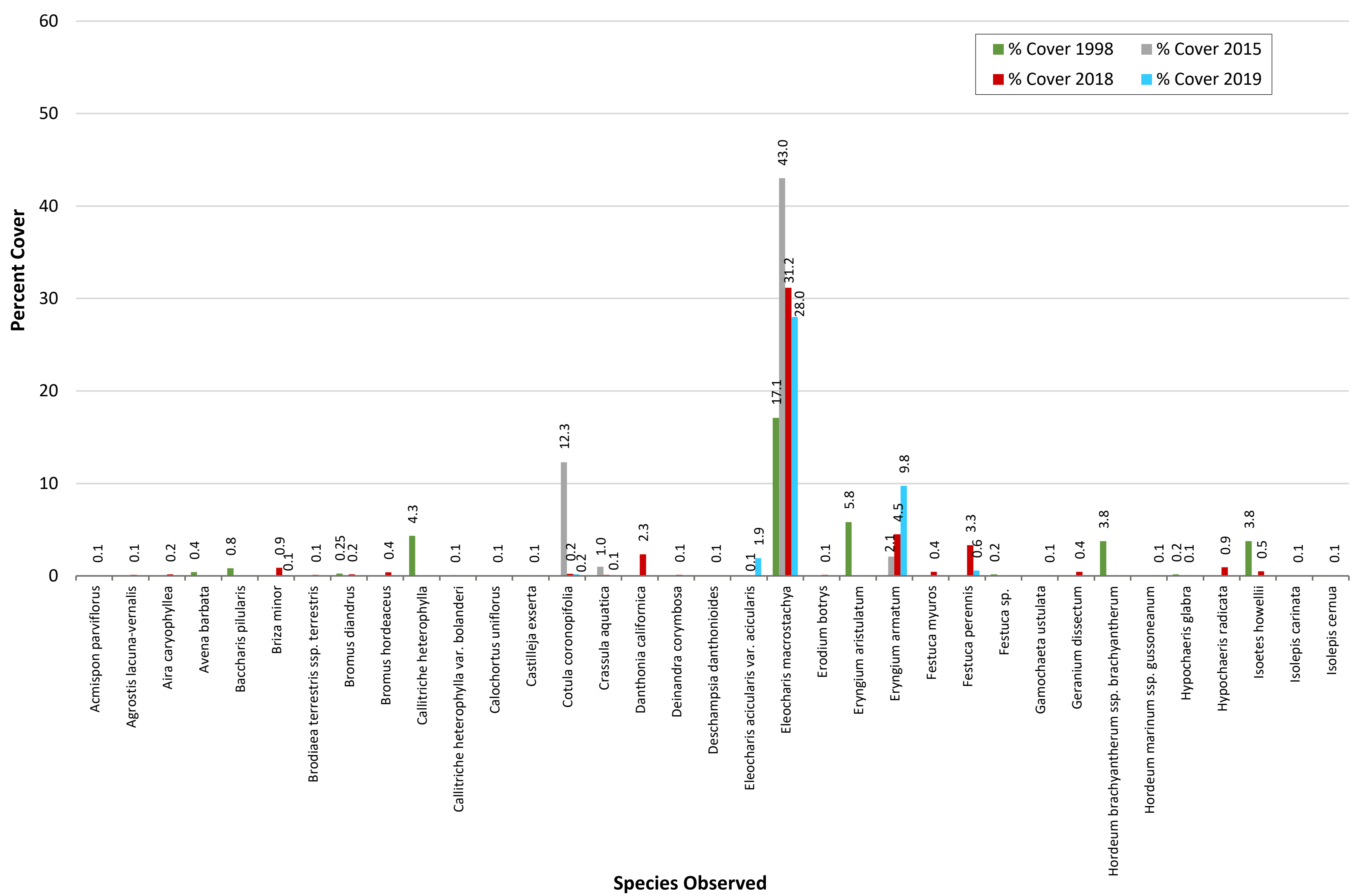


Figure H-10. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2015, 2018, and 2019 at Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation)

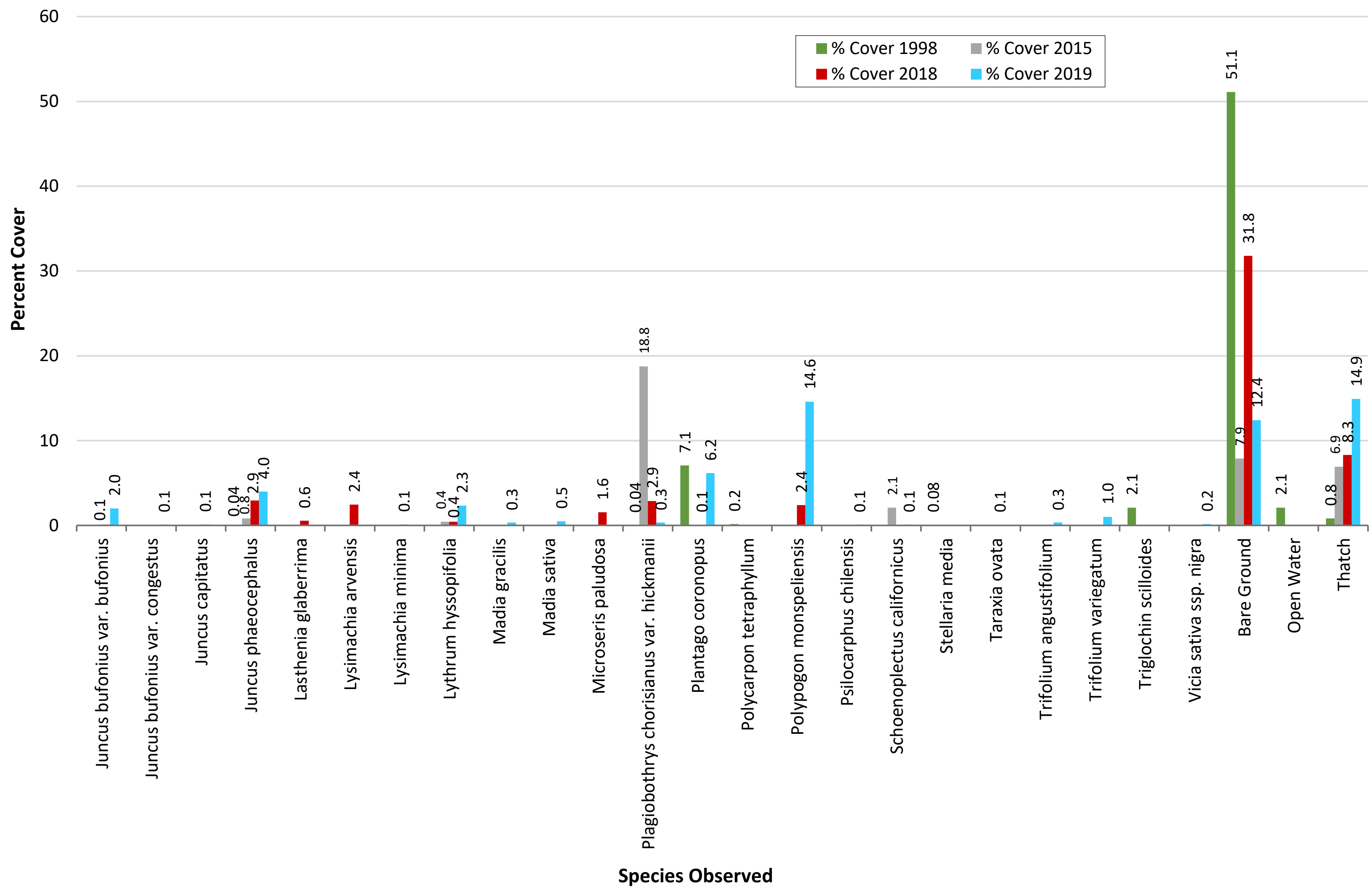


Figure H-1011 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2015, 2018, and 2019 at Pond 3 North (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation)

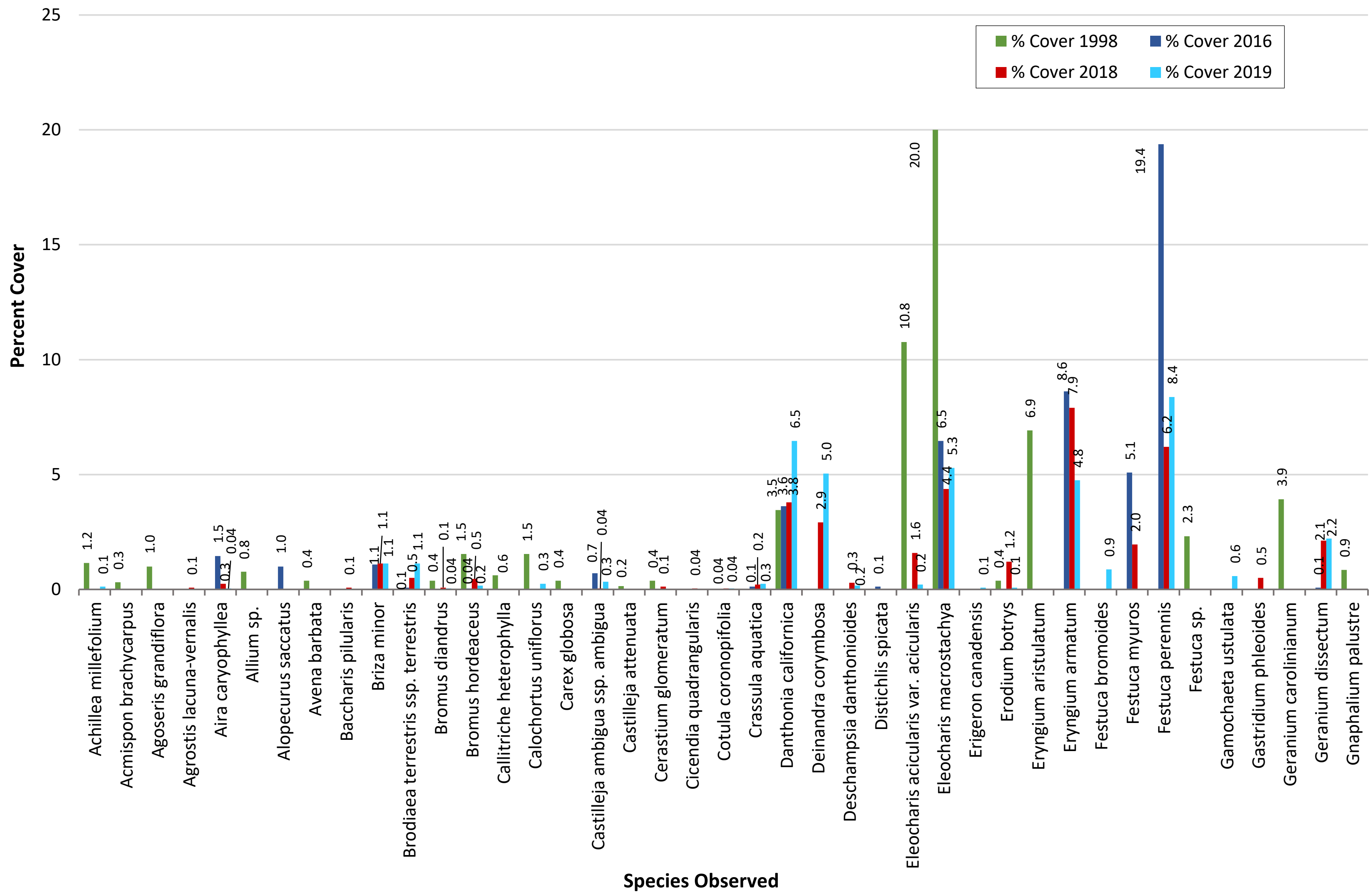


Figure H-11. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, and 2019 at Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation)

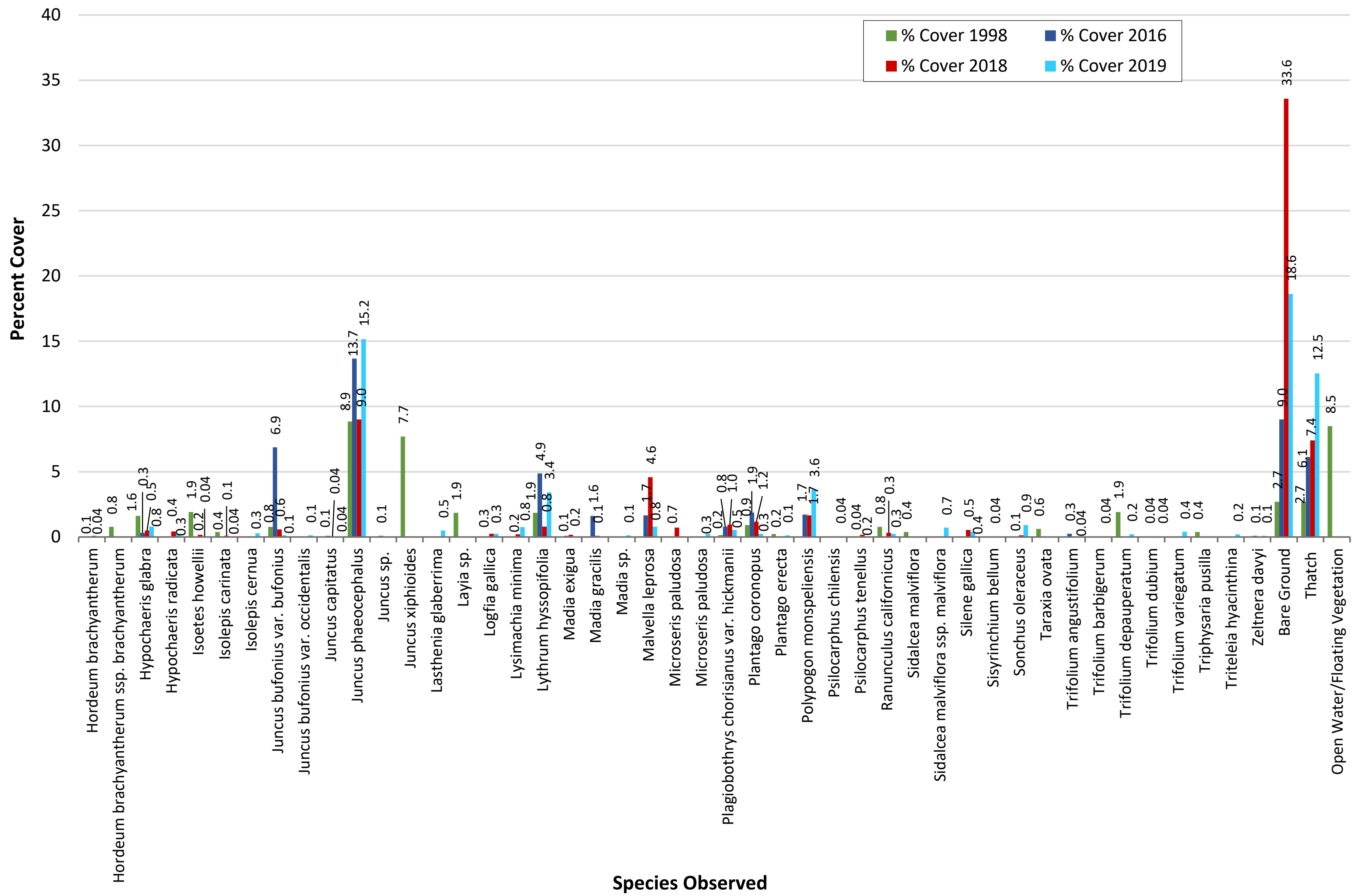


Figure H-11 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, and 2019 at Pond 3 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation)

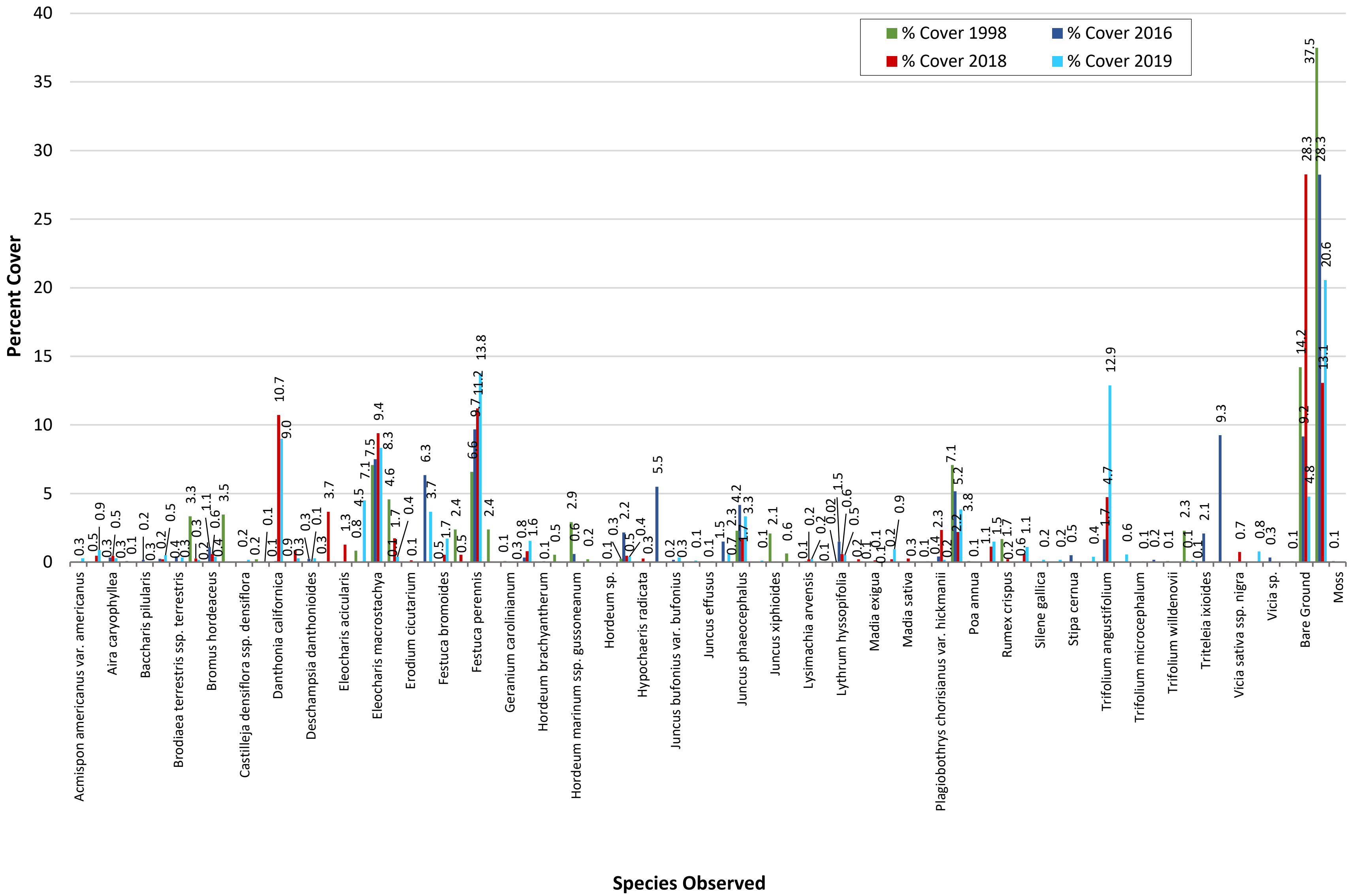


Figure H-12. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, and 2019 at Pond 39 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation)

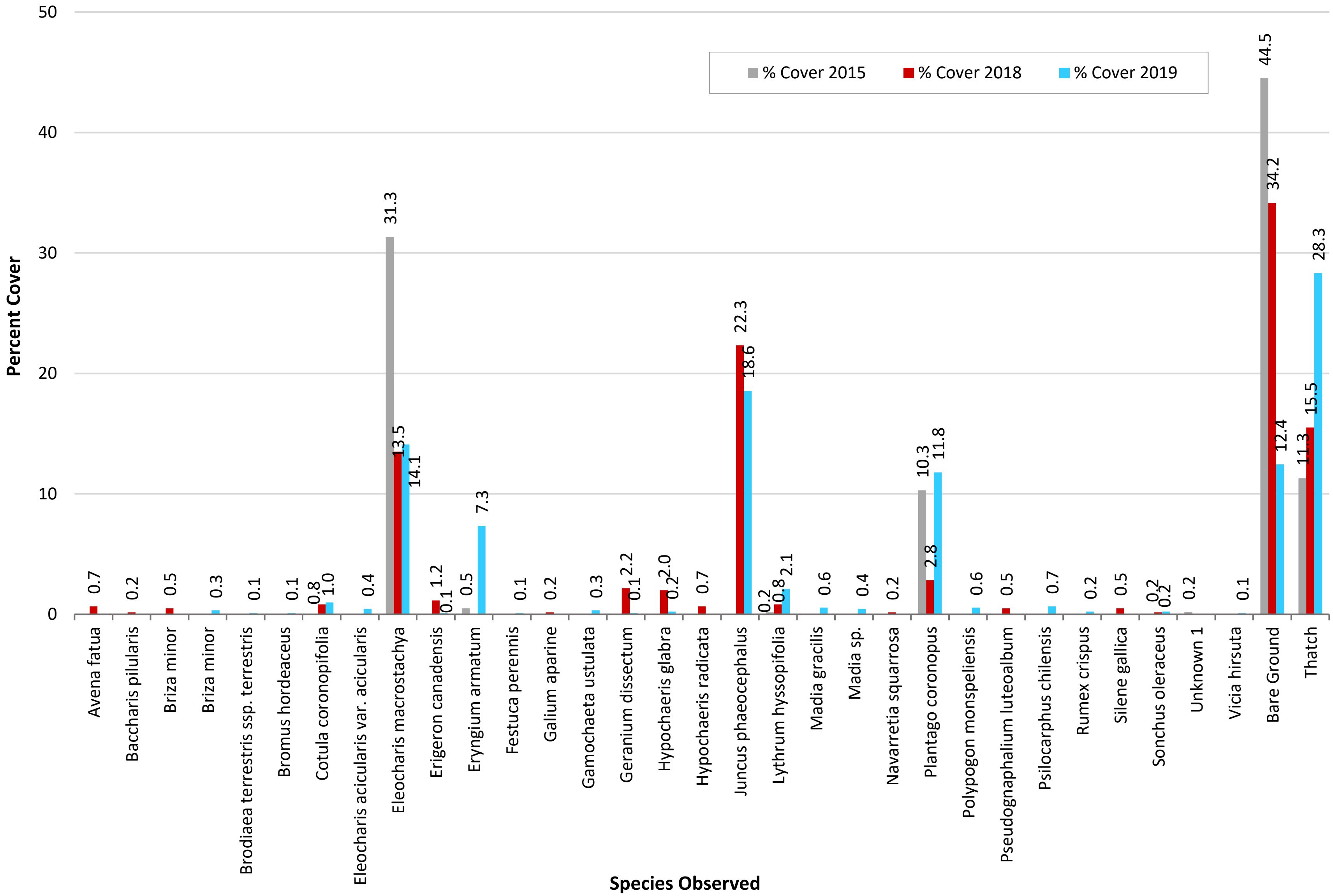


Figure H-13. Comparison Graph of Percent Cover by Wetland Plant Species for 2015, 2018, and 2019 at Pond 40 North (Year 2 Post-Burn)

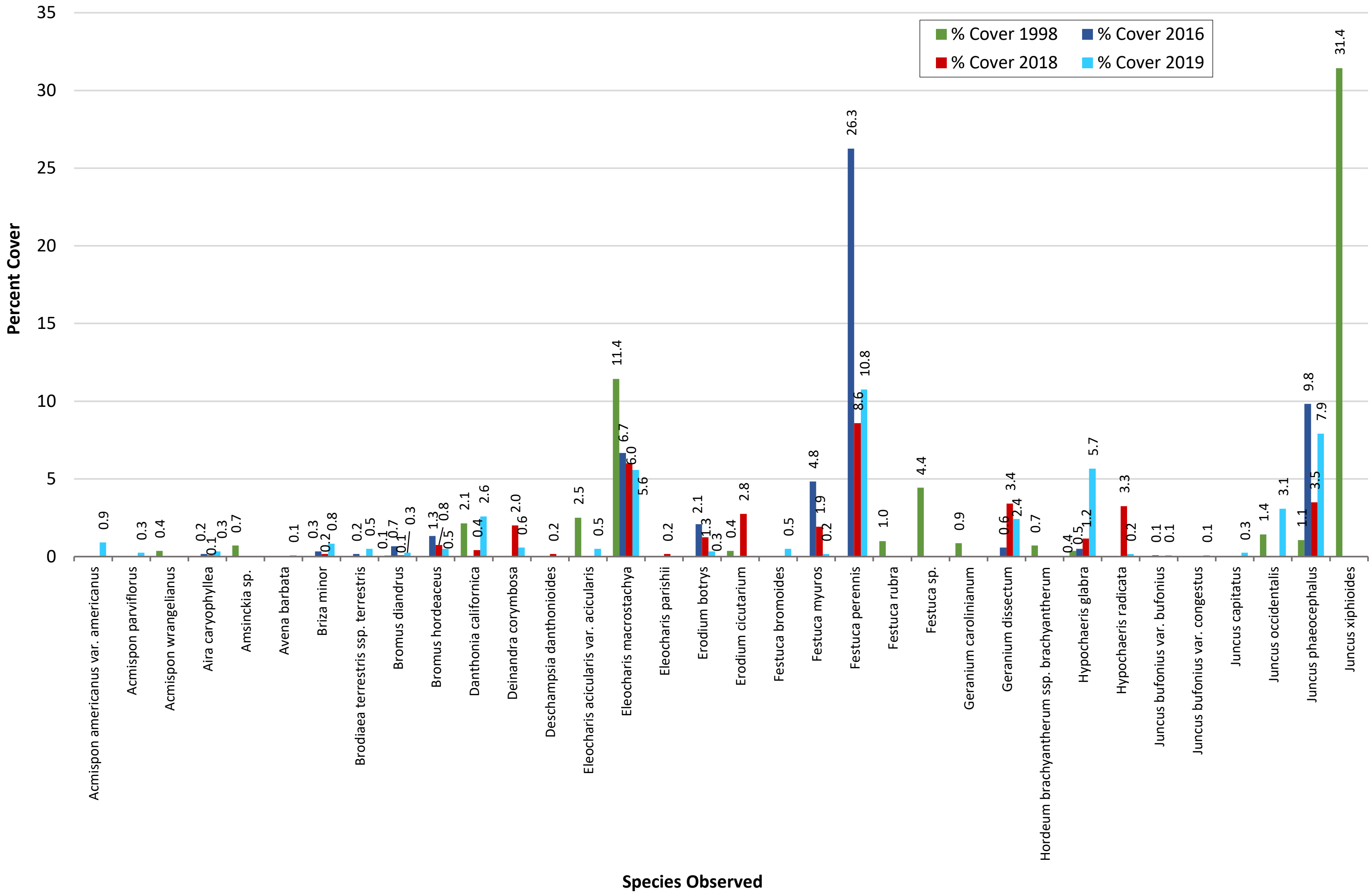


Figure H-14. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, and 2019 at Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation)

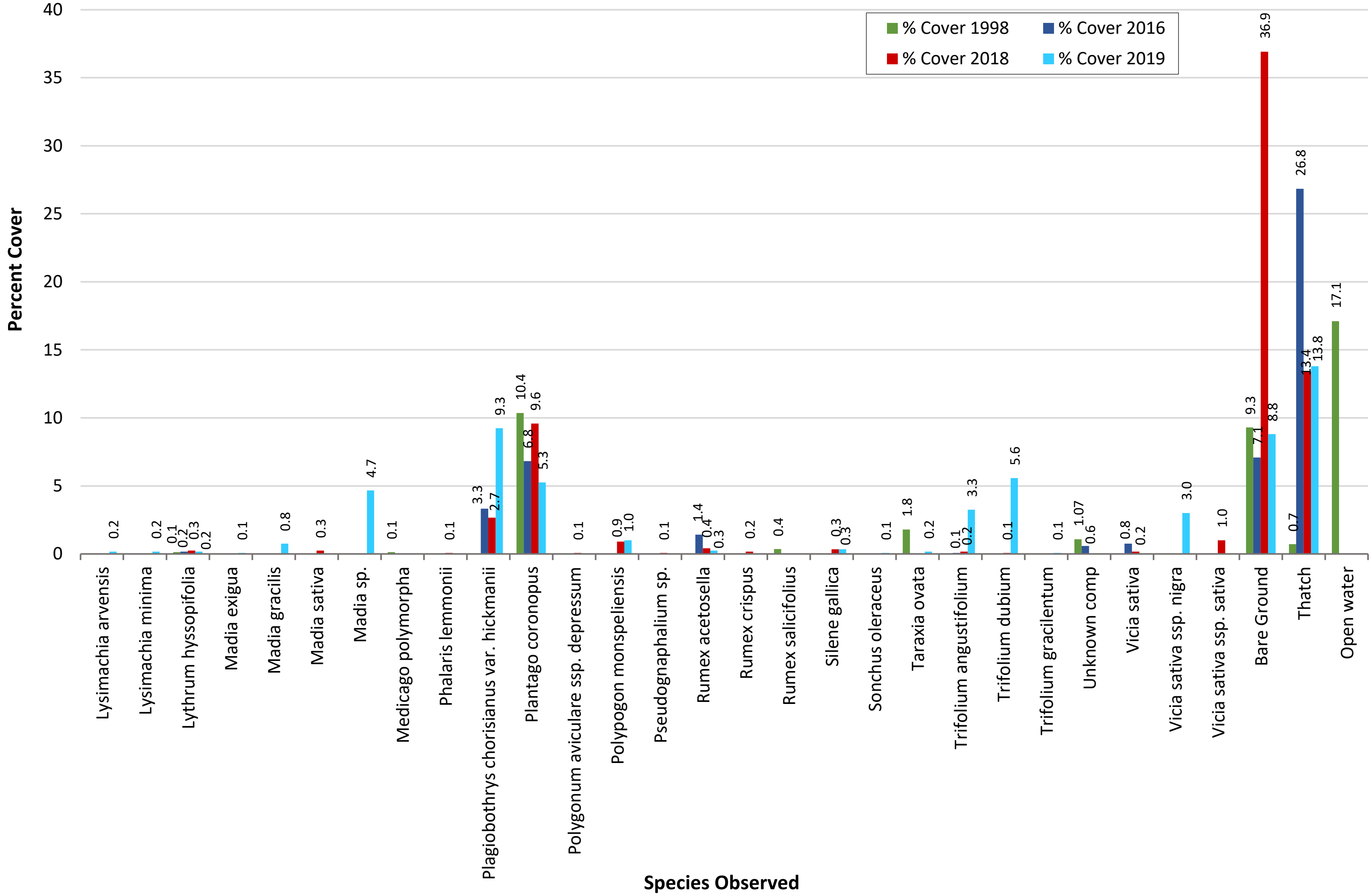
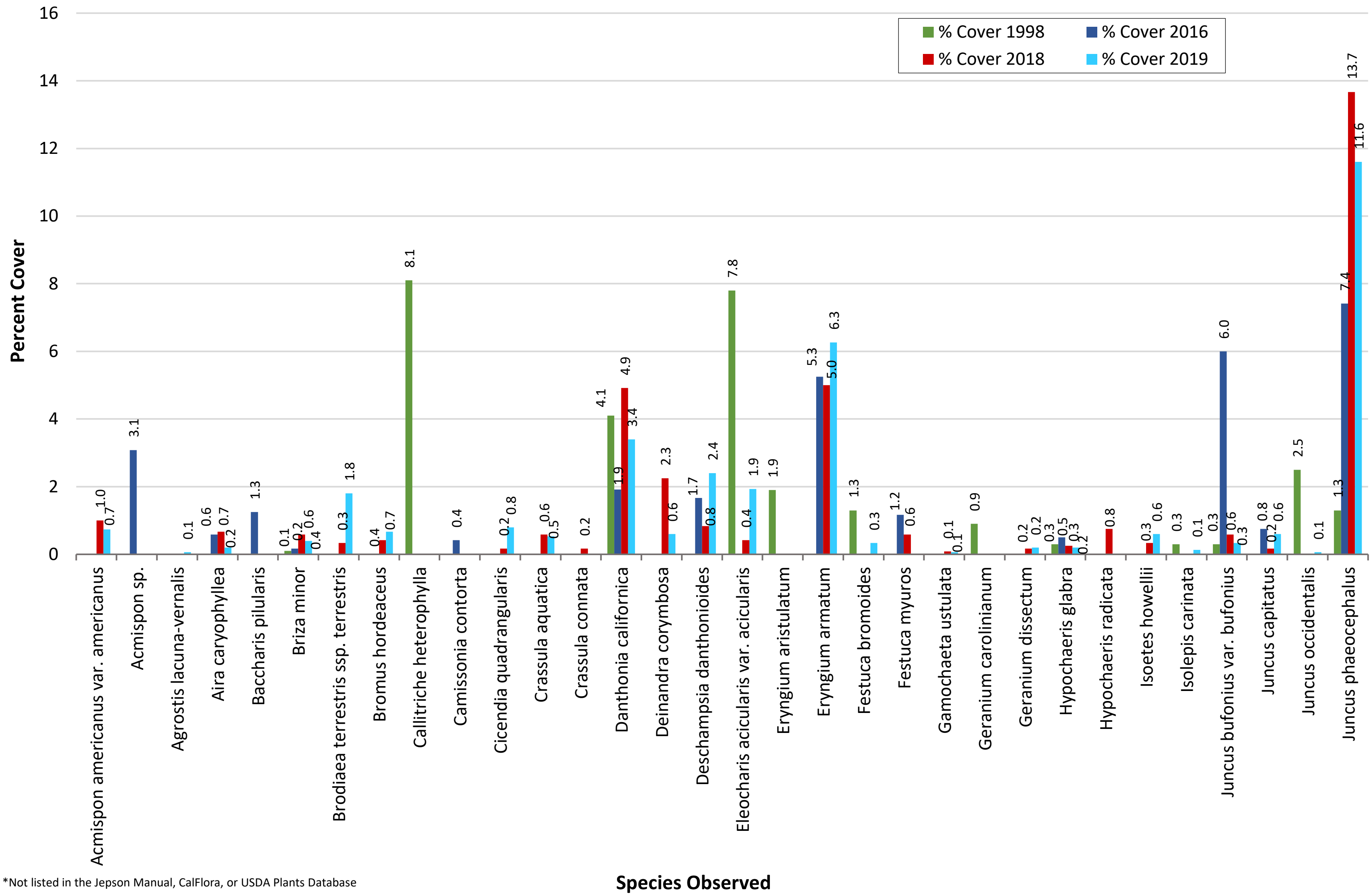


Figure H-14 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, and 2019 at Pond 40 South (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation)



*Not listed in the Jepson Manual, CalFlora, or USDA Plants Database

Figure H-15. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, and 2019 at Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation)

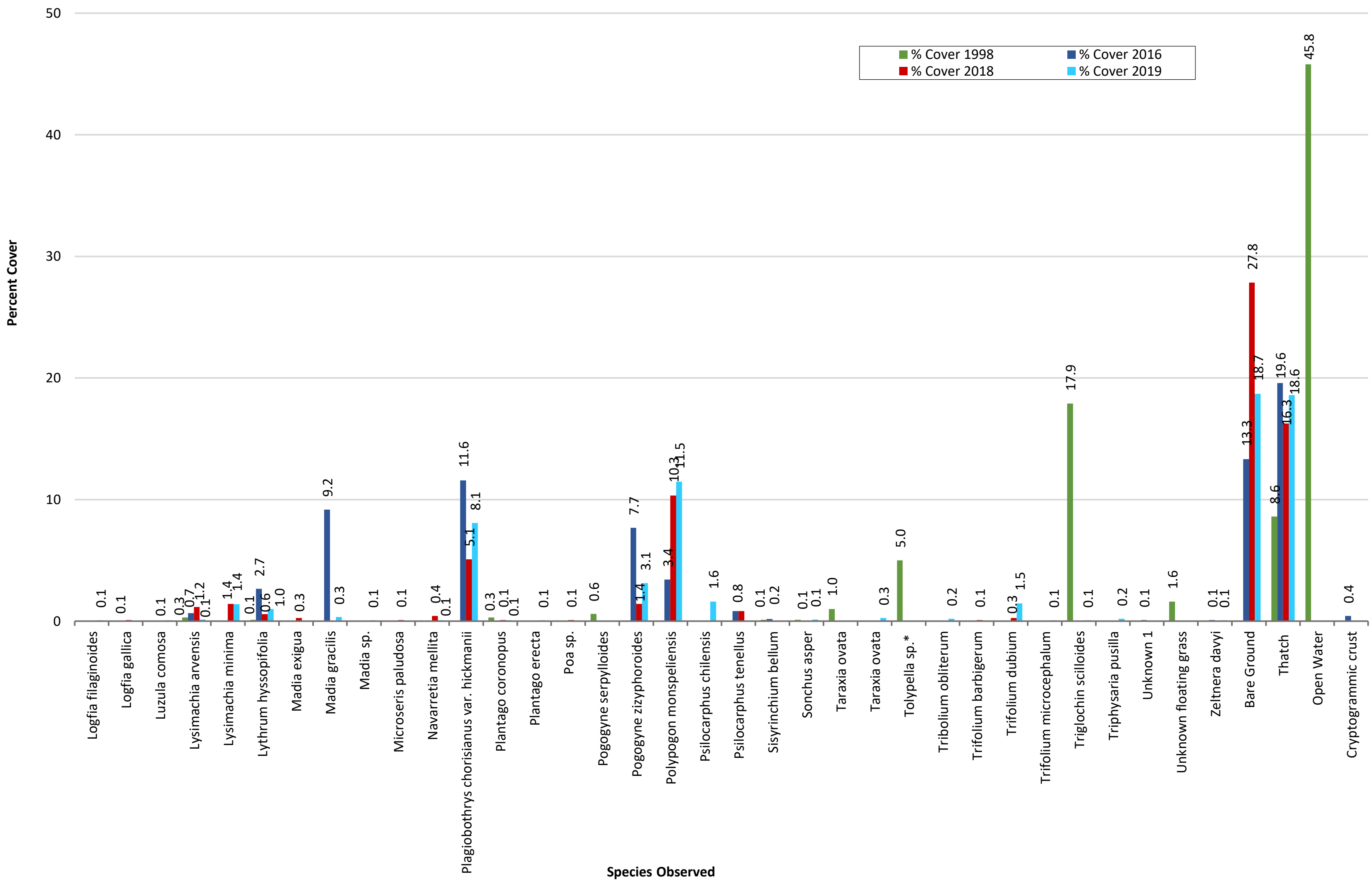


Figure H-15 (continued)16. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, and 2019 at Pond 43 (Year 2 Post-Burn, Year 1 Post-Subsurface Munitions Remediation)

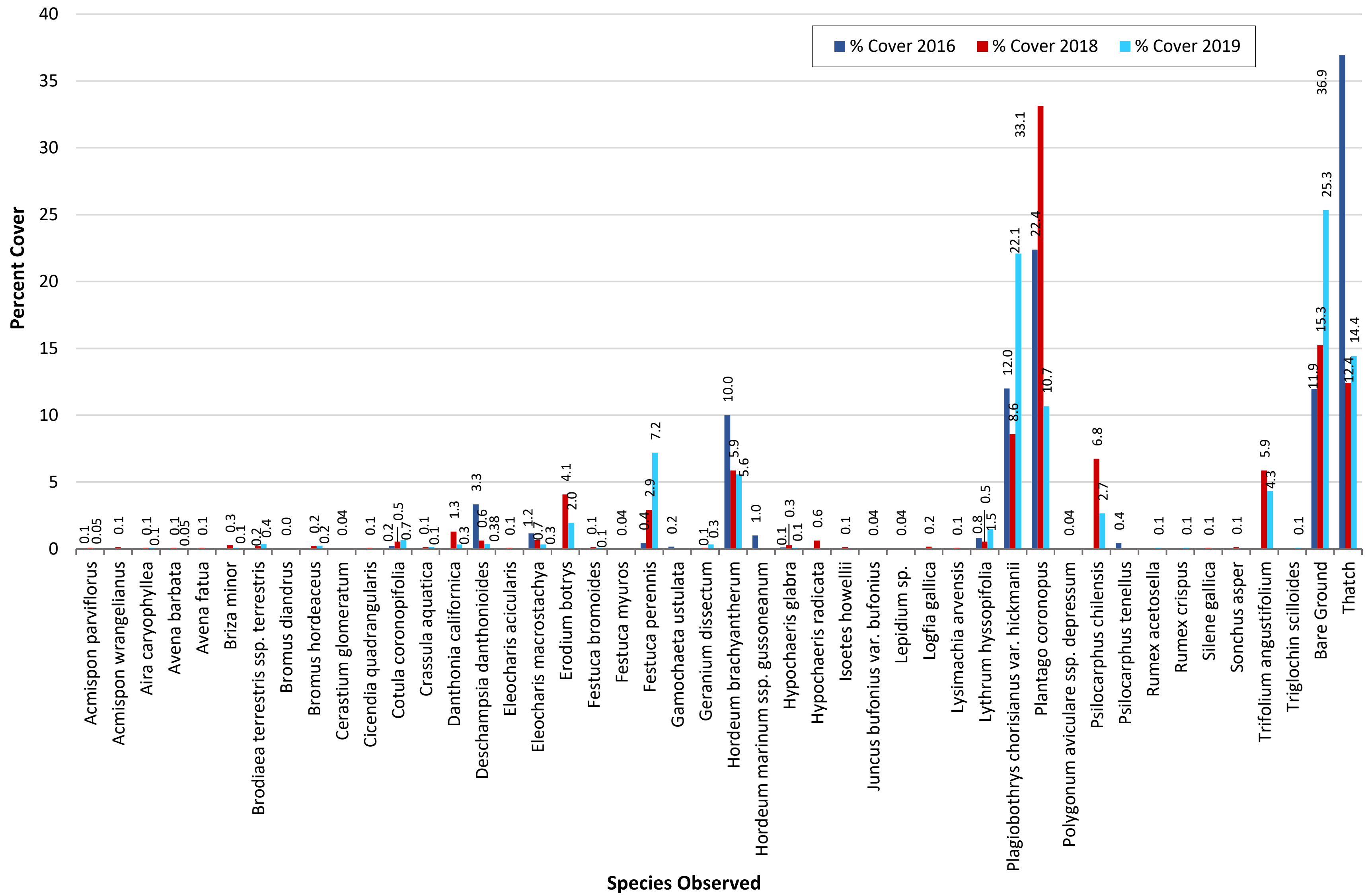


Figure H-16. Comparison Graph of Percent Cover by Wetland Plant Species for 2016, 2018, and 2019 at Pond 35 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation)

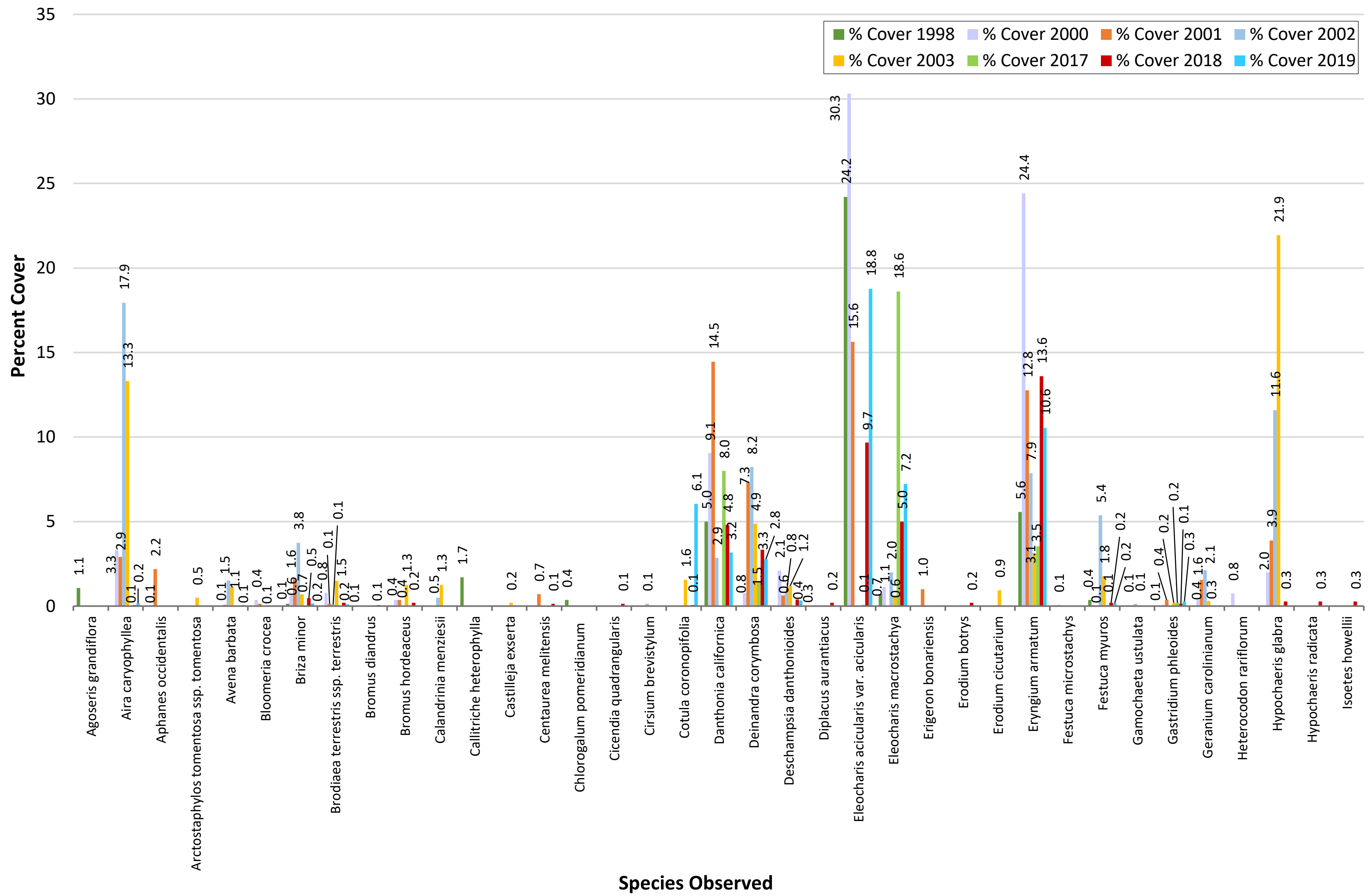
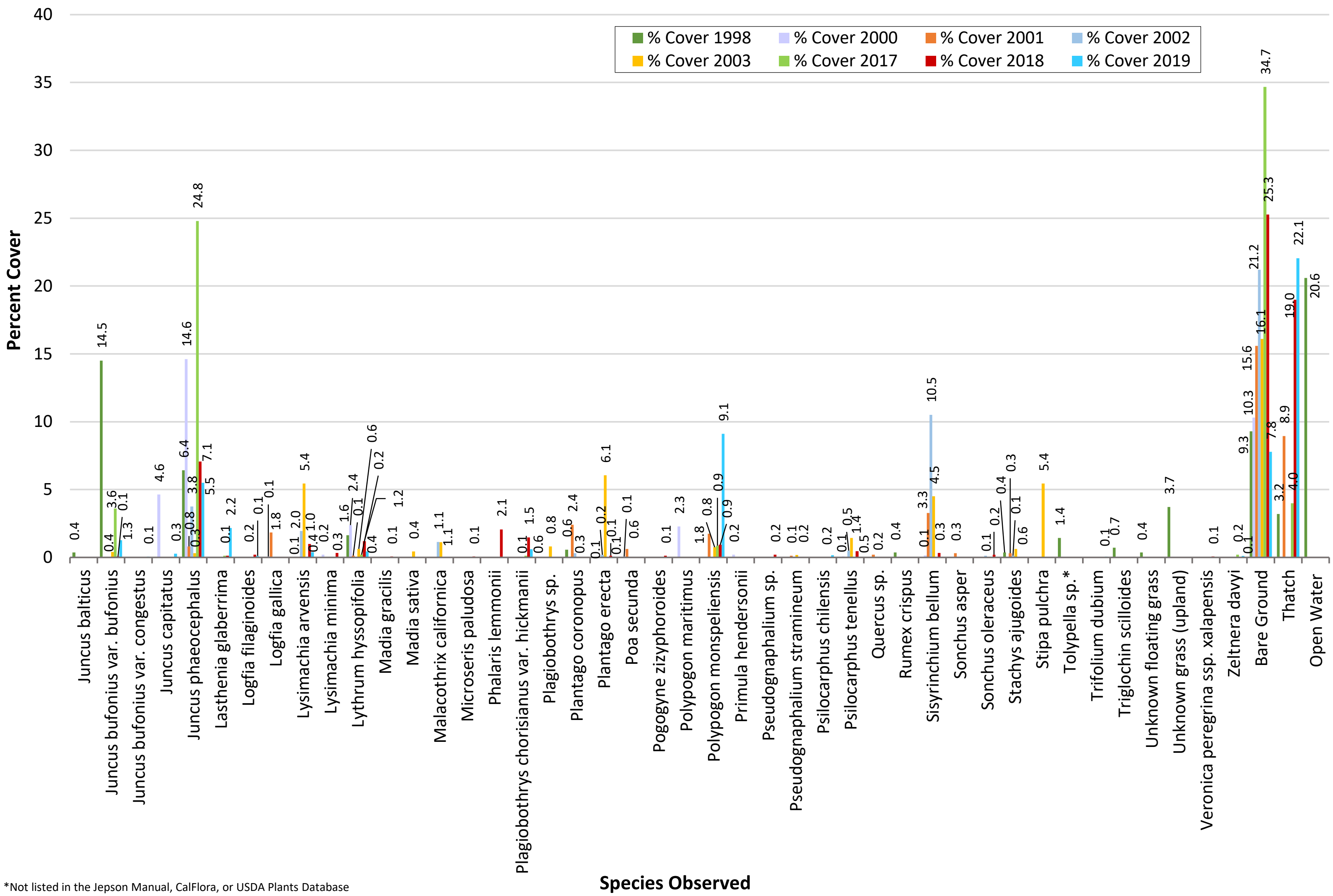


Figure H-17. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2000, 2001, 2002, 2003, 2017, 2018, and 2019 at Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation)



*Not listed in the Jepson Manual, CalFlora, or USDA Plants Database

Figure H-17 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2000, 2001, 2002, 2003, 2017, 2018, and 2019 at Pond 42 (Year 2 Post-Mastication and Post-Burn, Year 1 Post-Subsurface Munitions Remediation)

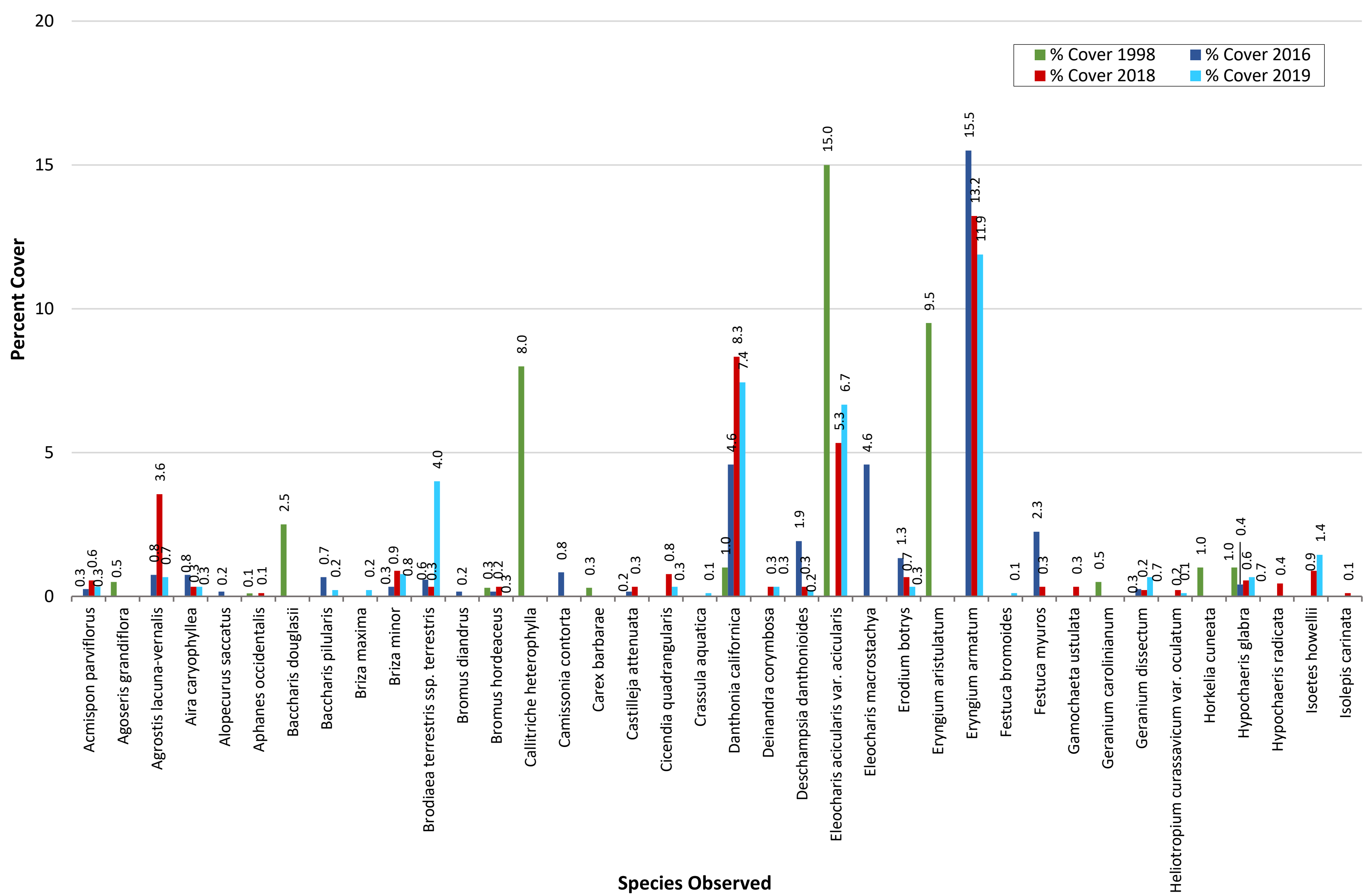


Figure H-18. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, and 2019 at Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation)

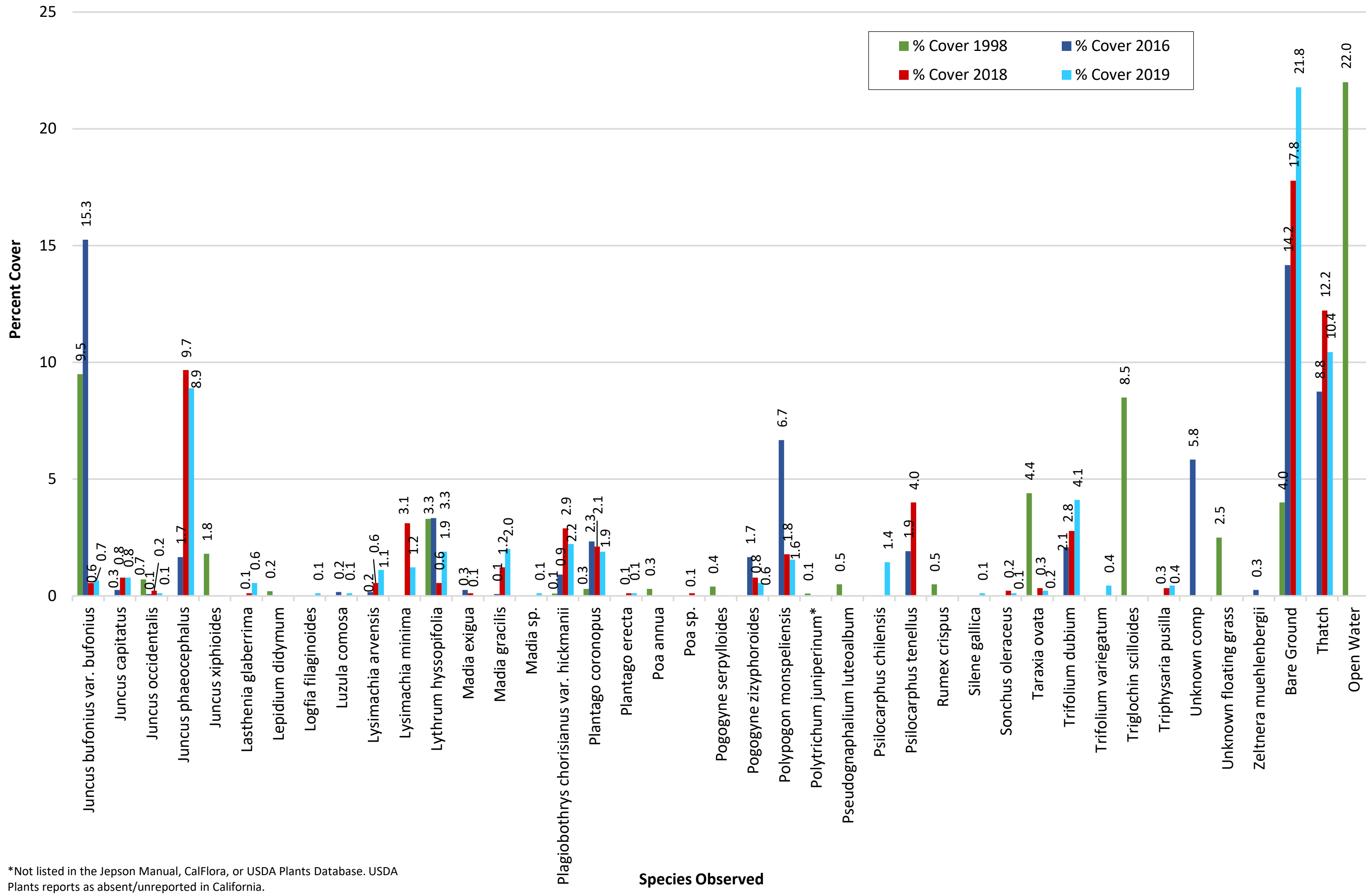


Figure H-18 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, and 2019 at Pond 44 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation)

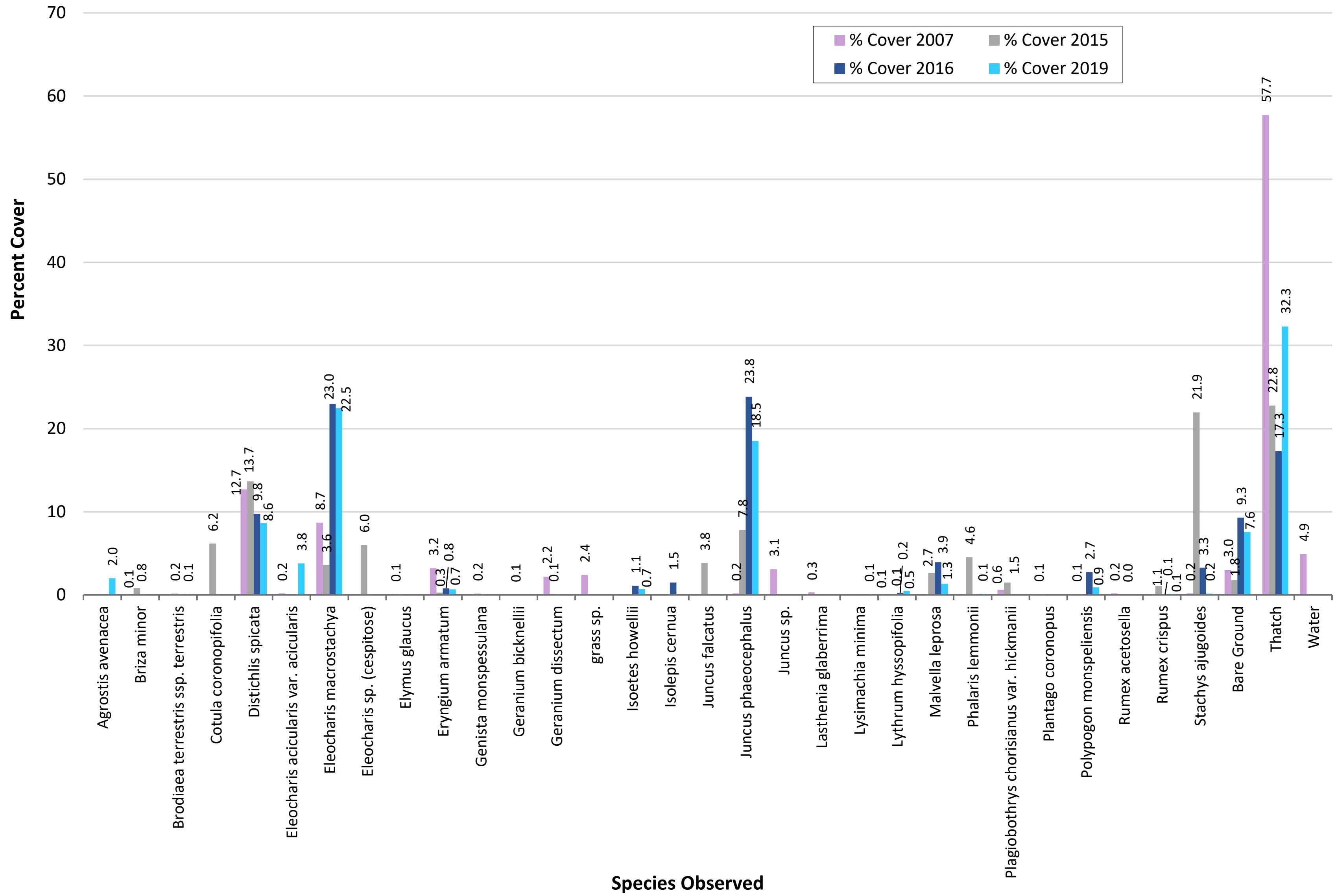


Figure H-19. Comparison Graph of Percent Cover by Wetland Plant Species for 2007, 2015, 2016, and 2019 at Pond 56 (Year 2 Post-Mastication)

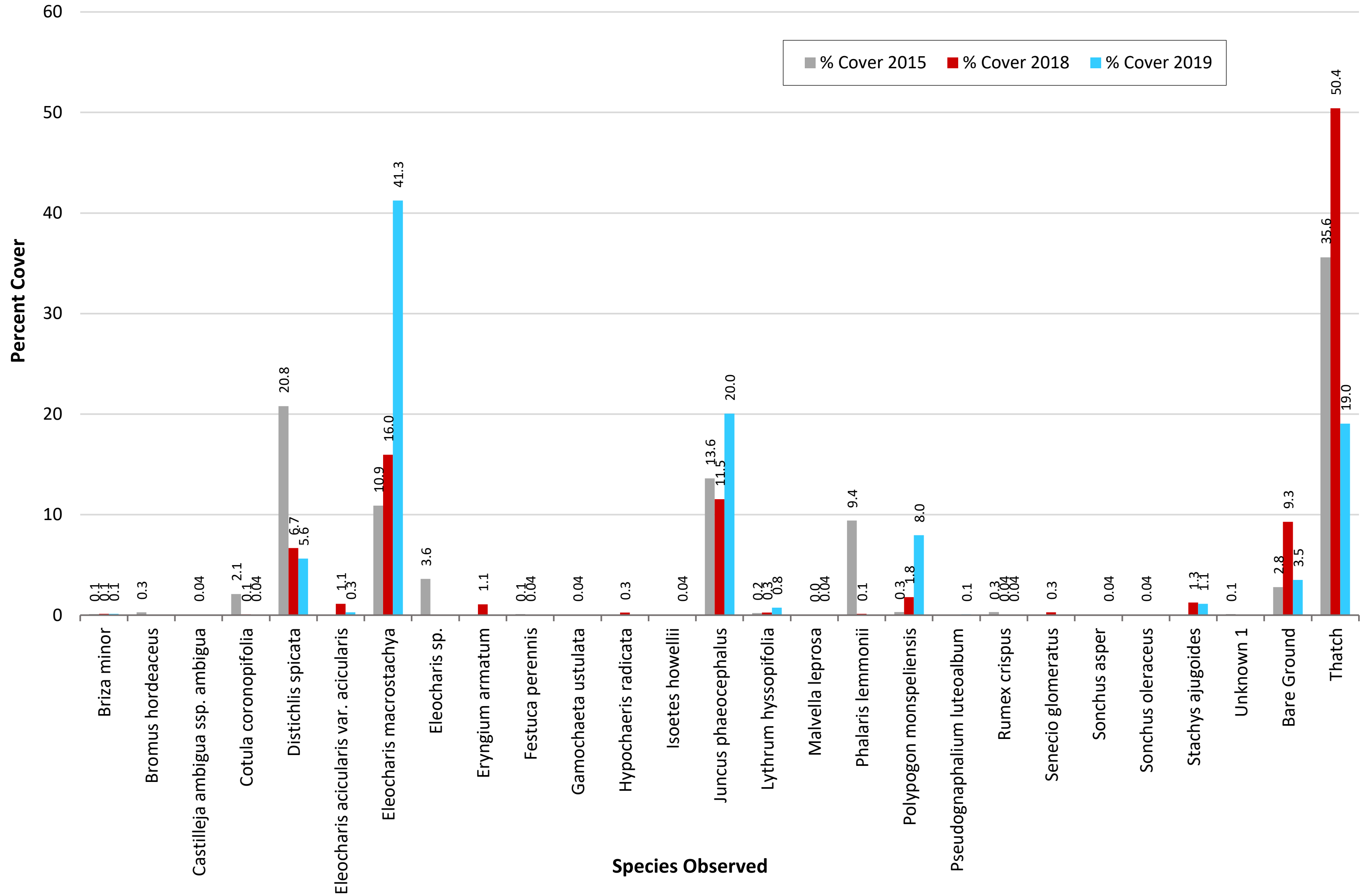


Figure H-20. Comparison Graph of Percent Cover by Wetland Plant Species for 2015, 2018, and 2019 at Pond 60 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation)

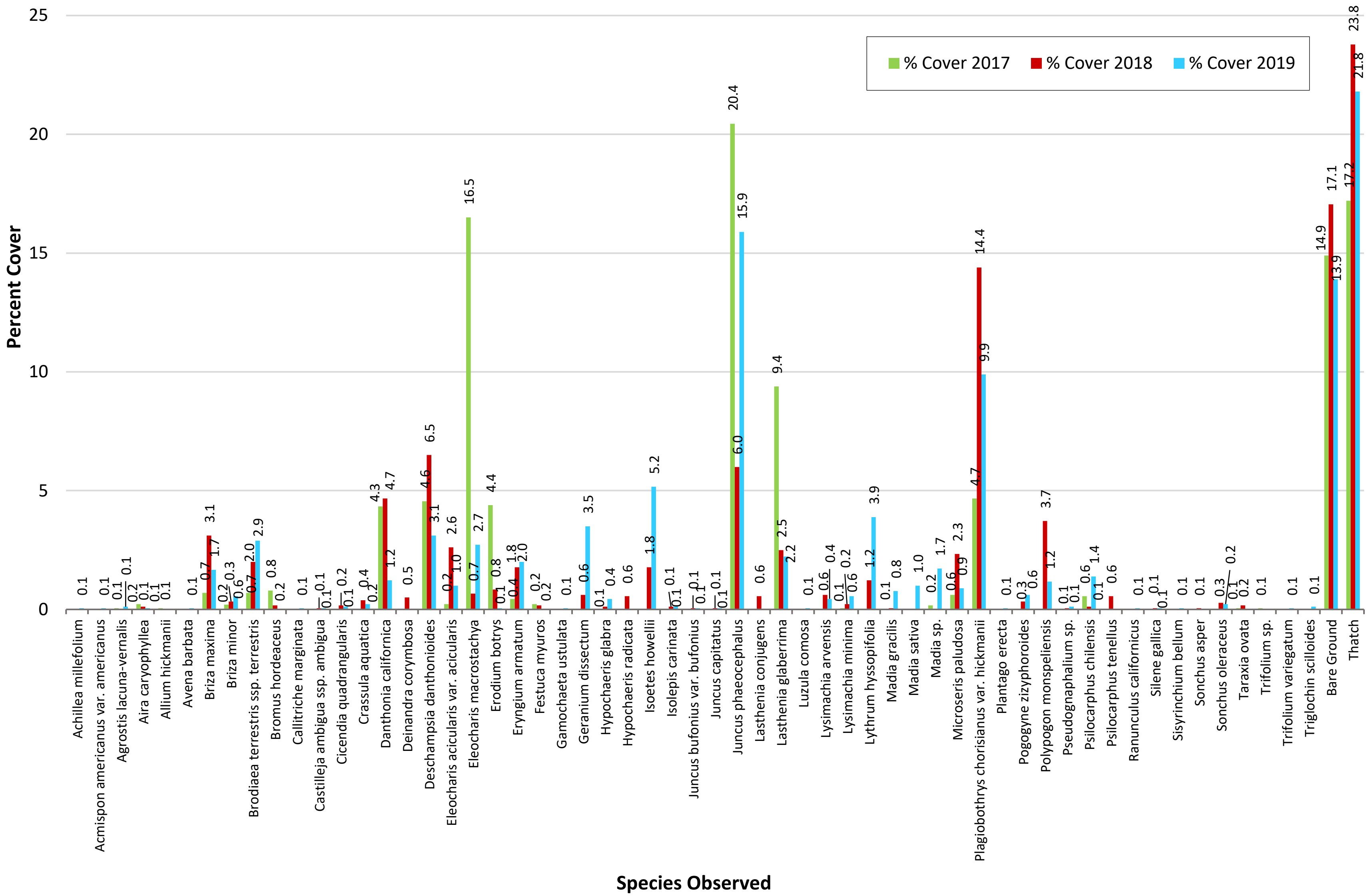


Figure H-21. Comparison Graph of Percent Cover by Wetland Plant Species for 2017, 2018, and 2019 at Pond 61 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation)

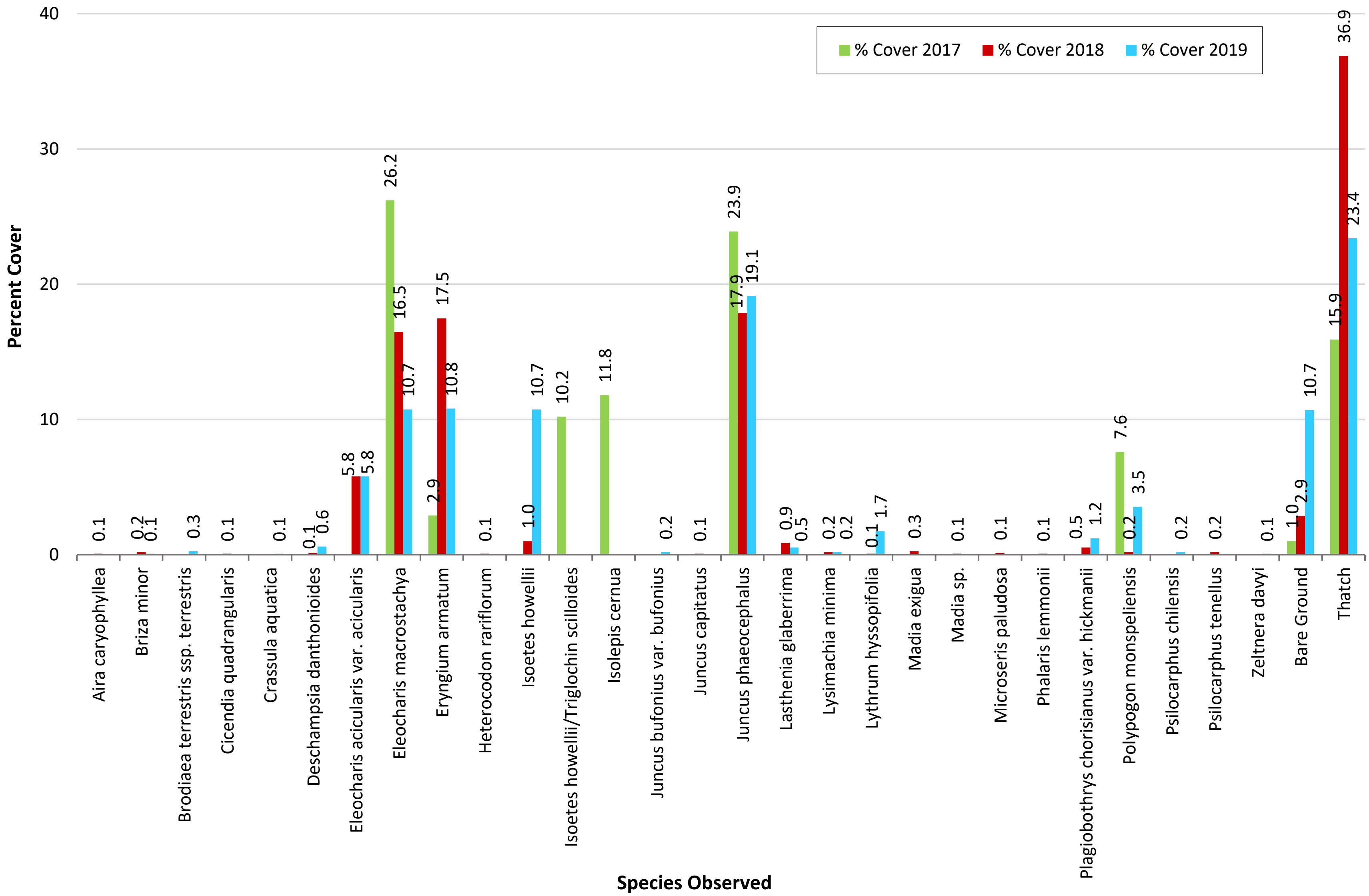


Figure H-22. Comparison Graph of Percent Cover by Wetland Plant Species for 2017, 2018, and 2019 at Pond 73 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation)

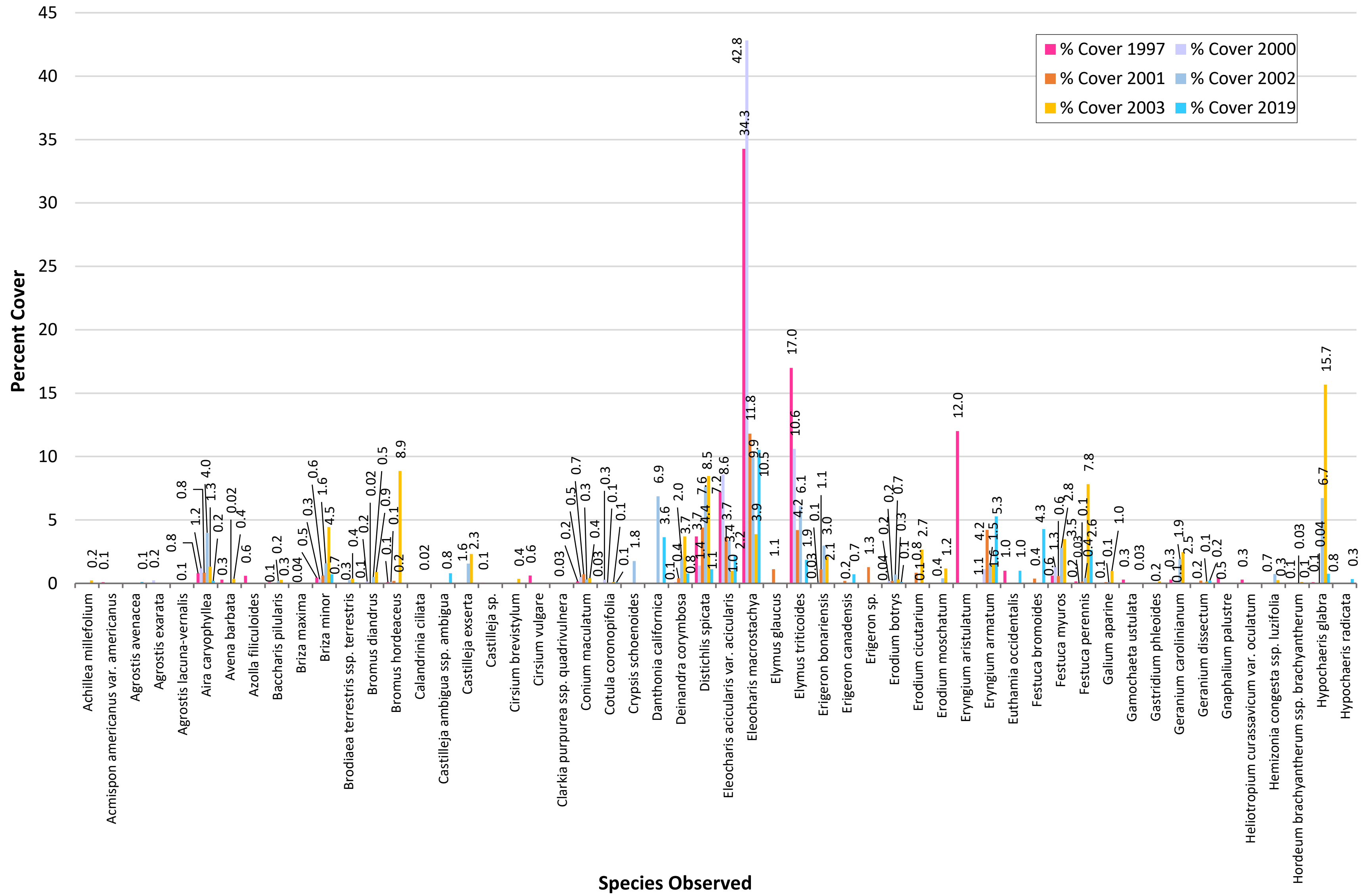


Figure H-23. Comparison Graph of Percent Cover by Wetland Plant Species for 1997, 2000, 2001, 2002, 2003, and 2019 at Machine Gun Flats (Year 2 Post-Mastication)

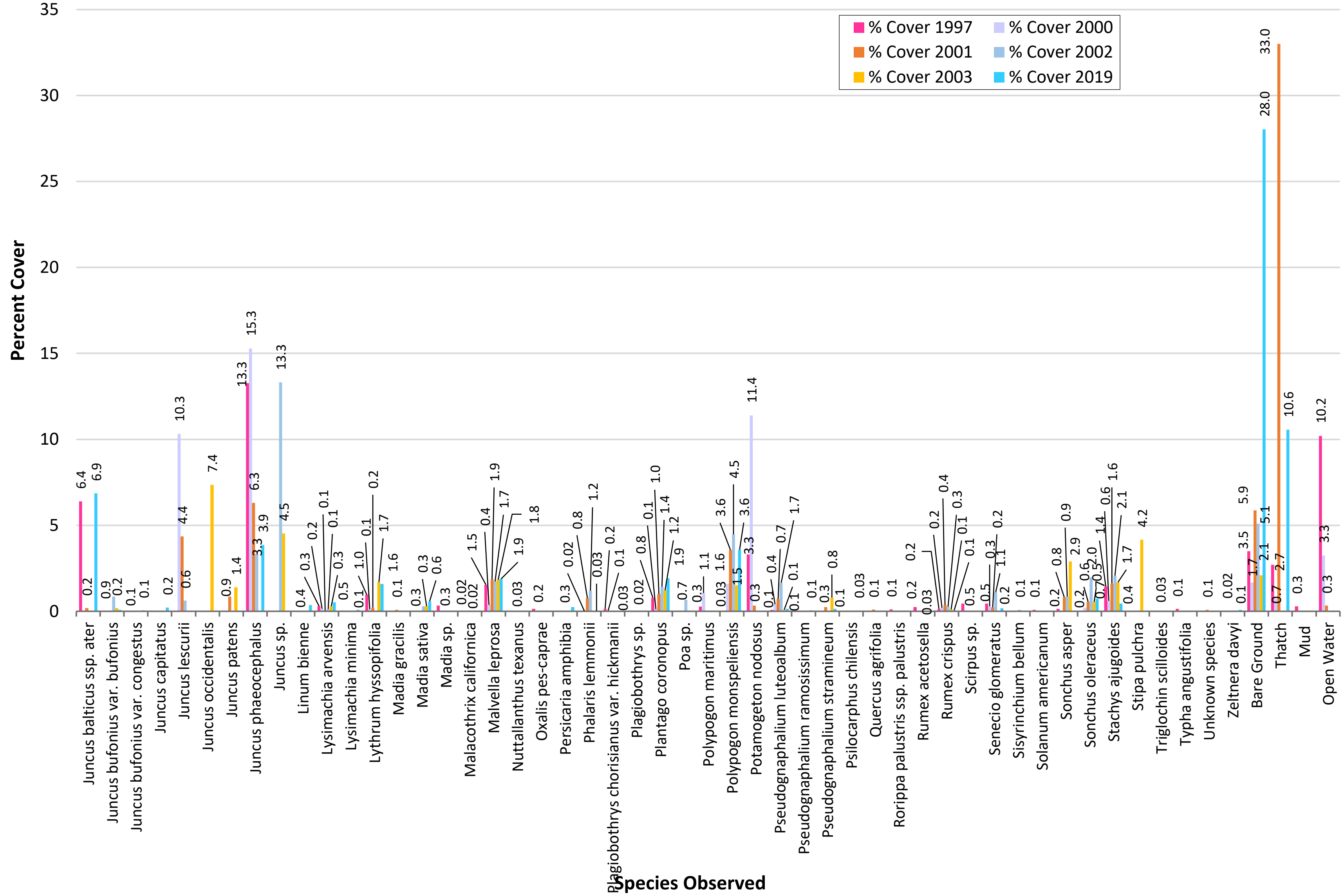


Figure H-23 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 1997, 2000, 2001, 2002, 2003, and 2019 at Machine Gun Flats (Year 2 Post-Mastication)

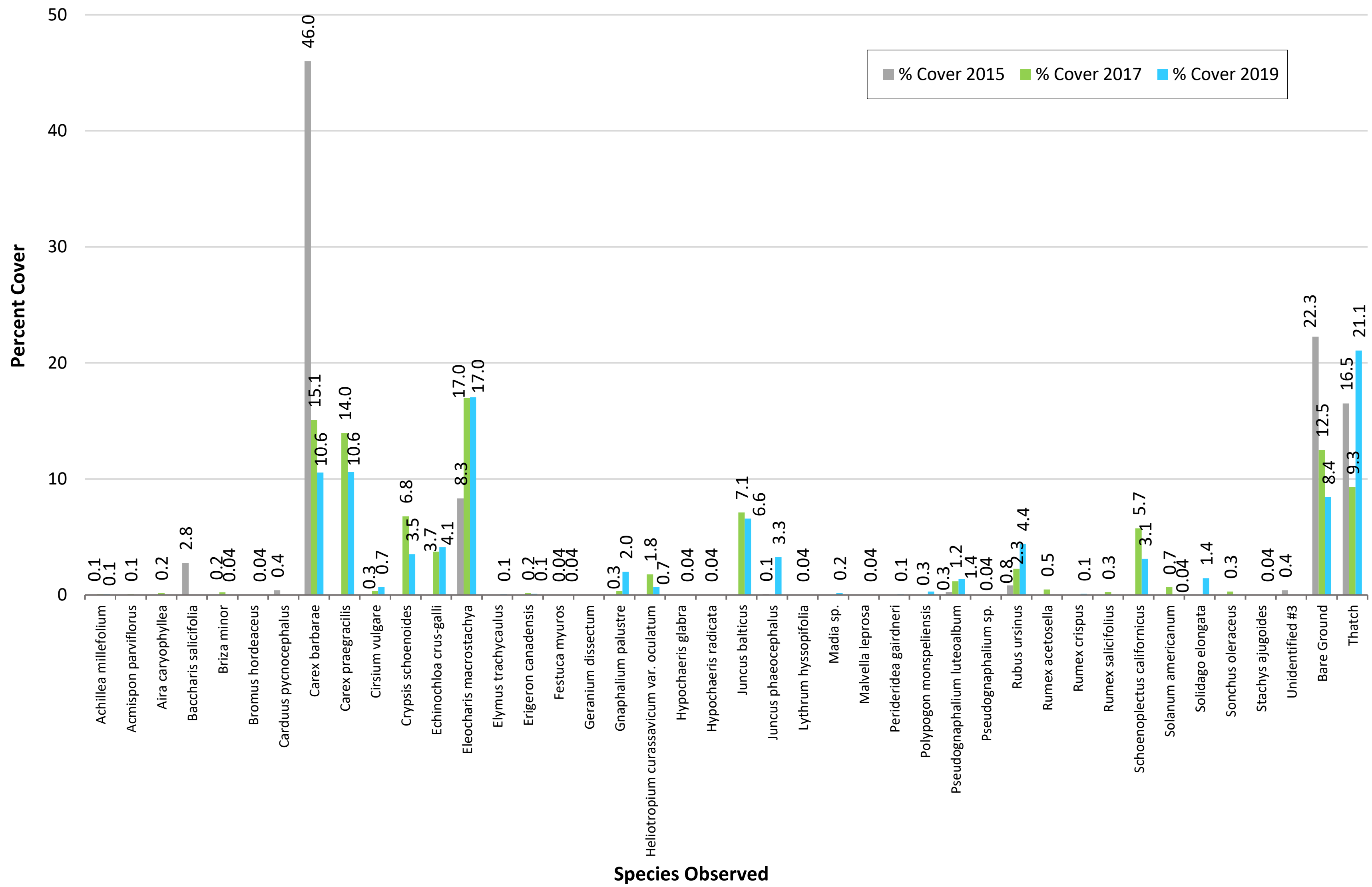


Figure H-24. Comparison Graph of Percent Cover by Wetland Plant Species for 2015, 2017, and 2019 at Pond 16 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation)

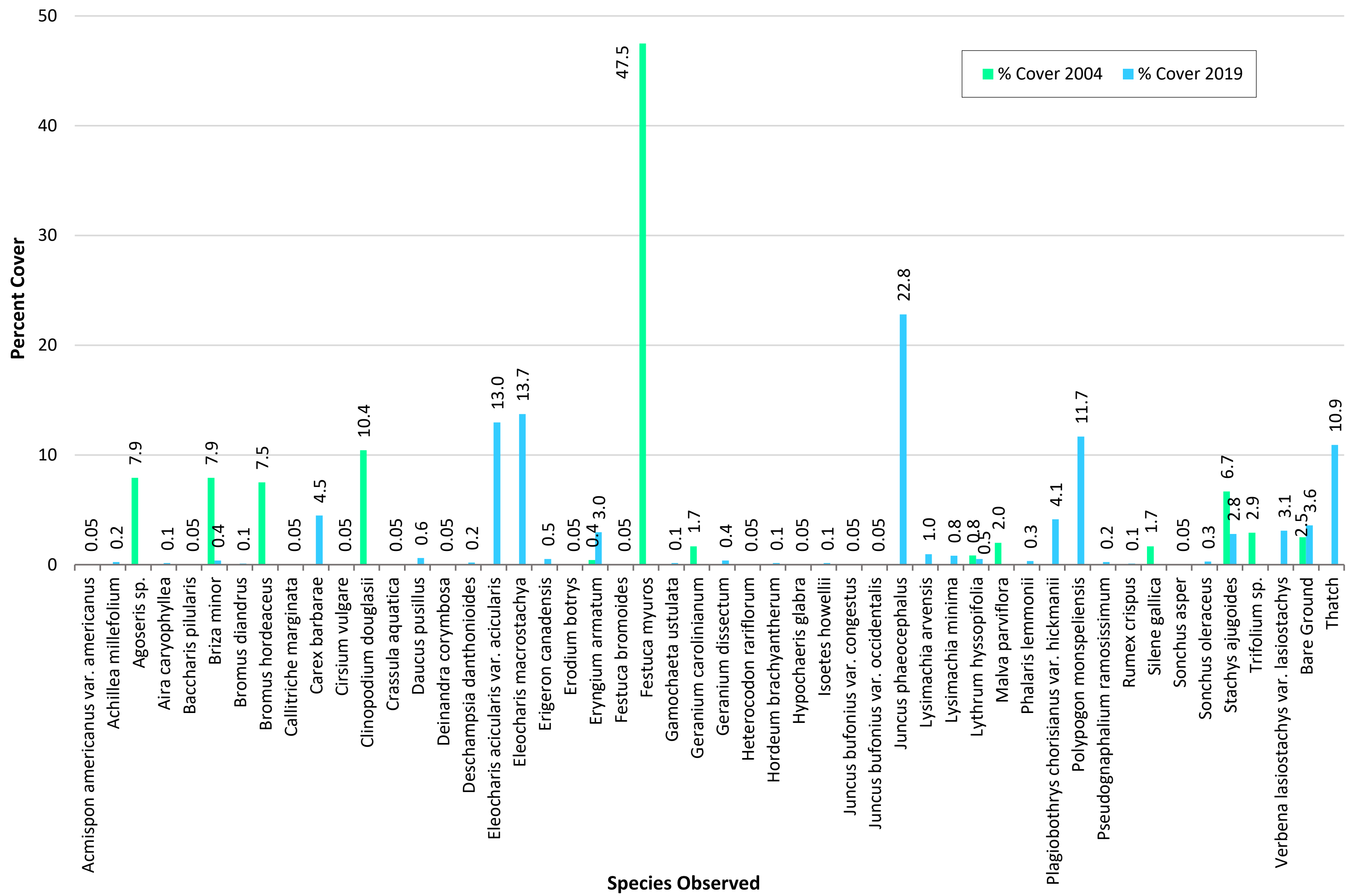


Figure H-25. Comparison Graph of Percent Cover by Wetland Plant Species for 2004 and 2019 at Pond 54 (Year 3 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation)

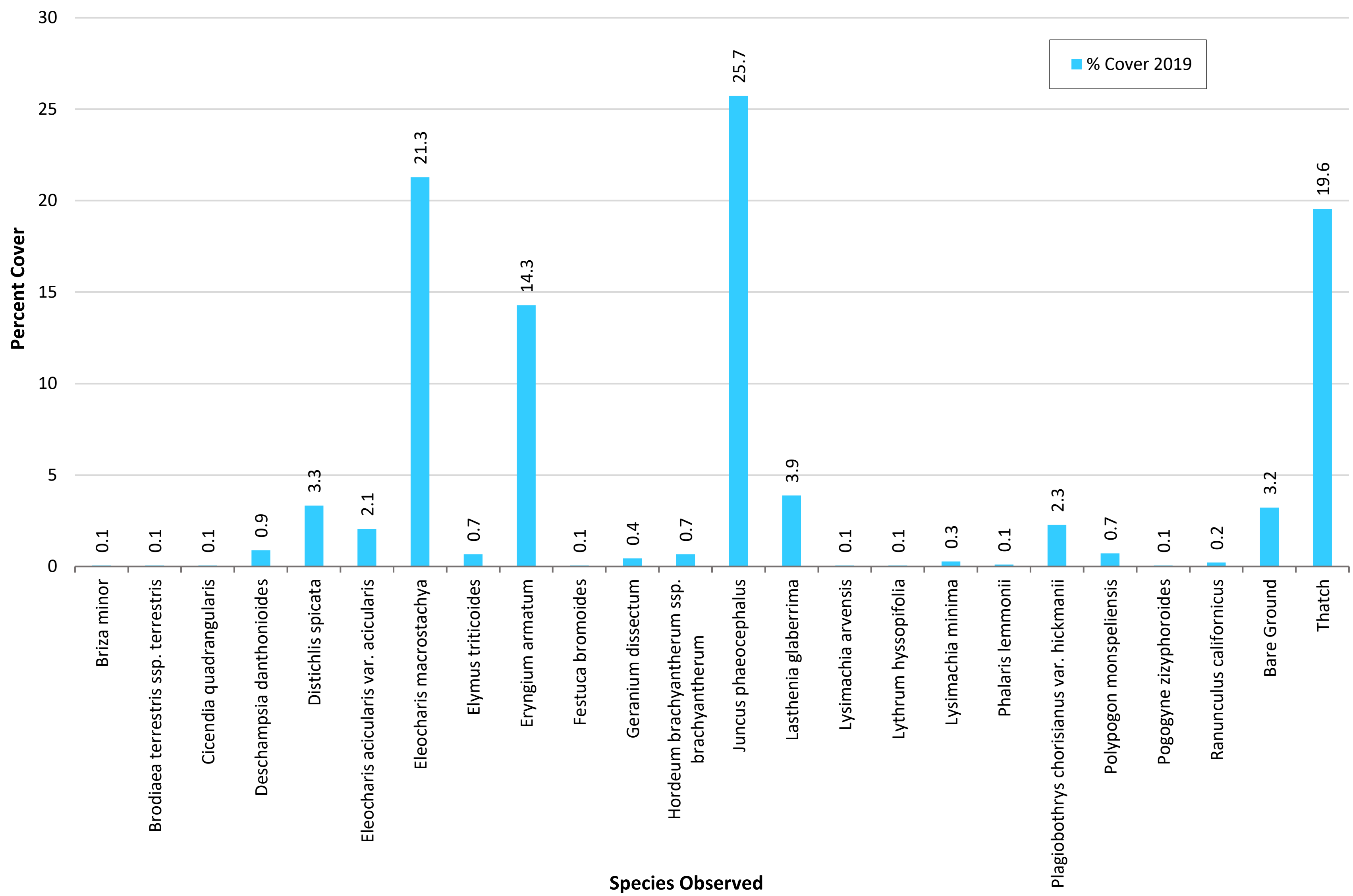


Figure H-26. Graph of Percent Cover by Wetland Plant Species for 2019 at Pond 72 (Year 3 Post-Mastication, Year 3 Post-Subsurface Munitions Remediation)