BW-2868
AR

2018 ANNUAL REPORT
WETLAND VEGETATION AND WILDLIFE MONITORING
CONTRACT NO. W91238-14-D-0010

FORMER FORT ORD

Prepared for:
US Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, CA 95814-2922

Prepared by:
Burleson Consulting Inc.
950 Glenn Drive, Suite 245
Folsom, CA 95630

Burleson Consulting Inc.
Woman-Owned Small Business
Environmental Services

February 2019

This page intentionally left blank

CONTENTS

Section **Page**

FIGURES

TABLES

APPENDICES

ACRONYMS AND ABBREVIATIONS

BO	Biological Opinion
BRAC	Base Realignment and Closure
Burleson	Burleson Consulting, Inc.
CCG	Contra Costa goldfields
CDWR	California Department of Water Resources
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
NDMC	National Drought Mitigation 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

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 2018 included Ponds 5, 101 East (West), 101 East (East), 997, 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). In 2018, vegetation monitoring was conducted at all vernal pools except Ponds 56, 16, 54, 72, and Machine Gun Flats. The populations of CCG were mapped and evaluated at Ponds 997, 3 North, 3 South, and 61. Occurrences of vernal pool bent grass (*Agrostis lacuna-vernalis*) were mapped at Ponds 101 East (East), 3 North, 3 South, 44, and 73. Invertebrate and protocol-level CTS aquatic sampling surveys were conducted only at vernal pools that held water long enough to trigger the wildlife surveys. For the 2017-2018 water-year, wildlife surveys were conducted at Ponds 5, 101 East (East), 3 North, 39, 42, and 60.

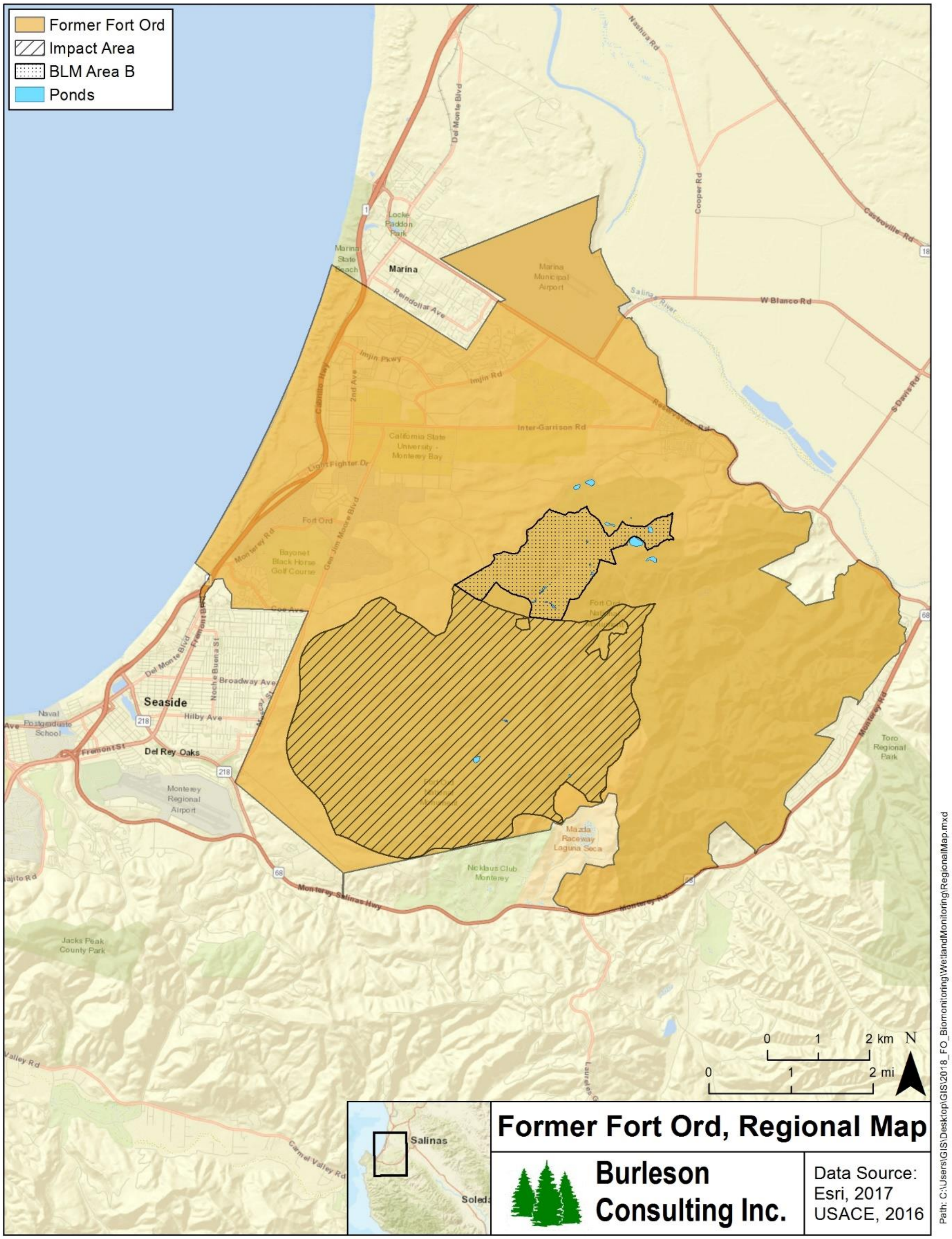


Figure 1-1. Location Map of Vernal Pools on Former Fort Ord

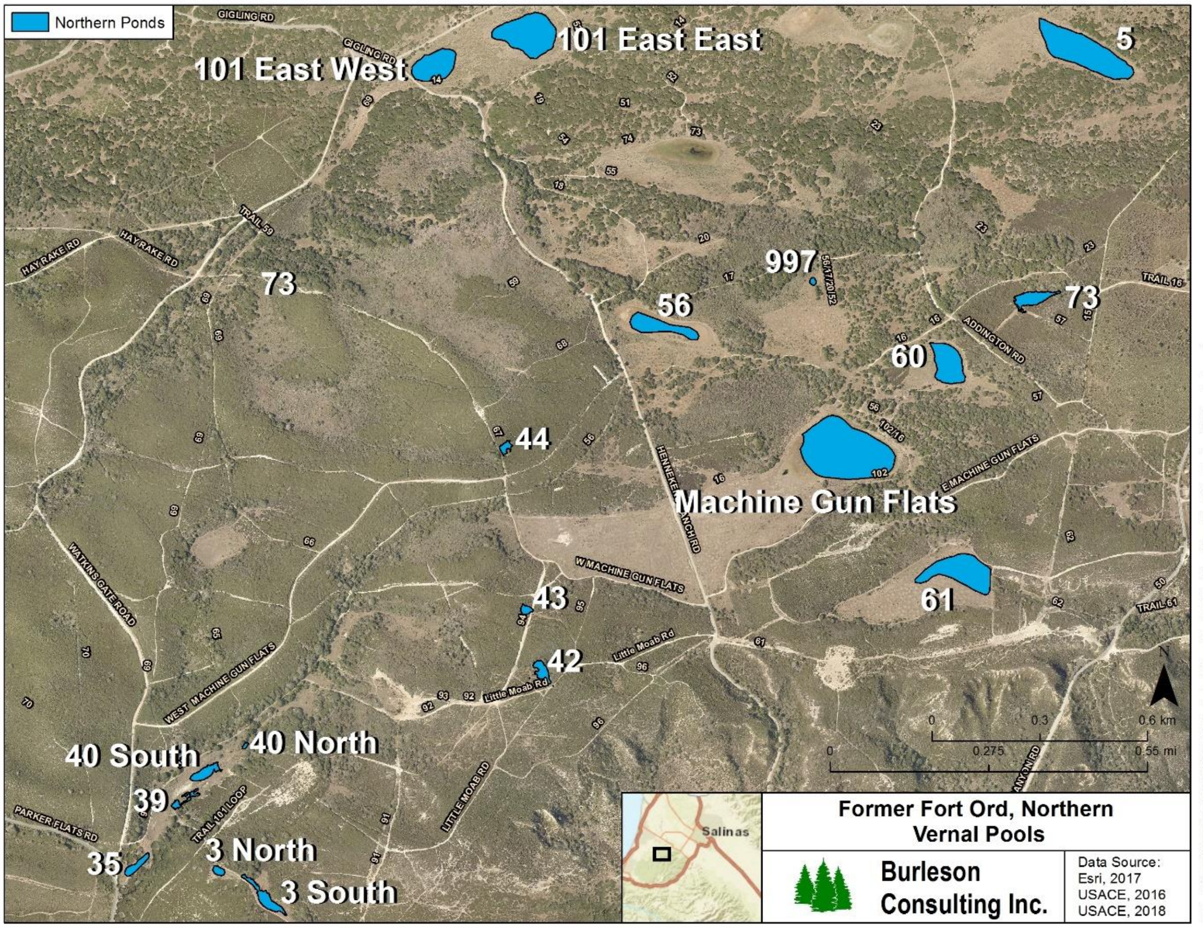


Figure 1-2. Location Map of Ponds 5, 101 East (West), 101 East (East), 997, 3 North, 3 South, 39, 40 North, 40 South, 43, 35, 42, 44, 56, 60, 61, 73, and Machine Gun Flats

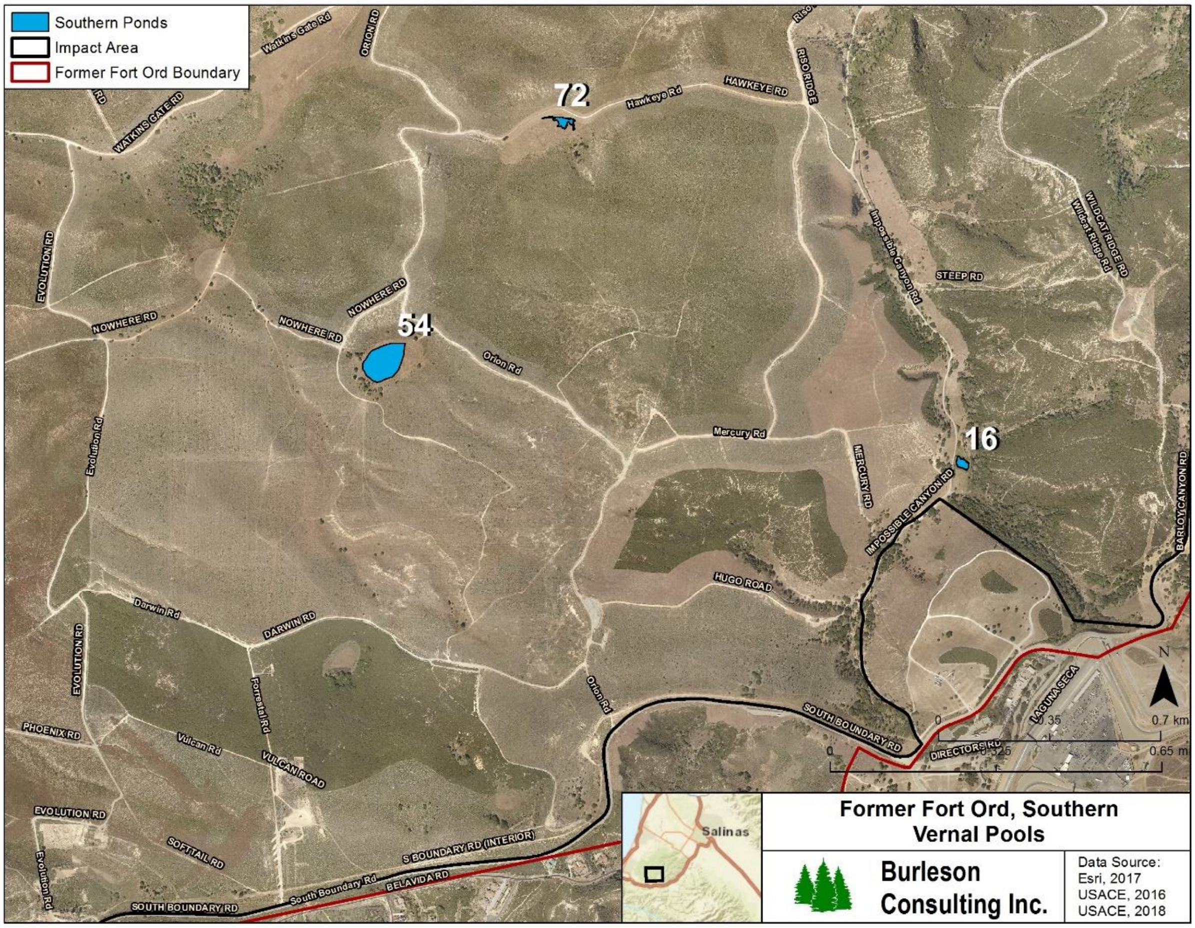


Figure 1-3. Location Map of Ponds 16, 54, and 72

In the 2017-2018 water-year, the state of California experienced below-normal precipitation (California Department of Water Resources [CDWR], 2018). Although conditions were abnormally dry, these below-normal precipitation conditions were not classified as drought by the National Drought Mitigation Center (NDMC, 2018). The National Weather Service Forecast Office (NWSFO) meteorological tower, located approximately 5 miles southwest of Site 39 on former Fort Ord, recorded cumulative monthly precipitation values below normal (see Figure 1-4; Naval Postgraduate School Department of Meteorology, 2018). 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 this station is defined as the mean precipitation from years 1981-2010. Despite above-normal precipitation from late rains in March and April, consistent below-normal precipitation occurred through most of the 2017-2018 water-year (see Figure 1-5).

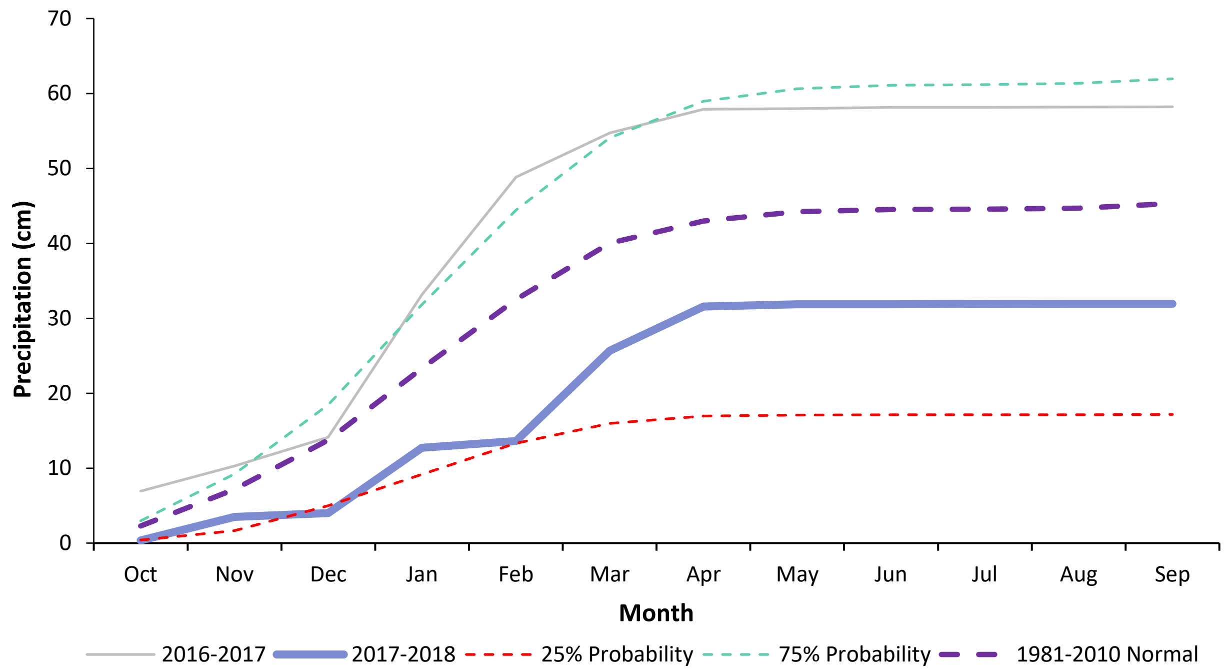


Figure 1-4. Cumulative Monthly Precipitation for the 2017-2018 Water-Year compared to the 30-Year Normal (mean 1981-2010), the 2016-2017 Water-Year, and the 25% and 75% Probabilities (NPS, 2018; National Climatic Data Center [NCDC] and National Oceanic and Atmospheric Administration [NOAA], 2018)

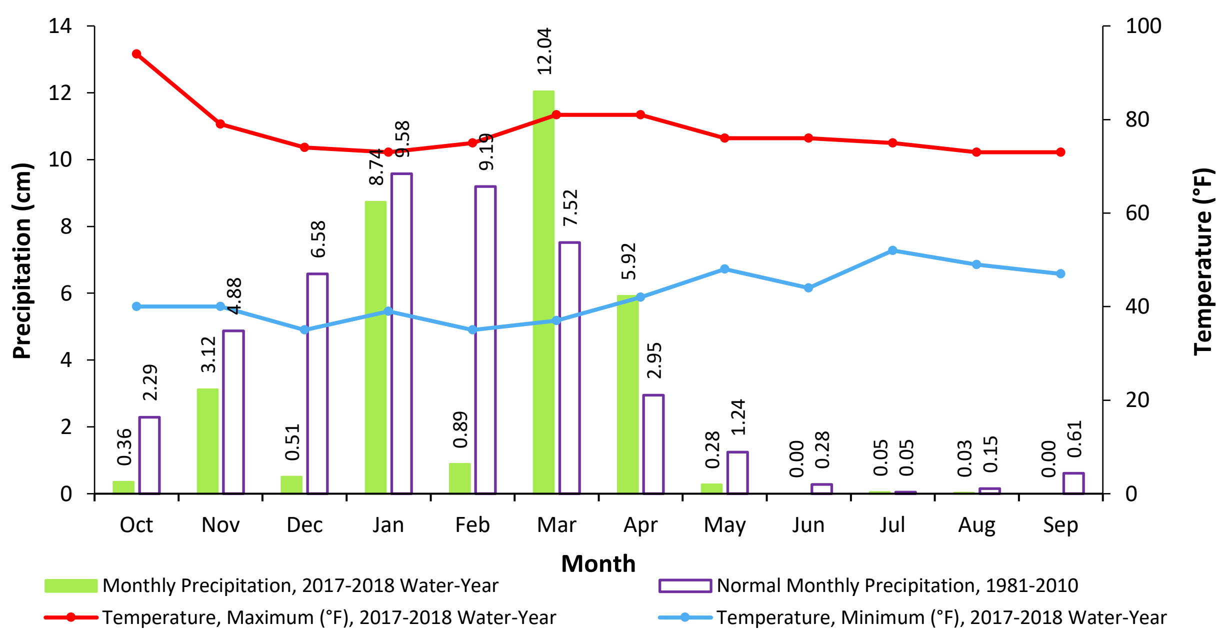


Figure 1-5. Monthly Precipitation, Maximum and Minimum Temperatures for the 2017-2018 Water-Year, and Normal Monthly Precipitation (NPS, 2018)

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 the 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 2018 at former Fort Ord.

Table 1-1. 2018 Monitoring Status of Vernal Pools on Former Fort Ord

Vernal Pool	Monitoring Status
5	Reference
101 East (West)	Reference
101 East (East)	Reference
997	Reference
3 North	Year 1 Post-Burn
3 South	Year 1 Post-Burn
39	Year 1 Post-Burn
40 North	Year 1 Post-Burn
40 South	Year 1 Post-Burn
43	Year 1 Post-Burn
35	Year 1 Post-Mastication
42	Year 1 Post-Mastication and Post-Burn
44	Year 1 Post-Mastication
56	Year 1 Post-Mastication
60	Year 1 Post-Mastication
61	Year 1 Post-Mastication
73	Year 1 Post-Mastication
Machine Gun Flats	Year 1 Post-Mastication
16	Year 2 Post-Mastication
54	Year 2 Post-Mastication
72	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 except at Ponds 5, 101 East (West), 101 East (East), 997, 42, 56, and Machine Gun Flats where it was deemed safe by USACE. Sampling and observations were completed from the bank for all other vernal pools 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 sampling 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. Reference vernal pools that will not be remediated are also monitored for comparison. In 2018, none of the vernal pools were monitored for baseline. Ponds 3 North, 3 South, 39, 40 North, 40 South and 43 were monitored for year 1 post-burn. Ponds 35, 44, 56, 60, 61, 73, and Machine Gun Flats were monitored for year 1 post-mastication. Pond 42 was monitored for year 1 post-mastication and post-burn. Ponds 16, 54, and 72 were monitored for year 2 post-mastication. Ponds 5, 101 East (West), 101 East (East), and 997 are reference vernal pools.

2.1 Hydrology Monitoring

Biologists measured pH, turbidity, temperature, dissolved oxygen, and 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 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 were only able to enter Ponds 5, 101 East (West), 101 East (East), 997, 42, Machine Gun Flats, and 56. 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 and 101 East (East). Supplemental data for November 2017 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 was collected at the pool edge for all other vernal pools. 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, 2017). 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. Some 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 2 and July 5, 2018. 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. This 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 generally 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.

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 data were collected 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, 2017).

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 some 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 (Peterson *et al.,* 2011). In 2018, 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). These were conducted concurrently on multiple occasions. 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). 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. Surveys for both species began when the vernal pools maintained a minimum depth of 10 cm of water during the March hydrologic monitoring event. In past years monitoring has occurred in March, April, and May. However, given the precipitation and late rain events that occurred in the 2017-2018 water-year, the March hydrology surveys were postponed as to not disturb CTS reproduction. This decision was supported by the observation of an adult female CTS and CTS eggs in late March at Pond 101 East (East) by University of California Los Angeles doctoral candidate, Robert Cooper. Wildlife monitoring in 2018 was conducted in April, May, and June.

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. Disposable nitrile gloves were used when handling CTS. Biologists used a new pair of gloves at each vernal pool.

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 (West), 101 East (East), 997, and 42. Ponds 3 North, 39, and 60 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 four 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 the first 30 individual CTS larvae collected. When the total number of CTS collected was less than 30, then 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). The relative abundance of amphibian species other than CTS was reported as follows:

- Few (F): 1 to 10 individuals;
- Common (C): 11 to 100 individuals; and
- Abundant (A): greater than 101 individuals.

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 5-10 swipes throughout the vernal pool. The number of collected fairy shrimp were totaled and the relative 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 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, 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.

3 RESULTS

Hydrology surveys were conducted monthly from January through September at Ponds 5, 101 East (East), 101 East (West), 997, 39, 40 North, 40 South, 43, 35, 42, 44, 56, 60, 61, 73, Machine Gun Flats, 16, 54, and 72. Ponds 997, 40 South, 43, 35, 44, and 61 did not hold water and were recorded as dry for the monitoring season. Measurable ponding was observed in 15 of the 21 vernal pools monitored in 2018. Machine Gun Flats was the largest vernal pool with a maximum depth and inundation of 111 cm and 8.32 acres, respectively. The smallest vernal pool was Pond 3 South with a maximum depth and inundation of 8 cm and 0.001 acres, respectively.

Due to late rain events, below-normal precipitation, and the prior above-normal water-year, vernal pools responded differently than has been typical in previous years. Vernal pools that held water in 2018 can be organized into three groups based on three distinct hydrological patterns closely related to the vernal pool size (see Table 3-1). The first group included relatively small and shallow vernal pools that filled slowly and dried quickly. These vernal pools required more than one storm event before they held water, and the vernal pools were only inundated in March and/or April. The second group included vernal pools that held water in January, dried, and filled again in March. These vernal pools were still relatively small but deeper and larger on average at their maximum recorded depth and inundation, respectively, than the first group. The third group followed a more typical pattern seen in past water-years in which the vernal pools start to fill at the first major rain event and dry in the spring or early summer. This third group of vernal pools was very similar in depth to the second group but had larger inundation areas. The only outlier to the observed trends was Machine Gun Flats. This vernal pool remained filled from the previous water-year and held water throughout the entire monitoring season.

Table 3-1. Hydrological Trends Observed at Vernal Pools During the 2017-2018 Water-Year

Hydrological Trend	Vernal Pool	Maximum Inundation (acres)		Maximum Depth (cm)	
		Range	Mean	Range	Mean
Remained Dry	997, 40 South, 43, 35, 44, 61	-	-	-	-
Filled Slowly, Dried Quickly	101 East (West), 3 North, 3 South, 40 North, 16, 54, 73, 72	0.001-0.36	0.10	8-36	21
Filled Twice	39, 42, 60	0.01-0.77	0.34	24-59	39
Typical	5, 101 East (East), 56	0.85-2.85	1.34	22-63	42
Remained Wet	Machine Gun Flats	-	8.34	-	111

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 12.67 °C in January to 9.67 °C in February and then gradually increased to 25.60 °C by June. Mean dissolved oxygen values were 2.85 milligrams per liter (mg/L) in January, increased to 7.34 mg/L in February, decreased to 6.05 mg/L in March, remained around 7.0 mg/L in April and May, and decreased to 5.06 mg/L in June. Mean pH values had a slight increased to 7.05 in February but otherwise remained around 6.60. Mean turbidity values were generally similar in January, March, and April with a slight increase in February and May. June mean turbidity was very low. The minimum mean turbidity value was 0.00 formazin nephelometric units (FNU) in June and the maximum was 253.48 FNU in May.

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 only eight vernal pools; Ponds 5, 101 East (East), 101 East (West), 3 North, 39, 42, 60, and 73.

Vegetation monitoring was conducted at Ponds 5, 101 East (West), 101 East (East), 997, 3 North, 3 South, 39, 40 North, 40 South, 43, 35, 42, 44, 60, 61, and 73. Across all monitored vernal pools, the mean number of native plant species was 19 and non-native was 16 (see Table 3-2). Of these species, a mean of 15 were wetland species, either obligate OBL or FACW (see Table 3-3). In addition to vegetative strata mapping and transect surveys, the populations of CCG were mapped at Ponds 3 North, 3 South, 61, and 997, and occurrences of vernal pool bent grass were mapped at Ponds 101 East (East), 3 North, 3 South, 44, and 73.

Table 3-2. Vegetation Species Richness of Native and Non-Native Species Observed on Transects at Vernal Pools Monitored in 2018

Vernal Pool	Monitoring Status	Native	Non-Native
5	Reference	25	16
101 East (West)	Reference	26	21
101 East (East)	Reference	18	11
997	Reference	24	19
3 North	Year-1 Post Burn	22	16
3 South	Year-1 Post Burn	26	23
39	Year-1 Post Burn	16	19
40 North	Year-1 Post Burn	6	11
40 South	Year-1 Post Burn	9	22
43	Year-1 Post Burn	22	14
35	Year-1 Post Mastication	13	23
42	Year-1 Post Mastication and Burn	24	15
44	Year-1 Post Mastication	28	15
60	Year-1 Post Mastication	10	9
61	Year-1 Post Mastication	24	16
73	Year-1 Post Mastication	15	5
Mean	-	**19**	**16**

Table 3-3. Vegetation Species Richness of Obligate and Facultative Wetland Species Observed on Transects at Vernal Pools Monitored in 2018

Vernal Pool	Monitoring Status	OBL	FACW	OBL & FACW
5	Reference	5	11	16
101 East (West)	Reference	8	11	19
101 East (East)	Reference	5	9	14
997	Reference	8	10	18
3 North	Year-1 Post Burn	10	8	18
3 South	Year-1 Post Burn	9	11	20
39	Year-1 Post Burn	4	7	11
40 North	Year-1 Post Burn	3	2	5
40 South	Year-1 Post Burn	3	5	8
43	Year-1 Post Burn	7	8	15
35	Year-1 Post Mastication	7	4	11
42	Year-1 Post Mastication and Burn	9	10	19
44	Year-1 Post Mastication	8	9	17
60	Year-1 Post Mastication	5	6	11
61	Year-1 Post Mastication	10	10	20
73	Year-1 Post Mastication	7	7	14
Mean	-	**7**	**8**	**15**

Aquatic wildlife monitoring was conducted at Ponds 5, 101 East (East), 3 North, 39, 42, 60, and 73 (see Appendix D Tables D-1 – D-3). When possible, biologists sampled vernal pools three times; however, this was not possible in all cases since some pools dried sooner than others. All vernal pools except Pond 60 dried completely during the sampling period and were not sampled during all events. Pond 101 East (East) was the only vernal pool in which CTS were present. Two larvae were observed on April 27, 2018. No CTS were observed at Ponds 5, 3 North, 39, 42, 60, and 73. Fairy shrimp were detected at Ponds 39 and 42 in low abundance (see Table 3-4).

Table 3-4. California Tiger Salamander and Fairy Shrimp Detections at Vernal Pools in 2018

Vernal Pool	Monitoring Status	CTS Detected	Fairy Shrimp Detected
5	Reference	No	No
101 East (West)	Reference	N/A*	N/A*
101 East (East)	Reference	Yes	No
997	Reference	N/A*	N/A*
3 North	Year-1 Post Burn	No	No
39	Year-1 Post Burn	No	Yes
3 South	Year-1 Post Burn	N/A*	N/A*
40 North	Year-1 Post Burn	N/A*	N/A*
40 South	Year-1 Post Burn	N/A*	N/A*
43	Year-1 Post Burn	N/A*	N/A*
73	Year-1 Post Mastication	No	No
60	Year-1 Post Mastication	No	No
35	Year-1 Post Mastication	N/A*	N/A*
44	Year-1 Post Mastication	N/A*	N/A*
61	Year-1 Post Mastication	N/A*	N/A*
42	Year-1 Post Mastication and Burn	No	Yes

*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 2018, Pond 5 was monitored for hydrology, vegetation, and wildlife.

3.1.1 Hydrology Monitoring

Pond 5 was monitored for hydrology six times and dried in May (see Table 3-5 and Figure 3-1). The first monitoring event in November was part of staff gauge maintenance and only included depth measurement.

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

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
11/20/2017	-	-	-	-	-	18	-
1/15/2018	11:14	7.12	12.56	6.54	16.6	22	2.95
2/23/2018	9:21	7.12	6.00	5.27	39.2	15	1.85
3/21/2018	8:58	7.01	11.76	6.65	4.7	22	3.01
4/18/2018	13:50	7.29	20.68	7.09	40.6	22	2.85
5/22/2018	11:58	-	-	-	-	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.

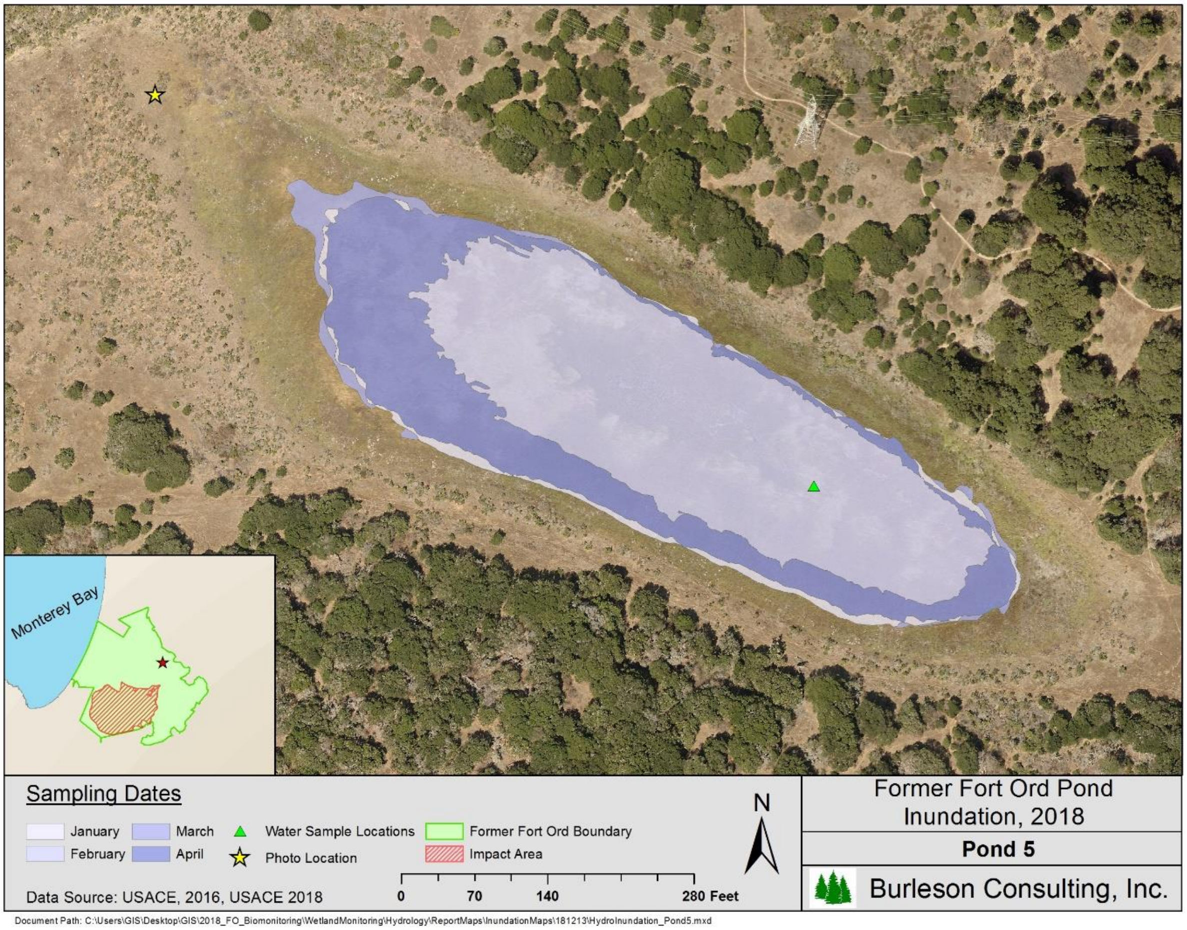


Figure 3-1. Map of Pond 5 (Reference) on Former Fort Ord, 2018

3.1.2 Vegetation Monitoring

Vegetation monitoring was conducted at Pond 5 on June 6 and 8, 2018. These monitoring data represent reference conditions. Pond 5 was dry by the June 6 monitoring event. Biologists identified six vegetative strata at the vernal pool (see Table 3-6 and Figure 3-2). Appendix C provides the species cover results for each stratum. Stratum 1 was repeated from 2016, strata 2, 3, and 4 were repeated from 2016 and 2017, stratum 5 was repeated from 2017, and stratum 6 was newly established. Transects 1 through 5 were repeated. Transects 2, 3, and 4 were relocated because the previous locations were no longer within the correct strata. Transect 2 was shortened to 5 m to fit within the stratum. Transect 6 was established in 2018.

Table 3-6. Pond 5 (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	40%
2	3%
3	11%
4	5%
5	20%
6	21%

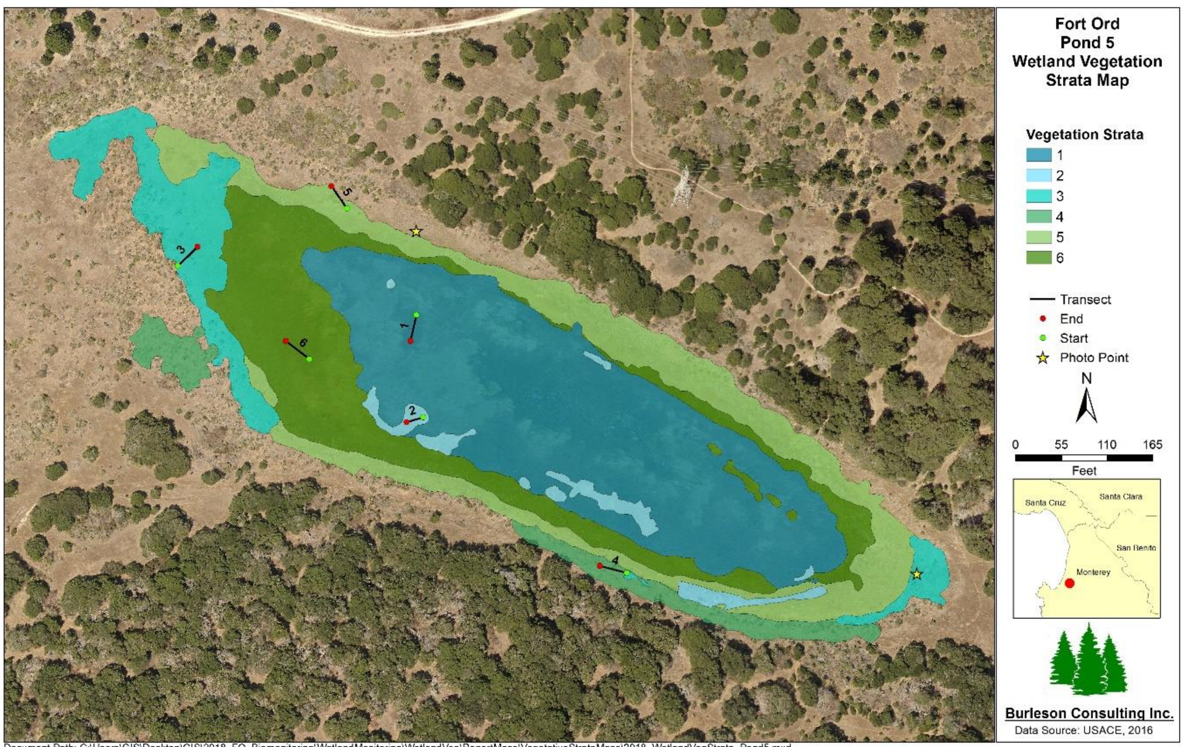


Figure 3-2. Pond 5 (Reference) Vegetation Strata and Transects on Former Fort Ord, 2018

Eighty-eight plant species were observed within the vernal pool basin boundary. Of these species, 56 were native and 32 were non-native. Additionally, ten species were OBL wetland plants, 29 were FACW or FAC, 18 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 5 consisted of a 10-m transect placed in stratum 1. Three plant species were observed along the transect. All three species are native. Pale spikerush (*Eleocharis macrostachya*) was the dominant species, accounting for approximately 34% cover (see Appendix C Table C-1). Bare ground was abundant, accounting for 56%. Spreading alkaliweed (*Cressa truxillensis*) and alkali mallow (*Malvella leprosa*) were the other two species observed. Thatch was also present.

Transect 2 at Pond 5 consisted of a 5-m transect placed in stratum 2. Six plant species were observed along the transect. Of these species, four were native and two were non-native. Pale spikerush and salt grass (*Distichlis spicata*) were the dominant species, accounting for approximately 22% and 19% cover, respectively (see Appendix C Table C-1). Bare ground was abundant, accounting for approximately 50%. Alkali mallow contributed approximately 4% cover. Other species included spreading alkaliweed, grass poly (*Lythrum hyssopifolia*), and rabbitfoot grass (*Polypogon monspeliensis*). Thatch was also present.

Transect 3 at Pond 5 consisted of a 10-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. Salt grass, pale spikerush, and bugle hedge nettle (*Stachys ajugoides*) were the dominant species, accounting for approximately 28%, 15%, and 12% cover, respectively (see Appendix C Table C-1). Thatch was abundant, accounting for approximately 24% cover. Cottonbatting plant (*Pseudognaphalium stramineum*) contributed approximately 6% cover, while annual quaking grass (*Briza minor*) contributed approximately 1% cover. Other species included needle spikerush (*Eleocharis acicularis* var. *acicularis*), horseweed (*Erigeron canadensis*), rough cat's-ear (*Hypochaeris radicata*), Baltic rush (*Juncus balticus*), grass poly, rabbitfoot grass, weedy cudweed (*Pseudognaphalium luteoalbum*), curly dock (*Rumex crispus*), cutleaf burnweed (*Senecio glomeratus*), small-flower catchfly (*Silene gallica*), and common sow thistle (*Sonchus oleraceus*). Bare ground was also present and accounted for approximately 10%.

Transect 4 at Pond 5 consisted of a 10-m transect placed in stratum 4. Twenty-one plant species were observed along the transect. Of these species, ten were native and eleven were non-native. Brown-headed rush (*Juncus phaeocephalus*) was the dominant species, accounting for approximately 33% cover (see Appendix C Table C-1). Bare ground and thatch were abundant, accounting for approximately 28% and 22%, respectively. Salt grass contributed approximately 6% cover, while annual quaking grass, grass poly, chaffweed (*Lysimachia minima*), weedy cudweed, sheep sorrel (*Rumex acetosella*), and cutleaf burnweed contributed cover ranging from 1% to 3%. Other species included Spanish lotus (*Acmispon americanus* var. *americanus*), coyote brush (*Baccharis pilularis*), Johnny-Nip (*Castilleja ambigua* ssp. *ambigua*), long-beaked filaree (*Erodium botrys*), coyote thistle (*Eryngium armatum*), rough cat's-ear, scarlet pimpernel (*Lysimachia arvensis),* cut-leaved plantain (*Plantago coronopus),* rabbitfoot grass, pink everlasting (*Pseudognaphalium ramosissimum*), cottonbatting plant, common sow thistle, and bugle hedge nettle.

Transect 5 at Pond 5 consisted of a 10-m transect placed in stratum 5. Twenty-seven plant species were observed along the transect. Of these species, sixteen were native and eleven were non-native. Salt grass, Baltic rush, scarlet pimpernel, and beardless wild rye (*Elymus triticoides*) were the dominant species, accounting for approximately 25%, 10%, 9%, and 7% cover, respectively (see Appendix C Table C-1). Bare ground and thatch were fairly abundant, accounting for approximately 18% and 16%, respectively. Horseweed, weedy cudweed, cottonbatting plant, cutleaf burnweed, small-flowered nightshade (*Solanum americanum*), and prickly sow thistle (*Sonchus asper*) contributed cover ranging from 1% to 4%. Other species included Spanish lotus, silvery hair-grass (*Aira caryophyllea*), coyote brush, annual quaking grass, needle spikerush, cut-leaved geranium (*Geranium dissectum*), grass poly, chaffweed, blue toadflax (*Nuttallanthus texanus*), Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*), rabbitfoot grass, coast live oak (*Quercus agrifolia*), small-flower catchfly, common sow thistle, bugle hedge-nettle, poison oak (*Toxicodendron diversilobum*), and Davy's centaury (*Zeltnera davyi*).

Transect 6 at Pond 5 consisted of a 10-m transect placed in stratum 6. Ten plant species were observed along the transect. Of these species, seven were native and three were non-native. Pale spikerush, rabbitfoot grass, and salt grass were the dominant species, accounting for approximately 23%, 20%, and 11% cover, respectively (see Appendix C Table C-1). Bare ground and thatch were fairly abundant, accounting for approximately 28% and 16%, respectively. Other species included spreading alkaliweed, common toad rush (*Juncus bufonius* var. *bufonius*), grass poly, alkali mallow, Lemmon's canary grass (*Phalaris lemmonii*), weedy cudweed, and Davy's centaury.

3.1.3 Wildlife Monitoring

Pond 5 was surveyed for CTS and fairy shrimp on April 25 and May 23, 2018. California tiger salamanders and fairy shrimp were not detected during the April and May survey events. No further surveys were conducted in June due to insufficient depth. Invertebrate results for 2018 are provided in Appendix D (see Table D-2).

3.2 Pond 101 East (West)

Pond 101 East (West)[1] is a reference vernal pool that was monitored as a control for comparison to the remediated vernal pools. In 2018, Pond 101 East (West) was monitored for hydrology and vegetation. Wildlife monitoring did not occur since the vernal pool was dry during surveys.

3.2.1 Hydrology Monitoring

Pond 101 East (West) was monitored for hydrology five times and dried in May (see Table 3-7 and Figure 3-3).

Table 3-7. Pond 101 East (West) (Reference) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/19/2018	11:13	-	-	-	-	DRY	0.00
2/21/2018	14:32	-	-	-	-	DRY	0.00
3/21/2018	10:50	6.62	13.58	3.09	39.5	16	0.004
4/17/2018	13:43	7.20	21.74	10.95	16.6	24	0.09
5/21/2018	13:00	-	-	-	-	DRY	0.00

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

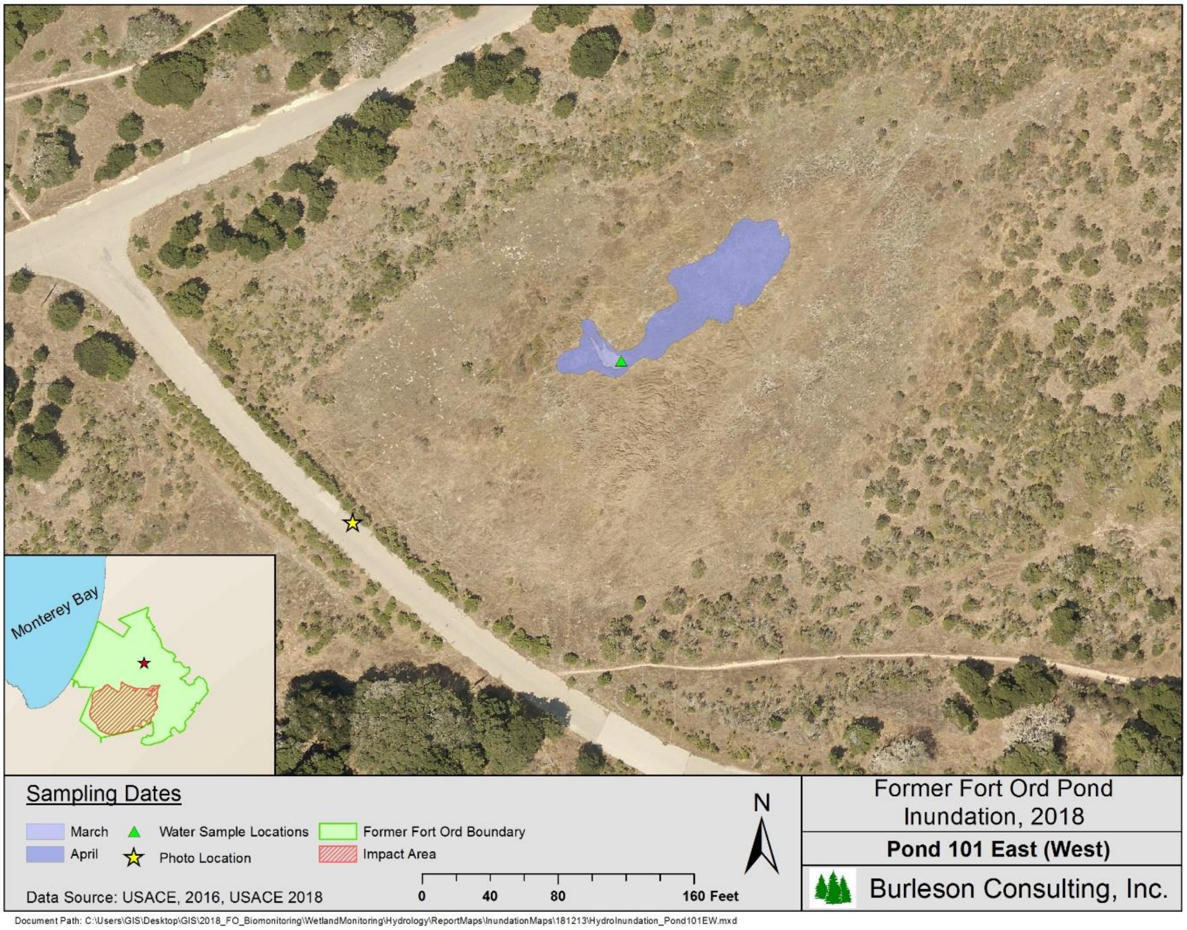


Figure 3-3. Map of Pond 101 East (West) (Reference) on Former Fort Ord, 2018

3.2.2 Vegetation Monitoring

Vegetation monitoring was conducted at Pond 101 East (West) on May 18 and 31, 2018. These monitoring data represent reference conditions. Pond 101 East (West) was dry by the May 18 monitoring event. Biologists identified six strata at the vernal pool (see Table 3-8 and Figure 3-4). Appendix C provides the species cover results within each stratum. Strata 1 through 5 were repeated from 2016 and 2017, whereas stratum 6 was repeated from 2017. Transects 1, 2, 4, and 5 were repeated in their 2016 and 2017 locations, whereas Transect 3 was relocated to an area with more representative vegetative composition. Transect 6 was shortened from 10 m in 2017 to 5 m in 2018 but kept in the same location.

Table 3-8. Pond 101 East (West) (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	5%
2	40%
3	12%
4	18%
5	21%
6	4%

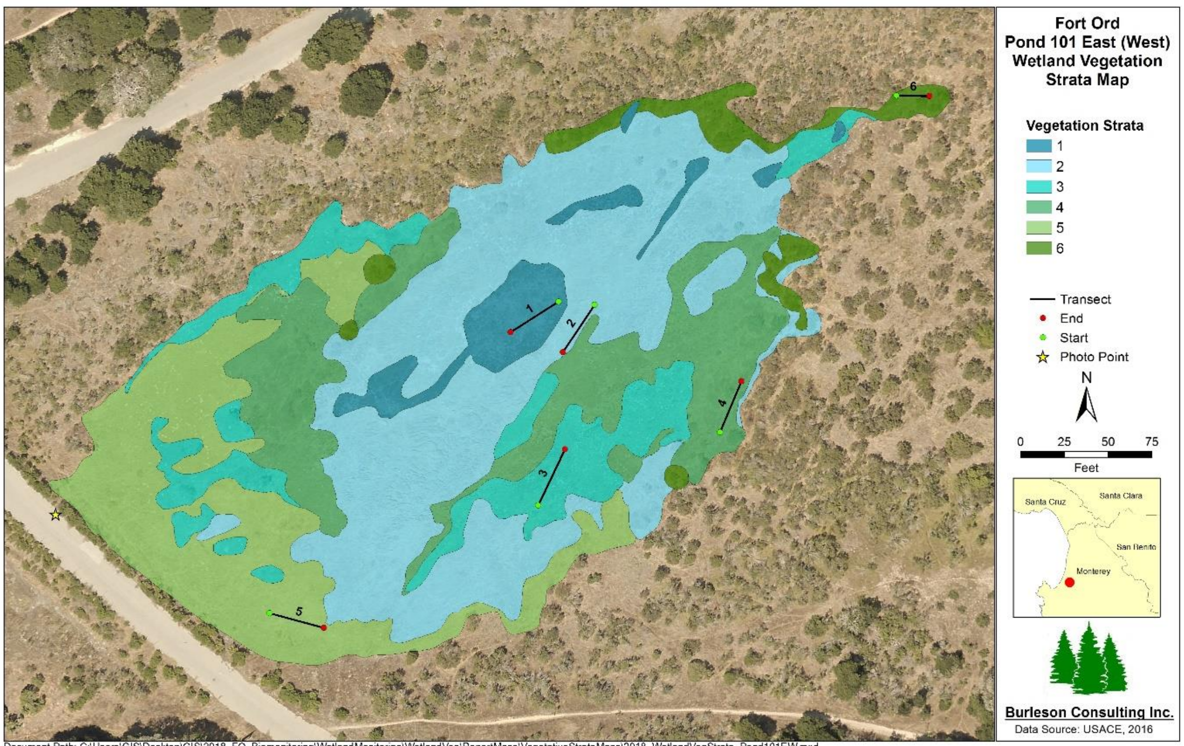


Figure 3-4. Pond 101 East (West) (Reference) Vegetation Strata and Transects on Former Fort Ord, 2018

Eighty-eight plant species were observed within the vernal pool basin boundary. Of these species, 53 were native, 34 were non-native, and one was unidentified. Additionally, 12 species were OBL wetland plants, 33 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.

Transect 1 at Pond 101 East (West) consisted of a 10-m transect placed in stratum 1. Twenty plant species were observed along the transect. Of these species, twelve were native, seven were non-native, and one was unidentified. Pale spikerush was the dominant species, accounting for approximately 18% cover (see Appendix C Table C-2). Bare ground and thatch were fairly abundant, accounting for approximately 18% and 17%, respectively. Pacific foxtail (*Alopecurus saccatus*), alkali mallow, prostrate knotweed (*Polygonum aviculare* ssp. *depressum*), and rabbitfoot grass contributed cover ranging from 8% to 9%. Pacific bent grass (*Agrostis avenacea*), lowland cudweed (*Gnaphalium palustre*), Lemmon's canary grass, and western yellow cress (*Rorippa curvisiliqua*) contributed cover ranging from 1% to 2%. Other species included needle spikerush, rattail sixweeks grass (*Festuca myuros*), Chinese pusley (*Heliotropium curassavicum* var. *oculatum*), smooth goldfields (*Lasthenia glaberrima*), grass poly, weedy cudweed, cottonbatting plant, curly dock, flowering quillwort (*Triglochin scilloides*), Apiaceae sp. (species), and bracted verbena (*Verbena bracteata*).

Transect 2 at Pond 101 East (West) consisted of a 10-m transect placed in stratum 2. Nine plant species were observed along the transect. Of these species, seven were native and two were non-native. Pale spikerush was the dominant species, accounting for approximately 42% cover (see Appendix C Table C-2). The dominant cover was thatch, which accounted for approximately 48% cover. Alkali mallow and Lemmon's canary grass contributed approximately 5% and 2% cover, respectively. Other species included Pacific foxtail, lowland cudweed, Chinese pusley, smooth goldfields, rabbitfoot grass, and common sow thistle. Bare ground was also present.

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, nine were native, eleven were non-native, and one was unidentified. Pale spikerush and Hickman's popcornflower were the dominant species, accounting for approximately 20% and 15% cover, respectively (see Appendix C Table C-2). The dominant cover was thatch, which accounted for approximately 27% cover. Salt grass, cut-leaved geranium, smooth goldfields, Lemmon's canary grass, prostrate knotweed, rabbitfoot grass, curly dock, and bugle hedge nettle contributed cover ranging from 1% to 4%. Other species included Pacific bent grass, horseweed, redstem filaree (*Erodium cicutarium*), rattail sixweeks grass, Italian rye grass (*Festuca perennis*), lowland cudweed, Chinese pusley, smooth cat's-ear (*Hypochaeris glabra*), grass poly, *Pseudognaphalium* sp., and common sow thistle. Bare ground was also present and accounted for 13%.

Transect 4 at Pond 101 East (West) consisted of a 10-m transect placed in stratum 4. Twenty-two plant species were observed along the transect. Of these species, ten were native and twelve were non-native. Salt grass was the dominant species, accounting for approximately 33% cover (see Appendix C Table C-2). The dominant cover was thatch, which accounted for approximately 35% cover. Annual quaking grass, pale spikerush, cut-leaved geranium, Chinese pusley, brown-headed rush, grass poly, rabbitfoot grass, and weedy cudweed contributed cover ranging from 1% to 5%. Other species included Spanish lotus, coyote brush, long-beaked filaree, horseweed, smooth cat's-ear, rough cat's-ear, scarlet pimpernel, coast tarweed (*Madia sativa*), Hickman's popcornflower, curly dock, common sow thistle, small head clover (*Trifolium microcephalum*), and common vetch (*Vicia sativa* ssp. *nigra*). Bareground was also present and accounted for approximately 7%.

Transect 5 at Pond 101 East (West) consisted of a 10-m transect placed in stratum 5. Twenty-two plant species were observed along the transect. Of these species, eight were native, thirteen were non-native, and one was unidentified. Italian rye grass was the dominant species, accounting for approximately 34% cover (see Appendix C Table C-2). Thatch and bare ground were fairly abundant, accounting for approximately 32% and 11%, respectively. Needle spikerush contributed approximately 8% cover, while pale spikerush, long-beaked filaree, and alkali mallow contributed cover ranging from 1% to 4%. Other species included coyote brush, annual quaking grass, soft chess (*Bromus hordeaceus*), redstem filaree, rattail sixweeks grass, purple cudweed (*Gamochaeta ustulata*), cut-leaved geranium, meadow barley (*Hordeum brachyantherum* ssp. *brachyantherum*), smooth cat's-ear, rough cat's-ear, grass poly, chaffweed, Hickman's popcornflower, curly dock, prickly sow thistle, common sow thistle, and *Vicia* sp.

Transect 6 at Pond 101 East (West) consisted of a 5-m transect placed in stratum 6. Fourteen plant species were observed along the transect. Of these species, five were native, eight were non-native, and one was unidentified. Brown-headed rush was the dominant species, accounting for approximately 39% cover (see Appendix C Table C-2). Thatch and bare ground were fairly abundant, accounting for approximately 30% and 16%, respectively. Sheep sorrel contributed approximately 7% cover, while Baltic rush (*Juncus balticus*), cut-leaved plantain, *Pseudognaphalium* sp., and common vetch contributed approximately 1% cover. Other species included annual quaking grass, annual hair grass (*Deschampsia danthonioides*), horseweed, rattail sixweeks grass, cut-leaved geranium, smooth cat's-ear, curly dock, and bugle hedge-nettle.

3.2.3 Wildlife Monitoring

Wildlife surveys were not conducted at Pond 101 East (West) in 2018 because the vernal pool did not have sufficient depth to trigger surveys.

3.3 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 2018, Pond 101 East (East) was monitored for hydrology, vegetation, and wildlife.

3.3.1 Hydrology Monitoring

Pond 101 East (East) was monitored for hydrology seven times and dried in June (see Table 3-9 and Figure 3-5). The first monitoring event in November was conducted as part of the staff gauge maintenance and only included depth. During data validation, the depth recorded in February appeared to be in error and was subsequently removed from the dataset.

Table 3-9. 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)
11/20/2017	-	-	-	-	-	44	-
1/19/2018	9:50	6.82	11.92	0.21	63.0	44	2.09
2/19/2018	11:08	6.80	10.94	4.45	114.0	-	1.44
3/21/2018	9:53	6.97	12.62	3.35	40.8	40	1.86
4/17/2018	13:04	7.12	21.88	10.03	99.4	40	1.67
5/22/2018	10:22	6.42	13.55	15.25	1000.0	14	0.04
6/19/2018	14:12	-	-	-	-	DRY	0.00

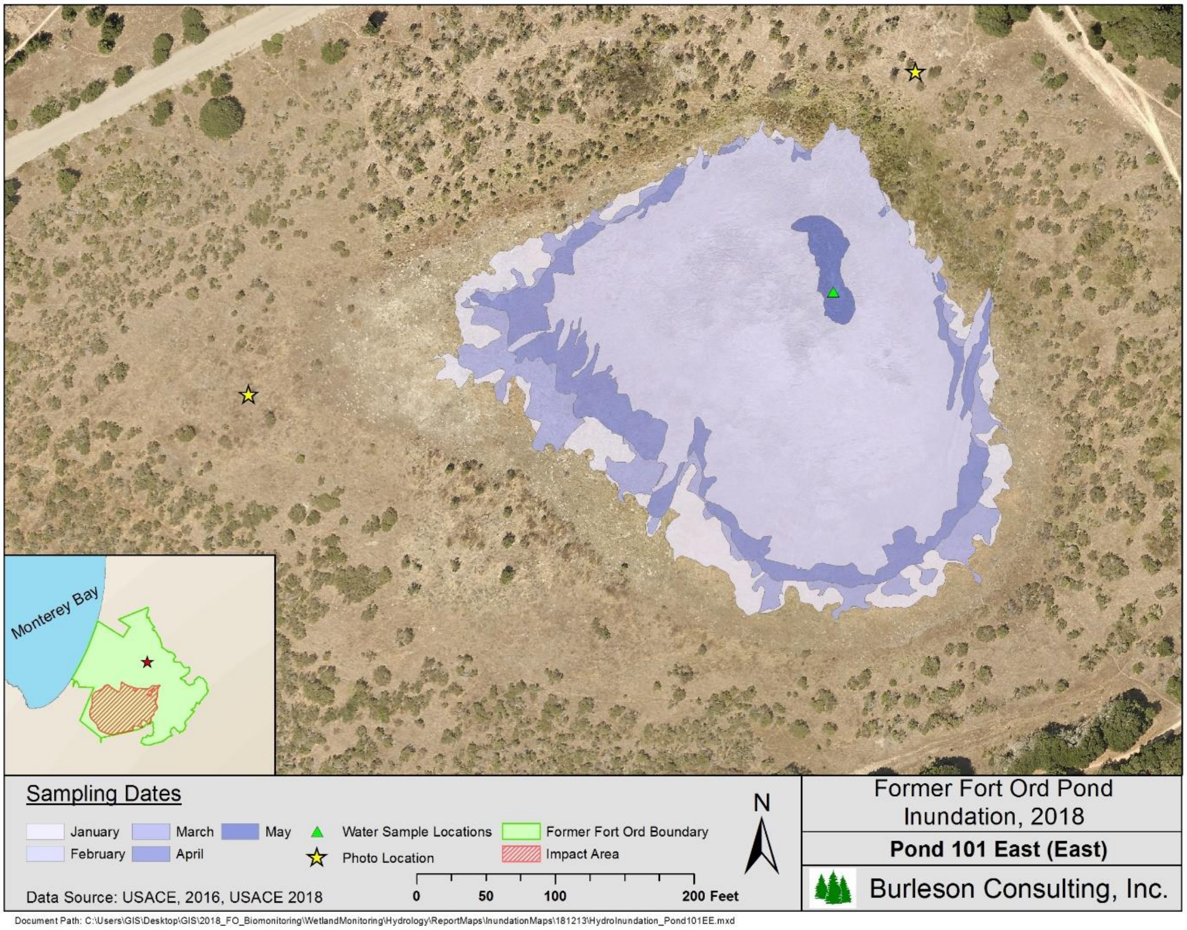


Figure 3-5. Map of Pond 101 East (East) (Reference) on Former Fort Ord, 2018

3.3.2 Vegetation Monitoring

Vegetation monitoring was conducted at Pond 101 East (East) on May 31, June 25, and July 5, 2018. These monitoring data represent reference conditions. Pond 101 East (East) was dry by the May 31 monitoring event. Biologists identified five strata at the vernal pool (see Table 3-10 and Figure 3-6). Appendix C provides the species cover results within each stratum. Strata 3 and 4 were mapped in previous years but were not present in 2018. Strata 1 and 2 were repeated from 2016, whereas strata 5 and 6 were repeated from 2017. Stratum 7 was new in 2018. 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. Transects 5 and 6 were repeated from 2017. Transect 7 was established in 2018.

Table 3-10. Pond 101 East (East) (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	7%
2	20%
5	30%
6	29%
7	14%

Figure 3-6. Pond 101 East (East) (Reference) Vegetation Strata and Transects on Former Fort Ord, 2018

Eighty-nine plant species were observed within the vernal pool basin boundary. Of these species, 52 were native, 35 were non-native, and two were unidentified. Additionally, nine species were OBL wetland plants, 34 were FACW or FAC, 16 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 101 East (East) consisted of a 10-m transect placed in stratum 1. Five plant species were observed along the transect. Of these species, two were native, two were non-native, and one was unidentified. Alkali mallow was the dominant species, accounting for approximately 42% cover (see Appendix C Table C-3). Bare ground was abundant, accounting for approximately 48%. Pale spikerush contributed approximately 6% cover, while *Rumex* sp. contributed approximately 3% cover. Redstem filaree and grass poly were the other two species observed. Thatch was also present.

Transect 2 at Pond 101 East (East) consisted of a 10-m transect placed in stratum 2. 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 67% cover (see Appendix C Table C-3). Bare ground and thatch were fairly abundant, accounting for approximately 17% and 8%, respectively. Alkali mallow contributed approximately 7% cover. Other species included lowland cudweed, grass poly, and rabbitfoot grass.

Transect 5 at Pond 101 East (East) consisted of a 10-m transect placed in stratum 5. Nineteen plant species were observed along the transect. Of these species, ten were native, eight were non-native, and one was unidentified. Cottonbatting plant was the dominant species, accounting for approximately 19% cover (see Appendix C Table C-3). Bare ground and thatch were abundant, accounting for approximately 31% and 26%, respectively. Seashore bent grass (*Agrostis pallens*), needle spikerush, Chinese pusley, weedy cudweed, sheep sorrel, bugle hedge nettle, and common vetch contributed cover ranging from 1% to 6%. Other species included Spanish lotus, vernal pool bent grass (*Agrostis lacuna-vernalis*), annual quaking grass, long-beaked filaree, horseweed, scarlet pimpernel, grass poly, rabbitfoot grass, brook cinquefoil (*Potentilla rivalis*), *Trifolium* sp., and small head clover.

Transect 6 at Pond 101 East (East) consisted of a 10-m transect placed in stratum 6. Five plant species were observed along the transect. Of these species, two were native and three were non-native. Baltic rush, clustered field sedge, and sheep sorrel were the dominant species, accounting for approximately 36%, 30%, and 17% cover, respectively (see Appendix C Table C-3). Thatch was fairly abundant accounting for approximately 13% cover. Weedy cudweed and curly dock were the other two species observed. Bare ground was also present and accounted for approximately 5%.

Transect 7 at Pond 101 East (East) consisted of a 10-m transect placed in stratum 7. Fourteen plant species were observed along the transect. Of these species, eight were native, four were non-native, and two were unidentified. Common toad rush was the dominant species, accounting for approximately 59% cover (see Appendix C Table C-3). Bare ground was fairly abundant, accounting for approximately 11%. Grass poly, alkali mallow, and rabbitfoot grass contributed approximately 10%, 7%, and 5% cover, respectively. Pale spikerush, lowland cudweed, and bugle hedge nettle contributed cover ranging from 1% to 3%. Other species included seashore bent grass, brook cinquefoil, weedy cudweed, western yellow cress, clustered dock (*Rumex conglomeratus*), *Trifolium* sp., and an unidentified herb. Thatch was also present.

3.3.2.1 *Vernal Pool Bent Grass*

Vernal pool bent grass occurrences at Pond 101 East (East) were mapped on May 31, 2018 (see Figure 3-7). This was the first time that the species has been documented at Pond 101 East (East). This documentation expands the current known range farther north than has been previously documented. The identification of the species was confirmed by David Styer, a CNPS volunteer. It was also found in Pond 3 North, 3 South, and 73 for the first time in 2018.

Figure 3-7. Vernal Pool Bent Grass Occurrence at Pond 101 East (East) (Reference), 2018

3.3.3 Wildlife Monitoring

Pond 101 East (East) was surveyed for CTS and fairy shrimp on April 27 and May 23, 2018. California tiger salamanders were present at the April survey event whereas fairy shrimp were not detected during either event. No further surveys were conducted in June due to insufficient vernal pool depth. Table 3-11 provides results of the CTS surveys conducted in 2018. Invertebrate results for 2018 are provided in Appendix D (see Table D-2).

Table 3-11. 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)	4/27/2018	2	2	118	118	118	60	55-65	N/A	1 hr 30 min
	5/23/2018	0	-	-	-	-	-	-	-	19 min 30 sec

*The mean was rounded to the nearest whole number

3.4 Pond 997

Pond 997 is a reference vernal pool that was monitored as a control for comparison to the remediated vernal pools. In 2018, Pond 997 was monitored for hydrology and vegetation.

3.4.1 Hydrology Monitoring

Pond 997 was monitored for hydrology four times from January through April and remained dry throughout the 2017-2018 water year.

3.4.2 Vegetation Monitoring

Vegetation monitoring was conducted at Pond 997 on April 8 and May 4, 2018. These monitoring data represent reference conditions. Pond 997 remained dry throughout the 2017-2018 water-year. Biologists identified four strata at the vernal pool (see Table 3-12 and Figure 3-8). Appendix C provides the species cover results within each stratum. Strata 1, 2, and 3 were repeated from 2017, whereas stratum 5 was new in 2018. Transects 1 and 3 were repeated from 2017. Transect 5 was established in 2018. Stratum 2 consisted of CCG and no transects were placed in this stratum. Figure 3-9 illustrates the extent and density of the goldfield population at Pond 997.

Table 3-12. Pond 997 (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	5%
2 (CCG)	1%
3	62%
5	31%
Upland	1%

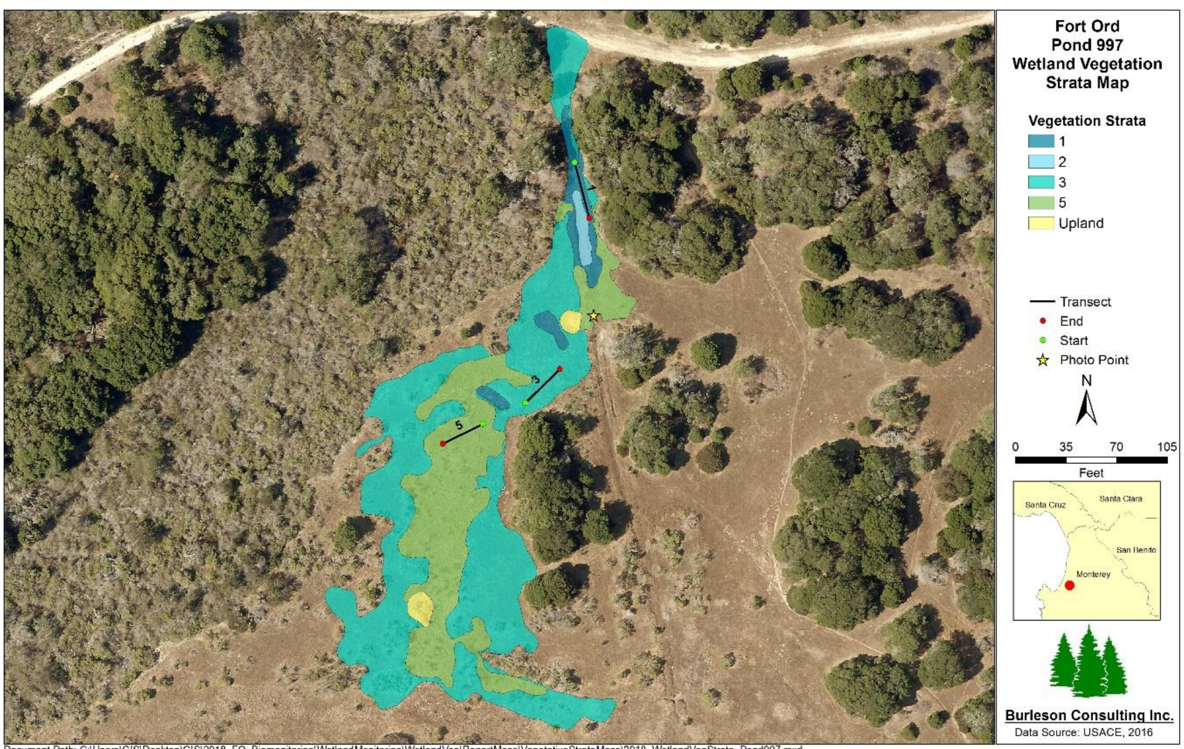


Figure 3-8. Pond 997 (Reference) Vegetation Strata and Transects on Former Fort Ord, 2018

Eighty-seven plant species were observed within the vernal pool basin boundary. Of these species, 59 were native, 27 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 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 997 consisted of a 10-m transect placed in stratum 1. Twenty-four plant species were observed along the transect. Of these species, thirteen were native, nine were non-native, and two were unidentified. Coyote thistle and rabbitfoot grass were the dominant species, accounting for approximately 15% and 10% cover, respectively (see Appendix C Table C-4). Thatch and bare ground were the dominant contributors, accounting for approximately 42% and 21%, respectively. Pale spikerush, long-beaked filaree, Hickman’s popcornflower, cut-leaved plantain, and round woolly-marbles (*Psilocarphus chilensis*) contributed cover ranging from 1% to 3%. Other species included silvery hair-grass, annual quaking grass, timwort (*Cicendia quadrangularis*), annual hair grass, needle spikerush, purple cudweed, smooth cat’s-ear, common toad rush, dwarf rush (*Juncus capitatus*), brown-headed rush, CCG, grass poly, chaffweed, Sacramento mesa mint (*Pogogyne zizyphoroides*), *Pseudognaphalium* sp., small-flower catchfly, and *Trifolium* sp.

Stratum 2 consisted of CCG. Figure 3-9 illustrates the extent and density of the population at Pond 997. No transects were placed in stratum 2 to avoid damaging the population.

Transect 3 at Pond 997 consisted of a 10-m transect placed in stratum 3. Twenty-five plant species were observed along the transect. Of these species, thirteen were native and twelve were non-native. California oat grass (*Danthonia californica*) and smooth cat’s-ear were the dominant species, accounting for approximately 16% and 12% cover, respectively (see Appendix C Table C-4). Thatch and bare ground were the dominant contributors, accounting for approximately 29% and 14%, respectively. Annual quaking grass, coyote thistle, long-beaked filaree, and rough cat’s-ear contributed cover ranging from 3% to 9%. Other species included Spanish lotus, silvery hair-grass, rattlesnake grass (*Briza maxima*), coastal tarweed (*Deinandra corymbosa*), pale spikerush, rattail sixweeks grass, climbing bedstraw (*Galium porrigens*), cut-leaved geranium, Howell's quillwort (*Isoetes howellii*), keeled bulrush (*Isolepis carinata*), brown-headed rush, scarlet pimpernel, grass poly, chaffweed, marsh microseris (*Microseris paludosa*), cut-leaved plantain, sheep sorrel, western blue-eyed grass (*Sisyrinchium bellum*), and coast pretty face (*Triteleia ixioides*).

Transect 5 at Pond 997 consisted of a 10-m transect placed in stratum 5. Twenty-one plant species were observed along the transect. Of these species, nine were native and twelve were non-native. Brown-headed rush was the dominant species, accounting for approximately 30% cover (see Appendix C Table C-4). Thatch and bare ground were abundant, accounting for approximately 36% and 24%, respectively. Rattlesnake grass, rough cat’s-ear, and grass poly contributed cover ranging from 1% to 2%. Other species included coyote brush, annual quaking grass, coyote thistle, long-beaked filaree, rattail sixweeks grass, climbing bedstraw, smooth cat’s-ear, keeled bulrush, common toad rush, narrowleaf cottonrose (*Logfia gallica*), scarlet pimpernel, chaffweed, Hickman’s popcornflower, English plantain (*Plantago lanceolata*), cutleaf burnweed, prickly sow thistle, and flowering quillwort.

3.4.2.1 *Contra Costa Goldfields*

Contra Costa goldfields at Pond 997 were mapped on April 8, 2018: they occupied 0.01 acres, with a density of 25% cover. Figure 3-9 illustrates the extent of the CCG population at Pond 997.

Figure 3-9. Contra Costa Goldfields Populations at Pond 997 (Reference), 2018

3.4.3 Wildlife Monitoring

Wildlife surveys were not conducted at Pond 997 in 2018 because the vernal pool did not have sufficient depth to trigger surveys.

3.5 Pond 3 North

Pond 3 North, a post-burn remediation vernal pool, was in year 1 of monitoring in 2018. In 2018, Pond 3 North was monitored for hydrology, vegetation, and wildlife.

3.5.1 Hydrology Monitoring

Pond 3 North was monitored for hydrology five times. The vernal pool held water in March and April and dried by May (see Table 3-13 and Figure 3-10).

Table 3-13. Pond 3 North (Year 1 Post-Burn) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundation Area (acres)
1/16/2018	10:20	-	-	-	-	DRY	0.00
2/20/2018	10:20	-	-	-	-	DRY	0.00
3/19/2018	10:35	6.27	11.33	8.75	57.4	10	0.02
4/16/2018	10:29	6.61	13.33	7.60	5.3	24	0.05
5/21/2018	9:42	-	-	-	-	DRY	0.00

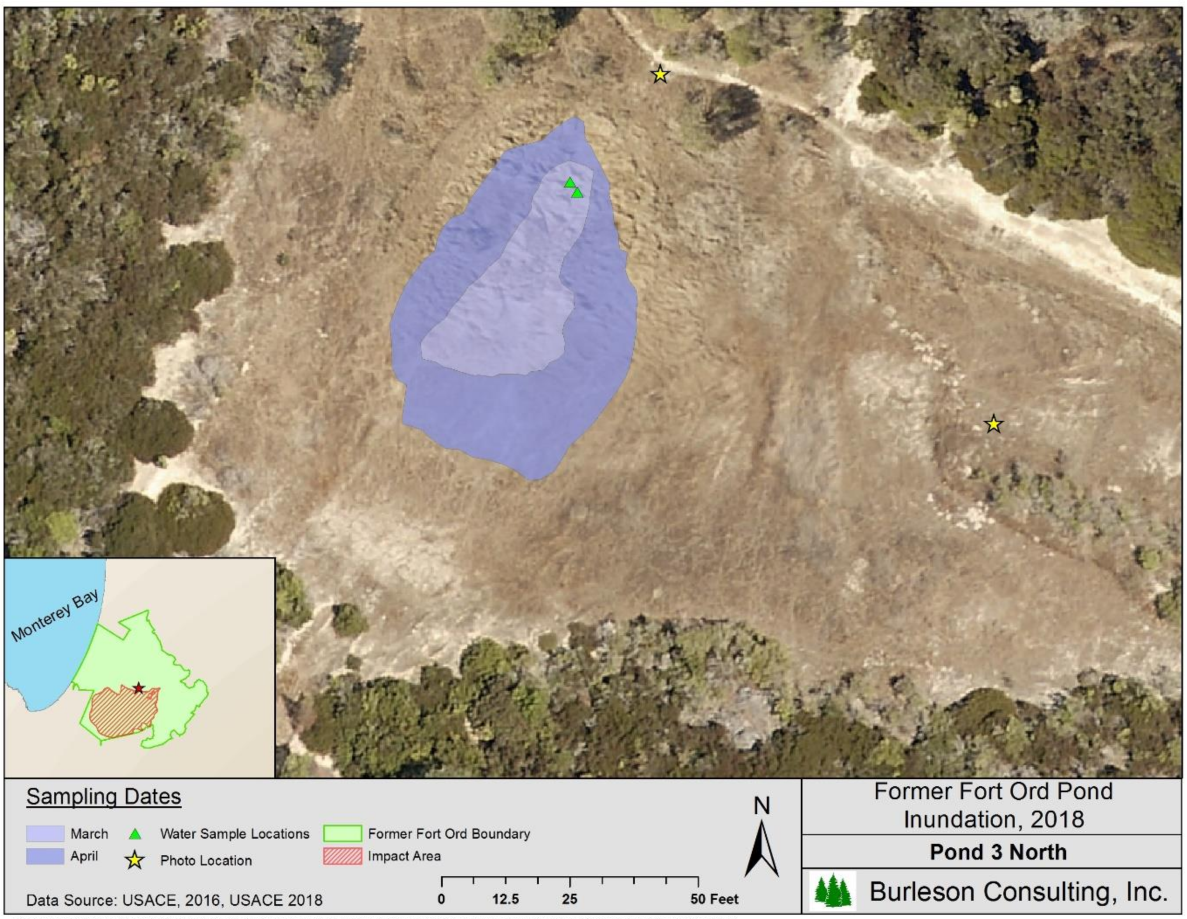


Figure 3-10. Map of Pond 3 North (Year 1 Post-Burn) on Former Fort Ord, 2018

3.5.2 Vegetation Monitoring

Vegetation monitoring was conducted at Pond 3 North on May 3 and 17, 2018. These monitoring data represent year 1 post-burn conditions. Standing water with a depth of 7 cm was present during the May 3 monitoring event, but the vernal pool was dry by May 17. Biologists identified four strata at the vernal pool (see Table 3-14 and Figure 3-11). Appendix C provides the species cover results within each stratum. Strata 1 through 4 were repeated from 2015. Transects 1 and 2 were repeated, whereas

Transect 3 was new in 2018. In 2015, stratum 3 was mapped but no transect was placed in the stratum as it did not support wetland vegetation for that water-year (Burleson, 2015). Stratum 4 consisted of CCG and no transects were placed in this stratum. Figure 3-12 illustrates the extent and density of the goldfield population at Pond 3 North.

Table 3-14. Pond 3 North (Year 1 Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	6%
2	18%
3	47%
4 (CCG)	29%

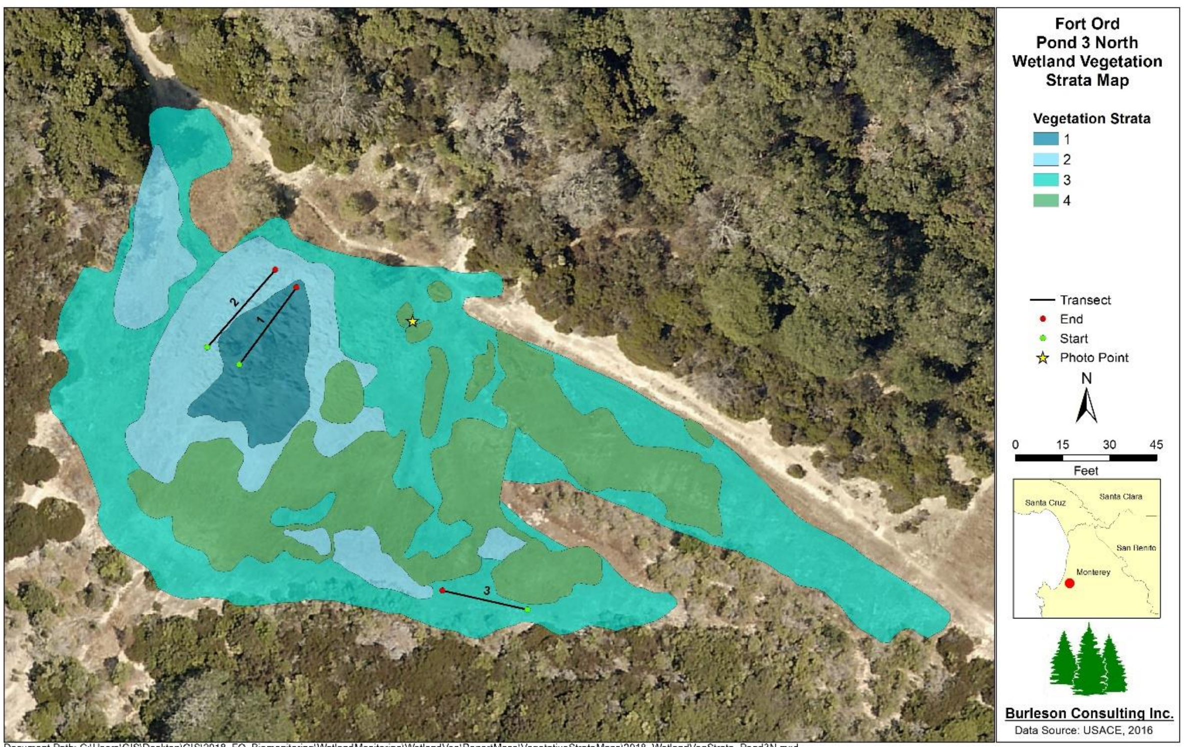


Figure 3-11. Pond 3 North (Year 1 Post-Burn) Vegetation Strata and Transects on Former Fort Ord, 2018

Eighty-two plant species were observed within the vernal pool basin boundary. Of these species, 52 were native and 30 were non-native. Additionally, 14 species were OBL wetland plants, 27 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 1 at Pond 3 North consisted of a 10-m transect placed in stratum 1. Eleven plant species were observed along the transect. Of these species, five were native and six were non-native. Pale spikerush was the dominant species, accounting for approximately 50% cover (see Appendix C Table C-5). Bare ground was abundant, accounting for approximately 30%. Smooth goldfields, Hickman's popcornflower, and rabbitfoot grass contributed cover ranging from 2% to 6%. Other species included brass buttons (*Cotula coronopifolia*), aquatic pygmy-weed (*Crassula aquatica*), rattail sixweeks grass, Italian rye grass, cut-leaved geranium, brown-headed rush, and grass poly. Thatch was also present and accounted for approximately 6% cover.

Transect 2 at Pond 3 North consisted of a 10-m transect placed in stratum 2. Eleven plant species were observed along the transect. Of these species, five were native and six were non-native. Pale spikerush was the dominant species, accounting for approximately 44% cover (see Appendix C Table C-5). Bare ground and thatch were fairly abundant, accounting for approximately 28% and 16%, respectively. Coyote thistle, cut-leaved geranium, brown-headed rush, and Hickman's popcornflower contributed cover ranging from 1% to 4%. Other species included brass buttons, needle spikerush, Italian rye grass, grass poly, cut-leaved plantain, and rabbitfoot grass.

Transect 3 at Pond 3 North consisted of a 10-m transect placed in stratum 3. Thirty plant species were observed along the transect. Of these species, eighteen were native and twelve were non-native. Coyote thistle and Italian rye grass were the dominant species, accounting for approximately 11% and 10% cover, respectively (see Appendix C Table C-5). Bare ground was abundant, accounting for approximately 38%. California oat grass, brown-headed rush, scarlet pimpernel, and marsh microseris contributed cover ranging from 4% to 7%. Annual quaking grass, soft chess, rough cat's-ear, and Howell's quillwort contributed cover ranging from 1% to 3%. Other species included hill lotus (*Acmispon parviflorus*), vernal pool bent grass, silvery hair-grass, dwarf brodiaea (*Brodiaea terrestris* ssp. *terrestris*), ripgut grass (*Bromus diandrus*), pink star-tulip (*Calochortus uniflorus*), purple owl's-clover (*Castilleja exserta*), aquatic pygmy-weed, coastal tarweed, annual hair grass, long-beaked filaree, rattail sixweeks grass, smooth cat's-ear, keeled bulrush, low bulrush (*Isolepis cernua*), common toad rush, dwarf rush, grass poly, chaffweed, and sun cups (*Taraxia ovata*). Thatch was also present and accounted for approximately 4%.

Stratum 4 consisted of CCG. Figure 3-12 illustrates the extent and density of the populations at 3 North. No transects were placed in stratum 4 to avoid damaging the population.

3.5.2.1 *Contra Costa Goldfields and Vernal Pool Bent Grass*

Contra Costa goldfields at Pond 3 North were mapped on May 3, 2018: they occupied 0.14 acres, with a density range of 10-70% cover. Figure 3-12 illustrates the extent of the CCG population at Pond 3 North.

Figure 3-12. Contra Costa Goldfields Populations at Pond 3 North (Year 1 Post-Burn), 2018

Vernal pool bent grass occurrences at Pond 3 North were mapped on May 3, 2018 (see Figure 3-13). This was the first time that the species has been documented at Pond 3 North. This documentation expands the current known range farther southeast than has been previously documented. It was also found in Ponds 101 East (East), 3 South, and 73 for the first time in 2018.

Figure 3-13. Vernal Pool Bent Grass Occurrences Pond 3 North (Year 1 Post-Burn), 2018

3.5.3 Wildlife Monitoring

Pond 3 North was surveyed for CTS and fairy shrimp on April 26, 2018. California tiger salamanders and fairy shrimp were not detected during the April survey event. No further surveys were conducted in May or June due to insufficient depth. Invertebrate results for 2018 are provided in Appendix D (see Table D-2).

3.6 Pond 3 South

Pond 3 South, a post-burn vernal pool, was in year 1 of monitoring in 2018. Pond 3 North was monitored for hydrology and vegetation.

3.6.1 Hydrology Monitoring

Pond 3 South was monitored for hydrology five times. The vernal pool held water in April and dried by May (see Table 3-15 and Figure 3-14).

Table 3-15. Pond 3 South (Year 1 Post-Burn) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundation Area (acres)
1/16/2018	10:27	-	-	-	-	DRY	0.00
2/20/2018	10:30	-	-	-	-	DRY	0.00
3/19/2018	10:49	-	-	-	-	DRY	0.00
4/16/2018	12:47	7.13	15.67	8.75	77.7	8	0.001‡
5/21/2018	9:32	-	-	-	-	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.

Document Path: C:\Users\GIS\Desktop\GIS\2018_FO_Biomonitoring\WetlandMonitoring\Hydrology\ReportMaps\InundationMaps\181213\HydroInundation_Pond3South.mxd

Figure 3-14. Map of Pond 3 South (Year 1 Post-Burn) on Former Fort Ord, 2018

3.6.2 Vegetation Monitoring

Vegetation monitoring was conducted at Pond 3 South on May 15 and 17, 2018. These monitoring data represent year 1 post-burn conditions. Pond 3 South was dry by the May 15 monitoring event. Biologists identified four strata at the vernal pool (see Table 3-16 and Figure 3-15). Appendix C provides the species cover results within each stratum. Strata 1 through 4 were repeated from 2016. Transects 1, 2, and 4 were repeated, whereas Transect 3 was relocated to an area with more representative vegetative composition.

Table 3-16. Pond 3 South (Year 1 Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	18%
2	29%
3	48%
4	4%
Upland	1%

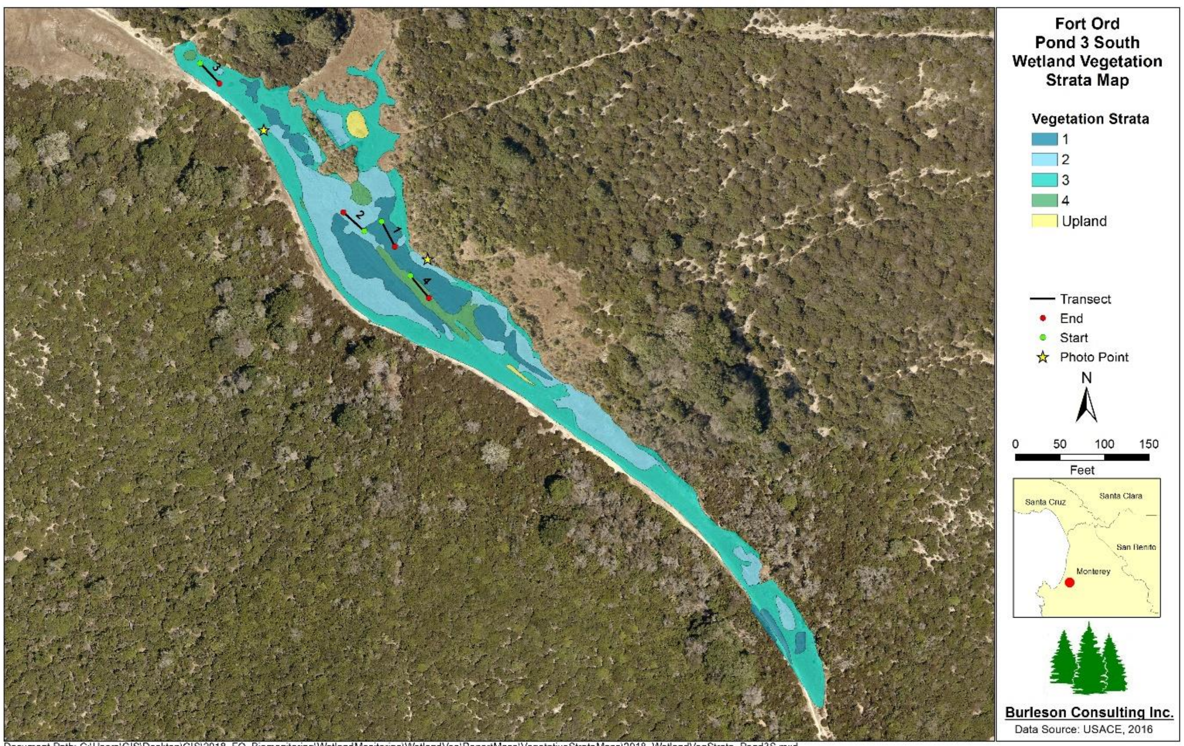


Figure 3-15. Pond 3 South (Year 1 Post-Burn) Vegetation Strata and Transects on Former Fort Ord, 2018

One hundred six plant species were observed within the vernal pool basin boundary. Of these species, 66 were native and 40 were non-native. Additionally, 13 species were OBL wetland plants, 35 were FACW or FAC, 18 were FACU or UPL, and 40 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. Sixteen plant species were observed along the transect. Of these species, eleven were native and five were non-native. Coyote thistle and pale spikerush were the dominant species, accounting for approximately 18% and 16% cover, respectively (see Appendix C Table C-6). Bare ground was abundant, accounting for approximately 33%. Needle spikerush, brown-headed rush, Hickman's popcornflower, and rabbitfoot grass contributed cover ranging from 3% to 7%. Grass poly, alkali mallow, and cut-leaved plantain contributed cover ranging from 1% to 2%. Other species included dwarf brodiaea, brass buttons, aquatic pygmy-weed, annual hair grass, smooth cat's-ear, chaffweed, and slender woolly-marbles (*Psilocarphus tenellus*). Thatch was also present and accounted for approximately 6% cover.

Transect 2 at Pond 3 South consisted of a 10-m transect placed in stratum 2. Twenty-seven plant species were observed along the transect. Of these species, fourteen were native and thirteen were non-native. Brown-headed rush was the dominant species, accounting for approximately 21% cover (see Appendix C Table C-6). Bare ground was abundant, accounting for approximately 30%. Coastal tarweed, coyote thistle, and alkali mallow contributed cover ranging from 5% to 7%. Annual quaking grass, dwarf brodiaea, needle spikerush, long-beaked filaree, rattail sixweeks grass, Italian rye grass, and marsh microseris contributed cover ranging from 1% to 3%. Other species included coyote brush, Johnny-Nip, sticky mouse-ear chickweed (*Cerastium glomeratum*), annual hair grass, pale spikerush, cut-leaved geranium, smooth cat's-ear, rough cat's-ear, keeled bulrush, Howell's quillwort, scarlet pimpernel, grass poly, cut-leaved plantain, rabbitfoot grass, California buttercup (*Ranunculus californicus*), and small-flower catchfly. Thatch was also present and accounted for approximately 11% cover.

Transect 3 at Pond 3 South consisted of a 10-m transect placed in stratum 3. Thirty-two plant species were observed along the transect. Of these species, fifteen were native and seventeen were non-native. California oat grass was the dominant species, accounting for approximately 15% cover (see Appendix C Table C-6). Bare ground was abundant, accounting for approximately 51% cover. Silvery hair-grass, coyote thistle, long-beaked filaree, rattail sixweeks grass, nit grass (*Gastridium phleoides*), common toad rush, narrowleaf cottonrose, scarlet pimpernel, and cut-leaved plantain contributed cover ranging from 1% to 5%. Other species included vernal pool bent grass, coyote brush, annual quaking grass, soft chess, timwort, aquatic pygmy-weed, coastal tarweed, smooth cat's-ear, rough cat's-ear, keeled bulrush, Howell's quillwort, dwarf rush, brown-headed rush, grass poly, chaffweed, small tarweed (*Madia exigua*), rabbitfoot grass, slender woolly-marbles, western blue-eyed grass, small-flower catchfly, narrow-leaved clover (*Trifolium angustifolium*), and little hop clover (*Trifolium dubium*). Thatch was also present and accounted for approximately 7%.

Transect 4 at Pond 3 South consisted of a 10-m transect placed in stratum 4. Twenty-five plant species were observed along the transect. Of these species, eleven were native and fourteen were non-native. Italian rye grass and alkali mallow were the dominant species, accounting for approximately 22% and 12% cover, respectively (see Appendix C Table C-6). Bare ground accounting for approximately 21%. Coastal tarweed, rattail sixweeks grass, cut-leaved geranium, and brown-headed rush contributed cover ranging from 4% to 8%. Annual quaking grass, soft chess, coyote thistle, smooth cat's-ear, marsh microseris, California buttercup, and small-flower catchfly contributed cover ranging from 1% to 2%. Other species included dwarf brodiaea, ripgut grass, California oat grass, pale spikerush, long-beaked filaree, meadow barley, rough cat's-ear, scarlet pimpernel, grass poly, gumweed (*Madia gracilis*), rabbitfoot grass, and common sow thistle. Thatch was also present and accounted for approximately 6%.

3.6.2.1 *Contra Costa Goldfields and Vernal Pool Bent Grass*

One individual CCG plant at Pond 3 South was mapped on May 17, 2018 (see Figure 3-16). This is the first documented occurrence at Pond 3 South; however, the proximity to Pond 3 North makes it likely that the species occurred in past years.

Figure 3-16. Contra Costa Goldfield Occurrence at Pond 3 South (Year 1 Post-Burn), 2018

Vernal pool bent grass occurrences at Pond 3 South were mapped on May 17, 2018 (see Figure 3-17). This was the first time that the species has been documented at Pond 3 South. It was also found in Ponds 101 East (East), 3 North, and 73 for the first time in 2018.

Figure 3-17. Vernal Pool Bent Grass Occurrences at Pond 3 South (Year 1 Post-Burn), 2018

3.6.3 Wildlife Monitoring

Wildlife surveys were not conducted at Pond 3 South in 2018 because the vernal pool did not have sufficient depth to trigger surveys.

3.7 Pond 39

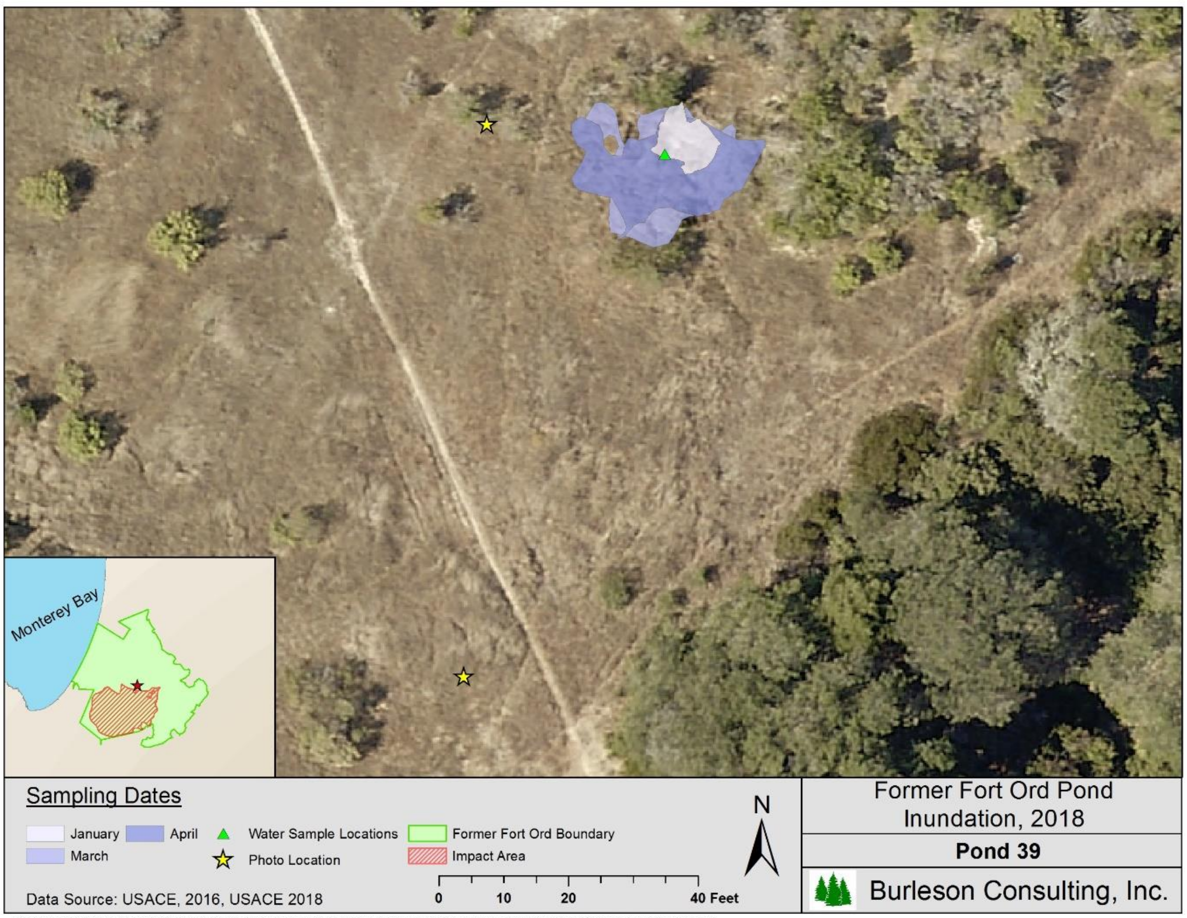
Pond 39, a post-burn vernal pool, was in year 1 of monitoring in 2018. Pond 39 was monitored for hydrology, vegetation, and wildlife.

3.7.1 Hydrology Monitoring

Pond 39 was monitored for hydrology six times. The vernal pool held water in January, dried in February held water again in March and April, and dried by May (see Table 3-17 and Figure 3-18). The first monitoring event in November was conducted as part of the staff gauge maintenance and only included depth. An additional staff gauge was installed at the deepest point to rectify the inaccuracy of the 2016 staff gauge. An offset of 30 cm was recorded between 2016 and the newly installed staff gauge. All prior depth measurements have been normalized for comparison.

Table 3-17. Pond 39 (Year 1 Post-Burn) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundation Area (acres)
11/20/2017	-	-	-	-	-	DRY	0.00
1/16/2018	9:18	5.94	11.78	2.36	43.1	15	0.002
2/20/2018	9:40	-	-	-	-	DRY	0.00
3/19/2018	9:48	6.51	8.35	4.59	142.0	38	0.01
4/16/2018	9:41	6.21	12.68	5.81	66.2	34	0.01
5/21/2018	12:02	-	-	-	-	DRY	0.00



Document Path: C:\Users\GIS\Desktop\GIS\2018_FO_Biomonitoring\WetlandMonitoring\Hydrology\ReportMaps\InundationMaps\181213\HydroInundation_Pond39.mxd

Figure 3-18. Map of Pond 39 (Year 1 Post-Burn) on Former Fort Ord, 2018

3.7.2 Vegetation Monitoring

Vegetation monitoring was conducted at Pond 39 on May 17 and 30, 2018. These monitoring data represent year 1 post-burn conditions. Pond 39 was dry by the May 17 monitoring event. Biologists identified four strata at the vernal pool (see Table 3-18 and Figure 3-19). Appendix C provides the species cover results within each stratum. Strata 1 and 3 were repeated from 2016. Stratum 2 was observed but was not mapped as it was insignificant to the overall wetland composition and too small to place a transect within. Stratum 4 was new in 2018. Transect 1 was repeated from 2016, whereas Transect 3 was relocated to an area with more representative vegetative composition. Transect 4 was established in 2018.

Table 3-18. Pond 39 (Year 1 Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	3%
3	56%
4	32%
Upland	9%

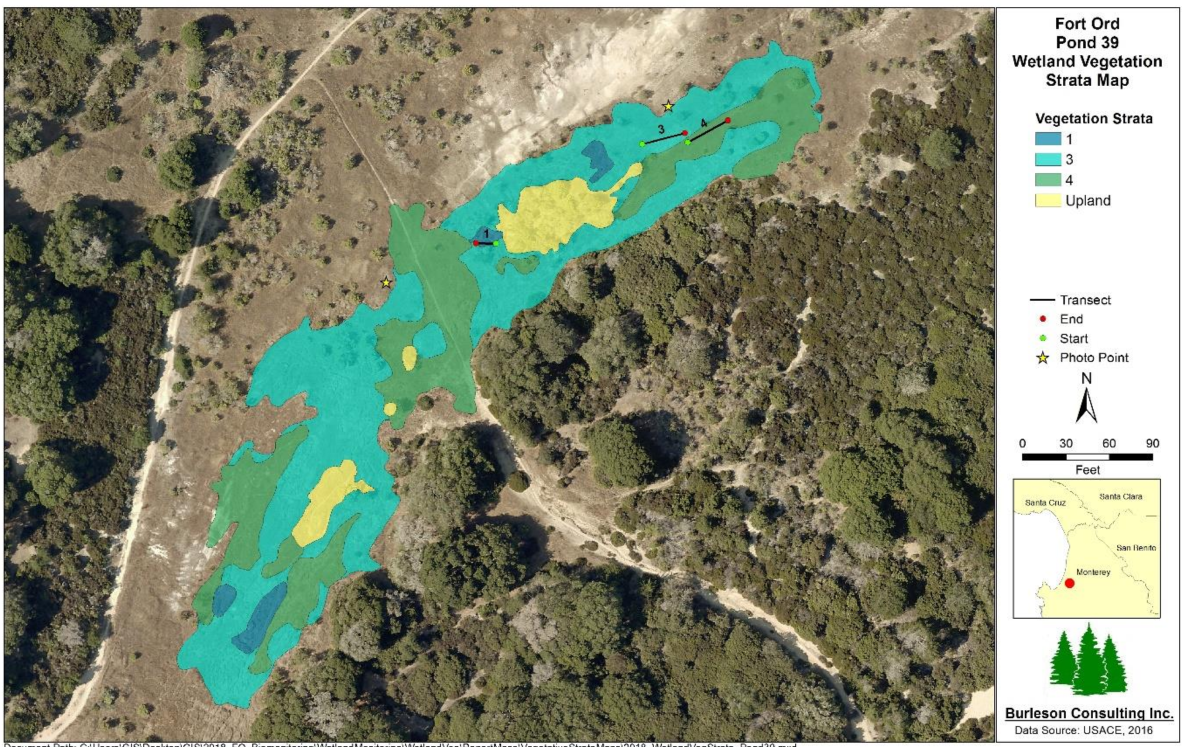


Figure 3-19. Pond 39 (Year 1 Post-Burn) Vegetation Strata and Transects on Former Fort Ord, 2018

Ninety plant species were observed within the vernal pool basin boundary. Of these species, 54 were native, 35 were non-native, and one was unidentified. Additionally, 10 species were OBL wetland plants, 27 were FACW or FAC, 16 were FACU or UPL, and 37 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. Twelve plant species were observed along the transect. Of these species, six were native and six were non-native. Pale spikerush and Hickman's popcornflower were the dominant species, accounting for approximately 47% and 12%

cover, respectively (see Appendix C Table C-7). Bare ground was fairly abundant, accounting for approximately 12%. Needle spikerush, brown-headed rush, grass poly, and rabbitfoot grass contributed cover ranging from 3% to 7%. Other species included annual hair grass, rattail sixweeks grass, Italian rye grass, cut-leaved geranium, meadow barley, and curly dock. Thatch was also present and accounted for approximately 5% cover.

Transect 3 at Pond 39 consisted of a 10-m transect placed in stratum 3. Twenty-one plant species were observed along the transect. Of these species, six were native and fifteen were non-native. Italian rye grass was the dominant species, accounting for approximately 28% cover (see Appendix C Table C-7). Bare ground and thatch were fairly abundant, accounting for approximately 29% and 14%, respectively. Salt grass contributed approximately 9% cover, while California oat grass, coastal tarweed, long-beaked filaree, cut-leaved geranium, cut-leaved plantain, and common vetch contributed cover ranging from 1% to 5%. Other species included annual quaking grass, ripgut grass, soft chess, redstem filaree, brome fescue (*Festuca bromoides*), rattail sixweeks grass, smooth cat's-ear, rough cat's-ear, scarlet pimpernel, chaffweed, common madia (*Madia elegans*), coast tarweed, and narrow-leaved clover.

Transect 4 at Pond 39 consisted of a 10-m transect placed in stratum 4. Twenty-three plant species were observed along the transect. Of these species, eight were native and fifteen were non-native. California oat grass and narrow-leaved clover were the dominant species, accounting for approximately 22% and 11% cover, respectively (see Appendix C Table C-7). Bare ground and thatch were fairly abundant, accounting for approximately 35% and 16%, respectively. Cut-leaved plantain contributed approximately 4% cover, while hill lotus, silvery hair-grass, soft chess, brome fescue, brown-headed rush, and checkerbloom (*Sidalcea malviflora* ssp. *malviflora*) contributed approximately 1% cover. Other species included annual quaking grass, ripgut grass, coastal tarweed, long-beaked filaree, rattail sixweeks grass, Italian rye grass, cut-leaved geranium, smooth cat's-ear, rough cat's-ear, scarlet pimpernel, common madia, small tarweed, gumweed, and common vetch.

3.7.3 Wildlife Monitoring

Pond 39 was surveyed for CTS and fairy shrimp on April 26, 2018. California tiger salamanders were not detected during the April survey event; however, fairy shrimp were detected in low abundance. No further surveys were conducted in May or June due to insufficient vernal pool depth. Invertebrate results for 2018 are provided in Appendix D (see Tables D-2 – D-3).

3.8 Pond 40 North

Pond 40 North, a post-burn vernal pool, was in year 1 of monitoring in 2018. Pond 40 North was monitored for hydrology and vegetation.

3.8.1 Hydrology Monitoring

Pond 40 North was monitored for hydrology five times. The vernal pool held water in March and April and dried by May (see Table 3-19 and Figure 3-20).

Table 3-19. Pond 40 North (Year 1 Post-Burn) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundation Area (acres)
1/16/2018	10:03	-	-	-	-	DRY	0.00
2/20/2018	9:55	-	-	-	-	DRY	0.00
3/19/2018	10:10	6.18	6.67	9.12	141.0	8	0.007
4/16/2018	10:07	6.36	11.72	7.62	64.2	9	0.005
5/21/2018	12:10	-	-	-	-	DRY	0.00

Figure 3-20. Map of Pond 40 North (Year 1 Post-Burn) on Former Fort Ord, 2018

3.8.2 Vegetation Monitoring

Vegetation monitoring was conducted at Pond 40 North on May 8, 2018. These monitoring data represent year 1 post-burn conditions. Pond 40 North was dry by the May 8 monitoring event. Biologists identified two strata at the vernal pool (see Table 3-20 and Figure 3-21). Appendix C provides the species cover results within each stratum. Stratum 2 was repeated from 2015, whereas stratum 4 was new in 2018. Stratum 1 from 2015 consisted of a monotypic stand of California bulrush. This species was not present in 2018; however, there was evidence of burned stalks in the area identified as stratum 1. No new growth was present at the stalks at the time of the survey. Stratum 3 from 2018 consisted of pale spikerush and cut-leaved plantain. Although these species were present, cut-leaved plantain was throughout the vernal pool basin but was not a dominant species. Transect 2 was repeated but the number was changed to correspond with the appropriate stratum. In 2015 it was labeled Transect 1 whereas in 2018 it is Transect 2 (Burleson, 2015). Transect 4 was established in 2018.

Table 3-20. Pond 40 North (Year 1 Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
2	26%
4	74%

Figure 3-21. Pond 40 North (Year 1 Post-Burn) Vegetation Strata and Transects on Former Fort Ord, 2018

Fifty-seven plant species were observed within the vernal pool basin boundary. Of these species, 34 were native and 23 were non-native. Additionally, five species were OBL wetland plants, 17 were FACW or FAC, 12 were FACU or UPL, and 23 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. Eleven plant species were observed along the transect. Of these species, four were native and seven were non-native. Pale spikerush was the dominant species, accounting for approximately 27% cover (see Appendix C Table C-

8). Bare ground and thatch were abundant, accounting for approximately 35% and 22%, respectively. Brass buttons, horseweed, cut-leaved geranium, smooth cat's-ear, grass poly, and cut-leaved plantain contributed cover ranging from 1% to 4%. Other species included coyote brush, skunkweed (*Navarretia squarrosa*), weedy cudweed, and common sow thistle.

Transect 4 at Pond 40 North consisted of a 5-m transect placed in stratum 4. Eleven plant species were observed along the transect. Of these species, three were native and eight were non-native. Brown-headed rush was the dominant species, accounting for approximately 45% cover (see Appendix C Table C-8). Bare ground was abundant, accounting for approximately 33%. Wild oat (*Avena fatua*), annual quaking grass, cut-leaved geranium, rough cat's-ear, cut-leaved plantain, and small-flower catchfly contributed cover ranging from 1% to 3%. Other species included pale spikerush, goose grass (*Galium aparine*), grass poly, and weedy cudweed. Thatch was also present and accounted for approximately 9%.

3.8.3 Wildlife Monitoring

Wildlife surveys were not conducted at Pond 40 North in 2018 because the vernal pool did not have sufficient depth to trigger surveys.

3.9 Pond 40 South

Pond 40 South, a post-burn vernal pool, was in year 1 of monitoring in 2018. Pond 40 South was monitored for hydrology and vegetation.

3.9.1 Hydrology Monitoring

Pond 40 South was monitored for hydrology four times from January through April and remained dry for the 2017-2018 water year.

3.9.2 Vegetation Monitoring

Vegetation monitoring was conducted at Pond 40 South on May 8, 2018. These monitoring data represent year 1 post-burn conditions. Pond 40 South was dry by the May 8 monitoring event. Biologists identified three strata at the vernal pool (see Table 3-21 and Figure 3-22). Appendix C provides the species cover results within each stratum. Strata 1 through 3 were repeated from 2016. Transects 1 and 2 were repeated, whereas Transect 3 was relocated to an area with more representative vegetative composition.

Table 3-21. Pond 40 South (Year 1 Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	6%
2	21%
3	73%

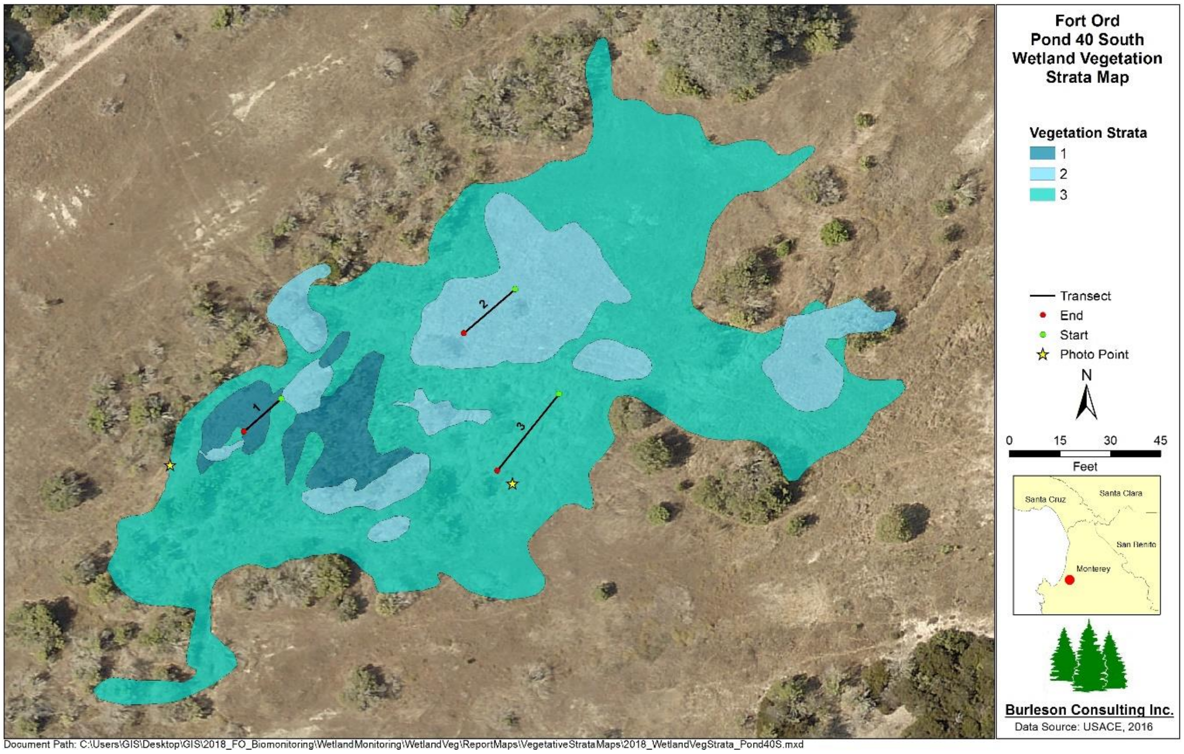


Figure 3-22. Pond 40 South (Year 1 Post-Burn) Vegetation Strata and Transects on Former Fort Ord, 2018

Fifty-five plant species were observed within the vernal pool basin boundary. Of these species, 27 were native and 28 were non-native. Additionally, four species were OBL wetland plants, 22 were FACW or FAC, 12 were FACU or UPL, and 17 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. Twelve plant species were observed along the transect. Of these species, four were native and eight were non-native. Cut-leaved plantain, pale spikerush, and Hickman's popcornflower were the dominant species, accounting for approximately 27%, 24%, and 11% cover, respectively (see Appendix C Table C-9). Bare ground was abundant, accounting for approximately 25%. Rabbitfoot grass and Italian rye grass contributed approximately 4% and 1% cover, respectively. Other species included annual hair grass, rough cat's-ear, grass poly, Lemmon's canary grass, prostrate knotweed, curly dock, and spring vetch (*Vicia sativa*). Thatch was also present and accounted for approximately 3% cover.

Transect 2 at Pond 40 South consisted of a 5-m transect placed in stratum 2. Twelve plant species were observed along the transect. Of these species, one was native, ten were non-native, and one was unidentified. Brown-headed rush and cut-leaved plantain were the dominant species, accounting for approximately 14% and 6% cover, respectively (see Appendix C Table C-9). Bare ground was abundant, accounting for approximately 64%. Long-beaked filaree, rough cat's-ear, and small-flower catchfly contributed cover ranging from 1% to 5%. Other species included silvery hair-grass, annual quaking grass, soft chess, rattail sixweeks grass, grass poly, *Pseudognaphalium* sp., and sheep sorrel. Thatch was also present and accounted for approximately 9% cover.

Transect 3 at Pond 40 South consisted of a 10-m transect placed in stratum 3. Twenty-one plant species were observed along the transect. Of these species, five were native and sixteen were non-native. Italian rye grass was the dominant species, accounting for approximately 17% cover (see Appendix C Table C-9). Bare ground and thatch were fairly abundant, accounting for approximately 29% and 18%, respectively. Coastal tarweed, long-beaked filaree, redstem filaree, rattail sixweeks grass, cut-leaved geranium, smooth cat's-ear, rough cat's-ear, cut-leaved plantain, and spring vetch (*Vicia sativa* ssp. *sativa*) contributed cover ranging from 2% to 6%. Other species included annual quaking grass, ripgut grass, soft chess, California oat grass, Parish's spikerush (*Eleocharis parishii*), brown-headed rush, coast tarweed, sheep sorrel, small-flower catchfly, narrow-leaved clover, and little hop clover.

3.9.3 Wildlife Monitoring

Wildlife surveys were not conducted at Pond 40 South in 2018 because the vernal pool did not have sufficient depth to trigger surveys.

3.10 Pond 43

Pond 43, a post-burn vernal pool, was in year 1 of monitoring in 2018. Pond 43 was monitored for hydrology and vegetation.

3.10.1 Hydrology Monitoring

Pond 43 was monitored for hydrology four times from January through April and remained dry for the 2017-2018 water year.

3.10.2 Vegetation Monitoring

Vegetation monitoring was conducted at Pond 43 on May 10 and 14, 2018. These monitoring data represent year 1 post-burn conditions. Pond 43 was dry by the May 10 monitoring event. Biologists identified three strata at the vernal pool (see Table 3-22 and Figure 3-23). Appendix C provides the species cover results within each stratum. All three strata were repeated from 2016. Transects 1 and 3 were repeated. Transect 2 was rotated slightly to stay within the boundary of stratum 2 and a new start point was established.

Table 3-22. Pond 43 (Year 1 Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	34%
2	48%
3	16%
Upland	2%

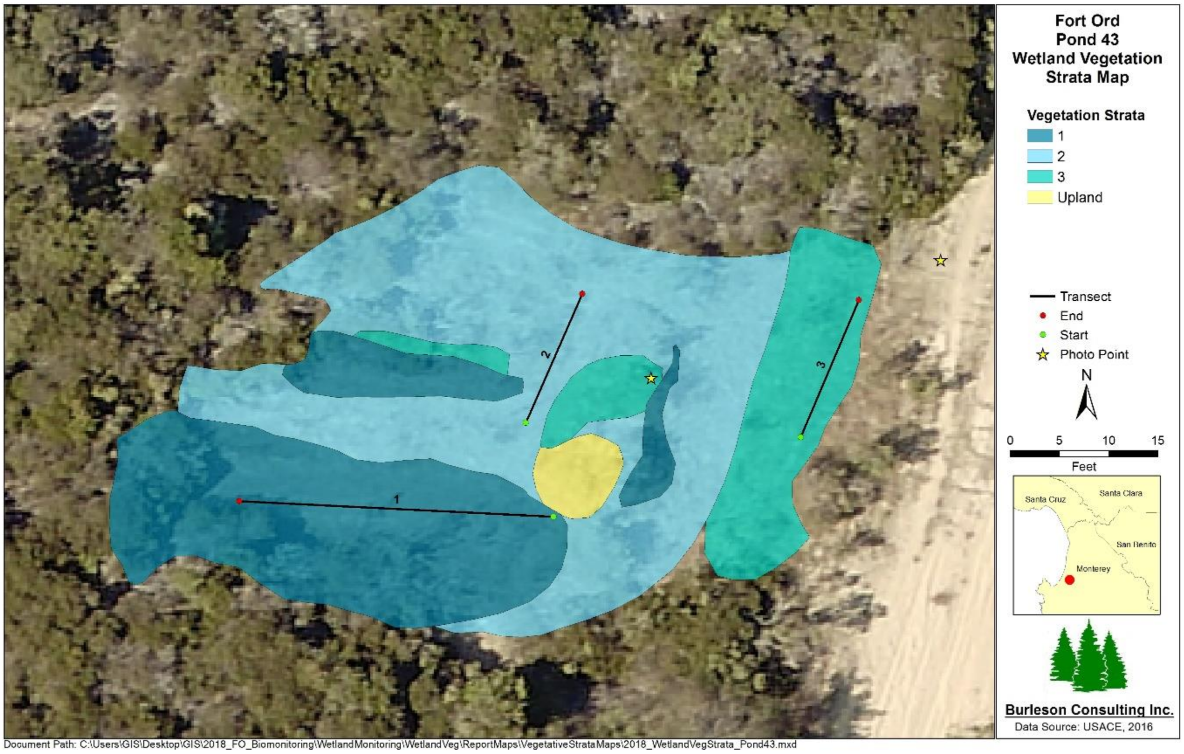


Figure 3-23. Pond 43 (Year 1 Post-Burn) Vegetation Strata and Transects on Former Fort Ord, 2018

Fifty-one plant species were observed within the vernal pool basin boundary. Of these species, 32 were native and 19 were non-native. Additionally, seven species were OBL wetland plants, 18 were FACW or FAC, nine were FACU or UPL, and 17 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. Nineteen plant species were observed along the transect. Of these species, fifteen were native and four were non-native. Rabbitfoot grass, brown-headed rush, and Hickman's popcornflower were the dominant species, accounting for approximately 20%, 11%, and 9% cover, respectively (see Appendix C Table C-10). Bare ground and thatch were fairly abundant, accounting for approximately 29% and 15%, respectively. Coyote thistle contributed approximately 5% cover, while aquatic pygmy-weed, coastal tarweed, annual hair grass, chaffweed, Sacramento mesa mint, and slender woolly-marbles contributed cover ranging from 1% to 2%. Other species included timwort, needle spikerush, cut-leaved geranium, Howell's quillwort, common toad rush, scarlet pimpernel, grass poly, small tarweed, and skunk navarretia (*Navarretia mellita*).

Transect 2 at Pond 43 consisted of a 5-m transect placed in stratum 2. Twenty-three plant species were observed along the transect. Of these species, fifteen were native, seven were non-native, and one was unidentified. Brown-headed rush and coyote thistle were the dominant species, accounting for approximately 28% and 10% cover, respectively (see Appendix C Table C-10). Bare ground and thatch were abundant, accounting for approximately 29% and 11%, respectively. Annual quaking grass, dwarf brodiaea, coastal tarweed, annual hair grass, needle spikerush, Howell's quillwort, scarlet pimpernel, grass poly, chaffweed, Hickman's popcornflower, rabbitfoot grass, Sacramento mesa mint, and slender woolly-marbles contributed cover ranging from 1% to 3%. Other species included silvery hair-grass, soft chess, pygmy-weed (*Crassula connata*), purple cudweed, common toad rush, dwarf rush, *Poa* sp., capetown grass (*Tribolium obliterum*), and bearded clover (*Trifolium barbigerum*).

Transect 3 at Pond 43 consisted of a 5-m transect placed in stratum 3. Twenty-two plant species were observed along the transect. Of these species, ten were native and twelve were non-native. California oat grass was the dominant species, accounting for approximately 20% cover (see Appendix C Table C-10). Bare ground and thatch were fairly abundant, accounting for approximately 24% and 23%, respectively. Spanish lotus, coastal tarweed, and brown-headed rush contributed cover ranging from 4% to 5%. Silvery hair-grass, rattail sixweeks grass, rough cat's-ear, and scarlet pimpernel contributed cover ranging from 2% to 3%. Annual quaking grass, soft chess, smooth cat's-ear, common toad rush, and little hop clover contributed approximately 1% cover. Other species included pygmy-weed, cut-leaved geranium, dwarf rush, narrowleaf cottonrose, chaffweed, small tarweed, marsh microseris, cut-leaved plantain, and slender woolly-marbles.

3.10.3 Wildlife Monitoring

Wildlife surveys were not conducted at Pond 43 in 2018 because the vernal pool did not have sufficient depth to trigger surveys.

3.11 Pond 35

Pond 35, a post-mastication vernal pool, was in year 1 of monitoring in 2018. Pond 35 was monitored for hydrology and vegetation.

3.11.1 Hydrology Monitoring

Pond 35 was monitored for hydrology four times from January through April and remained dry for the 2017-2018 water year.

3.11.2 Vegetation Monitoring

Vegetation monitoring was conducted at Pond 35 on May 2, 2018. These data represent year 1 post-mastication conditions. Pond 35 was dry by the May 2 monitoring event. Biologists identified four strata at the vernal pool (see Table 3-23 and Figure 3-24). Appendix C provides the species cover results within each stratum. Strata 1, 2, and 3 and corresponding transects were repeated from 2016, whereas stratum 4 and its corresponding transect were new in 2018.

Table 3-23. Pond 35 (Year 1 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	21%
2	41%
3	13%
4	25%

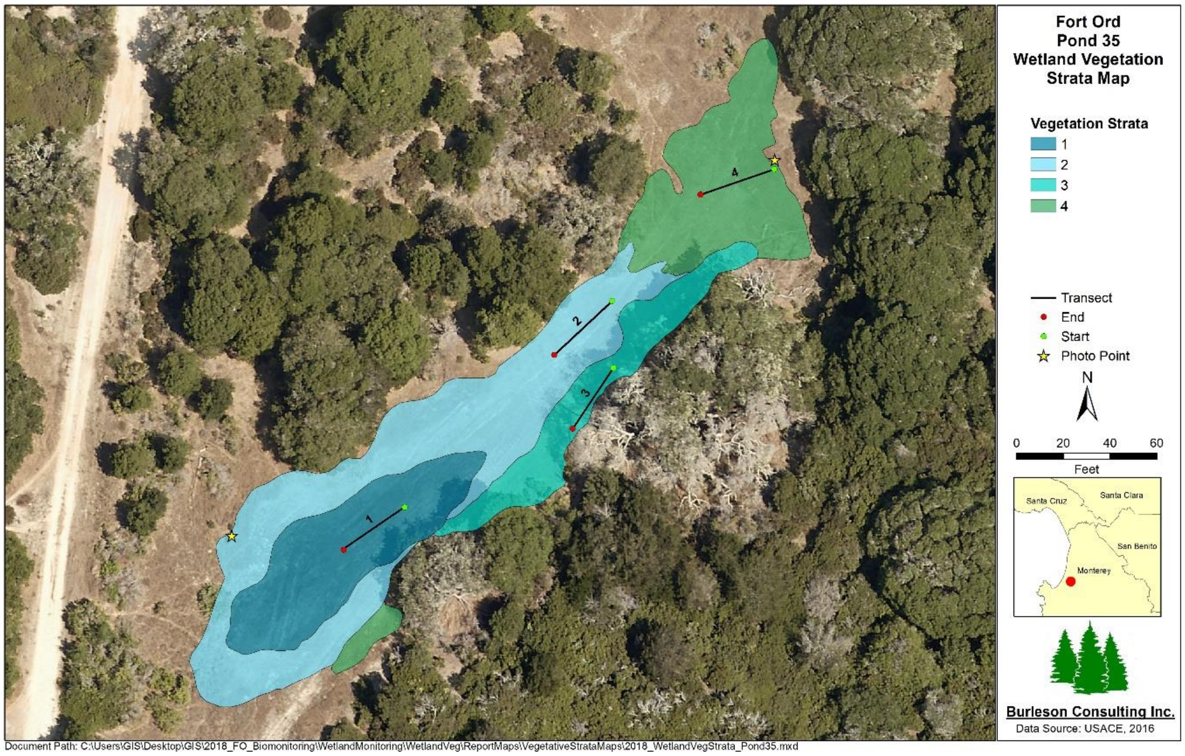


Figure 3-24. Pond 35 (Year 1 Post-Mastication) Vegetation Strata and Transects on Former Fort Ord, 2018

Sixty-four plant species were observed within the vernal pool basin boundary. Of these species, 28 were native, 34 were non-native, and two were unidentified. Additionally, nine species were OBL wetland plants, 18 were FACW or FAC, 12 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.

Transect 1 at Pond 35 consisted of a 10-m transect placed in stratum 1. Ten plant species were observed along the transect. Of these species, four were native and six were non-native. Cut-leaved plantain and Hickman's popcornflower were the dominant species, accounting for approximately 57% and 32% cover, respectively (see Appendix C Table C-11). Round woolly-marbles contributed approximately 4% cover, while brass buttons and pale spikerush contributed cover ranging from 1% to 2%. Bare ground and thatch were present and accounted for approximately 3% and 2%, respectively. Other species included rough cat's-ear, grass poly, prostrate knotweed, small-flower catchfly, and speedwell (*Veronica peregrina* ssp. *xalapensis*).

Transect 2 at Pond 35 consisted of a 10-m transect placed in stratum 2. Sixteen plant species were observed along the transect. Of these species, nine were native and seven were non-native. Cut-leaved plantain was the dominant species, accounting for approximately 39% cover (see Appendix C Table C-11). Thatch and bare ground were abundant, accounting for approximately 29% and 26%, respectively. Round woolly-marbles contributed approximately 2% cover. Other species included dwarf brodiaea, timwort, brass buttons, aquatic pygmy-weed, annual hair grass, pale spikerush, cut-leaved geranium, meadow barley, smooth cat's-ear, rough cat's-ear, Howell's quillwort, narrowleaf cottonrose, grass poly, and Hickman's popcornflower.

Transect 3 at Pond 35 consisted of a 10-m transect placed in stratum 3. Twenty plant species were observed along the transect. Of these species, eight were native and twelve were non-native. Cut-leaved plantain, meadow barley, and round woolly-marbles were the dominant species, accounting for approximately 25%, 23%, and 21% cover, respectively (see Appendix C Table C-11). Bare ground and thatch were fairly abundant, accounting for approximately 12% and 11%, respectively. Annual hair grass and Hickman's popcornflower contributed approximately 2% cover. Other species included hill lotus, annual quaking grass, soft chess, sticky mouse-ear chickweed, timwort, brass buttons, aquatic pygmy-weed, needle spikerush, brome fescue, Italian rye grass, rough cat's-ear, scarlet pimpernel, grass poly, small-flower catchfly, and prickly sow thistle.

Transect 4 at Pond 35 consisted of a 10-m transect placed in stratum 4. Twenty-five plant species were observed along the transect. Of these species, eight were native and seventeen were non-native. Narrow-leaved clover, long-beaked filaree, cut-leaved plantain, and Italian rye grass were the dominant species, accounting for approximately 24%, 16%, 12%, and 11% cover, respectively (see Appendix C Table C-11). Bare ground and thatch were fairly abundant, accounting for approximately 21% and 7%, respectively. California oat grass contributed approximately 5% cover. Other species included hill lotus, Chilean trefoil (*Acmispon wrangelianus*), silvery hair-grass, slender wild oat (*Avena barbata*), wild oat, annual quaking grass, dwarf brodiaea, ripgut grass, soft chess, annual hair grass, brome fescue, rattail sixweeks grass, cut-leaved geranium, smooth cat's-ear, rough cat's-ear, Howell's quillwort, common toad rush, scarlet pimpernel, grass poly, and round woolly-marbles.

3.11.3 Wildlife Monitoring

Wildlife surveys were not conducted at Pond 35 in 2018 because the vernal pool did not have sufficient depth to trigger surveys.

3.12 Pond 42

Pond 42, a post-mastication and post-burn vernal pool, was in year 1 of monitoring in 2018. Pond 42 was monitored for hydrology, vegetation, and wildlife.

3.12.1 Hydrology Monitoring

Pond 42 was monitored for hydrology five times. The vernal pool held water in January, dried in February, held water again in March and April, and dried by May (see Table 3-24 and Figure 3-25).

Table 3-24. Pond 42 (Year 1 Post-Mastication and Post-Burn) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1/15/2018	14:14	6.82	18.26	0.65	93.9	5	0.001
2/20/2018	11:40	-	-	-	-	DRY	0.00
3/19/2018	12:12	6.78	15.61	6.85	40.3	13	0.02‡
4/16/2018	11:22	6.79	12.18	8.69	16.1	24	0.24
5/21/2018	9:58	-	-	-	-	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.

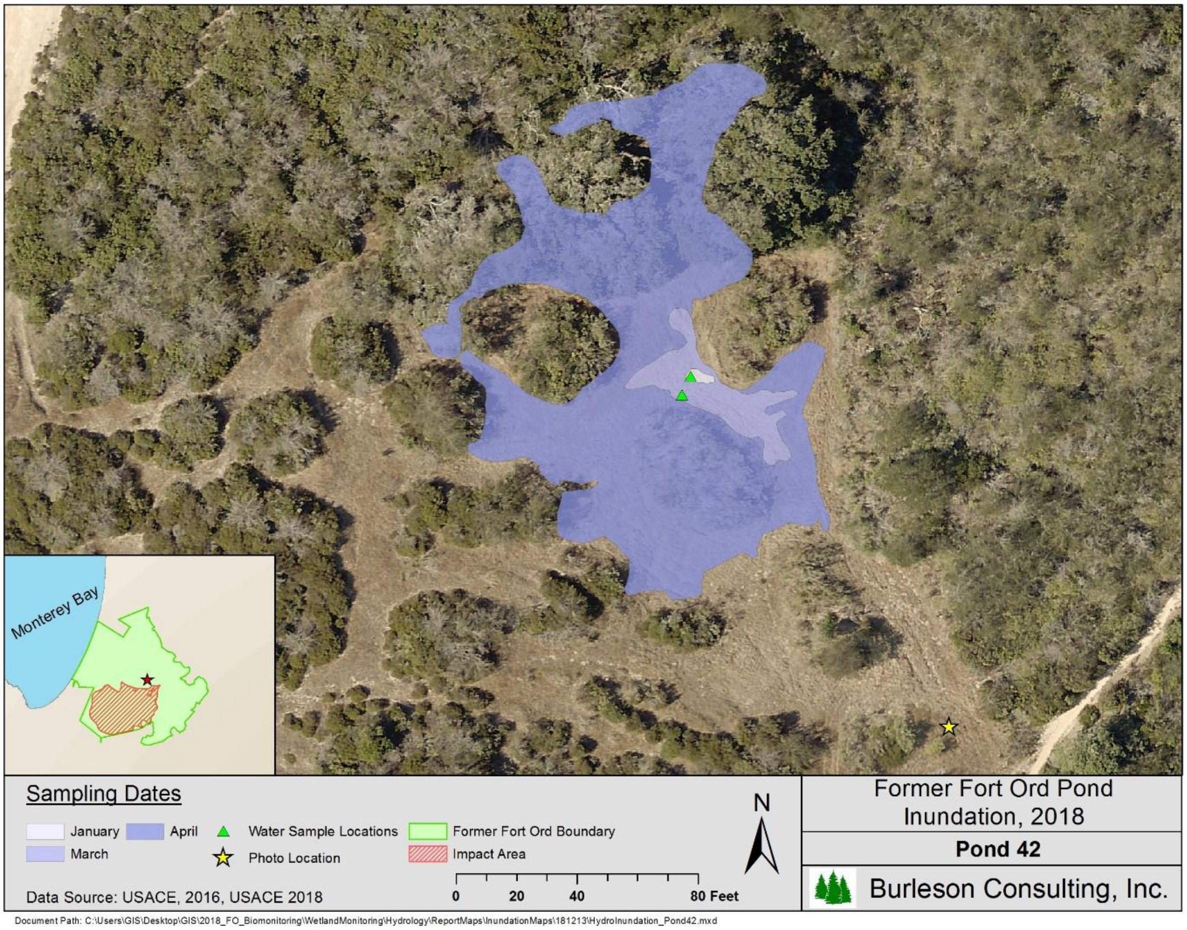


Figure 3-25. Map of Pond 42 (Year 1 Post-Mastication and Post-Burn) on Former Fort Ord, 2018

3.12.2 Vegetation Monitoring

Vegetation monitoring was conducted at Pond 42 on May 31, 2018. These monitoring data represent year 1 post-mastication and post-burn conditions. Pond 42 was dry by the May 31 monitoring event. Biologists identified four strata at the vernal pool (see Table 3-25 and Figure 3-26). Appendix C provides the species cover results within each stratum. Strata 1 through 4 were repeated from 2017. Transects 1, 3, and 4 were repeated, whereas Transect 2 was relocated because the previous location was no longer within the correct stratum due to a shift between monitoring years.

Table 3-25. Pond 42 (Year 1 Post-Mastication and Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	4%
2	5%
3	50%
4	23%
Upland	18%

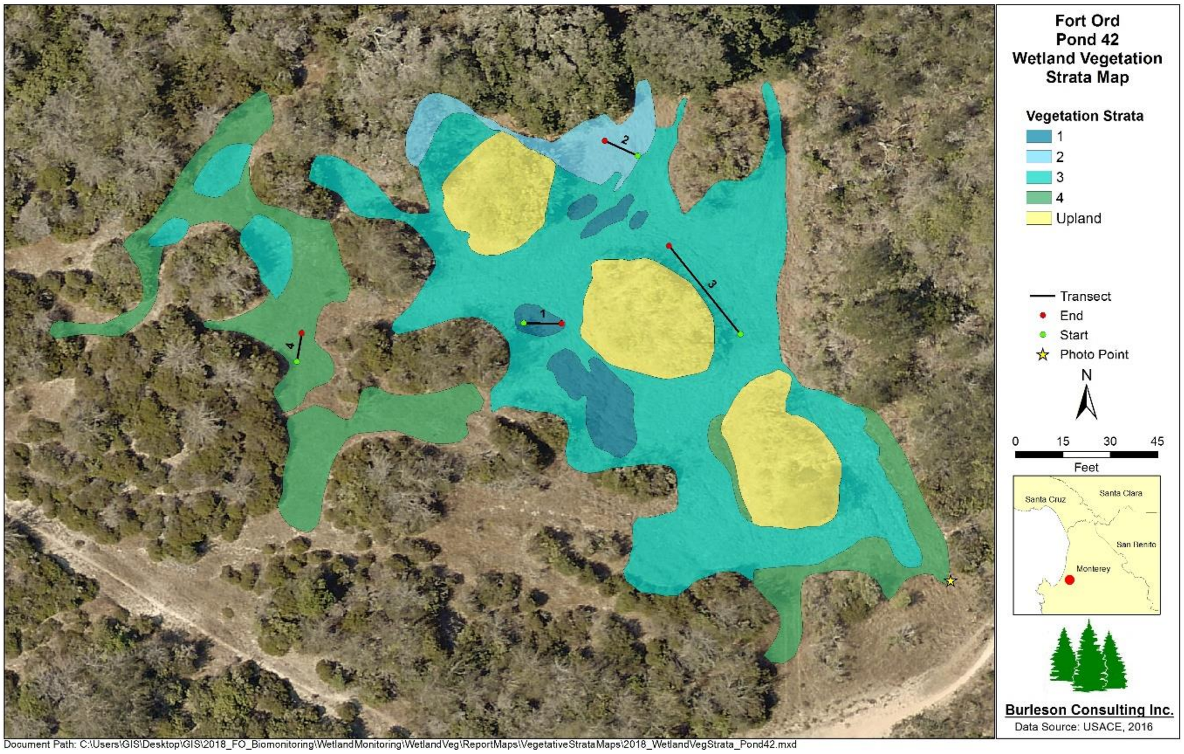


Figure 3-26. Pond 42 (Year 1 Post-Mastication and Post-Burn) Vegetation Strata and Transects on Former Fort Ord, 2018

One hundred twenty-six plant species were observed within the vernal pool basin boundary. Of these species, 91 were native and 35 were non-native. Additionally, 13 species were OBL wetland plants, 32 were FACW or FAC, 19 were FACU or UPL, and 62 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 4-m transect placed in stratum 1. This transect was less than 5-m so that it could fit within the stratum. Eleven plant species were observed along the transect. Of these species, ten were native and one was non-native. Needle spikerush and coyote thistle were the dominant species, accounting for 27% and 22% cover, respectively (see Appendix C Table C-12). Bare ground was abundant, accounting for approximately 29%. Brown-headed rush, grass poly, Hickman's popcornflower, and slender woolly-marbles contributed cover ranging from 1% to 3%. Other species included timwort, annual hair grass, Howell's quillwort, chaffweed, and Sacramento mesa mint. Thatch was also present and accounted for approximately 11% cover.

Transect 2 at Pond 42 consisted of a 5-m transect placed in stratum 2. Eight plant species were observed along the transect. Of these species, six were native and two were non-native. Pale spike-rush and Lemmon's canary grass were the dominant species, accounting for approximately 20% and 10% cover, respectively (see Appendix C Table C-12). Thatch and bare ground were the dominant contributors, accounting for approximately 38% and 23%, respectively. Needle spikerush, Hickman's popcornflower, and rabbitfoot grass contributed cover ranging from 2% to 4% cover. Other species included smooth goldfields, grass poly, and speedwell.

Transect 3 at Pond 42 consisted of a 10-m transect placed in stratum 3. Twenty-four plant species were observed along the transect. Of these species, fourteen were native, nine were non-native, and one was unidentified. Coyote thistle, brown-headed rush, and needle spikerush were the dominant species, accounting for approximately 23%, 17%, and 10% cover, respectively (see Appendix C Table C-12). Thatch and bare ground were abundant, each accounting for approximately 19%. Annual quaking grass, pale spikerush, scarlet pimpernel, grass poly, and Hickman's popcornflower contributed cover ranging from 1% to 2%. Other species included dwarf brodiaea, soft chess, timwort, brass buttons, coastal tarweed, annual hair grass, sticky monkey flower (*Diplacus aurantiacus*), rattail sixweeks grass, rough cat's-ear, Howell's quillwort, smooth goldfields, chaffweed, rabbitfoot grass, *Pseudognaphalium* sp., slender woolly-marbles, and common sow thistle.

Transect 4 at Pond 42 consisted of a 5-m transect placed in stratum 4. Twenty plant species were observed along the transect. Of these species, nine were native and eleven were non-native. California oat grass and coastal tarweed were the dominant species, accounting for approximately 24% and 16% cover, respectively (see Appendix C Table C-12). Bare ground was abundant, accounting for approximately 38%. Long-beaked filaree, smooth cat's-ear, California cottonrose (*Logfia filaginoides*), scarlet pimpernel, and western blue-eyed grass contributed cover ranging from 1% to 2%. Other species included silvery hair-grass, dwarf brodiaea, annual quaking grass, ripgut grass, soft chess, Maltese star-thistle (*Centaurea melitensis*), rattail sixweeks grass, nit grass, rough cat's-ear, common toad rush, gumweed, marsh microseris, and California plantain (*Plantago erecta*). Thatch was also present and accounted for approximately 9% cover.

3.12.3 Wildlife Monitoring

Pond 42 was surveyed for CTS and fairy shrimp on April 25, 2018. California tiger salamanders were not detected during the April survey event; however, fairy shrimp were detected in low abundance. No further surveys were conducted in May or June due to insufficient pool depth. Invertebrate results for 2018 are provided in Appendix D (see Tables D-2 – D-3).

3.13 Pond 44

Pond 44, a post-mastication vernal pool, was in year 1 of monitoring in 2018. Pond 44 was monitored for hydrology and vegetation.

3.13.1 Hydrology Monitoring

Pond 44 was monitored for hydrology four times from January through April and remained dry at the staff gauge during all 2017-2018 surveys. Some disparate puddles were observed in April but were not mapped because their depths were minimal, and they were not hydrologically connected to the staff gauge.

3.13.2 Vegetation Monitoring

Vegetation monitoring was conducted at Pond 44 on May 10 and 14, 2018. These monitoring data represent year 1 post-mastication conditions. Pond 44 was dry by the May 10 monitoring event. Biologists identified three strata at the vernal pool (see Table 3-26 and Figure 3-27). 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, whereas stratum 4 was new in 2018. Transect 3 was repeated, whereas Transect 1 was adjusted slightly to stay within the boundary of stratum 1 and a new start point was established. Transect 4 was established in 2018.

Table 3-26. Pond 44 (Year 1 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	61%
3	17%
4	11%
Upland	11%

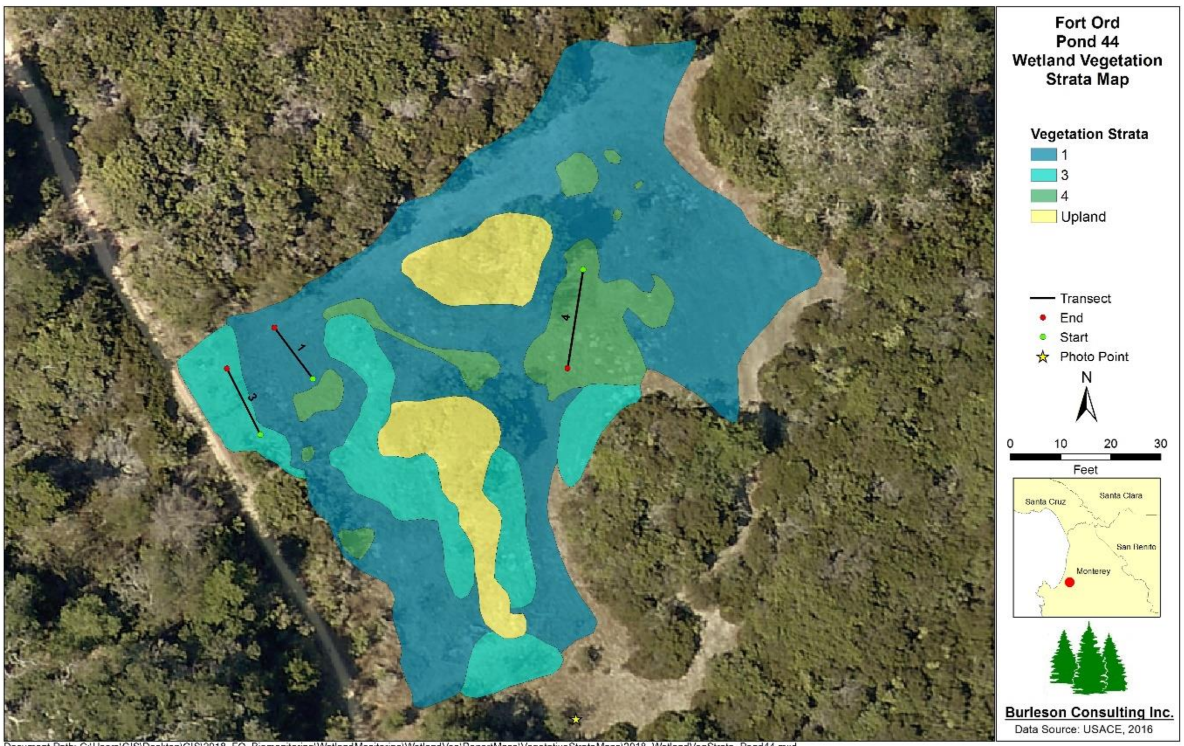


Figure 3-27. Pond 44 (Year 1 Post-Mastication) Vegetation Strata and Transects on Former Fort Ord, 2018

Seventy-one plant species were observed within the vernal pool basin boundary. Of these species, 48 were native, 22 were non-native, and one was unidentified. Additionally, nine species were OBL wetland plants, 20 were FACW or FAC, 11 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 44 consisted of a 5-m transect placed in stratum 1. Twenty-one plant species were observed along the transect. Of these species, fourteen were native and seven were non-native. Coyote thistle and needle spikerush were the dominant species, accounting for approximately 30% and 16% cover, respectively (see Appendix C Table C-13). Bare ground was fairly abundant, accounting for approximately 16%. Vernal pool bent grass and Hickman's popcornflower accounted for approximately

8% and 7% cover, respectively. Chaffweed, rabbitfoot grass, and slender woolly-marbles contributed cover ranging from 4% to 5%. Timwort, Howell's quillwort, dwarf rush, Sacramento mesa mint, and little hop clover contributed approximately 1% cover. Other species included annual quaking grass, dwarf brodiaea, annual hair grass, rattail sixweeks grass, Chinese pusley, smooth cat's-ear, common toad rush, smooth goldfields, and grass poly. Thatch was also present and accounted for approximately 3% cover.

Transect 3 at Pond 44 consisted of a 5-m transect placed in stratum 3. Twenty-eight plant species were observed along the transect. Of these species, fifteen were native and thirteen were non-native. California oat grass was the dominant species, accounting for approximately 25% cover (see Appendix C Table C-13). Bare ground and thatch were fairly abundant, accounting for approximately 21% and 17%, respectively. Little hop clover, cut-leaved plantain, and gumweed contributed approximately 7%, 6%, and 4% cover, respectively. Hill lotus, silvery hair-grass, annual quaking grass, soft chess, valley tassels (*Castilleja attenuata),* long-beaked filaree, smooth cat's-ear, rough cat's-ear, scarlet pimpernel, chaffweed, sun cups, and little owl's clover (*Triphysaria pusilla*) contributed cover ranging from 1% to 2%. Other species included western lady's mantle (*Aphanes occidentalis*), timwort, rattail sixweeks grass, cut-leaved geranium, Howell's quillwort, dwarf rush, western rush (*Juncus occidentalis*), small tarweed, California plantain, rabbitfoot grass, Sacramento mesa mint, and slender woolly-marbles.

Transect 4 at Pond 44 consisted of a 5-m transect placed in stratum 4. Twenty-two plant species were observed along the transect. Of these species, fifteen were native, six were non-native, and one was unidentified. Brown-headed rush was the dominant species, accounting for approximately 29% cover (see Appendix C Table C-13). Thatch and bare ground were fairly abundant, accounting for approximately 17% and 16%, respectively. Coyote thistle and slender woolly-marbles accounted for approximately 10% and 8% cover, respectively. Vernal pool bent grass, annual quaking grass, timwort, coastal tarweed, purple cudweed, Howell's quillwort, common toad rush, dwarf rush, grass poly, chaffweed, and Hickman's popcornflower contributed cover ranging from 1% to 3%. Other species included dwarf brodiaea, annual hair grass, keeled bulrush, scarlet pimpernel, *Poa* sp., rabbitfoot grass, Sacramento mesa mint, and common sow thistle.

3.13.3 Wildlife Monitoring

Wildlife surveys were not conducted at Pond 44 in 2018 because the vernal pool did not have sufficient depth to trigger surveys.

3.14 Pond 56

Pond 56, a post-mastication vernal pool, was in year 1 of monitoring in 2018. Pond 56 was monitored for hydrology.

3.14.1 Hydrology Monitoring

Pond 56 was monitored for hydrology eight times and dried by July (see Table 3-27 and Figure 3-28). The first monitoring event in November was conducted as part of the staff gauge maintenance and only included depth.

Table 3-27. Pond 56 (Year 1 Post-Mastication) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundation Area (acres)
11/20/2017	-	-	-	-	-	DRY	0.00
1/16/2018	13:09	5.96	12.02	3.22	46.2	22	0.08
2/20/2018	13:26	6.95	13.20	15.00	333.0	15	0.01
3/19/2018	13:07	7.03	10.79	9.75	8.3	38	0.25
4/17/2018	11:35	6.65	12.94	2.15	12.0	63	0.85
5/21/2018	12:45	6.38	14.75	2.56	1.5	56	0.31
6/19/2018	14:32	6.58	25.56	4.08	0.0	36	0.11
7/19/2018	10:36	-	-	-	-	DRY	0.00

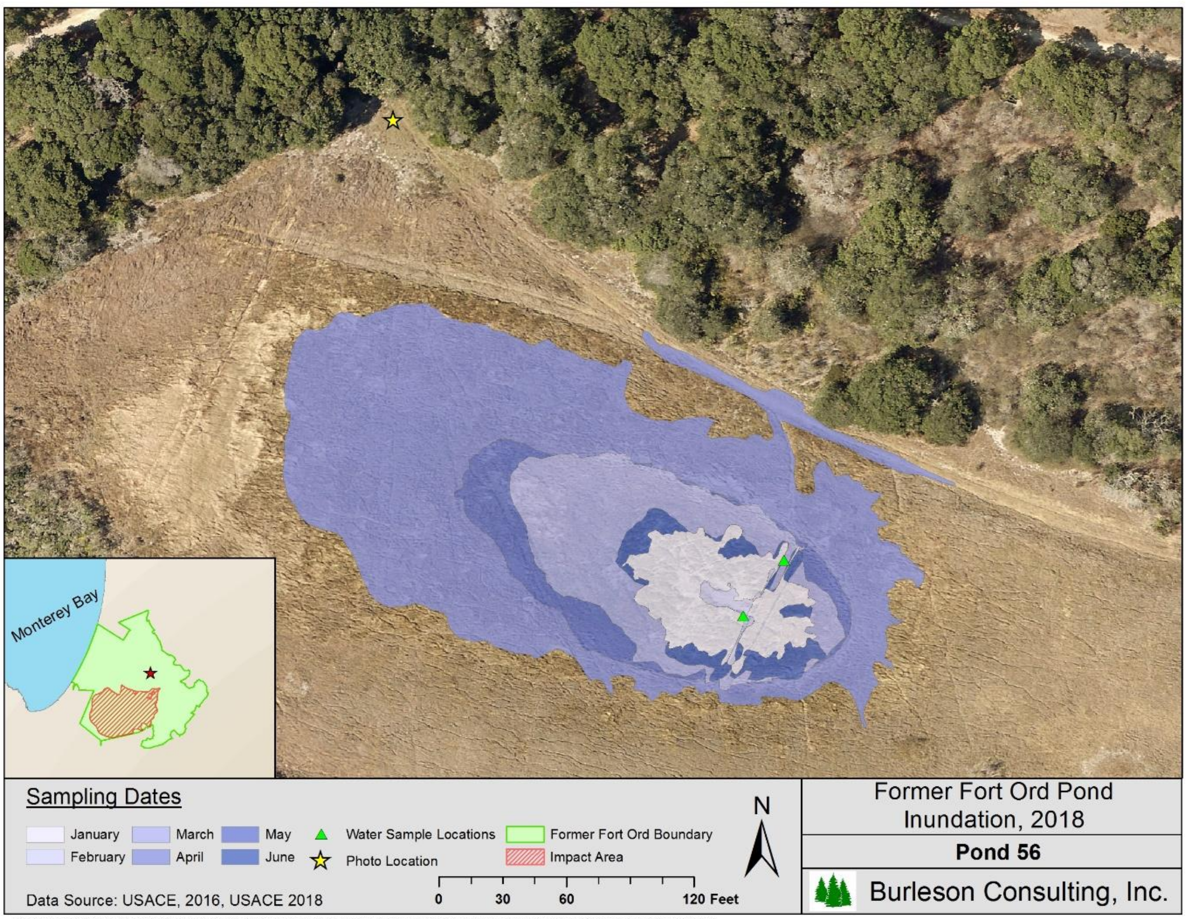


Figure 3-28. Map of Pond 56 (Year 1 Post-Mastication) on Former Fort Ord, 2018

3.15 Pond 60

Pond 60, a post-mastication vernal pool, was in year 1 of monitoring in 2018. Pond 60 was monitored for hydrology, vegetation, and wildlife.

3.15.1 Hydrology Monitoring

Pond 60 was monitored for hydrology seven times (see Table 3-28 and Figure 3-29). The vernal pool held water in January, dried in February, held water again in March, and dried by July.

Table 3-28. Pond 60 (Year 1 Post-Mastication) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundation Area (acres)
1/18/2018	11:54	6.29	11.00	3.60	25.7	20	0.07
2/22/2018	10:55	-	-	-	-	DRY	0.00
3/19/2018	13:37	6.40	14.82	8.71	12.1	38	0.20
4/17/2018	9:23	6.33	11.36	3.66†	1.2	59	0.77
5/21/2018	11:30	6.36	14.99	5.01	7.6	38	0.19
6/19/2018	13:45	6.74	28.26	8.41	0.0	18	0.02
7/19/2018	11:25	-	-	-	-	DRY	0.00

†Probe was on its side

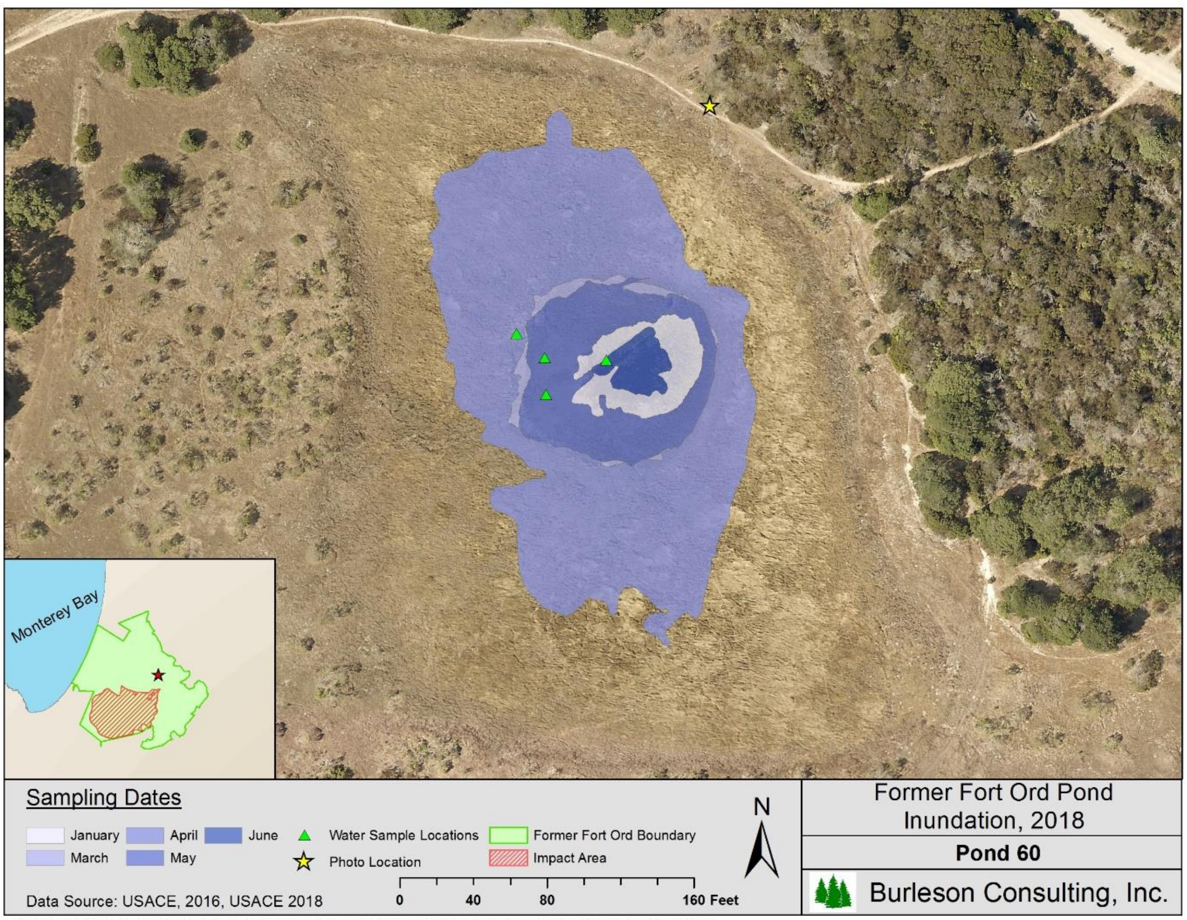


Figure 3-29. Map of Pond 60 (Year 1 Post-Mastication) on Former Fort Ord, 2018

3.15.2 Vegetation Monitoring

Vegetation monitoring was conducted at Pond 60 on June 14, 2018. These monitoring data represent year 1 post-mastication conditions. Pond 60 was dry by the June 14 monitoring event. Biologists identified four strata at the vernal pool (see Table 3-29 and Figure 3-30). Appendix C provides the species cover results within each stratum. Strata 1 through 4 were repeated from 2015. However, all transect locations were new. Transect 1 was established in stratum 1 in 2018 because this stratum was inundated in 2015. Transects 2, 3, and 4 were relocated to areas with more representative vegetative composition.

Table 3-29. Pond 60 (Year 1 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	10%
2	41%
3	14%
4	35%

Figure 3-30. Pond 60 (Year 1 Post-Mastication) Vegetation Strata and Transects on Former Fort Ord, 2018

Fifty-nine plant species were observed within the vernal pool basin boundary. Of these species, 33 were native and 26 were non-native. Additionally, seven species were OBL wetland plants, 19 were FACW or FAC, 12 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 60 consisted of a 10-m transect placed in stratum 1. Three plant species were observed along the transect. All three species were native. Pale spikerush was the dominant species, accounting for approximately 38% cover (see Appendix C Table C-14). The dominant cover was thatch, which accounted for approximately 50% cover. Salt grass and alkali mallow were the other two species observed. Bare ground was also present and accounted for approximately 12%.

Transect 2 at Pond 60 consisted of a 10-m transect placed in stratum 2. Four plant species were observed along the transect. Of these species, three were native and one was non-native. Pale spikerush and salt grass were the dominant species, accounting for approximately 15% and 13% cover, respectively (see Appendix C Table C-14). The dominant cover was thatch, which accounted for approximately 61% cover. Brown-headed rush and common sow thistle were the other two species observed. Bare ground was also present and accounted for approximately 10%.

Transect 3 at Pond 60 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. Brown-headed rush was the dominant species, accounting for approximately 42% cover (see Appendix C Table C-14). The dominant cover was thatch, which accounted for approximately 44% cover. Salt grass and pale spikerush each contributed approximately 6% cover. Curly dock was the other species observed. Bare ground was also present.

Transect 4 at Pond 60 consisted of a 10-m transect placed in stratum 4. Sixteen plant species were observed along the transect. Of these species, nine were native and seven were non-native. Salt grass and rabbitfoot grass were the dominant species, accounting for approximately 8% and 7% cover, respectively (see Appendix C Table C-14). The dominant cover was thatch, which accounted for approximately 46% cover. Needle spikerush, pale spikerush, coyote thistle, brown-headed rush, and bugle hedge nettle contributed cover ranging from 3% to 5%. Other species included annual quaking grass, Johnny-Nip, brass buttons, Italian rye grass, purple cudweed, rough cat's-ear, grass poly, Lemmon's canary grass, and cutleaf burnweed. Bare ground was also present and accounted for approximately 14%.

3.15.3 Wildlife Monitoring

Pond 60 was surveyed for CTS and fairy shrimp on April 26, May 23, and June 18, 2018. California tiger salamanders and fairy shrimp were not detected. Invertebrate results for 2018 are provided in Appendix D (see Table D-2).

3.16 Pond 61

Pond 61, a post-mastication vernal pool, was in year 1 of monitoring in 2018. Pond 61 was monitored for hydrology and vegetation.

3.16.1 Hydrology Monitoring

Pond 61 was monitored for hydrology four times from January through April and remained dry at the staff gauge for all 2017-2018 surveys. However, some disparate puddles were observed in March and April but were not mapped as there was no surface hydrological connectivity between the puddles and location of the staff gauge.

3.16.2 Vegetation Monitoring

Vegetation monitoring was conducted at Pond 61 on May 7 and 30, 2018. These monitoring data represent year 1 post-mastication conditions. Pond 61 was dry by the May 7 monitoring event. Biologists identified four strata at the vernal pool (see Table 3-30 and Figure 3-31). Appendix C provides the species cover results within each stratum. Strata 1 through 4 were repeated from 2017. Transect 1 was adjusted slightly to stay within the boundary of stratum 1. Transects 3 and 4 were repeated in 2018. Stratum 2 consisted of CCG and no transect was placed in this stratum. Figure 3-15 illustrates the extent and density of the populations at Pond 61.

Table 3-30. Pond 61 (Year 1 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	0.4%
2 (CCG)	5%
3	2%
4	61%
Upland	32%

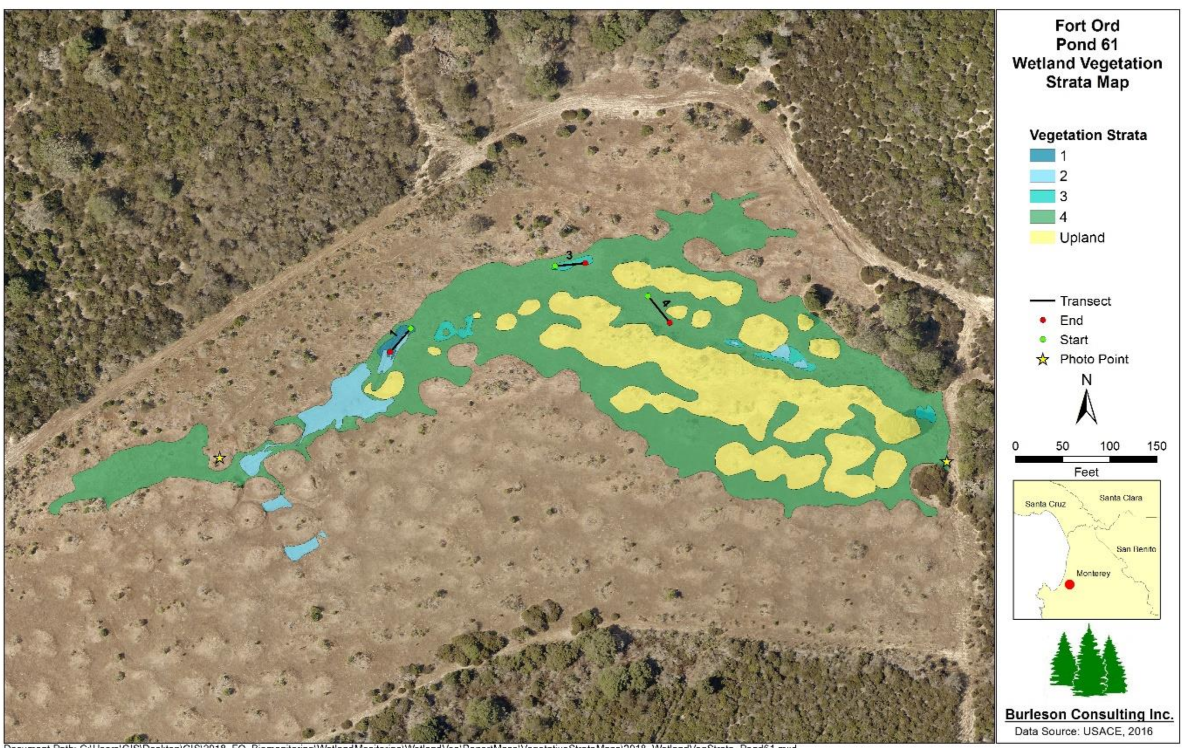


Figure 3-31. Pond 61 (Year 1 Post-Mastication) Vegetation Strata and Transects on Former Fort Ord, 2018

One hundred plant species were observed within the vernal pool basin boundary. Of these species, 70 were native and 30 were non-native. Additionally, 14 species were OBL wetland plants, 27 were FACW or FAC, 15 were FACU or UPL, and 44 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. Fifteen plant species were observed along the transect. Of these species, thirteen were native and two were non-native. Hickman's popcornflower was the dominant species, accounting for approximately 30% cover (see Appendix C Table C-15). Bare ground and thatch were abundant, accounting for approximately 28% and 15%, respectively. Rabbitfoot grass and smooth goldfields accounted for approximately 8% and 5% cover, respectively. Aquatic pygmy-weed, needle spikerush, pale spikerush, Howell's quillwort, CCG, grass poly, and slender woolly-marbles contributed cover ranging from 1% to 3%. Other species included dwarf brodiaea, timwort, coyote thistle, chaffweed, and Sacramento mesa mint.

Stratum 2 consisted of CCG. Figure 3-32 illustrates the extent and density of the populations at Pond 61. No transects were placed in stratum 2 to avoid damaging the population.

Transect 3 at Pond 61 consisted of a 10-m transect placed in stratum 3. Twenty plant species were observed along the transect. Of these species, thirteen were native and seven were non-native. Annual hair grass, Hickman's popcornflower, and brown-headed rush were the dominant species, accounting for approximately 20%, 13%, and 10% cover, respectively (see Appendix C Table C-15). The dominant cover was thatch, which accounted for approximately 22% cover. Dwarf brodiaea, needle spikerush, coyote thistle, and rabbitfoot grass contributed cover ranging from 4% to 5%. Cut-leaved geranium, Howell's quillwort, smooth goldfields, and grass poly contributed cover ranging from 1% to 2%. Other species included annual quaking grass, timwort, coastal tarweed, rough cat's-ear, marsh microseris, Sacramento mesa mint, round woolly-marbles, prickly sow thistle, and common sow thistle. Bare ground was also present and accounted for approximately 10%.

Transect 4 at Pond 61 consisted of a 10-m transect placed in stratum 4. Thirty plant species were observed along the transect. Of these species, fifteen were native, fourteen were non-native, and one was unidentified. California oat grass, rattlesnake grass, brown-headed rush, and marsh microseris were the dominant species, accounting for approximately 14%, 9%, 8%, and 7% cover, respectively (see Appendix C Table C-15). The dominant cover was thatch, which accounted for approximately 34% cover. Dwarf brodiaea, coastal tarweed, long-beaked filaree, Howell's quillwort, and scarlet pimpernel contributed cover ranging from 1% to 3%. Other species included silvery hair-grass, annual quaking grass, soft chess, Johnny-Nip, timwort, coyote thistle, rattail sixweeks grass, cut-leaved geranium, smooth cat's-ear, rough cat's-ear, keeled bulrush, common toad rush, dwarf rush, grass poly, chaffweed, gumweed, Hickman's popcornflower, *Pseudognaphalium* sp., small-flower catchfly, common sow thistle, and sun cups. Bare ground was also present and accounted for approximately 13%.

3.16.2.1 *Contra Costa Goldfields*

Contra Costa goldfields at Pond 61 were mapped on May 7, 2018: they occupied 0.12 acres with a density of 5-65% cover. Figure 3-32 illustrates the extent of the CCG population at Pond 61.

Figure 3-32. Contra Costa Goldfields Populations at Pond 61 (Year 1 Post-Mastication), 2018

3.16.3 Wildlife Monitoring

Wildlife surveys were not conducted at Pond 61 in 2018 because the vernal pool did not have sufficient depth to trigger surveys.

3.17 Pond 73

Pond 73, a post-mastication vernal pool, was in year 1 of monitoring in 2018. Pond 73 was monitored for hydrology, vegetation, and wildlife.

3.17.1 Hydrology Monitoring

Pond 73 was monitored for hydrology six times (see Table 3-31 and Figure 3-33). The vernal pool held water in April and dried by May. However, some disparate puddles were observed in March but were not mapped as there was no surface hydrological connectivity between the puddles and location of the staff gauge. The first monitoring event in November was conducted as part of the staff gauge maintenance and only included depth.

Table 3-31. Pond 73 (Year 1 Post-Mastication) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundation Area (acres)
11/20/2017	-	-	-	-	-	DRY	0.00
1/18/2018	9:01	-	-	-	-	DRY	0.00
2/22/2018	10:30	-	-	-	-	DRY	0.00
3/19/2018	13:55	-	-	-	-	DRY	0.00
4/17/2018	10:00	6.33	11.33	5.63	9.5	14	0.001‡
5/21/2018	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.

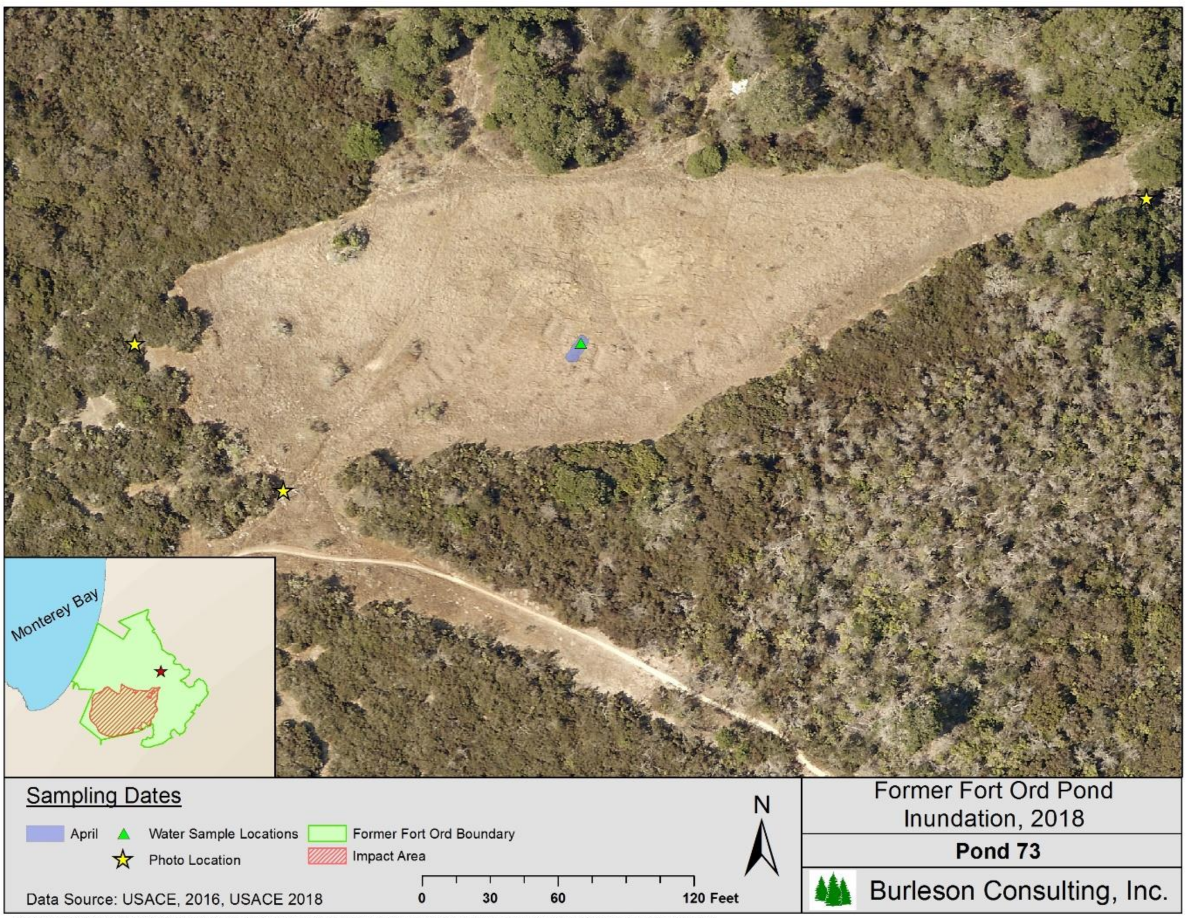


Figure 3-33. Map of Pond 73 (Year 1 Post-Mastication) on Former Fort Ord, 2018

3.17.2 Vegetation Monitoring

Vegetation monitoring was conducted at Pond 73 on May 14, 2018. These monitoring data represent year 1 post-mastication conditions. Pond 73 was dry by the May 14 monitoring event. Biologists identified three strata at the vernal pool (see Table 3-32 and Figure 3-34). Appendix C provides the species cover results within each stratum. Strata 1 and 2 were repeated from 2017, while strata 4 was identified in 2018. All three corresponding transects were established in 2018.

Table 3-32. Pond 73 (Year 1 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	2%
2	73%
4	22%
Upland	3%

Figure 3-34. Pond 73 (Year 1 Post-Mastication) Vegetation Strata and Transects on Former Fort Ord, 2018

Sixty-eight plant species were observed within the vernal pool basin boundary. Of these species, 41 were native and 27 were non-native. Additionally, nine species were OBL wetland plants, 23 were FACW or FAC, 13 were FACU or UPL, and 23 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. Four plant species were observed along the transect. All four species were native. Pale spikerush was the dominant species, accounting for approximately 73% cover (see Appendix C Table C-16). Thatch was fairly abundant accounting for approximately 23% cover. Hickman's popcornflower and smooth goldfields each contributed approximately 2% cover. Lemmon's canary grass was the other species observed. Bare ground was also present.

Transect 2 at Pond 73 consisted of a 10-m transect placed in stratum 2. Eight plant species were observed along the transect. Of these species, seven were native and one was unidentified. Brown-headed rush and needle spikerush were the dominant species, accounting for approximately 40% and 15% cover, respectively (see Appendix C Table C-16). The dominant cover was thatch, which accounted for approximately 42% cover. Pale spikerush and smooth goldfields contributed 5% and 1% cover, respectively. Other species included annual hair grass, coyote thistle, *Madia* sp., and Hickman's popcornflower. Bare ground was also present.

Transect 4 at Pond 73 consisted of a 10-m transect placed in stratum 4. Sixteen plant species were observed along the transect. Of these species, eleven were native and five were non-native. Coyote thistle was the dominant species, accounting for approximately 43% cover (see Appendix C Table C-16). Thatch was abundant, accounting for approximately 40% cover. Brown-headed rush and Howell's quillwort contributed approximately 5% and 3% cover, respectively. Other species included silvery hair-grass, annual quaking grass, timwort, annual hair grass, western pearlflower (*Heterocodon rariflorum*), dwarf rush, grass poly, chaffweed, small tarweed, marsh microseris, Hickman's popcornflower, rabbitfoot grass, and slender woolly-marbles. Bare ground was also present and accounted for approximately 5%.

3.17.2.1 *Vernal Pool Bent Grass*

Vernal pool bent grass occurrences at Pond 73 were mapped on May 31, 2018 (see Figure 3-35). This was the first time that the species has been documented at Pond 73. This documentation expands the current known range farther east than has been previously documented. The identification of the species was confirmed by David Styer, a CNPS volunteer. It was also found in Ponds 101 East (East), 3 North, and 3 South for the first time in 2018.

Figure 3-35. Vernal Pool Bent Grass Occurrences at Pond 73 (Year 1 Post-Mastication), 2018

3.17.3 Wildlife Monitoring

Pond 73 was surveyed for CTS and fairy shrimp on April 26, 2018. California tiger salamanders and fairy shrimp were not detected during the April monitoring event. No further surveys were conducted in May or June due to insufficient vernal pool depth. Invertebrate results for 2018 are provided in Appendix D (see Table D-2).

3.18 Machine Gun Flats

Machine Gun Flats, a post-mastication vernal pool, was in year 1 of monitoring in 2018. Machine Gun Flats was monitored for hydrology.

3.18.1 Hydrology Monitoring

Machine Gun Flats was monitored for hydrology ten times (see Table 3-33 and Figure 3-36). The first monitoring event in November was conducted as part of the staff gauge maintenance and only included depth. 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 6, 2018.

Table 3-33. Machine Gun Flats (Year 1 Post-Mastication) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundation Area (acres)
11/20/2017	-	-	-	-	-	98	-
1/15/2018	12:45	7.02	11.14	3.40	18.50	100	7.84*
2/23/2018	10:34	7.33	8.55	4.65	6.2	95	7.26*
3/21/2018	12:24	7.17	11.83	6.20	18.7	105	8.33*
4/18/2018	11:46	6.84	13.80	3.56	7.8	111	8.34*
5/24/2018	10:27	6.84	14.98	5.26	4.8	93	4.93*
6/19/2018	15:41	7.06	22.99	2.70	0.0	78	0.06
7/19/2018	10:56	-	-	-	-	60	0.04
8/20/2018	10:10	-	-	-	-	36	0.02
9/19/2018	-	-	-	-	-	15	0.01

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

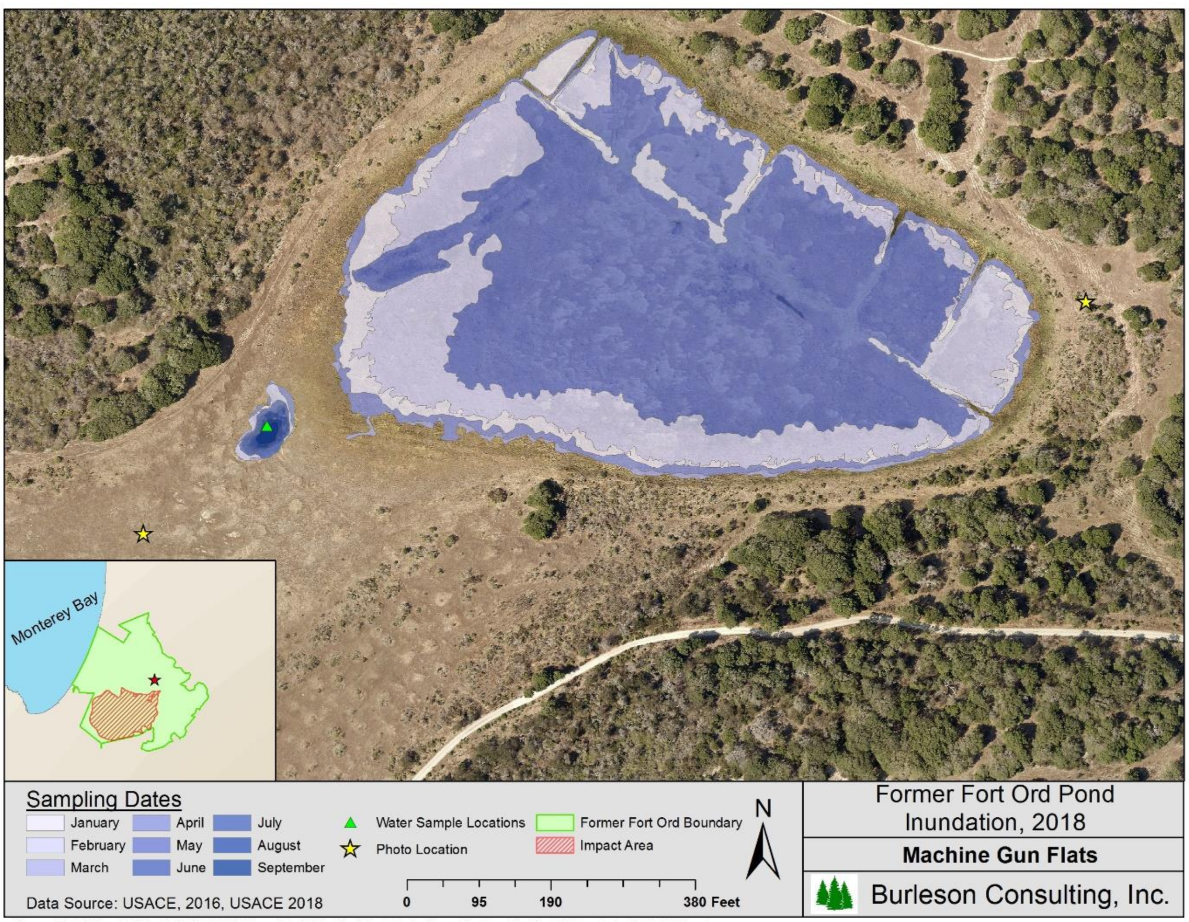


Figure 3-36. Map of Machine Gun Flats (Year 1 Post-Mastication) on Former Fort Ord, 2018

3.19 Pond 16

Pond 16, a post-mastication vernal pool, was in year 2 of monitoring in 2018. Pond 16 was monitored for hydrology.

3.19.1 Hydrology Monitoring

Pond 16 was monitored for hydrology six times (see Table 3-34 and Figure 3-37). The vernal pool held water in March and April and dried by May. The first monitoring event in November was conducted as part of staff gauge maintenance and only included depth.

Table 3-34. Pond 16 (Year 2 Post-Mastication) Hydrology Monitoring Results

Date	Time	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundation Area (acres)
11/21/2017	-	-	-	-	-	DRY	0.00
1/18/2018	11:08	-	-	-	-	DRY	0.00
2/22/2018	10:15	-	-	-	-	DRY	0.00
3/20/2018	8:36	6.65†	10.24†	5.29†	140.0†	12	0.11
4/16/2018	14:11	6.10	17.99	8.43	33.8	28	0.26
5/22/2018	8:40	-	-	-	-	DRY	0.00

†Water quality probe was horizontal for measurements.

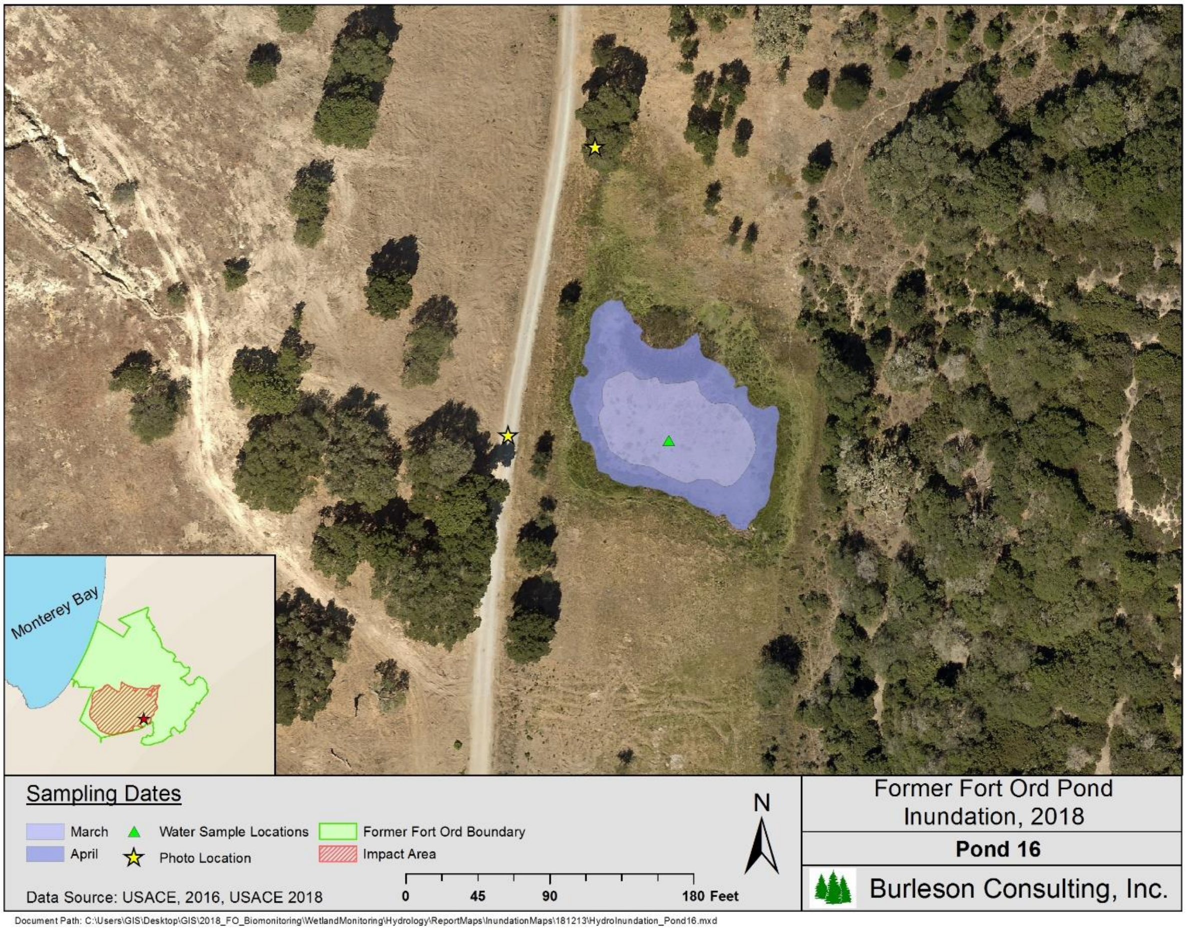


Figure 3-37. Map of Pond 16 (Year 2 Post-Mastication) on Former Fort Ord, 2018

3.20 Pond 54

Pond 54, a post-mastication vernal pool, was in year 2 of monitoring in 2018. Pond 54 was monitored for hydrology.

3.20.1 Hydrology Monitoring

Pond 54 was monitored for hydrology five times (see Table 3-35 and Figure 3-38). The vernal pool held water in March and April and dried by May.

Table 3-35. Pond 54 (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)
1/18/2018	10:40	-	-	-	-	DRY	0.00
2/22/2018	10:00	-	-	-	-	DRY	0.00
3/20/2018	9:37	6.19	10.07	3.82	35.2	22	0.001
4/16/2018	14:34	6.47	12.90	13.76	24.1	28	0.003
5/22/2018	12:50	-	-	-	-	DRY	0.00

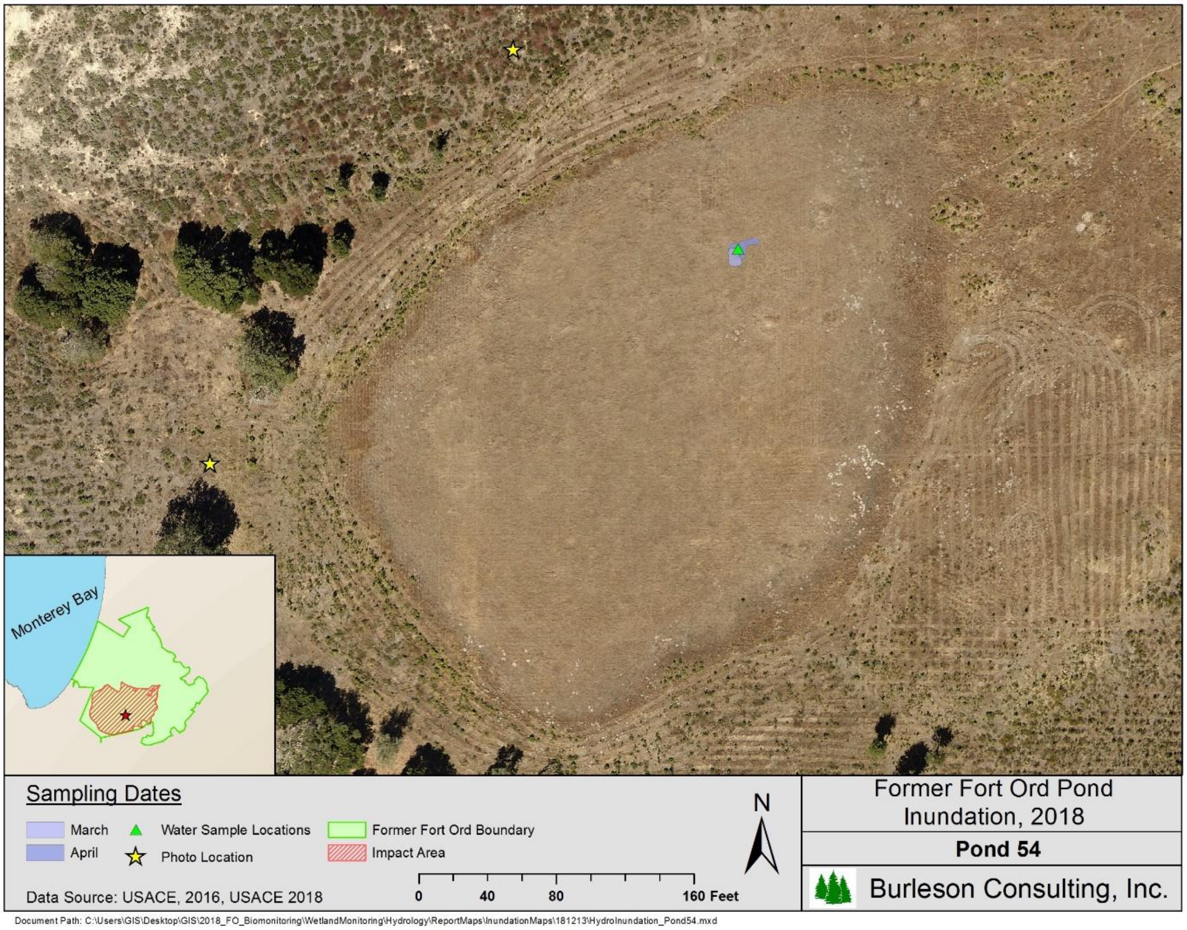


Figure 3-38. Map of Pond 54 (Year 2 Post-Mastication) on Former Fort Ord, 2018

3.21 Pond 72

Pond 72, a post-mastication vernal pool, was in year 2 of monitoring in 2018. Pond 72 was monitored for hydrology.

3.21.1 Hydrology Monitoring

Pond 72 was monitored for hydrology six times (see Table 3-36 and Figure 3-39). The vernal pool held water at the staff gauge in March and April and dried by May. Small peripheral ponding was observed in February and March despite low or no water at the staff gauge. These peripheral ponds were not mapped because there was no surface hydrological connectivity with the staff gauge. The first monitoring event in November was conducted as part of the staff gauge maintenance and only included depth.

Table 3-36. Pond 72 (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)
11/20/2017	-	-	-	-	-	DRY	0.00
1/18/2018	10:12	-	-	-	-	DRY	0.00
2/22/2018	8:49	-	-	-	-	DRY	0.00
3/20/2018	9:02	6.37	10.12	2.51	292	17	0.001‡
4/16/2018	13:25	6.53	12.85	11.86	12.1	36	0.36
5/22/2018	9:03	-	-	-	-	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.

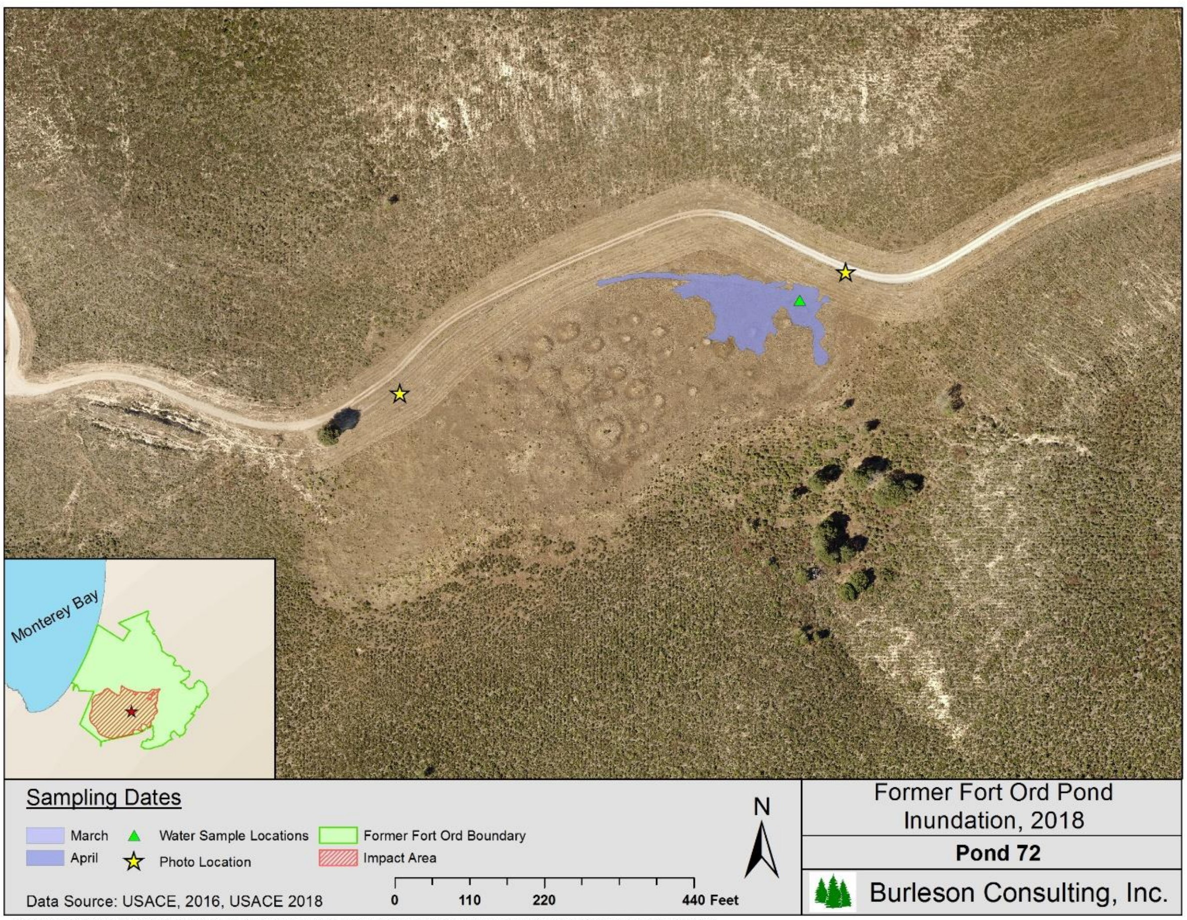


Figure 3-39. Map of Pond 72 (Year 2 Post-Mastication) on Former Fort Ord, 2018

4 DISCUSSION

Data quality objectives (DQO) and performance standards outlined in the Wetland Plan are used to measure successful wetland function following MEC and soil remediation activities (Burleson, 2006). Evaluation for the DQOs is 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

Some species at Ponds 5, 101 East (West), 101 East (East), 997, 42, and 61 were assigned incorrect categories for wetland indicator status and native/non-native in the 2017 dataset. Species richness and relative percent cover values were amended in the 2018 report to reflect the corrected categorizations. These corrections do not change overall findings discussed in the 2017 report.

4.1 Pond 5 - Reference

Pond 5 has been monitored for ten years as a reference vernal pool. Table 4-1 summarizes the years in which monitoring occurred and the type(s) of survey(s) conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted (see Figure 4-1). Above-normal water-years were 1994-1995, 2015-2016, and 2016-2017. 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
Hydrology	●	●	●	●		●	●	●	●	●
Vegetation	●	●	●	●				●	●	●
Wildlife	●	●	●	●	●			●	●	●

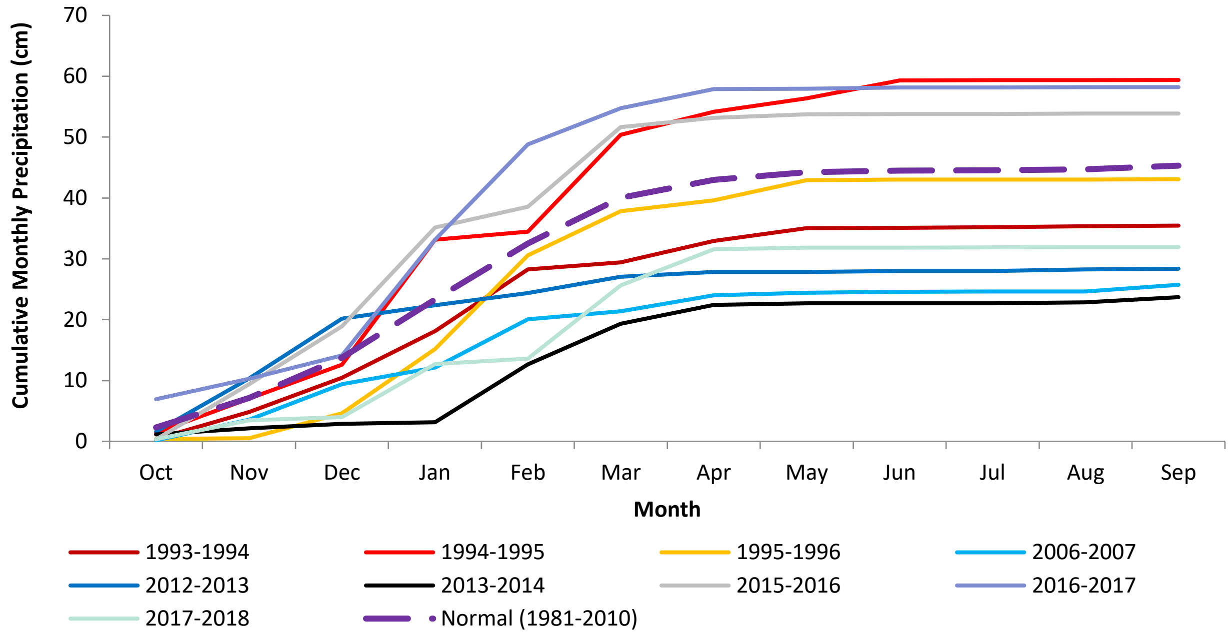


Figure 4-1. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 5 (Reference) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC and NOAA, 2018)

4.1.1 Hydrology Monitoring

The 2018 maximum inundation for Pond 5 was 3.01 acres with a maximum depth of approximately 22 cm. The depth and inundation values were within range of the previously recorded values (see Appendix F Table F-1). Pond 5 remained inundated from the previous water-year, as indicated by the November 2017 depth of 18 cm. The vernal pool then filled, held water, and dried in spring. The slight decrease in both depth and inundation in February correlates with the precipitation pattern of the 2017-2018 water-year. Figure 4-2 illustrates the relationship of precipitation and depth at Pond 5 for 2018.

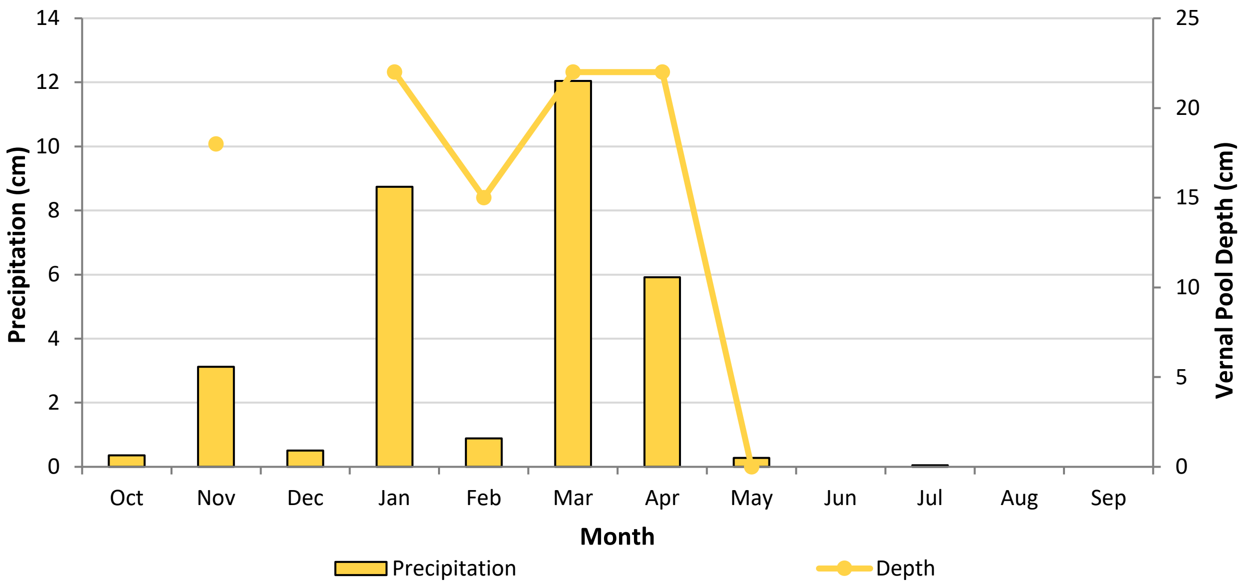


Figure 4-2. Monthly Depth and Precipitation at Pond 5 (Reference) for 2017-2018 Water-Year

Pond 5 was inundated in 1994, 1995, 1996, 2007, 2013, 2016, and 2017. The vernal pool did not fill in 2014. The historic inundations in below-normal water-years were 2.75 acres in March 1994, 1.58 acres in March 2007, and 0.01-0.91 acres in 2013. The maximum inundations for 1994 and 2007 were within the 2018 inundation range, whereas the inundations in water-year 2012-2013 were much smaller because Pond 5 was only inundated in December and January.

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 ranging from 5.3-7.8 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.

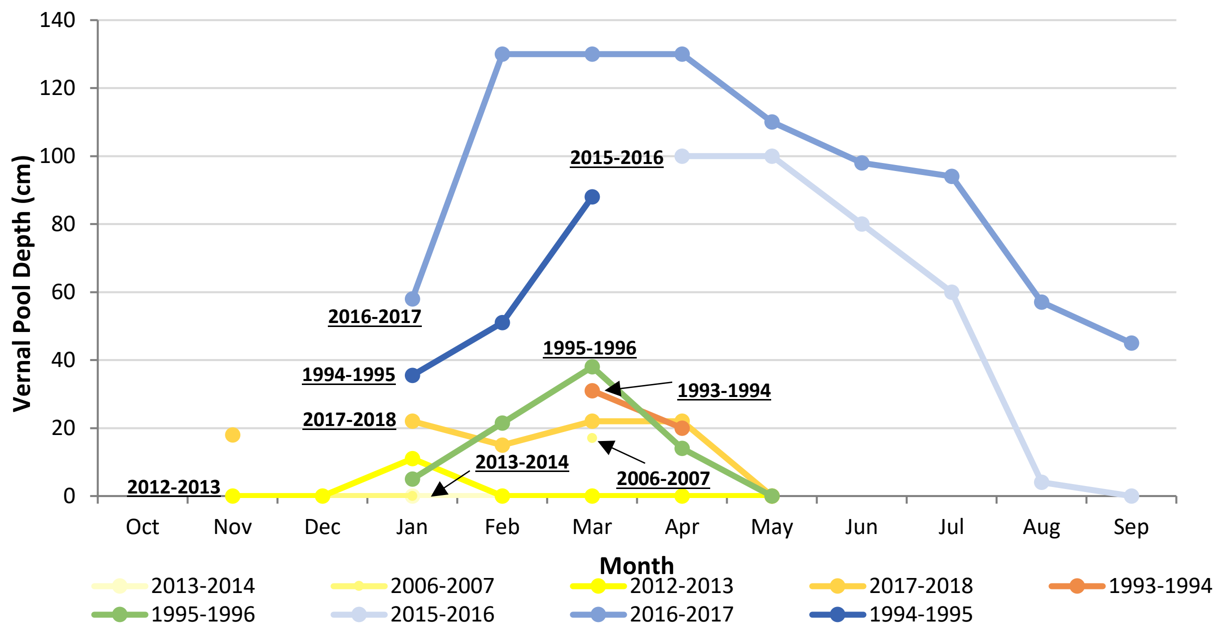


Figure 4-3. Historic Monthly Depths at Pond 5 (Reference). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

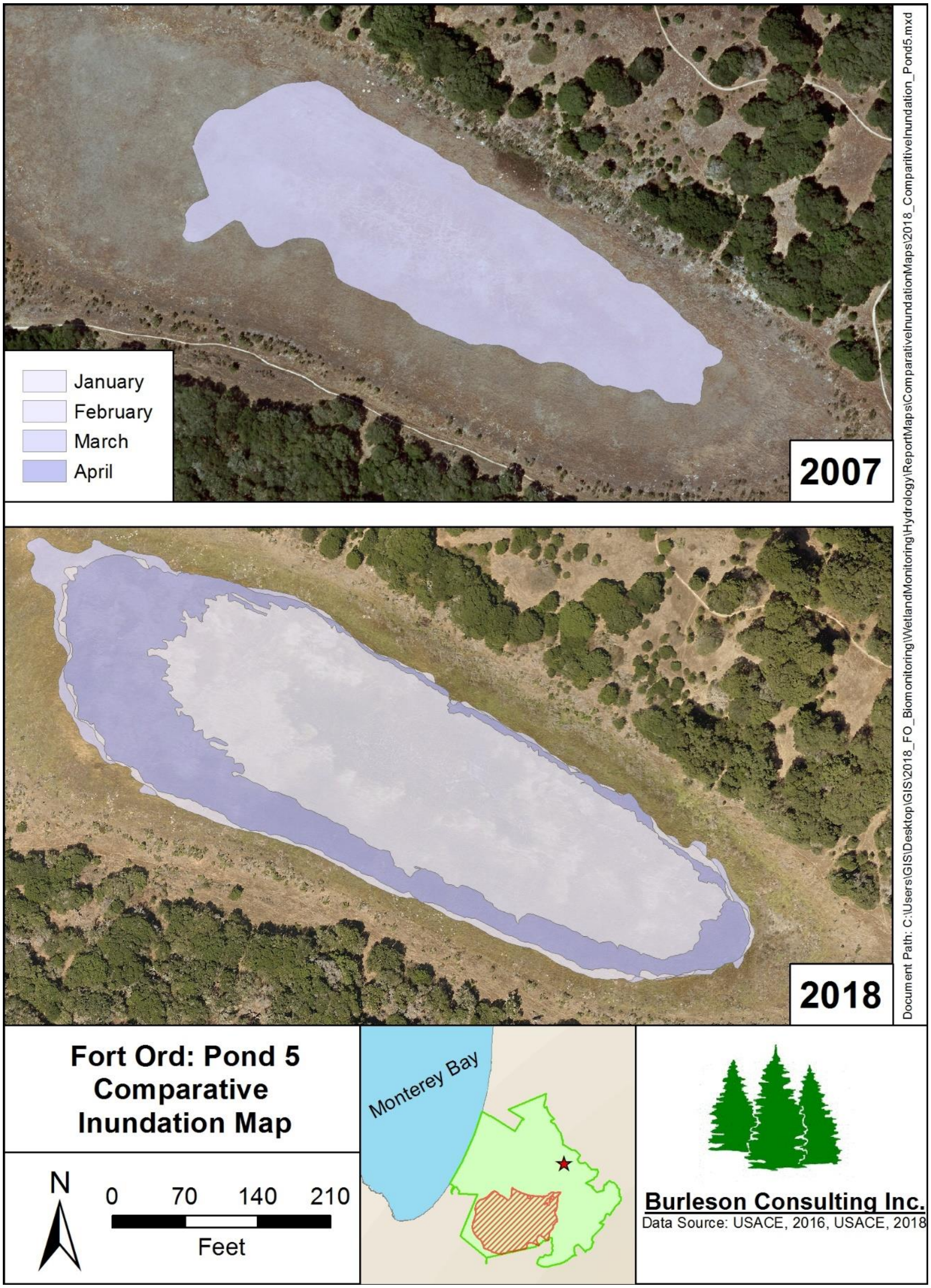


Figure 4-4. Pond 5 (Reference) Inundations for 2006-2007 (below-normal precipitation) and 2017-2018 (below-normal precipitation). Remediation effort did not occur at this vernal pool.

4.1.1.1 *Data Quality Objective 1*

Pond 5 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 5 did not provide sufficient depth for CTS (20 cm through March) or fairy shrimp (20 cm through April).

4.1.1.2 *Data Quality Objective 2*

Pond 5 was inundated January through April with an inundation range of 1.85-3.01 acres and a mean of 2.66 acres. The vernal pool was dry by May 22, 2018.

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, and 2018 (Shaw, 2008; Burleson, 2017, 2018). 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 comparison to other years. In 2016, 2017, and 2018, data were collected using methodologies described in the Methods section of this report. Data from 2016 and 2018 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	2018
1	26%	40%
2	32%	3%
3	38%	11%
4	4%	5%
5	N/A	20%
6	N/A	21%

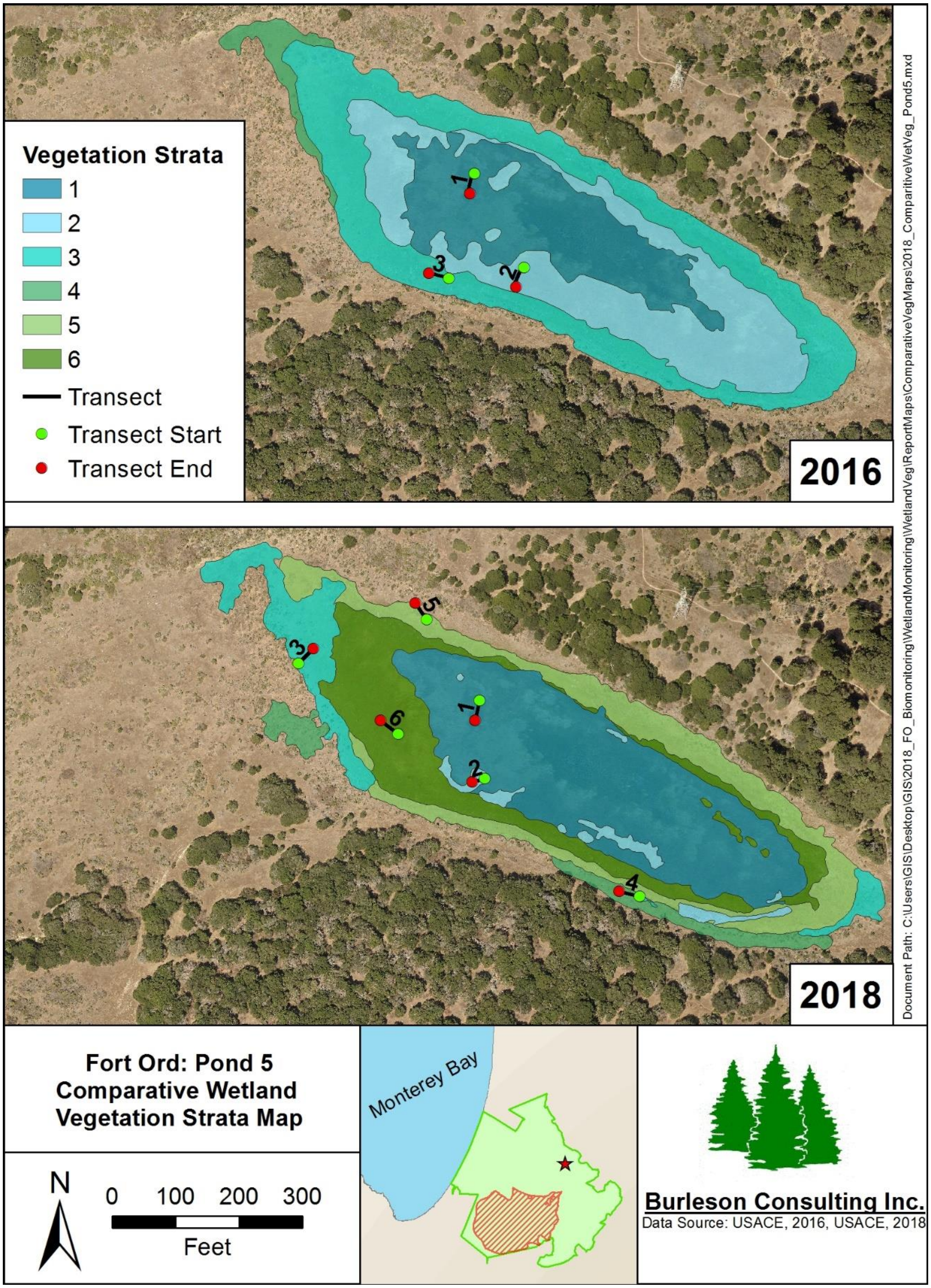


Figure 4-5. Pond 5 (Reference) Vegetation Strata and Transects for 2016 and 2018

The absolute percent vegetative cover observed in 2018 was comparable to previous years and most similar to 2017 (see Table 4-3). Vegetative cover ranged from 36.3% in 2007 to 75.1% in 2016, whereas thatch/bare ground ranged from 25.2% in 2016 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%

Species richness increased between 2007 and 2018 at Pond 5. Species richness on transects was 4, 7, 29, and 41 species in 2007, 2016, 2017, and 2018, respectively, whereas overall basin species richness was 26, 40, 73, and 88 species, respectively (see Table 4-4 and Appendix B Table B-1). A possible contributing factor to the species richness increase could be year-to-year fluctuations associated with hydroperiod (Barbour *et al*., 2007). The more variable inundation and depth regime in 2018 may have allowed seeds that were dormant during drought years or submerged in above-normal water-years to germinate (Bliss and Zedler, 1998). This increased variability can increase microhabitats and promote higher species richness compared to a vernal pool with less hydrologic variability (Witham *et al*., 1998).

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. A complete comparison of species composition observed during the surveys at Pond 5 in 2007, 2016, 2017, and 2018 can be found in Appendix H. Figure 4-6 shows a subset of this comparison for species observed with a 2% cover or greater.

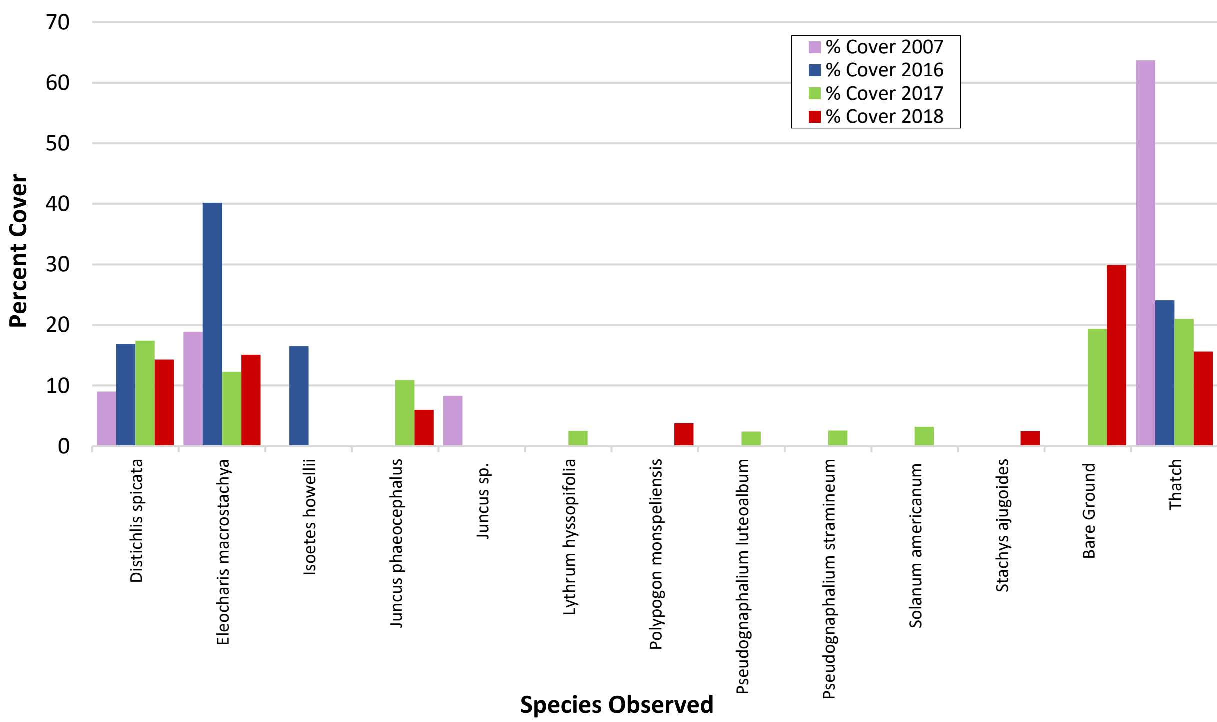


Figure 4-6. Percent Cover of Dominant Species at Pond 5 (Reference)

Native and non-native species richness on Pond 5 transects increased through time (see Table 4-4). The relative percent cover of native and non-native species varied through time, and the 2018 values were within the range of previously observed values (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

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%

Wetland and non-wetland species richness were higher on Pond 5 transects in 2018 than in previous years (see Table 4-6). The relative percent cover of wetland species increased from 2017, whereas the relative percent cover of non-wetland species decreased (see Table 4-7). Increased wetland vegetation cover and richness were likely attributable to stratum 1 being surveyed in 2018 and not surveyed in 2017 (stratum 1 was submerged), as well as year-to-year variability. Decreased non-wetland vegetation cover is likely attributable to year-to-year variability.

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

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%

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 2018. 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, and 2018 (Jones and Stokes, 1996; Shaw, 2008, 2011; Burleson, 2017, 2018). Fairy shrimp were only detected in 1995. California tiger salamander larvae were observed in 1995, 2010, 2016, and 2017. 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	0	0
1995	Abundant	Very low – moderate abundance
1996	0	0
2007	0	0
2010	12	0
2016	>101	0
2017	46	0
2018	0	0

4.1.3.1 *Data Quality Objective 1*

Pond 5 did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.1.1.1.

4.1.3.2 *Data Quality Objective 4*

Neither CTS nor fairy shrimp were present in 2018 at Pond 5 most likely due to insufficient depth; however, the water quality was likely adequate to support both species. Compared to other vernal pools and across years, the water quality data were within normal ranges. The pH ranged from 7.01 in March to 7.29 in April with a mean of 7.14. Temperatures ranged from 6.00°C in February to 20.68°C in April with a mean of 12.75°C. Dissolved oxygen ranged from 5.27 mg/L in February to 7.09 mg/L in April with a mean of 6.39 mg/L. The turbidity ranged from 4.7 FNU in March to 40.6 FNU in April with a mean of 25.3 FNU (see Table 3-5).

4.1.3.3 *Data Quality Objective 5*

California tiger salamanders were not present in 2018. They were present in 1995, 2010, 2016, and 2017, but not in 1994, 1996, or 2007. The variation in CTS presence may be associated with rainfall patterns. Although 2009-2010 was a below-normal water-year, early storms with above-normal precipitation likely provided enough suitable habitat for CTS through March. Additionally, 1995, 2016, and 2017 had above-normal precipitation levels. In contrast, the below-normal 2017-2018 water-year did not fill Pond 5 to depths suitable for CTS habitat (see Figure 4-1 and Figure 4-2).

Fairy shrimp were not detected in 2018, which was consistent with all but one previous monitoring year. Fairy shrimp were only detected in 1995. It was possible survey event timing prevented detection. Previous fairy shrimp detections were made in January through March, whereas 2018 surveys were conducted April through June. Fairy shrimp life cycle is dependent on inundation and eggs normally hatch within a few days of when ponding occurs (Eriksen and Belk, 1999). Ponding occurred late in 2018 for many vernal pools. This was observed at Ponds 39 and 42, the only vernal pools that had fairy shrimp detections during the April wildlife survey. This was not the case for Pond 5 which inundated in January however, wildlife monitoring still occurred in April due to concerns for damaging CTS eggs.

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 the 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 (West) - Reference

Pond 101 East (West) was monitored for seven years as a reference vernal pool. Table 4-10 summarizes the monitoring years and types of surveys conducted. The cumulative precipitation graph illustrates precipitation for monitoring (see Figure 4-7). The 2010-2011, 2015-2016, and 2016-2017 water-years were above-normal. All other monitoring was conducted either in a normal or below-normal water-year.

Table 4-10. Pond 101 East (West) (Reference) 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
Hydrology		●		●	●	●	●
Vegetation		●			●	●	●
Wildlife	●	●	●		●	●	

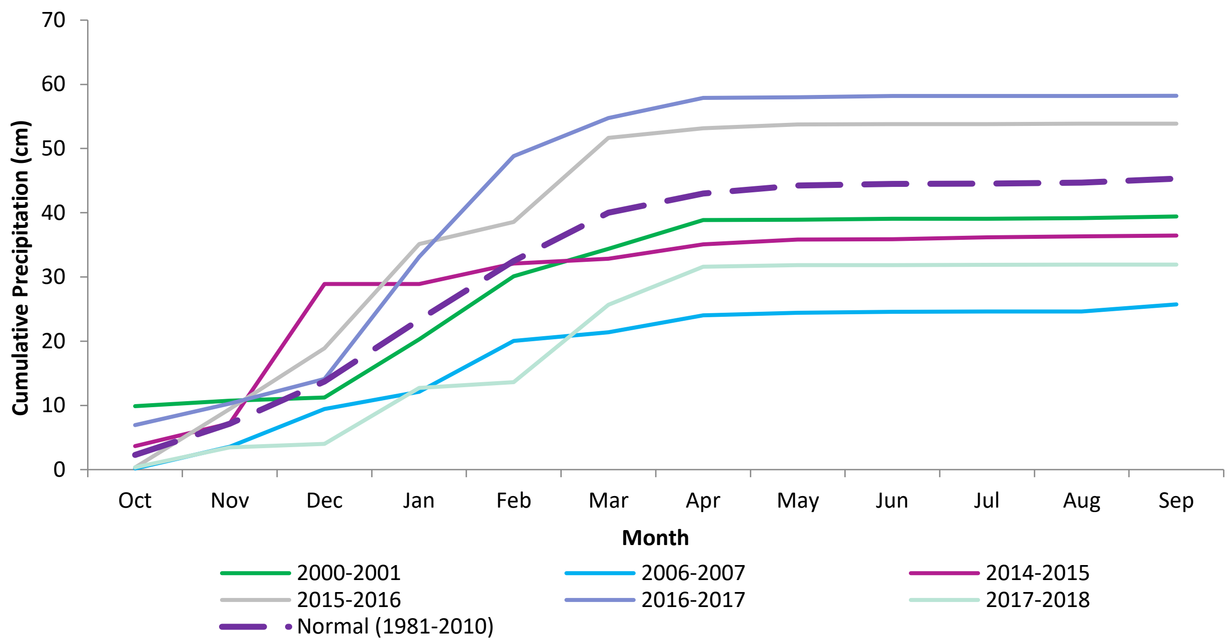


Figure 4-7. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 101 East (West) (Reference) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.2.1 Hydrology Monitoring

The 2018 maximum inundation for Pond 101 East (West) was 0.09 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-2). Pond 101 East (West) filled slowly this water-year and dried quickly. This vernal pool required more than one storm event before it held water, was only inundated in March and April, and remained relatively small and shallow compared to previous years. Figure 4-8 illustrates the relationship of precipitation and depth at Pond 101 East (West) for 2018.

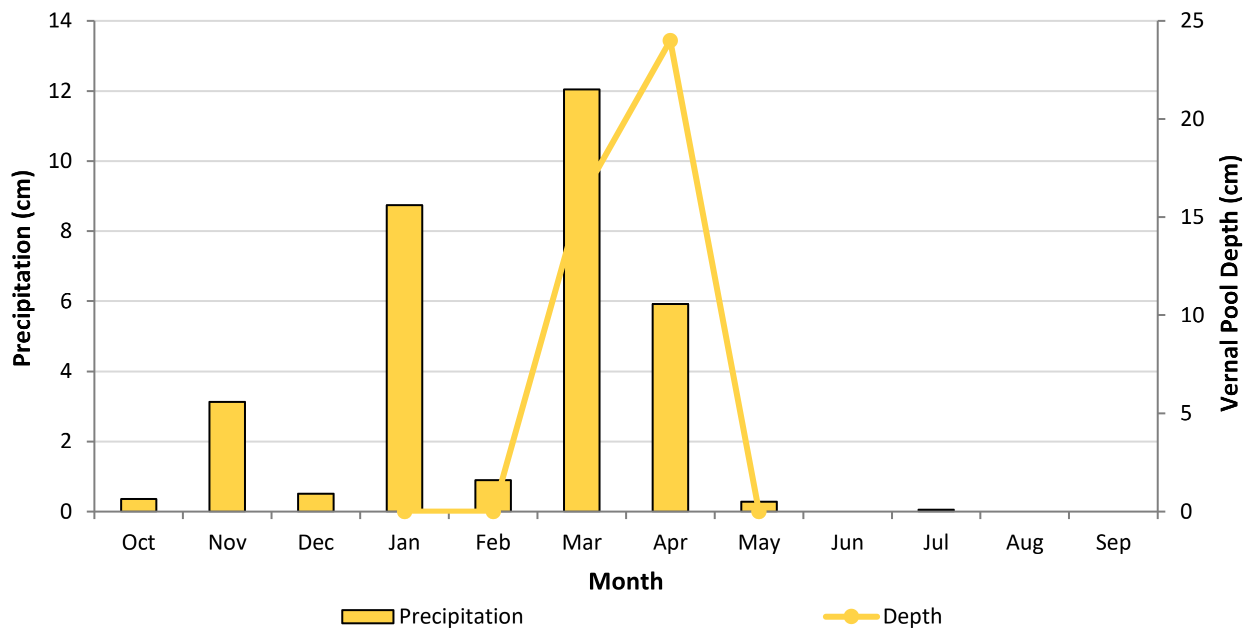


Figure 4-8. Monthly Depth and Precipitation at Pond 101 East (West) (Reference) for 2017-2018 Water-Year

Pond 101 East (West) was inundated in 2001, 2016, and 2017 but was dry in 2007 and 2015. The historic inundations in 2001 were within the inundation range of 2018, whereas the historic inundations in 2016 and 2017 were larger due to the above-normal water-years. Pond 101 East (West) inundates a small area or remains dry during below-normal precipitation years like 2018. During these years, it typically does not connect with Pond 101 East (East). The above-normal water-year in 2017 resulted in a large inundation, and the two adjacent vernal pools were connected from January to May. In contrast, the below-normal water-year in 2018 resulted in the smallest inundations recorded at Pond 101 East (West).

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 acre or more but would likely be connected to Pond 101 East (East), as observed in 2017 (see Appendix F Tables F-2 – F-3). Figure 4-9 illustrates historic vernal pool depths by month and organized by water-year. **Figure** 4-10 illustrates historic and recent inundation areas.

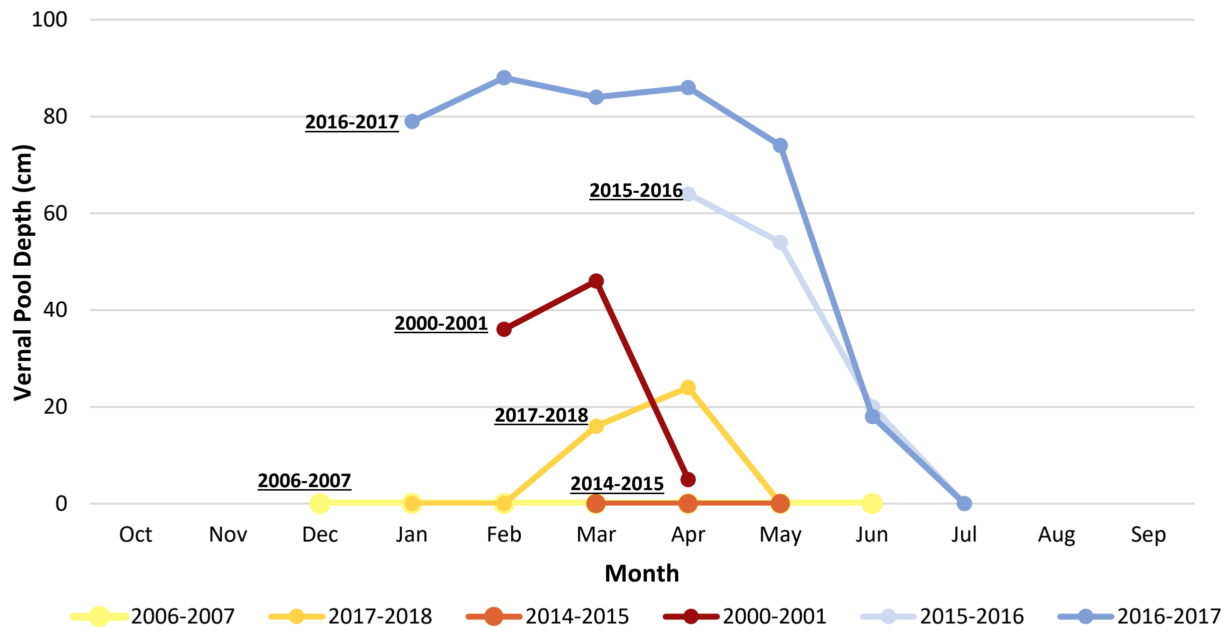


Figure 4-9. Historic Monthly Depths at Pond 101 East (West) (Reference). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years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

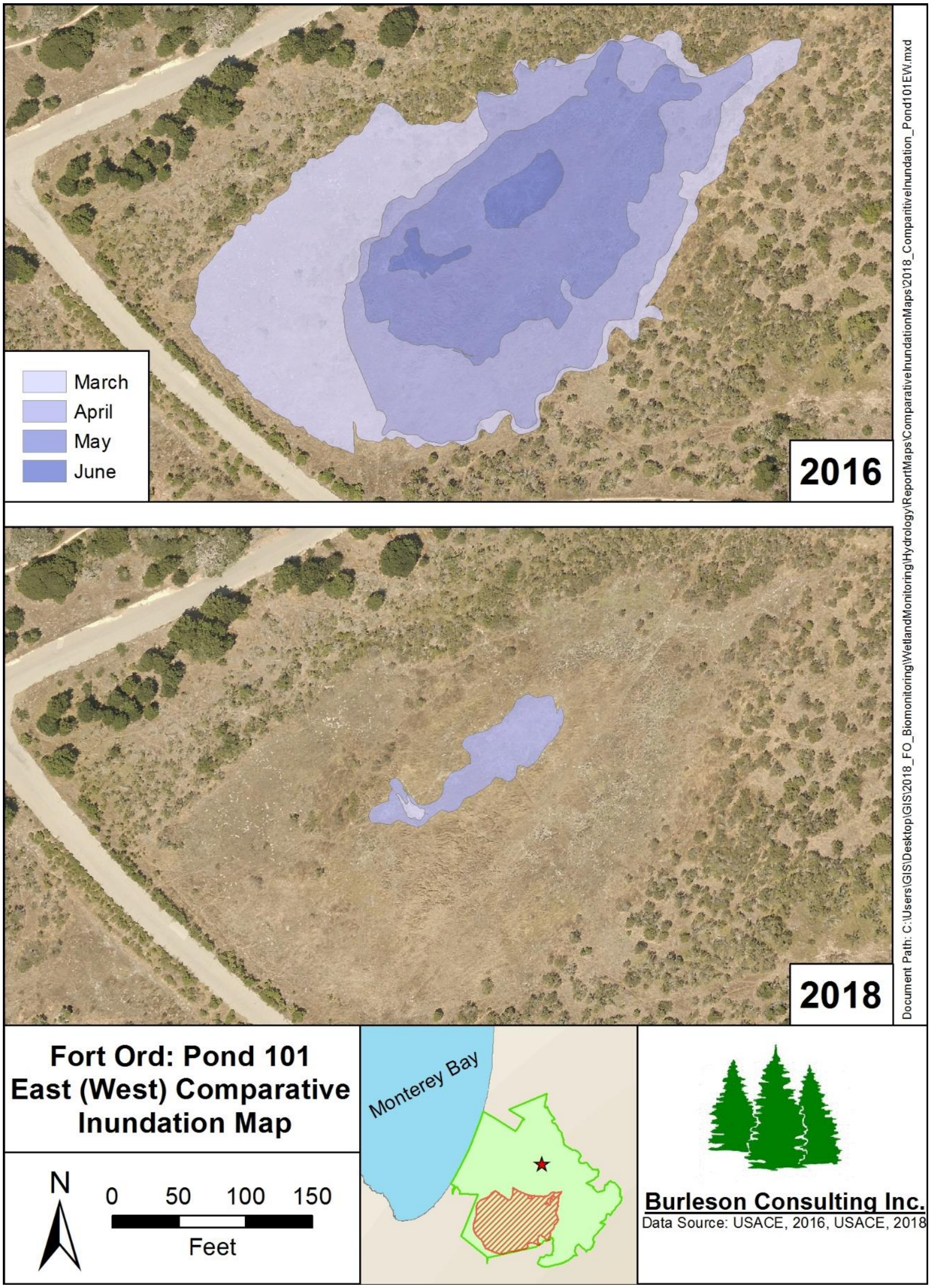


Figure 4-10. Pond 101 East (West) (Reference) Inundations for 2015-2016 (above-normal precipitation) and 2017-2018 (below-normal precipitation). Remediation effort did not occur at this vernal pool.

4.2.1.1 *Data Quality Objective 1*

Pond 101 East (West) 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 101 East (West) did not provide sufficient depth for CTS (16 cm through March) or fairy shrimp (20 cm through April). The first major rain events in 2018 occurred in March and April and did not create lasting ponding as Pond 101 East (West) was dry by May.

4.2.1.2 *Data Quality Objective 2*

Pond 101 East (West) was inundated March through April with an inundation range of 0.004-0.09 acres and a mean of 0.05 acres. The vernal pool was dry by May 21, 2018.

4.2.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 101 East (West) 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 (West) in 2001, 2016, 2017, and 2018 (Harding ESE, 2002; Burleson, 2017, 2018). 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 comparison to other years. In 2016, 2017, and 2018, data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2018 were compared stratum-to-stratum in Table 4-11 as well as visually in Figure 4-11.

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

Stratum	Percentage	
	2016	2018
1	13%	5%
2	37%	40%
3	12%	12%
4	22%	18%
5	15%	21%
6	N/A	4%

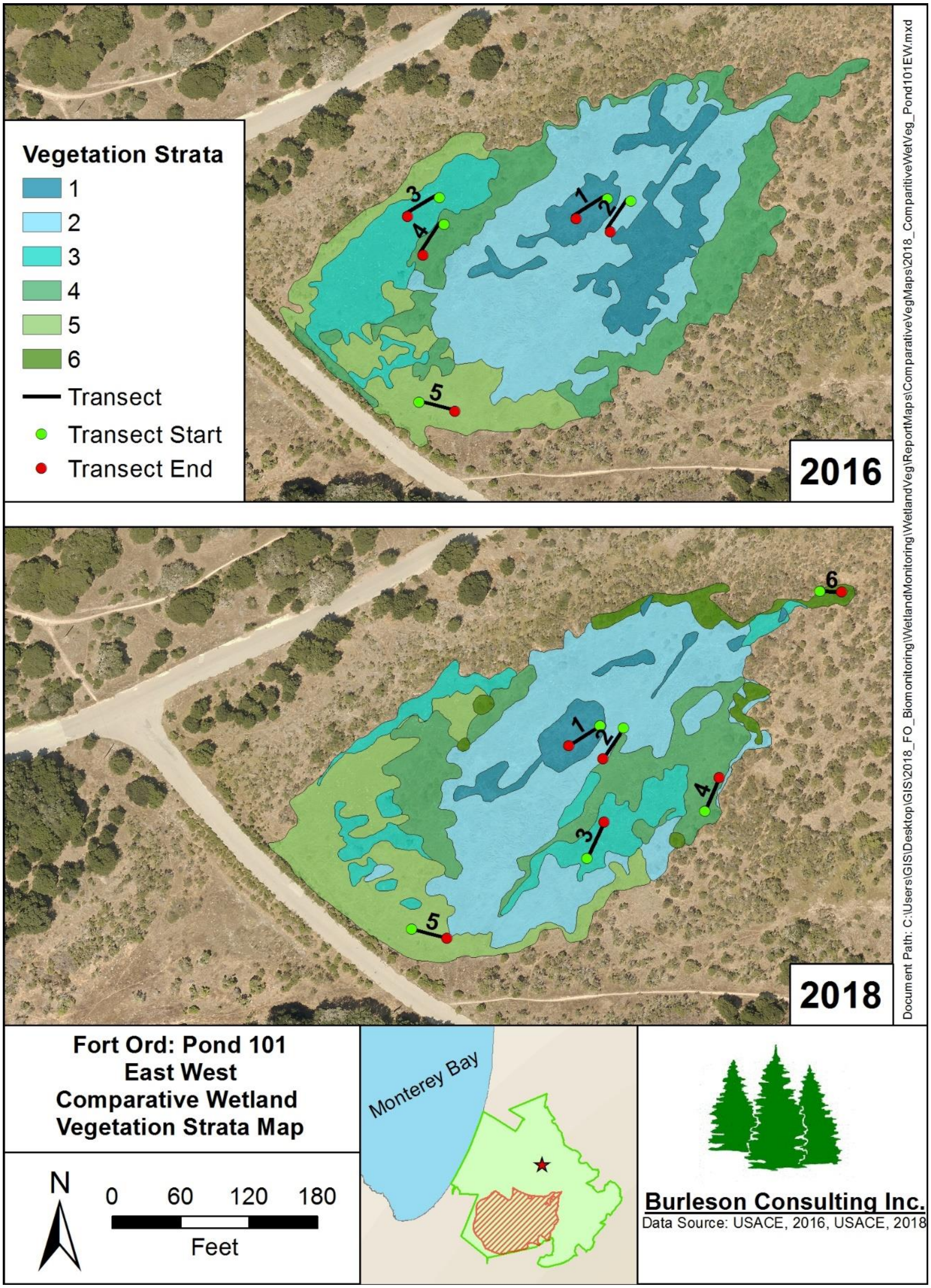


Figure 4-11. Pond 101 East (West) (Reference) Vegetation Strata and Transects for 2016 and 2018

The absolute percent vegetative cover observed in 2018 was comparable to previous years (see Table 4-12). The increased thatch between previous years and the 2018 surveys was notable. This increase might be attributable to the two previous above-normal water-years and the below-normal 2017-2018 water-year with an extended period without inundation in early 2018. This shift may have allowed for the desiccation of plants and greater accumulation of thatch.

Table 4-12. Pond 101 East (West) (Reference) 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%

Species richness increased between 2001 and 2018 at Pond 101 East (West). Species richness on transects was 31, 30, 36, and 50 species in 2001, 2016, 2017 and 2018, respectively, whereas overall basin species richness was 59, 68, and 88 species in 2016, 2017, and 2018, respectively (see Table 4-13 and Appendix B Table B-2). The 2001 survey only included species observed on the transects and might have underrepresented total vernal pool species richness. A possible contributing factor to the species richness increase could be year-to-year fluctuations associated with hydroperiod (Barbour *et al*., 2007). Although Pond 101 East (West) was dry early in 2018 and was only inundated in March and April, vernal pool plants can germinate and persist without inundation and may experience a late-season pulse of germination when seeds float free of the soil as the vernal pools fills (Bliss and Zedler, 1998). The more variable inundation and depth regime in 2018 may have allowed seeds that were dormant during drought years or submerged in above-normal water-years to germinate (Bliss and Zedler, 1998). This increased variability can increase microhabitats and promote higher species richness compared to a vernal pool with less hydrologic variability (Witham *et al*., 1998).

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 (*Eleocharis macrostachya*) and grass poly (Lythrum hyssopifolia) were the dominant species in 2017. A complete comparison of species composition observed at Pond 101 East (West) in 2001, 2016, 2017, and 2018 can be found in Appendix H. Figure 4-12 shows a subset of this comparison for species observed with a 2% cover or greater.

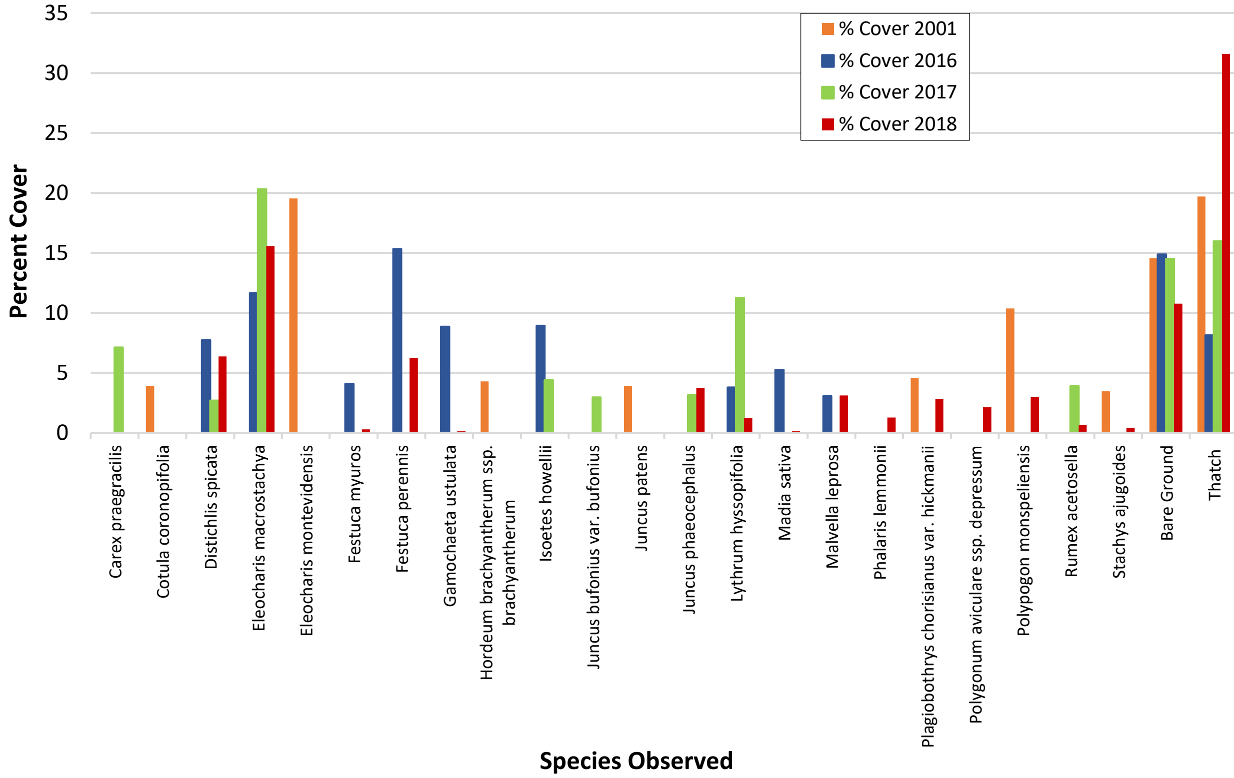


Figure 4-12. Percent Cover of Dominant Species at Pond 101 East (West) (Reference)

Native species richness on Pond 101 East (West) transects increased between 2001 and 2018 (see Table 4-13). Non-native species richness was more variable between monitoring years, but still generally increased by 2018. The relative percent cover of native and non-native species varied through time, and the 2018 values were within the range of previously observed values (see Table 4-14).

Table 4-13. Pond 101 East (West) (Reference) 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

Table 4-14. Pond 101 East (West) (Reference) 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%

Wetland and non-wetland species richness on Pond 101 East (West) transects increased between 2001 and 2018, although non-wetland species richness fluctuated within a range of 4 to 10 species (see Table 4-15). The relative percent cover of wetland and non-wetland species remained similar across monitoring years (see Table 4-16).

Table 4-15. Pond 101 East (West) (Reference) 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

Table 4-16. Pond 101 East (West) (Reference) 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%

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 (West) was used for comparison to baseline and remediated vernal pools.

4.2.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 101 East (West) 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 (West) in 1992, 2001, 2010, 2016, and 2017 (Jones and Stokes, 1992; Harding ESE, 2002; Shaw, 2011; Burleson, 2017, 2018). California tiger salamander larvae were detected in 1992, 2010, 2016, and 2017. Fairy shrimp were only detected in 2001. Pond 101 East (West) was not surveyed for CTS or fairy shrimp in 2018 due to insufficient depth. However, DQO 1 and DQO 4 were evaluated to allow for comparison in future years. DQO 5 was not applicable. Table 4-17 shows historic wildlife monitoring results.

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

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1992	Present*	0*
2001	0*	Moderate abundance*
2010	11*	0*
2016	>101	0
2017	107	0

*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 (West) did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.2.1.1.

4.2.3.2 *Data Quality Objective 4*

California tiger salamander and fairy shrimp surveys were not conducted in 2018 at Pond 101 East (West) due to insufficient depth; however, the water quality was likely adequate to support both species. Compared to other vernal pools and previous Pond 101 East (West) data, the water quality data was within normal ranges. The pH ranged from 6.62 in March to 7.20 in April with a mean of 6.91. Temperature ranged from 13.58°C in March to 21.74°C in April with a mean of 17.66°C. Dissolved oxygen ranged from 3.09 mg/L in March to 10.95 mg/L in April with a mean of 7.02 mg/L. Turbidity range was from 16.6 FNU in April to 39.5 FNU in March with a mean of 28.1 FNU (see Table 3-7).

4.2.3.3 *Performance Standard: Wildlife Usage*

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

Table 4-18. Success at Pond 101 East (West) (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	N/A**

**Not applicable; only hydrology and vegetation surveys were conducted

4.3 Pond 101 East (East) - Reference

Pond 101 East (East) was monitored for ten years as a reference vernal pool. Table 4-19 summarizes the years that monitoring occurred and the type(s) of surveys conducted. The cumulative precipitation graph shows the precipitation for the years in which monitoring was conducted at Pond 101 East (East) (see Figure 4-13). The only water-years above-normal were 2015-2016 and 2016-2017. All other monitoring was conducted either in a below-normal water-year, drought year, or consecutive drought year.

Table 4-19. 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
Hydrology		●	●		●	●	●	●	●	●
Vegetation								●	●	●
Wildlife	●	●	●	●				●	●	●

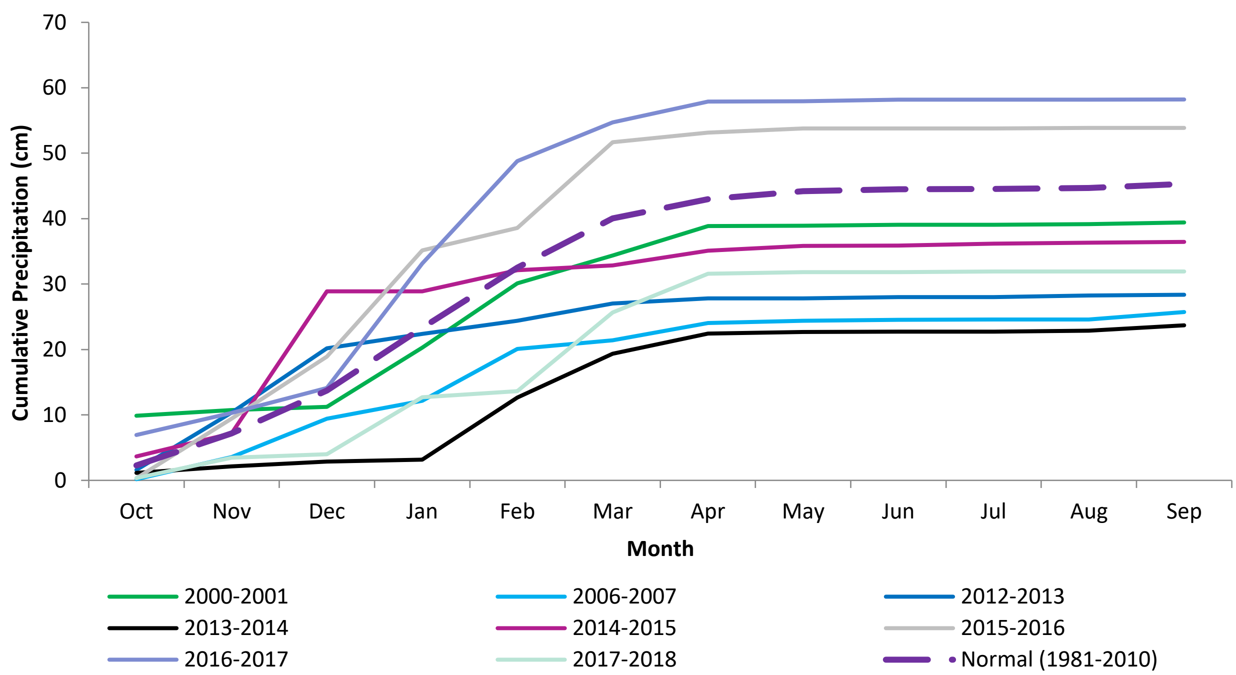


Figure 4-13. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 101 East (East) (Reference) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.3.1 Hydrology Monitoring

The 2018 maximum inundation for Pond 101 East (East) was 2.09 acres with a maximum depth of approximately 44 cm. The depth and inundation values were within range of the previously recorded values (see Appendix F Table F-3). Pond 101 East (East) remained inundated from the previous water-year, as indicated by the November depth of 44 cm. The vernal pool then filled, held water, and dried in spring. Figure 4-14 illustrates the relationship of precipitation and depth at Pond 101 East (East) for 2018.

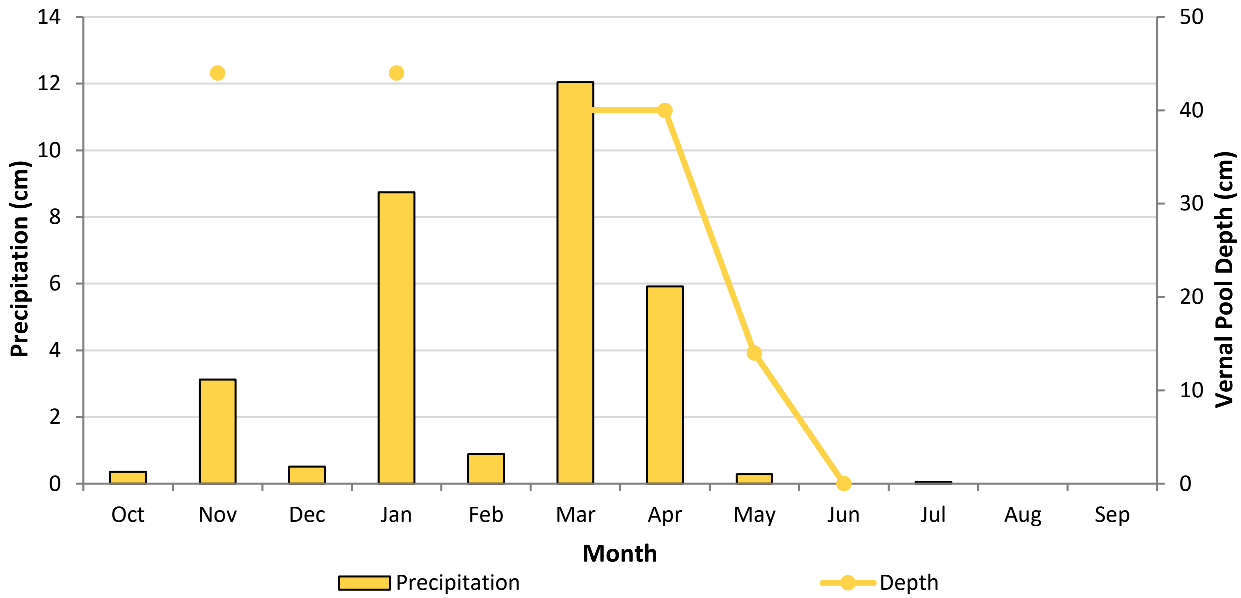


Figure 4-14. Monthly Depth and Precipitation at Pond 101 East (East) (Reference) for 2017-2018 Water-Year. During data validation, the depth recorded in February appeared to be in error and was subsequently removed from the dataset.

Pond 101 East (East) was inundated in 2001, 2007, 2013, 2016, and 2017 but was dry in 2014 and 2015. The historic inundations in 2001, 2007, and 2014 were within the inundation range of 2018, whereas the historic inundations in 2016 and 2017 were larger due to the above-normal water-years. Inundations were recorded one or two times in the below-normal water-years 2001, 2007, and 2013. In dry years, Pond 101 East (East) does not pond or is very small and disconnected from Pond 101 East (West). The above-normal precipitation in 2017 resulted in a large inundation, and the two adjacent pools were connected between January and May. In contrast, the below-normal 2018 water-year resulted in inundations that were within the ranges observed in drought years 2001, 2007, and 2013 (see Figure 4-15).

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 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 or more but would likely be connected to Pond 101 East (West) as observed in 2017 (see Appendix F Tables F-2 and F-3). Figure 4-15 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-16 illustrates historic and recent inundation areas.

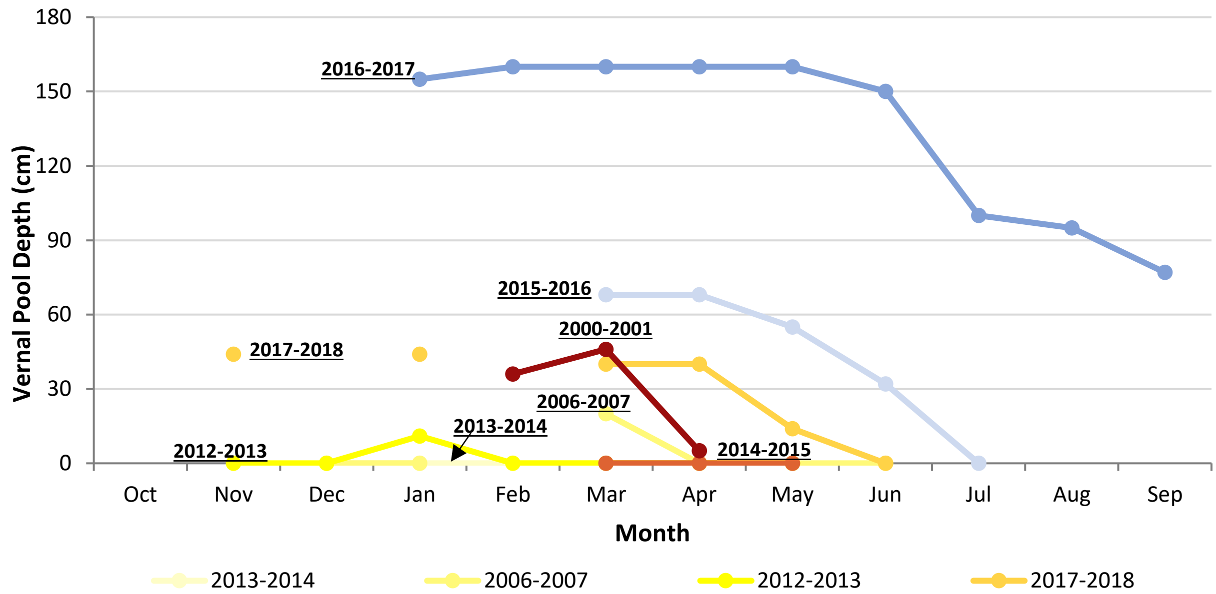


Figure 4-15. Historic Monthly Depths at Pond 101 East (East) (Reference). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

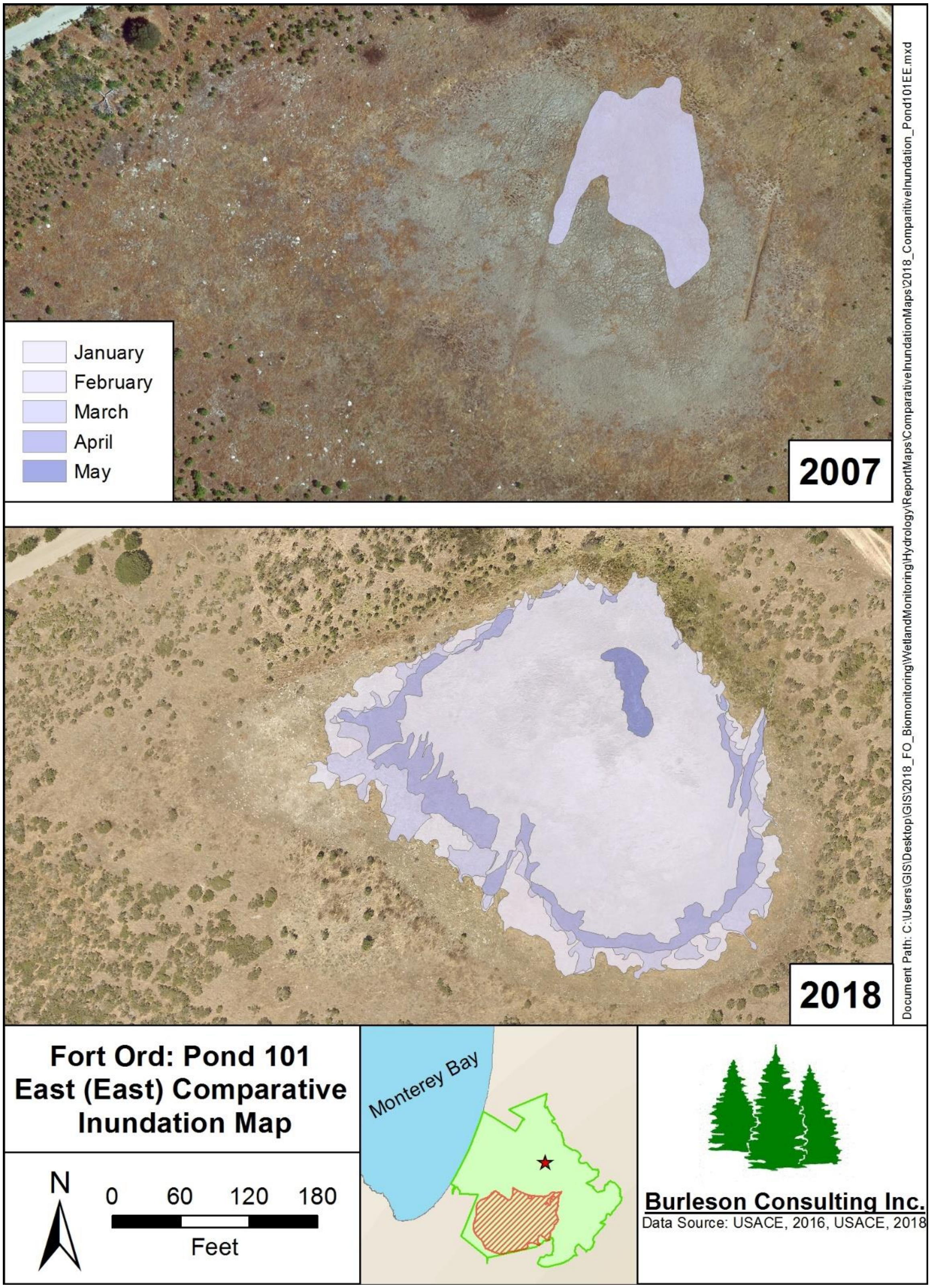


Figure 4-16. Pond 101 East (East) (Reference) Inundations for 2006-2007 (below-normal precipitation) and 2017-2018 (below-normal precipitation). Remediation effort did not occur at this vernal pool.

4.3.1.1 *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 (42 cm through March) and fairy shrimp (36 cm through May).

4.3.1.2 *Data Quality Objective 2*

Pond 101 East (East) was inundated January through May with an inundation range of 0.04-2.09 acres and a mean of 1.42 acres. The vernal pool was dry by June 19, 2018.

4.3.1.3 *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.

4.3.2 Vegetation Monitoring

Vegetation data were collected at Pond 101 East (East) in 2016, 2017, and 2018 (Burleson, 2017, 2018). Data from 2016, 2017, and 2018 were collected using the methodology described in the Methods section of this report. Data from 2016 and 2018 were compared stratum-to-stratum in Table 4-20 as well as visually in Figure 4-17.

Table 4-20. Pond 101 East (East) (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2018
1	0.4%	7%
2	48%	20%
3	44%	N/A
4	8%	N/A
5	N/A	30%
6	N/A	29%
7	N/A	14%

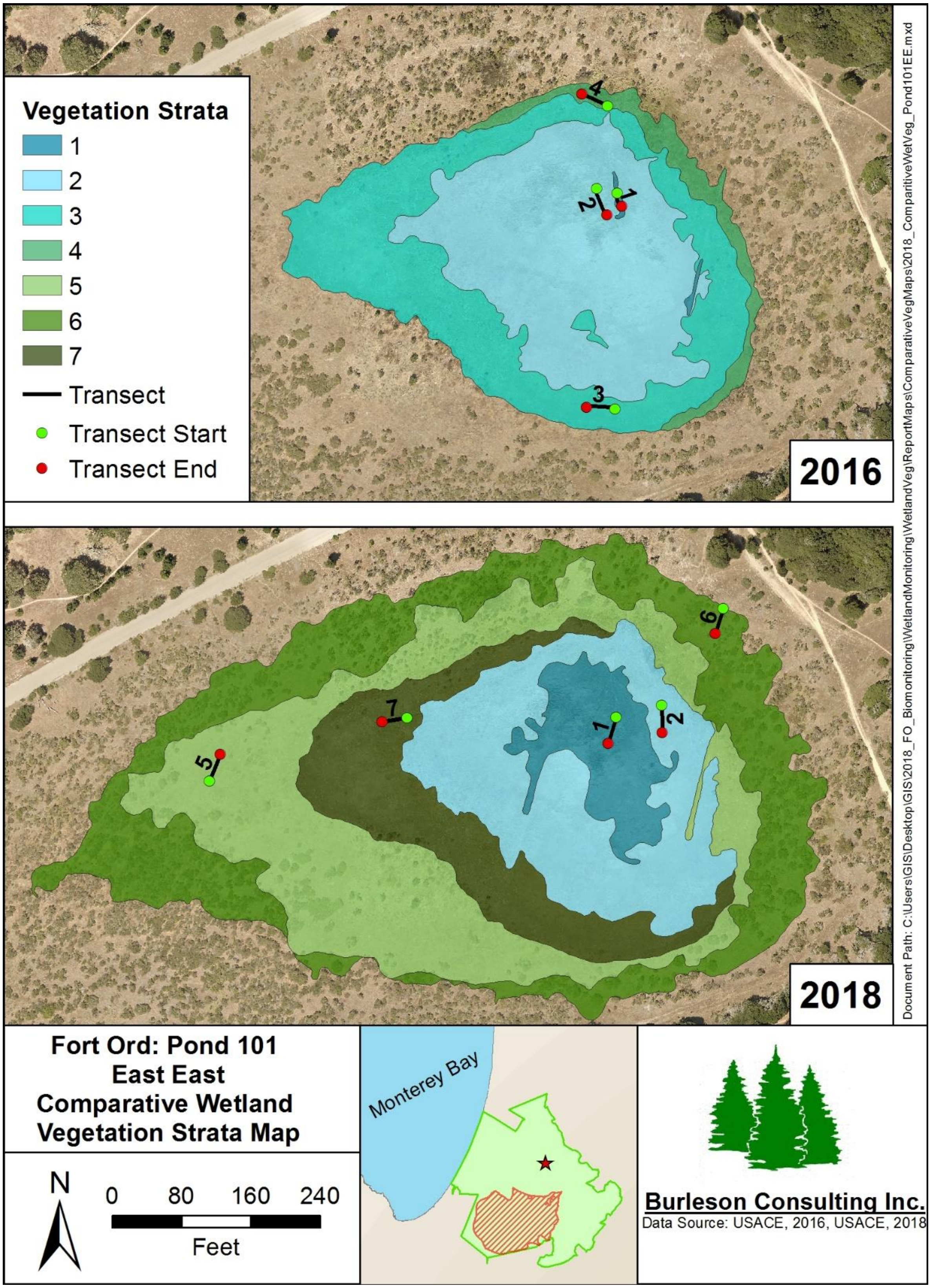


Figure 4-17. Pond 101 East (East) (Reference) Vegetation Strata and Transects for 2016 and 2018

The absolute percent vegetative cover observed in 2018 was comparable to previous years and most similar to 2016 (see Table 4-21). Vegetative cover ranged from 60.7% in 2016, peaked in 2017 with 84.6%, and decreased to 68.7% by 2018.

Table 4-21. 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%

Species richness increased between 2016 and 2018 at Pond 101 East (East). Species richness on transects was 18, 18, and 32 species in 2016, 2017, and 2018, respectively, whereas overall basin species richness was 37, 59, and 89 species, respectively (see Table 4-22 and Appendix B Table B-3). A possible contributing factor to the species richness increase could be year-to-year fluctuations associated with hydroperiod (Barbour *et al*., 2007). The more variable inundation and depth regime in 2018 may have allowed seeds that were dormant during drought years or submerged in above-normal water-years to germinate (Bliss and Zedler, 1998). This increased variability can increase microhabitats and promote higher species richness compared to a vernal pool with less hydrologic variability (Witham *et al.*, 1998).

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, and pale spikerush (*Eleocharis macrostachya*), common toadrush (*Juncus bufonius* var. *bufonius)* and alkali mallow (*Malvella leprosa*) were dominant in 2018. A complete comparison of species composition observed at Pond 101 East (East) in 2016, 2017, and 2018 can be found in Appendix H. Figure 4-18 shows a subset of this comparison for species observed with a 2% cover or greater.

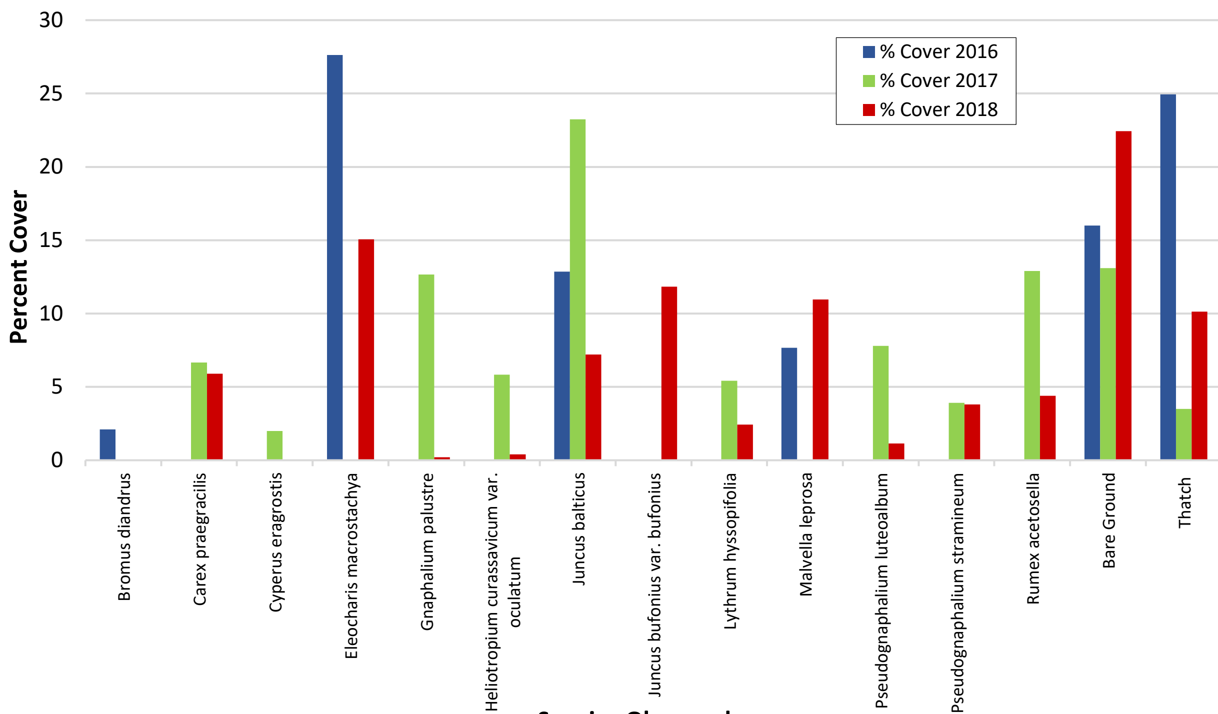


Figure 4-18. Percent Cover of Dominant Species at Pond 101 East (East) (Reference)

Native species richness on Pond 101 East (West) transects increased incrementally between 2016 and 2018 (see Table 4-22). Non-native species richness was more variable between monitoring years, but still generally increased by 2018. Native and non-native species relative percent cover were variable, and 2018 values were most similar to 2016 (see Table 4-23). The non-native relative cover in 2017 was notably higher than 2016 or 2018 and might be due to the above-normal water-year. However, the 2018 non-native cover declined and was similar to 2016.

Table 4-22. 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

Table 4-23. 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%

Wetland and non-wetland species richness on Pond 101 East (East) transects increased between 2016 and 2018 (see Table 4-24). The relative percent cover of wetland species was variable between surveys and the highest cover was observed in 2017, likely due to the above-normal water-year (see Table 4-25).

The relative percent cover of non-wetland species was relatively static between surveys with minor fluctuations.

Table 4-24. 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

Table 4-25. 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%

4.3.2.1 *Vernal Pool Bent Grass*

Vernal pool bent grass was identified at Pond 101 East (East) for the first time in 2018 (see Figure 3-7 in Section 3.3.2.1). 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 42, 44, 61, 997, and Machine Gun Flats on former Fort Ord. The Pond 101 East (East) documentation of vernal pool bent grass further expanded the current known range to the north. It was also found in Ponds 3 North, 3 South, and 73 for the first time in 2018.

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 101 East (East) was used for comparison to baseline and remediated vernal pools.

4.3.2.3 *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.

4.3.3 Wildlife Monitoring

Wildlife data were collected at Pond 101 East (East) in 1992, 2001, 2007, 2010, 2016, 2017, and 2018 (Jones and Stokes, 1992; Harding ESE, 2002; Shaw, 2007; Shaw, 2011; Burleson, 2017; Burleson, 2018). California tiger salamander larvae were observed in 1992, 2010, 2016, 2017, and 2018. Fairy shrimp were only detected in 2001. Table 4-26 shows historic wildlife monitoring results.

Table 4-26. Pond 101 East (East) (Reference) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1992	Present*	0*
2001	0*	Moderate abundance*
2007	0	0
2010	11*	0*
2016	>101	0
2017	111	0
2018	2	0

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

4.3.3.1 *Data Quality Objective 1*

Pond 101 East (East) provided suitable depth for CTS and fairy shrimp as discussed in Section 4.3.1.1.

4.3.3.2 *Data Quality Objective 4*

Fairy shrimp were not detected in 2018. However, CTS were present at Pond 101 East (East) in April and were not detected in May. The water quality was adequate to support CTS in April although high turbidity in May, due to the vernal pool drying, may have negatively impacted conditions for CTS in late May. Compared to other vernal pools and previous Pond 101 East (East) data, the water quality data were within normal ranges (with the exception of May turbidity). The pH ranged from 6.42 in May to 7.12 in April with a mean of 6.83. Temperature ranged from 10.94°C in February to 21.88°C in April with a mean of 14.18°C. Dissolved oxygen range ranged from 0.21 mg/L in January to 15.25 mg/L in May with a mean of 6.66 mg/L. Turbidity ranged from 40.8 FNU in March to 1000 FNU in May with a mean of 263.44 FNU (see Table 3-9).

4.3.3.3 *Data Quality Objective 5*

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

Fairy shrimp were not detected in 2018, which was consistent with some but not all previous years of monitoring. Fairy shrimp were detected in 2001. It was possible survey event timing prevented detection. Previous fairy shrimp detections were made January through April, whereas 2018 surveys were conducted April through June. Fairy shrimp life cycle is dependent on inundation and eggs normally hatch within a few days of when ponding occurs (Eriksen and Belk, 1999). Ponding occurred late in 2018 for many vernal pools. This was observed at Ponds 39 and 42, the only vernal pools that had fairy shrimp detections during the April wildlife survey. This was not the case for Pond 101 East (East) which inundated in January however, wildlife monitoring still occurred in April due to concerns for damaging CTS eggs.

4.3.3.4 *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.

4.3.4 Conclusion

Pond 101 East (East) was used for comparison to the remediated vernal pools (see Table 4-27).

Table 4-27. 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

4.4 Pond 997 - Reference

Pond 997 was monitored for two years as a reference vernal pool although approximately 13% of vegetation within the Pond 997 watershed was masticated in 2017. Table 4-28 summarizes the years that monitoring occurred and the type(s) of surveys conducted. The cumulative precipitation graph shows the precipitation for the years in which monitoring was conducted at Pond 997 (see Figure 4-19). The 2016-2017 water-year was above-normal, whereas the 2017-2018 water-year was below-normal.

Table 4-28. Pond 997 (Reference) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

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

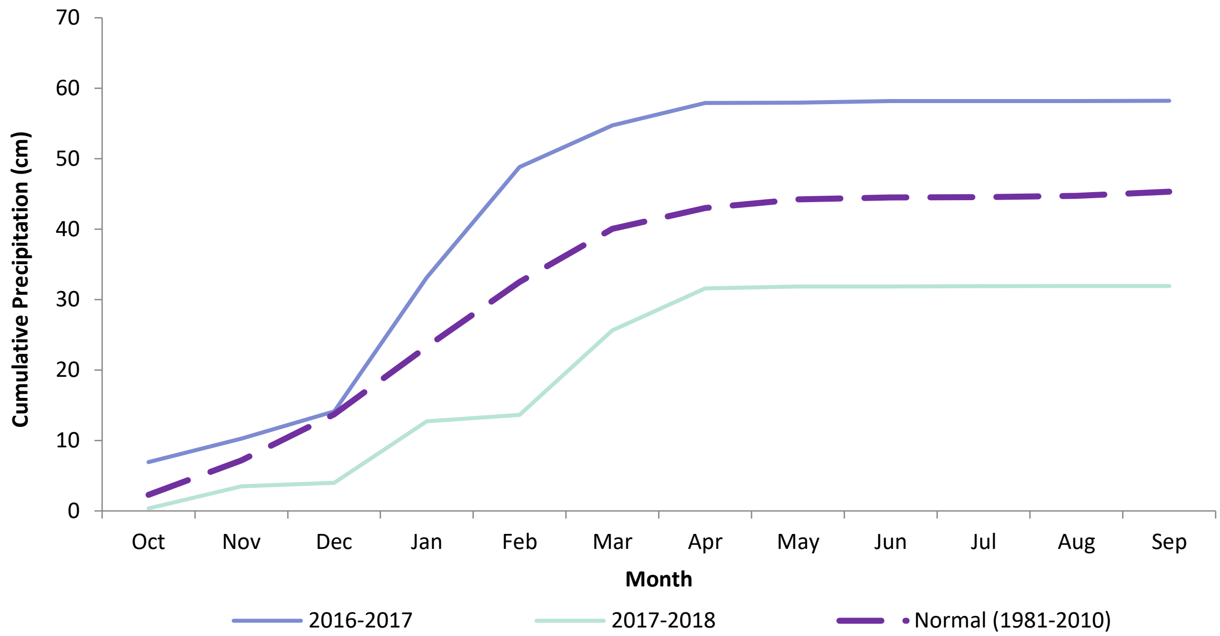


Figure 4-19. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 997 (Reference) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.4.1 Hydrology Monitoring

In 2018, Pond 997 remained dry throughout the water-year. This has not occurred previously; however, the only previous data were from 2017, an above-normal water-year (see Appendix F Table F-4). Figure 4-20 illustrates the relationship of precipitation and depth at Pond 997 for 2018.

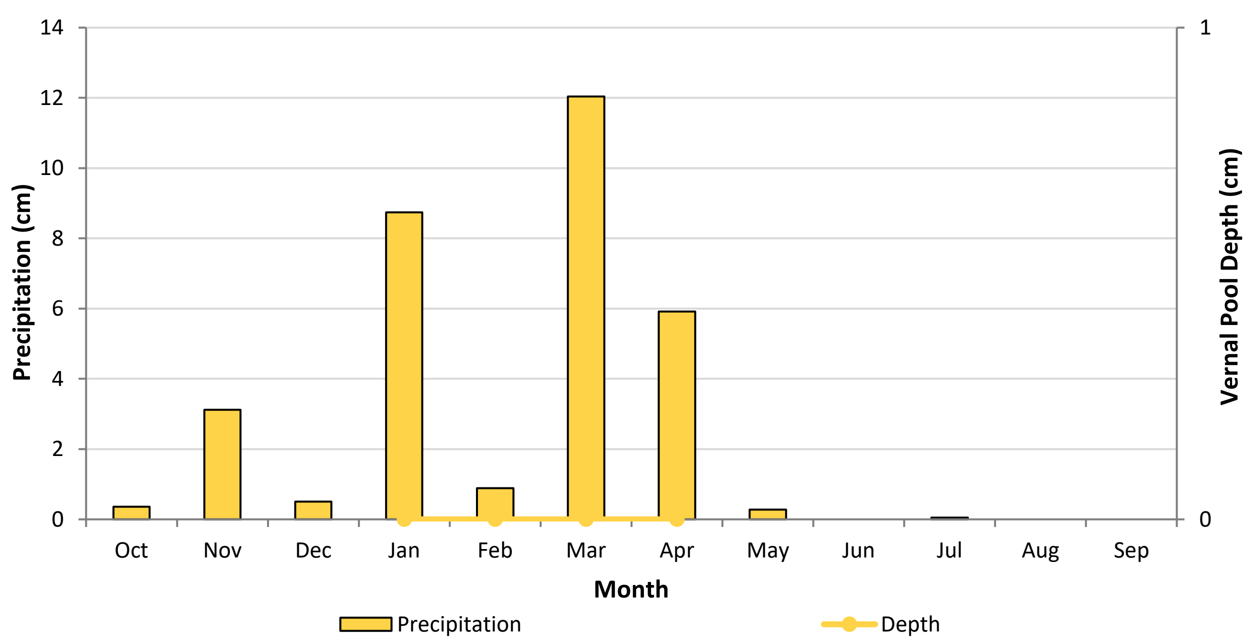


Figure 4-20. Monthly Depth and Precipitation at Pond 997 (Reference) for 2017-2018 Water-Year

Pond 997 was inundated in 2017. These inundations were between 0.02 and 0.33 acres. In below-normal precipitation years, Pond 997 may remain dry; however, this pattern has not been documented prior to this year. 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 up to 0.33 acres (see Appendix F Table F-4). Figure 4-21 illustrates historic vernal pool depths by month and organized by water-year.

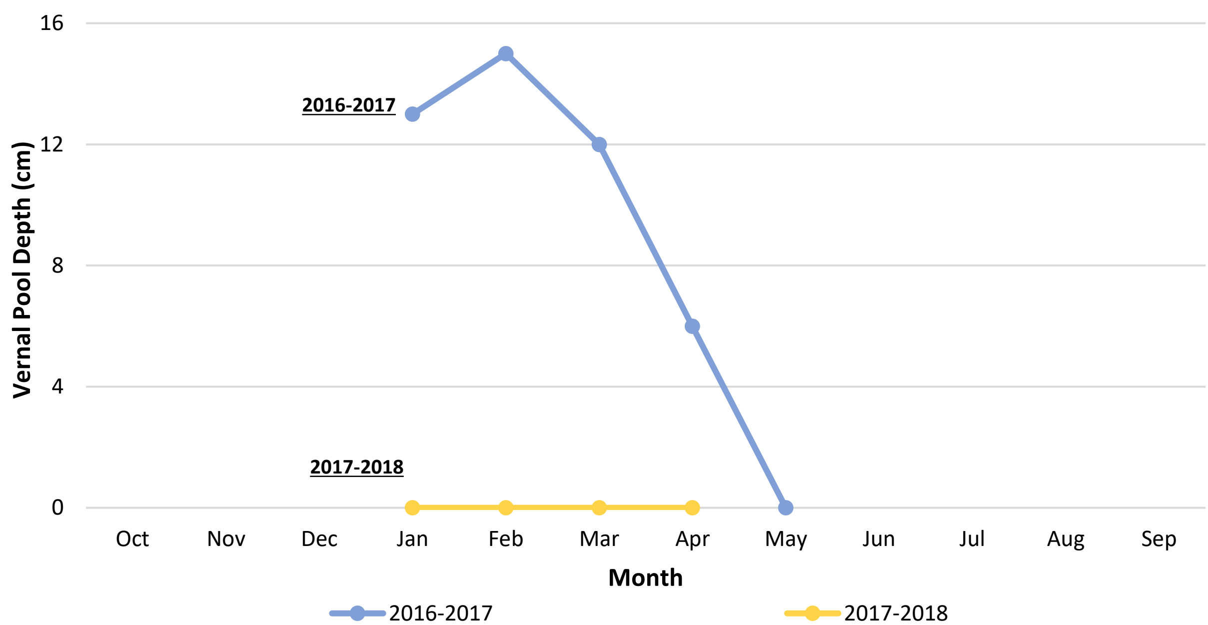


Figure 4-21. Historic Monthly Depths at Pond 997 (Reference). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

4.4.1.1 *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. The vernal pool remained dry throughout the 2017-2018 water-year and did not provide sufficient depth for CTS or fairy shrimp.

4.4.1.2 *Data Quality Objective 2*

Pond 997 was not inundated in 2018. Pond 997 was shallower and smaller than the other reference vernal pools. Pond 997 may only hold water in above-normal water-years. Pond 997 inundations should only be used as a reference control for vernal pools of similar size.

4.4.1.3 *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.

4.4.2 Vegetation Monitoring

Vegetation data were collected at Pond 997 in 2017 and 2018 (Burleson, 2018). Data from 2017 and 2018 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 4-22.

Pond 997 also supports a CCG population, located in stratum 2. The population was mapped in 2018 to compare to 2017, and a visual estimate of percent cover was recorded (see Figure 4-24 in Section 4.4.2.1).

Table 4-29. Pond 997 (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2017	2018
1	3%	5%
2 (CCG)	2%	1%
3	89%	62%
4	2%	N/A
5	N/A	31%
Upland	4%	1%

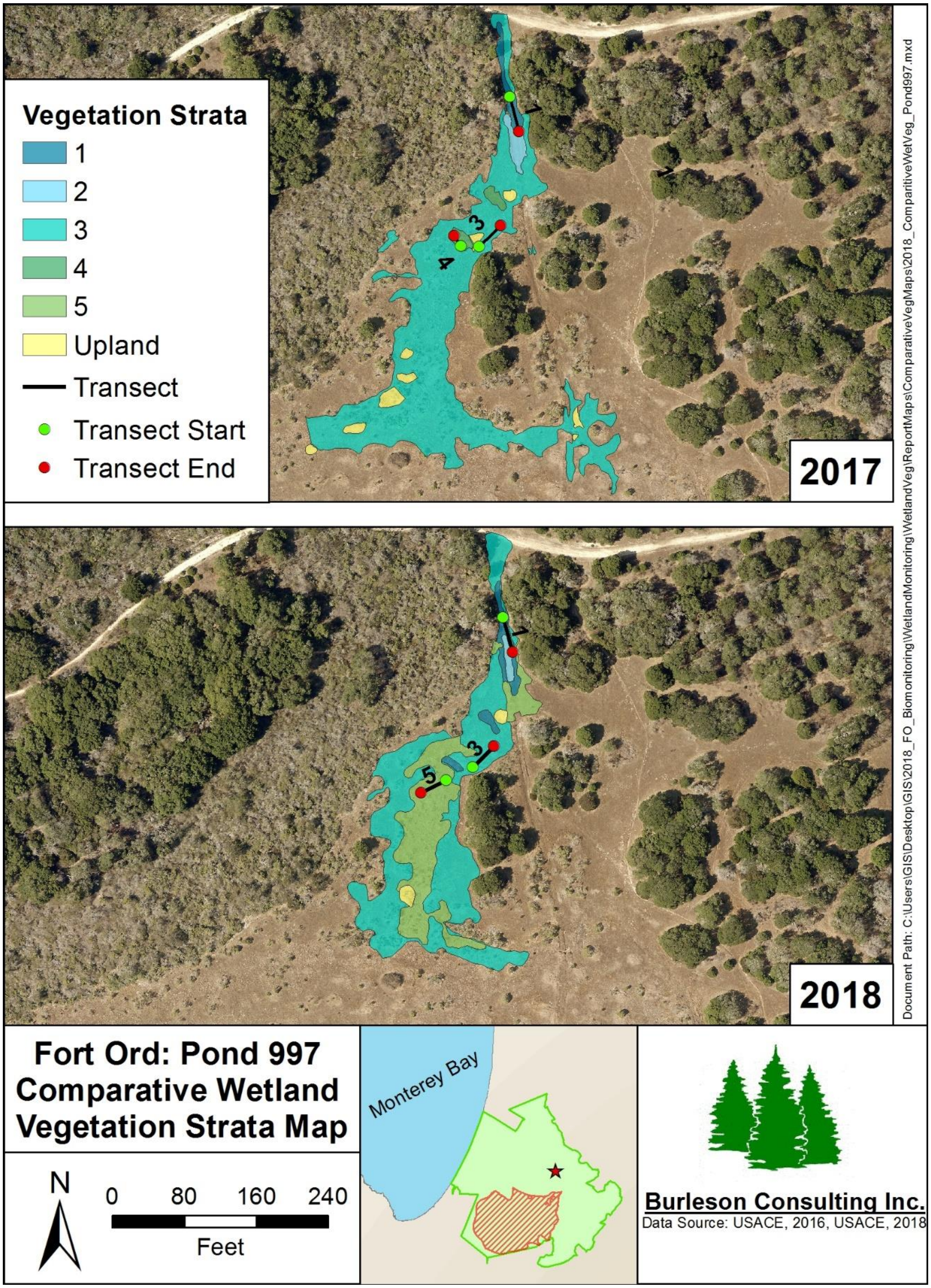


Figure 4-22. Pond 997 (Reference) Vegetation Strata and Transects for 2017 and 2018

The absolute percent vegetative cover in Pond 997 decreased from 2017, whereas thatch increased (see Table 4-30). The increase in thatch is likely due to an extended period without inundation in early 2018 which allowed the desiccation of plants and greater accumulation of thatch.

Table 4-30. Pond 997 (Reference) Absolute Percent Cover

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

Species richness increased between 2017 and 2018 at Pond 997. Species richness on transects was 27 and 45 species in 2017 and 2018, respectively, whereas overall basin species richness was 65 and 87 species, respectively (see Table 4-31 and Appendix B Table B-4). A possible contributing factor to the species richness increase could be year-to-year fluctuations associated with hydroperiod (Barbour *et al*., 2007). Although Pond 997 was dry throughout the 2017-2018 water-year, vernal pool plants can germinate and persist without inundation (Bliss and Zedler, 1998). In addition, seeds that were submerged in above-normal water-years may have germinated in 2018 (Bliss and Zedler, 1998).

Species composition at Pond 997 was similar in 2018 and 2017. Coyote thistle (*Eryngium armatum*), brown-headed rush (*Juncus phaeocephalus*), and California oat grass (*Danthonia californica*) were the dominant species. More non-native species were observed in 2018, including annual quaking grass (*Briza minor*), smooth cat's-ear (*Hypochaeris glabra*), and rough cat's-ear (*Hypochaeris radicata*). A complete list of species observed at Pond 997 in 2017 and 2018 can be found in Appendix H. Figure 4-23 shows a subset of the observed species with a 2% cover or greater.

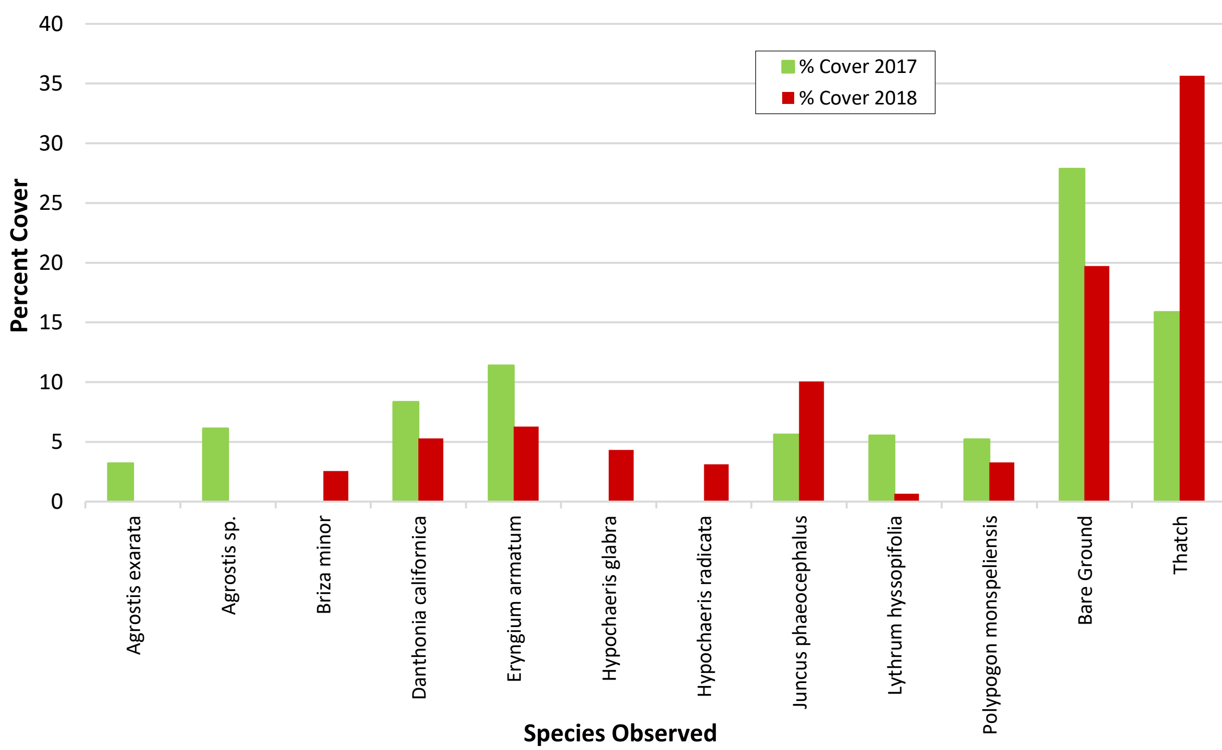


Figure 4-23. Percent Cover of Dominant Species at Pond 997 (Reference)

Native and non-native species richness on Pond 997 transects increased from 2017 to 2018 (see Table 4-31). Native relative percent cover was lower in 2018 than in 2017, whereas non-native relative percent cover was higher (see Table 4-32).

Table 4-31. Pond 997 (Reference) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2017	15	11	1
2018	24	19	2

Table 4-32. 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%

Wetland and non-wetland species richness on Pond 997 transects increased from 2017 to 2018 (see Table 4-33). The relative percent cover of wetland species decreased from 2017, whereas the relative percent cover of non-wetland species increased (see Table 4-34). The increase in non-wetland species relative percent cover may be a result of the expansion of species such as long-beaked filaree (*Erodium botrys*) and smooth cat's-ear (*Hypochaeris glabra*), which moved into strata where they were not observed in 2017. This expansion could be due to an increase of available plant niches due to the below-normal water-year (Bauder, 2000).

Table 4-33. 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

Table 4-34. 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%

4.4.2.1 *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 and 2018 (Burleson, 2018). The area of CCG at Pond 997 decreased from 0.02 acres in 2017 to 0.01 acres in 2018 (see Figure 4-24). However, the density increased from 10% cover in 2017 to 25% cover in 2018. In 2018, the CCG population was in a location similar to 2017. Minor changes in population size can be attributed to natural fluctuation.

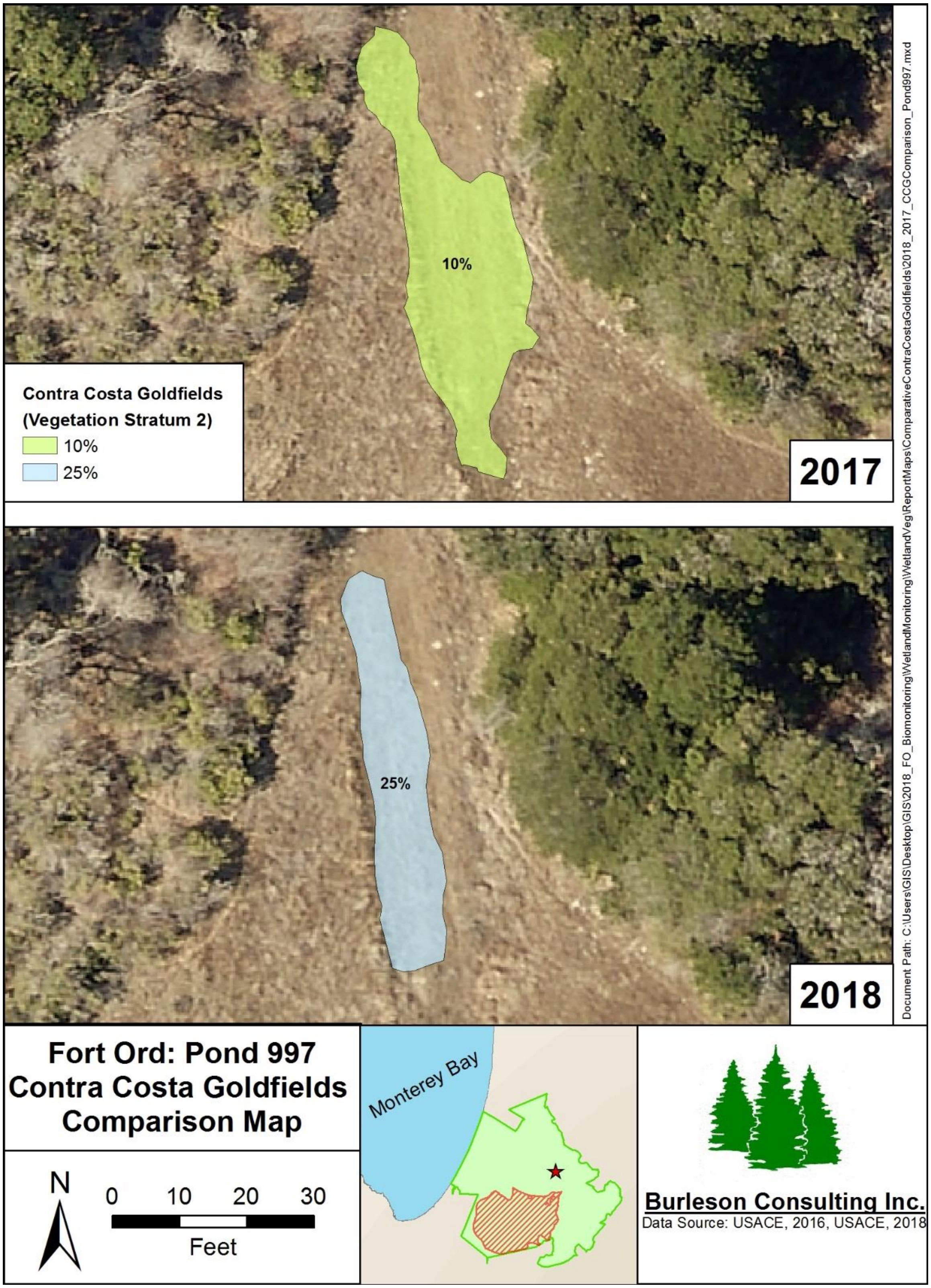


Figure 4-24. Contra Costa Goldfields Populations at Pond 997 (Reference) in 2017 and 2018

4.4.2.2 *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.

4.4.2.3 *Performance Standard: Plant Cover and Species Diversity*

Pond 997 is a reference vernal pool and was not required to meet performance standard in 2018. However, the vernal pool provides a control for comparison to the remediated vernal pools.

4.4.3 Wildlife Monitoring

Wildlife data were collected at Pond 997 in 2017 and CTS larvae and fairy shrimp were not detected. Pond 997 was not surveyed for CTS or fairy shrimp in 2018 due to insufficient depth. However, DQO 1 was evaluated to allow for comparison in future years. DQO 4 and DQO 5 were not applicable.

4.4.3.1 *Data Quality Objective 1*

Pond 997 remained dry throughout the 2017-2018 water-year and did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.4.1.1.

4.4.3.2 *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.

4.4.4 Conclusion

Pond 997 was used for comparison to the remediated vernal pools (see Table 4-35).

Table 4-35. 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	N/A*
	DQO 5	N/A**

*Not applicable; no water quality data were collected.
**Not applicable; only hydrology and vegetation surveys were conducted.

4.5 Pond 3 North - Year 1

Pond 3 North was monitored in 2018 as a year 1 post-burn 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. Table 4-36 summarizes the years that monitoring occurred and which survey(s) were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 3 North (see Figure 4-25). The 1997-1998 and 2015-2016 water-years were above-normal, whereas 2014-2015 and 2017-2018 water-years were below-normal.

Table 4-36. Pond 3 North (Year 1 Post-Burn) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year			
	1997-1998	2014-2015	2015-2016	2017-2018
Hydrology	●	●	●	●
Vegetation	●	●		●
Wildlife	●	●	●	●

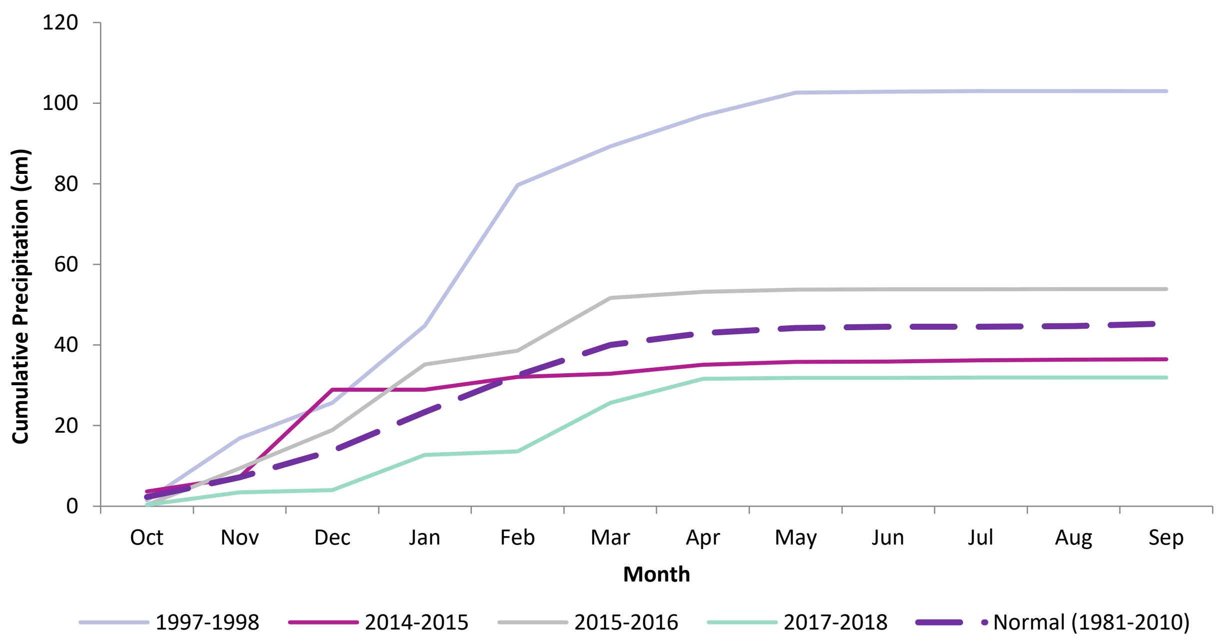


Figure 4-25. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 3 North (Year 1 Post-Burn) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.5.1 Hydrology Monitoring

The 2018 maximum inundation for Pond 3 North was 0.05 acres with a maximum depth of approximately 24 cm. The depth and inundation values were slightly lower than previously recorded values (see Appendix F Table F-5). Pond 3 North filled slowly this water-year and dried quickly. This vernal pool required more than one storm event before it held water, was only inundated in March and April, and remained relatively small and shallow compared to previous years. **Figure** 4-26 illustrates the relationship of precipitation and depth at Pond 3 North for 2018 as well as baseline in 2015.

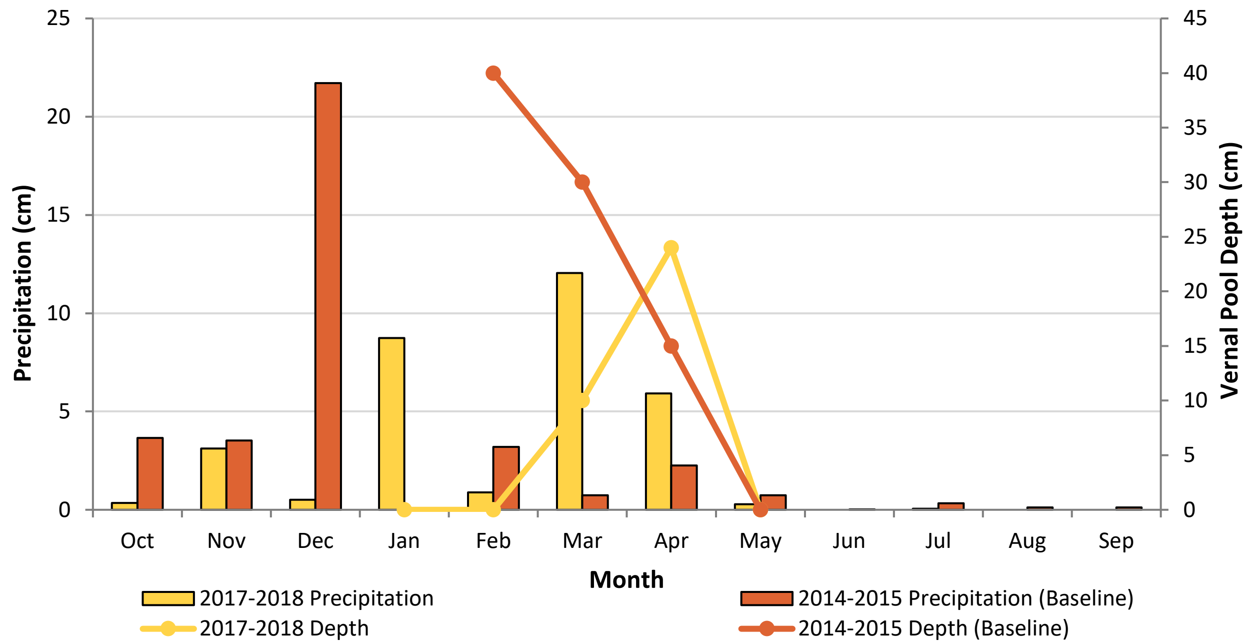


Figure 4-26. Monthly Depth and Precipitation at Pond 3 North (Year 1 Post-Burn) for 2017-2018 Water-Year Compared to Baseline 2014-2015 Water-Year

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 55 cm or more and a maximum inundation up to 0.38 acres (see Appendix F Table F-5). Figure 4-27 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-28 illustrates historic and recent inundation areas.

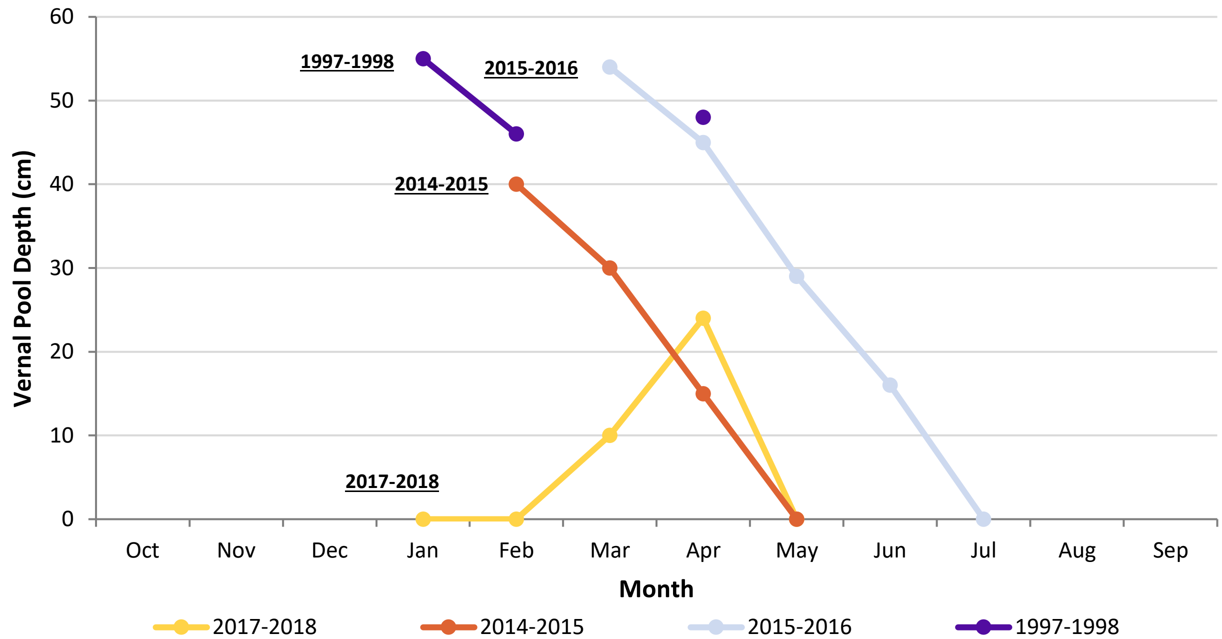


Figure 4-27. Historic Monthly Depths at Pond 3 North (Year 1 Post-Burn). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

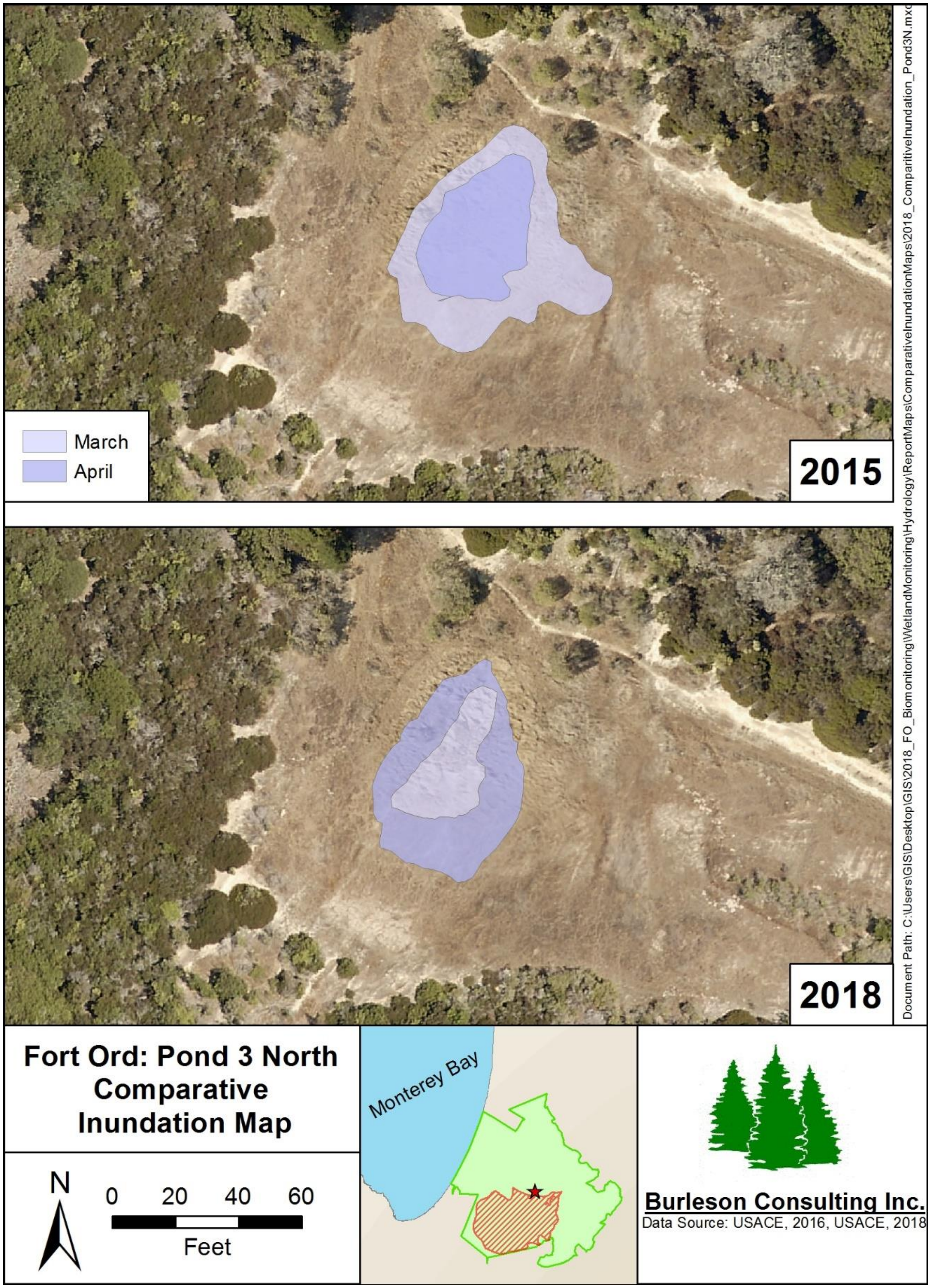


Figure 4-28. Pond 3 North (Year 1 Post-Burn) Inundations for 2014-2015 (below-normal precipitation) and 2017-2018 (below-normal precipitation). The vernal pool was burned in 2017 and was in year 1 of monitoring in 2018.

4.5.1.1 *Data Quality Objective 1*

Pond 3 North 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 3 North did not provide sufficient depth for CTS (10 cm through March, dry in February) or fairy shrimp (17 cm through April). 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 (West) since all three pools had depths near or at 20 cm.

4.5.1.2 *Data Quality Objective 2*

Pond 3 North had a similar inundation in 2018 as previous years and the relevant reference vernal pools. Pond 3 North was inundated March and April with an inundation range of 0.02-0.05 acres and a mean of 0.03 acres. The historic inundation ranges were slightly larger than the 2018 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 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 (see Figure 4-27). Similar to reference vernal pool 101 East (West), Pond 3 North was inundated only in March and April and had small inundation areas.

4.5.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 3 North, a post-burn vernal pool, was not on track to meet the performance standard for year 1 in 2018. Pond 3 North did not meet DQO 1 and the below-normal water-year and unusually late rains were likely contributing factors. Evaluation of DQO 2 indicated that Pond 3 North was similar to itself in previous monitoring years and reference Pond 101 East (West). The vernal pool followed a trend observed at seven other vernal pools, Ponds 101 East (West), 3 South, 40 North, 16, 54, 73, and 72. Pond 3 North will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.5.2 Vegetation Monitoring

Vegetation data were collected at Pond 3 North in 1998, 2015 and 2018 (HLA, 1998; Burleson *et al.*, 2016). 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 comparison to other years. Data from 2015 and 2018 were collected using the methodology described in the Methods section of this report and were compared stratum-to-stratum in Table 4-37 as well as visually in Figure 4-29.

Pond 3 North also supports a CCG population, located in stratum 4. The population was mapped in 2018 to compare to 2015 and 2016 (Burleson, 2016, 2017), and a visual estimate of percent cover was recorded (see Figure 4-31 in Section 4.5.2.1).

Table 4-37. Pond 3 North (Year 1 Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2015	2018
1	16%	6%
2	14%	18%
3	70%	47%
4 (CCG)	N/A	29%

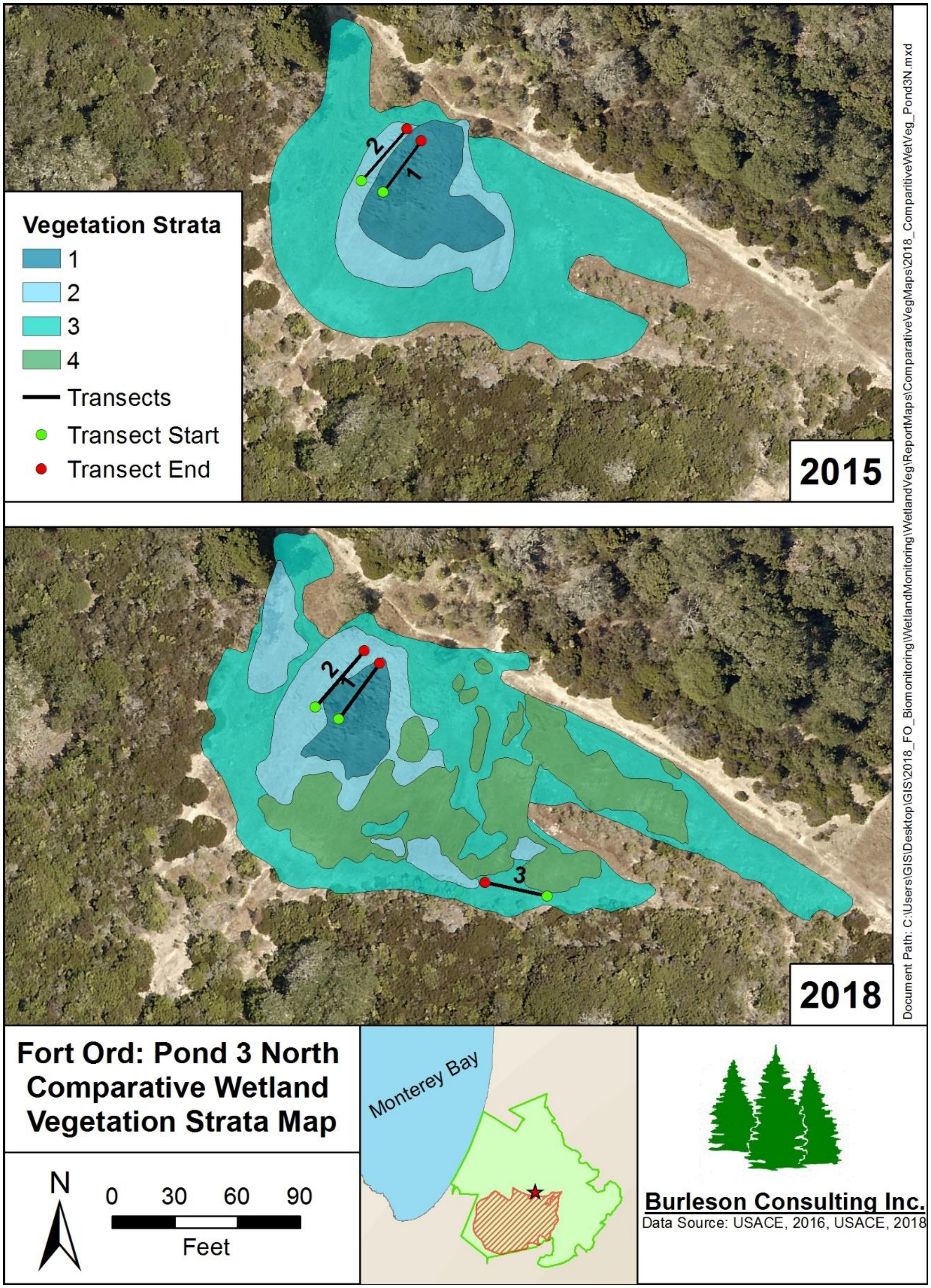


Figure 4-29. Pond 3 North (Year 1 Post-Burn) Vegetation Strata and Transects for 2015 and 2018

The absolute percent vegetative and thatch cover values of Pond 3 North in 2018 were within the ranges observed in previous years (see Table 4-38). 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 4-39).

Table 4-38. Pond 3 North (Year 1 Post-Burn) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998	46.1%	54.0%
2015	80.6%	14.8%
2018	60.2%	40.1%

Table 4-39. Pond 3 North (Year 1 Post-Burn) and Reference Vernal Pool Absolute Percent Cover in 2018

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	54.6%	45.5%
101 East (West)	58.1%	42.3%
101 East (East)	68.7%	32.6%
997	44.7%	55.4%
3 North	**60.2%**	**40.1%**

Species richness increased between 1998 and 2018. Species richness on transects was 16, 9, and 38 species in 1998, 2015, and 2018, respectively, whereas overall basin species richness was 24 and 82 species in 2015 and 2018, respectively (see Table 4-40 and Appendix B Table B-5). The 1998 survey was limited to species observed on the transect and may underrepresent total vernal pool species richness. A possible contributing factor to the species richness increase could be year-to-year fluctuations associated with hydroperiod (Barbour *et al*., 2007). Although Pond 3 North was dry early in 2018 and was only inundated in March and April, vernal pool plants can germinate and persist without inundation and may experience a late-season pulse of germination when seeds float free of the soil as the vernal pools fills (Bliss and Zedler, 1998). The more variable inundation and depth regime in 2018 may have allowed seeds that were dormant in drought years or submerged in above-normal water-years to germinate (Bliss and Zedler, 1998). This increased variability can increase microhabitats and promote higher species richness compared to a vernal pool with less hydrologic variability (Witham *et al*., 1998). Pond 3 North species richness was similar to the reference vernal pools (see Table 4-41 and Appendix G Tables G-17 and G-34).

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*). A complete comparison of species composition observed at Pond 3 North in 1998, 2015, and 2018 can be found in Appendix H. Figure 4-30 shows a subset of this comparison for species observed with a 2% cover or greater.

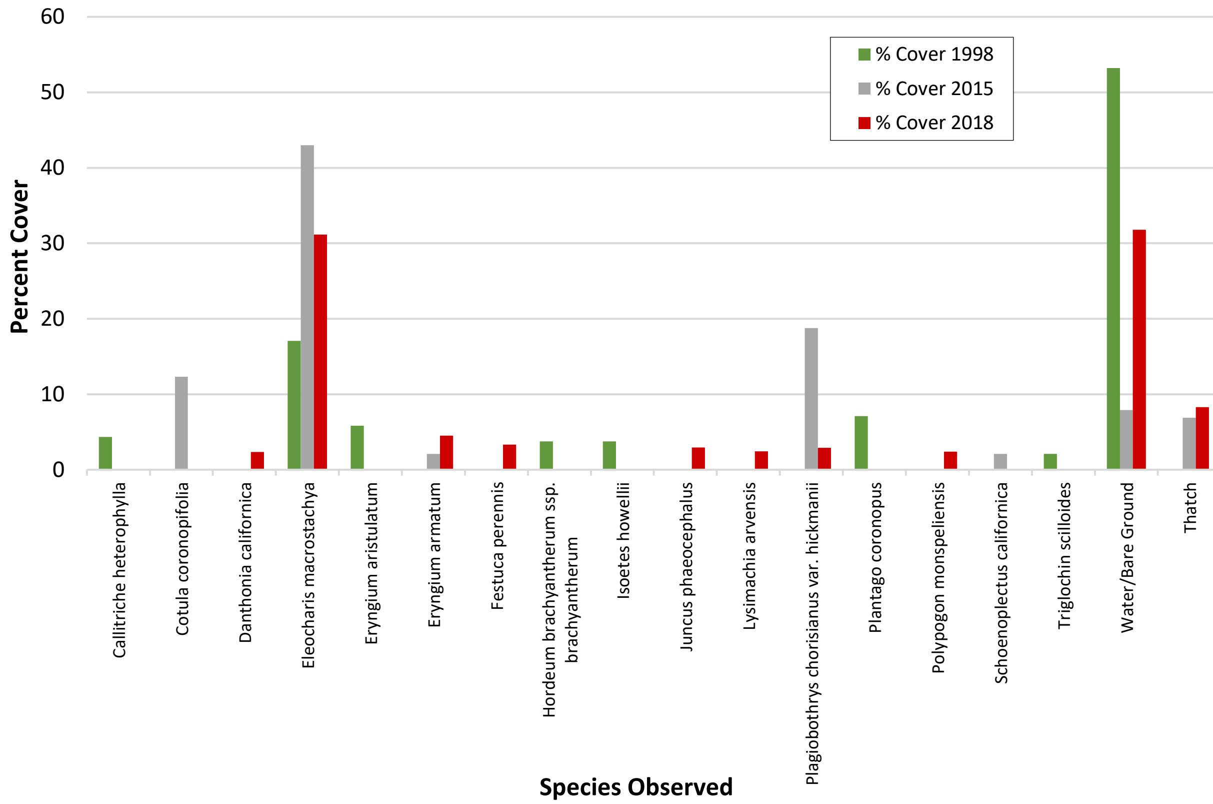


Figure 4-30. Percent Cover of Dominant Species at Pond 3 North (Year 1 Post-Burn)

Native and non-native species richness on Pond 3 North transects generally increased through time (see Table 4-40). Native and non-native species richness in 2018 were within the ranges observed at the reference vernal pools (see Table 4-41). Despite the increase in species richness, the relative percent cover of native and non-native species remained relatively static through time (see Table 4-42). The relative percent cover values of native and non-native species in Pond 3 North were within the ranges observed in reference vernal pools in 2018 (see Table 4-43).

Table 4-40. Pond 3 North (Year 1 Post-Burn) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998	9	6	1
2015	7	2	0
2018	22	16	0

Table 4-41. Pond 3 North (Year 1 Post-Burn) and Reference Vernal Pool Native and Non-Native Species Richness in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	25	16	0
101 East (West)	26	21	3
101 East (East)	18	11	3
997	24	19	2
3 North	**22**	**16**	**0**

Table 4-42. Pond 3 North (Year 1 Post-Burn) 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%

Table 4-43. Pond 3 North (Year 1 Post-Burn) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	83.3%	16.7%	0.0%
101 East (West)	67.1%	32.5%	0.4%
101 East (East)	84.4%	14.7%	0.9%
997	56.3%	43.5%	0.2%
3 North	**79.0%**	**21.0%**	**0.0%**

Wetland and non-wetland species richness on Pond 3 North transects increased between 1998 and 2018 (see Table 4-44). The wetland and non-wetland species richness were within the ranges observed at the reference vernal pools in 2018 and were most similar to reference Pond 101 East (East) (see Table 4-45). The relative percent cover of wetland species decreased slightly from 1998 to 2017, whereas the relative percent cover of non-wetland species increased to the highest value historically observed (see Table 4-46). The wetland and non-wetland species relative percent cover values were within the ranges observed at the reference vernal pools in 2018 and were most similar to reference Pond 101 East (East) (see Table 4-47).

Table 4-44. Pond 3 North (Year 1 Post-Burn) 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

Table 4-45. Pond 3 North (Year 1 Post-Burn) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	11	7	8	1	9
101 East (West)	8	11	9	8	2	12
101 East (East)	5	9	5	4	2	7
997	8	10	5	8	0	14
3 North	**10**	**8**	**5**	**6**	**0**	**9**

Table 4-46. 3 North (Year 1 Post-Burn) 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%

Table 4-47. Pond 3 North (Year 1 Post-Burn) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	33.7%	50.5%	10.2%	3.3%	0.3%	2.0%
101 East (West)	38.6%	29.0%	17.0%	8.4%	1.0%	6.1%
101 East (East)	28.2%	40.2%	6.0%	22.6%	1.1%	1.8%
997	4.6%	47.5%	20.7%	14.2%	0.0%	13.0%
3 North	**59.9%**	**17.1%**	**15.1%**	**3.6%**	**0.0%**	**4.3%**

4.5.2.1 *Contra Costa Goldfields and Vernal Pool Bent Grass*

The area of CCG at Pond 3 North increased between 2015 and 2018 (Burleson, 2016, 2017). The population occupied 0.04 acres in 2015, 0.13 acres in 2016, and 0.14 acres in 2018 (see Figure 4-31). The density ranged between 5-70% cover across the years. In 2018, the CCG population was in similar locations as 2015 and 2016, indicating that remedial burn activities in 2017 likely did not affect the population. Minor changes in population size can be attributed to natural fluctuation.

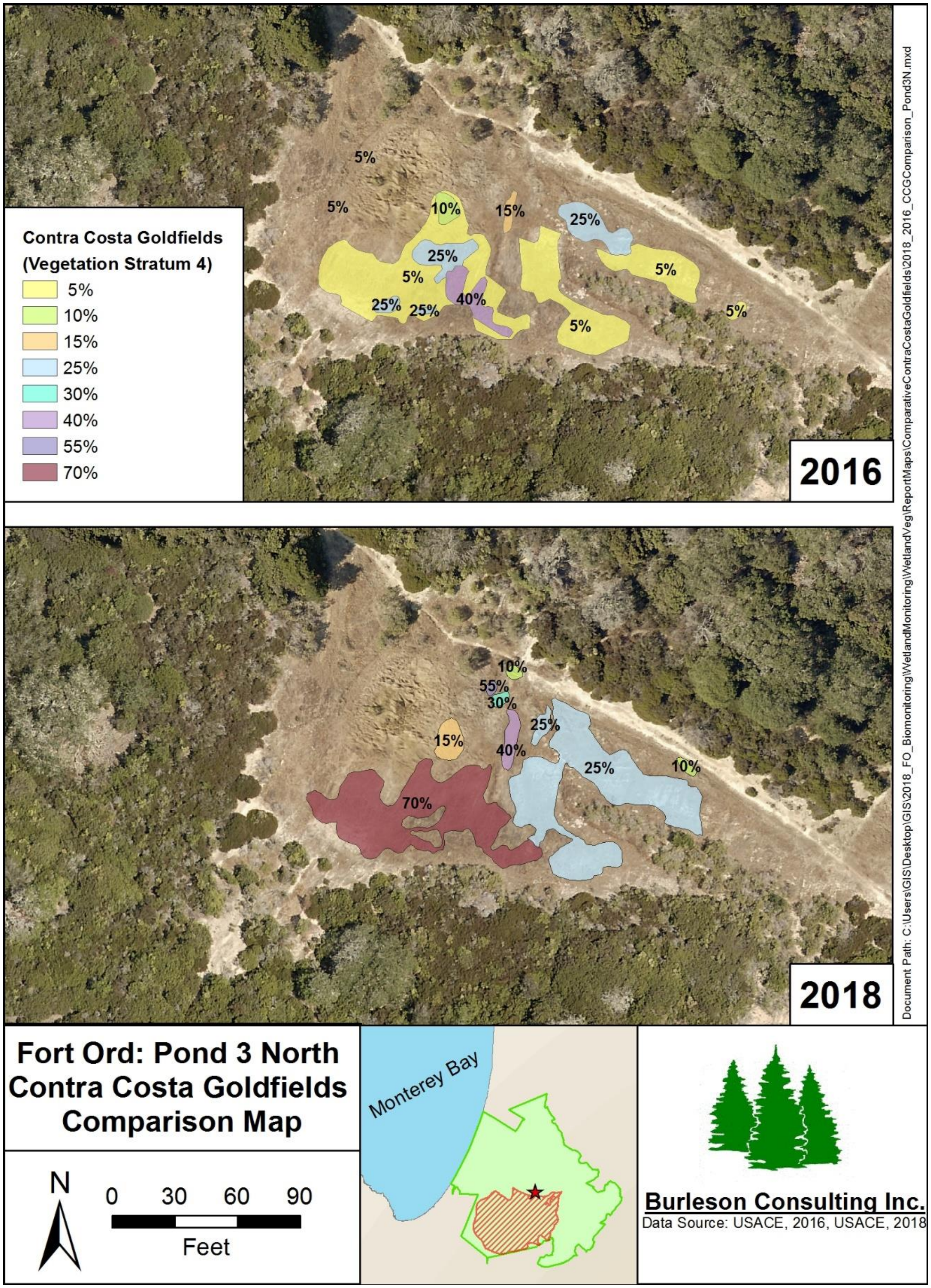


Figure 4-31. Contra Costa Goldfields Populations at Pond 3 North (Year 1 Post-Burn) in 2016 and 2018

Vernal pool bent grass was identified at Pond 3 North for the first time in 2018 (see Figure 3-13 in Section 3.5.2.1). 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 42, 44, 61, 997, and Machine Gun Flats on former Fort Ord. The Pond 3 North documentation of vernal pool bent grass further expanded the current known range to the southeast. It was also found in Ponds 101 East (East), 3 South, and 73 for the first time in 2018.

4.5.2.2 *Data Quality Objective 3*

Vegetative cover in Pond 3 North was dominated by native and wetland plant species during year 1 post-burn monitoring in 2018. Differences observed between baseline in 2015 and year 1 post-burn conditions can be attributed to the changes in the rainfall pattern and the resulting hydroperiod. Pond 3 North species richness was highest in 2018 and the vernal pool supported more native and wetland plant species than previous years, similar to reference vernal pools.

4.5.2.3 *Performance Standard: Plant Cover and Species Diversity*

Pond 3 North, a post-burn vernal pool, was on track to meet the performance standard for year 1 in 2018. The species composition, richness, and native and wetland species relative abundances were similar to baseline and reference vernal pool conditions. Pond 3 North provided suitable wetland habitat in 2018.

4.5.3 Wildlife Monitoring

Wildlife data were collected at Pond 3 North in 1998, 2015, 2016, and 2018 (HLA, 1998; Burleson, 2016, 2017). California tiger salamander larvae were not detected in 2018 or previous survey years. Fairy shrimp were only detected in 1998.

4.5.3.1 *Data Quality Objective 1*

Pond 3 North did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.5.1.1.

4.5.3.2 *Data Quality Objective 4*

Neither CTS nor fairy shrimp were present in 2018 at Pond 3 North most likely due to insufficient depth; however, the water quality was adequate to support both species. Compared to other vernal pools, the water quality data were within normal ranges. The pH ranged from 6.27 in March to 6.61 in April with a mean of 6.44. Temperature ranged from 11.33°C in March to 13.33°C in March with a mean of 12.33°C. Dissolved oxygen ranged from 7.60 mg/L in April to 8.75 mg/L in March with a mean of 8.18 mg/L. Turbidity ranged from 5.3 FNU in April to 57.4 FNU in March with a mean of 31.5 FNU (see Table 3-13).

4.5.3.3 *Data Quality Objective 5*

Neither CTS nor fairy shrimp were detected in 2018 at Pond 3 North. No recorded observations of CTS exist for Pond 3 North prior to remediation activities. Fairy shrimp were detected in 1998, but were not detected in 2016 or 2017.

4.5.3.4 *Performance Standard: Wildlife Usage*

Pond 3 North, a post-burn vernal pool, was not on track to meet the performance standard for year 1 in 2018 due to insufficient depth. Pond 3 North was not on track for DQO 1, was on track for DQO 4, and is partially on track for DQO 5. Pond 3 North will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.5.4 Conclusion

Pond 3 North, a post-burn vernal pool, was in year 1 of monitoring in 2018. Conditions in 2018 at Pond 3 North are suitable for comparison to future years. The vernal pool was on track to meet the plant cover and species diversity performance standard and was partially on track to meet the wildlife usage but was not on track to meet hydrological conditions (see Table 4-48). Pond 3 North will continue to be monitored in the future.

Table 4-48. Success at Pond 3 North (Year 1 Post-Burn) 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	Partially on track

4.6 Pond 3 South - Year 1

Pond 3 South was monitored in 2018 as a year 1 post-burn 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. Table 4-49 summarizes the years that monitoring occurred and which survey(s) were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 3 South (see Figure 4-32). The 1997-1998 and 2015-2016 water-years were above-normal, whereas the 2014-2015 and 2017-2018 water-years were below-normal.

Table 4-49. Pond 3 South (Year 1 Post-Burn) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year			
	1997-1998	2014-2015	2015-2016	2017-2018
Hydrology	●	●	●	●
Vegetation	●		●	●
Wildlife	●		●	

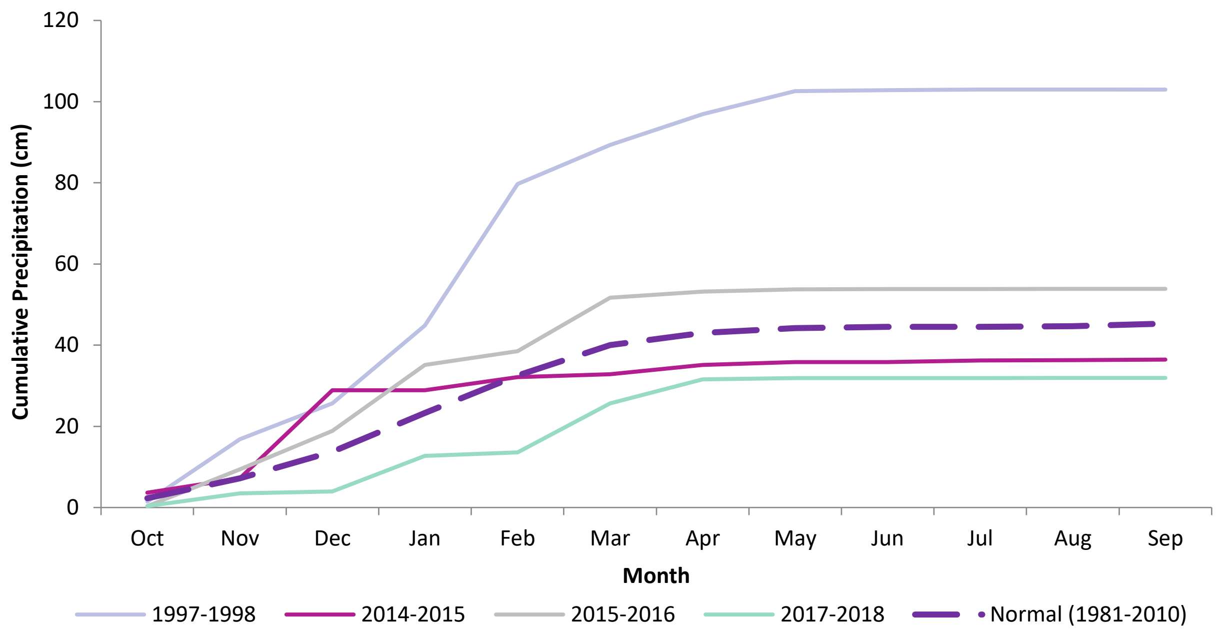


Figure 4-32. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 3 South (Year 1 Post-Burn) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.6.1 Hydrology Monitoring

The 2018 maximum inundation for Pond 3 South was 0.001 acres with a depth of approximately 8 cm. The depth and inundation values were slightly lower than previously recorded values (see Appendix F Table F-6). Pond 3 South filled slowly this water-year and dried quickly. This vernal pool required more than one storm event before it held water, was only inundated in April, and remained relatively small and shallow compared to previous years. **Figure** 4-33 illustrates the relationship of precipitation and depth at Pond 3 South for 2018 as well as baseline in 2016.

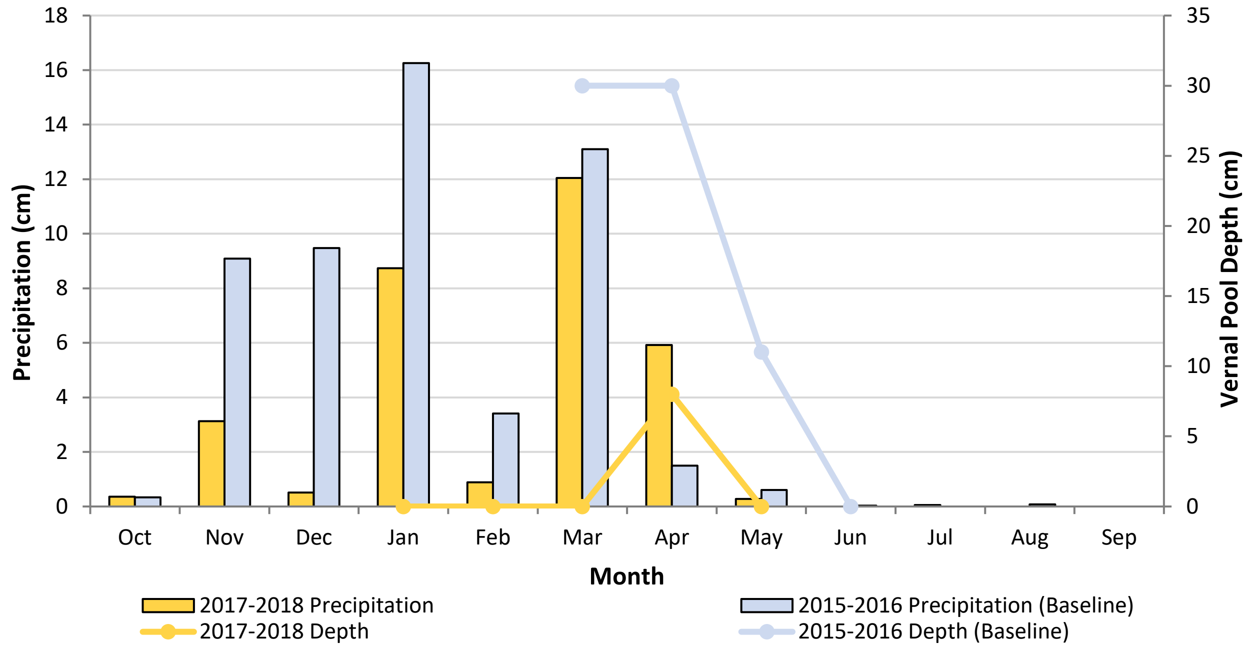


Figure 4-33. Monthly Depth and Precipitation at Pond 3 South (Year 1 Post-Burn) for 2017-2018 Water-Year Compared to Baseline 2015-2016 Water-Year

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 33 cm or more and a maximum inundation up to 0.78 acres (see Appendix F Table F-6). Figure 4-34 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-35 illustrates historic and recent inundation areas.

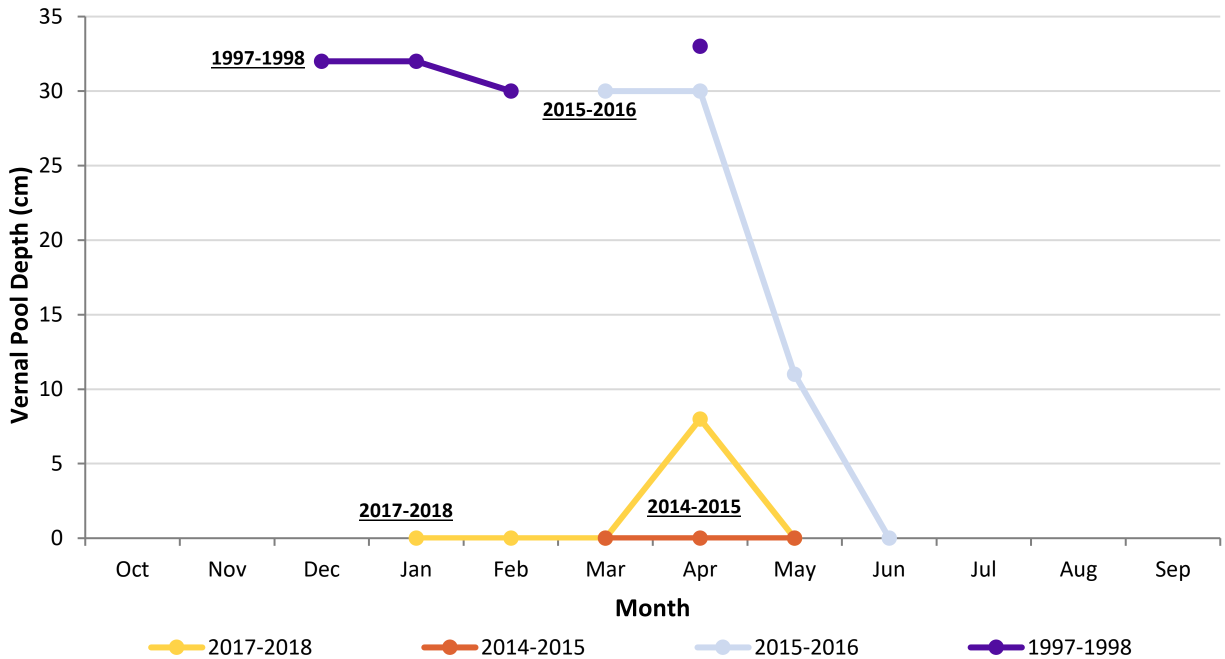


Figure 4-34. Historic Monthly Depths at Pond 3 South (Year 1 Post-Burn). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

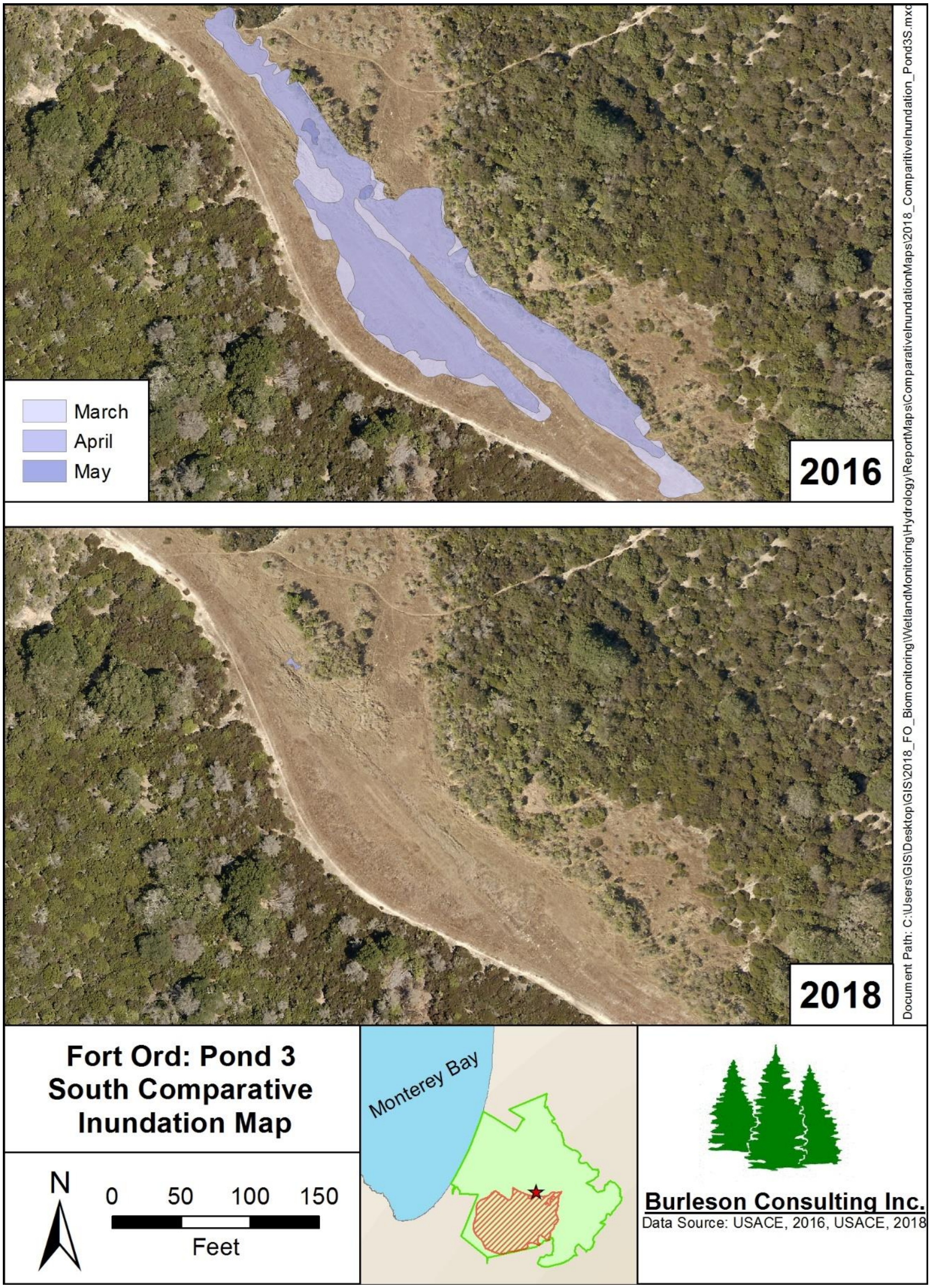


Figure 4-35. Pond 3 South (Year 1 Post-Burn) Inundations for 2015-2016 (above-normal precipitation) and 2017-2018 (below-normal precipitation). The vernal pool was burned in 2017 and was in year 1 of monitoring in 2018.

4.6.1.1 *Data Quality Objective 1*

Pond 3 South 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 3 South did not provide sufficient depth for CTS (8 cm in April) or fairy shrimp (8 cm in April). 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 inundated reference vernal pools but was greater than reference vernal pool 997 which remained dry.

4.6.1.2 *Data Quality Objective 2*

Pond 3 South had smaller inundations in 2018 than in 1998 and 2016 and the relevant reference vernal pools in 2018. Pond 3 South was inundated in April with an area of 0.001 acres. The vernal pool only filled in April and dried quickly. The historic inundation ranges were larger than the range of 2018 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, and in a drought year, the vernal pool may remain dry or dry quickly (see Figure 4-34). Similar to reference vernal pool 101 East (West), Pond 3 South was inundated in April and had a small inundation area.

4.6.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 3 South, a post-burn vernal pool, was not on track to meet the performance standard for year 1 in 2018. Pond 3 South did not meet DQO 1 and the below-normal water-year and unusually late rains were likely contributing factors. Evaluation of DQO 2 indicated that Pond 3 South was similar to itself in previous monitoring years and reference Pond 101 East (West). The vernal pool followed a trend observed at seven other vernal pools, Ponds 101 East (West), 3 North, 40 North, 16, 54, 73, and 72. Pond 3 South will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.6.2 Vegetation Monitoring

Vegetation data were collected at Pond 3 South in 1998, 2016 and 2018 (HLA, 1998; Burleson, 2017). 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 comparison to other years. Data from 2016 and 2018 were collected using the methodology described in the Methods section of this report and were compared stratum-to-stratum in Table 4-50 as well as visually in Figure 4-36.

Table 4-50. Pond 3 South (Year 1 Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2018
1	20%	6%
2	38%	18%
3	35%	47%
4	5%	29%
Upland	2%	N/A

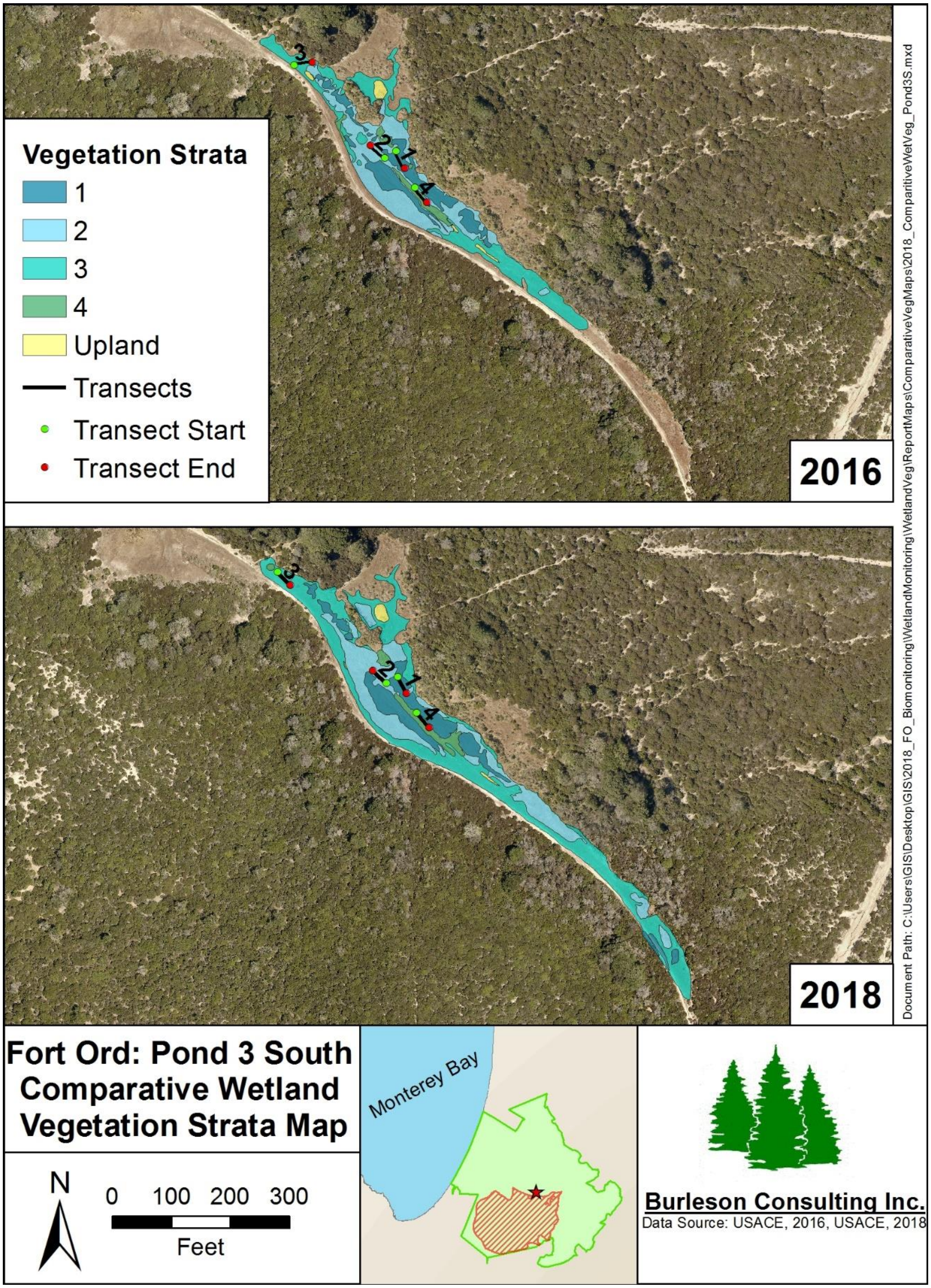


Figure 4-36. Pond 3 South (Year 1 Post-Burn) Vegetation Strata and Transects for 2016 and 2018

Absolute percent vegetative cover decreased between 1998 and 2018, whereas thatch increased significantly (see Table 4-51). The increase in thatch is likely due to an extended period without inundation in early 2018 which allowed the desiccation of plants and greater accumulation of thatch. The absolute percent vegetative cover of Pond 3 South in 2018 was within ranges observed at the reference vernal pools (see Table 4-52).

Table 4-51. Pond 3 South (Year 1 Post-Burn) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998	90.1%	13.9%
2016	82.8%	15.1%
2018	59.4%	41.0%

Table 4-52. Pond 3 South (Year 1 Post-Burn) and Reference Vernal Pool Absolute Percent Cover in 2018

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	54.6%	45.5%
101 East (West)	58.1%	42.3%
101 East (East)	68.7%	32.6%
997	44.7%	55.4%
3 South	**59.4%**	**41.0%**

Species richness increased between 1998 and 2018 at Pond 3 South. Species richness on transects was 38, 30, and 49 species in 1998, 2016, and 2018, respectively, whereas overall basin species richness was 69 and 106 species in 2016 and 2018, respectively (see Table 4-53 and Appendix B Table B-6). The 1998 survey was limited to species on the transect and may underrepresent total vernal pool species richness. A possible contributing factor to the species richness increase could be year-to-year fluctuations associated with hydroperiod (Barbour *et al*., 2007). Although Pond 3 South was dry early in 2018 and was only inundated in April, vernal pool plants can germinate and persist without inundation and may experience a late-season pulse of germination when seeds float free of the soil as the vernal pools fills (Bliss and Zedler, 1998). The more variable inundation and depth regime in 2018 may have allowed seeds that were dormant during drought years or submerged in above-normal water-years to germinate (Bliss and Zedler, 1998). This increased variability can increase microhabitats and promote higher species richness compared to a vernal pool with less hydrologic variability (Witham *et al*., 1998). Pond 3 South species richness was within the range observed on transects at the reference vernal pools but was higher for the entire basin (see Table 4-54 and Appendix G Tables G-17 and G-34).

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. A complete comparison of species composition observed at Pond 3 South in 1998, 2016, and 2018 can be found in Appendix H. Figure 4-37 shows a subset of this comparison for species observed with a 2% cover or greater.

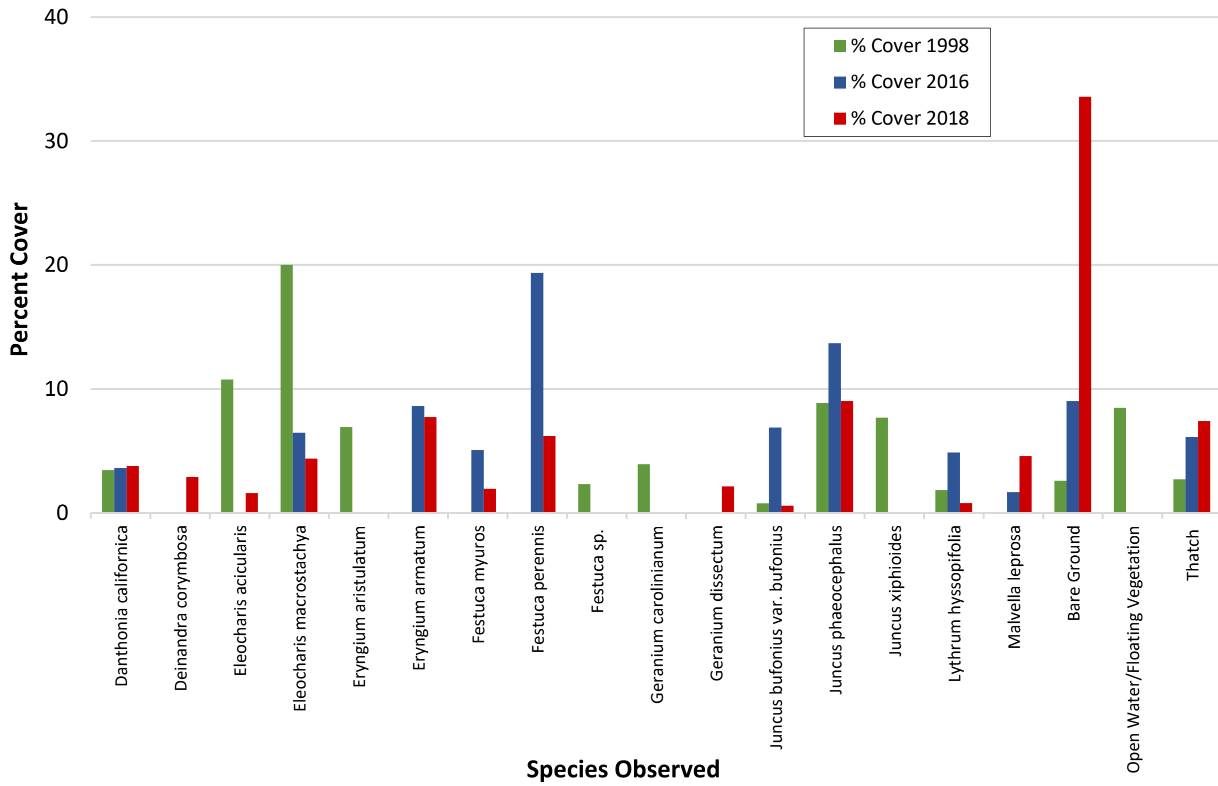


Figure 4-37. Percent Cover of Dominant Species at Pond 3 South (Year 1 Post-Burn)

Native species richness on Pond 3 South transects were the same in 1998 and 2018, and lower in 2016 (see Table 4-53). Non-native species richness in Pond 3 South increased through time. Despite an increase in non-native species richness in the vernal pool, both native and non-native richness in 2018 were within the range of the reference vernal pool values and most similar to Pond 101 East (West) (see Table 4-54). The relative percent cover of native species increased between 2016 and 2018, and the non-native relative percent decreased between years (see Table 4-55). Native and non-native relative percent cover values were within the ranges observed in the reference vernal pools in 2018 (see Table 4-56).

Table 4-53. Pond 3 South (Year 1 Post-Burn) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998	26	9	3
2016	16	13	1
2018	26	23	0

Table 4-54. Pond 3 South (Year 1 Post-Burn) and Reference Vernal Pool Native and Non-Native Species Richness in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	25	16	0
101 East (West)	26	21	2
101 East (East)	18	11	3
997	24	19	2
3 South	**26**	**23**	**0**

Table 4-55. Pond 3 South (Year 1 Post-Burn) 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%

Table 4-56. Pond 3 South (Year 1 Post-Burn) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	83.3%	16.7%	0.0%
101 East (West)	67.1%	32.5%	0.3%
101 East (East)	84.4%	14.7%	0.9%
997	56.3%	43.5%	0.2%
3 South	**65.7%**	**34.3%**	**0.0%**

Wetland and non-wetland species richness in Pond 3 South increased between 1998 and 2018 (see Table 4-57). The relative percent cover of wetland species decreased, whereas the non-wetland species progressively increased (see Table 4-59). The below-normal water-year left Pond 3 South dry, small, and shallow for most of 2018 and may have created more suitable habitat for non-wetland species. The wetland and non-wetland species richness and relative percent cover at Pond 3 South were within the ranges observed at the reference vernal pools in 2018 (see Table 4-58 and Table 4-60).

Table 4-57. Pond 3 South (Year 1 Post-Burn) 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

Table 4-58. Pond 3 South (Year 1 Post-Burn) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	11	7	8	1	9
101 East (West)	8	11	9	8	2	12
101 East (East)	5	9	5	4	2	7
997	8	10	5	8	0	14
3 South	**9**	**11**	**6**	**10**	**1**	**12**

Table 4-59. Pond 3 South (Year 1 Post-Burn) 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%

Table 4-60. Pond 3 South (Year 1 Post-Burn) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	33.7%	50.5%	10.2%	3.3%	0.3%	2.0%
101 East (West)	38.6%	29.0%	17.0%	8.4%	1.0%	6.1%
101 East (East)	28.2%	40.2%	6.0%	22.6%	1.1%	1.8%
997	4.6%	47.5%	20.7%	14.2%	0.0%	13.0%
3 South	**14.1%**	**33.6%**	**22.5%**	**16.1%**	**0.2%**	**13.5%**

4.6.2.1 *Contra Costa Goldfields and Vernal Pool Bent Grass*

A single CCG plant was documented at Pond 3 South for the first time in 2018 (see Figure 3-16 in Section 3.6.2.1).

Vernal pool bent grass was identified at Pond 3 South for the first time in 2018 (see Figure 3-17 in Section 3.6.2.1). 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 42, 44, 61, 997, and Machine Gun Flats on former Fort Ord. The Pond 3 South documentation expanded the current known range of vernal pool bent grass to the southeast. It was also found in Ponds 101 East (East), 3 North, and 73 for the first time in 2018.

4.6.2.2 *Data Quality Objective 3*

Vegetative cover in Pond 3 South was dominated by native and wetland plant species during year 1 post-burn monitoring in 2018. Differences observed between baseline in 2016 and year 1 post-burn conditions can be attributed to the changes in the rainfall pattern and the resulting hydroperiod. Pond 3 South species richness was highest in 2018 and the vernal pool supported more native and wetland plant species than previous years, similar to reference vernal pools.

4.6.2.3 *Performance Standard: Plant Cover and Species Diversity*

Pond 3 South, a post-burn vernal pool, was on track to meet the performance standard for year 1 in 2018. The species composition, richness, and native and wetland species relative abundances were similar to baseline and reference vernal pool conditions. Pond 3 South provided suitable wetland habitat in 2018.

4.6.3 Wildlife Monitoring

Wildlife data were collected at Pond 3 South in 1998 and 2016 (HLA, 1998; Burleson, 2017). California tiger salamander larvae were not detected in 1998 or 2016. Fairy shrimp were only detected in 1998. Pond 3 South was not surveyed for CTS or fairy shrimp in 2018 due to insufficient depth. However, DQO 1 and DQO 4 were evaluated to allow for comparison in future years. DQO 5 was not applicable.

4.6.3.1 *Data Quality Objective 1*

Pond 3 South did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.6.1.1.

4.6.3.2 *Data Quality Objective 4*

California tiger salamander and fairy shrimp surveys were not conducted in 2018 at Pond 3 South due to insufficient depth; however, the water quality was adequate for both species. Compared to other vernal pools and previous data, the water quality data were within normal ranges. Water quality data were only collected in April: pH was 7.13, temperature was 15.67°C, dissolved oxygen range was 8.75 mg/L, and turbidity was 77.7 FNU (see Table 3-15).

4.6.3.3 *Performance Standard: Wildlife Usage*

Pond 3 South, a post-burn vernal pool, was not on track to meet the performance standard for year 1 in 2018 due to insufficient depth. Pond 3 South was not on track for DQO 1, was on track for DQO 4, and DQO 5 cannot be accessed at this time. Pond 3 South will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.6.4 Conclusion

Pond 3 South, a post-burn vernal pool, was in year 1 of monitoring in 2018. Conditions in 2018 at Pond 3 South are suitable for comparison to future years. The vernal pool was on track to meet the plant cover and species diversity performance standard but was not on track to meet hydrological conditions for wildlife usage (see Table 4-61). Pond 3 South will continue to be monitored in the future.

Table 4-61. Success at Pond 3 South (Year 1 Post-Burn) 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	N/A**

**Not applicable; only hydrology and vegetation surveys were conducted

4.7 Pond 39 - Year 1

Pond 39 was monitored in 2018 as a year 1 post-burn 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. Table 4-62 summarizes the years that monitoring occurred and which survey(s) were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 39 (see Figure 4-38). The 1997-1998 and 2015-2016 water-years were above-normal, whereas the 2014-2015 and 2017-2018 water-years were below-normal.

Table 4-62. Pond 39 (Year 1 Post-Burn) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year			
	1997-1998	2014-2015	2015-2016	2017-2018
Hydrology	●	●	●	●
Vegetation	●		●	●
Wildlife	●		●	●

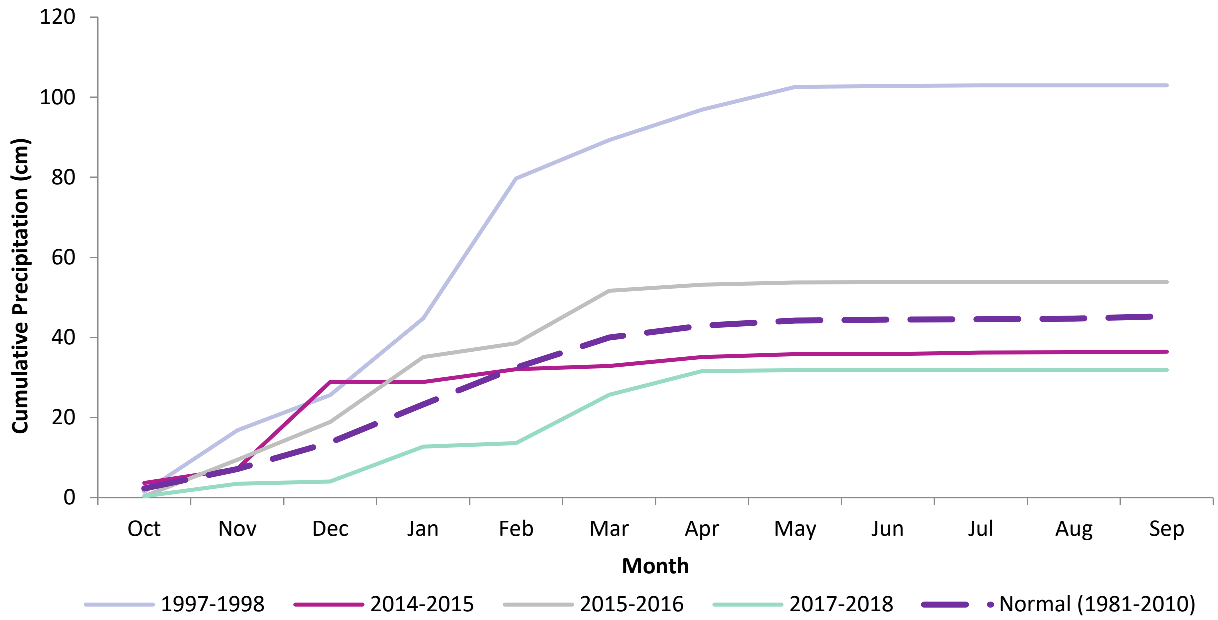


Figure 4-38. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 39 (Year 1 Post-Burn) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.7.1 Hydrology Monitoring

The 2018 maximum inundation for Pond 39 was 0.01 acres with a maximum depth of approximately 38 cm. The depth and inundation values were within range of the previously recorded values (see Appendix F Table F-7). Unlike previous years, Pond 39 held water in January, dried, and filled again in March. The vernal pool was inundated in January, March, and April. **Figure** 4-39 illustrates the relationship of precipitation and depth at Pond 39 for 2018 as well as baseline in 2016.

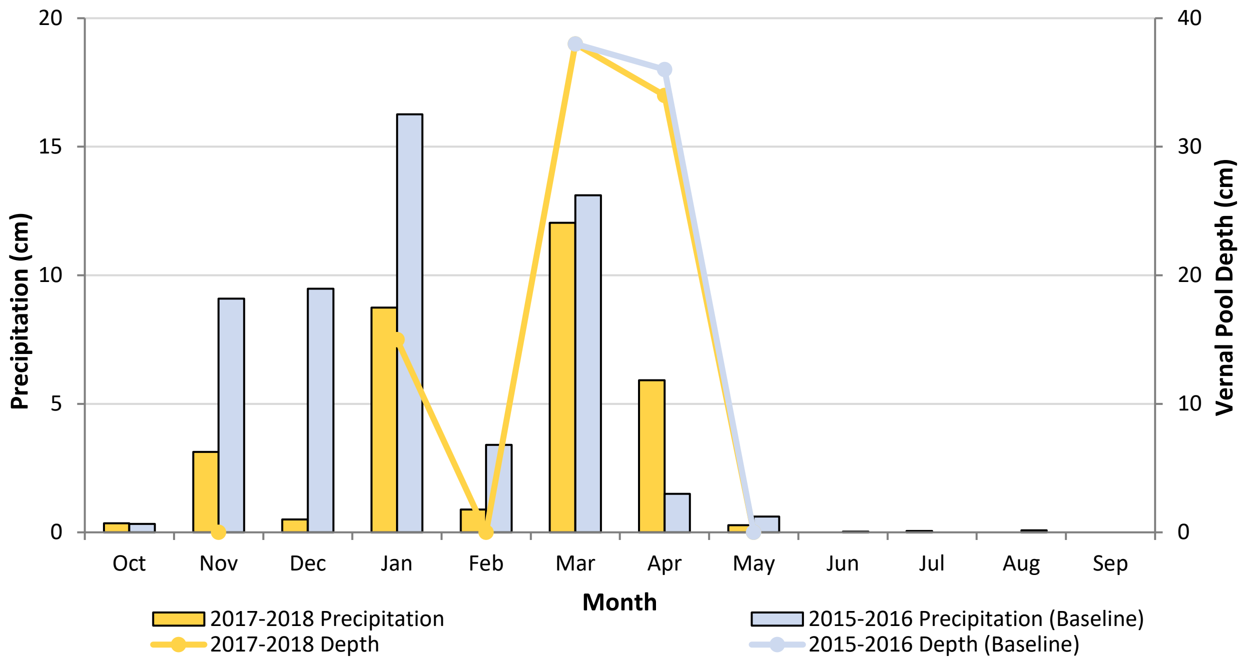


Figure 4-39. Monthly Depth and Precipitation at Pond 39 (Year 1 Post-Burn) for 2017-2018 Water-Year Compared to Baseline 2015-2016 Water-Year

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 48 cm or more and a maximum inundation up to 0.49 acres (see Appendix F Table F-7). Figure 4-40 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-41 illustrates historic and recent inundation areas.

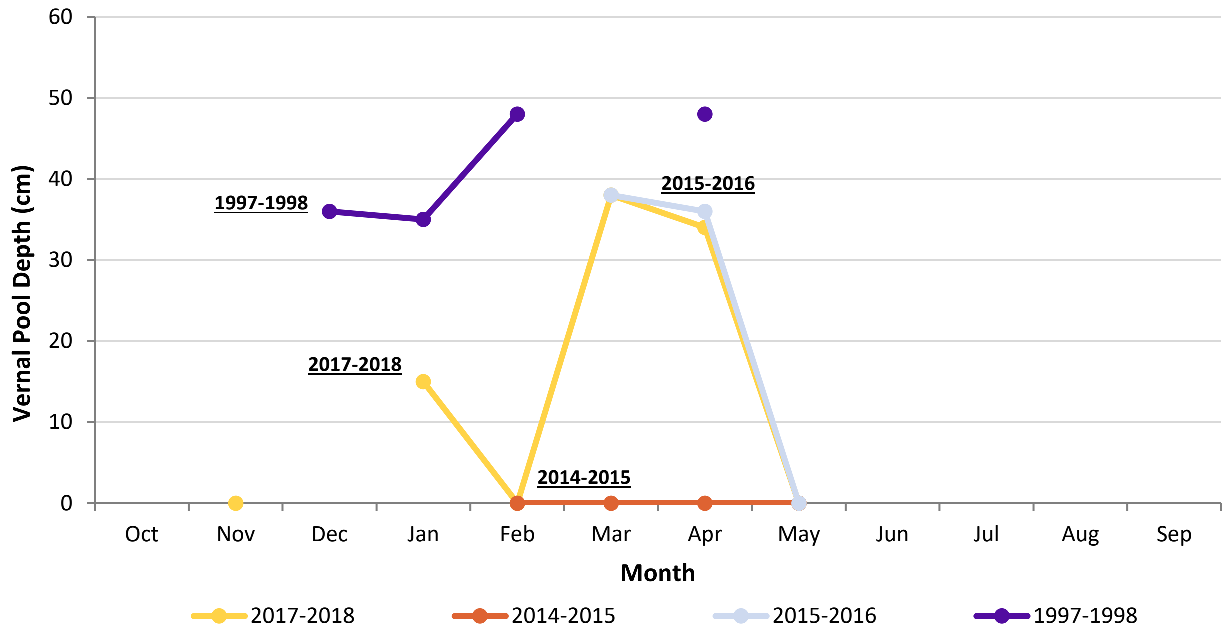


Figure 4-40. Historic Monthly Depths at Pond 39 (Year 1 Post-Burn). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

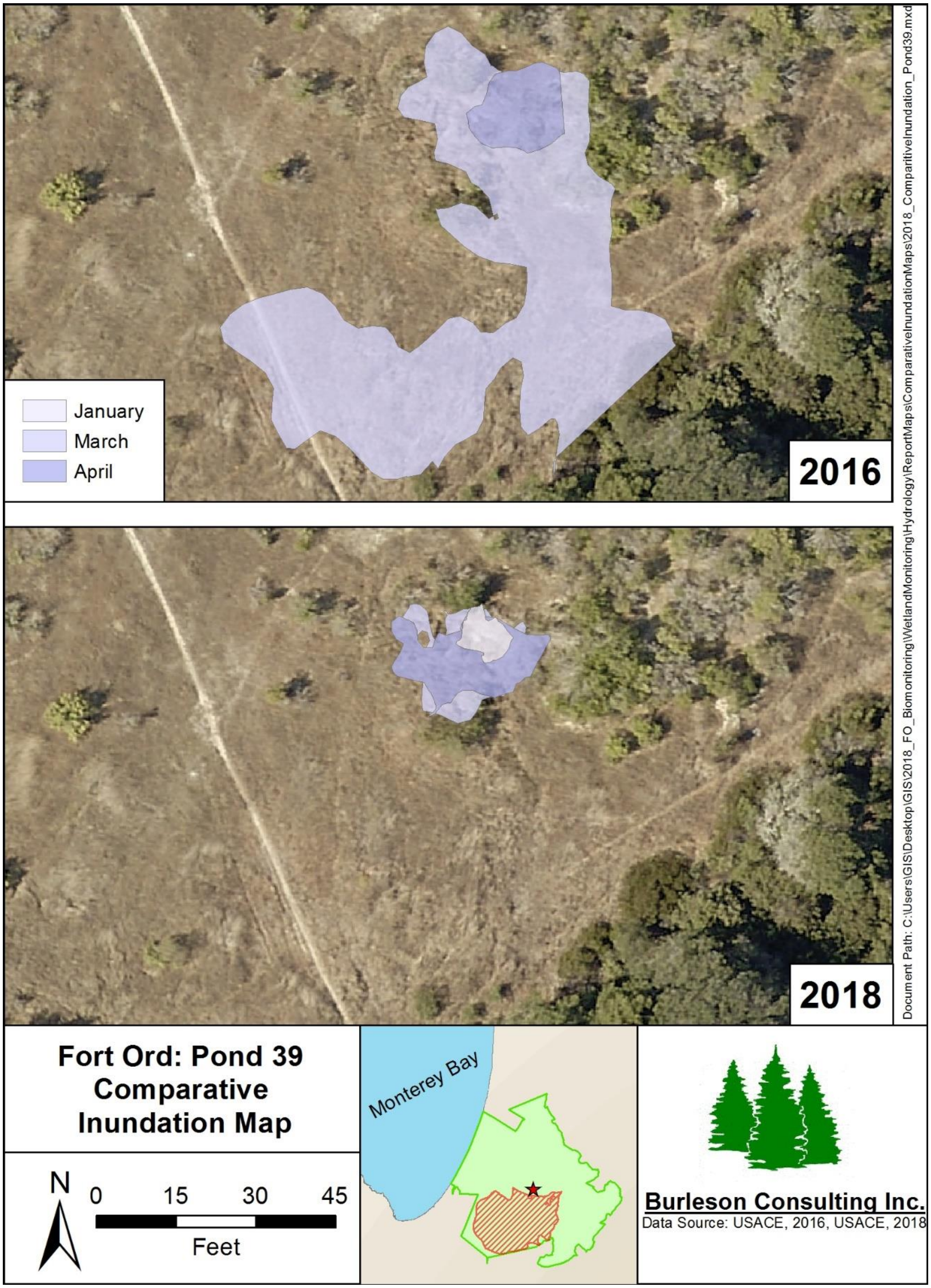


Figure 4-41. Pond 39 (Year 1 Post-Burn) Inundations for 2015-2016 (above-normal precipitation) and 2017-2018 (below-normal precipitation). The vernal pool was burned in 2017 and was in year 1 of monitoring in 2018.

4.7.1.1 *Data Quality Objective 1*

Pond 39 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 39 did not provide sufficient depth for CTS (18 cm through March) and fairy shrimp (22 cm through April). 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. Although the depths observed at Pond 39 are within the ranges observed at reference vernal pool 101 East (West), Pond 39 had a different hydroperiod regime than the reference vernal pools, making direct comparison unfeasible. Pond 101 East (West) did not fill until March, whereas Pond 39 filled in January, dried, and filled again in March. Pond 39 held water with less precipitation than Pond 101 East (West), indicating that in low precipitation years, Pond 39 could provide suitable habitat even though Pond 101 East (West) may not.

4.7.1.2 *Data Quality Objective 2*

Pond 39 had similar inundations in 2018 as previous years but was different than the relevant reference vernal pools in 2018 due to a different hydroperiod regime. Pond 39 was inundated in January, dried in February, and was inundated again March through May. The vernal pool had an inundation range of 0.002-0.01 acres and a mean of 0.01 acres. The historic inundation ranges were larger than the 2018 inundation range, with 0.24-0.49 acres in 1998 and 0.0-0.03 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 be connected to Pond 40 South. However, in a drought year, the vernal pool may remain dry or dry quickly (see Figure 4-40). Pond 39 is generally smaller than reference vernal pools 5, 101 East (West), and 101 East (East), and slightly larger than Pond 997. Because Pond 39 had a different hydroperiod regime than the reference vernal pools, it cannot be directly compared to the reference vernal pools and should instead be compared against itself in previous monitoring years considering varying water-years.

4.7.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 39, a post-burn vernal pool, was not on track to meet the performance standard for year 1 in 2018. Pond 39 did not meet DQO 1 due to insufficient depth and the below-normal water-year and unusually late rains were likely contributing factors. Evaluation of DQO 2 indicated that Pond 39 was similar to itself in previous monitoring years but different from the reference vernal pools. Despite being different from the reference vernal pools, Pond 39 was similar to Ponds 42 and 60 because all three vernal pools filled in January, dried, and re-filled in March. Pond 39 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.7.2 Vegetation Monitoring

Vegetation data were collected at Pond 39 in 1998, 2016 and 2018 (HLA, 1998; Burleson, 2017). 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 comparison to other years. Data from 2016 and 2018 were collected using the methodology described in the Methods section of this report and were compared stratum-to-stratum in Table 4-63 as well as visually in Figure 4-42.

Table 4-63. Pond 39 (Year 1 Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2018
1	5%	3%
2	8%	N/A
3	87%	56%
4	N/A	32%
Upland	N/A	9%

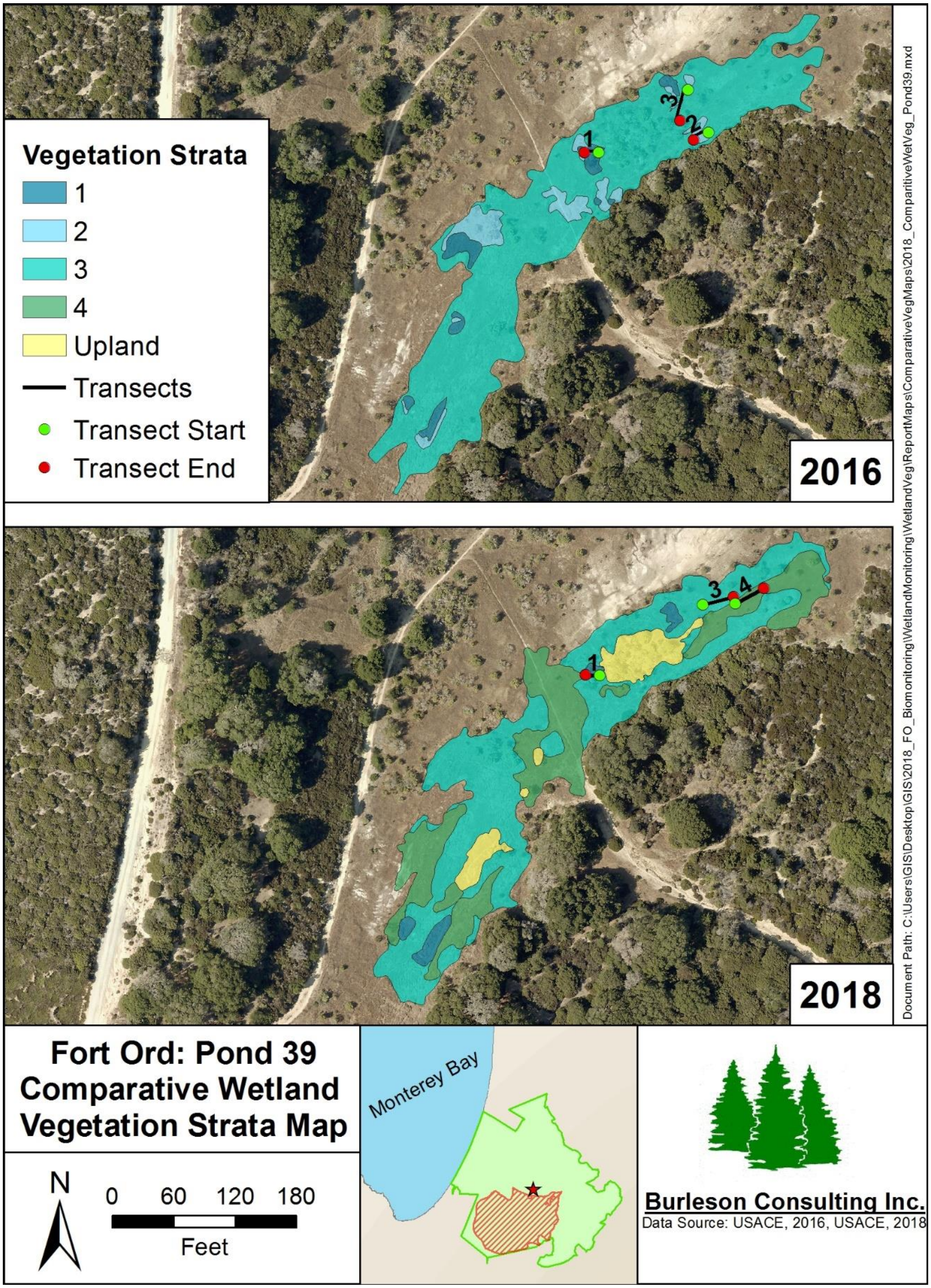


Figure 4-42. Pond 39 (Year 1 Post-Burn) Vegetation Strata and Transects for 2016 and 2018

Absolute percent vegetative cover increased between 1998 and 2016 and remained relatively static between 2016 and 2018 (see Table 4-64). The opposite was observed with thatch: thatch cover decreased between 1998 and 2016, and in 2018 it was similar to 2016. The absolute percent vegetative cover of Pond 39 in 2018 was within ranges observed at the reference vernal pools and was most similar to Pond 101 East (West) (see Table 4-65).

Table 4-64. Pond 39 (Year 1 Post-Burn) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998	48.7%	51.8%
2016	61.9%	37.4%
2018	59.1%	41.3%

Table 4-65. Pond 39 (Year 1 Post-Burn) and Reference Vernal Pool Absolute Percent Cover in 2018

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	54.6%	45.5%
101 East (West)	58.1%	42.3%
101 East (East)	68.7%	32.6%
997	44.7%	55.4%
39	**59.1%**	**41.3%**

Species richness increased between 1998 and 2018 at Pond 39. Species richness on transects was 22, 30, and 35 species in 1998, 2016, and in 2018, respectively, whereas overall basin species richness was 61 and 90 species in 2016 and 2018, respectively (see Table 4-66 and Appendix B Table B-7). The 1998 survey was limited to species on the transect and may underrepresent total vernal pool species richness. A possible contributing factor to the species richness increase could be year-to-year fluctuations associated with hydroperiod (Barbour *et al*., 2007). Although in 2018 Pond 39 followed an unusual pattern of filling, drying, and filling again, vernal pool plants can germinate and persist without inundation and may experience a late-season pulse of germination when seeds float free of the soil as the vernal pools fills (Bliss and Zedler, 1998). The more variable inundation and depth regime in 2018 may have allowed seeds that were dormant during drought years or submerged in above-normal water-years to germinate (Bliss and Zedler, 1998). This increased variability can increase microhabitats and promote higher species richness compared to a vernal pool with less hydrologic variability (Witham *et al*., 1998). 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 4-67 and Appendix G Tables G-17 and G-34).

Species composition at Pond 39 was similar between monitoring years: 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 and 2018, respectively. A complete comparison of species composition observed at Pond 39 in 1998, 2016, and 2018 can be found in Appendix H. Figure 4-43 shows a subset of this comparison for species observed with a 2% cover or greater.

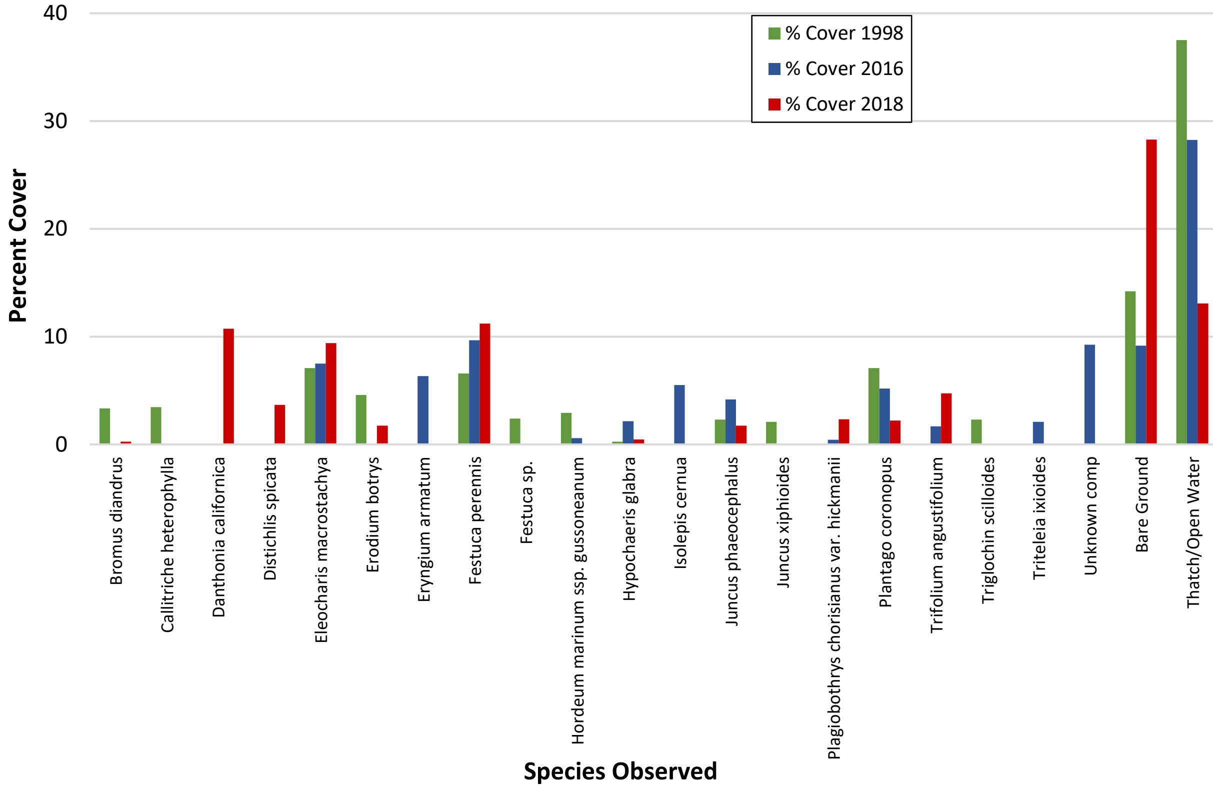


Figure 4-43. Percent Cover of Dominant Species at Pond 39 (Year 1 Post-Burn)

Native and non-native species richness on Pond 39 transects increased between 1998 and 2018 (see Table 4-66). Pond 39 native species richness in 2018 was below the range observed at the reference vernal pools (see Table 4-67). Pond 39 was not similar to previous years or the reference vernal pools because more non-native species than native species were observed (see Table 4-66 and Table 4-67). The relative percent cover of native species increased between monitoring years, whereas the relative percent cover of non-native species was variable (see Table 4-68). Pond 39 was within the range of native and non-native relative percent cover observed at the reference vernal pools in 2018 and was most similar to Pond 997 (see Table 4-69).

Table 4-66. Pond 39 (Year 1 Post-Burn) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998	10	11	1
2016	14	13	3
2018	16	19	0

Table 4-67. Pond 39 (Year 1 Post-Burn) and Reference Vernal Pool Native and Non-Native Species Richness in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	25	16	0
101 East (West)	26	21	3
101 East (East)	18	11	3
997	24	19	2
39	**16**	**19**	**0**

Table 4-68. Pond 39 (Year 1 Post-Burn) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1998	39.8%	55.3%	4.9%
2016	47.1%	37.1%	15.7%
2018	54.3%	45.7%	0.0%

Table 4-69. Pond 39 (Year 1 Post-Burn) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	83.3%	16.7%	0.0%
101 East (West)	67.1%	32.5%	0.3%
101 East (East)	84.4%	14.7%	0.9%
997	56.3%	43.5%	0.2%
39	**54.3%**	**45.7%**	**0.0%**

Wetland and non-wetland species richness on Pond 39 transects increased slightly between 1998 and 2018 (see Table 4-70). Pond 39 wetland and non-wetland species richness was slightly below the ranges observed at the reference vernal pools in 2018 (see Table 4-71). The relative percent cover of wetland species was similar in all monitoring years, and non-wetland species were similar in 1998 and 2018 with a decrease in 2015 (see Table 4-72). Pond 39 facultative wetland relative percent cover was lower than reference vernal pool values, whereas facultative species relative percent cover was higher (see Table 4-73). The relative percent cover of all wetland species (including OBL, FACW, and FAC) at Pond 39 in 2018 was similar to the reference vernal pools.

Table 4-70. Pond 39 (Year 1 Post-Burn) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998	7	2	6	2	0	5
2015	5	5	7	3	0	10
2018	4	7	6	5	1	12

Table 4-71. Pond 39 (Year 1 Post-Burn) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	11	7	8	1	9
101 East (West)	8	11	9	8	2	12
101 East (East)	5	9	5	4	2	7
997	8	10	5	8	0	14
39	**4**	**7**	**6**	**5**	**1**	**12**

Table 4-72. Pond 39 (Year 1 Post-Burn) 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%	39.0%	9.6%	0.0%	12.8%
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%

Table 4-73. Pond 39 (Year 1 Post-Burn) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	33.7%	50.5%	10.2%	3.3%	0.3%	2.0%
101 East (West)	38.6%	29.0%	17.0%	8.4%	1.0%	6.1%
101 East (East)	28.2%	40.2%	6.0%	22.6%	1.1%	1.8%
997	4.6%	47.5%	20.7%	14.2%	0.0%	13.0%
39	**23.0%**	**12.4%**	**41.9%**	**6.1%**	**1.2%**	**15.3%**

4.7.2.1 *Data Quality Objective 3*

Vegetative cover in Pond 39 was dominated by native and wetland plant species during year 1 post-burn monitoring. Differences observed between baseline in 2015 and year 1 post-burn conditions can be attributed to the changes in the rainfall pattern and the resulting hydroperiod. Pond 39 species richness was the highest in 2018, similar to the reference vernal pools. Despite a slight increase in non-native and non-wetland species richness, Pond 39 supported more native and wetland plant species than previous years, similar to the reference vernal pools.

4.7.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 39, a post-burn vernal pool, was on track to meet the performance standard for year 1 in 2018. The species composition, richness, and native and wetland species relative abundances were similar to baseline and reference vernal pool conditions. Pond 39 provided suitable wetland habitat in 2018.

4.7.3 Wildlife Monitoring

Wildlife data were collected at Pond 39 in 1998, 2016, and 2018 (HLA, 1998; Burleson, 2017). California tiger salamander larvae were not detected in 2018 or previous survey years. Fairy shrimp were detected in 1998 and 2018.

4.7.3.1 *Data Quality Objective 1*

Pond 39 did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.7.1.1.

4.7.3.2 *Data Quality Objective 4*

Fairy shrimp were detected in 2018 at Pond 39, whereas CTS were not detected. However, the water quality was adequate to support both species. Compared to other vernal pools and previous Pond 39 data, the water quality data were within normal ranges. The pH ranged from 5.94 in January to 6.51 in March with a mean of 6.22. Temperature ranged from 8.35°C in March to 12.68°C in April with a mean of 10.94°C. Dissolved oxygen ranged from 2.36 mg/L in January to 5.81 mg/L in April with a mean of 4.25 mg/L. Turbidity ranged from 43.1 FNU in January to 142.0 FNU in March with a mean of 83.8 FNU (see Table 3-17).

4.7.3.3 *Data Quality Objective 5*

California tiger salamanders were not present in 2018, which was consistent with previous monitoring. Fairy shrimp were detected in 2018, which was consistent with previous monitoring in 1998.

4.7.3.4 *Performance Standard: Wildlife Usage*

Although Pond 39, a post-burn vernal pool, was not on track to meet the performance standard for year 1 in 2018 due to insufficient inundation, results of 2018 wildlife surveys are consistent with baseline surveys. Pond 39 was not on track for DQO 1 but was on track for DQO 4 and DQO 5. Pond 39 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.7.4 Conclusion

Pond 39, a post-burn vernal pool, was in year 1 of monitoring in 2018. Conditions in 2018 at Pond 39 are suitable for comparison to future years. The vernal pool was on track to meet the plant cover and species diversity performance standard but was not on track to meet hydrological conditions and wildlife usage (see Table 4-74). Pond 39 will continue to be monitored in the future.

Table 4-74. Success at Pond 39 (Year 1 Post-Burn) 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

4.8 Pond 40 North - Year 1

Pond 40 North was monitored in 2018 as a year 1 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. Table 4-75 summarizes the years that monitoring occurred and which survey(s) were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 40 North (see Figure 4-44). The 2014-2015 and 2017-2018 water-years were below-normal.

Table 4-75. Pond 40 North (Year 1 Post-Burn) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year	
	2014-2015	2017-2018
Hydrology	●	●
Vegetation	●	●
Wildlife	●	

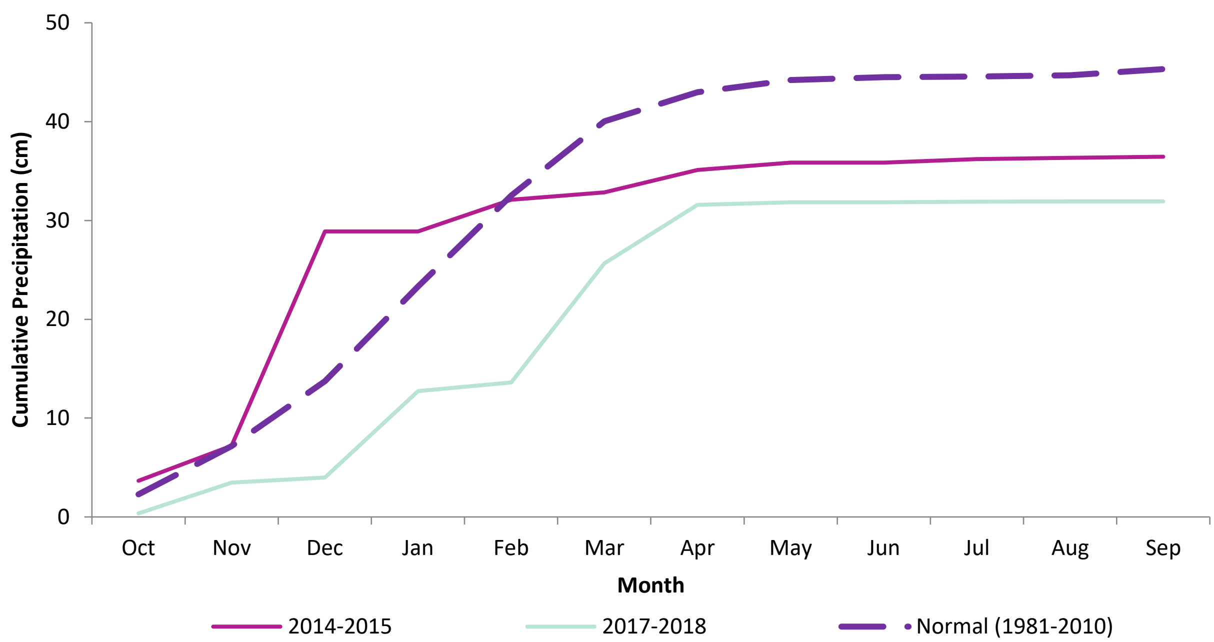


Figure 4-44. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 40 North (Year 1 Post-Burn) North Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.8.1 Hydrology Monitoring

The 2018 maximum inundation for Pond 40 North was 0.007 acres with a maximum depth of approximately 9 cm. The depth and inundation values were very similar to previously recorded values; however, there are limited data available for comparison (see Appendix F Table F-8). Pond 40 North filled slowly this water-year and dried quickly. This vernal pool required more than one storm event before it held water and was only inundated in March and April. **Figure** 4-45 illustrates the relationship of precipitation and depth at Pond 40 North in 2018 as well as baseline in 2015.

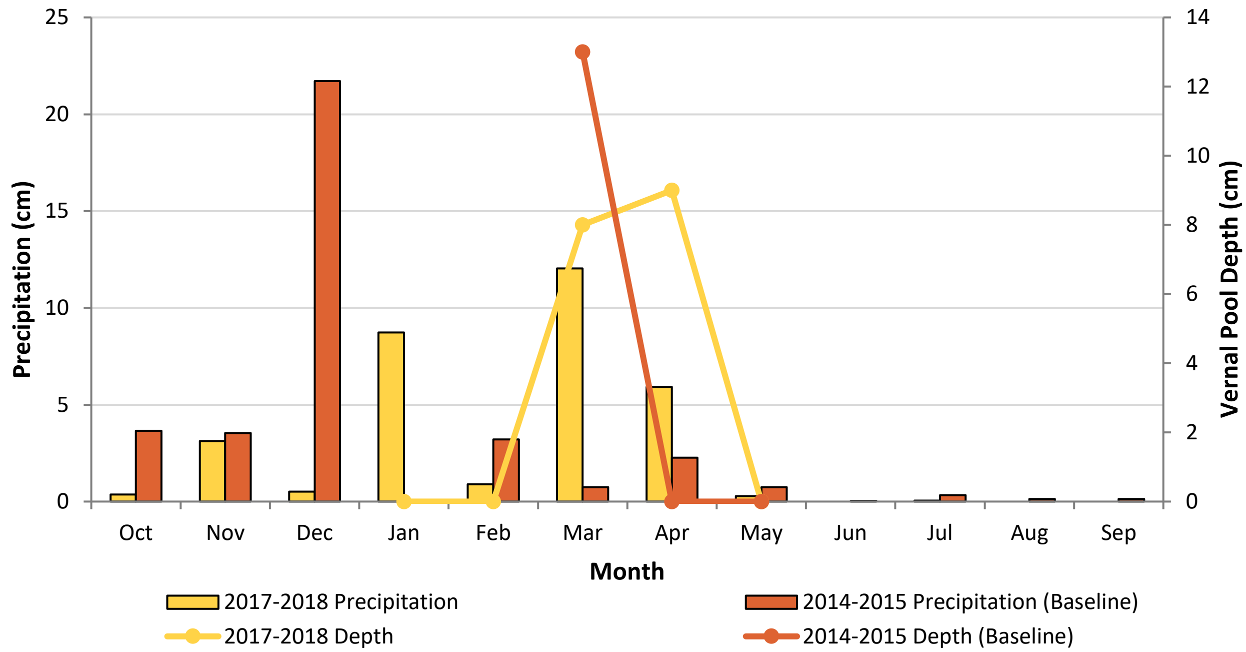


Figure 4-45. Monthly Depth and Precipitation at Pond 40 North (Year 1 Post-Burn) for 2017-2018 Water-Year Compared to Baseline 2014-2015 Water-Year

Pond 40 North has only been monitored in years with below-normal precipitation. In below-normal water-years, the vernal pool 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 or above-normal precipitation years (see Appendix F Table F-8). Figure 4-46 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-47 illustrates historic and recent inundation areas.

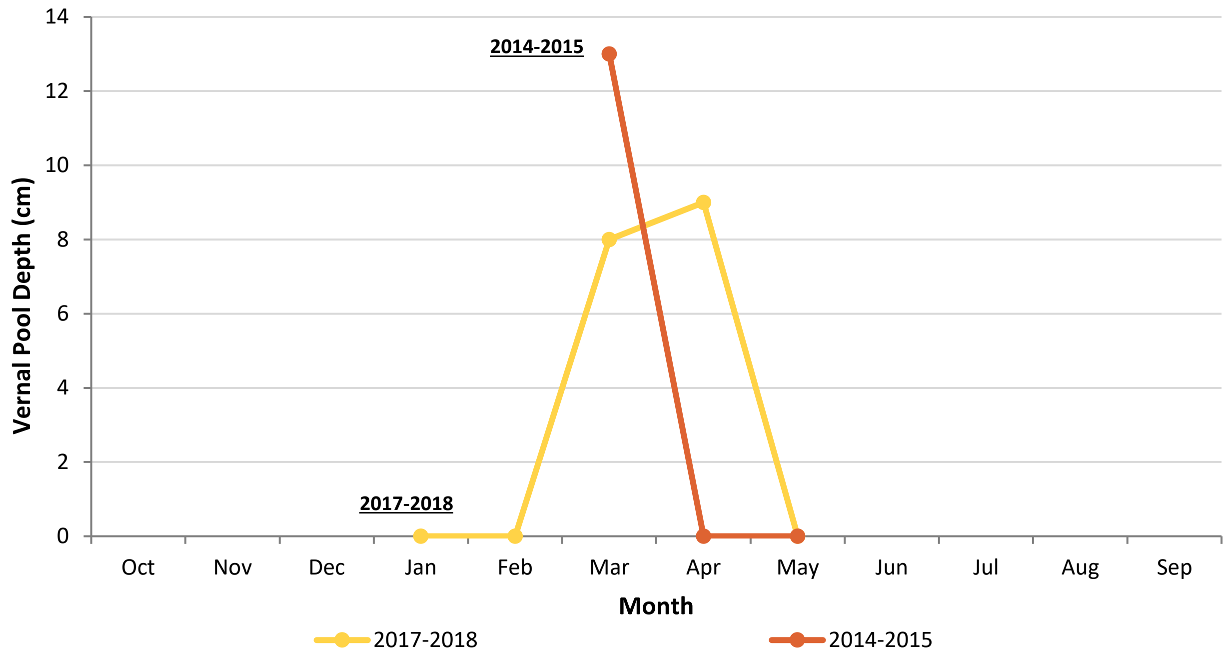


Figure 4-46. Historic Monthly Depths at Pond 40 North (Year 1 Post-Burn). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

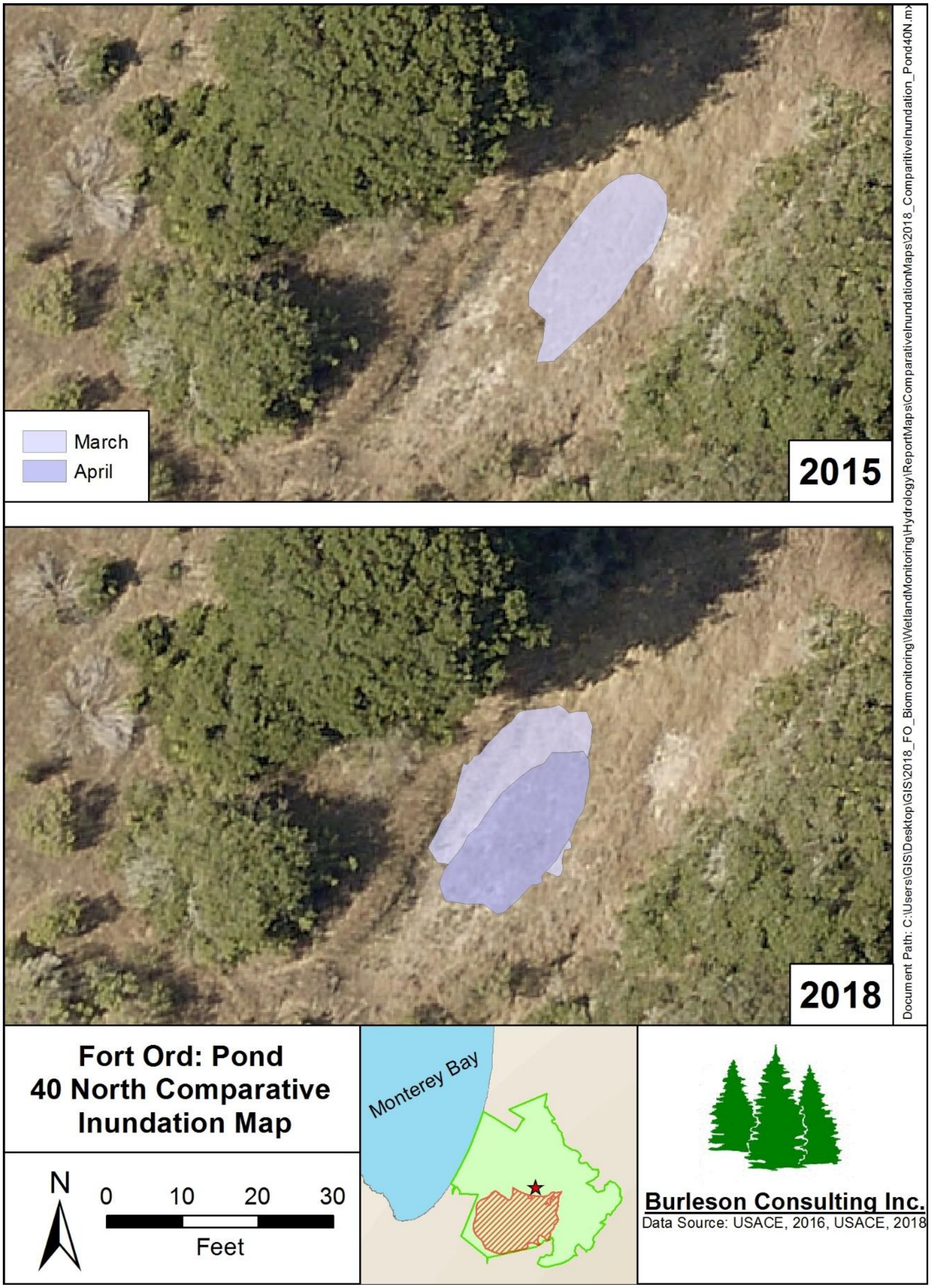


Figure 4-47. Pond 40 North (Year 1 Post-Burn) Inundations for 2014-2015 (below-normal precipitation) and 2017-2018 (below-normal precipitation). The vernal pool was burned in 2017 and was in year 1 of monitoring in 2018.

4.8.1.1 *Data Quality Objective 1*

Pond 40 North 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 40 North did not provide sufficient depth for CTS (8 cm through March) or fairy shrimp (8.5 cm through April). 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 depth at Pond 40 North was below the ranges observed at inundated reference vernal pools but was greater than reference vernal pool 997 which remained dry.

4.8.1.2 *Data Quality Objective 2*

Pond 40 North had similar inundations in 2018 as previous years and the relevant reference vernal pools. Pond 40 North was inundated in March and April with an inundation range of 0.005-0.007 acres and a mean of 0.006 acres. The March 2015 historic inundation of 0.01 acres was comparable to the range of 2018 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 4-46). Similar to reference vernal pool 101 East (West), Pond 40 North held water only in March and April and had a small inundation area.

4.8.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 40 North, a post-burn vernal pool, was not on track to meet the performance standard for year 1 in 2018. Pond 40 North did not meet DQO 1 and the below-normal water-year and unusually late rains were likely contributing factors. Evaluation of DQO 2 indicated that Pond 40 North was similar to itself in previous monitoring years and reference Pond 101 East (West). The vernal pool followed a trend observed at seven other vernal pools, Ponds 101 East (West), 3 North, 3 South, 16, 54, 73, and 72. Pond 40 North 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 40 North in 2015 and 2018 (Burleson *et al.*, 2016). Data from 2015 and 2018 were collected using the methodology described in the Methods section of this report and were compared stratum-to-stratum in Table 4-76 as well as visually in Figure 4-48.

Table 4-76. Pond 40 North (Year 1 Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2015	2018
1	2%	N/A
2	40%	26%
3	58%	N/A
4	N/A	74%

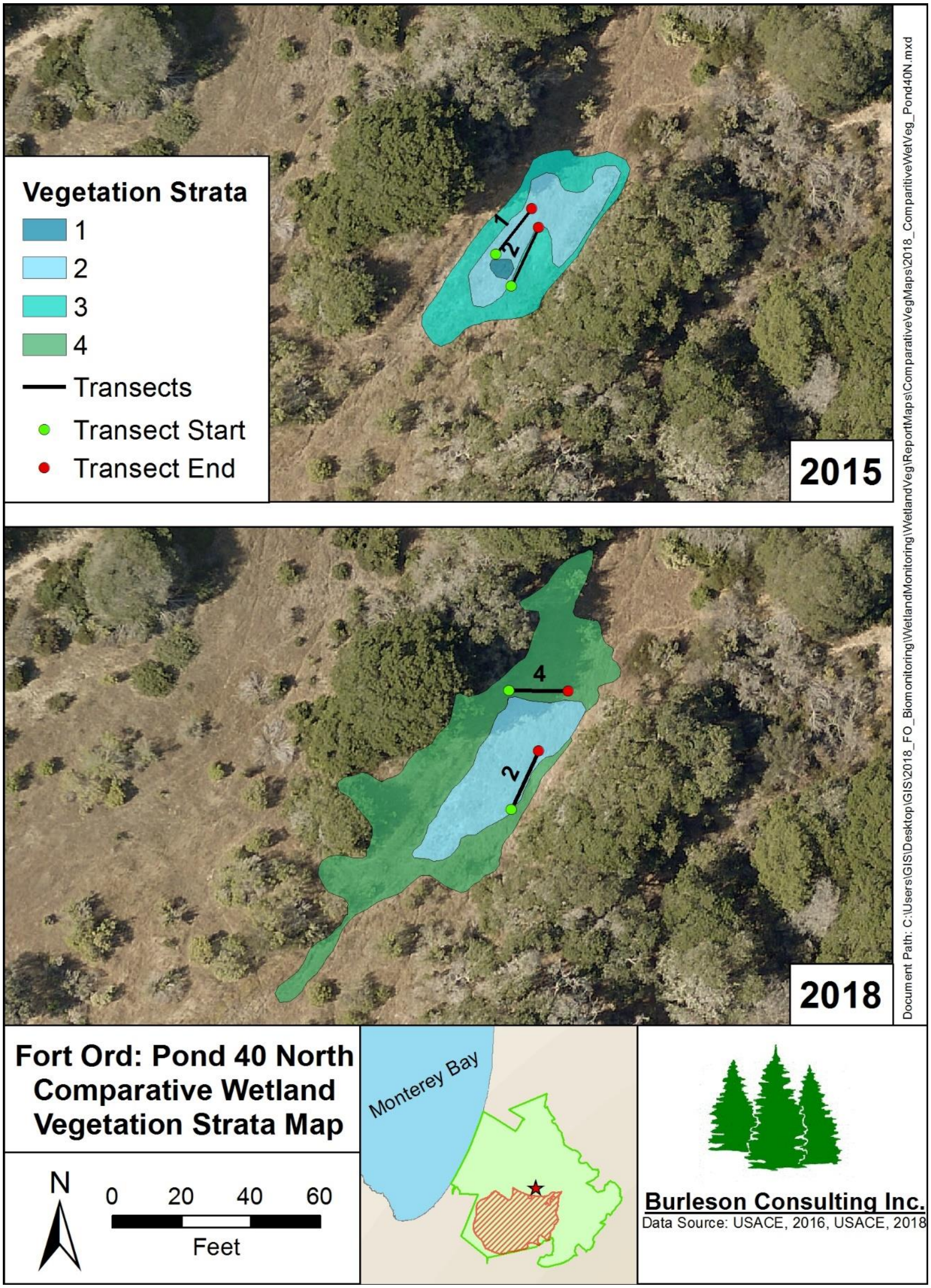


Figure 4-48. Pond 40 North (Year 1 Post-Burn) Vegetation Strata and Transects for 2015 and 2018. The 2018 transect 2 in stratum 2 was identified as transect 1 in 2015 (Burleson *et* al., 2016).

Absolute percent vegetative cover increased between 2015 and 2018, and thatch cover decreased (see Table 4-77). The absolute percent vegetative cover of Pond 40 North in 2018 was within ranges observed at the reference vernal pools (see Table 4-78).

Table 4-77. Pond 40 North (Year 1 Post-Burn) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2015	42.5%	55.8%
2018	49.2%	49.7%

Table 4-78. Pond 40 North (Year 1 Post-Burn) and Reference Vernal Pool Absolute Percent Cover in 2018

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	54.6%	45.5%
101 East (West)	58.1%	42.3%
101 East (East)	68.7%	32.6%
997	44.7%	55.4%
40 North	**49.2%**	**49.7%**

Species richness increased between 2015 and 2018 at Pond 40 North. Species richness on transects was 5 and 17 species in 2015 and 2018, respectively, whereas overall basin species richness was 27 and 57 species, respectively (see Table 4-79 and Appendix B Table B-8). A possible contributing factor to the species richness increase could be year-to-year fluctuations associated with hydroperiod (Barbour *et al*., 2007). Although Pond 40 North was dry early in 2018 and was only inundated in March and April, vernal pool plants can germinate and persist without inundation and may experience a late-season pulse of germination when seeds float free of the soil as the vernal pools fills (Bliss and Zedler, 1998). The more variable inundation and depth regime in 2018 may have allowed seeds that were dormant during drought years or submerged in above-normal water-years to germinate (Bliss and Zedler, 1998). This increased variability can increase microhabitats and promote higher species richness compared to a vernal pool with less hydrologic variability (Witham *et al*., 1998). 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 4-80 and Appendix G Tables G-17 and G-34).

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. A complete comparison of species composition observed at Pond 40 North in 2015 and 2018 can be found in Appendix H. Figure 4-49 shows a subset of this comparison for species observed with a 2% cover or greater.

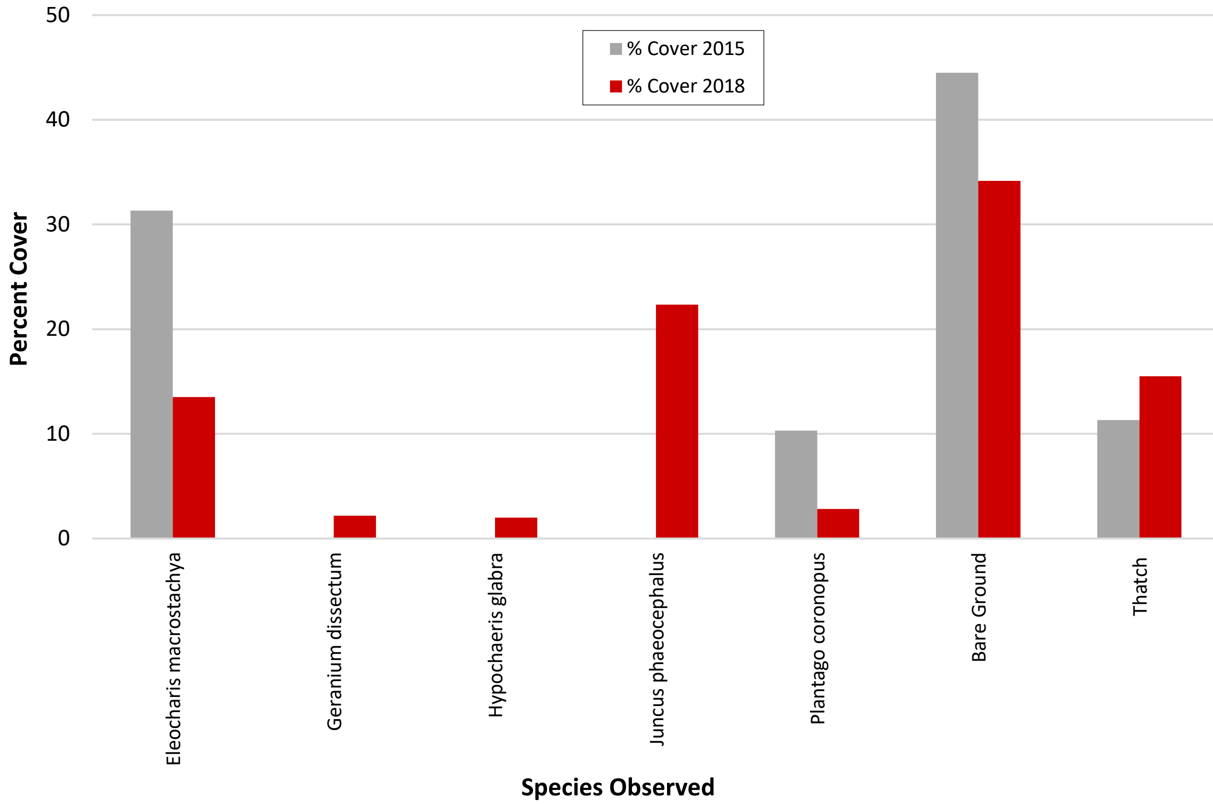


Figure 4-49. Percent Cover of Dominant Species at Pond 40 North (Year 1 Post-Burn)

Native and non-native species richness on Pond 40 North transects increased between 2015 and 2018, and more non-native species than native species were observed in 2018 (see Table 4-79). Pond 40 North native species richness was lower than the ranges observed at the reference vernal pools. The non-native species richness in 2018 was within the reference vernal pool ranges and most similar to reference Pond 101 East (East) (see Table 4-80). The relative percent cover of native species increased between 2015 and 2018, whereas the relative percent cover of non-native species decreased (see Table 4-81). Pond 40 North was within the range of native and non-native relative percent cover values observed at the reference vernal pools in 2018 (see Table 4-82).

Table 4-79. Pond 40 North (Year 1 Post-Burn) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2015	2	2	1
2018	6	11	0

Table 4-80. Pond 40 North (Year 1 Post-Burn) and Reference Vernal Pool Native and Non-Native Species Richness in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	25	16	0
101 East (West)	26	21	3
101 East (East)	18	11	3
997	24	19	2
40 North	**6**	**11**	**0**

Table 4-81. Pond 40 North (Year 1 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%

Table 4-82. Pond 40 North (Year 1 Post-Burn) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	83.3%	16.7%	0.0%
101 East (West)	67.1%	32.5%	0.4%
101 East (East)	84.4%	14.7%	0.9%
997	56.3%	43.5%	0.2%
40 North	**76.3%**	**23.7%**	**0.0%**

Wetland and non-wetland species richness values on Pond 40 North transects increased between 2015 and 2018 (see Table 4-83). Despite these increases, the wetland and non-wetland species richness at the vernal pool were below the ranges observed at the reference vernal pools in 2018 (see Table 4-84). The relative percent cover of wetland species decreased from 2015, and the non-wetland species cover increased (see Table 4-85). Notably, obligate wetland species cover decreased by 44% from 2015, whereas facultative wetland species cover increased by 45%. In contrast to species richness, the wetland and non-wetland relative percent cover values were within the ranges observed at reference vernal pools in 2018 and were most similar to reference Pond 101 East (West) (see Table 4-86).

Table 4-83. Pond 40 North (Year 1 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

Table 4-84. Pond 40 North (Year 1 Post-Burn) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	11	7	8	1	9
101 East (West)	8	11	9	8	2	12
101 East (East)	5	9	5	4	2	7
997	8	10	4	9	0	14
40 North	**3**	**2**	**2**	**4**	**1**	**5**

Table 4-85. Pond 40 North (Year 1 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%

Table 4-86. Pond 40 North (Year 1 Post-Burn) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	33.7%	50.5%	10.2%	3.3%	0.3%	2.0%
101 East (West)	38.6%	29.0%	17.0%	8.4%	1.0%	6.1%
101 East (East)	28.2%	40.2%	6.0%	22.6%	1.1%	1.8%
997	4.6%	47.5%	8.9%	26.0%	0.0%	13.0%
40 North	**30.8%**	**46.4%**	**6.8%**	**4.4%**	**0.3%**	**11.2%**

4.8.2.1 *Data Quality Objective 3*

Despite higher non-native species richness than native, vegetative cover at Pond 40 North was dominated by native and wetland plant species during year 1 post-burn monitoring in 2018. Although more non-native species than native were observed, the relative percent cover of both remained similar between 2015 and 2018. Differences observed between baseline in 2015 and year 1 post-burn conditions can likely be attributed to the changes in the rainfall pattern and the resulting hydroperiod. Pond 40 North species richness was highest in 2018, similar to the reference vernal pools.

4.8.2.2 *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 1 in 2018. The species composition, richness, and native and wetland species relative abundances were similar to baseline and reference vernal pool conditions. While this is the case, the increase in non-native plants should be closely evaluated in future years. Pond 40 North provided suitable wetland habitat in 2018.

4.8.3 Wildlife Monitoring

Wildlife data were collected at Pond 40 North in 2015 (Burleson *et al.*, 2016). California tiger salamander larvae and fairy shrimp were not detected at Pond 40 North in 2015. Pond 40 North was not surveyed for CTS or fairy shrimp in 2018 due to insufficient depth. However, DQO 1 and DQO 4 were evaluated to allow for comparison in future years. DQO 5 was not applicable.

4.8.3.1 *Data Quality Objective 1*

Pond 40 North did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.8.1.1.

4.8.3.2 *Data Quality Objective 4*

California tiger salamander and fairy shrimp surveys were not conducted in 2018 at Pond 40 North due to insufficient depth; however, the water quality was adequate for both species. Compared to other vernal pools and previous Pond 40 North data, the water quality data were within normal ranges. The pH ranged from 6.18 in March to 6.36 in April with a mean of 6.27. Temperature ranged from 6.67°C in March to 11.72°C in April with a mean of 9.20°C. Dissolved oxygen ranged from 7.62 mg/L in April to 9.12 mg/L in March with a mean of 8.37 mg/L. Turbidity ranged from 64.2 FNU in April to 141.0 FNU in March with a mean of 102.6 FNU (see Table 3-19).

4.8.3.3 *Performance Standard: Wildlife Usage*

Pond 40 North, a post-burn vernal pool, was not on track to meet the performance standard for year 1 in 2018 due to insufficient depth. Pond 40 North was not on track for DQO 1, was on track for DQO 4, and DQO 5 cannot be accessed at this time. The vernal pool will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.8.4 Conclusion

Pond 40 North, a post-burn vernal pool, was in year 1 of monitoring in 2018. Conditions in 2018 at Pond 40 North are suitable for comparison to future years. The vernal pool was on track to meet the plant cover and species diversity performance standard but was not on track to meet hydrological conditions and wildlife usage (see Table 4-87). Pond 40 North will continue to be monitored in the future.

Table 4-87. Success at Pond 40 North (Year 1 Post-Burn) 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	N/A**

**Not applicable; only hydrology and vegetation surveys were conducted

4.9 Pond 40 South – Year 1

Pond 40 South was monitored in 2018 as a year 1 post-burn 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. Table 4-88 summarizes the monitoring years and type(s) of surveys. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 40 South (see Figure 4-50). The 1997-1998, 2015-2016, and 2016-2017 water-years were above-normal, whereas 2014-2015 and 2017-2018 water-years were below-normal.

Table 4-88. Pond 40 South (Year 1 Post-Burn) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year				
	1997-1998	2014-2015	2015-2016	2016-2017	2017-2018
Hydrology	●	●	●	●	●
Vegetation	●		●		●
Wildlife	●		●		

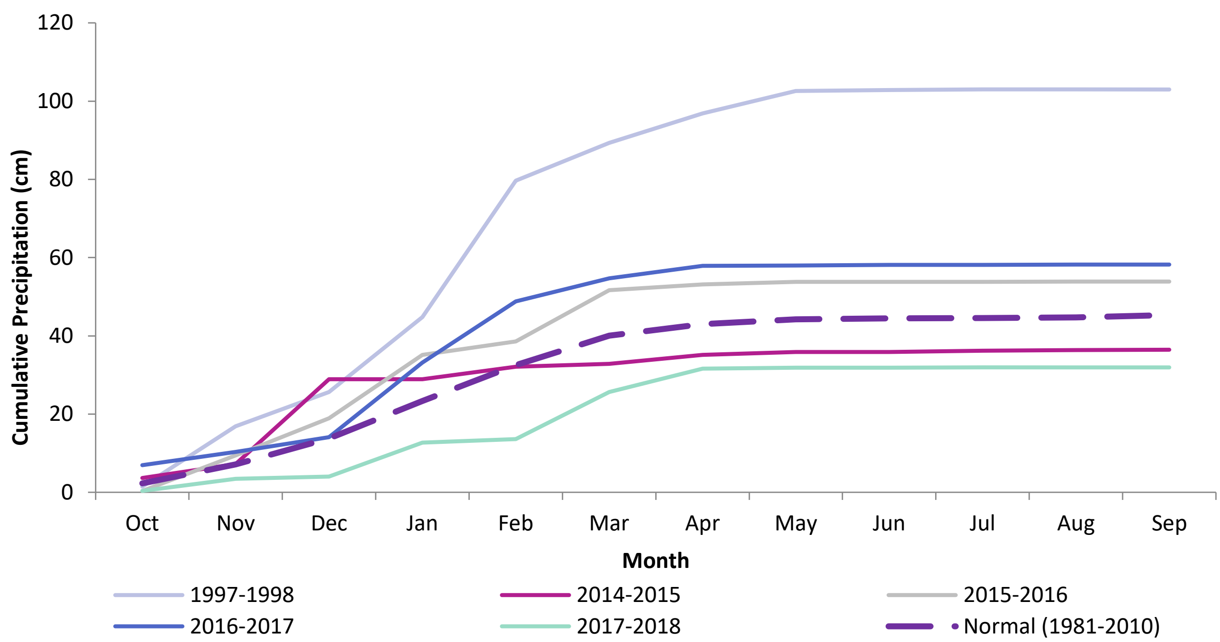


Figure 4-50. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 40 South (Year 1 Post-Burn) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.9.1 Hydrology Monitoring

In 2018, Pond 40 South remained dry throughout the water-year. This has occurred in previous water-years, specifically 2014-2015 (see Appendix F Table F-9). Figure 4-51 illustrates the relationship of precipitation and depth at Pond 40 South for 2018 as well as baseline in 2015.

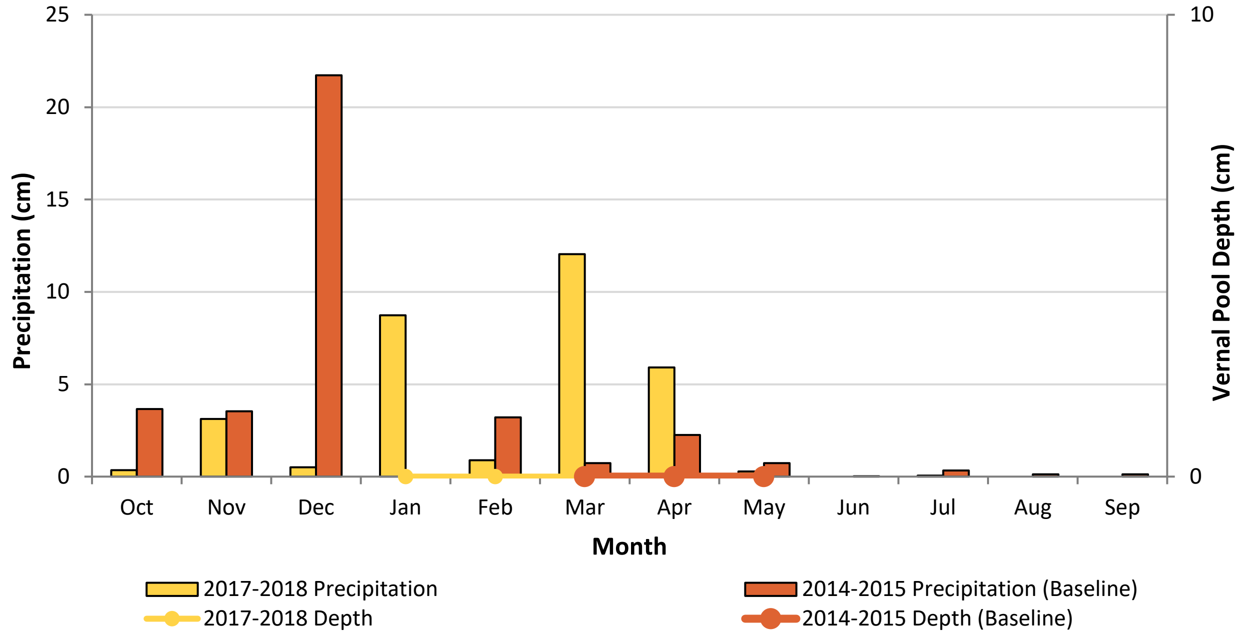


Figure 4-51. Monthly Depth and Precipitation at Pond 40 South (Year 1 Post-Burn) for 2017-2018 Water-Year Compared to Baseline 2014-2015 Water-Year

The historic inundation ranges were 0.12-0.21 acres in 1998, 0.08 acres in 2016, and 0.12-0.96 acres in 2017. In an above-normal water-year, Pond 40 South will likely be inundated and may connect to Pond 39. In above-normal water-year 2016-2017, when Pond 40 South connected to Pond 39, the inundation ranged from 0.12-0.96 acres, whereas in 2016 the inundation was much smaller (0.08 acres) because Pond 40 South was separate. In contrast, in below-normal years 2015 and 2018, Pond 40 South was dry the entire monitoring season.

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-9). Figure 4-52 illustrates historic vernal pool depths by month and organized by water-year.

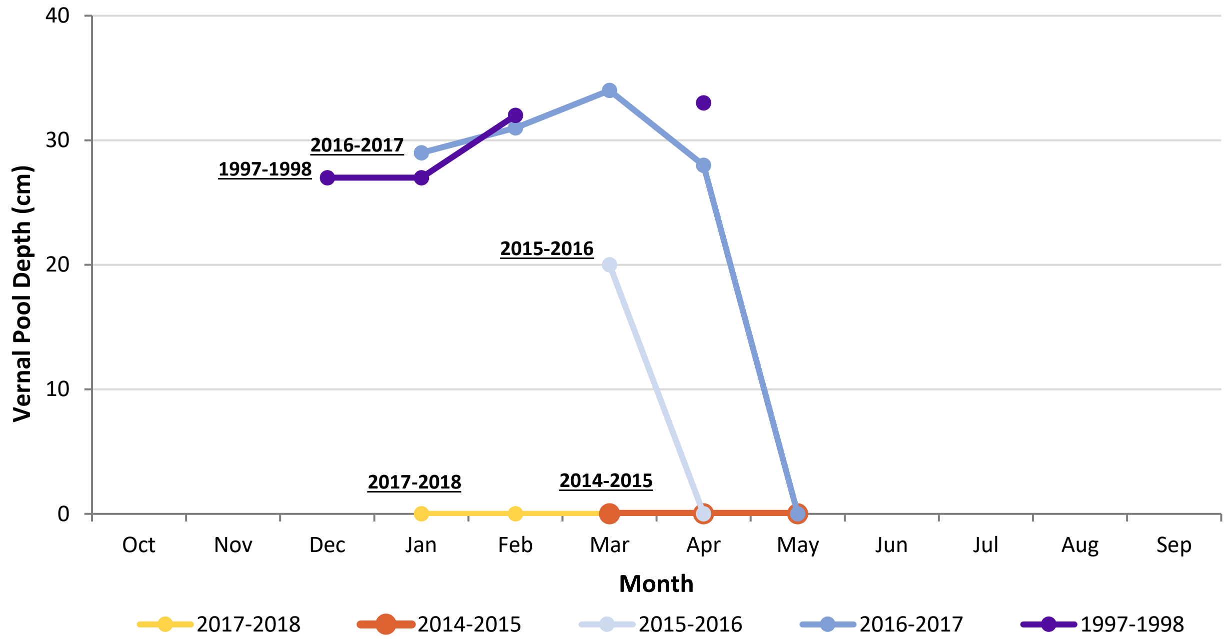


Figure 4-52. Historic Monthly Depths at Pond 40 South (Year 1 Post-Burn). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

4.9.1.1 *Data Quality Objective 1*

Pond 40 South 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. The vernal pool remained dry throughout the 2017-2018 water-year and therefore did not provide sufficient depth for CTS or fairy shrimp. Pond 40 South likely met the DQO in 1998 and 2017, although monitoring did not continue into May in 1998. Pond 40 South was similar to reference Pond 997 in 2018 since both vernal pools remained dry.

4.9.1.2 *Data Quality Objective 2*

Pond 40 South was not inundated in 2018, similar to 2015 and reference Pond 997 in 2018. Pond 40 South was inundated in 1998, 2016, and 2017 but was dry in 2015. Pond 40 South is a small vernal pool that is likely to fill in a normal or above-normal water-year when it may be connected to Pond 39. However, in a drought year, the vernal pool may remain dry or dry quickly (see Figure 4-52). Pond 40 South was similar to reference Pond 997 because both remained dry in 2018. Although Pond 40 South may be larger when connected to Pond 39, Pond 40 South is slightly smaller than reference Pond 997 and may remain dry in years when Pond 997 fills.

4.9.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 40 South, a post-burn vernal pool, was not on track to meet the performance standard for year 1 in 2018. Pond 40 South did not meet DQO 1 and the below-normal water-year and unusually late rains were likely contributing factors. Evaluation of DQO indicated that Pond 40 South was similar to itself in previous monitoring years and reference Pond 997. The vernal pool followed a trend observed at five other vernal pools, Ponds 997, 43, 35, 44, and 61. Pond 40 South 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 40 South in 1998, 2016 and 2018 (HLA, 1998; Burleson, 2017). 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 comparison to other years. Data from 2016 and 2018 were collected using the methodology described in the Methods section of this report and were compared stratum-to-stratum in Table 4-89 as well as visually in Figure 4-53.

Table 4-89. Pond 40 South (Year 1 Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2018
1	9%	6%
2	26%	21%
3	65%	73%

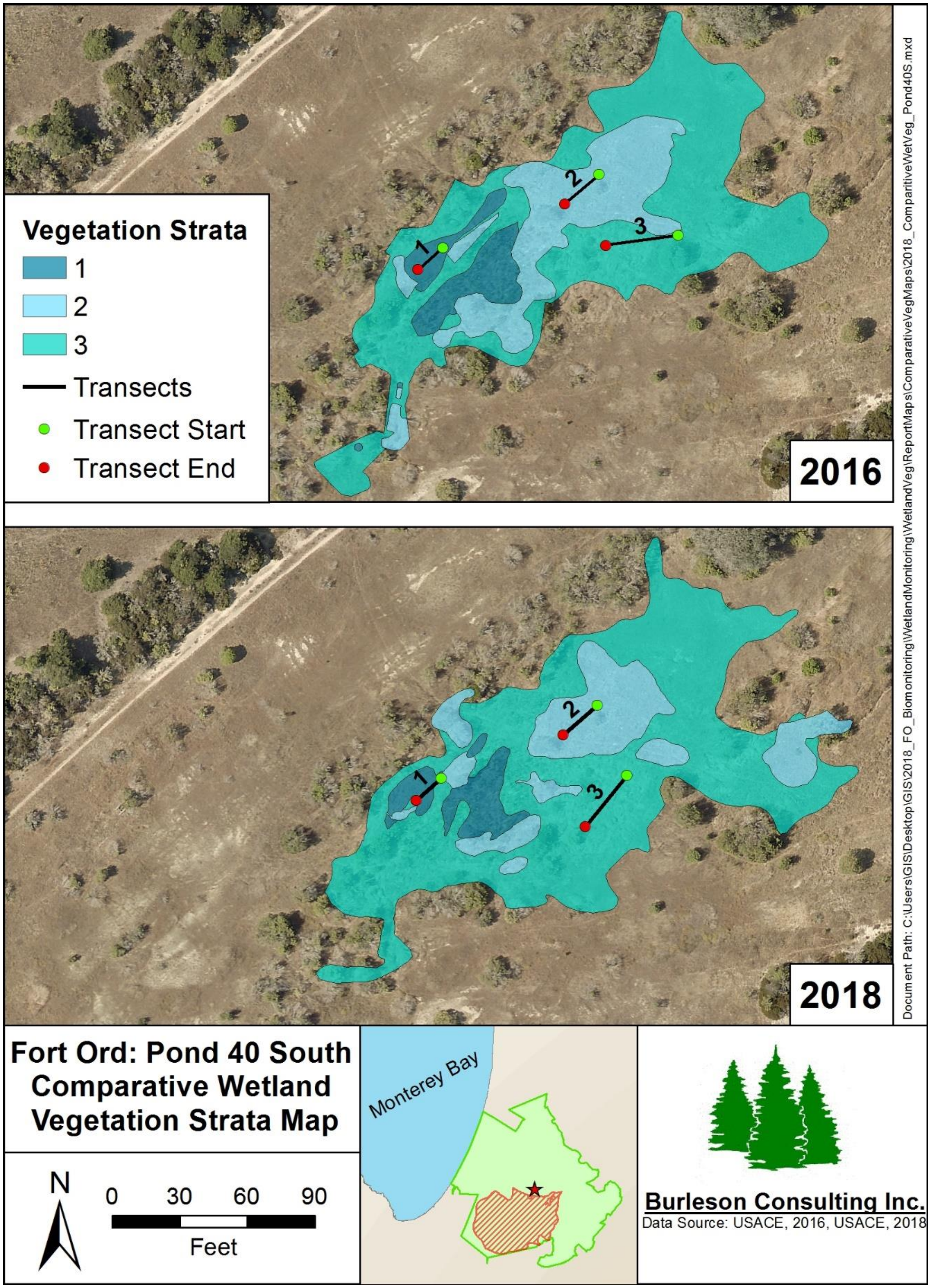


Figure 4-53. Pond 40 South (Year 1 Post-Burn) Vegetation Strata and Transects for 2016 and 2018

Absolute percent vegetative cover decreased between 1998 and 2018, and thatch cover increased (see Table 4-90). The increase in thatch is likely due to an extended period without inundation in early 2017-2018 which allowed for the desiccation of plants and greater accumulation of thatch. The absolute percent vegetative cover of Pond 40 South in 2018 was within the ranges observed at the reference vernal pools (see Table 4-91).

Table 4-90. Pond 40 South (Year 1 Post-Burn) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998	72.7%	27.1%
2016	66.7%	33.9%
2018	51.9%	50.3%

Table 4-91. Pond 40 South (Year 1 Post-Burn) and Reference Vernal Pool Absolute Percent Cover in 2018

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	54.6%	45.5%
101 East (West)	58.1%	42.3%
101 East (East)	68.7%	32.6%
997	44.7%	55.4%
40 South	**51.9%**	**50.3%**

Species richness increased between 1998 and 2018 at Pond 40 South. Species richness on transects was 21, 20, and 32 species in 1998, 2016, and 2018, respectively, whereas overall basin species richness was 27 and 55 species in 2016 and 2018, respectively (see Table 4-92 and Appendix B Table B-9). The 1998 survey was limited to species on the transect and may underrepresent total vernal pool species richness. A possible contributing factor to the species richness increase could be year-to-year fluctuations associated with hydroperiod (Barbour *et al*., 2007). Although Pond 40 South was dry throughout the 2017-2018 water-year, vernal pool plants can germinate and persist without inundation (Bliss and Zedler, 1998). In addition, seeds that were dormant during drought years or submerged in above-normal water-years may have germinated in 2018 (Bliss and Zedler, 1998). This increased variability can increase microhabitats and promote higher species richness compared to a vernal pool with less hydrologic variability (Witham *et al.,* 1998). 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 4-93 and Appendix G Tables G-17 and G-34).

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*), Italian rye grass (*Festuca perennis*), and cut-leaved plantain *(Plantago coronopus*) in 1998, 2016, and 2018, respectively. Italian rye grass was also dominant in 2018. Pale spike rush (*Eleocharis macrostachya*) was a dominant species in all three years. A complete comparison of species composition observed at Pond 40 South in 1998, 2016, and 2018 can be found in Appendix H. Figure 4-54 shows a subset of this comparison for species observed with a 2% cover or greater.

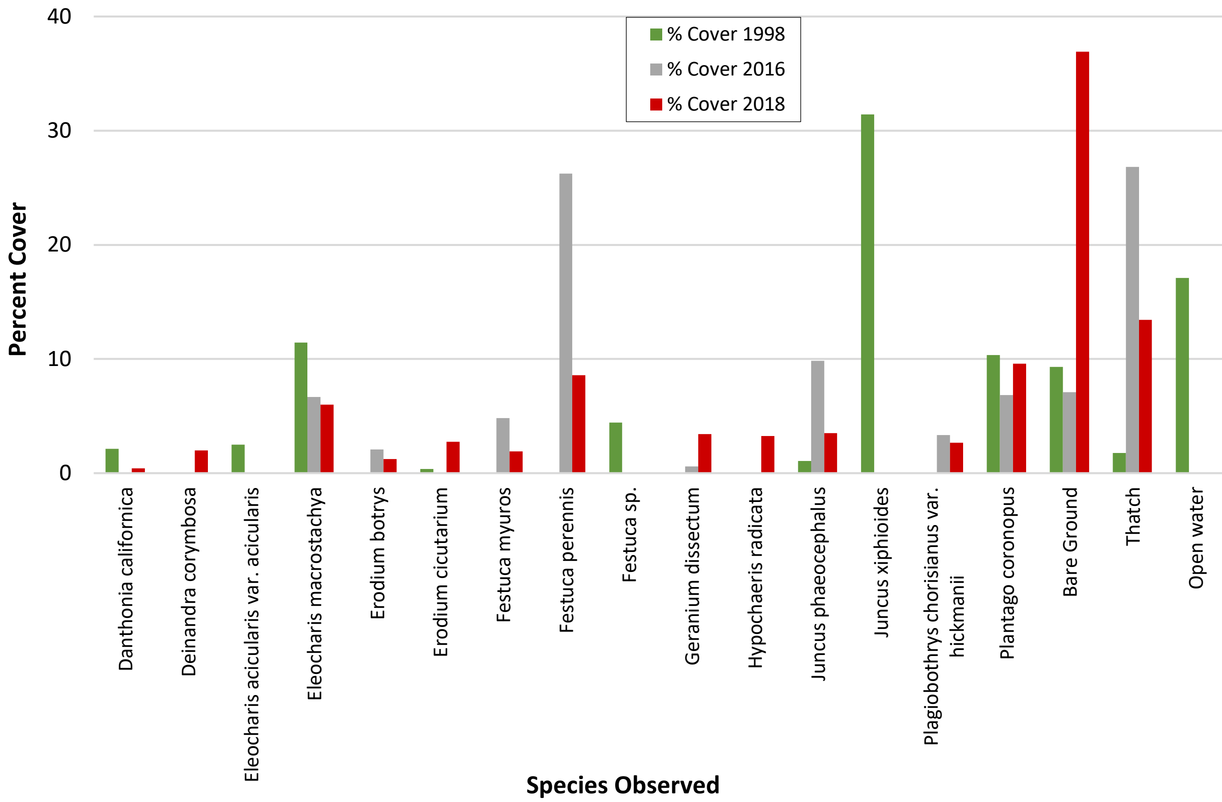


Figure 4-54. Percent Cover of Dominant Species at Pond 40 South (Year 1 Post-Burn)

Native species richness on Pond 40 South transects decreased slightly from 1998, whereas non-native species richness almost quadrupled from 1998 (see Table 4-92). Pond 40 South native species richness in 2018 was below the ranges of the reference pools, whereas non-native species richness was within the ranges (see Table 4-93). The relative percent cover of native species decreased between monitoring years, whereas the relative percent cover of non-native species increased from 1998, but these values were almost identical to 2016 (see Table 4-94). Pond 40 South was well below the range of native relative percent cover at the reference vernal pools in 2018 (see Table 4-95). The non-native relative percent cover was almost double that of reference Pond 997, the reference vernal pool with the highest non-native cover and most similar in size to Pond 40 South. Despite these changes, Pond 40 South native species richness and relative percent cover do not appear to be affected by remediation since values were similar before and after prescribed burns. Moreover, these changes occurred between 1998 and 2016, and it is possible the vernal pool was severely affected by the historic drought which occurred between 2012 and 2017.

Table 4-92. Pond 40 South (Year 1 Post-Burn) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998	12	6	3
2016	5	14	1
2018	9	22	1

Table 4-93. Pond 40 South (Year 1 Post-Burn) and Reference Vernal Pool Native and Non-Native Species Richness in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	25	16	0
101 East (West)	26	21	3
101 East (East)	18	11	3
997	24	19	2
40 South	**9**	**22**	**1**

Table 4-94. Pond 40 South (Year 1 Post-Burn) 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%

Table 4-95. Pond 40 South (Year 1 Post-Burn) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	83.3%	16.7%	0.0%
101 East (West)	67.1%	32.5%	0.4%
101 East (East)	84.4%	14.7%	0.9%
997	56.3%	43.5%	0.2%
40 South	**29.4%**	**70.5%**	**0.2%**

Wetland and non-wetland species richness on Pond 40 South transects increased between 1998 and 2018 (see Table 4-96). The relative percent cover of wetland species decreased from 1998 to 2018, whereas that of non-wetland species increased (see Table 4-98). The wetland species richness and relative percent cover at Pond 40 South were below the ranges observed at the reference vernal pools in 2018 (see Table 4-97 and Table 4-99). However, the non-wetland species richness and relative percent cover were within ranges observed at the reference vernal pools in 2018 and were most similar to reference Pond 997.

Table 4-96. Pond 40 South (Year 1 Post-Burn) 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

Table 4-97. Pond 40 South (Year 1 Post-Burn) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	11	7	8	1	9
101 East (West)	8	11	9	8	2	12
101 East (East)	5	9	5	4	2	7
997	8	10	5	8	0	14
40 South	**3**	**5**	**6**	**7**	**2**	**9**

Table 4-98. Pond 40 South (Year 1 Post-Burn) 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%

Table 4-99. Pond 40 South (Year 1 Post-Burn) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	33.7%	50.5%	10.2%	3.3%	0.3%	2.0%
101 East (West)	38.6%	29.0%	17.0%	8.4%	1.0%	6.1%
101 East (East)	28.2%	40.2%	6.0%	22.6%	1.1%	1.8%
997	4.6%	47.5%	20.7%	14.2%	0.0%	13.0%
40 South	**17.2%**	**9.3%**	**36.6%**	**14.9%**	**2.2%**	**19.7%**

4.9.2.1 *Data Quality Objective 3*

Vegetative cover in Pond 40 South was dominated by non-native species and wetland species during year 1 post-burn monitoring in 2018. This was similar to 2016 when the vernal pool was dominated by non-native species but was different from 1998 when the vernal pool was dominated by native species. It is unlikely that remediation caused these changes since they occurred prior to the prescribed burns. The vernal pool was likely affected by the prolonged drought between 2012 and 2017. While Pond 40 South had significantly higher non-native species richness and cover than the reference vernal pools, the 2018 values were similar to the 2016 pre-remediation values.

4.9.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 40 South, a post-burn vernal pool, was on track to meet the performance standard for year 1 in 2018. 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 native, non-native, and wetland species richness and relative percent cover. Non-native species richness and relative percent cover increased between 1998 and 2016 and should be closely monitored in future years. Pond 40 South provided suitable wetland habitat in 2018.

4.9.3 Wildlife Monitoring

Wildlife data were collected at Pond 40 South in 1998 and 2016 (HLA, 1998; Burleson, 2017). California tiger salamander larvae and fairy shrimp were not detected at Pond 40 South in 1998 and 2016. Pond 40 South was not surveyed for CTS or fairy shrimp in 2018 due to insufficient depth. However, DQO 1 was evaluated to allow for comparison in future years. DQO 4 and DQO 5 were not applicable.

4.9.3.1 *Data Quality Objective 1*

Pond 40 South remained dry throughout the 2017-2018 water-year and did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.9.1.1.

4.9.3.2 *Performance Standard: Wildlife Usage*

Pond 40 South, a post-burn vernal pool, was not on track to meet the performance standard for year 1 in 2018 due to the vernal pool remaining dry for the entire season. Pond 40 South was not on track for DQO 1. DQO 4 and DQO 5 cannot be accessed at this time. Pond 40 South will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.9.4 Conclusion

Pond 40 South, a post-burn vernal pool, was in year 1 of monitoring in 2018. Conditions in 2018 at Pond 40 South are suitable for comparison to future years. The vernal pool was on track to meet the plant cover and species diversity performance standard but was not on track to meet hydrological conditions or wildlife usage (see Table 4-100). Pond 40 South will continue to be monitored in the future.

Table 4-100. Success at Pond 40 South (Year 1 Post-Burn) 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	N/A*
	DQO 5	N/A**

*Not applicable; no water quality data were collected.
**Not applicable; only hydrology and vegetation surveys were conducted.

4.10 Pond 43 - Year 1

Pond 43 was monitored in 2018 as a year 1 post-burn vernal pool. Pond 43 was monitored for baseline conditions in 1998, 2000, 2015, and 2016. Vegetation in Pond 43 and within its watershed were burned in October 2017 as part of the prescribed burn of BLM Area B Subunit B. Table 4-101 summarizes the years that monitoring occurred and which survey(s) were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 43 (see Figure 4-55). The 1997-1998 and 2015-2016 water-years were above-normal, whereas the 1999-2000, 2014-2015 and 2017-2018 water-years were below-normal.

Table 4-101. Pond 43 (Year 1 Post-Burn) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year				
	1997-1998	1999-2000	2014-2015	2015-2016	2017-2018
Hydrology	●	●	●	●	●
Vegetation	●			●	●
Wildlife	●	●		●	

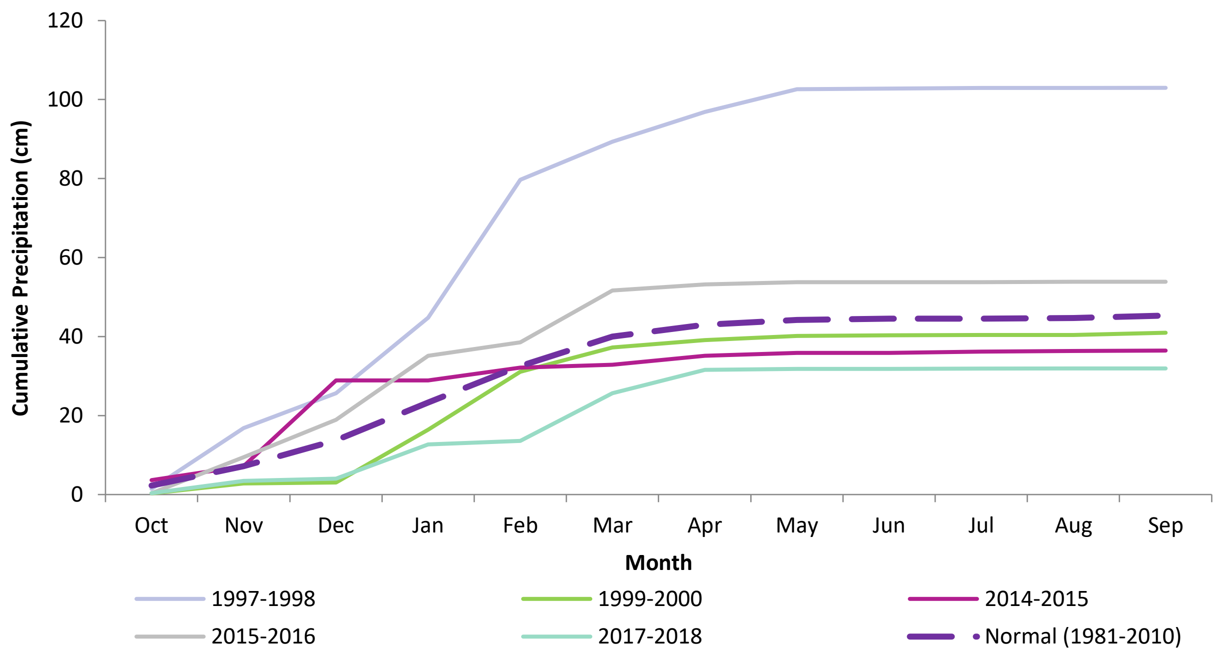


Figure 4-55. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 43 (Year 1 Post-Burn) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.10.1 Hydrology Monitoring

In 2018, Pond 43 remained dry throughout the water-year. This has occurred in previous water-years, specifically 2014-2015 (see Appendix F Table F-10). **Figure** 4-56 illustrates the relationship of precipitation and depth at Pond 43 for 2018 as well as baseline in 2015.

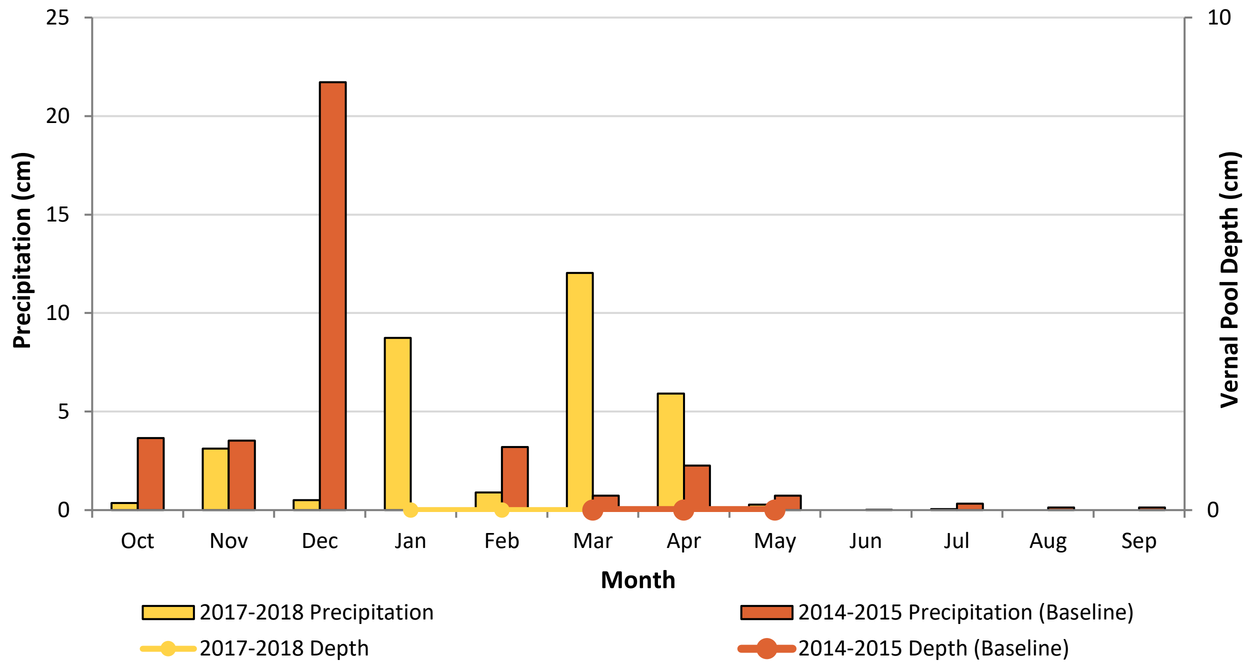


Figure 4-56. Monthly Depth and Precipitation at Pond 43 (Year 1 Post-Burn) for 2017-2018 Water-Year Compared to Baseline 2014-2015 Water-Year

In below-normal precipitation years, Pond 43 is likely to have a maximum depth of 0-25 cm and a maximum inundation of 0-0.04 acres. No depths and inundations for Pond 43 have been recorded in normal precipitation years. In above-normal precipitation years, Pond 43 could have maximum depths of 36 cm or more and a maximum inundation up to 0.04 acres (see Appendix F Table F-10). Figure 4-57 illustrates historic vernal pool depths by month and organized by water-year.

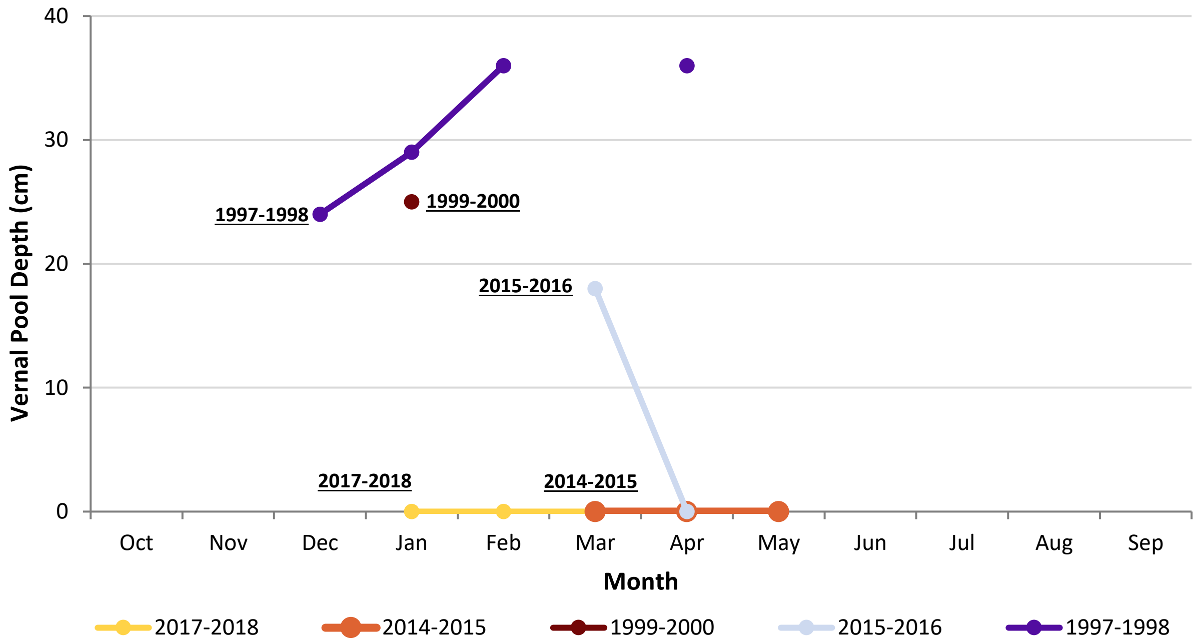


Figure 4-57. Historic Monthly Depths at Pond 43 (Year 1 Post-Burn). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

4.10.1.1 *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. The vernal pool remained dry throughout the 2017-2018 water-year and therefore did not provide sufficient depth for CTS or for fairy shrimp. Recorded depths indicate that DQO 1 was likely met in 1998 and 2000 although monitoring did continue into May for 1998 and depth data were only collected in January 2000. Pond 43 was similar to reference vernal pool 997 in 2018 since both vernal pools remained dry.

4.10.1.2 *Data Quality Objective 2*

Pond 43 was not inundated in 2018, similar to 2015 and reference Pond 997. Pond 43 was inundated in 1998, 2000, and 2016 but was dry in 2015. Pond 43 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 4-57). Pond 43 is similar to reference Pond 997 because both remained dry through 2018. However, Pond 43 is smaller and may remain dry in years when Pond 997 fills.

4.10.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 43, a post-burn vernal pool, was not on track to meet the performance standard for year 1 in 2018. Pond 43 did not meet DQO 1 and the below-normal water-year and unusually late rains were likely contributing factors. Evaluation of DQO 2 indicated that Pond 43 was similar to itself in previous monitoring years and reference Pond 997. The vernal pool followed a trend observed at five other vernal pools, Ponds 997, 40 South, 35, 44, and 61. Pond 43 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 43 in 1998, 2016 and 2018 (HLA, 1998; Burleson, 2017). 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 comparison to other years. Data from 2016 and 2018 were collected using the methodology described in the Methods section of this report and were compared stratum-to-stratum in Table 4-102 as well as visually in Figure 4-58.

Table 4-102. Pond 43 (Year 1 Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2018
1	19%	34%
2	50%	48%
3	27%	16%
Upland	3%	2%

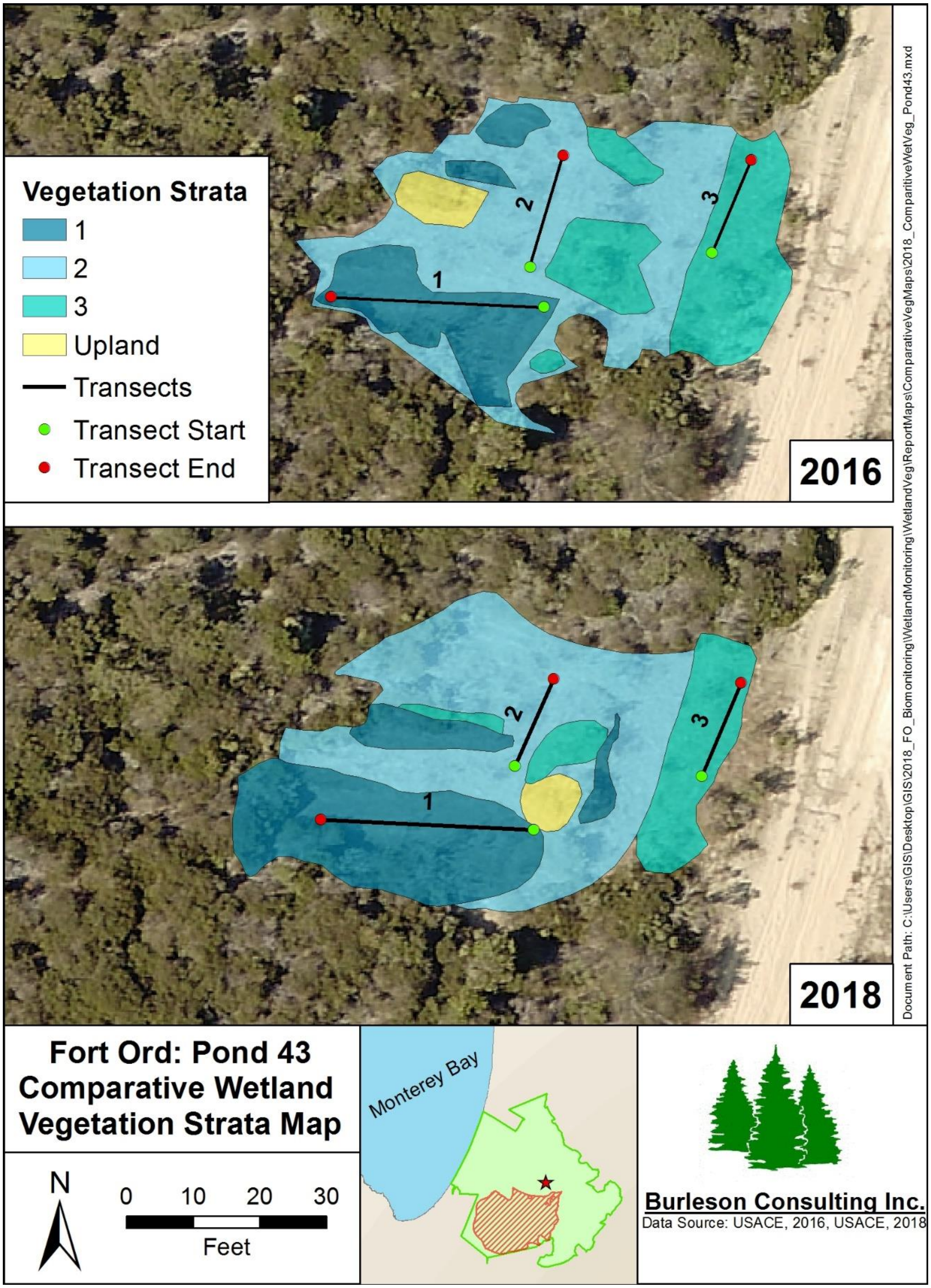


Figure 4-58. Pond 43 (Year 1 Post-Burn) Vegetation Strata and Transects for 2016 and 2018

Absolute percent vegetative cover was similar across monitoring years, with the highest value observed in 2016 (see Table 4-103). The absolute percent vegetative cover of Pond 43 in 2018 was within ranges observed at the reference vernal pools in 2018 and was most similar to reference Pond 5 (see Table 4-104).

Table 4-103. Pond 43 (Year 1 Post-Burn) Absolute Percent Cover

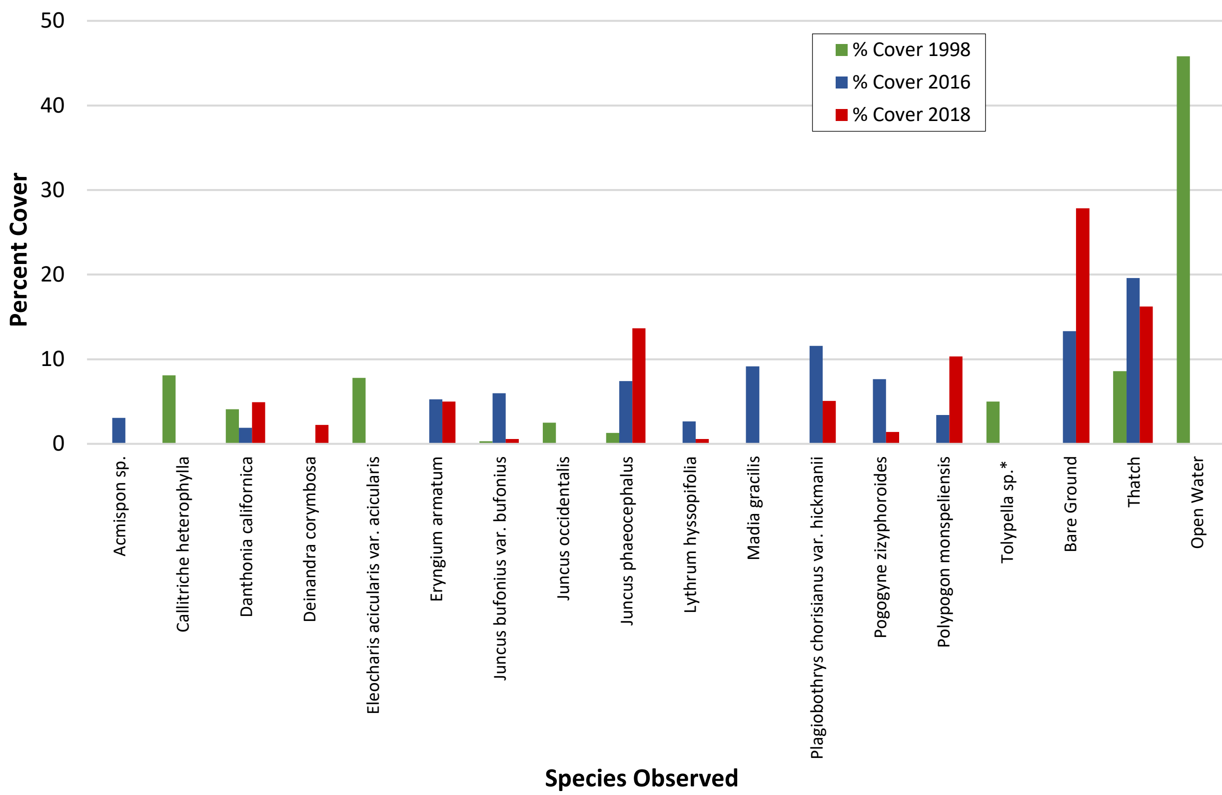
Year	Vegetative Cover	Thatch/Bare Ground
1998	55.9%	54.4%
2016	66.5%	33.3%
2018	56.1%	44.1%

Table 4-104. Pond 43 (Year 1 Post-Burn) and Reference Vernal Pool Absolute Percent Cover in 2018

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	54.6%	45.5%
101 East (West)	58.1%	42.3%
101 East (East)	68.7%	32.6%
997	44.7%	55.4%
43	**56.1%**	**44.1%**

Species richness increased between 1998 and 2018 at Pond 43. Species richness on transects was 22, 24, and 37 species in 1998, 2016, and 2018, whereas overall basin species richness was 35 and 51 species in 2016 and 2018, respectively (see Table 4-105 and Appendix B Table B-10). The 1998 survey was limited to species on the transect and may underrepresent total vernal pool species richness. A possible contributing factor to the species richness increase could be year-to-year fluctuations associated with hydroperiod (Barbour *et al*., 2007). Although Pond 43 was dry throughout the 2017-2018 water-year, vernal pool plants can germinate and persist without inundation (Bliss and Zedler, 1998). In addition, seeds that were dormant during drought years or submerged in above-normal water-years may have germinated in 2018 (Bliss and Zedler, 1998). This increased variability can increase microhabitats and promote higher species richness compared to a vernal pool with less hydrologic variability (Witham *et al*., 1998). Pond 43 species richness was within the range observed on transects at the reference vernal pools but below the range observed for the entire basin (see Table 4-106 and Appendix G Tables G-17 and G-34).

Species composition and dominant species at Pond 43 were different across monitoring years. Water starwort (*Callitriche heterophylla*) and needle spikerush (*Eleocharis acicularis* var. *acicularis*) were 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. A complete comparison of species composition observed at Pond 43 in 1998, 2016, and 2018 can be found in Appendix H. Figure 4-59 shows a subset of this comparison for species observed with a 2% cover or greater.



*This plant is not listed in CalFlora, the Jepson Manual, or USDA Plants

Figure 4-59. Percent Cover of Dominant Species at Pond 43 (Year 1 Post-Burn)

Native and non-native species richness on Pond 43 transects increased between 1998 and 2018 (see Table 4-105). Pond 43 native species richness in 2018 was within the range observed at the reference vernal pools, whereas non-native species richness was slightly below the range observed at the reference vernal pools (see Table 4-106). The relative percent cover of native species decreased between monitoring years, whereas the relative percent cover of non-native species increased (see Table 4-107). Pond 43 was within the range of native and non-native relative percent cover values observed at the reference vernal pools in 2018 and was most similar to reference Pond 101 East (West) (see Table 4-108).

Table 4-105. Pond 43 (Year 1 Post-Burn) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998	13	7	2
2016	13	8	2
2018	22	14	1

Table 4-106. Pond 43 (Year 1 Post-Burn) and Reference Vernal Pool Native and Non-Native Species Richness in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	25	16	0
101 East (West)	26	21	2
101 East (East)	18	11	3
997	24	19	2
43	**22**	**14**	**1**

Table 4-107. Pond 43 (Year 1 Post-Burn) 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%

Table 4-108. Pond 43 (Year 1 Post-Burn) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	83.3%	16.7%	0.0%
101 East (West)	67.1%	32.5%	0.4%
101 East (East)	84.4%	14.7%	0.9%
997	56.3%	43.5%	0.2%
43	**71.2%**	**28.7%**	**0.1%**

Wetland and non-wetland species richness on Pond 43 transects increased between 1998 and 2018 (see Table 4-109). Relative percent cover of wetland and non-wetland species also increased from 1998 to 2018 (see Table 4-111). The wetland and non-wetland species richness and relative percent cover values at Pond 43 were within the ranges observed at the reference vernal pools in 2018 (see Table 4-110 and Table 4-112).

Table 4-109. Pond 43 (Year 1 Post-Burn) 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

Table 4-110. Pond 43 (Year 1 Post-Burn) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	11	7	8	1	9
101 East (West)	8	11	9	8	2	12
101 East (East)	5	9	5	4	2	7
997	8	10	5	8	0	14
43	**7**	**8**	**6**	**6**	**0**	**10**

Table 4-111. Pond 43 (Year 1 Post-Burn) 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%

Table 4-112. Pond 43 (Year 1 Post-Burn) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	33.7%	50.5%	10.2%	3.3%	0.3%	2.0%
101 East (West)	38.6%	29.0%	17.0%	8.4%	1.0%	6.1%
101 East (East)	28.2%	40.2%	6.0%	22.6%	1.1%	1.8%
997	4.6%	47.5%	20.7%	14.2%	0.0%	13.0%
43	**16.5%**	**57.2%**	**13.1%**	**5.1%**	**0.0%**	**8.2%**

4.10.2.1 *Data Quality Objective 3*

Vegetative cover in Pond 43 was dominated by native and wetland plant species during year 1 post-burn monitoring in 2018. Differences observed between baseline in 2016 and year 1 post-burn conditions can be attributed to the changes in the rainfall pattern and the resulting hydroperiod. Pond 43 species richness was highest in 2018, similar to the reference vernal pools. Despite increases in non-native species richness and relative percent cover values, Pond 43 vegetation was similar over time and to the reference vernal pools.

4.10.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 43, a post-burn vernal pool, was on track to meet the performance standard for year 1 in 2018. The species composition, richness, and native and wetland species relative abundances were similar to baseline and reference vernal pool conditions. Pond 43 provided suitable wetland habitat in 2018.

4.10.3 Wildlife Monitoring

Wildlife data were collected at Pond 43 in 1998, 2000, and 2016 (HLA, 1998, 2000; Burleson, 2017). California tiger salamander larvae were not detected in any survey year. Fairy shrimp were only detected in 1998. Pond 43 was not surveyed for CTS or fairy shrimp in 2018 due to insufficient depth. However, DQO 1 was evaluated to allow for comparison in future years. DQO 4 and DQO 5 were not applicable.

4.10.3.1 *Data Quality Objective 1*

Pond 43 remained dry throughout the 2017-2018 water-year and did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.10.1.1.

4.10.3.2 *Performance Standard: Wildlife Usage*

Pond 43, a post-burn vernal pool, was not on track to meet the performance standard for year 1 in 2018 due to the vernal pool remaining dry for the entire season. Pond 43 was not on track for DQO 1. DQO 4 and DQO 5 cannot be accessed at this time. Pond 43 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.10.4 Conclusion

Pond 43, a post-burn vernal pool, was in year 1 of monitoring in 2018. Conditions in 2018 at Pond 43 are suitable for comparison to future years. The vernal pool was on track to meet the plant cover and species diversity performance standard but was not on track to meet hydrological conditions and wildlife usage (see Table 4-113). Pond 43 will continue to be monitored in the future.

Table 4-113. Success at Pond 43 (Year 1 Post-Burn) 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	N/A*
	DQO 5	N/A**

*Not applicable; no water quality data were collected.
**Not applicable; only hydrology and vegetation surveys were conducted.

4.11 Pond 35 - Year 1

Pond 35 was monitored in 2018 as a year 1 post-mastication vernal pool. Pond 35 was monitored for baseline conditions in 1994, 1995, 1996, 2015, and 2016. Vegetation within Pond 35 watershed was masticated in summer of 2017 as part of 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. Table 4-114 summarizes the years that monitoring occurred and which survey(s) were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 35 (see Figure 4-60). The 1994-1995 and 2015-2016 water-years were above-normal, whereas all other monitoring was conducted during a below-normal water-year, drought year, or consecutive drought year.

Table 4-114. Pond 35 (Year 1 Post-Mastication) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year					
	1993-1994	1994-1995	1995-1996	2014-2015	2015-2016	2017-2018
Hydrology	●	●	●	●	●	●
Vegetation	●	●	●		●	●
Wildlife	●	●	●			

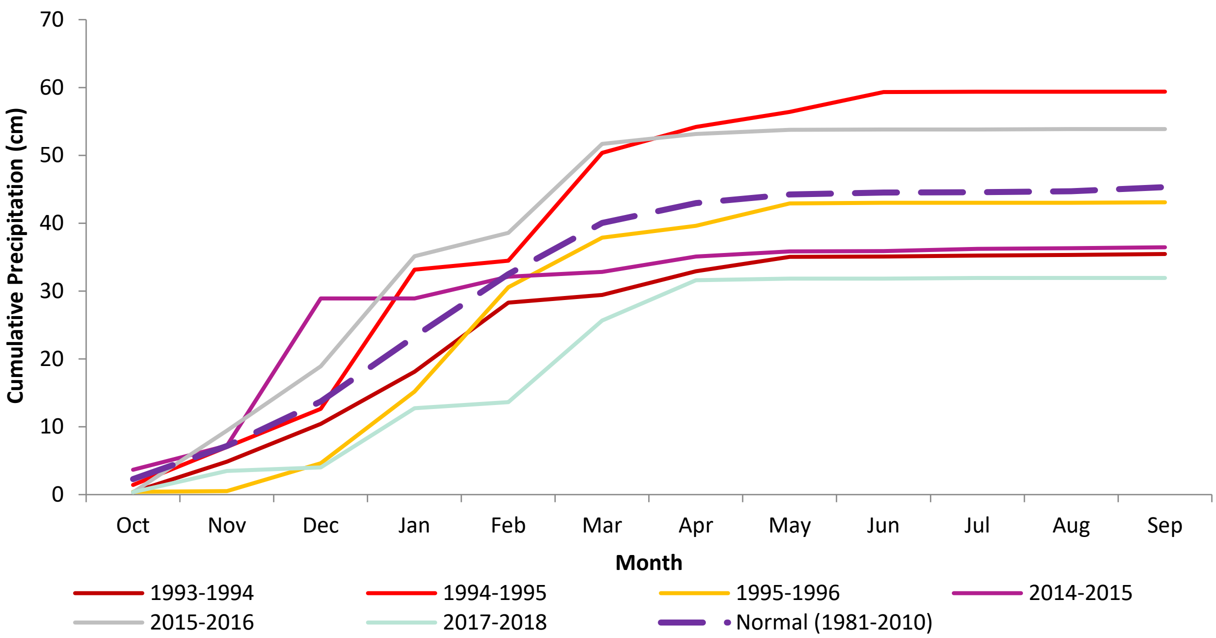


Figure 4-60. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 35 (Year 1 Post-Mastication) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.11.1 Hydrology Monitoring

In 2018, Pond 35 remained dry throughout the water-year. This has occurred in previous water-years, specifically 2014-2015 (see Appendix F Table F-11). **Figure** 4-61 illustrates the relationship of precipitation and depth at Pond 35 for 2018 as well as baseline in 2015.

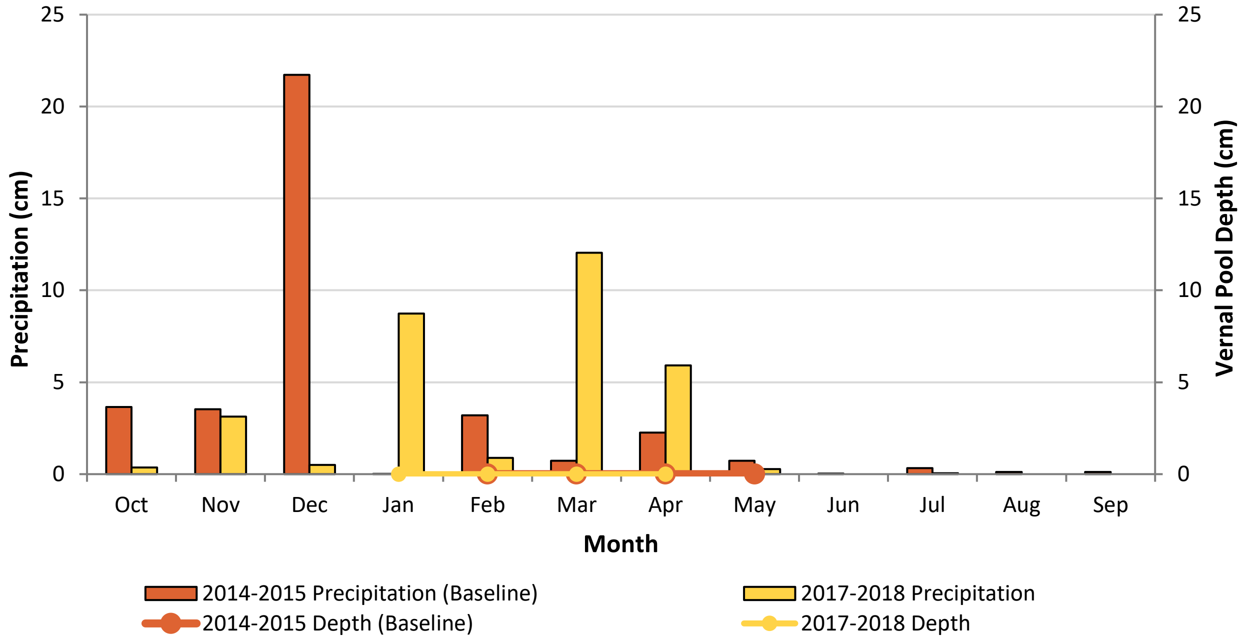


Figure 4-61. Monthly Depth and Precipitation at Pond 35 (Year 1 Post-Mastication) 2017-2018 Water-Year Compared to Baseline 2014-2015 Water-Year

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 or more (see Appendix F Table F-11). Two historic inundations were recorded: 0.20 acres on March 15, 1994 and 0.001 acres on March 31, 2016. Figure 4-62 illustrates historic vernal pool depths by month and organized by water-year.

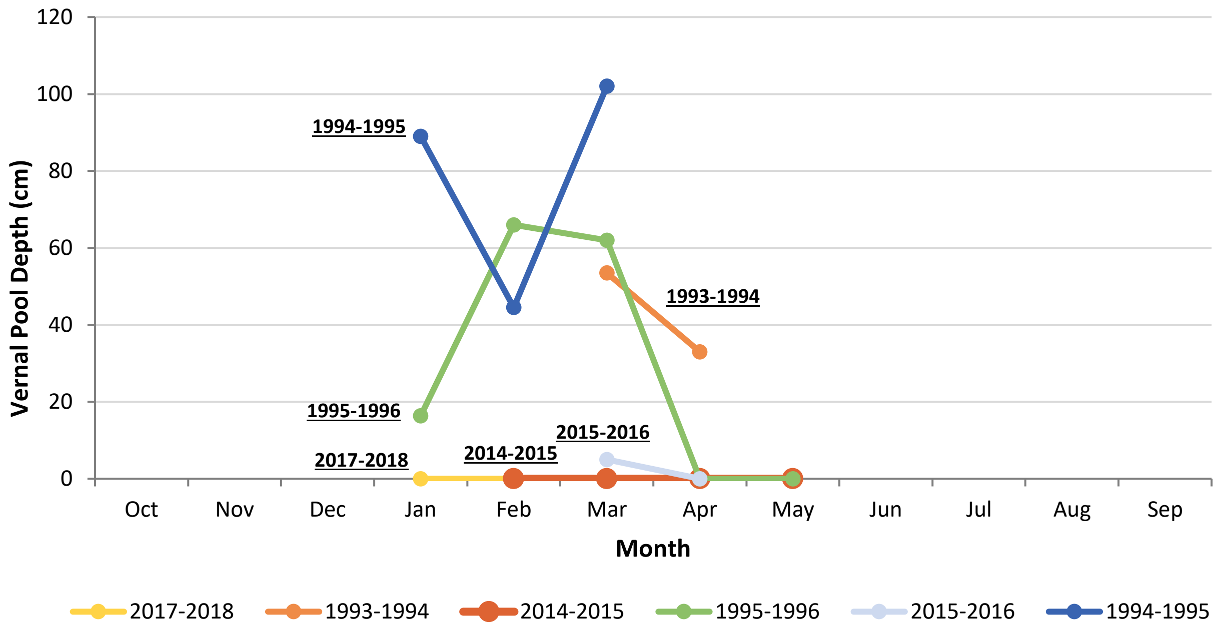


Figure 4-62. Historic Monthly Depths at Pond 35 (Year 1 Post-Mastication). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

4.11.1.1 *Data Quality Objective 1*

Pond 35 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. The vernal pool remained dry throughout the 2017-2018 water-year and therefore did not provide sufficient depth for CTS or 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 was similar to reference vernal pool 997 since both vernal pools remained dry.

4.11.1.2 *Data Quality Objective 2*

Pond 35 was not inundated in 2018, similar to 2015 and reference Pond 997. Pond 35 was inundated in 1994, 1995, 1996, and 2016 but was dry in 2015. Pond 35 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 4-62). Pond 35 was similar to reference Pond 997 because both remained dry through 2018. However, Pond 35 is smaller and may remain dry in years when Pond 997 fills.

4.11.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 35, a post-mastication vernal pool, was not on track to meet the performance standard for year 1 in 2018. Pond 35 did not meet DQO 1 and the below-normal water-year and unusually late rains were likely contributing factors. Evaluation of DQO 2 indicated that Pond 35 was similar to itself in previous monitoring years and reference Pond 997. The vernal pool followed a trend observed at five other vernal pools, Ponds 997, 40 South, 43, 44, and 61. Pond 35 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 35 in 2016 and 2018 (Burleson, 2017). Data from 2016 and 2018 were collected using the methodology described in the Methods section of this report and were compared stratum-to-stratum in Table 4-115 as well as visually in Figure 4-63.

Table 4-115. Pond 35 (Year 1 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2018
1	5%	21%
2	8%	41%
3	87%	13%
4	N/A	25%

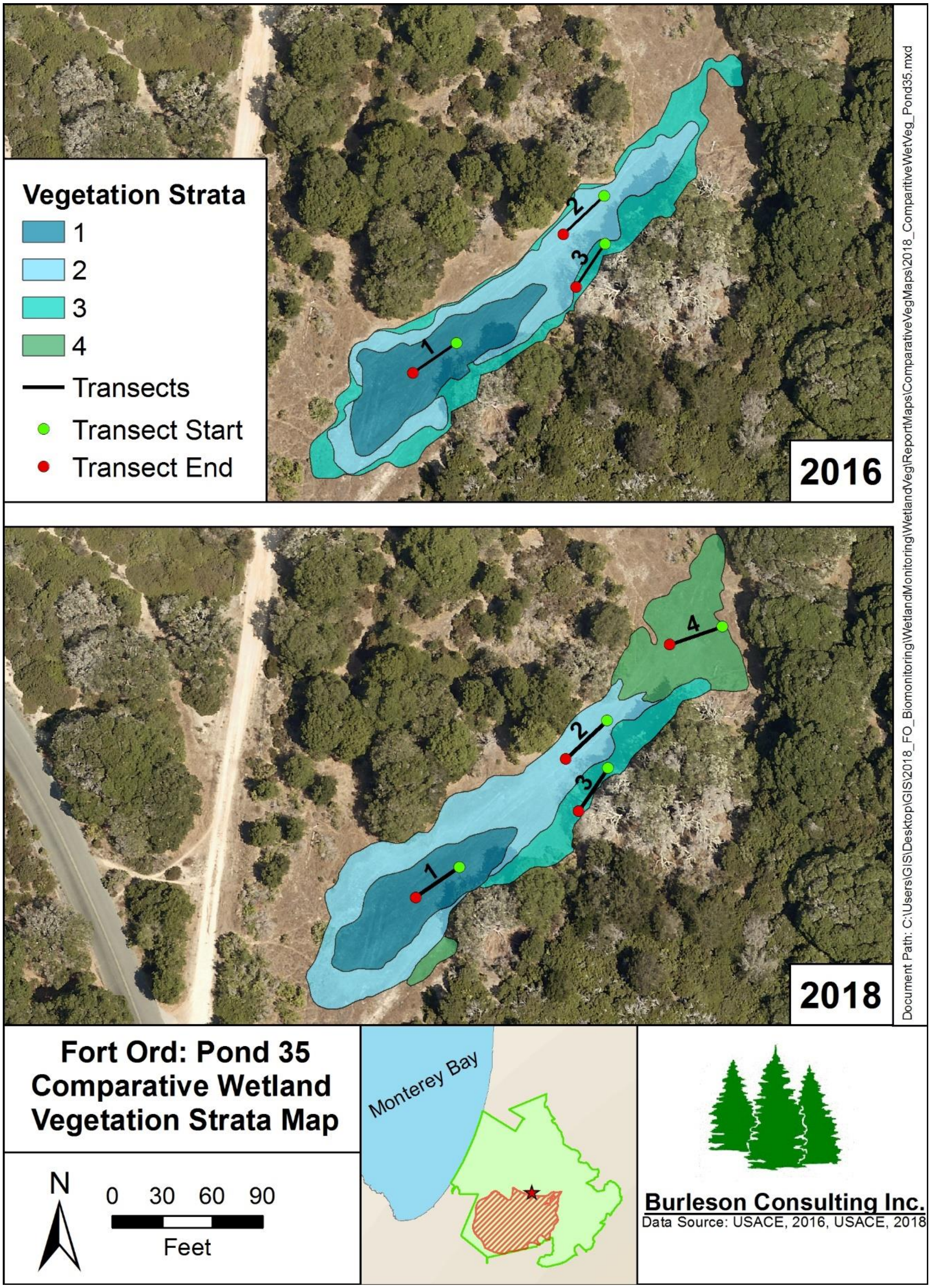


Figure 4-63. Pond 35 (Year 1 Post-Mastication) Vegetation Strata and Transects for 2016 and 2018

Absolute percent vegetative cover increased between 2016 and 2018, whereas thatch cover decreased (see Table 4-116). The absolute percent vegetative cover of Pond 35 in 2018 was higher than the reference vernal pools (see Table 4-117).

Table 4-116. Pond 35 (Year 1 Post-Mastication) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2016	52.1%	48.9%
2018	74.3%	27.7%

Table 4-117. Pond 35 (Year 1 Post-Mastication) and Reference Vernal Pool Absolute Percent Cover in 2018

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	54.6%	45.5%
101 East (West)	58.1%	42.3%
101 East (East)	68.7%	32.6%
997	44.7%	55.4%
35	**74.3%**	**27.7%**

Species richness increased between 2016 and 2018 at Pond 35. Species richness on transects was 12 and 38 species in 2016 and 2018, respectively, whereas overall basin species richness was 35 and 64 species, respectively (see Table 4-118 and Appendix B Table B-11). A possible contributing factor to the species richness increase could be year-to-year fluctuations associated with hydroperiod (Barbour *et al*., 2007). Although Pond 35 was dry throughout the 2017-2018 water-year, vernal pool plants can germinate and persist without inundation (Bliss and Zedler, 1998). In addition, seeds that were dormant during drought years or submerged in above-normal water-years may have germinated in 2018 (Bliss and Zedler, 1998). This increased variability can increase microhabitats and promote higher species richness compared to a vernal pool with less hydrologic variability (Witham *et al*., 1998). Pond 35 species richness was within the range observed at the reference vernal pools on transects but below the range observed for the entire basin (see Table 4-119 and Appendix G Tables G-17 and G-34).

Species composition at Pond 35 was similar in 2018 and 2016, and the dominant species was cut-leaved plantain (*Plantago coronopus*) in both monitoring years. Other dominant species included meadow barley (*Hordeum brachyantherum*) in 2016 and Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*) in 2016 and 2018. A complete comparison of species composition observed at Pond 35 in 2016 and 2018 can be found in Appendix H. Figure 4-64 shows a subset of this comparison for species observed with a 2% cover or greater.

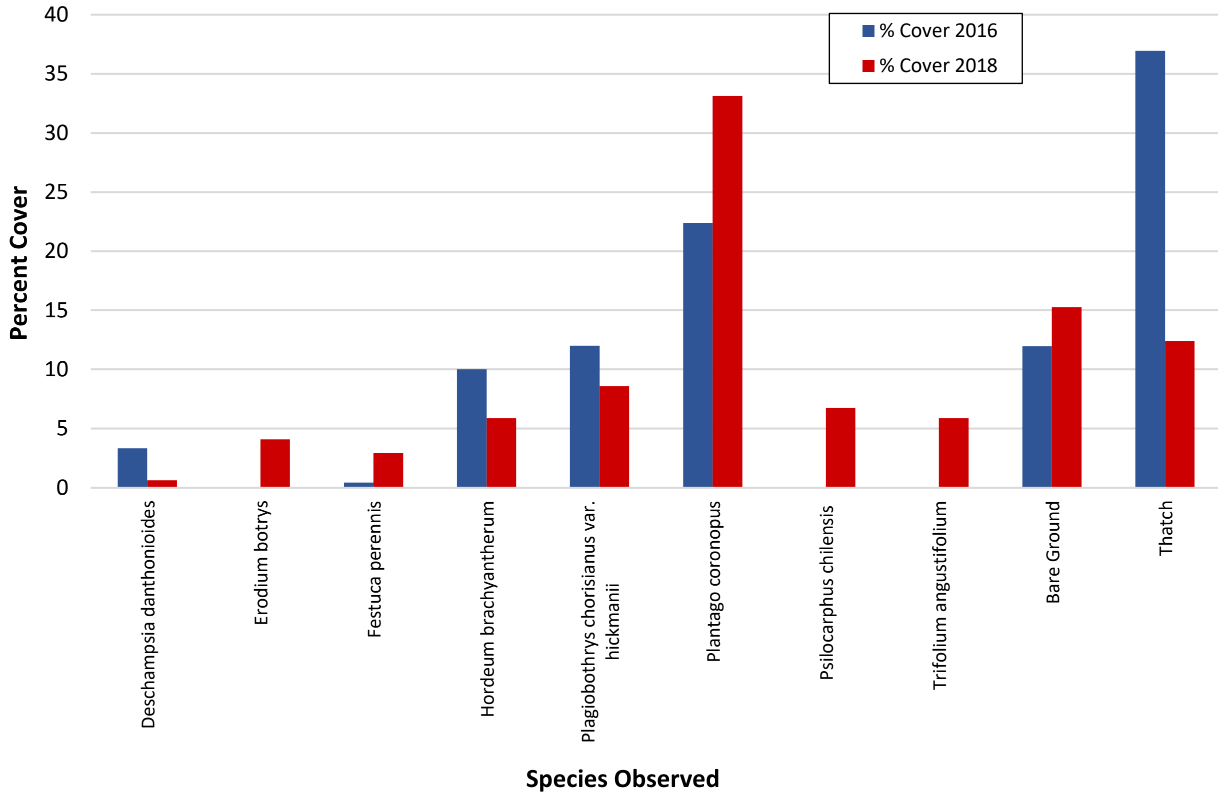


Figure 4-64. Percent Cover of Dominant Species at Pond 35 (Year 1 Post-Mastication)

Native species richness on Pond 35 transects more than doubled between 2016 and 2018, non-native species richness almost quadrupled, and non-native species richness was higher than native species richness in 2018 (see Table 4-118). Pond 35 native species richness was below the range observed at the reference vernal pools in 2018, whereas non-native species richness was above the range observed at the reference vernal pools (see Table 4-119). The relative percent cover of native species decreased between monitoring years, whereas that of non-native species increased (see Table 4-120). Pond 35 native relative percent cover values were significantly below the range observed at the reference vernal pools in 2018, whereas non-native relative percent cover values were much higher than the range observed at the reference vernal pools (see Table 4-121). The large increase in non-native species richness, decrease in native species cover, and increase in non-native species cover may be due to the below-normal 2017-2018 water-year that created more suitable habitat for non-native species.

Table 4-118. Pond 35 (Year 1 Post-Mastication) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2016	6	6	0
2018	13	23	2

Table 4-119. Pond 35 (Year 1 Post-Mastication) and Reference Vernal Pool Native and Non-Native Species Richness in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	25	16	0
101 East (West)	26	21	3
101 East (East)	18	11	3
997	24	19	2
35	**13**	**23**	**2**

Table 4-120. Pond 35 (Year 1 Post-Mastication) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2016	52.0%	48.0%	0.0%
2018	24.1%	66.7%	9.1%

Table 4-121. Pond 35 (Year 1 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	83.3%	16.7%	0.0%
101 East (West)	67.1%	32.5%	0.4%
101 East (East)	84.4%	14.7%	0.9%
997	56.3%	43.5%	0.2%
35	**24.1%**	**66.7%**	**9.1%**

Wetland and non-wetland species richness on Pond 35 transects increased between 2016 and 2018 (see Table 4-122). The relative percent cover of wetland species decreased from 2016 to 2018 by approximately 25%, whereas the relative percent cover of non-wetland species increased by 7% (see Table 4-124). The wetland and non-wetland species richness at Pond 35 were within the ranges observed at the reference vernal pools in 2018; however, facultative wetland species cover was much lower than at reference pools and facultative species cover was much higher (see Table 4-123 and Table 4-125).

Table 4-122. Pond 35 (Year 1 Post-Mastication) 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	4	6	7	0	14

Table 4-123. Pond 35 (Year 1 Post-Mastication) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	11	7	8	1	9
101 East (West)	8	11	9	8	2	12
101 East (East)	5	9	5	4	2	7
997	8	10	5	8	0	14
35	**7**	**4**	**6**	**7**	**0**	**14**

Table 4-124. Pond 35 (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	28.1%	25.6%	45.7%	0.0%	0.0%	0.5%
2018	14.4%	8.9%	50.8%	7.0%	0.0%	18.9%

Table 4-125. Pond 35 (Year 1 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	33.7%	50.5%	10.2%	3.3%	0.3%	2.0%
101 East (West)	38.6%	29.0%	17.0%	8.4%	1.0%	6.1%
101 East (East)	28.2%	40.2%	6.0%	22.6%	1.1%	1.8%
997	4.6%	47.5%	20.7%	14.2%	0.0%	13.0%
35	**14.4%**	**8.9%**	**50.8%**	**7.0%**	**0.0%**	**18.9%**

4.11.2.1 *Data Quality Objective 3*

Vegetative cover in Pond 35 was dominated by non-native species and wetland plant species during year 1 post-mastication monitoring in 2018. These patterns were not similar to baseline or the reference vernal pools. It is unclear whether mastication caused these changes and it is possible that the prolonged drought had at least some effect on the vernal pool. Pond 35 was only similar to reference vernal pools in that species richness was highest in 2018.

4.11.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 35, a post-mastication vernal pool, was not on track to meet the performance standard for year 1 in 2018. Species composition, richness, and native and wetland species relative abundances were not similar to baseline or reference vernal pool conditions. Pond 35 did not provide suitable wetland habitat in 2018 and will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.11.3 Wildlife Monitoring

Wildlife data were collected at Pond 35 in 1994, 1995, and 1996 (Jones and Stokes, 1996). California tiger salamander larvae were not detected in any previous survey year. Fairy shrimp were detected in 1994, 1995, and 1996. Pond 35 was not surveyed for CTS or fairy shrimp in 2018 due to insufficient depth. However, DQO 1 was evaluated to allow for comparison in future years. DQO 4 and DQO 5 were not applicable.

4.11.3.1 *Data Quality Objective 1*

Pond 35 remained dry throughout the 2017-2018 water-year and did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.11.1.1.

4.11.3.2 *Performance Standard: Wildlife Usage*

Pond 35, a post-mastication vernal pool, was not on track to meet the performance standard for year 1 in 2018 due to the vernal pool remaining dry for the entire season. Pond 35 was not on track for DQO 1. DQO 4 and DQO 5 cannot be accessed at this time. Pond 35 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.11.4 Conclusion

Pond 35, a post-mastication vernal pool, was in year 1 of monitoring in 2018. Conditions in 2018 at Pond 35 are suitable for comparison to future years. The vernal pool was not on track to meet any of the performance standards due to the vernal pool remaining dry for the entire season (see Table 4-126). Pond 35 will continue to be monitored in the future.

Table 4-126. Success at Pond 35 (Year 1 Post-Mastication) 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	Not on track
Wildlife Usage	DQO 1	Not on track
	DQO 4	N/A*
	DQO 5	N/A**

*Not applicable; no water quality data were collected.
**Not applicable; only hydrology and vegetation surveys were conducted.

4.12 Pond 42 – Year 1

Pond 42 was monitored in 2018 as a year 1 post-mastication and post-burn 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 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. Table 4-127 summarizes the monitoring years and type(s) of surveys conducted in each year. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 42 (see Figure 4-65). The above-normal water-years were 1997-1998 and 2016-2017. Other monitoring years were below-normal water-year, drought year, or consecutive drought year.

Table 4-127. Pond 42 (Year 1 Post-Mastication and Post-Burn) 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
Hydrology	●	●	●	●	●	●	●	●
Vegetation	●	●	●	●	●		●	●
Wildlife	●	●	●	●	●			●

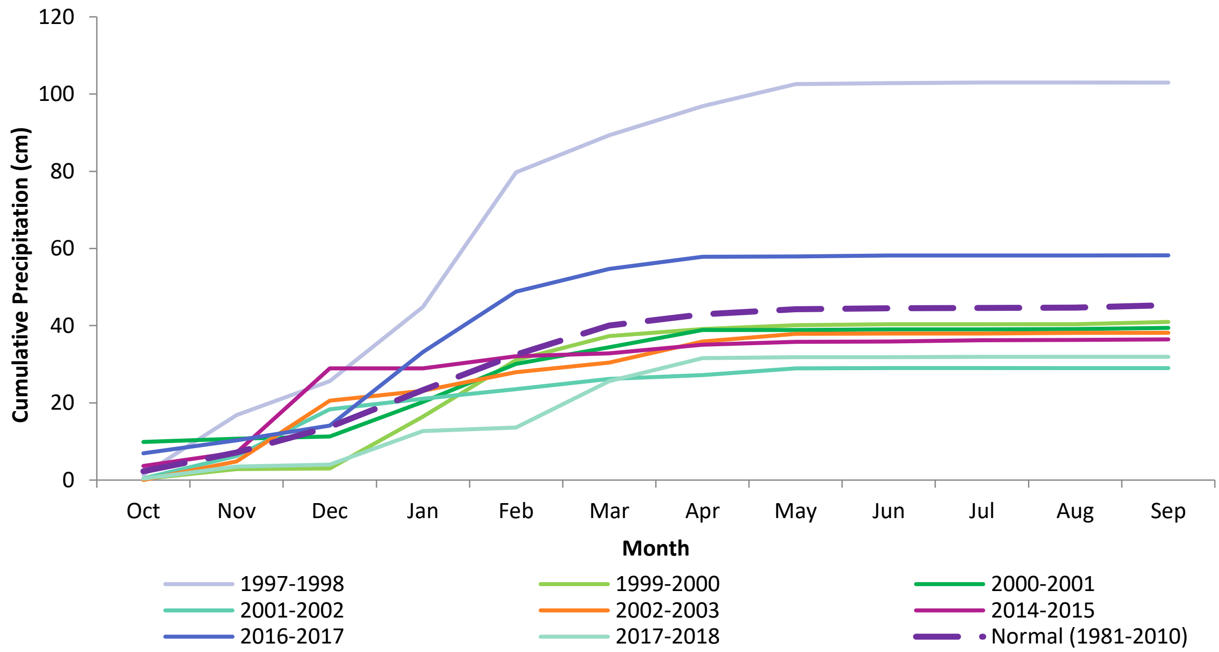


Figure 4-65. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 42 (Year 1 Post-Mastication and Post-Burn) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.12.1 Hydrology Monitoring

The 2018 maximum inundation for Pond 42 was 0.24 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-12). Unlike previous years, Pond 42 held water in January, dried, and filled again in March. The vernal pool was inundated in January, March, and April. Figure 4-66 illustrates the relationship of precipitation and depth at Pond 42 for 2018 as well as baseline in 2003.

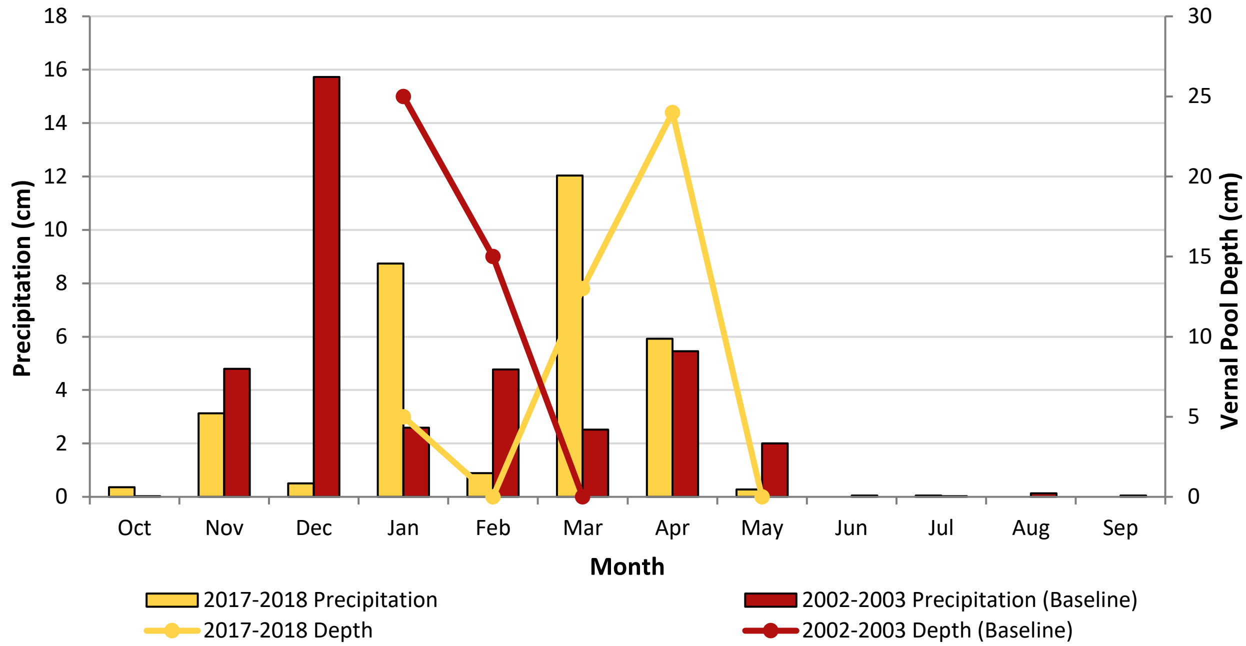


Figure 4-66. Monthly Depth and Precipitation at Pond 42 (Year 1 Post-Mastication and Post-Burn) for 2017-2018 Compared to Baseline 2002-2003 Water-Year

Pond 42 was inundated in 1998, 2000, 2001, 2002, 2003, and 2017 (see Figure 4-67). The maximum inundation from these years ranged from 0.07-0.96 acres. The 2018 maximum was within this range.

In below-normal precipitation years, Pond 42 is likely to range from 0-30 cm in depth with a maximum inundation of 0-0.8 acres. No depths or inundations for Pond 42 have been recorded in normal precipitation years. In above-normal precipitation years, 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-12). Figure 4-67 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-68 illustrates historic and recent inundation areas.

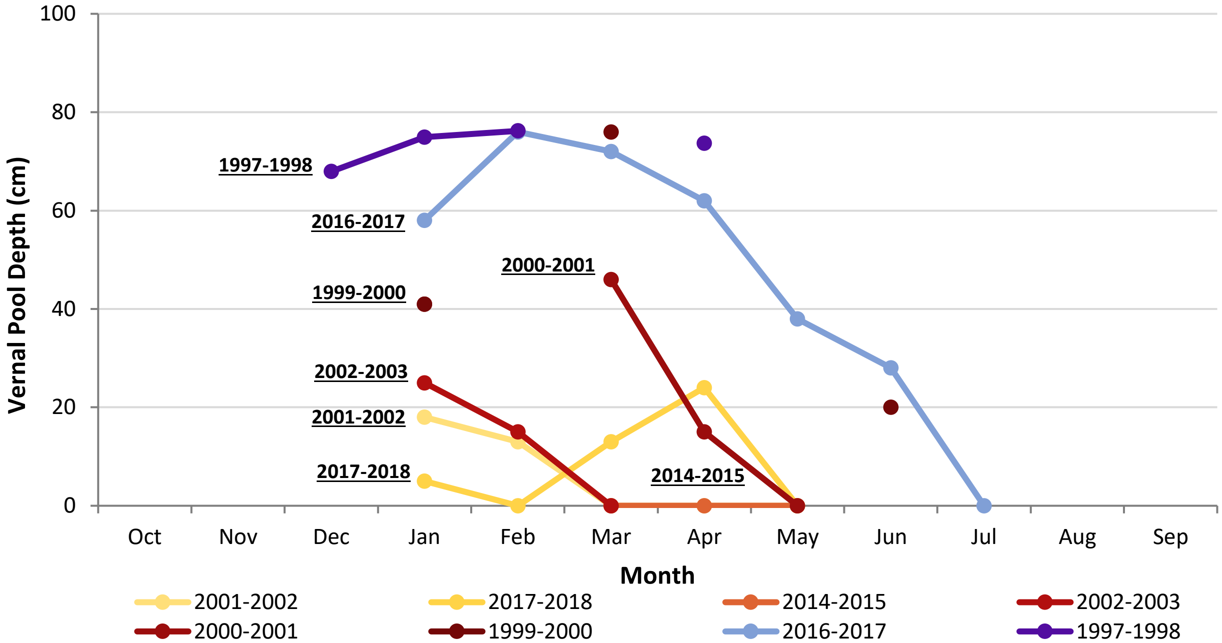


Figure 4-67. Historic Monthly Depths at Pond 42 (Year 1 Post-Mastication and Post-Burn). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

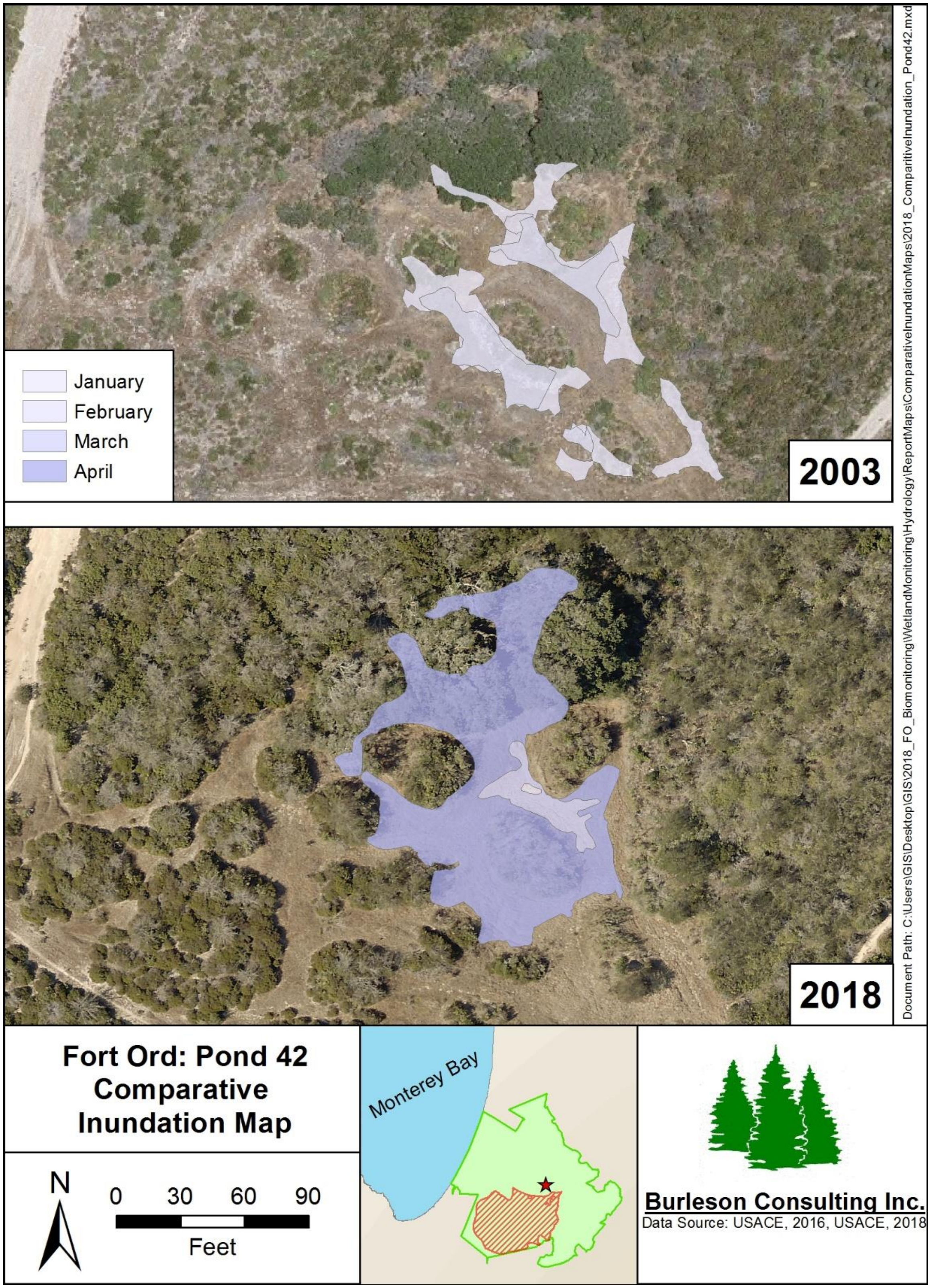


Figure 4-68. Pond 42 (Year 1 Post-Mastication and Post-Burn) Inundations for 2002-2003 (below-normal precipitation) and 2017-2018 (below-normal precipitation). The vernal pool was masticated and burned in 2017 and was in year 1 of monitoring in 2018.

4.12.1.1 *Data Quality Objective 1*

Pond 42 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 42 did not provide sufficient depth for CTS (6 cm through March, dry in February) or fairy shrimp (11 cm through April). 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. Although the depths observed at Pond 42 were within the ranges observed at reference vernal pools 5 and 101 East (West), Pond 42 had a different hydroperiod regime than the reference vernal pools, making direct comparison unfeasible. Pond 42 filled with the January precipitation, dried, and filled again in March which is a pattern that was different than any of the reference vernal pools.

4.12.1.2 *Data Quality Objective 2*

Pond 42 had similar inundations in 2018 as previous years but was unlike the relevant reference vernal pools due to a different hydroperiod regime. Pond 42 was inundated in January, dried in February, and was inundated again March through May. The vernal pool had an inundation range of 0.001-0.24 acres and a mean of 0.09 acres. The historic inundations in 2001, 2002, and 2003 were most comparable to the 2018 inundations. The vernal pool was dry in 2015. Inundations in 1998 and 2017 were much larger due to the above-normal water-years. 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 4-67). Pond 42 is generally smaller than reference vernal pools 5, 101 East (West), and 101 East (East), but larger than Pond 997. However, because Pond 42 had a different hydroperiod regime than the reference vernal pools, it cannot be directly compared to the reference vernal pools and should instead be compared against itself in previous monitoring years considering varying water-years.

4.12.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 42, a post-mastication and post-burn vernal pool, was not on track to meet the performance standard for year 1 in 2018. Pond 42 did not meet DQO 1 due to insufficient depth, and the below-normal water-year and unusually late rains were likely contributing factors. Evaluation of DQO 2 indicated that Pond 42 was similar to itself in previous monitoring years but different from the reference vernal pools. The vernal pool followed a trend observed at Ponds 39 and 60 in 2018. Pond 42 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 42 in 1998, 2000, 2001, 2002, 2003, 2017, and 2018 (HLA, 1998, 2001; Harding ESE, 2002; MACTEC, 2003, 2004; Burleson, 2018). 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 and 2018. Data from 2017 and 2018 were collected using the methodology described in the Methods section of this report and were compared stratum-to-stratum in Table 4-128 as well as visually in **Figure** 4-69. Wetland vegetation comparisons were made with a focus on 2017 and 2018 because remediation occurred between these two years. However, previous data were included and discussed when relevant.

Table 4-128. Pond 42 (Year 1 Post-Mastication and Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2017	2018
Inundated	4%	N/A
1	8%	4%
2	9%	5%
3	52%	50%
4	10%	23%
Upland	17%	18%

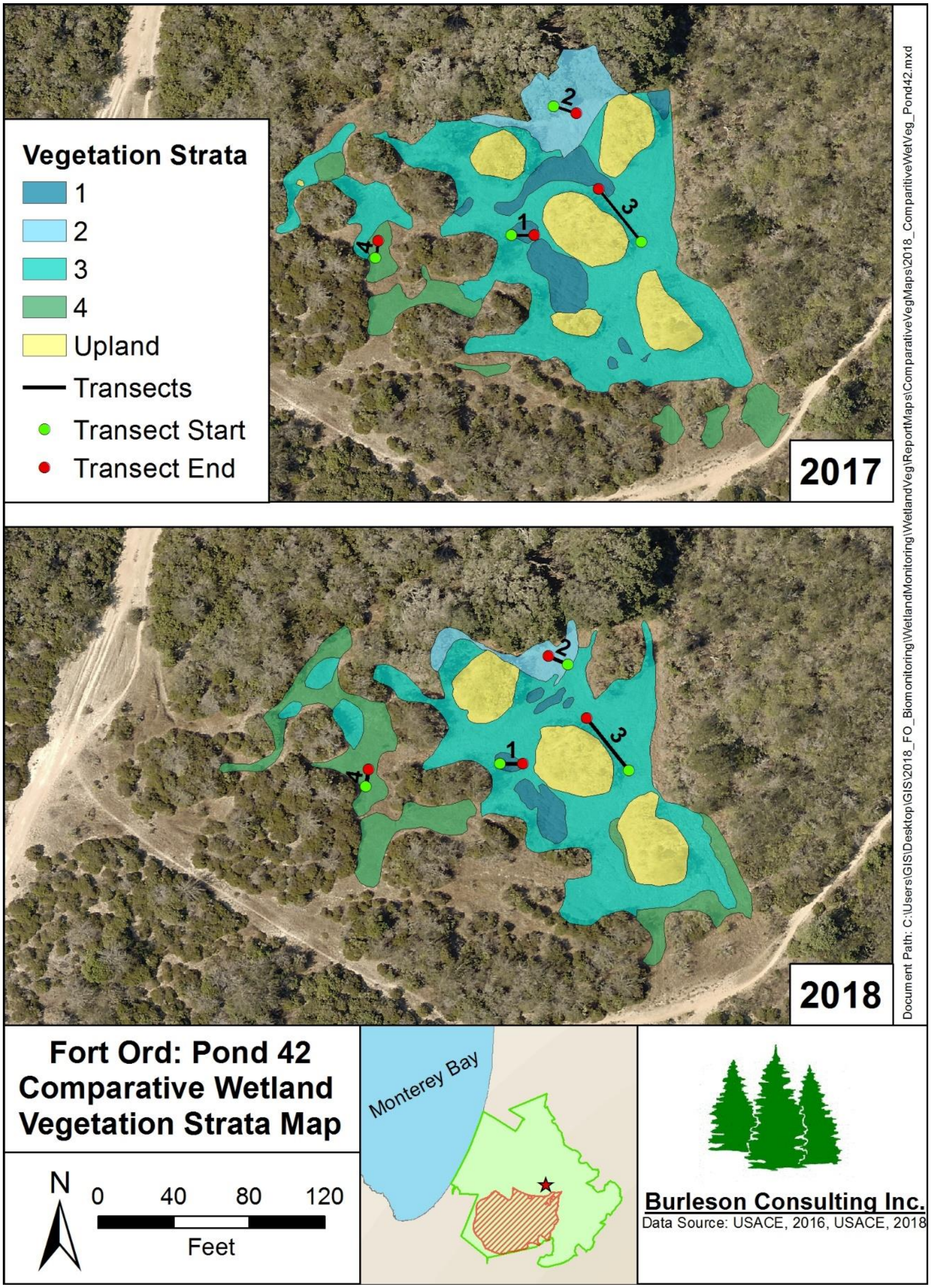


Figure 4-69. Pond 42 (Year 1 Post-Mastication and Post-Burn) Vegetation Strata and Transects for 2017 and 2018

The absolute percent vegetative cover in 2018 was lower than in previous years, and thatch cover was higher (see Table 4-129). Pond 42 absolute percent vegetative cover was within the range observed at the reference vernal pools (see Table 4-130).

Table 4-129. Pond 42 (Year 1 Post-Mastication and Post-Burn) 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	85.5%	16.1%
2017	61.9%	38.7%
2018	55.8%	44.3%

Table 4-130. Pond 42 (Year 1 Post-Mastication and Post-Burn) and Reference Vernal Pool Absolute Percent Cover in 2018

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	54.6%	45.5%
101 East (West)	58.1%	42.3%
101 East (East)	68.7%	32.6%
997	44.7%	55.4%
42	**55.8%**	**44.3%**

Species richness increased between 1998 and 2018 at Pond 42. Species richness on transects was 20, 31, 28, 24, 34, 14, and 40 in 1998, 2000, 2001, 2002, 2003, 2017, and 2018, respectively. Overall basin species richness values were only recorded in 2017 and 2018 and were 78 and 126 species, respectively (see Table 4-131 and Appendix B Table B-12). A possible contributing factor to the species richness increase could be year-to-year fluctuations associated with hydroperiod (Barbour *et al*., 2007). Although in 2018 Pond 42 followed an unusual pattern of filling, drying, and filling again, vernal pool plants can germinate and persist without inundation and may experience a late-season pulse of germination when seeds float free of the soil as the vernal pools fills (Bliss and Zedler, 1998). The more variable inundation and depth regime in 2018 may have allowed seeds that were dormant during drought years or submerged in above-normal water-years to germinate (Bliss and Zedler, 1998). This increased variability can increase microhabitats and promote higher species richness compared to a vernal pool with less hydrologic variability (Witham *et al*., 1998). Pond 42 has mima mounds which can also create more microhabitats due to varying elevation and soil moisture (see **Figure** 4-69). When considering species richness on the transects, in 2018 Pond 42 was similar to the reference vernal pools (see Table 4-132). Notably, Pond 42 total vernal pool basin species richness was the highest of all vernal pools monitored for vegetation in 2018 (see Appendix G Tables G-17 and G-34).

Species composition at Pond 42 was different in 2018 than in previous years, 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*) and coyote thistle (*Eryngium armatum*) were the two most dominant species in 2018. A complete comparison of species composition observed during the surveys at Pond 42 in 1998, 2000, 2001, 2002, 2003, 2017, and 2018 can be found in Appendix H. Figure 4-70 shows a subset of this comparison for species observed with a 2% cover or greater.

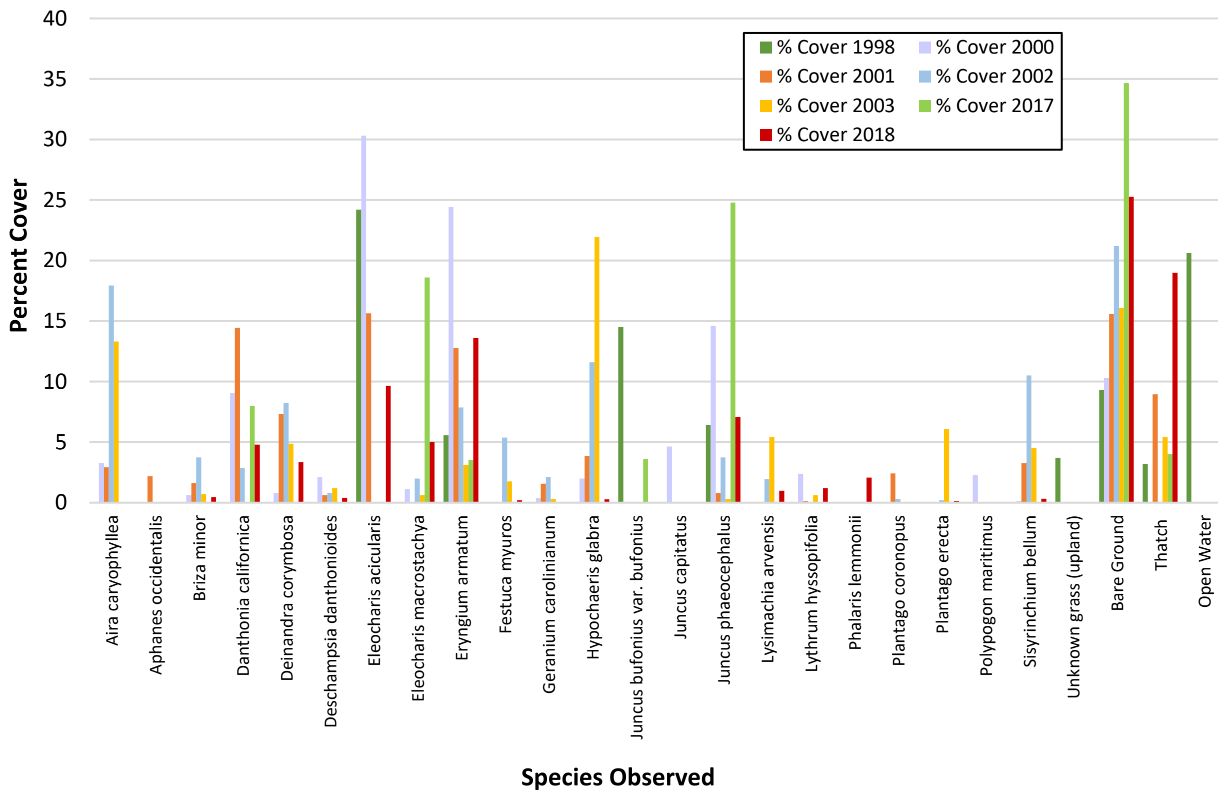


Figure 4-70. Percent Cover of Dominant Species at Pond 42 (Year 1 Post-Mastication and Post-Burn)

Native and non-native species richness on Pond 42 transects increased between previous surveys and 2018 (see Table 4-131). Pond 42 species richness was similar to the reference vernal pools (see Table 4-132). The relative percent cover of natives decreased between 2017 and 2018, whereas that of non-natives increased (see Table 4-133). Pond 42 relative native percent cover was higher than the values observed at the reference vernal pools, whereas non-native relative percent cover was lower (see Table 4-134).

Table 4-131. Pond 42 (Year 1 Post-Mastication and Post-Burn) 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	13	1
2017	10	4	0
2018	24	15	1

Table 4-132. Pond 42 (Year 1 Post-Mastication and Post-Burn) and Reference Vernal Pool Native and Non-Native Species Richness in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	25	16	0
101 East (West)	26	21	3
101 East (East)	18	11	3
997	24	19	2
42	**24**	**15**	**1**

Table 4-133. Pond 42 (Year 1 Post-Mastication and Post-Burn) 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	39.9%	59.1%	0.9%
2017	97.8%	2.2%	0.0%
2018	90.0%	9.7%	0.4%

Table 4-134. Pond 42 (Year 1 Post-Mastication and Post-Burn) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	83.3%	16.7%	0.0%
101 East (West)	67.1%	32.5%	0.4%
101 East (East)	84.4%	14.7%	0.9%
997	56.3%	43.5%	0.2%
42	**90.0%**	**9.7%**	**0.4%**

Wetland and non-wetland species richness on Pond 42 transects increased between previous surveys and 2018 (see Table 4-135). Wetland and non-wetland species richness at Pond 42 were similar to the reference vernal pools (see Table 4-136). The relative percent cover of wetland and non-wetland species decreased between 2017 and 2018; however, compared to surveys before 2017, the 2018 relative percent cover values were within ranges previously observed (see Table 4-137). Pond 42 relative percent cover values of wetland and non-wetland species were within the ranges observed in reference pools and were most similar to reference Pond 5 (see Table 4-138).

Table 4-135. Pond 42 (Year 1 Post-Mastication and Post-Burn) 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	15
2017	5	4	1	2	0	2
2018	9	10	3	7	1	10

Table 4-136. Pond 42 (Year 1 Post-Mastication and Post-Burn) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	11	7	8	1	9
101 East (West)	8	11	9	8	2	12
101 East (East)	5	9	5	4	2	7
997	8	10	5	8	0	14
42	**9**	**10**	**3**	**7**	**1**	**10**

Table 4-137. Pond 42 (Year 1 Post-Mastication and Post-Burn) 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	5.7%	12.0%	7.4%	19.3%	0.0%	55.5%
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%

Table 4-138. Pond 42 (Year 1 Post-Mastication and Post-Burn) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	33.7%	50.5%	10.2%	3.3%	0.3%	2.0%
101 East (West)	38.6%	29.0%	17.0%	8.4%	1.0%	6.1%
101 East (East)	28.2%	40.2%	6.0%	22.6%	1.1%	1.8%
997	4.6%	47.5%	20.7%	14.2%	0.0%	13.0%
42	**33.0%**	**44.8%**	**11.2%**	**2.3%**	**0.4%**	**8.4%**

4.12.2.1 *Data Quality Objective 3*

Vegetative cover in Pond 42 was dominated by native and wetland plant species during year 1 post-mastication monitoring in 2018. Differences observed between baseline in 2017 and year 1 post-mastication conditions can be attributed to the changes in the rainfall pattern and the resulting hydroperiod. Pond 42 species richness was highest in 2018 and the vernal pool supported more native and wetland species than previous years, similar to the reference vernal pools.

4.12.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 42, a post-mastication and post-burn vernal pool, was on track to meet the performance standard for year 1 in 2018. The species composition, richness, and native and wetland species relative abundances were similar to baseline and reference vernal pool conditions. Pond 42 provided suitable wetland habitat in 2018.

4.12.3 Wildlife Monitoring

Wildlife data were collected at Pond 42 in 1998, 2000, 2001, 2002, 2003, and 2018 (HLA, 1998, 2001, 2002; MACTEC, 2003, 2004). California tiger salamander larvae were only observed in 2000. Fairy shrimp were detected in all years.

4.12.3.1 *Data Quality Objective 1*

Pond 42 did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.12.1.1.

4.12.3.2 *Data Quality Objective 4*

Fairy shrimp were present in 2018, whereas CTS were not detected. However, water quality was adequate to support both species. Compared to other vernal pools and previous Pond 42 data, water quality data were within normal ranges. However, low dissolved oxygen in January may have negatively impacted conditions for fairy shrimp early in 2018. The pH ranged from 6.78 in March to 6.82 in January with a mean of 6.80. Temperature ranged from 12.18°C in April to 18.26°C in January with a mean of 15.35°C. Dissolved oxygen ranged from 0.65 mg/L in January to 8.69 mg/L in April with a mean of 5.40 mg/L. Turbidity ranged from 16.1 FNU in April to 93.9 FNU in January with a mean of 50.1 FNU (see Table 3-24).

4.12.3.3 *Data Quality Objective 5*

California tiger salamanders were not detected in 2018, whereas fairy shrimp were present in 2018. California tiger salamanders were only present in 2000 and fairy shrimp were present in 1998, 2000, 2001, 2002, and 2003.

4.12.3.4 *Performance Standard: Wildlife Usage*

Pond 42, a post-mastication and post-burn vernal pool, was not on track to meet the performance standard for year 1 in 2018 due to insufficient depth. Pond 42 was not on track for DQO 1, was on track for DQO 4, and was partially on track for DQO 5. Pond 42 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.12.4 Conclusion

Pond 42, a post-mastication and post-burn vernal pool, was in year 1 of monitoring in 2018. Conditions in 2018 at Pond 42 are suitable for comparison to future years. The vernal pool was on track to meet the plant cover and species diversity performance standard but was not on track to meet hydrological conditions or wildlife usage (see Table 4-139). Pond 42 will continue to be monitored in the future.

Table 4-139. Success at Pond 42 (Year 1 Post-Mastication and Post-Burn) 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	Partially on track

4.13 Pond 44 - Year 1

Pond 44 was monitored in 2018 as a year 1 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 as part of preparations for a prescribed burn of BLM Area B Subunit B. Table 4-140 summarizes the years that monitoring occurred and which survey(s) were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 44 (see Figure 4-71). The 1997-1998 and 2015-2016 water-years were above-normal, whereas the 2014-2015 and 2017-2018 water-years were below-normal.

Table 4-140. Pond 44 (Year 1 Post-Mastication) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year			
	1997-1998	2014-2015	2015-2016	2017-2018
Hydrology	●	●	●	●
Vegetation	●		●	●
Wildlife	●			

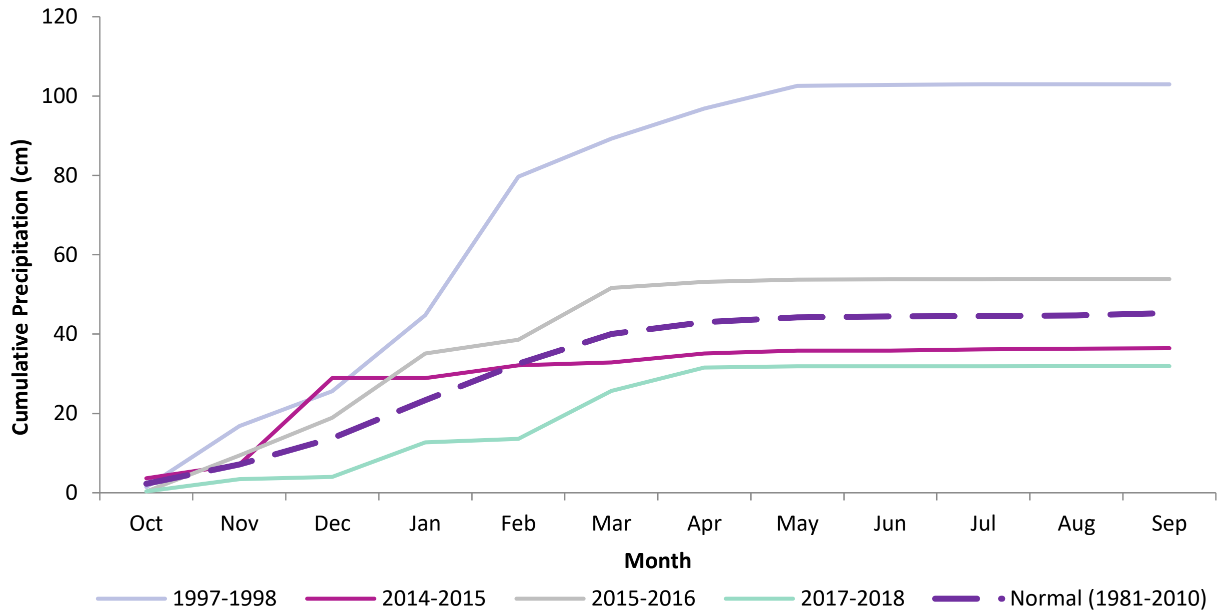


Figure 4-71. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 44 (Year 1 Post-Mastication) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.13.1 Hydrology Monitoring

In 2018, Pond 44 remained dry throughout the water-year. This has occurred in previous water-years, specifically 2014-2015 (see Appendix F Table F-13). **Figure** 4-72 illustrates the relationship of precipitation and depth at Pond 44 for 2018 as well as baseline in 2015.

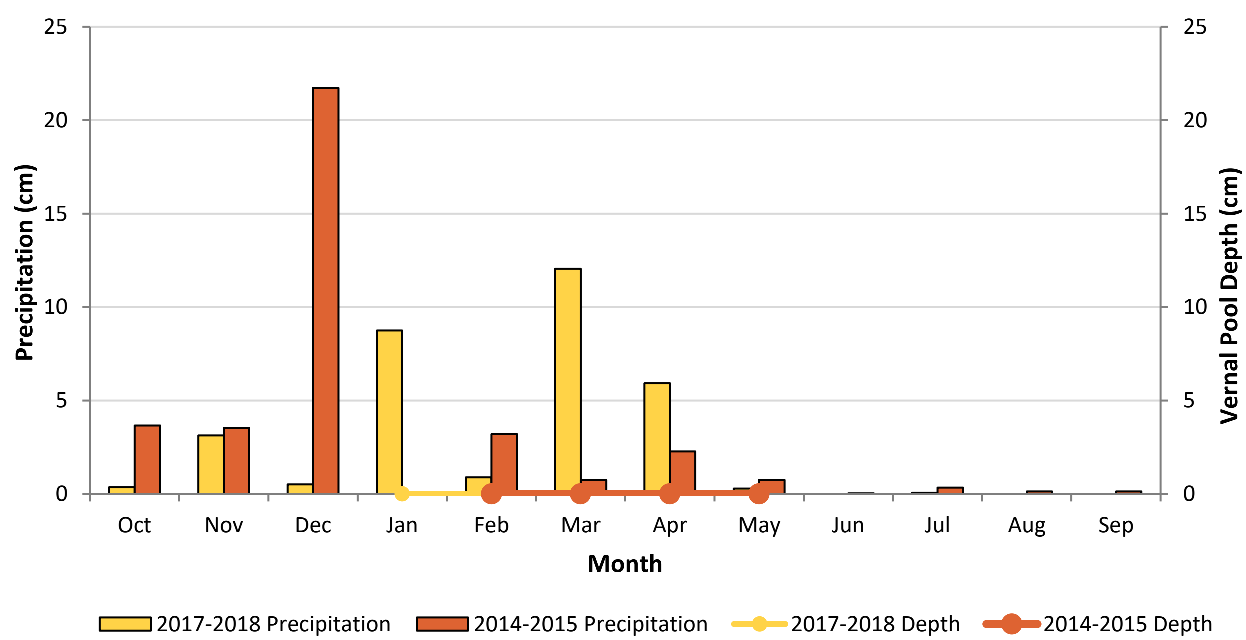


Figure 4-72. Monthly Depth and Precipitation at Pond 44 (Year 1 Post-Mastication) for 2017-2018 Water-Year Compared to Baseline 2014-2015 Water-Year

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-13). Figure 4-73 illustrates historic vernal pool depths by month and organized by water-year.

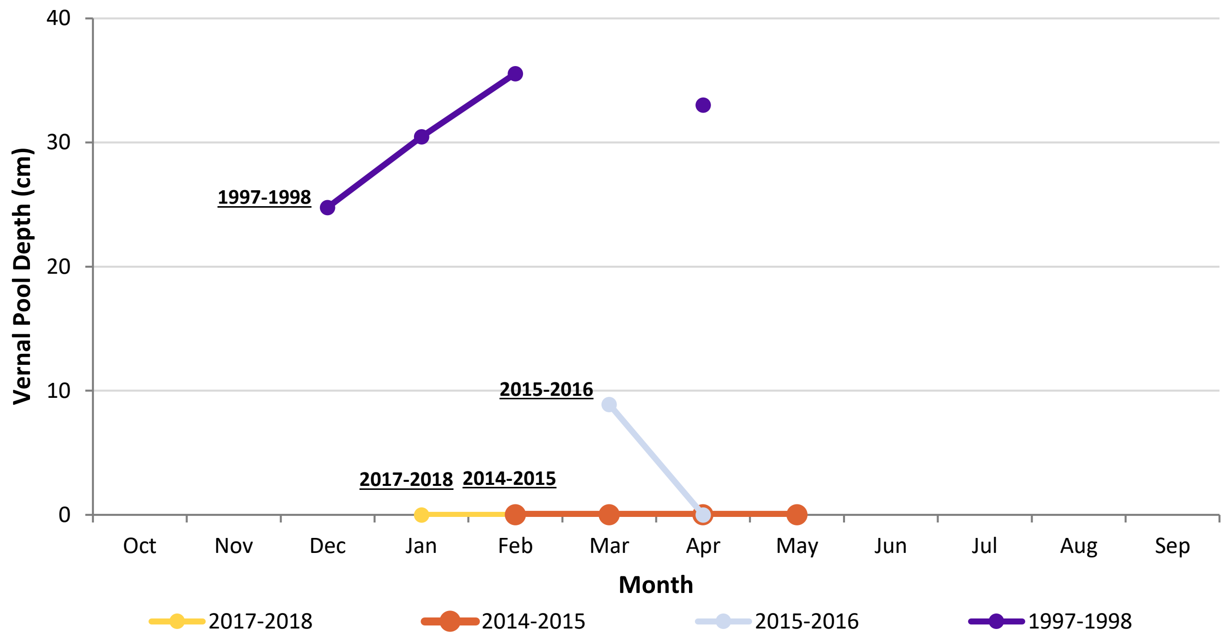


Figure 4-73. Historic Monthly Depths at Pond 44 (Year 1 Post-Mastication). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

4.13.1.1 *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. The vernal pool remained dry throughout the 2017-2018 water-year and therefore did not provide sufficient depth for CTS or fairy shrimp. 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 is similar to reference vernal pool 997 since both vernal pools remained dry.

4.13.1.2 *Data Quality Objective 2*

Pond 44 was not inundated in 2018, similar to 2015 and reference Pond 997. Pond 44 was inundated in 1998 and was likely inundated in the early months of 2016 although monitoring was only conducted in April. Pond 44 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 4-73). Pond 44 was similar to reference Pond 997 in 2018 since both remained dry. However, Pond 44 was slightly smaller and may remain dry in years when Pond 997 fills.

4.13.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 44, a post-mastication vernal pool, was not on track to meet the performance standard for year 1 in 2018. Pond 44 did not meet DQO 1 and the below-normal water-year and unusually late rains were likely contributing factors. Evaluation of DQO 2 indicated that Pond 44 was similar to previous years and reference Pond 997. The vernal pool followed a trend observed at five other vernal pools, Ponds 997, 40 South, 43, 35, and 61. Pond 44 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 44 in 1998, 2016 and 2018 (HLA, 1998; Burleson, 2017). 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 comparison to other years. Data from 2016 and 2018 were collected using the methodology described in the Methods section of this report and were compared stratum-to-stratum in Table 4-141 as well as visually in Figure 4-74.

Table 4-141. Pond 44 (Year 1 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2018
1	60%	61%
2	17%	N/A
3	7%	17%
4	N/A	11%
Upland	16%	11%

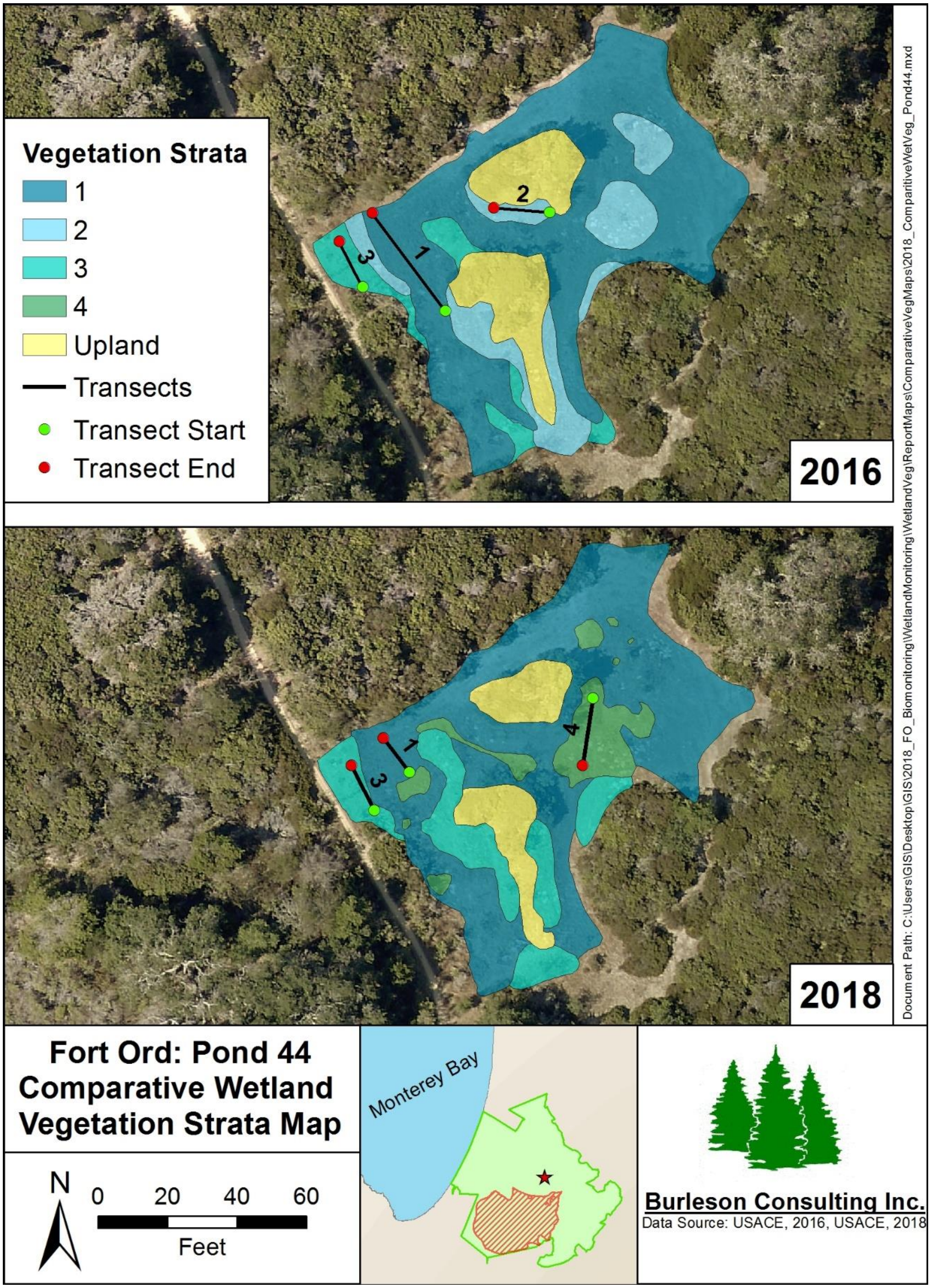


Figure 4-74. Pond 44 (Year 1 Post-Mastication) Vegetation Strata and Transects for 2016 and 2018

Absolute percent vegetative cover decreased slightly between 1998 and 2018 (see Table 4-142). The absolute percent vegetative cover of Pond 44 in 2018 was higher than the range observed at the reference vernal pools (see Table 4-143).

Table 4-142. Pond 44 (Year 1 Post-Mastication) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998	72.8%	26.0%
2016	78.6%	22.9%
2018	70.9%	30.0%

Table 4-143. Pond 44 (Year 1 Post-Mastication) and Reference Vernal Pool Absolute Percent Cover in 2018

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	54.6%	45.5%
101 East (West)	58.1%	42.3%
101 East (East)	68.7%	32.6%
997	44.7%	55.4%
44	**70.9%**	**30.0%**

Species richness increased between 1998 and 2018 at Pond 44. Species richness on transects was 27, 36, and 44 species in 1998, 2016, and 2018, respectively, whereas overall basin species richness was 47 and 71 species in 2016 and 2018, respectively (see Table 4-144 and Appendix B Table B-13). The 1998 survey was limited to species on the transects and may underrepresent total vernal pool species richness. A possible contributing factor to the species richness increase could be year-to-year fluctuations associated with hydroperiod (Barbour *et al*., 2007). Although Pond 44 was dry throughout the 2017-2018 water-year, vernal pool plants can germinate and persist without inundation (Bliss and Zedler, 1998). In addition, seeds that were dormant during drought years or submerged in above-normal water-years may have germinated in 2018 (Bliss and Zedler, 1998). This increased variability can increase microhabitats and promote higher species richness compared to a vernal pool with less hydrologic variability (Witham *et al*., 1998). Pond 44 species richness was within the range observed on transects at the reference vernal pools but was slightly below the ranges observed for the entire basin (see Table 4-145 and Appendix G Tables G-17 and G-34).

Species composition at Pond 44 was different among the monitoring years, and the dominant species were different. The dominant species in 1998, 2016, and 2018 were needle spikerush (*Eleocharis acicularis* var. *acicularis*), coyote thistle (*Eryngium armatum*), and common toad rush (*Juncus bufonius* var. *bufonius*), respectively. A complete comparison of species composition observed at Pond 44 in 1998, 2016, and 2018 can be found in Appendix H. Figure 4-75 shows a subset of this comparison for species observed with a 2% cover or greater.

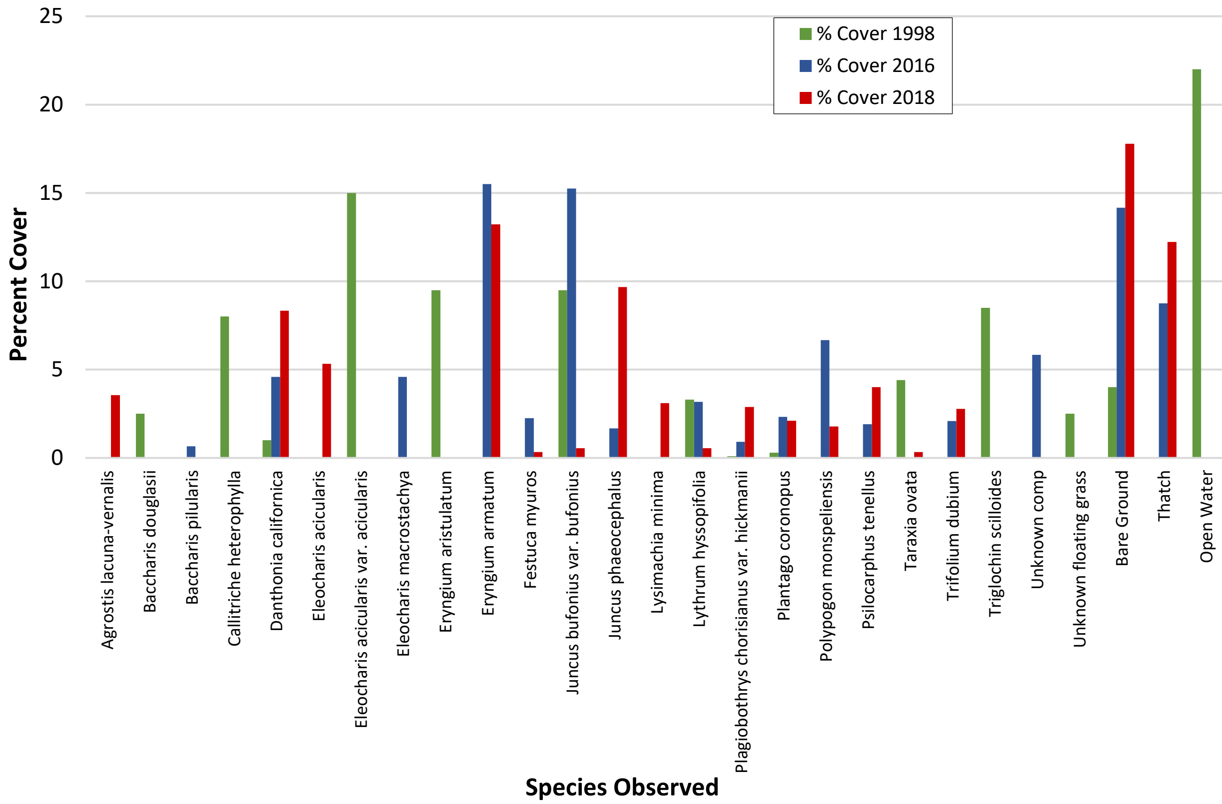


Figure 4-75. Percent Cover of Dominant Species at Pond 44 (Year 1 Post-Mastication)

Native and non-native species richness on Pond 44 transects increased between 1998 and 2018 (see Table 4-144). Pond 44 native species richness in 2018 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 4-145). The relative percent cover of native and non-native species varied through time (see Table 4-146). Pond 44 was within the range of native and non-native relative percent cover values observed at the reference vernal pools in 2018 (see Table 4-147).

Table 4-144. Pond 44 (Year 1 Post-Mastication) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998	17	7	2
2016	21	14	1
2018	28	15	1

Table 4-145. Pond 44 (Year 1 Post-Mastication) and Reference Vernal Pool Native and Non-Native Species Richness in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	25	16	0
101 East (West)	26	21	3
101 East (East)	18	11	3
997	24	19	2
44	**28**	**15**	**1**

Table 4-146. Pond 44 (Year 1 Post-Mastication) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1998	87.6%	8.5%	3.7%
2016	66.5%	26.1%	7.4%
2018	82.1%	17.7%	0.2%

Table 4-147. Pond 44 (Year 1 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	83.3%	16.7%	0.0%
101 East (West)	67.1%	32.5%	0.4%
101 East (East)	84.4%	14.7%	0.9%
997	56.3%	43.5%	0.2%
44	**82.1%**	**17.7%**	**0.2%**

Wetland and non-wetland species richness on Pond 44 transects increased between 1998 and 2018 (see Table 4-148). The relative percent cover of wetland species was relatively similar across monitoring years (see Table 4-150). The relative percent cover of non-wetland species increased between 1998 and 2016, and the 2018 cover was similar to 2016. 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 2018 (see Table 4-149 and Table 4-151).

Table 4-148. Pond 44 (Year 1 Post-Mastication) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998	7	4	5	1	0	10
2016	5	9	5	6	0	11
2018	8	9	4	7	1	15

Table 4-149. Pond 44 (Year 1 Post-Mastication) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	11	7	8	1	9
101 East (West)	8	11	9	8	2	12
101 East (East)	5	9	5	4	2	7
997	8	10	5	8	0	14
44	**8**	**9**	**4**	**7**	**1**	**15**

Table 4-150. Pond 44 (Year 1 Post-Mastication) 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%	17.6%
2016	15.8%	53.8%	9.7%	8.7%	0.0%	12.1%
2018	20.7%	46.9%	16.8%	8.0%	0.3%	7.4%

Table 4-151. Pond 44 (Year 1 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	33.7%	50.5%	10.2%	3.3%	0.3%	2.0%
101 East (West)	38.6%	29.0%	17.0%	8.4%	1.0%	6.1%
101 East (East)	28.2%	40.2%	6.0%	22.6%	1.1%	1.8%
997	4.6%	47.5%	20.7%	14.2%	0.0%	13.0%
44	**20.7%**	**46.9%**	**16.8%**	**8.0%**	**0.3%**	**7.4%**

4.13.2.1 *Data Quality Objective 3*

Vegetative cover in Pond 44 was dominated by native and wetland plant species during year 1 post-mastication monitoring in 2018. Differences observed between baseline in 2016 and year 1 post-mastication conditions can be attributed to the changes in the rainfall pattern and the resulting hydroperiod. In 2018, Pond 44 vegetation was generally similar to pre-remediation conditions as well as the reference vernal pools. Pond 44 species richness was highest in 2018 and the vernal pool supported more native and wetland species than previous years, similar to the reference vernal pools.

4.13.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 44, a post-mastication vernal pool, was on track to meet the performance standard for year 1 in 2018. The species composition, richness, and native and wetland species relative abundances were similar to baseline and reference vernal pool conditions. Pond 44 provided suitable wetland habitat in 2018.

4.13.3 Wildlife Monitoring

Wildlife data were collected at Pond 44 in 1998 (HLA, 1998). California tiger salamanders were not detected in 1998, whereas fairy shrimp were present. Pond 44 was not surveyed for CTS or fairy shrimp in 2018 due to insufficient depth. However, DQO 1 was evaluated to allow for comparison in future years. DQO 4 and DQO 5 were not applicable.

4.13.3.1 *Data Quality Objective 1*

Pond 44 remained dry throughout the 2017-2018 water-year and did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.13.1.1.

4.13.3.2 *Performance Standard: Wildlife Usage*

Pond 44, a post-burn vernal pool, was not on track to meet the performance standard for year 1 in 2018 due to the vernal pool remaining dry for the entire season. Pond 44 was not on track for DQO 1. DQO 4 and DQO 5 cannot be accessed at this time. Pond 44 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.13.4 Conclusion

Pond 44, a post-mastication vernal pool, was in year 1 of monitoring in 2018. Conditions in 2018 at Pond 44 are suitable for comparison to future years. The vernal pool was on track to meet the plant cover and species diversity performance standard but was not on track to meet hydrological conditions and wildlife usage (see Table 4-152). Pond 44 will continue to be monitored in the future.

Table 4-152. Success at Pond 44 (Year 1 Post-Mastication) 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	N/A*
	DQO 5	N/A**

*Not applicable; no water quality data were collected.
**Not applicable; only hydrology and vegetation surveys were conducted.

4.14 Pond 56 - Year 1

Pond 56 was monitored in 2018 as a year 1 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 as part of preparation for a prescribed burn in 2017, and to support MEC remediation in BLM Area B Subunit B-3 East. Less than 50 percent of the watershed was masticated. Prior to the 2017 mastication, Pond 56 was used as a reference vernal pool. Table 4-153 summarizes the years that monitoring occurred and which survey(s) were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 56 (see Figure 4-76). The 2015-2016 water-year was above-normal, whereas all other monitoring was conducted during a below-normal water-year, drought year, or consecutive drought year.

Table 4-153. Pond 56 (Year 1 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
Hydrology	●	●	●	●	●	●
Vegetation	●			●	●	
Wildlife	●	●	●	●	●	

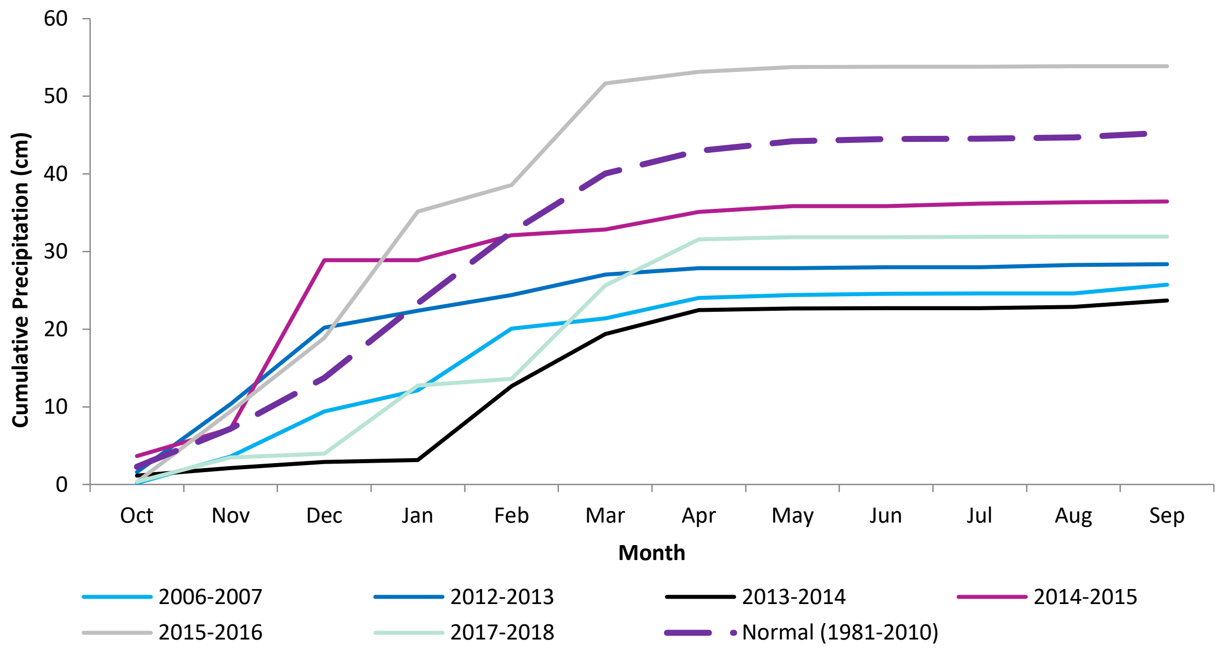


Figure 4-76. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 56 (Year 1 Post-Mastication) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.14.1 Hydrology Monitoring

The 2018 maximum inundation for Pond 56 was 0.85 acres with a maximum depth of approximately 63 cm. The depth and inundation values were within range of the previously recorded values (see Appendix F Table F-14). Pond 56 filled with the first major rain events, held water, and dried in summer. There was a slight decrease in depth and inundation in February which correlates with the unusual precipitation pattern of the 2017-2018 water-year. **Figure** 4-77 illustrates the relationship of precipitation and depth at Pond 56 for 2018 as well as baseline in 2007.

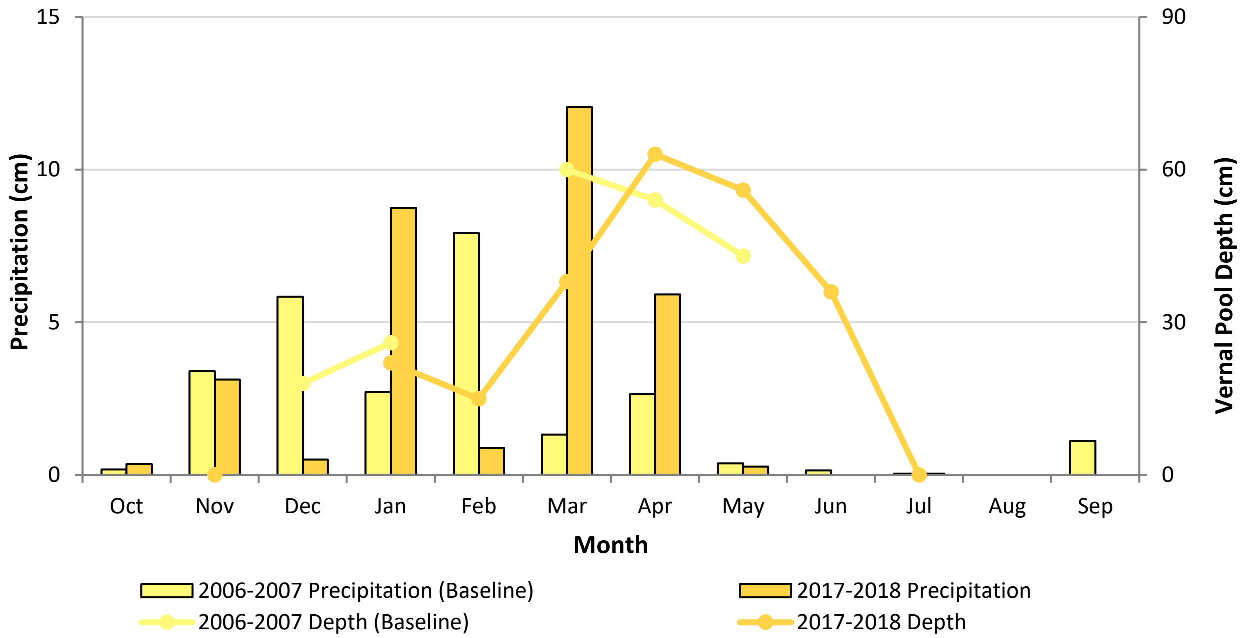


Figure 4-77. Monthly Depth and Precipitation at Pond 56 (Year 1 Post-Mastication) for 2017-2018 Water-Year Compared to Baseline 2006-2007 Water-Year

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-14). Figure 4-78 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-79 illustrates historic and recent inundation areas.

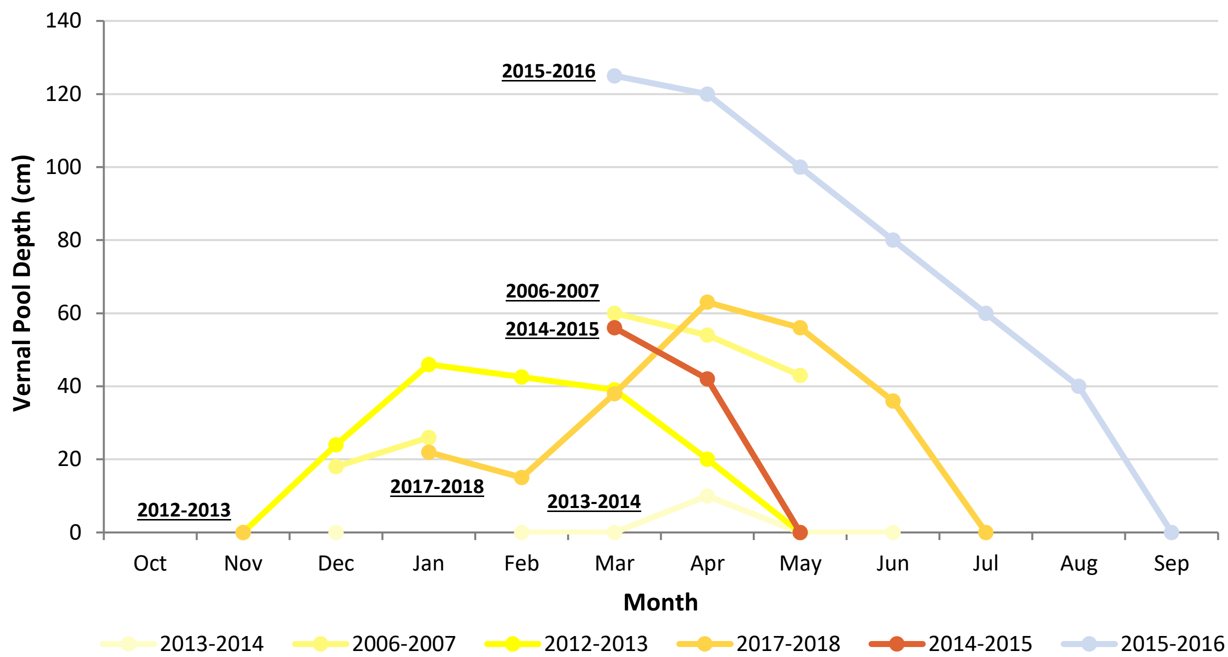


Figure 4-78. Historic Monthly Depths at Pond 56 (Year 1 Post-Mastication). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

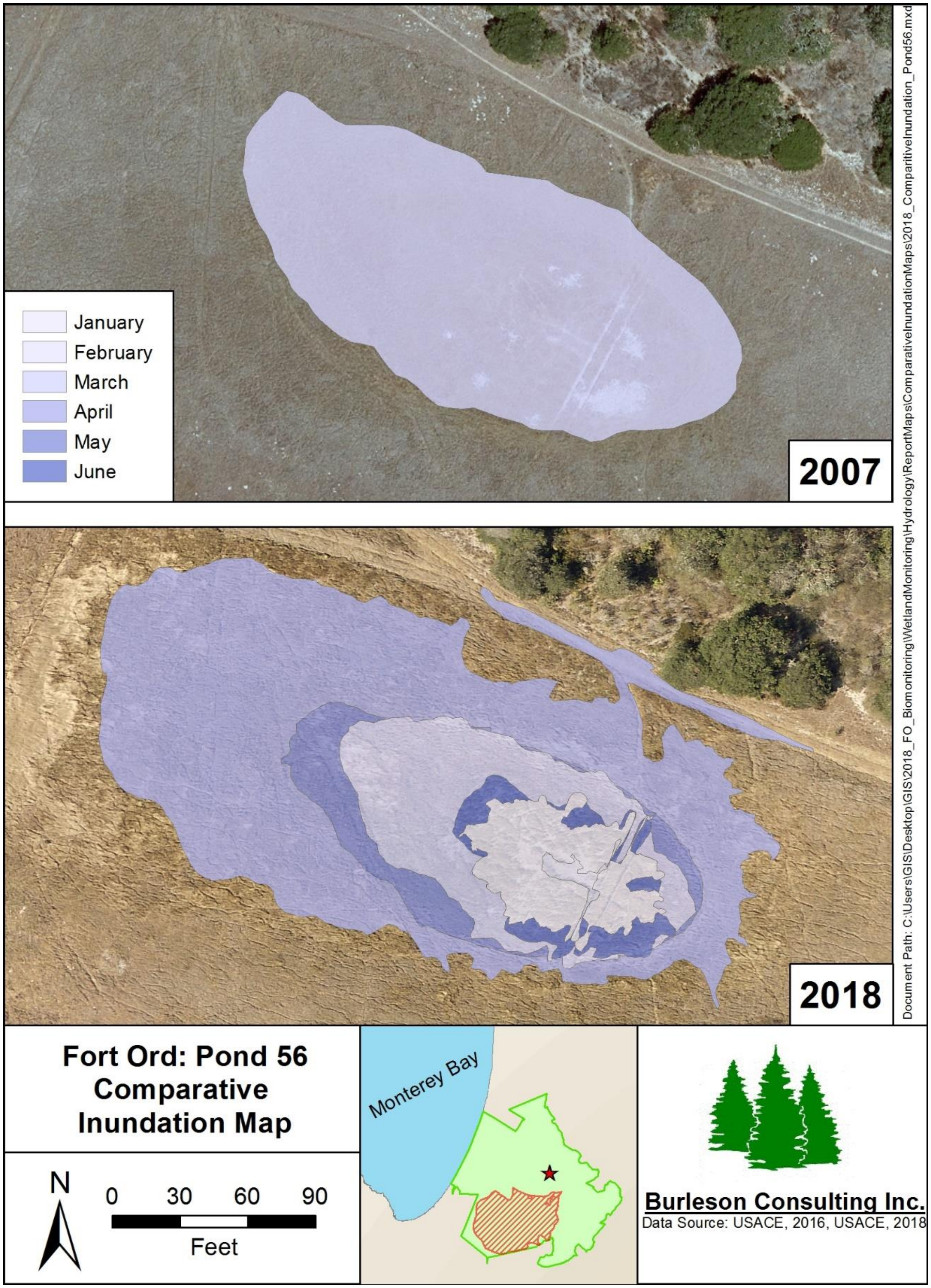


Figure 4-79. Pond 56 (Year 1 Post-Mastication) Inundations for 2006-2007 (below-normal precipitation) and 2017-2018 (below-normal precipitation). Parts of the vernal pool watershed were masticated in 2017. The vernal pool was in year 1 of monitoring in 2018.

4.14.1.1 *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 (25 cm through March) and fairy shrimp (38 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 within the ranges observed at reference vernal pools 5 and 101 East (East).

4.14.1.2 *Data Quality Objective 2*

Pond 56 was inundated January through June 2018 with an inundation range of 0.01-0.85 acres and a mean of 0.30 acres. The historic inundations in 2013 and 2016 were between 0.05 and 5.17 acres. The 2018 inundations were within this range and similar to 2007, 2014, and 2015. Pond 56 can be expected to fill in slightly below-normal years but may remain dry in a drought year (see Figure 4-78). Pond 56 is generally smaller than reference vernal pools Pond 5 and 101 East (East) in a below-normal water-year like 2018.

4.14.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 56, a post-mastication vernal pool, was on track to meet the performance standard for year 1 in 2018. Pond 56 met DQOs 1 and 2 and followed a trend similar to previous years and reference vernal pools 5 and 101 East (East). Pond 56 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.14.2 Wildlife Monitoring

Wildlife data were collected at Pond 56 in 2007, 2013, 2014, 2015, and 2016 (Shaw, 2008; Tetra Tech, 2014, 2015; Burleson, 2016, 2017). California tiger salamander larvae were observed in 2015 and 2016. Fairy shrimp were detected in 2007 and 2013. Pond 56 was not required to be surveyed for CTS or fairy shrimp in 2018 per the wetland protocol and PBO. However, DQO 1 and DQO 4 were evaluated to allow for comparison in future years. DQO 5 was not applicable. Table 4-154 shows historic wildlife monitoring results.

Table 4-154. Pond 56 (Year 1 Post-Mastication) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2007	0	20-23
2013	0	Present
2014	0	0
2015	28	0
2016	>101	0

4.14.2.1 *Data Quality Objective 1*

Pond 56 provided suitable depth for CTS and fairy shrimp as discussed in Section 4.14.1.1.

4.14.2.2 *Data Quality Objective 4*

California tiger salamander and fairy shrimp presence in 2018 at Pond 56 are unknown; however, 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 5.96 in January to 7.03 in March with a mean of 6.59. Temperature ranged from 10.79°C in March to 25.56°C in June with a mean of 14.88°C. Dissolved oxygen ranged from 2.15 mg/L in April to 15.00 mg/L in February with a mean of 6.13 mg/L. Turbidity ranged from 0.0 FNU in June to 333.0 FNU in February with a mean of 66.8 FNU (see Table 3-27).

4.14.2.3 *Performance Standard: Wildlife Usage*

Pond 56 is a post-mastication vernal pool in year 1 of monitoring. Wildlife was not surveyed in 2018. Pond 56 is on track to meet DQO 1 and 4. DQO 5 cannot be accessed at this time. The vernal pool provided suitable habitat for CTS and fairy shrimp although presence was unknown in 2018. Pond 56 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.14.3 Conclusion

Pond 56, a post-mastication vernal pool, was in year 1 of monitoring in 2018. Conditions in 2018 at Pond 56 are suitable for comparison to future years. The vernal pool was on track to meet the hydrological conditions. The plant cover and species diversity and wildlife usage performance standards were not applicable because vegetation and wildlife surveys were not conducted in 2018 (see Table 4-155). Pond 56 will continue to be monitored in the future.

Table 4-155. Success at Pond 56 (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	N/A**
Wildlife Usage	DQO 1	On track
	DQO 4	On track
	DQO 5	N/A**

**Not applicable; only hydrology surveys were conducted

4.15 Pond 60 - Year 1

Pond 60 was monitored in 2018 as a year 1 post-mastication vernal pool. 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. Table 4-156 summarizes the years that monitoring occurred and which survey(s) were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 60 (see Figure 4-80). The 2015-2016 water-year was above-normal, whereas the 2014-2015 and 2017-2018 water-years were below-normal.

Table 4-156. Pond 60 (Year 1 Post-Mastication) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year		
	2014-2015	2015-2016	2017-2018
Hydrology	●	●	●
Vegetation	●		●
Wildlife	●	●	●

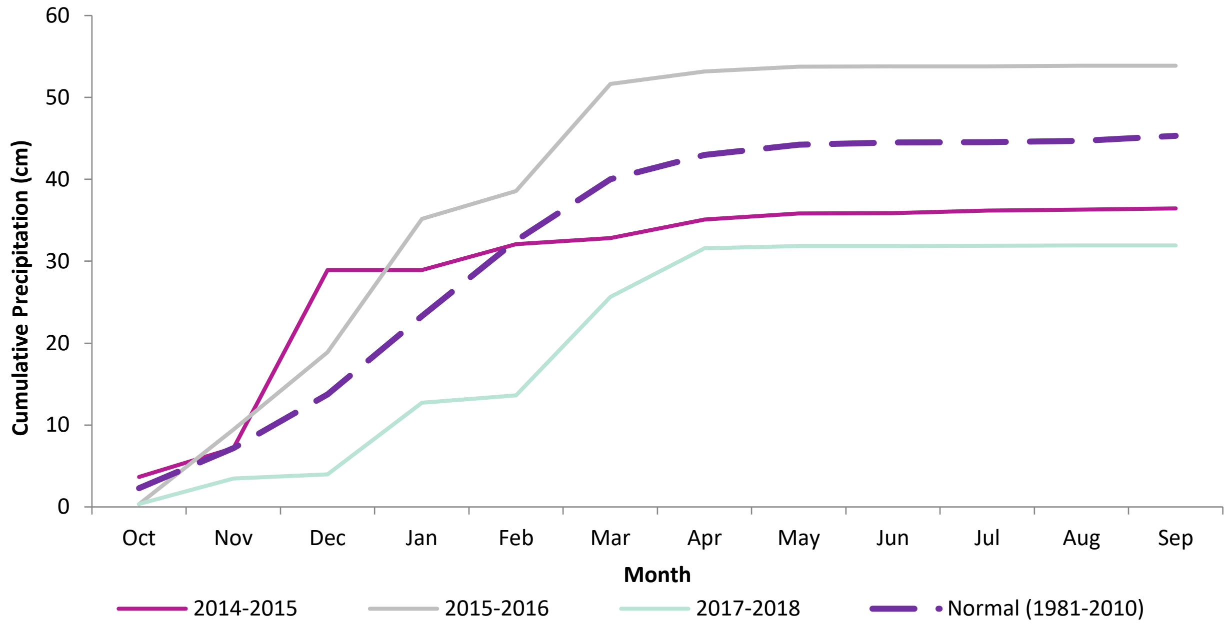


Figure 4-80. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 60 (Year 1 Post-Mastication) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.15.1 Hydrology Monitoring

The 2018 maximum inundation for Pond 60 was 0.77 acres with a maximum depth of approximately 59 cm. The depth and inundation values were within range of the previously recorded values (see Appendix F Table F-15). Unlike previous years, Pond 60 held water in January, dried, and filled again in March. The vernal pool was inundated in January, March, and April and was slightly smaller compared to previous years. **Figure** 4-81 illustrates the relationship of precipitation and depth at Pond 60 for 2018 as well as baseline in 2015.

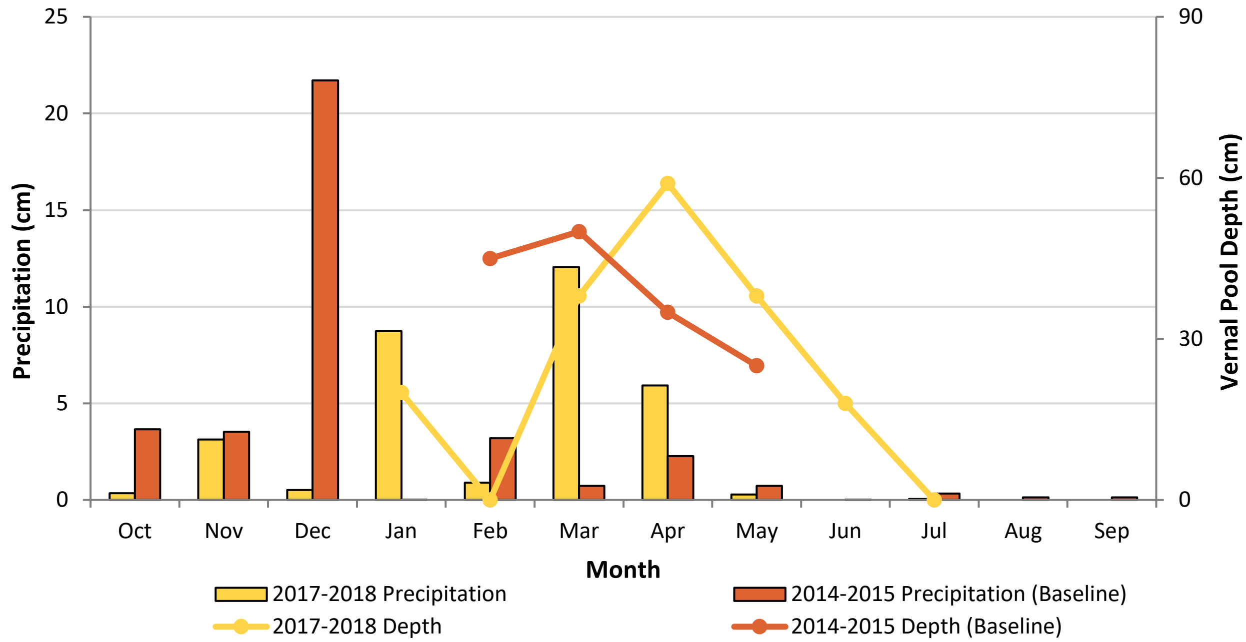


Figure 4-81. Monthly Depth and Precipitation at Pond 60 (Year 1 Post-Mastication) for 2017-2018 Water-Year Compared to Baseline 2014-2015 Water-Year

In below-normal precipitation years, Pond 60 is likely to range from 0-59 cm in depth with a maximum 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 2.7 acres (see Appendix F Table F-15). Figure 4-82 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-83 illustrates historic and recent inundation areas.

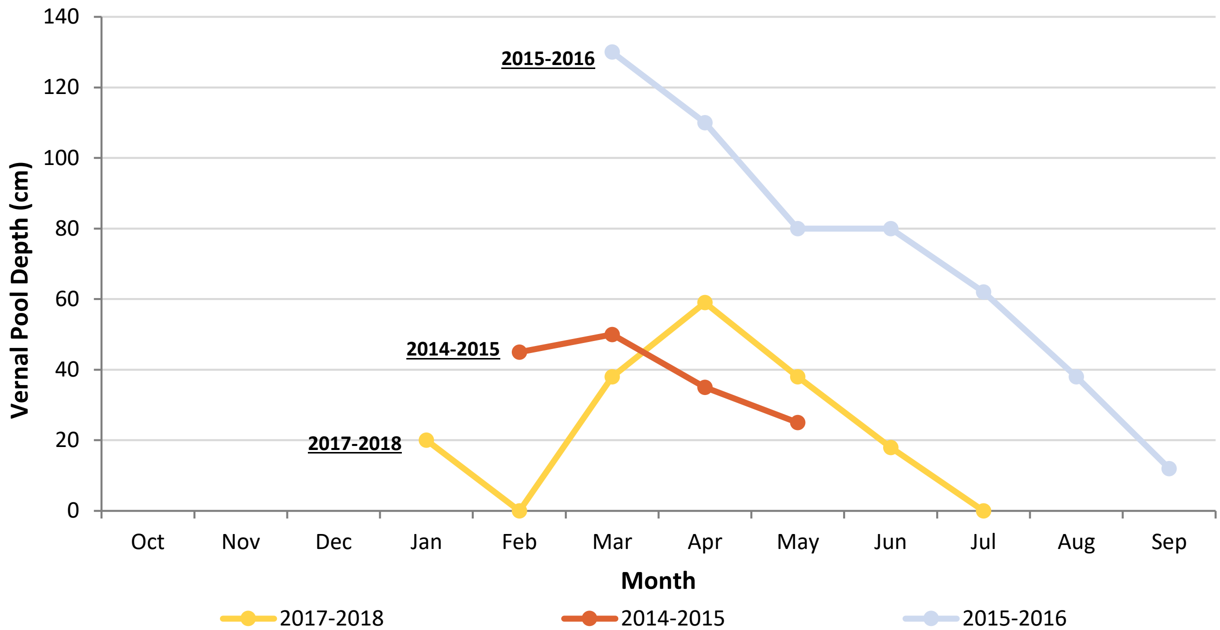


Figure 4-82. Historic Monthly Depths at Pond 60 (Year 1 Post-Mastication). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

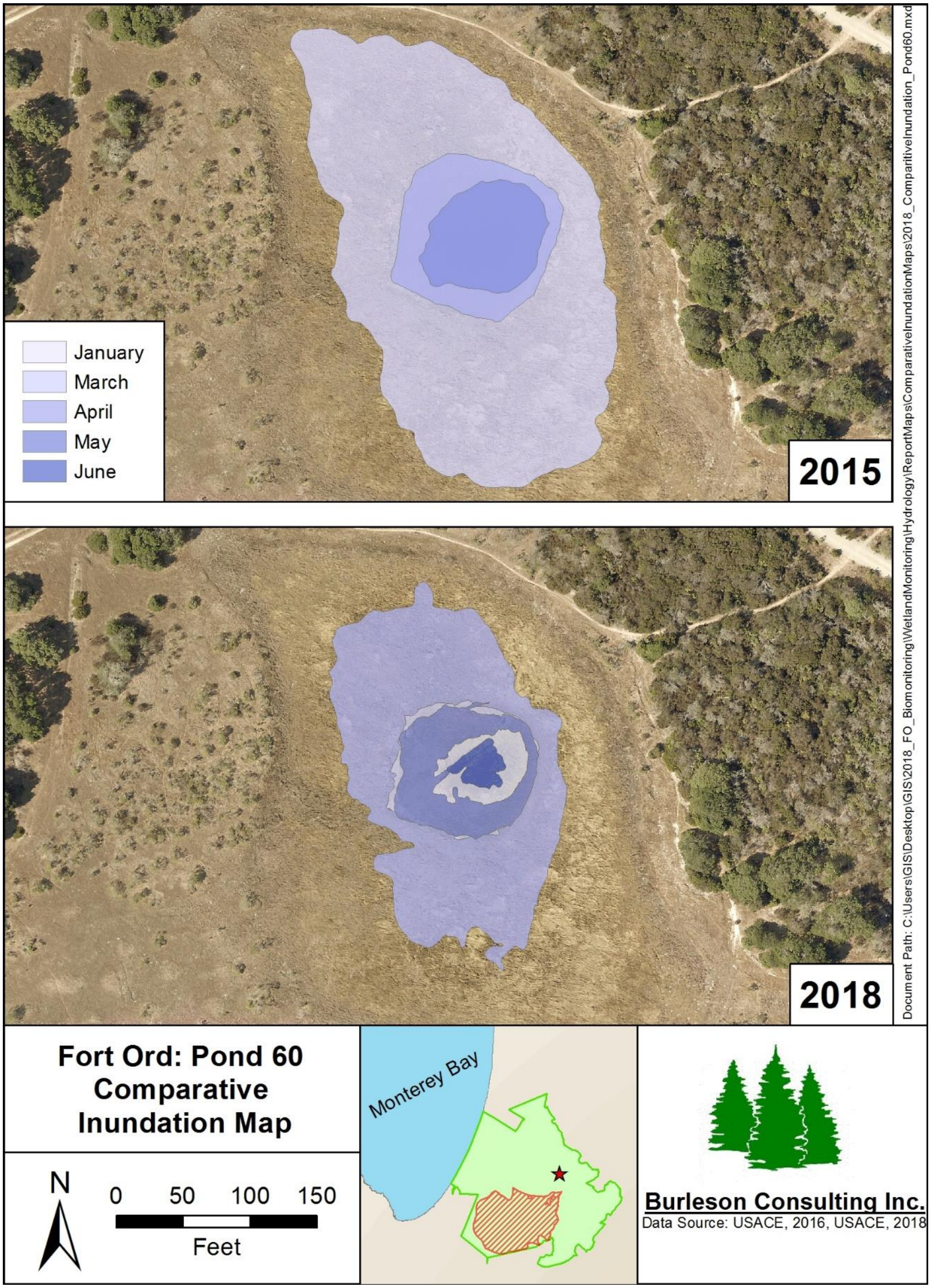


Figure 4-83. Pond 60 (Year 1 Post-Mastication) Inundations for 2014-2015 (below-normal precipitation) and 2017-2018 (below-normal precipitation). The vernal pool was masticated in 2017 and was in year 1 of monitoring in 2018.

4.15.1.1 *Data Quality Objective 1*

Pond 60 partially 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 did not provide sufficient depth for CTS (19 cm through March, dry in February) but did for fairy shrimp (31 cm through May). Pond 60 likely met the DQO in 2015 and 2016; however, neither of those data sets is complete. In 2015 and 2016, monitoring started later in the season. Although the depths observed at Pond 60 are within the ranges observed at reference vernal pools 5, 101 East (West), and 101 East (East), Pond 60 had a different hydroperiod regime than the reference vernal pools, making direct comparison unfeasible. Pond 60 filled with the January precipitation, dried, and filled again in March which is a pattern that was different than any of the reference vernal pools.

4.15.1.2 *Data Quality Objective 2*

Pond 60 had similar inundations in 2018 as previous years but was unlike the relevant reference vernal pools due to a different hydroperiod regime. Pond 60 was inundated in January, dried in February, and inundated again March through June. The inundation range was 0.02-0.77 acres with a mean of 0.21 acres. The historic inundation ranges in 2015 and 2016 were between 0.01 and 2.65 acres. The 2018 inundations were within this range and most similar to 2015. Pond 60 can be expected to fill in slightly below-normal years but may remain dry in a drought year (see Figure 4-82). Pond 60 is generally smaller than reference vernal pools 5 and 101 East (East), but larger than Ponds 997 and 101 East (West). However, because Pond 60 had a different hydroperiod regime than the reference vernal pools, it cannot be directly compared to the reference vernal pools but should be compared against itself in previous monitoring years considering varying water-years.

4.15.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 60, a post-mastication vernal pool, was partially on track to meet the performance standard for year 1 in 2018. Pond 60 partially met DQO 1 because depth requirements for fairy shrimp were met but not for CTS. Evaluation of DQO 2 indicated that Pond 60 was similar to itself in previous monitoring years but was different from the reference vernal pools. The vernal pool followed a trend observed at Ponds 39 and 42. Pond 60 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 60 in 2015 and 2018 (Burleson *et al.*, 2016). Data from 2015 and 2018 were collected using the methodology described in the Methods section of this report and were compared stratum-to-stratum in Table 4-157 as well as visually in Figure 4-84.

Table 4-157. Pond 60 (Year 1 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2015	2018
1	7%	10%
2	35%	41%
3	3%	14%
4	27%	35%
5	2%	N/A
6	26%	N/A

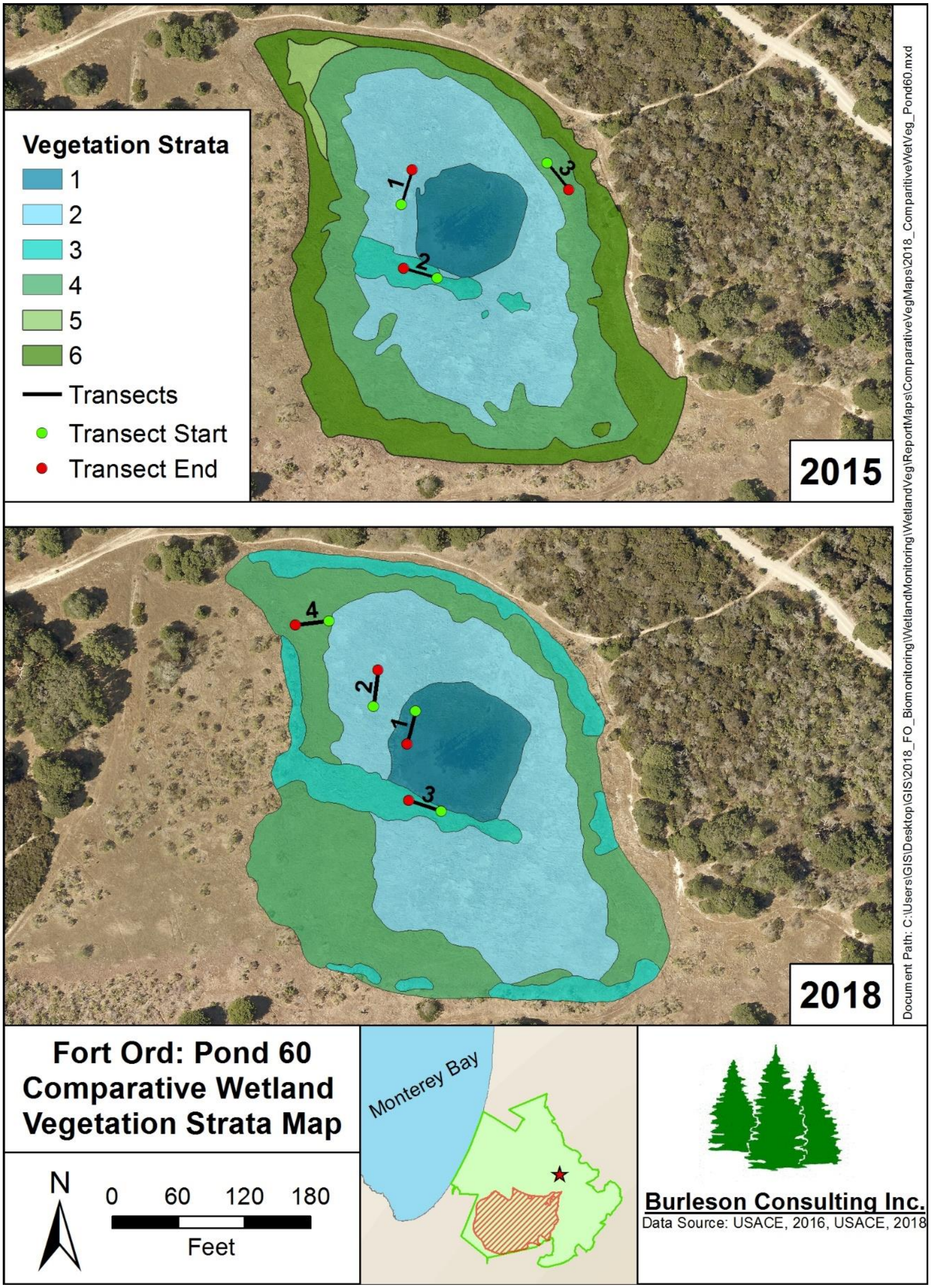


Figure 4-84. Pond 60 (Year 1 Post-Mastication) Vegetation Strata and Transects for 2015 and 2018

Absolute percent vegetative cover decreased between 2015 and 2018, whereas thatch cover increased (see Table 4-158). The absolute percent vegetative cover of Pond 60 in 2018 was slightly 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 4-159).

Table 4-158. Pond 60 (Year 1 Post-Mastication) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2015	61.8%	38.4%
2018	40.8%	59.7%

Table 4-159. Pond 60 (Year 1 Post-Mastication) and Reference Vernal Pool Absolute Percent Cover in 2018

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	54.6%	45.5%
101 East (West)	58.1%	42.3%
101 East (East)	68.7%	32.6%
997	44.7%	55.4%
60	**40.8%**	**59.7%**

Species richness increased between 2015 and 2018 at Pond 60. Species richness on transects was 13 and 19 species in 2015 and 2018, respectively, whereas overall basin species richness was 30 and 59 species, respectively (see Table 4-160 and Appendix B Table B-14). A possible contributing factor to the species richness increase could be year-to-year fluctuations associated with hydroperiod (Barbour *et al*., 2007). Although in 2018 Pond 60 followed an unusual pattern of filling, drying, and filling again, vernal pool plants can germinate and persist without inundation and may experience a late-season pulse of germination when seeds float free of the soil as the vernal pools fills (Bliss and Zedler, 1998). The more variable inundation and depth regime in 2018 may have allowed seeds that were dormant during drought years or submerged in above-normal water-years to germinate (Bliss and Zedler, 1998). This increased variability can increase microhabitats and promote higher species richness compared to a vernal pool with less hydrologic variability (Witham *et al*., 1998). Pond 60 species richness was lower than reference vernal pool values on transects and for the entire basin (see Table 4-161 and Appendix G Tables G-17 and G-34).

Species composition at Pond 60 was similar in 2015 and 2018, and the dominant species in both 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 and 2018 can be found in Appendix H. Figure 4-85 shows a subset of this comparison for species observed with a 2% cover or greater.

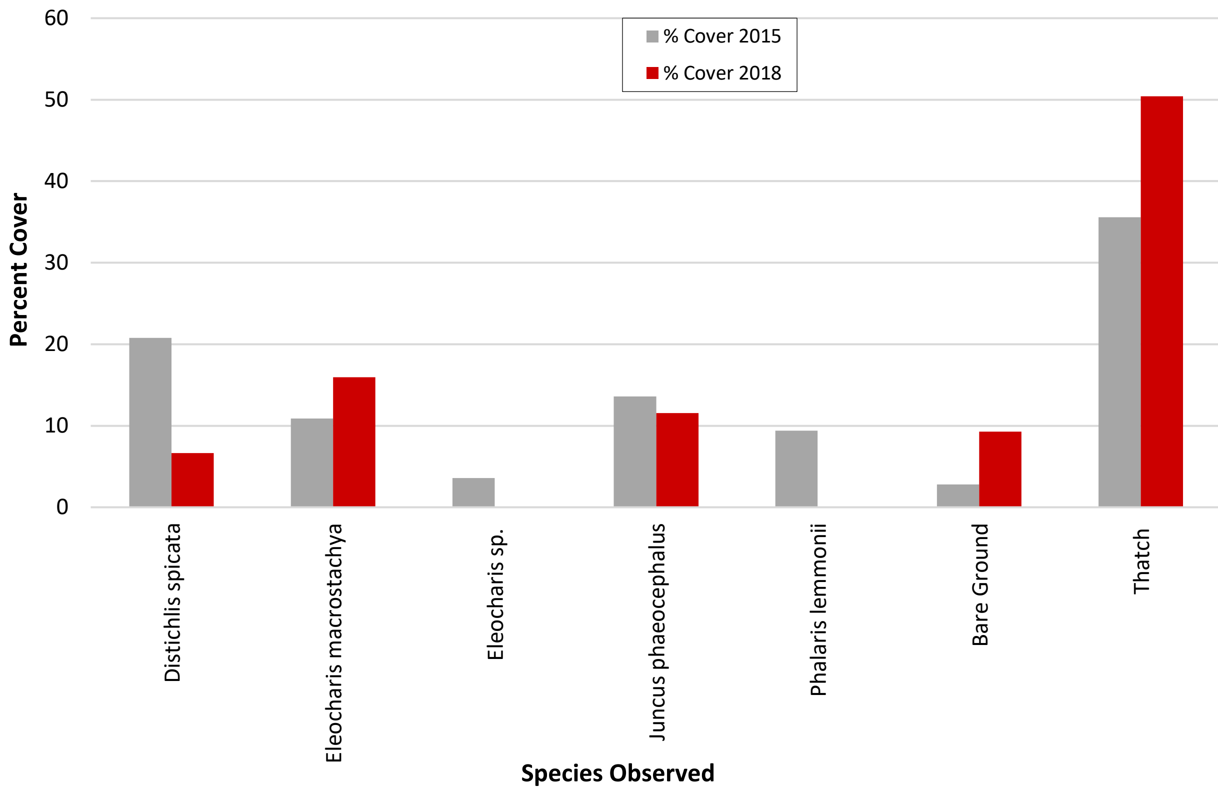


Figure 4-85. Percent Cover of Dominant Species at Pond 60 (Year 1 Post-Mastication)

Native and non-native species richness on Pond 60 transects increased between 2015 and 2018 (see Table 4-160). Pond 60 native and non-native species richness in 2018 were below the values observed in reference vernal pools (see Table 4-161). The relative percent cover of native and non-native species increased between monitoring years (see Table 4-162). Pond 60 relative percent cover of native species was higher than the reference vernal pools, whereas the non-native species cover was lower (see Table 4-163).

Table 4-160. Pond 60 (Year 1 Post-Mastication) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2015	4	7	2
2018	10	9	0

Table 4-161. Pond 60 (Year 1 Post-Mastication) and Reference Vernal Pool Native and Non-Native Species Richness in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	25	16	0
101 East (West)	26	21	3
101 East (East)	18	11	3
997	24	19	2
60	**10**	**9**	**0**

Table 4-162. Pond 60 (Year 1 Post-Mastication) 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%

Table 4-163. Pond 60 (Year 1 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	83.3%	16.7%	0.0%
101 East (West)	67.1%	32.5%	0.4%
101 East (East)	84.4%	14.7%	0.9%
997	56.3%	43.5%	0.2%
60	**92.8%**	**7.2%**	**0.0%**

Wetland and non-wetland species richness on Pond 60 transects increased between 2015 and 2018 (see Table 4-164). Relative percent cover of wetland and non-wetland species increased from 2015 to 2018 (see Table 4-166). The wetland and non-wetland species richness at Pond 60 were similar although slightly lower than the reference vernal pool values in 2018 (see Table 4-165 and Table 4-167). However, the wetland relative percent cover values were higher than those of the reference vernal pools.

Table 4-164. Pond 60 (Year 1 Post-Mastication) 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

Table 4-165. Pond 60 (Year 1 Post-Mastication) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	11	7	8	1	9
101 East (West)	8	11	9	8	2	12
101 East (East)	5	9	5	4	2	7
997	8	10	4	9	0	14
60	**5**	**6**	**3**	**2**	**1**	**2**

Table 4-166. Pond 60 (Year 1 Post-Mastication) 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%

Table 4-167. Pond 60 (Year 1 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	33.7%	50.5%	10.2%	3.3%	0.3%	2.0%
101 East (West)	38.6%	29.0%	17.0%	8.4%	1.0%	6.1%
101 East (East)	28.2%	40.2%	6.0%	22.6%	1.1%	1.8%
997	4.6%	47.5%	8.9%	26.0%	0.0%	13.0%
60	**45.8%**	**52.1%**	**0.5%**	**0.7%**	**0.1%**	**0.8%**

4.15.2.1 *Data Quality Objective 3*

Vegetative cover in Pond 60 was dominated by native and wetland plant species during year 1 post-mastication monitoring in 2018. Differences observed between baseline in 2015 and year 1 post-mastication conditions can be attributed to the changes in the rainfall pattern and the resulting hydroperiod. Pond 60 species richness was highest in 2018 and the vernal pool supported more native and wetland plant species than previous years, similar to the reference vernal pools.

4.15.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 60, a post-mastication vernal pool, was on track to meet the performance standard for year 1 in 2018. 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 2018.

4.15.3 Wildlife Monitoring

Wildlife data were collected at Pond 60 in 2015, 2016, and 2018 (Burleson *et al.*, 2016, 2017). California tiger salamander larvae were observed in 2015 and 2016. Fairy shrimp were not detected in 2018 or previous years. Table 4-168 shows historic wildlife monitoring results.

Table 4-168. Pond 60 (Year 1 Post-Mastication) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2015	70	0
2016	21	0
2018	0	0

4.15.3.1 *Data Quality Objective 1*

Pond 60 did not provide suitable depth for CTS but did for fairy shrimp as discussed in Section 4.15.1.1.

4.15.3.2 *Data Quality Objective 4*

Neither CTS nor fairy shrimp were detected in 2018 at Pond 60; however, the water quality was adequate for both species. Compared to other vernal pools and previous Pond 60 data, the water quality data were within normal ranges. The pH ranged from 6.29 in January to 6.74 in June with a mean of 6.42. Temperature ranged from 11.00°C in January to 28.26°C in June with a mean of 16.09°C. Dissolved oxygen ranged from 3.60 mg/L in January to 8.71 mg/L in March with a mean of 5.88 mg/L. Turbidity range was from 0.0 FNU in June to 25.7 FNU in January with a mean of 9.3 FNU (see Table 3-28).

4.15.3.3 *Data Quality Objective 5*

California tiger salamanders were not detected in 2018, although they were present in 2015 and 2016. The absence of CTS in 2018 may be associated with below-normal precipitation and unusual precipitation pattern that caused Pond 60 to dry in February. Reference vernal pools 101 East (West) and 5 both followed a similar trend and had CTS present in 2015 and 2016 yet not 2018.

Fairy shrimp were not detected in 2018, which was consistent with previous monitoring. However, in 2015 and 2016, timing of monitoring may have occurred too late in relation to inundation. This is not the case for 2018. Pond 39 and 42, which had a similar hydroperiod to Pond 60, had fairy shrimp detections whereas Pond 60 did not.

4.15.3.4 *Performance Standard: Wildlife Usage*

Pond 60, a post-mastication vernal pool, was partially on track to meet the performance standard for year 1 in 2018. The vernal pool met the performance standard for fairy shrimp but not for CTS due to insufficient depth. Pond 60 was partially on track for DQO 1, was on track for DQO 4, and partially on track for DQO 5. Pond 60 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.15.4 Conclusion

Pond 60, a post-mastication vernal pool, was in year 1 of monitoring in 2018. Conditions in 2018 at Pond 60 are suitable for comparison to future years. The vernal pool was on track to meet the plant cover and species diversity performance standard and was partially on track to meet hydrological conditions and wildlife usage (see Table 4-169). Pond 60 will continue to be monitored in the future.

Table 4-169. Success at Pond 60 (Year 1 Post-Mastication) 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	Partially on track

4.16 Pond 61 – Year 1

Pond 61 was monitored in 2018 as a year 1 post-mastication vernal pool. Although some MEC 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. Vegetation within the watershed of Pond 61 was masticated in the summer of 2017 to support MEC remediation in BLM Area B Subunit B-3 East. Less than 50 percent of the watershed was masticated. Table 4-170 summarizes the years that monitoring occurred and which survey(s) were conducted. The cumulative precipitation graph shows the precipitation for the years in which monitoring was conducted at Pond 61 (see Figure 4-86). The 2016-2017 water-year was above-normal, whereas the 2017-2018 water-year was below-normal.

Table 4-170. Summary of Pond 61 (Year 1 Post-Mastication) Historic Surveys for Hydrology, Vegetation, and Wildlife

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

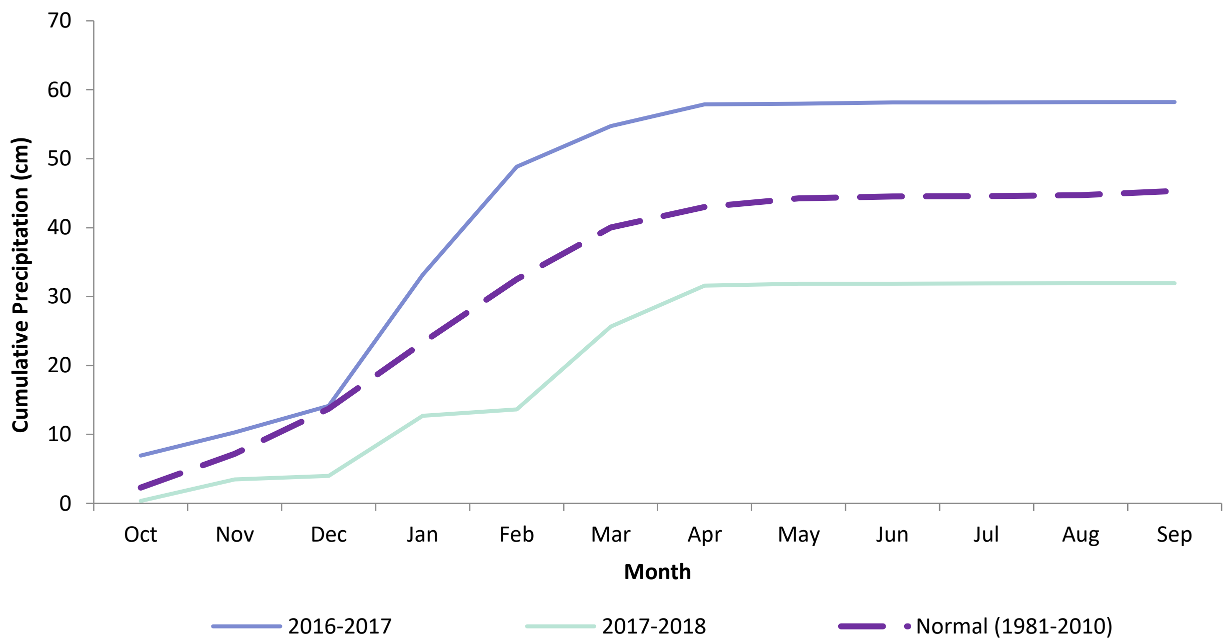


Figure 4-86. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 61 (Year 1 Post-Mastication) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.16.1 Hydrology Monitoring

In 2018, Pond 61 remained dry throughout the water-year. This has not been documented previously; however, the only previous data were from 2017, an above-normal water-year (see Appendix F Table F-16). Figure 4-87 illustrates the relationship of precipitation and depth at Pond 61 for 2018 as well as baseline in 2017.

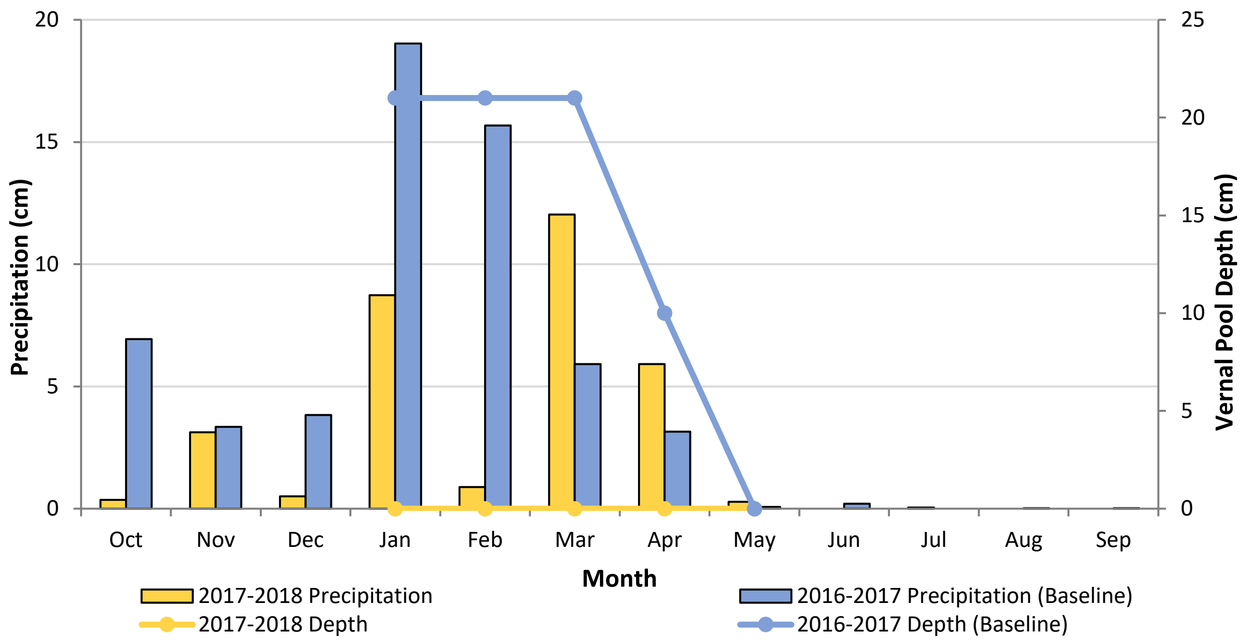


Figure 4-87. Monthly Depth and Precipitation at Pond 61 (Year 1 Post-Mastication) for 2017-2018 Compared to Baseline 2016-2017 Water-Year

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-16). Figure 4-88 illustrates historic vernal pool depths by month and organized by water-year.

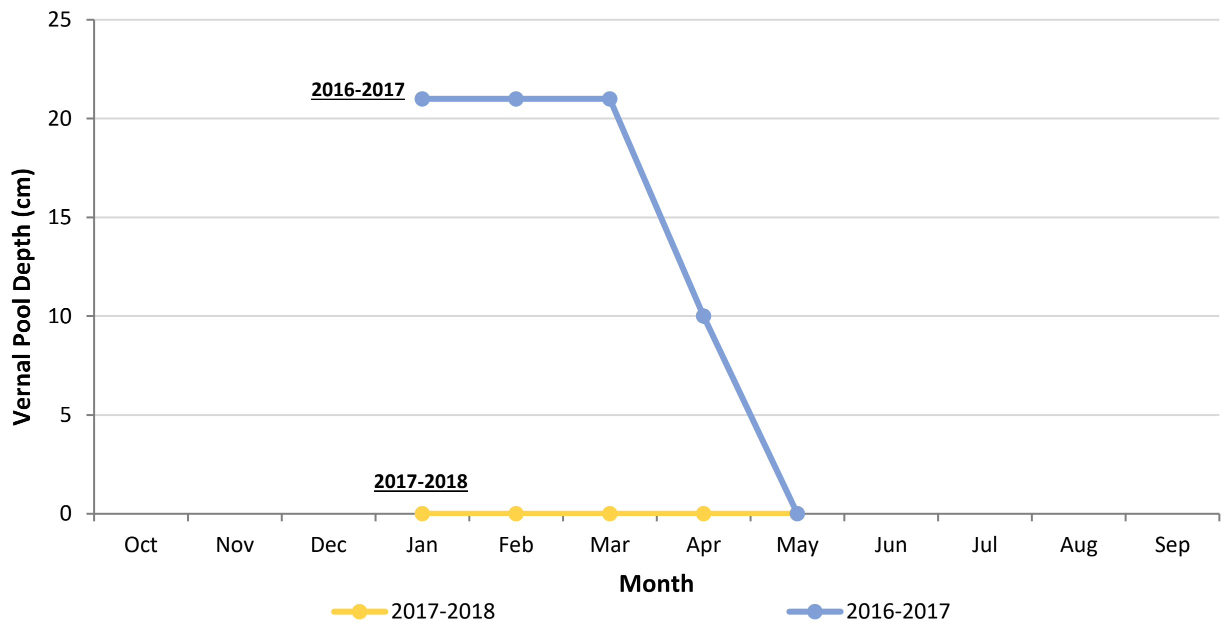


Figure 4-88. Historic Monthly Depths at Pond 61 (Year 1 Post-Mastication). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

4.16.1.1 *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. The vernal pool remained dry throughout the 2017-2018 water-year and therefore did not provide sufficient depth for CTS or fairy shrimp. In 2017, Pond 61 partially met the DQO for fairy shrimp. In 2018, Pond 61 was similar to reference Pond 997 because both vernal pools did not meet DQO 1.

4.16.1.2 *Data Quality Objective 2*

Pond 61 was not inundated in 2018. 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. However, Pond 61 was similar to reference Pond 997 because both remained dry through 2018. Pond 61 is larger and may fill in years when Pond 997 remains dry.

4.16.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 61, a post-mastication vernal pool, was not on track to meet the performance standard for year 1 in 2018. Pond 61 did not meet DQO 1 and the below-normal water-year and unusually late rains were likely contributing factors. Evaluation of DQO 2 indicated that Pond 61 was most similar to reference Pond 997. The vernal pool followed a trend observed at five other vernal pools, Ponds 997, 40 South, 43, 35, and 44. Pond 61 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 61 in 2017 and 2018 (Burleson, 2018). Baseline vegetation data were collected at Pond 61 in 2017. Data from 2017 and 2018 were collected using the methodology described in the Methods section of this report and were compared stratum-to-stratum in Table 4-171 as well as visually in Figure 4-89.

Pond 61 also supports a CCG population, located in stratum 2. The population was mapped, and a visual estimate of percent cover was recorded (see Figure 3-32 in Section 3.16.2.1).

Table 4-171. Pond 61 (Year 1 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2017	2018
1	1%	0.4%
2 (CCG)	5%	5%
3	7%	2%
4	54%	61%
Upland	33%	32%

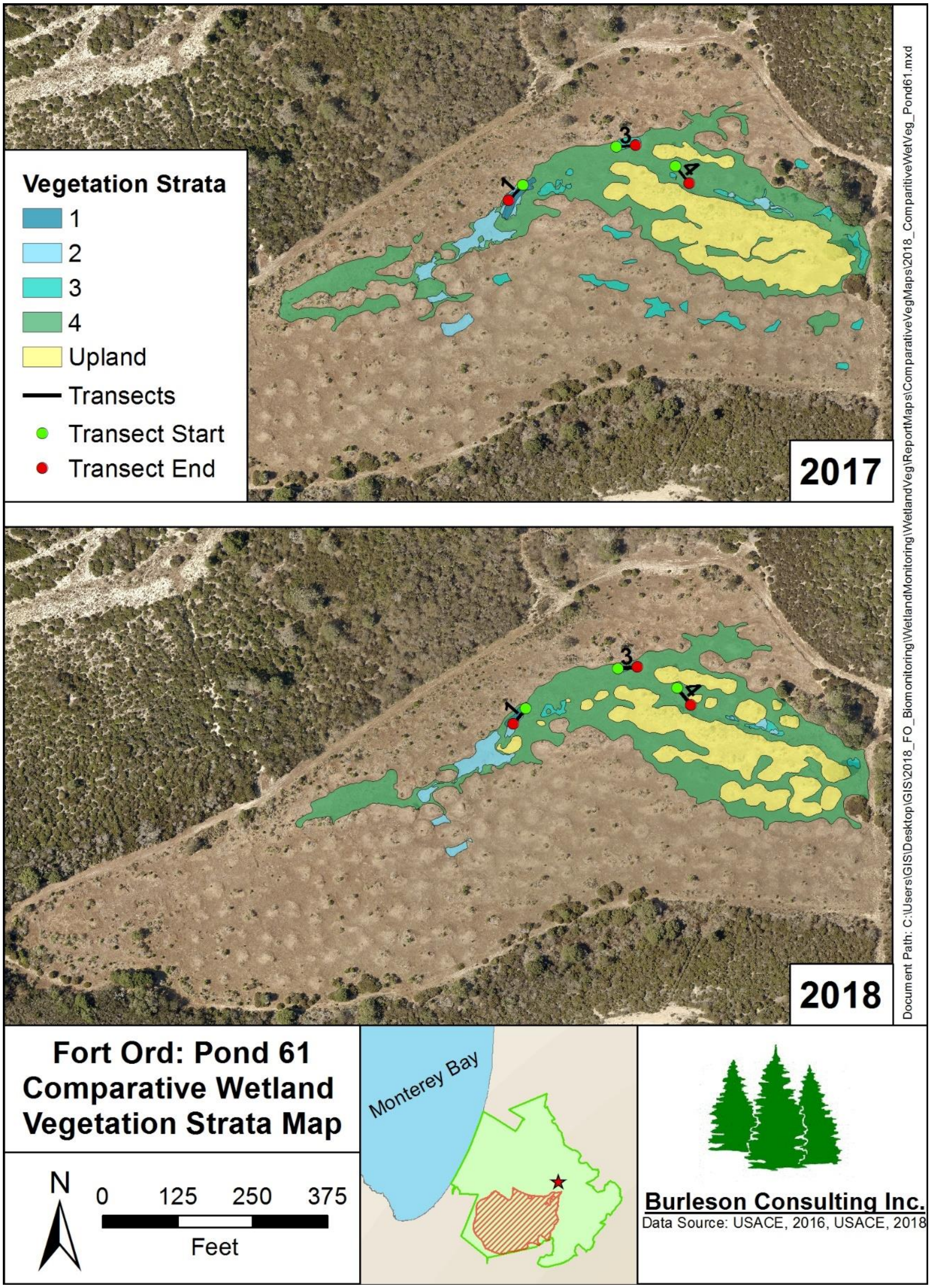


Figure 4-89. Pond 61 (Year 1 Post-Mastication) Vegetation Strata and Transects for 2017 and 2018

Absolute percent vegetative cover decreased between 2017 and 2018, whereas thatch increased (see Table 4-172). Pond 61 vegetative cover was similar to reference vernal pool values and was most similar to reference vernal pool 101 East (West) (see Table 4-173).

Table 4-172. Pond 61 (Year 1 Post-Mastication) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2017	69.4%	32.1%
2018	60.6%	40.8%

Table 4-173. Pond 61 (Year 1 Post-Mastication) and Reference Vernal Pool Absolute Percent Cover in 2018

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	54.6%	45.5%
101 East (West)	58.1%	42.3%
101 East (East)	68.7%	32.6%
997	44.7%	55.4%
61	**60.6%**	**40.8%**

Species richness increased between 2017 and 2018 at Pond 61. Species richness on transects was 23 and 41 species in 2017 and 2018, respectively, whereas overall basin species richness was 61 and 100 species, respectively (see Table 4-174 and Appendix B Table B-15). A possible contributing factor to the species richness increase could be year-to-year fluctuations associated with hydroperiod (Barbour *et al*., 2007). Although Pond 61 was dry throughout the 2017-2018 water-year, vernal pool plants can germinate and persist without inundation (Bliss and Zedler, 1998). In addition, seeds that were dormant during drought years or submerged in above-normal water-years may have germinated in 2018 (Bliss and Zedler, 1998). Pond 61 also has topographic features including Mima mounds and small depressions that may have created more microhabitats due to varying elevation and soil moisture (see Figure 4-89). Pond 61 species richness was similar to the range observed on transects at the reference vernal pools and higher than the range observed for the entire basin (see Table 4-175 and Appendix G Tables G-17 and G-34).

Species composition at Pond 61 was different between 2017 and 2018, and the dominant species were different. 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. A complete list of species composition observed during the surveys at Pond 61 in 2017 and 2018 can be found in Appendix H. Figure 4-90 shows a subset of this comparison for species observed with a 2% cover or greater.

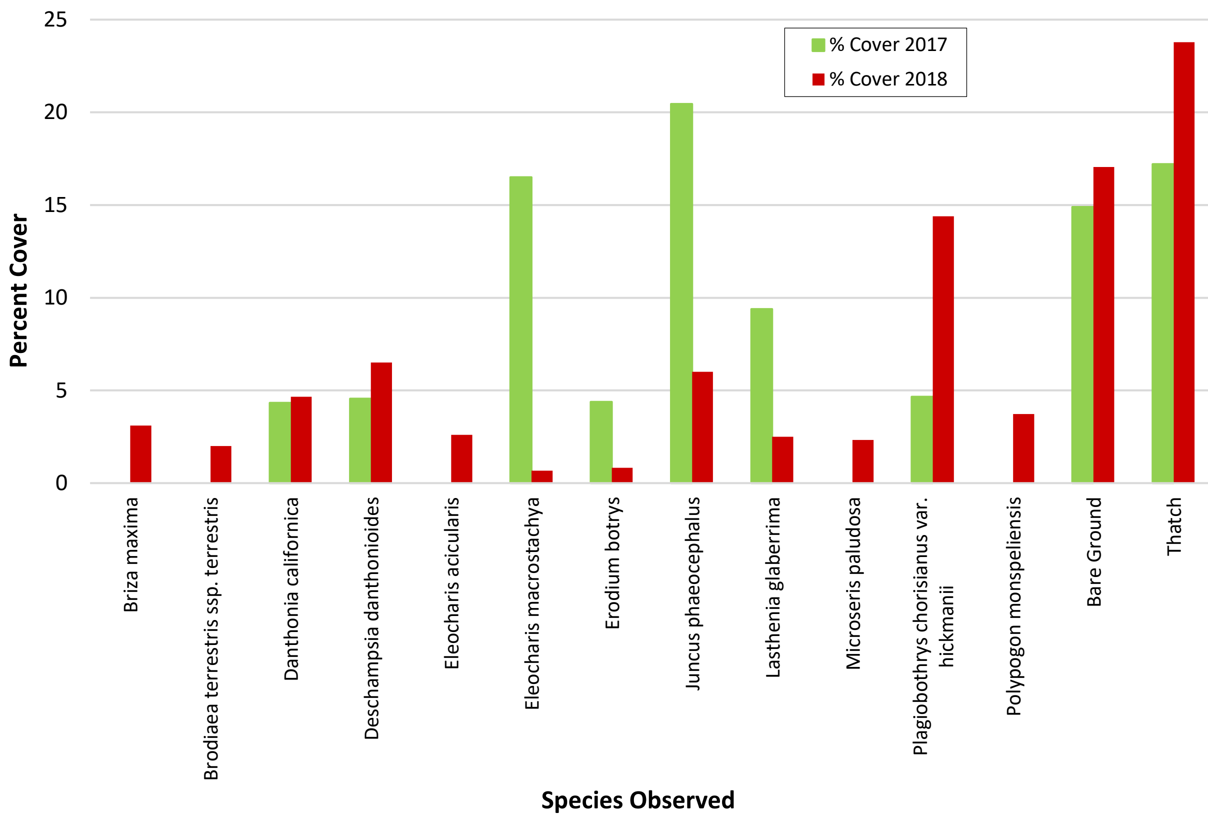


Figure 4-90. Percent Cover of Dominant Species at Pond 61 (Year 1 Post-Mastication)

Native and non-native species richness on Pond 61 transects increased between 2017 and 2018 (see Table 4-174). The relative percent cover of native species decreased between 2017 and 2018, whereas the relative percent cover of non-native species increased (see Table 4-176). Pond 61 native and non-native species richness and relative percent cover values were similar to those observed in the reference vernal pools in 2018 and were most similar to Pond 5 (see Table 4-175 and Table 4-177).

Table 4-174. Pond 61 (Year 1 Post-Mastication) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2017	15	6	2
2018	24	16	1

Table 4-175. Pond 61 (Year 1 Post-Mastication) and Reference Vernal Pool Native and Non-Native Species Richness in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	25	16	0
101 East (West)	26	21	3
101 East (East)	18	11	3
997	24	19	2
61	**24**	**16**	**1**

Table 4-176. Pond 61 (Year 1 Post-Mastication) 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%

Table 4-177. Pond 61 (Year 1 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	83.3%	16.7%	0.0%
101 East (West)	67.1%	32.5%	0.4%
101 East (East)	84.4%	14.7%	0.9%
997	56.3%	43.5%	0.2%
61	**80.1%**	**19.8%**	**0.1%**

Wetland and non-wetland species richness on Pond 61 transects increased between 2017 and 2018 (see Table 4-178). Relative percent cover of wetland and non-wetland species decreased between 2017 and 2018 (see Table 4-180). The wetland and non-wetland species richness and relative percent cover values at Pond 61 were similar to values observed at the reference vernal pools in 2018 (see Table 4-179 and Table 4-181).

Table 4-178. Pond 61 (Year 1 Post-Mastication) 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

Table 4-179. Pond 61 (Year 1 Post-Mastication) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	11	7	8	1	9
101 East (West)	8	11	9	8	2	12
101 East (East)	5	9	5	4	2	7
997	8	10	5	8	0	14
61	**10**	**10**	**3**	**7**	**1**	**10**

Table 4-180. Pond 61 (Year 1 Post-Mastication) 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%

Table 4-181. Pond 61 (Year 1 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	33.7%	50.5%	10.2%	3.3%	0.3%	2.0%
101 East (West)	38.6%	29.0%	17.0%	8.4%	1.0%	6.1%
101 East (East)	28.2%	40.2%	6.0%	22.6%	1.1%	1.8%
997	4.6%	47.5%	20.7%	14.2%	0.0%	13.0%
61	**40.6%**	**31.7%**	**9.3%**	**3.2%**	**0.5%**	**14.9%**

4.16.2.1 *Contra Costa Goldfields*

The area of CCG at Pond 61 decreased slightly from 0.14 acres in 2017 to 0.12 acres in 2018 (Burleson, 2018) (see Figure 4-91). The density also decreased from a range of 10-85% in 2017 to 5-65% in 2018. In 1999, 2000, 2002, and 2017, the CCG population was in similar locations as 2018 and all within the range of 0.09-0.14 acres (HLA, 2000, 2001; MACTEC, 2003; Burleson, 2018). Minor changes in population size can be attributed to natural fluctuation.

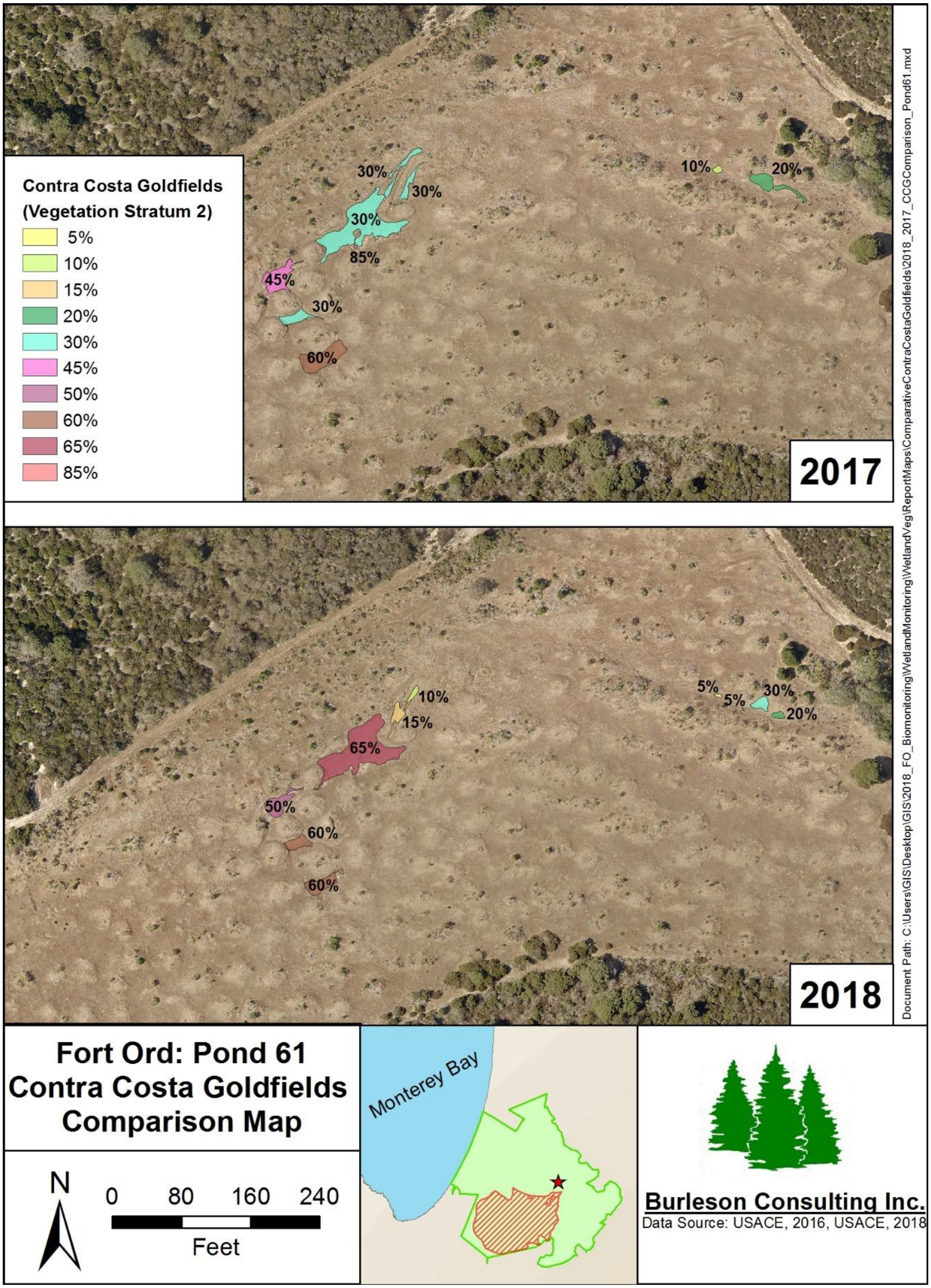


Figure 4-91. Contra Costa Goldfields Populations at Pond 61 (Year 1 Post-Mastication) in 2017 and 2018

4.16.2.2 *Data Quality Objective 3*

Vegetative cover in Pond 61 was dominated by native and wetland plant species during year 1 post-mastication monitoring in 2018. Differences observed between baseline in 2017 and year 1 post-mastication conditions can be attributed to the changes in the rainfall pattern and the resulting hydroperiod. Pond 61 species richness was highest in 2018 and the vernal pool supported more native and wetland species than previous years, similar to the reference vernal pools.

4.16.2.3 *Performance Standard: Plant Cover and Species Diversity*

Pond 61, a post-mastication vernal pool, was on track to meet the performance standard for year 1 in 2018. The species composition, richness, and native and wetland species relative abundances were similar to baseline and reference vernal pool conditions. Pond 61 provided suitable wetland habitat in 2018.

4.16.3 Wildlife Monitoring

Baseline wildlife data were collected at Pond 61 in 2017 (Burleson, 2018). California tiger salamander larvae and fairy shrimp were not detected. Pond 61 was not surveyed for CTS or fairy shrimp in 2018 due to insufficient depth. However, DQO 1 was evaluated to allow for comparison in future years. DQO 4 and DQO 5 were not applicable.

4.16.3.1 *Data Quality Objective 1*

Pond 61 remained dry throughout the 2017-2018 water-year and did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.16.1.1.

4.16.3.2 *Performance Standard: Wildlife Usage*

Pond 61, a post-mastication vernal pool, was not on track to meet the performance standard for year 1 in 2018 due to the vernal pool remaining dry for the entire season. Pond 61 was not on track for DQO 1. DQO 4 and DQO 5 cannot be accessed at this time. Pond 61 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.16.4 Conclusion

Pond 61, a post-mastication vernal pool, was in year 1 of monitoring in 2018. Conditions in 2018 at Pond 61 are suitable for comparison to future years. The vernal pool was on track to meet the plant cover and species diversity performance standard but was not on track to meet hydrological conditions or wildlife usage (see Table 4-182). Pond 61 will continue to be monitored in the future.

Table 4-182. Success at Pond 61 (Year 1 Post-Mastication) 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	N/A*
	DQO 5	N/A**

*Not applicable; no water quality data were collected.

**Not applicable; only hydrology and vegetation surveys were conducted.

4.17 Pond 73 - Year 1

Pond 73 was monitored in 2018 as a year 1 post-mastication 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. Baseline inundation and vegetation surveys were recorded in 2017 but no baseline depth, water quality or wildlife monitoring has been conducted. Table 4-183 summarizes the years that monitoring occurred and which survey(s) were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 73 (see Figure 4-92). The 2016-2017 water-year was above-normal, whereas the 2017-2018 water-year was below-normal.

Table 4-183. Pond 73 (Year 1 Post-Mastication) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

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

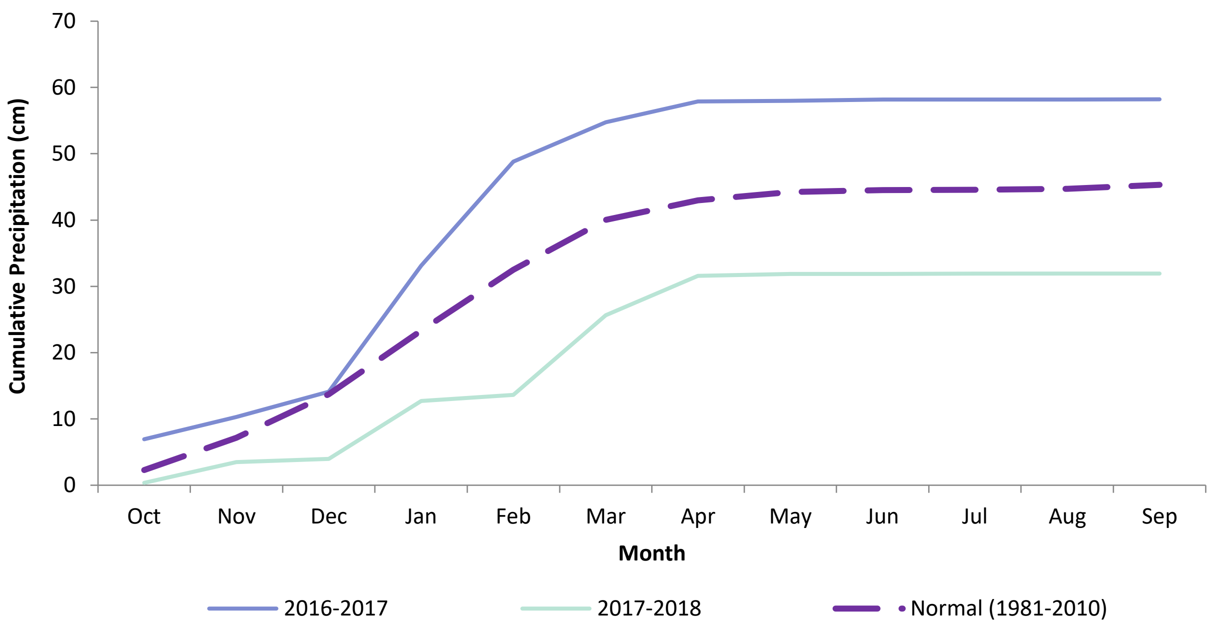


Figure 4-92. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 73 (Year 1 Post-Mastication) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.17.1 Hydrology Monitoring

The 2018 maximum inundation for Pond 73 was 0.001 acres with a maximum depth of approximately 14 cm (see Appendix F Table F-17). A single record of inundation extent at Pond 73 exists from May 15, 2017 of 0.636 acres. In 2018, Pond 73 filled slowly this water-year and dried quickly. This vernal pool required more than one storm event before it held water. Pond 73 was only inundated in March and April; however, no depth or inundation was recorded in March because the inundated area consisted of very minimal peripheral puddling that was not hydrologically connected to the staff gauge. Pond 73 remained relatively small compared to 2017. Figure 4-93 illustrates the relationship of precipitation and depth at Pond 73 for the year 1 2017-2018 water-year. Only precipitation was included in Figure 4-93 for the baseline 2016-2017 water-year since depths were not recorded. Figure 4-94 illustrates historic and recent inundation areas.

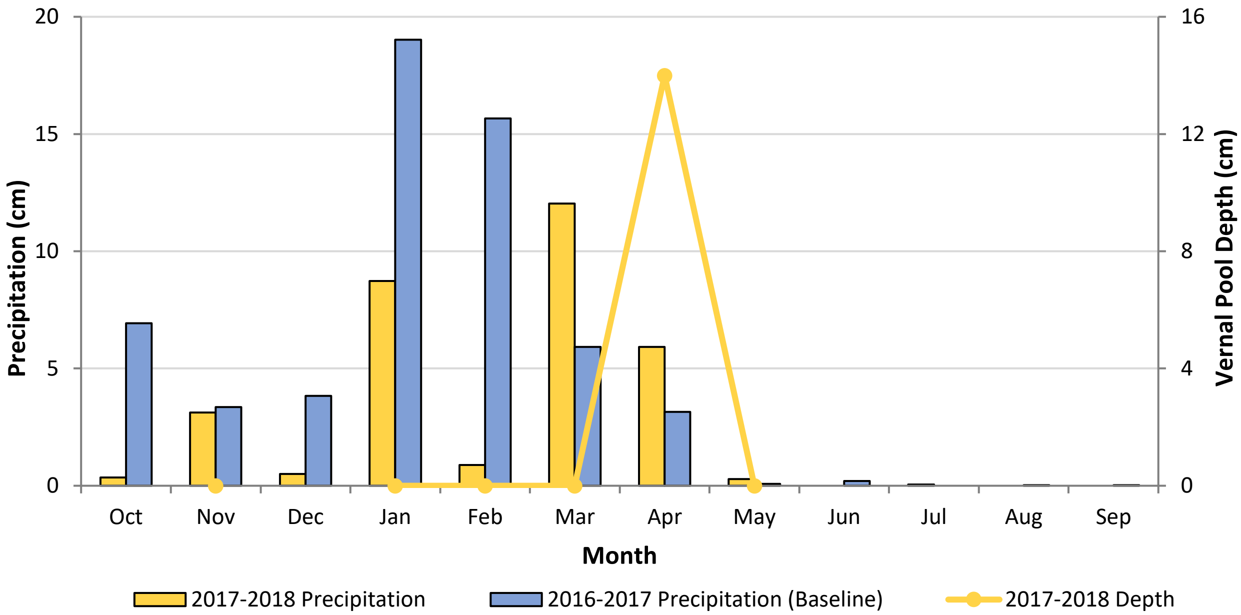


Figure 4-93. Monthly Depth and Precipitation at Pond 73 (Year 1 Post-Mastication) for 2017-2018 Water-Year Compared to Baseline 2016-2017 Water-Year. Only Precipitation is Illustrated for Baseline Since Depths Were Not Recorded.

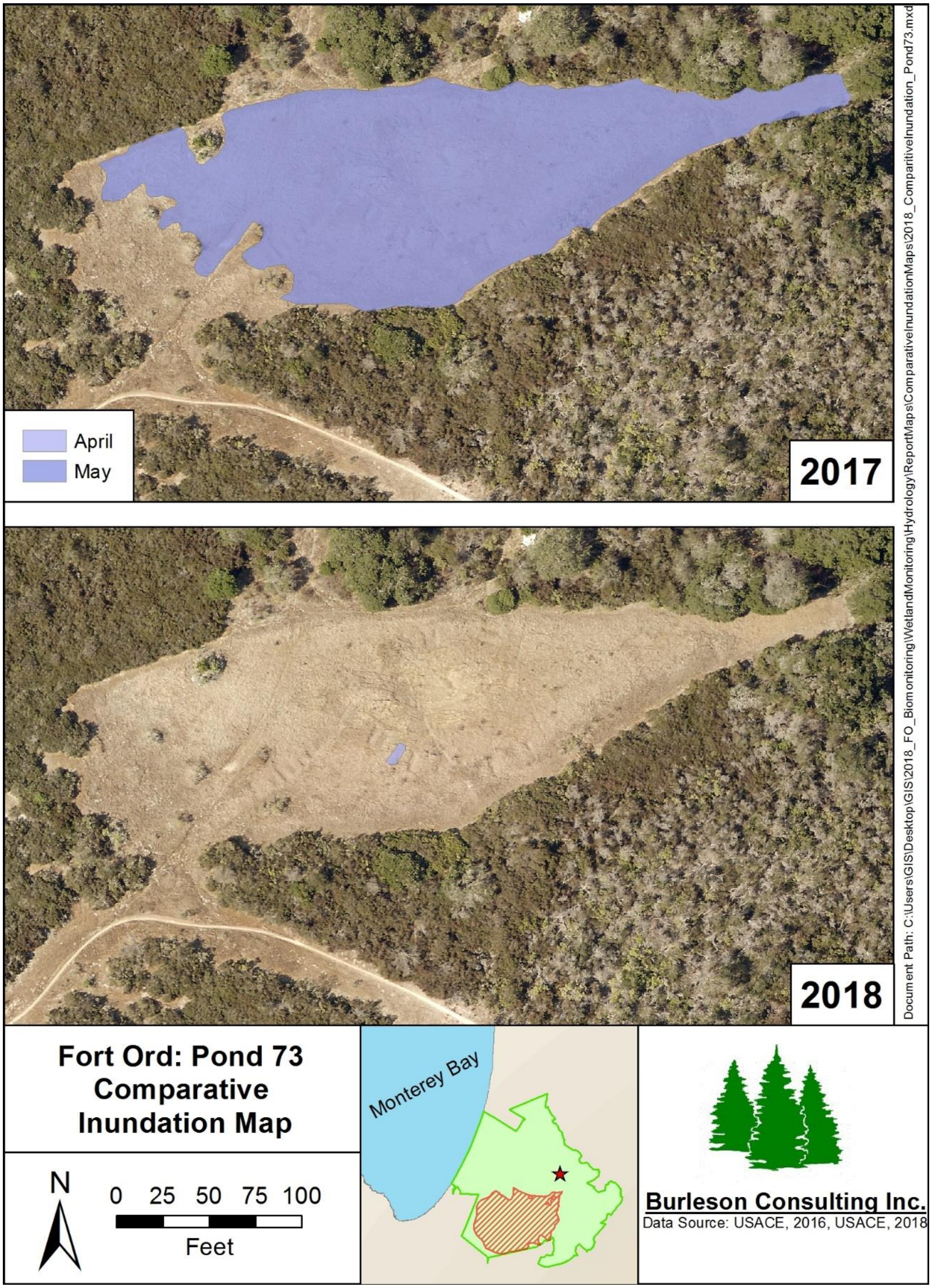


Figure 4-94. Pond 73 (Year 1 Post-Mastication) Inundations for 2016-2017 (above-normal precipitation) and 2017-2018 (below-normal precipitation). Parts of the vernal pool watershed were masticated in 2017. The vernal pool was in year 1 of monitoring in 2018.

4.17.1.1 *Data Quality Objective 1*

Pond 73 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 73 did not provide sufficient depths for CTS (0 cm through March) or fairy shrimp (14 cm through April). Similar to reference Pond 101 East (West), Pond 73 was shallow and did not meet DQO 1.

4.17.1.2 *Data Quality Objective 2*

Pond 73 was inundated in April with an inundation of 0.001 acres, which is much smaller than the inundation of 0.636 acres recorded in 2017. This is likely due to the above-normal water-year in 2017. In a below-normal water-year, Pond 73 is likely to be inundated in a series of small puddles and pools. In 2018, Pond 73 was similar to reference Pond 101 East (West) because both held water through April with inundations less than 1 acre. Pond 73 was slightly smaller than Pond 101 East (West) in 2018 and may remain dry in below-normal years when Pond 101 East (West) fills.

4.17.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 73, a post-mastication vernal pool, was on track to meet the performance standard for year 1 in 2018. Pond 73 followed a trend in hydrological conditions and inundation areas that was observed at seven other vernal pools, Ponds 101 East (West), 3 North, 3 South, 40 North, 16, 54, and 72. Pond 73 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 73 in 2017 and 2018. Baseline vegetation data were collected at Pond 73 in 2017 by DD&A and provided by the Army in 2018. Data from 2017 and 2018 were collected using the methodology described in the Methods section of this report and were compared stratum-to-stratum in Table 4-185 as well as visually in Figure 4-95.

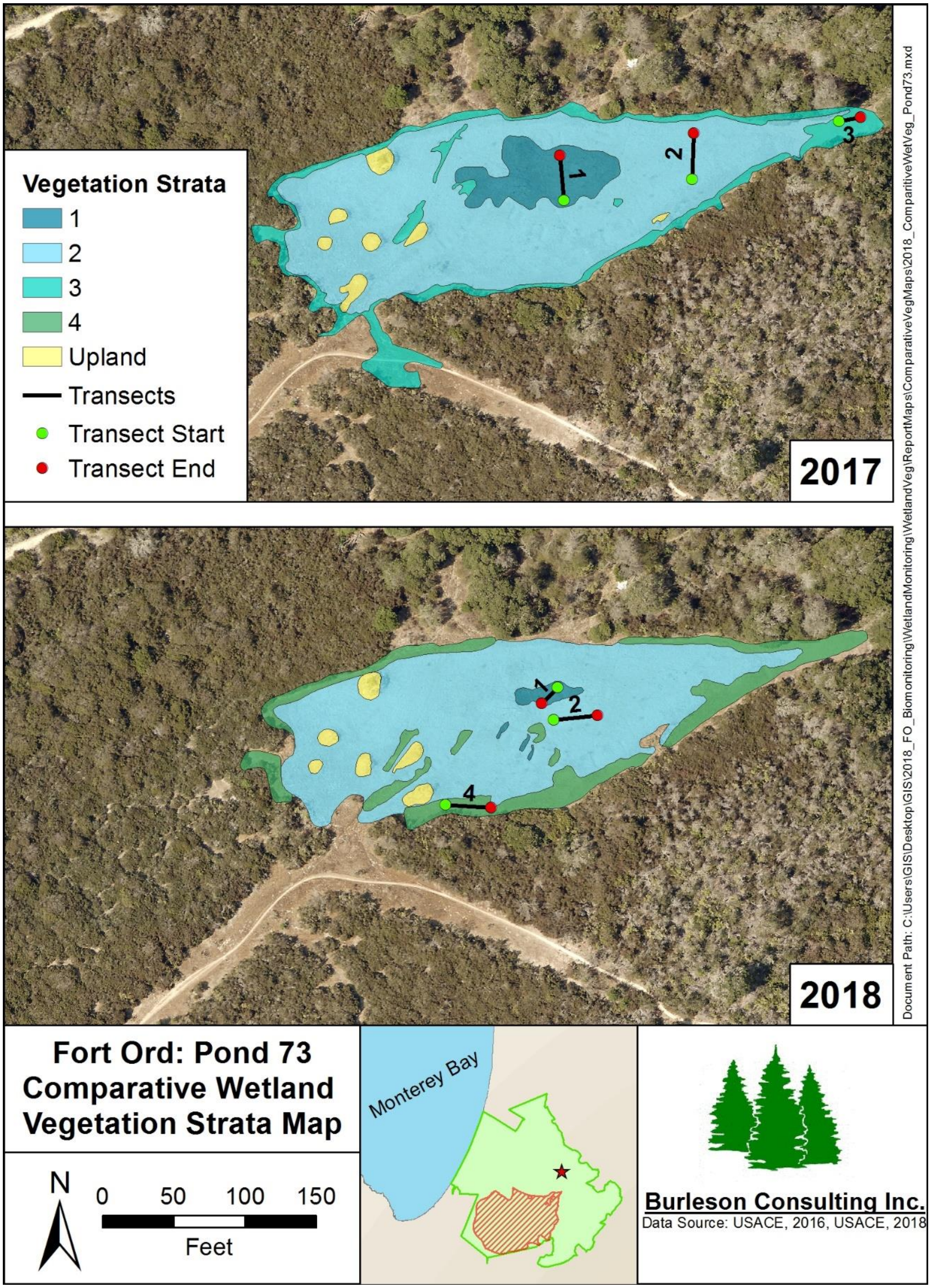


Figure 4-95. Pond 73 (Year 1 Post-Mastication) Vegetation Strata and Transects for 2017 and 2018

Table 4-184. Pond 73 (Year 1 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2017	2018
1	9%	2%
2	71%	73%
3	17%	-
4	-	22%
Upland	3%	3%

The absolute percent vegetative cover decreased between 2017 and 2018, whereas thatch increased (see Table 4-185). Pond 73 vegetative cover was similar to values observed in reference vernal pools and was closest to reference vernal pool 101 East (West), which had 58.1% vegetative cover (see Table 4-186).

Table 4-185. Pond 73 (Year 1 Post-Mastication) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2017	82.6%	16.9%
2018	61.8%	39.7%

Table 4-186. Pond 73 (Year 1 Post-Mastication) and Reference Vernal Pool Absolute Percent Cover in 2018

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	54.6%	45.5%
101 East (West)	58.1%	42.3%
101 East (East)	68.7%	32.6%
997	44.7%	55.4%
73	**61.8%**	**39.7%**

Species richness increased between 2017 and 2018 at Pond 73. Species richness on transects was 6 and 21 species in 2017 and 2018, respectively, whereas overall basin species richness was 49 and 68 species, respectively (see Table 4-186 and Appendix B Table B-16). A possible contributing factor to the species richness increase could be year-to-year fluctuations associated with hydroperiod (Barbour *et al*., 2007). Although Pond 73 was dry early in 2018 and was only inundated in March and April, vernal pool plants can germinate and persist without inundation and may experience a late-season pulse of germination when seeds float free of the soil as the vernal pools fills (Bliss and Zedler, 1998). The more variable inundation and depth regime in 2018 may have allowed seeds that were dormant during drought years or submerged in above-normal water-years to germinate (Bliss and Zedler, 1998). This increased variability can increase microhabitats and promote higher species richness compared to a vernal pool with less hydrologic variability (Witham *et al*., 1998). Despite the increase in overall basin species richness, Pond 73 species richness was lower than reference vernal pool ranges on transects and for the entire basin (see Table 4-188 and Appendix G Tables G-17 and G-34). Pond 73 was most similar to reference Pond 101 East (West) which had 32 species on transects, the lowest species richness on transects among the four reference pools (see Table 4-188).

Species composition at Pond 73 was similar between 2017 and 2018, and the dominant species in both years were brown headed rush (*Juncus phaeocephalus*), and pale spikerush (*Eleocharis macrostachya*). However, in 2018, coyote thistle (*Eryngium armatum*) was a third dominant species. A complete comparison of species composition observed at Pond 73 in 2017 and 2018 can be found in Appendix H. Figure 4-96 shows a subset of this comparison for species observed with a 2% cover or greater.

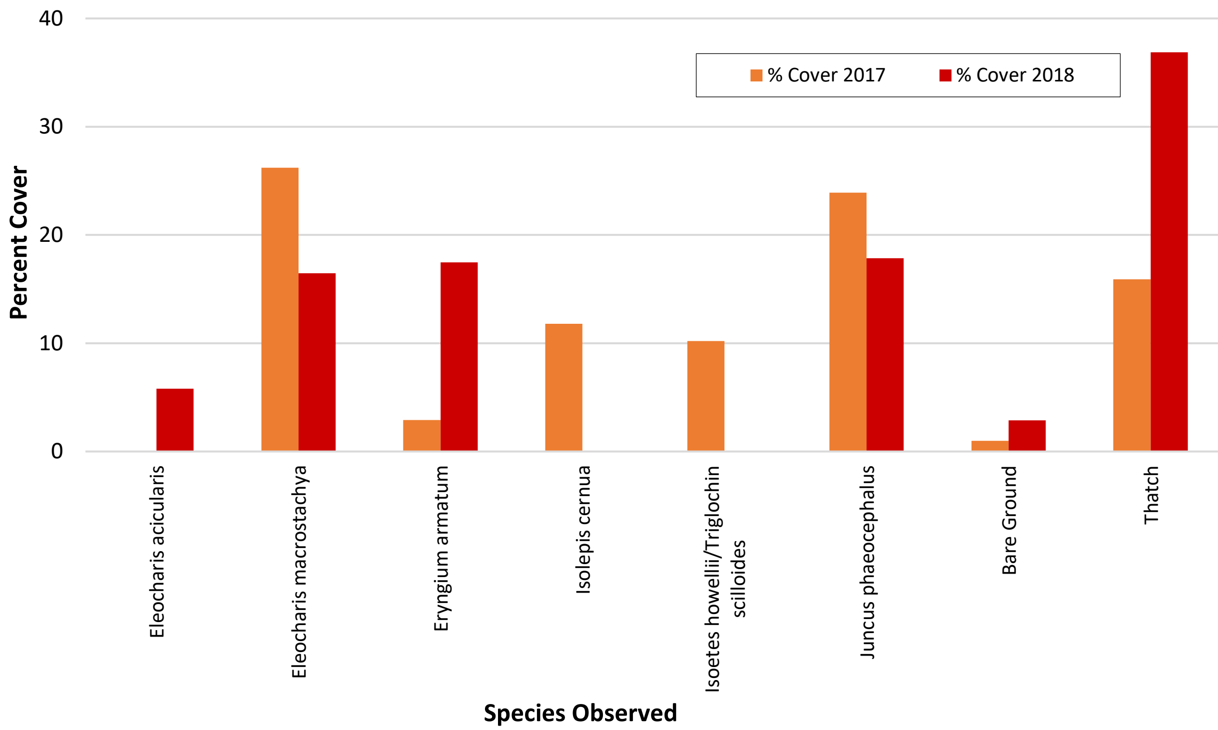


Figure 4-96. Percent Cover of Dominant Species at Pond 73 (Year 1 Post-Mastication)

Native and non-native species richness on Pond 73 transects increased between 2017 and 2018 (see Table 4-187). The native and non-native species richness were below values observed at reference vernal pools in 2018 but were closest to reference Pond 101 East (East) (see Table 4-188). The relative percent cover of native species increased between monitoring years, while the relative percent cover of non-native species decreased (see Table 4-189). Pond 73 was not similar to any reference vernal pool when considering native and non-native relative percent cover; however, the extremely high native relative percent cover was optimal (see Table 4-190).

Table 4-187. Pond 73 (Year 1 Post-Mastication) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2017	5	1	
2018	15	5	1

Table 4-188. Pond 73 (Year 1 Post-Mastication) and Reference Vernal Pool Native and Non-Native Species Richness in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	25	16	0
101 East (West)	26	21	3
101 East (East)	18	11	3
997	24	19	2
73	**15**	**5**	**1**

Table 4-189. Pond 73 (Year 1 Post-Mastication) 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%

Table 4-190. Pond 73 (Year 1 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2018

Vernal Pool	Native	Non-Native	Unidentified
5	83.3%	16.7%	0.0%
101 East (West)	67.1%	32.5%	0.4%
101 East (East)	84.4%	14.7%	0.9%
997	56.3%	43.5%	0.2%
73	**98.9%**	**1.0%**	**0.1%**

Wetland and non-wetland species richness on Pond 73 transects increased between 2017 and 2018 (see Table 4-191). Pond 73 wetland and non-wetland species richness were similar to reference vernal pool values and most similar to reference Pond 101 East (East) (see Table 4-192). The relative percent cover of wetland and non-wetland species was similar between 2017 and 2018 (see Table 4-193). Pond 73 wetland species relative percent cover values were higher than reference vernal pools in 2018, whereas non-wetland species were lower (see Table 4-194).

Table 4-191. Pond 73 (Year 1 Post-Mastication) 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

Table 4-192. Pond 73 (Year 1 Post-Mastication) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	5	11	7	8	1	9
101 East (West)	8	11	9	8	2	12
101 East (East)	5	9	5	4	2	7
997	8	10	4	9	0	14
73	**7**	**7**	**2**	**2**	**0**	**3**

Table 4-193. Pond 73 (Year 1 Post-Mastication) 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%

Table 4-194. Pond 73 (Year 1 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2018

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	33.7%	50.5%	10.2%	3.3%	0.3%	2.0%
101 East (West)	38.6%	29.0%	17.0%	8.4%	1.0%	6.1%
101 East (East)	28.2%	40.2%	6.0%	22.6%	1.1%	1.8%
997	4.6%	47.5%	8.9%	26.0%	0.0%	13.0%
73	**40.3%**	**58.3%**	**0.4%**	**0.2%**	**0.0%**	**0.8%**

4.17.2.1 *Vernal Pool Bent Grass*

Vernal pool bent grass was identified at Pond 73 for the first time in 2018 (see Figure 3-35 in Section 3.17.2.1). 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 42, 44, 61, 997, and Machine Gun Flats on former Fort Ord. The Pond 73 documentation of vernal pool bent grass further expanded the current known range to the east. It was also found in Ponds 101 East (East), 3 North, and 3 South for the first time in 2018.

4.17.2.2 *Data Quality Objective 3*

Vegetative cover in Pond 73 was dominated by native and wetland plant species during year 1 post-mastication monitoring in 2018. Differences observed between baseline in 2017 and year 1 post-mastication conditions can be attributed to the changes in the rainfall pattern and the resulting hydroperiod. Pond 73 species richness was highest in 2018 and the vernal pool supported more native and wetland plant species than previous years, similar to the reference vernal pools.

4.17.2.3 *Performance Standard: Plant Cover and Species Diversity*

Pond 73, a post-mastication vernal pool, was on track to meet the performance standard for year 1 in 2018. The species composition, richness, and native and wetland species relative abundances were similar to reference vernal pool conditions. Pond 73 provided suitable wetland habitat in 2018.

4.17.3 Wildlife Monitoring

Wildlife data were collected at Pond 73 in 2018. California tiger salamander larvae and fairy shrimp were not detected in 2018. No baseline historic wildlife data were available for comparison.

4.17.3.1 *Data Quality Objective 1*

Pond 73 did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.17.1.1.

4.17.3.2 *Data Quality Objective 4*

Neither CTS nor fairy shrimp were detected in 2018 at Pond 73; however, the water quality was adequate for both species. Compared to other vernal pools, the water quality data were within normal ranges. Water quality data were only collected in April: pH was 6.33, temperature was 11.33°C, dissolved oxygen range was 5.63 mg/L, and turbidity was 9.5 FNU (see Table 3-31).

4.17.3.3 *Data Quality Objective 5*

California tiger salamanders and fairy shrimp were not detected in 2018 at Pond 73. Wildlife monitoring was postponed until April due to late rains. No baseline wildlife data were available for comparison.

4.17.3.4 *Performance Standard: Wildlife Usage*

Pond 73, a post-mastication vernal pool, was not on track to meet the performance standard for year 1 in 2018 due to insufficient depth. Pond 73 was on track for DQO 4 but was not on track for DQO 1. DQO 5 cannot be accessed at this time. The vernal pool was only evaluated against the performance standard for year 1 because there were no baseline depth or wildlife data. Pond 73 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.17.4 Conclusion

Pond 73, a post-mastication vernal pool, was in year 1 of monitoring in 2018. Conditions in 2018 at Pond 73 are suitable for comparison to future years. The vernal pool was only evaluated against the performance standards for hydrological conditions and inundation and plant cover and species richness because there were no baseline wildlife data. Pond 73 was on track to meet the plant cover and species diversity performance standard but was not on track to meet hydrological conditions or wildlife usage (see Table 4-195). Pond 73 will continue to be monitored in the future.

Table 4-195. Success at Pond 73 (Year 1 Post-Mastication) 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	Cannot be assessed

4.18 Machine Gun Flats - Year 1

Machine Gun Flats was monitored in 2018 as a year 1 post-mastication vernal pool. Machine Gun Flats was monitored for baseline conditions in 1997 and 1998. Previous mastication and MEC remediation and subsurface activities were conducted in 1999 and 2000 and follow-up monitoring occurred in 2000, 2001, 2002, and 2003 (HLA, 2001; Harding, 2002; MACTEC, 2003, MACTEC, 2004). In addition, less than 50 percent of vegetation within the watershed of and adjacent to 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 4-196 summarizes the years that monitoring occurred and which survey(s) were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Machine Gun Flats (see Figure 4-97). The 1997-1998 water-year was above-normal, whereas all other monitoring occurred in below-normal water-years.

Table 4-196. Machine Gun Flats (Year 1 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
Hydrology	●	●	●	●	●	●	●
Vegetation	●		●	●	●	●	
Wildlife	●	●	●	●	●	●	

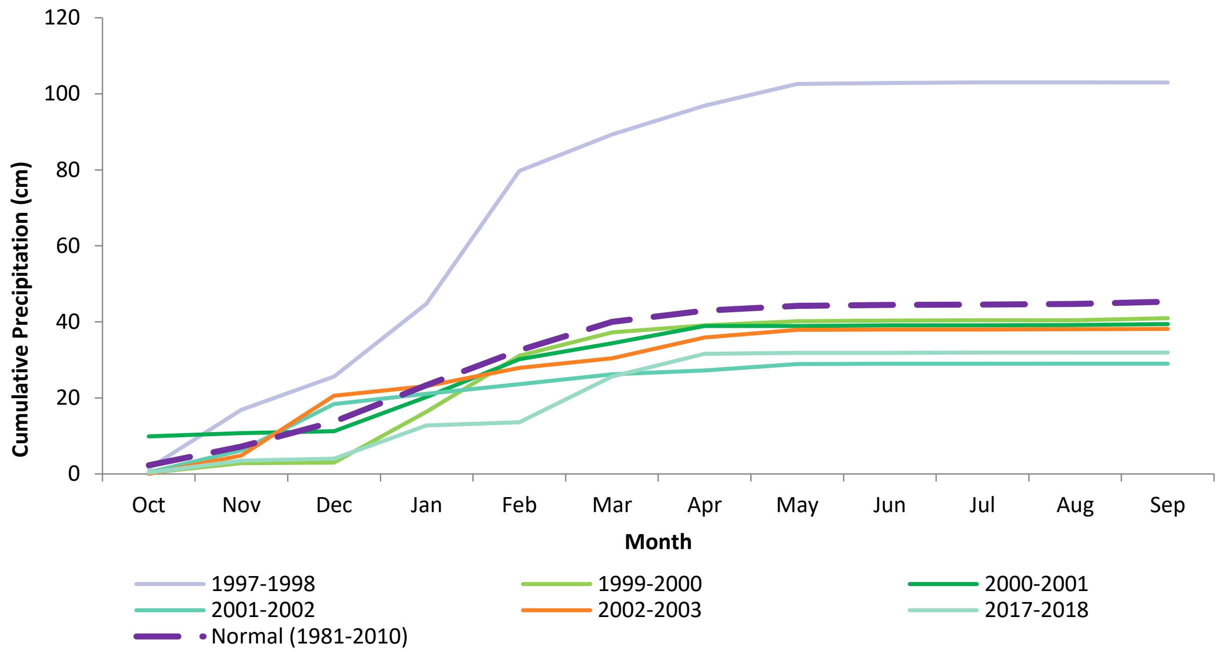


Figure 4-97. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Machine Gun Flats (Year 1 Post-Mastication) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.18.1 Hydrology Monitoring

Machine Gun Flats was not dry by the last recorded monitoring in September 2018. The 2018 maximum inundation for Machine Gun Flats was 8.34 acres with a maximum depth of approximately 111 cm. The depth and inundation values were within range of the previously recorded values (see Appendix F Table F-18). Machine Gun Flats remained filled from the previous water-year and held water throughout the entire monitoring season. Figure 4-98 illustrates the relationship of precipitation and depth at Machine Gun Flats for 2018 as well as baseline in 1998.

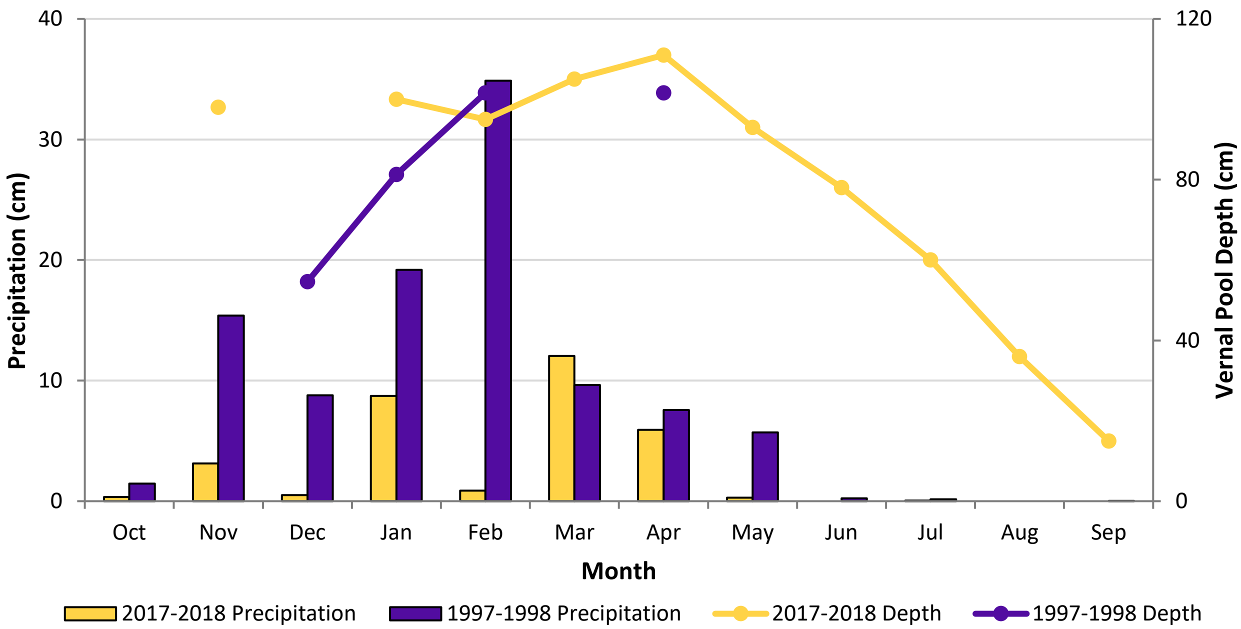


Figure 4-98. Monthly Depth and Precipitation at Machine Gun Flats (Year 1 Post-Mastication) for 2017-2018 Water-Year Compared to Baseline 1997-1998 Water-Year

In below-normal precipitation years, Machine Gun Flats is likely to range from 15-102 cm in depth with a maximum inundation of 10.65 acres. No depths or inundations for Machine Gun Flats have been recorded in normal precipitation years. In above-normal precipitation years, Machine Gun Flats could have maximum depths of 111 cm or more and a maximum inundation up to 14.75 acres (see Appendix F Table F-18). Figure 4-99 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-100 illustrates historic and recent inundation areas.

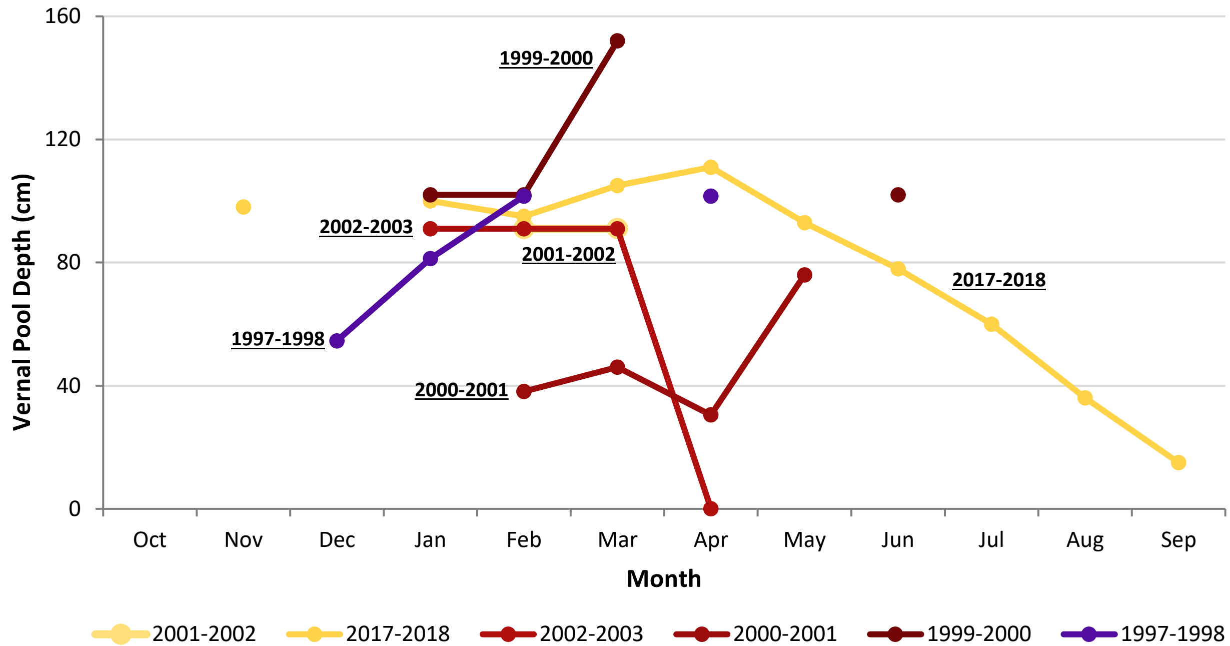


Figure 4-99. Historic Monthly Depths at Machine Gun Flats (Year 1 Post-Mastication). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

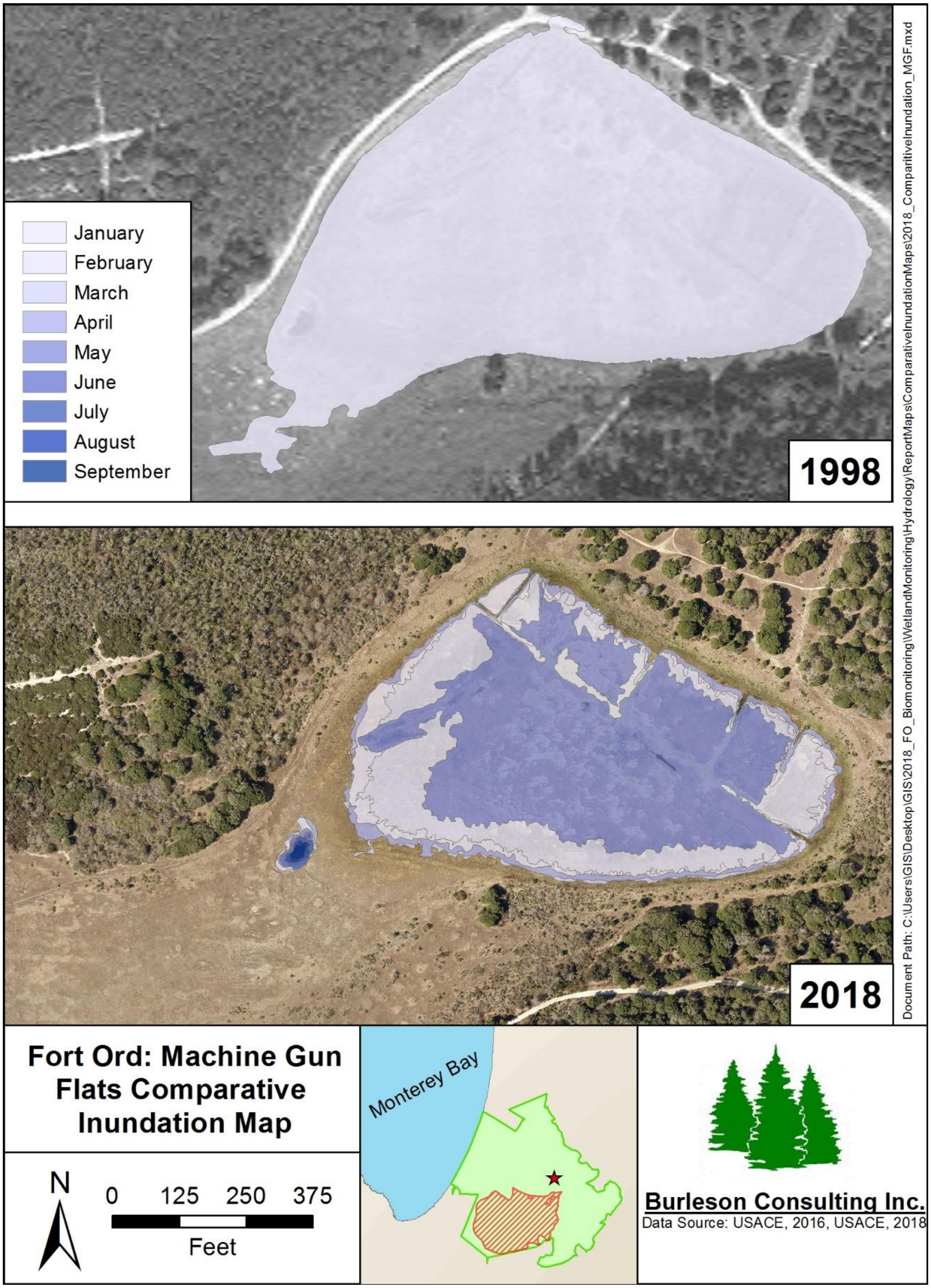


Figure 4-100. Machine Gun Flats (Year 1 Post-Mastication) Inundations for 1997-1998 (above-normal precipitation) and 2017-2018 (below-normal precipitation). The vernal pool was masticated in 2017 and was in year 1 of monitoring in 2018.

4.18.1.1 *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 (100 cm through March) and fairy shrimp (101 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. Although Machine Gun Flats is larger than reference vernal pool 101 East (East), both vernal pools met DQO 1.

4.18.1.2 *Data Quality Objective 2*

Machine Gun Flats had similar inundations in 2018 as previous years and was much larger than the reference vernal pools. Machine Gun Flats was inundated throughout the 2018 monitoring year with an inundation range of 0.02-8.34 acres and a mean of 4.09 acres. The historic inundation ranges in 1998 and 2002 were between 0.01 and 14.50 acres. The 2018 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 dry completely in below-normal and drought years (see Figure 4-99). Machine Gun Flats was larger than any of the reference vernal pools but was most comparable to Pond 5 and 101 East (East) because these reference vernal pools had the largest inundation areas in 2018. However, because Machine Gun Flats had a different hydroperiod regime than the reference vernal pools it cannot be directly compared to the reference vernal pools and should instead be evaluated against itself in previous monitoring years.

4.18.1.3 *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 1 in 2018. Machine Gun Flats met DQOs 1 and 2 and followed a similar trend of inundation and depth through time. The vernal pool fills with significant rain storms and has large inundations and deep depths. When the depth is below approximately 70 cm, the vernal pool decreases in size dramatically and only holds water in a small area at the staff gauge. Machine Gun Flats will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.18.2 Wildlife Monitoring

Wildlife data were collected at Machine Gun Flats in 1998, 2000, 2001, 2002, and 2003 (HLA, 1998, 2001; Harding ESE, 2002; MACTEC, 2003, 2004). California tiger salamander larvae were not detected in any previous survey year, although juveniles were observed in 2003. Fairy shrimp were detected in all years. Machine Gun Flats was not required to be surveyed for CTS or fairy shrimp in 2018, although surveys for CTS were conducted by Robert Cooper, a UCLA graduate researcher. DQO 1 and DQO 4 were evaluated to allow for comparison in future years. DQO 5 was not applicable. Table 4-197 shows historic wildlife monitoring results.

Table 4-197. Machine Gun Flats (Year 1 Post-Mastication) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998	0	Low - very high abundance
2000	0	Very high abundance
2001	0	Low - very high abundance
2002	0	Very high abundance
2003	0 (juveniles present)	Very high abundance

4.18.2.1 *Data Quality Objective 1*

Machine Gun Flats provided suitable depth for CTS and fairy shrimp as discussed in Section 4.18.1.1.

4.18.2.2 *Data Quality Objective 4*

California tiger salamander and fairy shrimp presence in 2018 at Machine Gun Flats are unknown; however, the water quality was adequate for 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 6.84 in April and May to 7.33 in February with a mean of 7.04. Temperature ranged from 8.55°C in February to 22.99°C in June with a mean of 13.88°C. Dissolved oxygen ranged from 2.70 mg/L in June to 6.20 mg/L in March with a mean of 4.30 mg/L. Turbidity ranged from 0.0 FNU in June to 18.7 FNU in March with a mean of 9.33 FNU (see Table 3-33).

4.18.2.3 *Performance Standard: Wildlife Usage*

Machine Gun Flats is a post-mastication vernal pool in year 1 of monitoring. Wildlife was not surveyed in 2018. Machine Gun Flats is on track to meet DQO 1 and DQO 4. DQO 5 cannot be accessed at this time. However, one native adult CTS was caught on March 2, 2018 in Machine Gun Flats by a UCLA researcher.

4.18.3 Conclusion

Machine Gun Flats, a post-mastication vernal pool, was in year 1 of monitoring in 2018. Conditions in 2018 at Machine Gun Flats are suitable for comparison to future years. The vernal pool was on track to meet the hydrological conditions. The plant cover and species diversity and wildlife usage performance standards were not applicable because vegetation and wildlife surveys were not conducted in 2018 (see Table 4-198). Machine Gun Flats will continue to be monitored in the future.

Table 4-198. Success at Machine Gun Flats (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	N/A*
Wildlife Usage	DQO 1	On track
	DQO 4	On track
	DQO 5	N/A*

*Only hydrology surveys were conducted however one adult CTS was caught by UCLA researcher Robert Cooper.

4.19 Pond 16 - Year 2

Pond 16 was monitored in 2018 as a year 2 post-mastication vernal pool. Pond 16 was monitored for baseline conditions in 1994, 1995, 1996, 2009, and 2015. Vegetation within Pond 16 and immediately around it was masticated in the summer of 2016 in preparations for a prescribed burn in Unit 31. Less than 50 percent of the Pond 16 watershed was masticated. Table 4-199 summarizes the years that monitoring occurred and which survey(s) were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 16 (see Figure 4-101). The 1994-1995 and 2016-2017 water-years were above-normal, whereas all other monitoring years were below-normal.

Table 4-199. Pond 16 (Year 2 Post-Mastication) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year						
	1993-1994	1994-1995	1995-1996	2008-2009	2014-2015	2016-2017	2017-2018
Hydrology	●	●	●		●	●	●
Vegetation	●	●	●		●	●	
Wildlife	●	●	●	●	●		

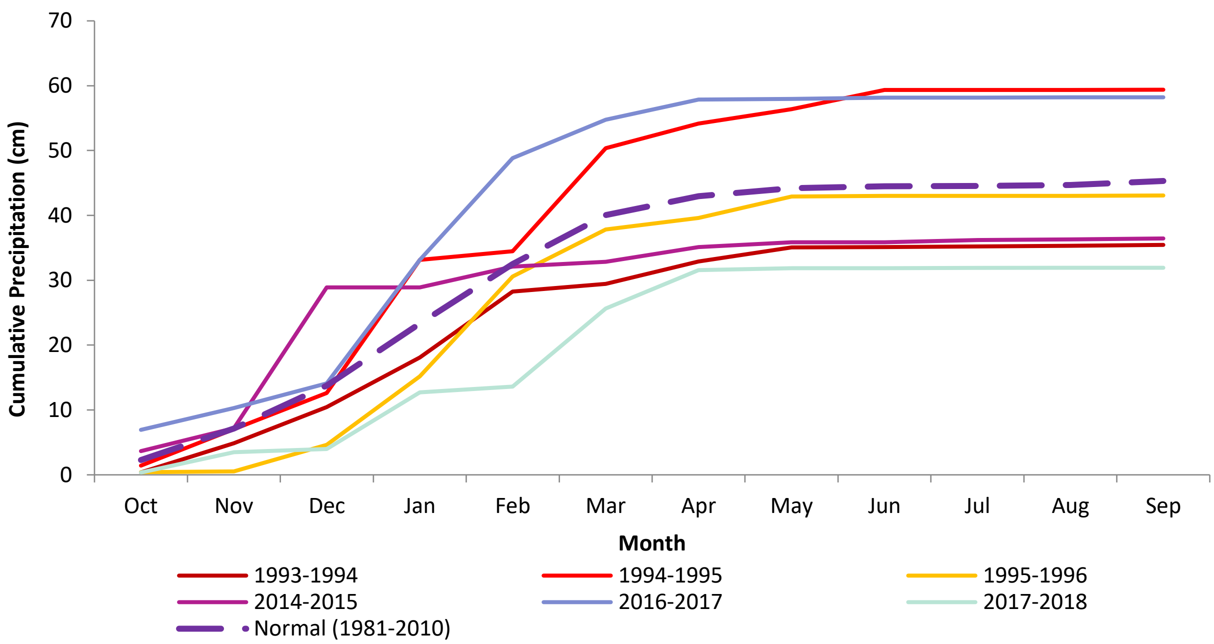


Figure 4-101. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 16 (Year 2 Post-Mastication) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.19.1 Hydrology Monitoring

The 2018 maximum inundation for Pond 16 was 0.26 acres with a maximum depth of approximately 28 cm. The depth and inundation values were within range of previous recorded values (see Appendix F Table F-19). Pond 16 filled slowly this water-year and dried quickly. This vernal pool required more than one storm event before it held water, was only inundated in March and April, and remained relatively small and shallow compared to previous years. Figure 4-102 illustrates the relationship of precipitation and depth at Pond 16 for 2018 as well as baseline in 2015.

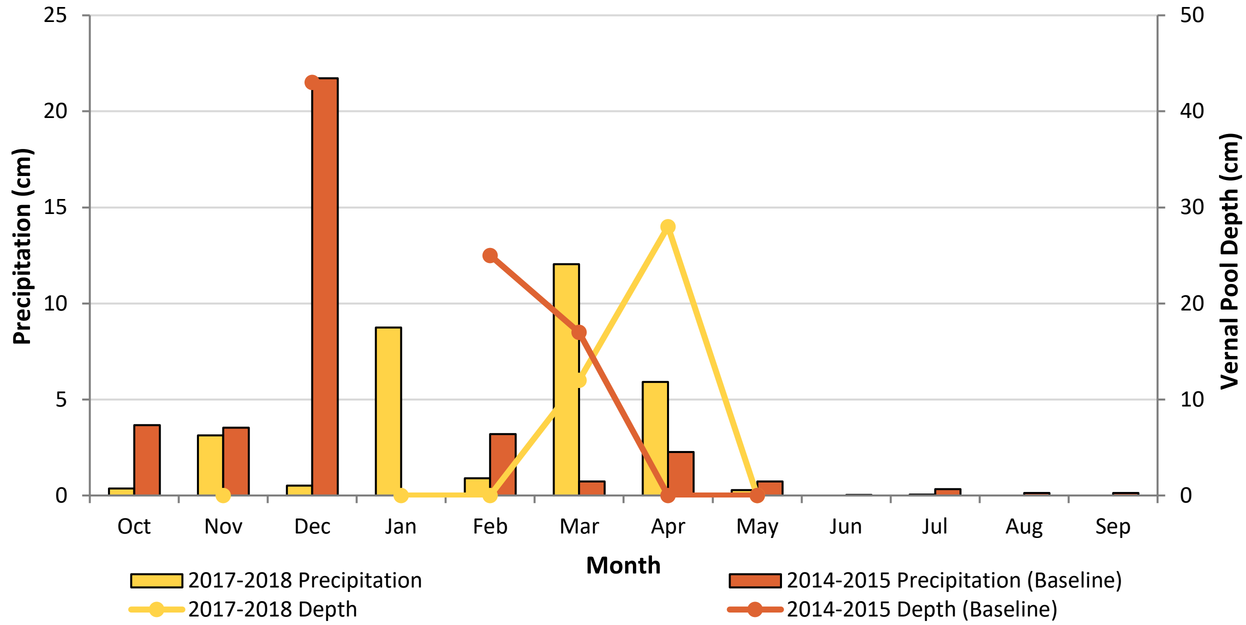


Figure 4-102. Monthly Depth and Precipitation at Pond 16 (Year 2 Post-Mastication) for 2017-2018 Water-Year Compared to Baseline 2014-2015 Water-Year

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 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-19). Figure 4-103 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-104 illustrates historic and recent inundation areas.

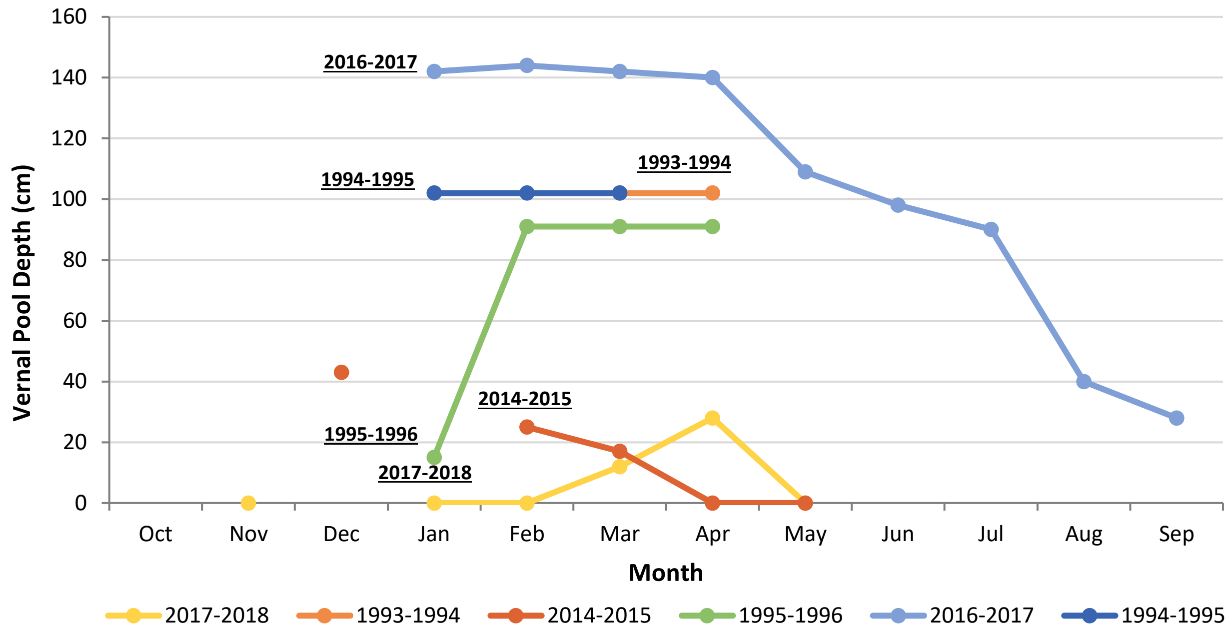


Figure 4-103. Historic Monthly Depths at Pond 16 (Year 2 Post-Mastication). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

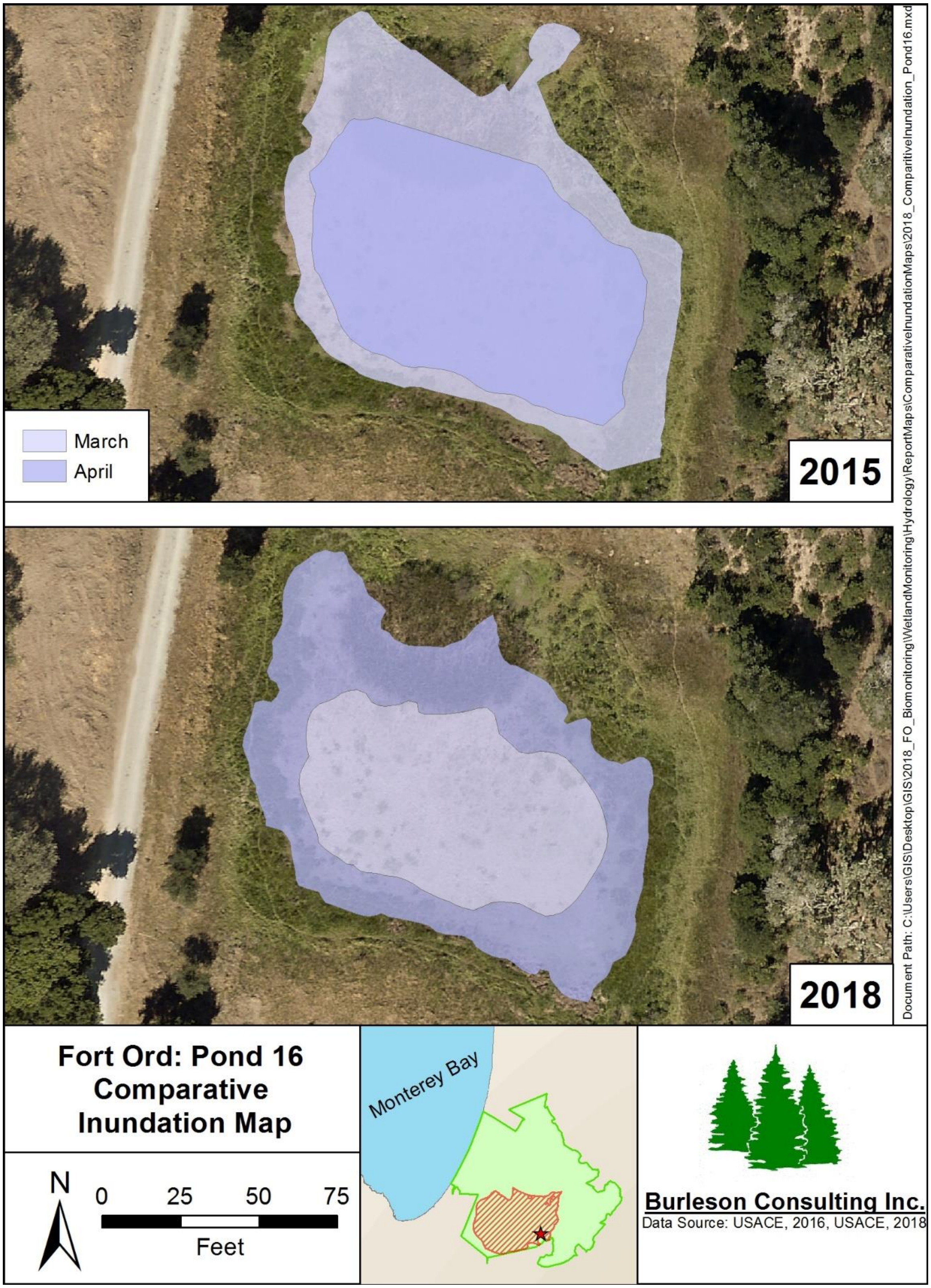


Figure 4-104. Pond 16 (Year 2 Post-Mastication) Inundations for 2014-2015 (below-normal precipitation) and 2017-2018 (below-normal precipitation). The vernal pool was masticated in 2015 and was in year 2 of monitoring in 2018.

4.19.1.1 *Data Quality Objective 1*

Pond 16 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 16 did not provide sufficient depths for CTS (12 cm through March) or fairy shrimp (20 cm through April). 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. Depths at Pond 16 were within the ranges observed at reference Pond 101 East (West) since both vernal pools only held water in March and April with depths between 10-30 cm.

4.19.1.2 *Data Quality Objective 2*

Pond 16 had similar inundations in 2018 as previous years and the relevant reference vernal pools. Pond 16 was inundated March through April with an inundation range of 0.11-0.26 acres and a mean of 0.18 acres. The historic inundation ranges in 2015 and 2017 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. In 2018, Pond 16 was similar to reference vernal pool 101 East (West) because both held water March and April with inundations less than 1 acre.

4.19.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 16, a post-mastication vernal pool, was not on track to meet the performance standard for year 2 in 2018. Pond 16 did not meet DQO 1 and the below-normal water-year and unusually late rains were likely contributing factors. Evaluation of DQO 2 indicated that Pond 16 was similar to itself in previous monitoring years and reference Pond 101 East (West). The vernal pool followed a trend observed at seven other vernal pools, Ponds 101 East (West), 3 North, 3 South, 40 North, 54, 73, and 72. Pond 16 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.19.2 Wildlife Monitoring

Wildlife data were collected at Pond 16 in 1992, 1994, 1995, 1996, 2009, and 2015 (Jones & Stokes, 1992, 1996; Shaw, 2010; Burleson *et al.*, 2016). California tiger salamander larvae were observed only in 2015. Fairy shrimp were detected at Pond 16 in 1994, 1995, 1996, and 2009. Pond 16 was not surveyed for CTS or fairy shrimp in 2018. However, DQO 1 and DQO 4 were evaluated to allow comparison in future years. DQO 5 was not applicable. Table 4-200 shows historic wildlife results.

Table 4-200. Pond 16 (Year 2 Post-Mastication) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1992	0	Present
1994	0	Very low - high abundance
1995	0	Low - high abundance
1996	0	Present
2009	11 (only eggs present)	32-105
2015	14	0

4.19.2.1 *Data Quality Objective 1*

Pond 16 did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.19.1.1.

4.19.2.2 *Data Quality Objective 4*

California tiger salamander and fairy shrimp presence in 2018 at Pond 16 are unknown; however, 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 6.10 in April to 6.65 in March with a mean of 6.38. Temperature ranged from 10.24°C in March to 17.99°C in April with a mean of 14.12°C. Dissolved oxygen ranged from 5.29 mg/L in March to 8.43 mg/L in April with a mean of 6.86 mg/L. Turbidity ranged from 33.8 FNU in April to 140.0 FNU in March with a mean of 86.9 FNU (see Table 3-34).

4.19.2.3 *Performance Standard: Wildlife Usage*

Pond 16 is a post-mastication vernal pool in year 2 of monitoring. Wildlife was not surveyed in 2018. Pond 16 is on track to meet DQO 4 and is not on track to meet DQO 1 due to insufficient inundation. DQO 5 cannot be accessed at this time. Pond 16 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.19.3 Conclusion

Pond 16, a post-mastication vernal pool, was in year 2 of monitoring in 2018. Conditions in 2018 at Pond 16 are suitable for comparison to future years. The vernal pool was not on track to meet the hydrological conditions due to insufficient depth. The plant cover and species diversity and wildlife usage performance standards were not applicable because vegetation and wildlife surveys were not conducted in 2018 (see Table 4-201). Pond 16 will continue to be monitored in the future.

Table 4-201. Success at Pond 16 (Year 2 Post-Mastication) 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	N/A*
Wildlife Usage	DQO 1	Not on track
	DQO 4	On track
	DQO 5	N/A*

*Not applicable; only hydrology surveys were conducted.

4.20 Pond 54 - Year 2

Pond 54 is a post-mastication vernal pool in year 2 of monitoring in 2018. Vegetation within Pond 54 watershed was masticated in the summer of 2015 in support of MEC remediation in Unit 23. All surveys before 2014 are pre-remediation and are considered baseline. Table 4-202 summarizes the monitoring years and corresponding survey(s). The cumulative precipitation graph shows the precipitation for monitoring years at Pond 54 (see Figure 4-105). The 2016-2017 water-year was above-normal, whereas water-years 2003-2004, 2008-2009, and 2017-2018 were below-normal.

Table 4-202. Pond 54 (Year 2 Post-Mastication) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year			
	2003-2004	2008-2009	2016-2017	2017-2018
Hydrology	●		●	●
Vegetation	●			
Wildlife	●	●	●	

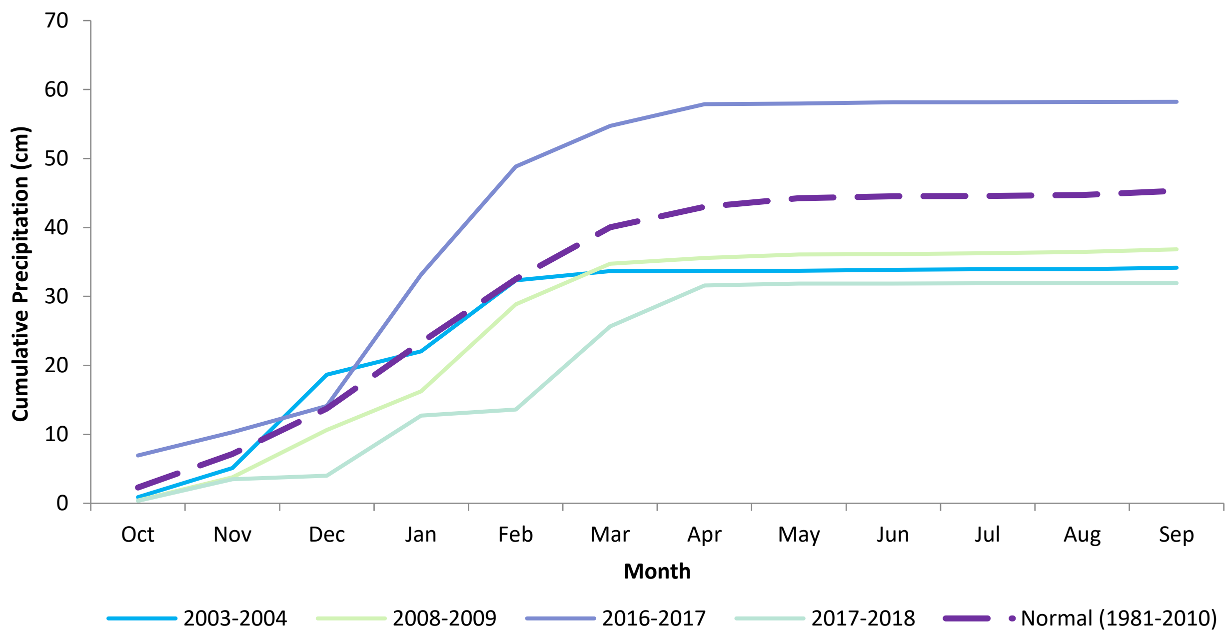


Figure 4-105. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 54 (Year 2 Post-Mastication) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.20.1 Hydrology Monitoring

The 2018 maximum inundation for Pond 54 was 0.003 acres with a maximum depth of approximately 28 cm. The depth and inundation values were within range of previous recorded values (see Appendix F Table F-20). Pond 54 filled slowly this water-year and dried quickly. This vernal pool required more than one storm event before it held water, was only inundated in March and April, and remained relatively small compared to previous years. Figure 4-106 illustrates the relationship of precipitation and depth at Pond 54 for 2018 as well as baseline in 2004.

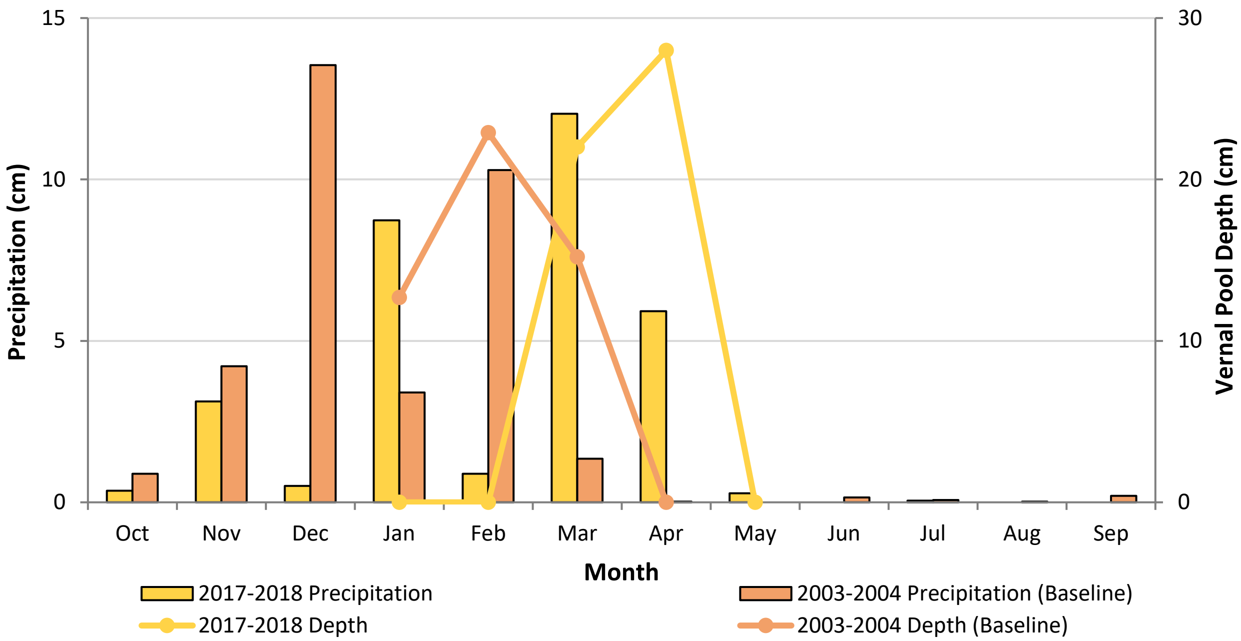


Figure 4-106. Monthly Depth and Precipitation at Pond 54 (Year 2 Post-Mastication) for 2017-2018 Water-Year Compared to Baseline 2003-2004 Water-Year

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-20). Figure 4-107 illustrates historic vernal pool depths by month and organized by water-year. Figure 4-108 illustrates historic and recent inundation areas.

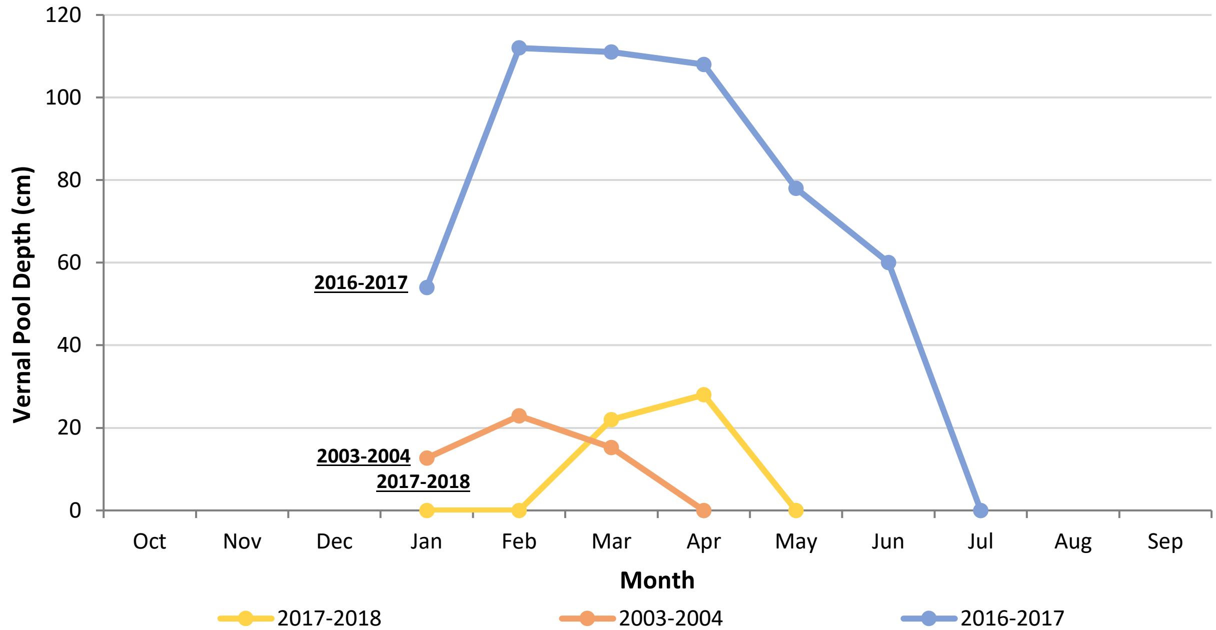


Figure 4-107. Historic Monthly Depths at Pond 54 (Year 2 Post-Mastication). Water-years are color-coded in relation to 30-Year Normal (mean 1981-2010). Red, yellow, and orange are cumulative water-years below-normal, greens are cumulative water-years within 2 inches of normal, and blues are cumulative water-years above-normal.

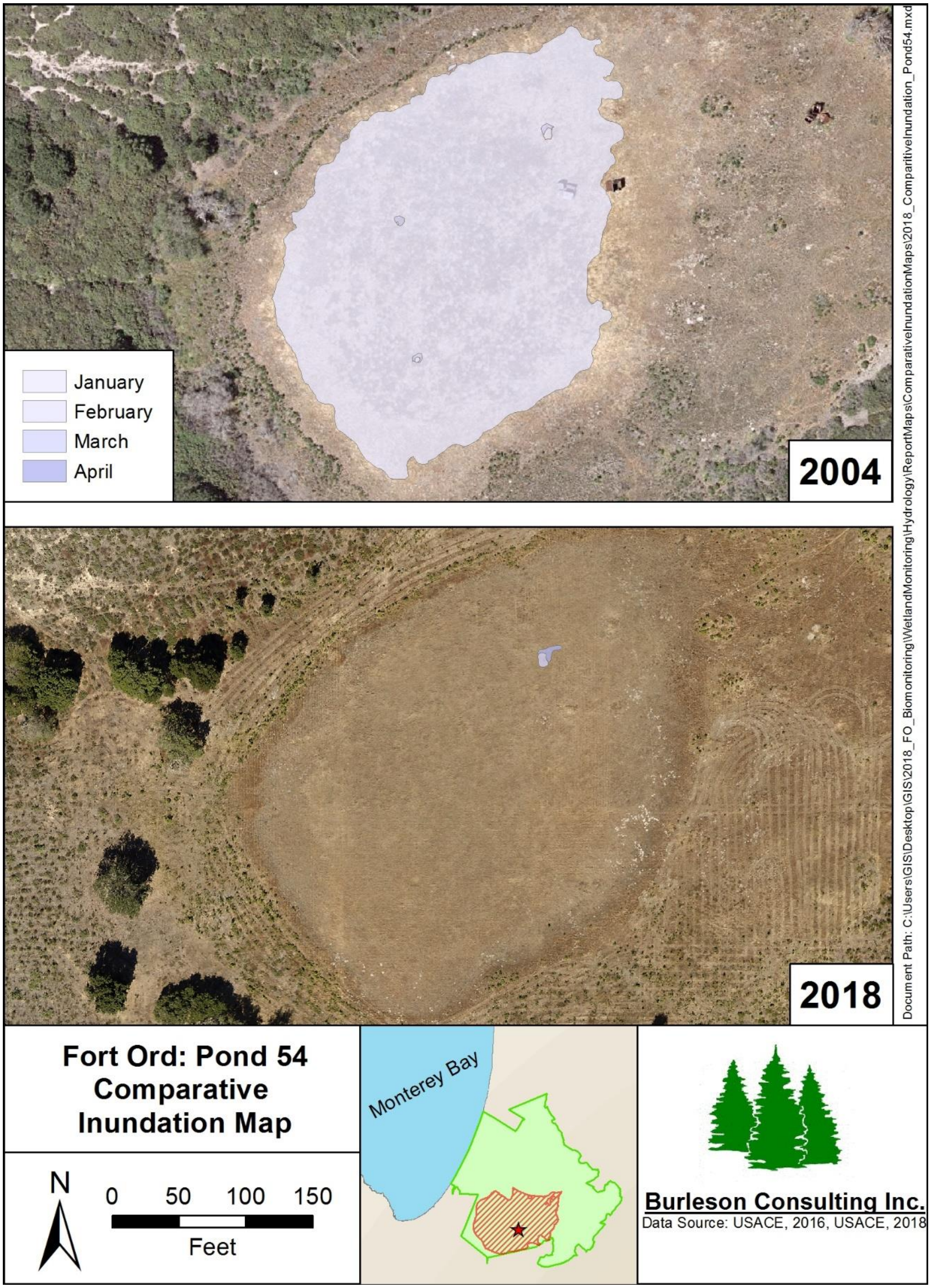


Figure 4-108. Pond 54 (Year 2 Post-Mastication) Inundations for 2003-2004 (below-normal precipitation) and 2017-2018 (below-normal precipitation). Vegetation within Pond 54 watershed was masticated in 2015 and the vernal pool was in year 2 of monitoring in 2018.

4.20.1.1 *Data Quality Objective 1*

Pond 54 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 54 did not provide sufficient depth for CTS (22 cm through March) or fairy shrimp (25 cm through April). In previous years when data were collected from the first rain event through May, DQO 1 was not met in 2003 but was met in 2017. In 2018, Pond 54 was similar to reference vernal pool 101 East (West) because both were shallow and did not meet DQO 1.

4.20.1.2 *Data Quality Objective 2*

Pond 54 had similar inundations in 2018 as previous years and the relevant reference vernal pools. Pond 54 was inundated March and April of 2018 with an inundation range of 0.001-0.003 acres and a mean of 0.002 acres. The historic inundation ranges in 2004 and 2017 were between 0.001 and 3.10 acres. The 2018 inundations were within this range and were similar to January and March 2004. 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 4-107). In 2018, Pond 54 was similar to reference vernal pool 101 East (West) because both held water March and April with inundations less than 1 acre.

4.20.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 54, a post-mastication vernal pool, was not on track to meet the performance standard for year 2 in 2018. Pond 54 did not meet DQO 1 and the below-normal water-year and unusually late rains were likely contributing factors. Evaluation of DQO 2 indicated that Pond 54 was similar to itself in previous monitoring years and reference Pond 101 East (West). The vernal pool followed a trend observed at seven other vernal pools, Ponds 101 East (West), 3 North, 3 South, 40 North, 16, 73, and 72. Pond 54 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.20.2 Wildlife Monitoring

Wildlife data were collected at Pond 54 in 2004, 2009, and 2017 (MACTEC, 2005; Shaw, 2010). California tiger salamander larvae were not detected in 2004 but were present in 2017 (year 1 post-mastication) additionally, CTS eggs were observed in 2009. Fairy shrimp have never been detected. Pond 54 was not required to be surveyed for CTS or fairy shrimp in 2018. However, DQO 1 and DQO 4 were evaluated to allow for comparison in future years. DQO 5 was not applicable. Table 4-203 shows historic wildlife monitoring results.

Table 4-203. Pond 54 (Year 2 Post-Mastication) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2004	0	-
2009	CTS eggs present; no larvae	0
2017	7	0

4.20.2.1 *Data Quality Objective 1*

Pond 54 did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.20.1.1.

4.20.2.2 *Data Quality Objective 4*

California tiger salamander and fairy shrimp presence in 2018 at Pond 54 are unknown; however, the water quality was adequate for both species. Compared to other vernal pools and previous Pond 54 data, the water quality data were in normal ranges. The pH ranged from 6.19 in March to 6.47 in April with a mean of 6.33. Temperature ranged from 10.07°C in March to 12.90°C in April with a mean of 11.49°C. Dissolved oxygen ranged from 3.82 mg/L in March to 13.76 mg/L in April with a mean of 8.79 mg/L. Turbidity ranged from 24.1 FNU in April to 35.2 FNU in March with a mean of 29.7 FNU (see Table 3-35).

4.20.2.3 *Performance Standard: Wildlife Usage*

Pond 54 is a post-mastication vernal pool in year 2 of monitoring. Wildlife was not surveyed in 2018. Pond 54 is on track to meet DQO 4 and is not on track to meet DQO 1 due to insufficient depth. DQO 5 cannot be accessed at this time. Pond 54 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.20.3 Conclusion

Pond 54, a post-mastication vernal pool, was in year 2 of monitoring in 2018. Conditions in 2018 at Pond 54 are suitable for comparison to future years. The vernal pool was not on track to meet the hydrological conditions due to insufficient depth. The plant cover and species diversity and wildlife usage performance standards were not applicable because vegetation and wildlife surveys were not conducted in 2018 (see Table 4-204). Pond 54 will continue to be monitored in the future.

Table 4-204. Success at Pond 54 (Year 2 Post-Mastication) 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	N/A*
Wildlife Usage	DQO 1	Not on track
	DQO 4	On track
	DQO 5	N/A*

*Not applicable; only hydrology surveys were conducted.

4.21 Pond 72 - Year 2

Pond 72 is a post-mastication vernal pool in year 2 of monitoring. Vegetation in Pond 72 and within its watershed was first masticated in 2011 to support MEC remediation in Unit 11. Less than 50% of Pond 72 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 4-205 summarizes the monitoring year and types of surveys conducted. The cumulative precipitation graph shows the precipitation for all monitoring years (see Figure 4-109). The 2017-2018 water-year was below-normal.

Table 4-205. Pond 72 (Year 2 Post-Mastication) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year 2017-2018
Hydrology	●
Vegetation	
Wildlife	

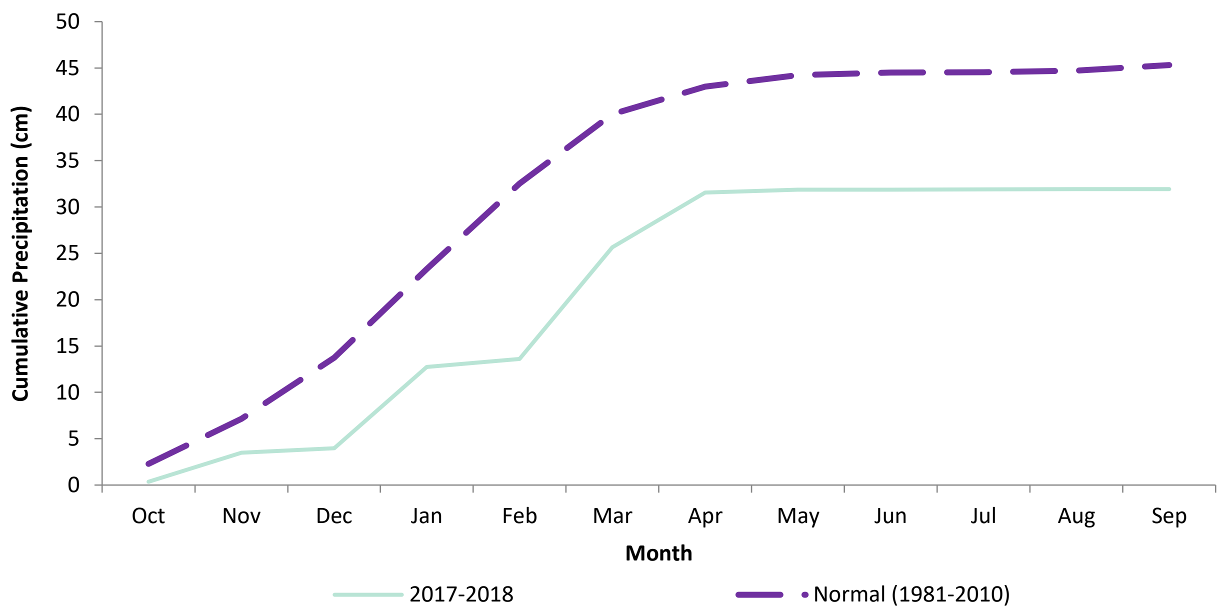


Figure 4-109. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 72 (Year 2 Post-Mastication) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2018; NCDC NOAA, 2018)

4.21.1 Hydrology Monitoring

The 2018 maximum inundation for Pond 72 was 0.36 acres with a maximum depth of approximately 36 cm (see Appendix F Table F-21). No historic hydrology data are available for comparison. Pond 72 filled slowly this water-year and dried quickly. This vernal pool required more than one storm event before it held water and was only inundated in March and April. Figure 4-110 illustrates the relationship of precipitation and depth at Pond 72 for 2018.

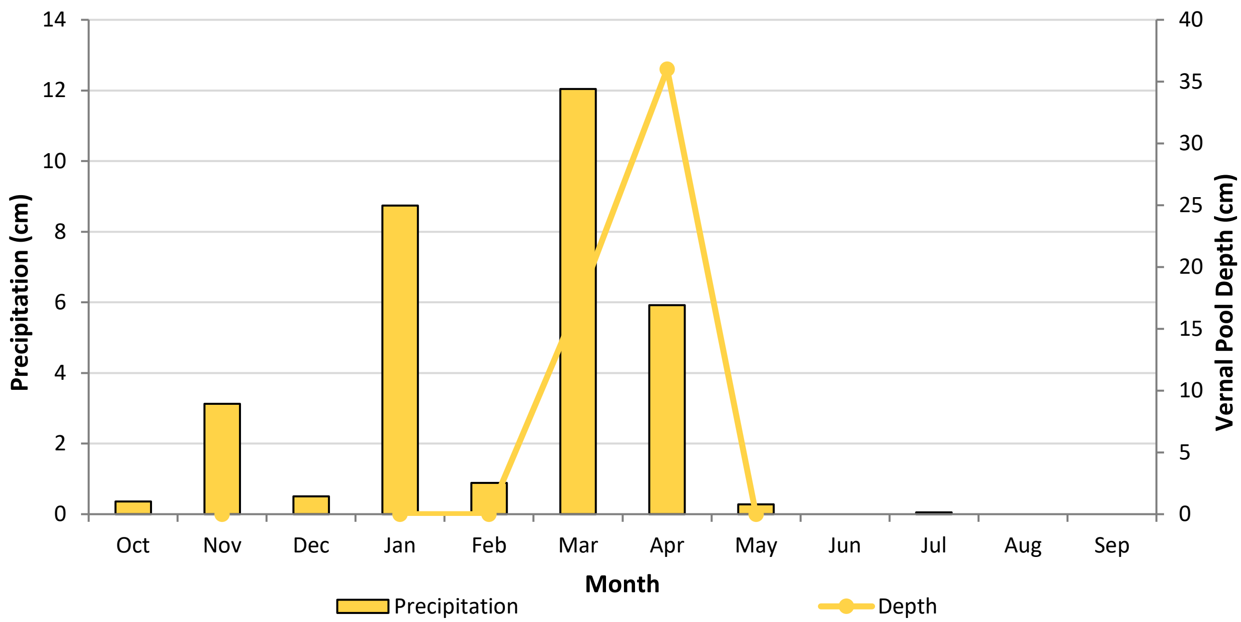


Figure 4-110. Monthly Depth and Precipitation at Pond 72 (Year 2 Post-Mastication) for 2017-2018 Water-Year

Pond 72 was monitored for the first time in 2018. No historic hydrology data are available for comparison.

4.21.1.1 *Data Quality Objective 1*

Pond 72 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 73 did not provide sufficient depth for CTS (17 cm through March) or fairy shrimp (27 cm through April). In 2018, Pond 72 was similar to reference Pond 101 East (West) because both vernal pools were shallow and did not meet DQO 1.

4.21.1.2 *Data Quality Objective 2*

Pond 72 was inundated March through April with an inundation range of 0.001-0.36 acres and a mean of 0.18 acres. No historic baseline inundations are available for comparison. In a below-normal water-year, Pond 72 is likely to be inundated. In 2018, Pond 72 was similar to reference vernal pool 101 East (West) because both held water March and April with inundations less than 1 acre.

4.21.1.3 *Performance Standard: Hydrological Conditions and Inundation Area*

Pond 72, a post-mastication vernal pool, was not on track to meet the performance standard for year 2 in 2018. The vernal pool can only be evaluated against the performance standard for year 2 in 2018 because there are no baseline or year 1 data. However, in 2018 Pond 72 followed a trend observed at seven other vernal pools, Ponds 101 East (West), 3 North, 3 South, 40 North, 16, 54, and 73. Pond 72 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.21.2 Wildlife Monitoring

Pond 72 was not surveyed for CTS or fairy shrimp in 2018. However, DQO 1 and DQO 4 were evaluated to allow for comparison in future years. DQO 5 was not applicable.

4.21.2.1 *Data Quality Objective 1*

Pond 72 did not provide suitable depth for CTS or fairy shrimp as discussed in Section 4.21.1.1.

4.21.2.2 *Data Quality Objective 4*

California tiger salamander and fairy shrimp presence in 2018 at Pond 72 are unknown; however, the water quality was adequate for both species. Compared to other vernal pools, the water quality data were within normal ranges. The pH ranged from 6.37 in March to 6.53 in April with a mean of 6.45. Temperature ranged from 10.12°C in March to 12.85°C in April with a mean of 11.49°C. Dissolved oxygen ranged from 2.51 mg/L in March to 11.86 mg/L in April with a mean of 7.19 mg/L. Turbidity ranged from 12.1 FNU in April to 292.0 FNU in March with a mean of 152.1 FNU (see Table 3-36).

4.21.2.3 *Performance Standard: Wildlife Usage*

Pond 72 is a post-mastication vernal pool in year 2 of monitoring. Wildlife was not surveyed in 2018. Pond 72 is on track to meet DQO 4 and is not on track to meet DQO 1 due to insufficient depth. DQO 5 cannot be accessed at this time. Pond 72 will continue to be monitored in future years to evaluate its progress to meet the performance standard.

4.21.3 Conclusion

Pond 72, a post-mastication vernal pool, was in year 2 of monitoring in 2018. Conditions in 2018 at Pond 72 are suitable for comparison to future years. The vernal pool can only be evaluated against the performance standards for year 2 in 2018 because there are no baseline or year 1 data. Pond 72 was not on track to meet the hydrological conditions. The plant cover and species diversity and wildlife usage performance standards were not applicable because vegetation and wildlife surveys were not conducted in 2018 (see Table 4-206). Pond 72 will continue to be monitored in the future.

Table 4-206. Success at Pond 72 (Year 2 Post-Mastication) 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	N/A*
Wildlife Usage	DQO 1	Not on track
	DQO 4	On track
	DQO 5	N/A*

*Not applicable; only hydrology surveys were conducted

This page intentionally left blank

5 CONCLUSION

Late rain events in March and April and below-normal precipitation in 2018 significantly impacted the vernal pools' hydrological conditions, wetland vegetation, and wildlife usage. Only two of the vernal pools were on track to meet the performance standard for hydrological conditions and inundation (see Table 5-1). Vernal pools did not meet the DQO 1 for depth due to remaining dry, insufficient depth, drying early or unusual fluctuations in the hydroperiod. This made it difficult to achieve the performance standard for wildlife usage as well, since it is partially based on DQO 1. Pond 60 was partially on track to meeting performance standards while all other vernal pools were not on track. The wildlife usage performance standard was not met for many vernal pools due to DQO 1 not being met. The DQO 1 was not met in these cases due to the below-normal precipitation year.

Plant cover and species diversity were on track for all surveyed vernal pools except Pond 35. There was an increase in species richness for both native and non-native species at all vernal pools for all treatment types. The average increase was the same for native and non-native species, 7.75 species. With the exception of Ponds 40 South and 35, the majority of the species were native and the relative percent cover was dominated by native species. In addition, all vernal pools supported a majority of wetland species and relative percent cover was dominated by wetland species. Of the newly observed species in 2018 that had not been recorded in any previous year, most of the species were non-wetland. However, with the exception of Pond 35, the relative percent cover of these non-wetland species made up less than 10% of the relative vernal pool cover. The most prevalent new species observed in 2018 were rough cat's-ear (non-native, FACU), needle spikerush (native, OBL), and coastal tarweed (native, NL), which were recorded at 12, 9, and 7 vernal pools respectively.

All remediated vernal pools monitored in 2018 are either in year 1 or year 2 and will continue to be monitored. None of the vernal pools are required to meet performance standards at this time.

Table 5-1. 2018 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)
3 North	Year 1 Post-Burn	Not on track	On track	On track	Not on track	On track	Partial
3 South	Year 1 Post-Burn	Not on track	On track	On track	Not on track	On track	N/A*
39	Year 1 Post-Burn	Not on track	On track	On track	Not on track	On track	On track
40 North	Year 1 Post-Burn	Not on track	On track	On track	Not on track	On track	N/A*
40 South	Year 1 Post-Burn	Not on track	On track	On track	Not on track	N/A*	N/A*
43	Year 1 Post-Burn	Not on track	On track	On track	Not on track	N/A*	N/A*
35	Year 1 Post-Mastication	Not on track	On track	Not on track	Not on track	N/A*	N/A*
42	Year 1 Post-Mastication and Post-Burn	Not on track	On track	On track	Not on track	On track	Partial
44	Year 1 Post-Mastication	Not on track	On track	On track	Not on track	N/A*	N/A*
56	Year 1 Post-Mastication	On track	On track	N/A*	On track	On track	N/A*
60	Year 1 Post-Mastication	Partial	On track	On track	Partial	On track	Partial
61	Year 1 Post-Mastication	Not on track	On track	On track	Not on track	N/A*	N/A*
73	Year 1 Post-Mastication	Not on track	On track	On track	Not on track	On track	Cannot be assessed
Machine Gun Flats	Year 1 Post-Mastication	On track	On track	N/A*	On track	On track	N/A*
16	Year 2 Post-Mastication	Not on track	On track	N/A*	Not on track	On track	N/A*
54	Year 2 Post-Mastication	Not on track	On track	N/A*	Not on track	On track	N/A*
72	Year 2 Post-Mastication	Not on track	On track	N/A*	Not on track	On track	N/A*

*Performance standard not measured since surveys not conducted

6 REFERENCES

Baldwin BG, Goldman DH, Keil DJ, Patterson R, Rosatti TJ, Wilken DH (eds.). 2012. The Jepson Manual - Vascular Plants of California. 2nd ed. University of California Press, Berkeley, CA. pp. 1600.

Barbour, M.G., J.H. Burk, and W.D. Pitts. 1980. Terrestrial Plant Ecology. Benjamin/Cummings Publishing. Menlo Park, California.

Barbour MG, T Keeler-Wolf, and AA Schoenherr (eds.). 2007. Terrestrial Vegetation of California, Third Edition. University of California Press, Berkeley, CA. pp. 394-424.

Bauder ET. 2000. "Inundation effects on small-scale plant distributions in San Diego, California vernal pools." Aquatic Ecology 34. Kluwer Academic Publishers. pp. 43-61.

Bauder ET. 2005. "The effects of an unpredictable precipitation regime on vernal pool hydrology." Freshwater Biology 50. Blackwell Publishing Ltd. pp. 2129-2135.

Bliss SA and PH Zedler. 1998. "The Germination Process in Vernal Pools: Sensitivity to Environmental Conditions and Effects on Community Structure." Oecologia, Vol. 113, No. 1. Springer in cooperation with International Association for Ecology. pp. 67-73.

Burleson Consulting, Inc. 2006. Wetland Monitoring and Restoration Plan for Munitions and Contaminated Soil Remediation. Prepared for the Department of the Army, U.S. Army Corps of Engineers, Sacramento, CA.

Burleson Consulting, Inc. 2012. Site Specific Restoration Plan, Historic Areas 18, 19, 22, 23, 26, 27, 27A, 28, 29, 33, 34, 36, 37, 38, 39/40, 43, 44, 48 and Austin Rd, Former Fort Ord, California. Prepared for the Department of the Army, U.S. Army Corps of Engineers, Sacramento, CA.

Burleson Consulting, Inc., Denise Duffy & Associates, Inc., and EcoSystems West Consulting Group. 2016. 2015 Annual Wetland Vegetation and Wildlife Monitoring Report. Prepared for the Department of the Army, U.S. Army Corps of Engineers, Sacramento, CA.

Burleson Consulting, Inc. and Denise Duffy & Associates, Inc. 2017. 2016 Annual Wetland Vegetation and Wildlife Monitoring Report. Prepared for the Department of the Army, U.S. Army Corps of Engineers, Sacramento, CA.

Burleson Consulting, Inc. 2018. 2017 Annual Wetland Vegetation and Wildlife Monitoring Report. Prepared for the Department of the Army, U.S. Army Corps of Engineers, Sacramento, CA.

California Department of Water Resources (CDWR). 2018. California Data Exchange Center. [Internet]. Accessed on August 28, 2018. Available at http://cdec.water.ca.gov/index.html

California Native Plant Society. 2013. Rare and Endangered Plant Inventory. [Internet]. Accessed on November 3, 2016. Available at http://www.rareplants.cnps.org/detail/3732.html

Erickson C and D Belk. 1999. Fairy shrimps of California's puddles, pools, and playas. Mad River Press, Eureka CA.

Esri. 2017. ArcGIS Version 10.6.

Denise Duffy & Associates, Inc. 2009. California Tiger Salamander and California Fairy Shrimp Aquatic Sampling Survey Report. In: 2009 Annual Biological Monitoring Report, Former Fort Ord, California. Prepared for U.S. Army Corps of Engineers, Sacramento, CA.

Denise Duffy & Associates, Inc. 2010. California Tiger Salamander and California Fairy Shrimp Aquatic Sampling Survey Report. In: 2010 Annual Biological Monitoring Report, Former Fort Ord, California. Prepared for U.S. Army Corps of Engineers, Sacramento, CA.

Harding ESE. 2002. 2001 Annual Monitoring Report Biological Baseline Studies and Follow-up Monitoring Former Fort Ord, Monterey, California. Prepared for U. S. Department of the Army, Sacramento, CA.

Harding Lawson and Associates (HLA). 1997. 1997 Annual Habitat Monitoring Report Former Fort Ord, Monterey, California. Prepared for U. S. Department of the Army, Seaside, CA.

Harding Lawson and Associates (HLA). 1998. 1998 Annual Monitoring Report Biological Baseline Studies and Follow-Up Monitoring at Unexploded Ordnance Sites on Former Fort Ord, Presidio of Monterey Annex, Monterey, California. Prepared for U.S. Department of the Army, Sacramento, CA.

Harding Lawson and Associates (HLA). 1999. 1999 Annual Habitat Monitoring Report Former Fort Ord, Monterey County, California. Prepared for U. S. Department of the Army, Sacramento, CA.

Harding Lawson and Associates (HLA). 2001. 2000 Annual Monitoring Report Biological Baseline Studies and Follow-up Monitoring Former Fort Ord, Monterey County, California. Prepared for U. S. Department of the Army, Sacramento, CA.

Jones and Stokes Associates, Inc. 1992. Flora and Fauna Baseline Study of Fort Ord, California. Prepared for Army Corps of Engineers, Sacramento, CA.

Jones and Stokes Associates Inc. 1996. 1996 Annual Wetland Monitoring Report for UXO Removal at Former Fort Ord. Prepared for Army Corps of Engineers, Sacramento, CA.

Lichvar, RW, NC Melvin, ML Butterwick, and WN Kirchner. 2012. National Wetland Plant List Indicator Rating Definitions. US Army Corps of Engineers Engineer Research and Development Center. Available at: http://rsgisias.crrel.usace.army.mil/nwpl_static/data/DOC/NWPL/pubs/2012b_Lichvar_et_al.pdf

Lichvar, RW, DL Banks, WN Kirchner, and NC Melvin. 2016. The National Wetland Plant List: 2016 Wetland Ratings. Phytoneuron 2016-30: 1-17. Available at http://wetland-plants.usace.army.mil/

MACTEC. 2003. 2002 Annual Monitoring Report Biological Baseline Studies and Follow-up Monitoring Former Fort Ord, Monterey, California. Prepared for U. S. Department of the Army, Sacramento, CA.

MACTEC. 2004. 2003 Annual Monitoring Report Biological Baseline Studies and Follow-up Monitoring Former Fort Ord, Monterey, California. Prepared for U. S. Department of the Army, Sacramento, CA.

MACTEC. 2005. 2004 Annual Monitoring Report Biological Baseline Studies and Follow-up Monitoring Former Fort Ord, Monterey, California. Prepared for U. S. Department of the Army, Sacramento, CA.

Matthews MA and M Mitchell. 2015. The Plants of Monterey County, an Illustrated Field Key. 2nd ed. California Native Plant Society Press, Sacramento, CA. pp. 446.

National Climatic Data Center of the National Oceanic and Atmospheric Administration (NDC NOAA). 2018. 30-Year Normal Precipitation Data for the NWSFO Monterey Airport Meteorological Tower. [Internet]. Accessed on July 27, 2018. Available at: http://www.ncdc.noaa.gov/cdo-web/datatools/normals

National Drought Mitigation Center (NDMC) at the University of Nebraska-Lincoln, National Oceanic and Atmospheric Administration, and U.S. Department of Agriculture. 2018. United States Drought Monitor. [Internet]. Accessed August 29, 2018. Available at: https://droughtmonitor.unl.edu/

Naval Postgraduate School Department of Meteorology (NPSDM). 2018. Monthly Precipitation Summaries for the Monterey Region. [Internet]. Accessed October 1, 2018. Available at: http://met.nps.edu/~ldm/renard_wx/

Peterson PM, RJ Soreng, D Styer, D Neubauer, R Morgan, V Yadon. 2011. *Agrostis Lacuna-Vernalis* (Pooideae: Poeae: Agrostidinae), a New Species from California. Journal of the Botanical Research Institute of Texas. 5(2):421-426.

Tetra Tech, Inc. 2014. 2013 California Tiger Salamander and California Fairy Shrimp Aquatic Sampling Former Fort Ord. In: 2013 Biological Monitoring Report for Units 7, 5E, and 23E; Units 15, 21, 32, and 34; Units 18 and 22; and Ranges 43–48 Former Fort Ord. Prepared for U.S. Army Corps of Engineers, Sacramento, CA.

Tetra Tech, Inc. 2015. 2014 California Tiger Salamander and California Fairy Shrimp Aquatic Sampling Former Fort Ord. In: 2014 Biological Monitoring Report for Units 25 and 31; Units 06, 07, 10, 33, WGBA, and MOUT; Units 04, 11, 12 and 23N; Units 14 and 19; and MRS-16 Former Fort Ord. Prepared for U.S. Army Corps of Engineers, Sacramento, CA.

Shaw Environmental, Inc. (Shaw). 2008. 2007 Annual Biological Monitoring Report, Former Fort Ord, California. Prepared for the Department of the Army, U.S. Army Corps of Engineers, Sacramento, CA.

Shaw Environmental, Inc. (Shaw). 2010. 2009 Annual Biological Monitoring Report, Former Fort Ord, California. Prepared for the Department of the Army, U.S. Army Corps of Engineers, Sacramento, CA.

Shaw Environmental, Inc. (Shaw). 2011. 2010 Annual Biological Monitoring Report, Former Fort Ord, California. Prepared for the Department of the Army, U.S. Army Corps of Engineers, Sacramento, CA.

Witham CW, ET Bauder, D Belk, WR, Jr., Ferren, R Ornduff (eds.). 1998. Ecology, Conservation, and Management of Vernal Pool Ecosystems - Proceedings from a 1996 Conference. California Native Plant Society, Sacramento, CA.

United States Army Corps of Engineers, Sacramento District. 1994. Installation-Wide Multi-Species Habitat Management Plan for Former Fort Ord, California. February. Sacramento, CA.

United States Army Corps of Engineers, Sacramento District. 1997. Installation-Wide Multi-Species Habitat Management Plan for Former Fort Ord, California. April. Sacramento, CA.

United States Army Corps of Engineers. 2016a. aquatic_habitat_area.shp. [Data set]. Unpublished.

United States Department of Agriculture, Natural Resources Conservation Services. 2018. National Agricultural Imagery Program Imagery. [Internet]. Accessed on September 1, 2018. Available at https://gdg.sc.egov.usda.gov/

U.S. Fish and Wildlife Service and California Department of Fish and Game. 1996. 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.

U.S. Fish and Wildlife Service and California Department of Fish and Game. 2003. Interim Guidance on Site Assessment for Determining the Presence or a Negative Finding of the California Tiger Salamander.

United States Fish and Wildlife Service. 2015. Programmatic Biological Opinion for Cleanup and Property Transfer Actions Conducted at the Former Fort Ord, Monterey County, CA. Report No. 8-8-09-F-74.

United States Fish and Wildlife Service. 2017. Reinitiation of Programmatic Biological Opinion for Cleanup and Property Transfer Actions Conducted at the Former Fort Ord, Monterey County, CA. Report No. 8-8-09-F-74.

United States Geological Survey. 2017. California Drought. [Internet]. Accessed on November 1, 2017. Available at http://ca.water.usgs.gov/data/drought/

APPENDIX A

Water Quality Results and Inundation Area for Vernal Pools by Month

This page intentionally left blank

Table A-1. Hydrology Results for January Monitoring (1/15/2018-1/19/2018)

Vernal Pool	Monitoring Status	Date	Time	pH	Temperature (˚C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
5	Reference	1/15/2018	11:14	7.12	12.56	6.54	16.6	22	2.95
101 East (West)	Reference	1/19/2018	11:13	-	-	-	-	DRY	0.00
101 East (East)	Reference	1/19/2018	9:50	6.82	11.92	0.21	63	44	2.09
997	Reference	1/19/2018	8:58	-	-	-	-	DRY	0.00
3 North	Year 1	1/16/2018	10:20	-	-	-	-	DRY	0.00
3 South	Year 1	1/16/2018	10:27	-	-	-	-	DRY	0.00
39	Year 1	1/16/2018	9:18	5.94	11.78	2.36	43.1	15	0.002
40 North	Year 1	1/16/2018	10:03	-	-	-	-	DRY	0.00
40 South	Year 1	1/16/2018	9:50	-	-	-	-	DRY	0.00
43	Year 1	1/16/2018	13:55	-	-	-	-	DRY	0.00
35	Year 1	1/16/2018	9:00	-	-	-	-	DRY	0.00
42	Year 1	1/15/2018	14:14	6.82	18.26	0.65	93.9	5	0.001
44	Year 1	1/18/2018	9:41	-	-	-	-	DRY	0.00
56	Year 1	1/16/2018	13:09	5.96	12.02	3.22	46.2	22	0.08
60	Year 1	1/18/2018	11:54	6.29	11.00	3.60	25.7	20	0.07
61	Year 1	1/16/2018	11:42	-	-	-	-	DRY	0.00
73	Year 1	1/18/2018	9:01	-	-	-	-	DRY	0.00
MGF	Year 1	1/15/2018	12:45	7.02	11.14	3.40	18.5	100	7.84*
16	Year 2	1/18/2018	11:08	-	-	-	-	DRY	0.00
54	Year 2	1/18/2018	10:40	-	-	-	-	DRY	0.00
72	Year 2	1/18/2018	10:12	-	-	-	-	DRY	0.00

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

Table A-2. Hydrology Results for February Monitoring (2/16/2018, 2/20/2018-2/23/2018)

Vernal Pool	Monitoring Status	Date	Time	pH	Temperature (˚C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
5	Reference	2/23/2018	9:21	7.12	6.00	5.27	39.2	15	1.85
101 East (West)	Reference	2/21/2018	14:32	-	-	-	-	DRY	0.00
101 East (East)	Reference	2/16/2018	11:08	6.80	10.94	4.45	114	-	1.44
997	Reference	2/23/2018	8:28	-	-	-	-	DRY	0.00
3 North	Year 1	2/20/2018	10:20	-	-	-	-	DRY	0.00
3 South	Year 1	2/20/2018	10:30	-	-	-	-	DRY	0.00
39	Year 1	2/20/2018	9:40	-	-	-	-	DRY	0.00
40 North	Year 1	2/20/2018	9:55	-	-	-	-	DRY	0.00
40 South	Year 1	2/20/2018	9:50	-	-	-	-	DRY	0.00
43	Year 1	2/20/2018	11:55	-	-	-	-	DRY	0.00
35	Year 1	2/20/2018	9:30	-	-	-	-	DRY	0.00
42	Year 1	2/20/2018	11:40	-	-	-	-	DRY	0.00
44	Year 1	2/20/2018	11:20	-	-	-	-	DRY	0.00
56	Year 1	2/20/2018	13:26	6.95	13.20	15.00	333	15	0.01
60	Year 1	2/22/2018	10:55	-	-	-	-	DRY	0.00
61	Year 1	2/20/2018	14:46	-	-	-	-	DRY	0.00
73	Year 1	2/22/2018	10:30	-	-	-	-	DRY	0.00
MGF	Year 1	2/23/2018	10:34	7.33	8.55	4.65	6.2	95	7.26*
16	Year 2	2/22/2018	10:15	-	-	-	-	DRY	0.00
54	Year 2	2/22/2018	10:00	-	-	-	-	DRY	0.00
72	Year 2	2/22/2018	8:49	-	-	-	-	DRY	0.00

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

Table A-3. Hydrology Results for March Monitoring (3/19/2018-3/21/2018)

Vernal Pool	Monitoring Status	Date	Time	pH	Temperature (˚C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
5	Reference	3/21/2018	8:58	7.01	11.76	6.65	4.7	22	3.01
101 East (West)	Reference	3/21/2018	10:50	6.62	13.58	3.09	39.5	16	0.004
101 East (East)	Reference	3/21/2018	9:53	6.97	12.62	3.35	40.8	40	1.86
997	Reference	3/20/2018	11:17	-	-	-	-	DRY	0.00
3 North	Year 1	3/19/2018	10:35	6.27	11.33	8.75	57.4	10	0.02
3 South	Year 1	3/19/2018	10:49	-	-	-	-	DRY	0.00
39	Year 1	3/19/2018	9:48	6.51	8.35	4.59	142.0	38	0.01
40 North	Year 1	3/19/2018	10:10	6.18	6.67	9.12	141.0	8	0.01
40 South	Year 1	3/19/2018	10:02	-	-	-	-	DRY	0.00
43	Year 1	3/19/2018	11:55	-	-	-	-	DRY	0.00
35	Year 1	3/19/2018	9:40	-	-	-	-	DRY	0.00
42	Year 1	3/19/2018	12:12	6.78	15.61	6.85	40.3	13	0.02‡
44	Year 1	3/19/2018	11:30	-	-	-	-	DRY	0.00
56	Year 1	3/19/2018	13:07	7.03	10.79	9.75	8.3	38	0.25
60	Year 1	3/19/2018	13:37	6.40	14.82	8.71	12.1	38	0.20
61	Year 1	3/19/2018	14:30	-	-	-	-	DRY	0.00‡
73	Year 1	3/19/2018	13:55	-	-	-	-	DRY	0.00
MGF	Year 1	3/21/2018	12:24	7.17	11.83	6.20	18.7	105	8.33*
16	Year 2	3/20/2018	8:36	6.65†	10.24†	5.29†	140.0†	12	0.11
54	Year 2	3/20/2018	9:37	6.19	10.07	3.82	35.2	22	0.00
72	Year 2	3/20/2018	9:02	6.37	10.12	2.51	292	17	0.001‡

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

Table A-4. Hydrology Results for April Monitoring (4/16/2018-4/18/2018)

Vernal Pool	Monitoring Status	Date	Time	pH	Temperature (˚C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
5	Reference	4/18/2018	13:50	7.29	20.68	7.09	40.6	22	2.85
101 East (West)	Reference	4/17/2018	13:43	7.20	21.74	10.95	16.6	24	0.09
101 East (East)	Reference	4/17/2018	13:04	7.12	21.88	10.03	99.4	40	1.67
997	Reference	4/18/2018	13:00	-	-	-	-	DRY	0.00
3 North	Year 1	4/16/2018	10:29	6.61	13.33	7.60	5.3	24	0.05
3 South	Year 1	4/16/2018	12:47	7.13	15.67	8.75	77.7	8	0.001‡
39	Year 1	4/16/2018	9:41	6.21	12.68	5.81	66.2	34	0.01
40 North	Year 1	4/16/2018	10:07	6.36	11.72	7.62	64.2	9	0.01
40 South	Year 1	4/16/2018	11:59	-	-	-	-	DRY	0.00
43	Year 1	4/16/2018	11:34	-	-	-	-	DRY	0.00
35	Year 1	4/16/2018	9:28	-	-	-	-	DRY	0.00
42	Year 1	4/16/2018	11:22	6.79	12.18	8.69	16.1	24	0.24
44	Year 1	4/16/2018	11:00	-	-	-	-	DRY	0.00‡
56	Year 1	4/17/2018	11:35	6.65	12.94	2.15	12.0	63	0.85
60	Year 1	4/17/2018	9:23	6.33	11.36	3.66†	1.2	59	0.77
61	Year 1	4/17/2018	8:47	-	-	-	-	DRY	0.00‡
73	Year 1	4/17/2018	10:00	6.33	11.33	5.63	9.5	14	0.001‡
MGF	Year 1	4/18/2018	11:46	6.84	13.8	3.56	7.8	111	8.34*
16	Year 2	4/16/2018	14:11	6.10	17.99	8.43	33.8	28	0.26
54	Year 2	4/16/2018	14:34	6.47	12.90	13.76	24.1	28	0.00
72	Year 2	4/16/2018	13:25	6.53	12.85	11.86	12.1	36	0.36

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

Table A-5. Hydrology Results for May Monitoring (5/21/2018-5/22/2018, 5/24/2018)

Vernal Pool	Monitoring Status	Date	Time	pH	Temperature (˚C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
5	Reference	5/22/2018	11:58	-	-	-	-	DRY	0.00‡
101 East (West)	Reference	5/21/2018	13:00	-	-	-	-	DRY	0.00
101 East (East)	Reference	5/22/2018	10:22	6.42	13.55	15.25	1000	14	0.04
3 North	Year 1	5/21/2018	9:42	-	-	-	-	DRY	0.00
3 South	Year 1	5/21/2018	9:32	-	-	-	-	DRY	0.00
39	Year 1	5/21/2018	12:02	-	-	-	-	DRY	0.00
40 North	Year 1	5/21/2018	12:10	-	-	-	-	DRY	0.00
42	Year 1	5/21/2018	9:58	-	-	-	-	DRY	0.00
56	Year 1	5/21/2018	12:45	6.38	14.75	2.56	1.5	56	0.31
60	Year 1	5/21/2018	11:30	6.36	14.99	5.01	7.6	38	0.19
73	Year 1	5/21/2018	10:16	-	-	-	-	DRY	0.00
MGF	Year 1	5/24/2018	10:27	6.84	14.98	5.26	4.8	93	4.93*
16	Year 2	5/22/2018	8:40	-	-	-	-	DRY	0.00
54	Year 2	5/22/2018	12:50	-	-	-	-	DRY	0.00
72	Year 2	5/22/2018	9:03	-	-	-	-	DRY	0.00

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

Table A-6. Hydrology Results for June Monitoring (6/19/2018)

Vernal Pool	Monitoring Status	Date	Time	pH	Temperature (˚C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
101 East (East)	Reference	6/19/18	14:12	-	-	-	-	DRY	0.00
56	Year 1	6/19/18	14:32	6.58	25.56	4.08	0.00	36	0.11
60	Year 1	6/19/18	13:45	6.74	28.26	8.41	0.00	18	0.02
MGF	Year 1	6/19/18	15:41	7.06	22.99	2.70	0.00	78	0.06

Table A-7. Hydrology Results for July Monitoring (7/19/2018)

Vernal Pool	Monitoring Status	Date	Time	Max Depth (cm)	Inundated Surface Area (acres)
56	Year 1	7/19/18	10:36	DRY	0.00
60	Year 1	7/19/18	11:25	DRY	0.00
MGF	Year 1	7/19/18	10:56	60	0.06

Table A-8. Hydrology Results for August Monitoring (8/20/2018)

Vernal Pool	Monitoring Status	Date	Time	Max Depth (cm)	Inundated Surface Area (acres)
MGF	Year 1	8/20/18	10:10	36	0.02

Table A-9. Hydrology Results for September Monitoring (9/19/2018)

Vernal Pool	Monitoring Status	Date	Time	Max Depth (cm)	Inundated Surface Area (acres)
MGF	Year 1	9/19/18	8:30	15	0.01

Page: 1 of 1

Fort Ord

WATER QUALITY MONITORING

Date: 3/19, 3/20, 3/21 **Weather Conditions:** 3/19 sunny, brisk wind / 3/20 rain / 3/21 overcast no rain **Personnel:** K. Christianson; R. Spellenberg

Location	Date	Time	pH	Temp (C)	Specific Cond. (µS/cm)	D/O (mg/L)	Turbidity (FNU)	Comments
Pond 3 North (Year 1) UXO DO NOT ENTER	3/19	10:35	6.27	11.33	130	8.75	57.4	10cm
Pond 3 South (Year 1) UXO DO NOT ENTER	3/19	10:49						DRY
Pond 5 (Reference) NO UXO ENTER	3/20	8:58	7.01	11.76	974	6.65	4.7	22cm
Pond 16 (Year 2 Mastication) UXO DO NOT ENTER	3/20	8:36	6.65	10.24	321	5.29	140	12cm; probe on its side for measurement
Pond 35 (Year 1 Mastication) UXO DO NOT ENTER	3/19	9:40						DRY
Pond 39 (Year 1) UXO DO NOT ENTER	3/19	9:48	6.51	8.35	0	4.95	142	38cm; 2nd gauge dry
Pond 40 North (Year 1) UXO DO NOT ENTER	3/19	10:10	6.18	6.67	36	9.12	141	8cm
Pond 40 South (Year 1) UXO DO NOT ENTER	3/19	10:02						DRY
Pond 42 (Year 1 Mastication) ~~NO UXO~~ DO NOT ENTER	3/19	12:12	6.78	15.61	129	6.85	40.3	13cm; peripheral ponding not hydro. connected to ponded area @ gauge
Pond 43 (Year 1) UXO DO NOT ENTER	3/19	11:55						DRY
Pond 44 (Year 1 Mastication) UXO DO NOT ENTER	3/19	11:30						DRY; installed new gauge
Pond 54 (Year 2 Mastication) UXO DO NOT ENTER	3/20	9:37	6.19	10.07	464	3.82	35.2	22cm: Temp logged under Pond 72
Pond 56 (Year 1 Mastication) UXO DO NOT ENTER	3/19	13:07	7.03	10.79	590	9.75	8.3	38cm
Pond 60 (Year 1 Mastication) UXO DO NOT ENTER	3/19	13:37	6.40	14.82	1014	8.71	12.1	38cm
Pond 61 (Year 1 Mastication) UXO DO NOT ENTER	3/19	14:30						DRY; ponding on western end in CCG was not mapped
Pond 72 (Year 2 Mastication) UXO DO NOT ENTER	3/20	9:02	6.37	10.12	301	2.51	292	17cm; peripheral ponding not hydro connected to ponded area @ gauge
Pond 73 (Year 1 Mastication) UXO DO NOT ENTER	3/19	13:55						DRY
Pond 101 East (East) (Reference) NO UXO ENTER	3/21	9:53	6.97	12.62	510	3.35	40.8	40 cm
Pond 101 East (West) (Reference) NO UXO ENTER	3/21	10:50	6.62	13.58	436	6.09	39.5	16 cm
Pond 997 (Reference) NO UXO ENTER	3/20	11:47						DRY
MGF (Year 1 Mastication) NO UXO ENTER (check map)	3/21	12:24	7.17	11.83	470	6.20	18.7	105cm
				11.833			18.79	

Figure A-1. Example field data collection sheet

FIELD INSTRUMENT CALIBRATION RECORD

Fort Ord

Calibration Code:		Sheet of
Employee Performing Calibration: Kayti Christianson		
Instruments:	**Standards:**	**Lot Number and Expiration Date:**
(1) pH meter	pH = 7.00	0935 9/2020
(2) pH meter	pH = 4.00	
(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
3/21/2018	8:35	HI 9829-0	6.85	6.85	17.5/16.75			
3/21/2018	12:52	" "		6.84	20.71			

Review	***Action***
Site Manager/Project Manager ______ Date ______	

09/09/16 11:30 AM

Figure A-2. Example Probe Calibration Sheet for Hanna Instruments 9829 Multiparameter Meter

This page intentionally left blank

APPENDIX B

Vegetation Transect Data

This page intentionally left blank

Table B-1. Pond 5 (Reference) Wetland Vegetation Transect Data by Stratum

POND 5			
Date	6/6/2018, 6/8/2018		
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 6/6/2018 survey. Stratum 1 was repeated from 2016, strata 2, 3, and 4 were repeated from 2016 and 2017, stratum 5 was repeated from 2017, and stratum 6 was new in 2018. Transects 1 and 5 were repeated. Transects 2, 3, and 4 were relocated because the previous locations were no longer within the correct strata. Transect 2 was shortened to 5-m to fit within the stratum. Transect 6 was established in 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
1	**10 m**	**40%**	ELMA	33	ELMA	25	ELMA	45	ELMA	47	ELMA	35	CRTR	5
			TH	2	MALE	1	TH	4	TH	6	MALE	5	ELMA	20
			BG	65	TH	4	BG	51	BG	47	TH	5	MALE	3
					BG	70					BG	55	TH	22
													BG	50
			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**	**3%**	DISP	27	DISP	15	CRTR	2
			ELMA	20	ELMA	17	DISP	15
			LYHY	1	MALE	6	ELMA	30
			MALE	2	POMO	1	MALE	4
			TH	5	TH	4	POMO	1
			BG	45	BG	61	TH	3
							BG	45
			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
3	**10 m**	**11%**	BRMI	1	BRMI	1	BRMI	1	BRMI	2	BRMI	1	BRMI	1
			DISP	22	DISP	22	DISP	23	DISP	34	DISP	25	DISP	42
			ELAC	1	ELMA	20	ELMA	25	JUBA	1	ELMA	26	ELMA	15
			ELMA	1	HYRA	1	ERCA	1	LYHY	1	LYHY	1	LYHY	1
			LYHY	1	LYHY	1	JUBA	1	POMO	1	PSST	2	PSST	4
			PSST	7	PSLU	3	PSST	3	PSST	12	RUCR	1	SEGL	1
			RUCR	1	PSST	8	RUCR	1	RUCR	1	SEGL	1	STAJ	5
			SEGL	1	RUCR	1	STAJ	1	SEGL	1	SOOL	1	TH	25
			SIGA	1	SEGL	1	TH	39	STAJ	25	STAJ	5	BG	6
			SOOL	1	STAJ	2	BG	3	TH	7	TH	35		
			STAJ	35	TH	30			BG	15	BG	2		
			TH	5	BG	10								
			BG	23										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**98**	**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**	**5%**	BRMI	1	BRMI	2	BRMI	1	BRMI	1	BAPI	1	ACAMa	1
			DISP	7	DISP	25	JUPH	45	JUPH	25	BRMI	1	BRMI	1
			JUPH	44	JUPH	15	LYAR	1	LYHY	1	CAAMa	1	DISP	4
			LYHY	1	LYHY	1	LYHY	1	LYMI	1	JUPH	30	ERAR12	2
			LYMI	1	LYMI	2	LYMI	1	POMO	1	LYHY	2	ERBO	1
			PSLU	3	PSLU	1	PSLU	4	PSLU	4	LYMI	1	HYRA	1
			RUAC	1	RUAC	1	PSRA	1	RUAC	3	PLCO	1	JUPH	40
			SEGL	1	SEGL	7	PSST	1	STAJ	1	POMO	1	LYHY	1
			TH	15	STAJ	4	RUAC	2	TH	10	TH	37	PLCO	2
			BG	25	TH	23	SOOL	1	BG	53	BG	25	PSLU	1
					BG	20	TH	19					TH	26
							BG	23					BG	20
			TOTAL	**99**	**TOTAL**	**101**	**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%	JUBA	26	DISP	65	BAPI	1	AICA	1	AICA	1	ACAMa	2
			LYAR	25	ELTR3	3	DISP	15	BRMI	1	BRMI	1	DISP	12
			LYHY	1	ERCA	4	ERCA	1	DISP	25	DISP	30	ELAC	4
			POMO	1	JUBA	1	JUBA	20	ELTR3	6	ELTR3	18	ELTR3	15
			PSST	3	LYAR	2	LYAR	10	ERCA	1	ERCA	3	ERCA	1
			SEGL	1	LYHY	1	NUTE	1	JUBA	13	GEDI	1	LYAR	15
			SOAM	6	PSLU	1	PSST	3	LYAR	1	LYAR	3	LYHY	1
			SOAS	1	PSST	2	SEGL	1	LYHY	1	LYHY	1	LYMI	1
			SOOL	1	STAJ	3	ZEDA	1	PLCHh	1	LYMI	1	NUTE	1
			TH	15	ZEDA	1	TH	37	POMO	1	NUTE	1	PSLU	4
			BG	20	TH	12	BG	10	PSLU	1	POMO	1	PSST	4
					BG	5			PSST	6	PSST	5	QUAG	1
									SEGL	2	SOAS	1	SEGL	2
									SOAS	4	SOOL	1	SIGA	1
									TODI	1	STAJ	1	SOOL	1
									TH	15	ZEDA	1	TH	5
									BG	20	TH	10	BG	33
											BG	20		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**103**

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	21%	CRTR	2	DISP	11	DISP	10	DISP	7	DISP	15	DISP	15
			DISP	7	ELMA	16	ELMA	30	ELMA	28	ELMA	20	ELMA	15
			ELMA	30	LYHY	1	MALE	1	PHLE	1	JUBUb	1	LYHY	1
			LYHY	1	POMO	30	PHLE	1	POMO	20	POMO	25	POMO	12
			MALE	2	PSLU	1	POMO	20	PSLU	1	PSLU	1	PSLU	2
			POMO	10	TH	16	TH	10	TH	28	TH	10	ZEDA	1
			PSLU	1	BG	25	BG	28	BG	15	BG	28	TH	24
			TH	8									BG	30
			BG	39										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 5 2018 Species List

Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA
Acmispon strigosus	strigose lotus	ACST
Agrostis avenacea	Pacific bent grass	AGAV
Agrostis pallens	seashore bent grass	AGPA
Aira caryophyllea	silvery hair-grass	AICA
Avena barbata	slender wild oat	AVBA
Azolla filiculoides	fern-like azolla	AZFI
Baccharis glutinosa	marsh baccharis	BAGL
Baccharis pilularis	coyote brush	BAPI
Brassica nigra	black mustard	BRNI
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
Carpobrotus edulis	ice plant	CAED
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA
Cirsium brevistylum	Indian thistle	CIBR
Cirsium vulgare	bull thistle	CIVU
Clarkia purpurea ssp. *quadrivulnera*	winecup clarkia	CLPUQ
Clinopodium douglasii	yerba buena	CLDO
Conium maculatum	poison hemlock	COMA
Cotula coronopifolia	brass buttons	COCO
Cressa truxillensis	spreading alkaliweed	CRTR
Cynosurus echinatus	bristly dogtail grass	CYEC
Cyperus eragrostis	tall cyperus	CYER
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	needle spikerush	ELAC
Eleocharis macrostachya	pale spikerush	ELMA
Elymus triticoides	beardless wild rye	ELTR3
Epilobium ciliatum	fringed willowherb	EPCI
Erigeron canadensis	horseweed	ERCA
Erodium botrys	long-beaked filaree	ERBO
Erodium cicutarium	redstem filaree	ERCI
Eryngium armatum	coyote thistle	ERAR12
Euthamia occidentalis	western goldenrod	EUOC
Festuca myuros	rattail sixweeks grass	FEMY
Galium porrigens	climbing bedstraw	GAPO
Gamochaeta ustulata	purple cudweed	GAUS
Geranium dissectum	cut-leaved geranium	GEDI
Gnaphalium palustre	lowland cudweed	GNPA
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO
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 phaeocephalus	brown-headed rush	JUPH
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
Nuttallanthus texanus	blue toadflax	NUTE
Oxalis corniculata	creeping woodsorrel	OXCO
Phalaris lemmonii	Lemmon's canary grass	PHLE
Plagiobothrys chorisianus var. *hickmanii*	Hickman's popcornflower	PLCHH
Plantago coronopus	cut-leaved plantain	PLCO
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
Rubus ursinus	California blackberry	RUUR
Rumex acetosella	sheep sorrel	RUAC
Rumex conglomeratus	clustered dock	RUCO
Rumex crispus	curly dock	RUCR
Salix lasiolepis	arroyo willow	SALA
Salvia mellifera	black sage	SAME
Schoenoplectus californicus	California bulrush	SCCA
Senecio glomeratus	cutleaf burnweed	SEGL
Silene gallica	small-flower catchfly	SIGA
Solanum americanum	small-flowered nightshade	SOAM
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Stachys ajugoides	bugle hedge nettle	STAJ
Toxicodendron diversilobum	poison oak	TODI
Triglochin scilloides	flowering quillwort	TRSC
Verbena lasiostachys var. *lasiostachys*	western vervain	VELAL
Zeltnera davyi	Davy's centuary	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff/Algae	

Table B-2. Pond 101 East (West) (Reference) Wetland Vegetation Transect Data by Stratum

POND 101 East (West)			
Date	5/18/2018, 5/31/2018		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond dry at time of 5/18/2018 survey. Strata 1, 2, 3, 4, and 5 were repeated from 2016 and 2017, whereas stratum 6 was repeated from 2017. Transects 1, 2, 4, and 5 were repeated in their 2016 and 2017 locations, whereas Transect 3 was relocated to an area with more representative vegetative composition. Transect 6 was shortened from 10 m in 2017 to 5 m in 2018 but kept in the same location.			

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**	**5%**	AGAV	1	ALSA	1	ALSA	1	AGAV	3	ALSA	6	AGAV	8
			ALSA	1	ELMA	46	ELMA	45	ALSA	25	ELMA	3	ALSA	15
			ELMA	6	GNPA	3	LYHY	4	ELMA	2	GNPA	3	ELAC	1
			FEMY	1	LYHY	3	MALE	4	GNPA	1	LYHY	9	ELMA	5
			GNPA	2	MALE	3	PHLE	1	HECUo	2	MALE	25	GNPA	1
			HECUo	1	PHLE	5	POAVd	12	LYHY	4	POAVd	3	LAGL3	1
			LYHY	4	POAVd	8	POMO	1	MALE	8	POMO	3	LYHY	3
			MALE	4	ROCU	3	RUCR	2	POAVd	15	TRSC	1	MALE	7
			PHLE	3	TH	20	TH	21	POMO	9	VEBR	1	PHLE	1
			POAVd	5	BG	8	BG	10	PSST	1	TH	5	POAVd	15
			POMO	36					TH	15	BG	40	POMO	4
			PSLU	1					BG	20			ROCU	1
			ROCU	4									unk Apiaceae	1
			RUCR	1									VEBR	1
			TH	15									TH	27
			BG	15									BG	15
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**101**	**TOTAL**	**105**	**TOTAL**	**99**	**TOTAL**	**106**

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**	**40%**	ELMA	49	ELMA	45	ELMA	35	ELMA	41	ALSA	1	ELMA	48
			MALE	1	MALE	4	LAGL3	1	LAGL3	1	ELMA	35	LAGL3	1
			TH	52	PHLE	1	MALE	6	MALE	1	GNPA	1	MALE	8
			BG	0	TH	50	PHLE	2	PHLE	1	HECUo	1	PHLE	3
					BG	0	POMO	1	TH	55	LAGL3	1	TH	40
							TH	53	BG	1	MALE	11	BG	0
							BG	2			PHLE	3		
											SOOL	2		
											TH	35		
											BG	10		
			TOTAL	**102**	**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**	**12%**	AGAV	1	DISP	3	ELMA	33	AGAV	1	AGAV	1	ELMA	36
			DISP	7	ELMA	12	GNPA	1	ELMA	25	ELMA	3	FEPE	3
			ELMA	10	ERCA	1	HECUo	1	FEMY	1	ERCA	1	GEDI	2
			FEMY	1	GEDI	12	LAGL3	6	GEDI	6	ERCI	2	LAGL3	1
			GNPA	1	LAGL3	4	PHLE	1	HYGL	2	GEDI	1	PHLE	2
			HECUo	2	LYHY	1	PLCHh	5	LAGL3	1	LAGL3	1	PLCHh	1
			LAGL3	2	PHLE	2	RUCR	6	PHLE	2	PHLE	15	POMO	6
			PLCHh	35	PLCHh	25	SOOL	1	PLCHh	6	PLCHh	15	RUCR	1
			POMO	1	POMO	2	TH	33	POMO	10	POAVd	12	SOOL	1
			RUCR	5	*Pseudognaphalium sp.*	1	BG	15	*Pseudognaphalium sp.*	1	POMO	1	STAJ	12
			TH	27	RUCR	2			RUCR	1	RUCR	3	TH	30
			BG	8	TH	29			TH	30	TH	15	BG	5
					BG	6			BG	12	BG	30		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**102**	**TOTAL**	**98**	**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**	**18%**	DISP	35	BRMI	1	ACAMa	1	BRMI	1	BRMI	2	BRMI	2
			ELMA	4	DISP	27	BAPI	1	DISP	35	DISP	41	DISP	22
			GEDI	6	ELMA	6	BRMI	1	ELMA	2	GEDI	4	ELMA	2
			HECUo	1	ERBO	3	DISP	40	ERCA	1	HECUo	1	ERCA	1
			HYRA	1	GEDI	4	ELMA	4	GEDI	8	HYGL	1	GEDI	2
			JUPH	3	LYHY	1	ERCA	1	HYGL	1	PLCHh	1	HECUo	4
			LYHY	4	MASA	1	GEDI	7	JUPH	3	POMO	10	HYRA	1
			POMO	2	POMO	1	LYHY	1	LYHY	2	TRMI	1	LYAR	1
			PSLU	1	PSLU	4	MASA	2	PLCHh	2	VISAn	1	LYHY	1
			TH	35	RUCR	1	PLCHh	1	POMO	2	TH	35	MASA	1
			BG	7	SOOL	1	POMO	1	PSLU	2	BG	3	PLCHh	1
					TH	40	PSLU	1	TRMI	1			POMO	8
					BG	10	RUCR	2	TH	30			SOOL	1
							SOOL	3	BG	10			TRMI	1
							TH	30					VISAn	2
							BG	4					TH	40
													BG	10
			TOTAL	**99**	**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	21%	BRMI	1	ELAC	15	BRHO	1	BAPI	1	BRMI	1	BRHO	1
			ELAC	2	ELMA	3	BRMI	1	BRMI	1	ELAC	2	ELMA	4
			ELMA	1	FEMY	1	ELAC	8	ELAC	20	ELMA	4	ERCI	1
			ERBO	1	FEPE	43	ELMA	2	ELMA	3	FEPE	37	FEPE	40
			FEMY	1	GEDI	2	ERBO	6	FEMY	2	GAUS	1	GAUS	1
			FEPE	34	HOBRb	1	FEMY	1	FEPE	25	HYGL	1	HOBRb	1
			GAUS	1	MALE	2	FEPE	24	GEDI	1	HYRA	2	HYGL	1
			GEDI	1	*Vicia* sp.	1	GAUS	1	LYHY	1	MALE	5	LYHY	1
			HYRA	2	TH	30	GEDI	1	LYMI	1	RUCR	1	MALE	6
			LYHY	1	BG	2	HYRA	1	RUCR	1	SOOL	1	RUCR	1
			LYMI	1			LYHY	1	TH	25	TH	40	SOOL	1
			MALE	1			LYMI	1	BG	19	BG	5	TH	39
			SOAS	1			MALE	7					BG	3
			SOOL	2			PLCHh	1						
			TH	38			SOOL	1						
			BG	12			TH	18						
							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	
			Species	% Cover	Species	% Cover	Species	% Cover
6	5 m	4%	JUPH	50	BRMI	1	ERCA	1
			Pseudognaphalium sp.	1	DEDA	1	FEMY	1
			RUAC	5	ERCA	1	GEDI	2
			TH	34	JUBA	2	HYGL	2
			BG	10	JUPH	28	JUBA	1
					PLCO	3	JUPH	40
					Pseudognaphalium sp.	1	*Pseudognaphalium* sp.	1
					RUAC	8	RUAC	8
					RUCR	1	VISAn	1
					STAJ	2	TH	28
					VISAn	2	BG	15
					TH	28		
					BG	23		
			TOTAL	**100**	**TOTAL**	**101**	**TOTAL**	**100**

Pond 101 East (West) 2018 Species List

Species Name	Common Name	Species Code
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA
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 carinatus	California brome	BRCA
Bromus diandrus	ripgut grass	BRDI
Bromus hordeaceus	soft chess	BRHO
Calandrinia menziesii	redmaids	CAME
Callitriche marginata	California water-starwort	CAMA
Carduus pycnocephalus	Italian thistle	CAPY
Carex praegracilis	clustered field sedge	CAPR
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
Deschampsia danthonioides	annual hair grass	DEDA
Distichlis spicata	salt grass	DISP
Drymocallis glandulosa var. *wrangelliana*	sticky cinquefoil	DRGLW
Elatine californica	California waterwort	ELCA
Eleocharis acicularis	needle spikerush	ELAC
Eleocharis macrostachya	pale spikerush	ELMA
Erigeron canadensis	horseweed	ERCA
Erodium botrys	long-beaked filaree	ERBO
Erodium cicutarium	redstem filaree	ERCI
Eryngium armatum	coyote thistle	ERAR12
Euthamia occidentalis	western goldenrod	EUOC
Festuca myuros	rattail sixweeks grass	FEMY
Festuca perennis	rye grass	FEPE
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
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
Juncus balticus	baltic rush	JUBA
Juncus bufonius var. *bufonius*	common toad rush	JUBUB
Juncus hesperius	bog rush	JUHE
Gamochaeta ustulata	purple cudweed	GAUS
Geranium dissectum	cut-leaved geranium	GEDI
Juncus patens	spreading rush	JUPA
Juncus phaeocephalus	brown-headed rush	JUPH
Lasthenia glaberrima	smooth goldfields	LAGL3
Lupinus arboreus	yellow bush lupine	LUAR
Lupinus bicolor	miniature lupine	LUBI
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
Malvella leprosa	alkali mallow	MALE
Nuttallanthus texanus	blue toadflax	NUTE
Oxalis micrantha	dwarf woodsorrel	OXMI
Oxalis sp.		
Phalaris lemmonii	Lemmon's canary grass	PHLE
Plagiobothrys chorisianus var. *hickmanii*	Hickman's popcornflower	PLCHH
Plantago coronopus	cut-leaved plantain	PLCO
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
Ranunculus lobbii	Lobb's buttercup	RALO
Rorippa curvisiliqua	western yellow cress	ROCU
Rumex acetosella	sheep sorrel	RUAC
Rumex crispus	curly dock	RUCR
Rumex salicifolius	willow dock	RUSA
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Stachys ajugoides	bugle hedge-nettle	STAJ
Taraxia ovata	sun cups	TAOV
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
Triglochin scilloides	flowering quillwort	TRSC
Verbena bracteata	bracted verbena	VEBR
Verbena lasiostachys var. *lasiostachys*	western vervain	VELAL
Vicia sativa ssp. *nigra*	common vetch	VISAN
Vicia sativa ssp. *sativa*	spring vech	VISAS
Vicia villosa ssp. *villosa*	hairy vetch	VIVIV

Groundcover Codes	
BG	Bare Ground
TH	Thatch/Duff/Algae

Table B-3. Pond 101 East (East) (Reference) Wetland Vegetation Transect Data by Stratum

POND 101 East (East)			
Date	5/31/2018, 6/25/2018, 7/5/2018		
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 at time of 5/31/2018 survey. Strata 3 and 4 were mapped in previous years but were not present in 2018. Strata 1 and 2 were repeated from 2016, whereas strata 5 and 6 were repeated from 2017. Stratum 7 was new in 2018. 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. Transects 5 and 6 were repeated from 2017. Transect 7 was established in 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
1	**10 m**	**7%**	ELMA	4	ELMA	3	ELMA	10	ELMA	5	ELMA	10	ELMA	5
			MALE	55	MALE	25	ERCI	1	ERCI	1	ERCI	1	LYHY	1
			Rumex sp.	1	*Rumex* sp.	2	MALE	63	LYHY	1	MALE	45	MALE	18
			TH	0	TH	1	*Rumex* sp.	1	MALE	43	*Rumex* sp.	6	*Rumex* sp.	4
			BG	40	BG	69	TH	0	*Rumex* sp.	2	TH	1	TH	2
							BG	25	TH	1	BG	37	BG	70
									BG	47				
			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**	**20%**	ELMA	70	ELMA	50	ELMA	55	ELMA	80	ELMA	85	ELMA	60
			MALE	8	GAUS	2	MALE	10	LYHY	5	LYHY	2	GAUS	1
			TH	10	MALE	15	TH	5	MALE	5	POMO	1	MALE	1
			BG	12	TH	5	BG	30	POMO	2	TH	10	TH	8
					BG	28			TH	10	BG	2	BG	30
									BG	2				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**104**	**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	30%	AGLAV	1	BRMI	1	ACAMa	1	BRMI	1	ELAC	8	AGPA	1
			BRMI	1	HECUo	1	AGPA	6	ERBO	3	HECUo	1	ELAC	1
			ELAC	1	LYAR	1	BRMI	1	HECUo	2	PSST	16	HECUo	1
			HECUo	4	PSLU	1	ERCA	1	POMO	1	RUAC	2	LYHY	1
			LYHY	1	PSST	30	HECUo	3	PORI	1	STAJ	7	PSLU	1
			PSST	25	RUAC	11	LYAR	1	PSLU	1	*Trifolium* sp.	1	PSST	22
			RUAC	3	STAJ	2	LYHY	1	PSST	20	VISAn	1	RUAC	10
			STAJ	3	VISAn	3	PSLU	20	RUAC	6	TH	30	STAJ	3
			VISAn	3	TH	20	PSST	1	STAJ	8	BG	34	TRMI	1
			TH	20	BG	30	RUAC	2	VISAn	2			VISAn	1
			BG	35			STAJ	3	TH	25			TH	33
							VISAn	2	BG	30			BG	25
							TH	25						
							BG	33						
			TOTAL	**97**	**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	29%	CAPR	95	CAPR	75	CAPR	5	CAPR	2	JUBA	55	JUBA	60
			JUBA	1	JUBA	2	JUBA	3	JUBA	95	RUAC	1	PSLU	6
			RUAC	2	RUAC	15	RUAC	80	RUAC	1	RUCR	1	RUCR	2
			TH	2	TH	5	TH	10	TH	2	PSLU	3	TH	30
			BG	3	BG	5	BG	2	BG	2	TH	30	BG	5
											BG	10		
			TOTAL	**103**	**TOTAL**	**102**	**TOTAL**	**100**	**TOTAL**	**102**	**TOTAL**	**100**	**TOTAL**	**103**

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	14%	ELMA	2	ELMA	8	ELMA	1	ELMA	1	AGPA	2	AGPA	2
			GNPA	1	GNPA	1	GNPA	1	JUBUb	60	ELMA	2	ELMA	1
			JUBUb	60	JUBUb	60	JUBUb	75	LYHY	8	GNPA	3	JUBUb	40
			LYHY	5	LYHY	6	LYHY	5	MALE	7	JUBUb	60	LYHY	25
			MALE	10	MALE	5	MALE	2	POMO	5	LYHY	12	MALE	7
			POMO	15	POMO	3	POMO	3	PORI	1	MALE	10	POMO	2
			ROCU	1	STAJ	1	STAJ	2	ROCU	2	POMO	2	PORI	1
			STAJ	3	TH	6	TH	2	STAJ	4	PORI	1	PSLU	1
			TH	5	BG	10	BG	15	TR sp.	1	PSLU	1	RUCO	1
			BG	3					TH	1	STAJ	5	STAJ	3
									BG	15	TH	2	Unk herb	1
											BG	10	TH	3
													BG	14
			TOTAL	**105**	**TOTAL**	**100**	**TOTAL**	**106**	**TOTAL**	**105**	**TOTAL**	**110**	**TOTAL**	**101**

Pond 101 East (East) 2018 Species List

Species Name	Common Name	Species Code
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA
Agrostis avenacea	Pacific bent grass	AGAV
Agrostis exarata	spike bent grass	AGEX
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV
Agrostis pallens	seashore bent grass	AGPA
Aira caryophyllea	silvery hair-grass	AICA
Alopecurus saccatus	Pacific foxtail	ALSA
Avena barbata	slender wild oat	AVBA
Atriplex prostrata	fat-hen	ATPR
Baccharis glutinosa	marsh baccharis	BAGL
Baccharis pilularis	coyote brush	BAPI
Brassica nigra	black mustard	BRNI
Briza maxima	rattlesnake grass	BRMA
Briza minor	annual quaking grass	BRMI
Bromus diandrus	ripgut grass	BRDI
Bromus hordeaceus	soft chess	BRHO
Callitriche marginata	California water-starwort	CAMA
Carduus pycnocephalus	Italian thistle	CAPY
Carex praegracilis	clustered field sedge	CAPR
Cirsium brevistylum	Indian thistle	CIBR
Cirsium vulgare	bull thistle	CIVU
Clarkia sp.		
Conium maculatum	poison hemlock	COMA
Cotula coronopifolia	brass buttons	COCO
Cyperus eragrostis	tall cyperus	CYER
Eleocharis acicularis	needle spikerush	ELAC
Eleocharis macrostachya	pale spikerush	ELMA
Epilobium ciliatum ssp. *watsonii*	willow herb	EPCIW
Erigeron canadensis	horseweed	ERCA
Erigeron canadensis	horseweed	ERCA
Erodium botrys	long-beaked filaree	ERBO
Erodium cicutarium	redstem filaree	ERCI
Euthamia occidentalis	western goldenrod	EUOC
Festuca myuros	rattail sixweeks grass	FEMY
Festuca perennis	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
Heterotheca grandiflora	telegraph weed	HEGR
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 phaeocephalus	brown-headed rush	JUPH
Lonicera involucrata var. *ledebourii*	black twinberry	LOINL
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
Malvella leprosa	alkali mallow	MALE
Nuttallanthus texanus	blue toadflax	NUTE
Petrorhagia dubia	hairypink	PEDU
Phalaris lemmonii	Lemmon's canary grass	PHLE
Plantago coronopus	cut-leaved plantain	PLCO
Polypogon monspeliensis	rabbitfoot grass	POMO
Potentilla rivalis	brook cinquefoil	PORI
Pseudognaphalium californicum	California everlasting	PSCA
Pseudognaphalium luteoalbum	weedy cudweed	PSLU
Pseudognaphalium ramosissimum	pink everlasting	PSRA
Pseudognaphalium stramineum	cottonbatting plant	PSST
Ribes speciosum	fuchsia-flower gooseberry	RISP
Rorippa curvisiliqua	western yellow cress	ROCU
Rubus ursinus	California blackberry	RUUR
Rumex acetosella	sheep sorrel	RUAC
Rumex conglomeratus	clustered dock	RUCO
Rumex fueginus	golden dock	RUFU
Rumex crispus	curly dock	RUCR
Rumex salicifolius	willow dock	RUSA
Senecio glomeratus	cutleaf burnweed	SEGL
Silene gallica	small-flower catchfly	SIGA
Solanum americanum	small-flowered nightshade	SOAM
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Stachys ajugoides	bugle hedge nettle	STAJ
Stachys bullata	California hedge nettle	STBU
Toxicodendron diversilobum	poison oak	TODI
Trifolium barbigerum	bearded clover	TRBA
Trifolium depauperatum	sack clover	TRDE
Trifolium gracilentum	pin point clover	TRGR
Trifolium microcephalum	small head clover	TRMI
Triglochin scilloides	flowering quillwort	TRSC
Typha sp.		
Verbena bracteata	bracted verbena	VEBR
Verbena lasiostachys var. *lasiostachys*	western vervain	VELAL
Veronica peregrina ssp. *xalapensis*	speedwell	VEPEX
Vicia sativa ssp. *nigra*	common vetch	VISAN
Vicia sativa ssp. *sativa*	spring vetch	VISAS
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff/Algae	

Table B-4. Pond 997 (Reference) Wetland Vegetation Transect Data by Stratum

POND 997			
Date	5/4/2018		
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 5/4/2018 survey. Strata 1, 2, and 3 were repeated from 2017, whereas stratum 5 was new in 2018. Transects 1 and 3 were repeated from 2017. Transect 5 was established in 2018. Stratum 2 consisted of Contra Costa goldfields (CCG) and no transects were placed in this stratum; see CCG map for vegetative cover estimate. CCG occupied 1% relative cover of the wetland. An upland stratum was mapped and occupied 2% relative cover of the 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	5%	ELMA	1	ELAC	1	ELAC	1	AICA	1	CIQU	1	BRMI	1
			ERAR12	15	ELMA	1	ELMA	1	ELMA	1	ERAR12	15	CIQU	1
			JUPH	1	ERAR12	12	ERAR12	15	ERAR12	15	ERBO	3	DEDA	1
			LYMI	1	GAUS	1	LYMI	1	ERBO	3	JUBUb	1	ELMA	2
			PLCHh	1	LYMI	1	PLCHh	1	JUBUb	1	JUCA	1	ERAR12	15
			PLCO	2	PLCHh	1	PLCO	1	LACO	1	LYHY	1	ERBO	1
			POMO	1	PLCO	2	POMO	3	LYHY	1	LYMI	1	HYGL	1
			PSCH	2	POMO	6	*Pseudognaphalium* sp.	1	PLCHh	1	PLCHh	1	JUBUb	1
			SIGA	1	PSCH	2	PSCH	1	PLCO	5	PLCO	4	JUCA	1
			TH	48	TH	40	TH	40	POMO	14	POMO	20	LACO	1
			BG	24	BG	31	BG	35	PSCH	1	PSCH	1	LYHY	1
									TH	45	TH	46	LYMI	1
									BG	12	BG	10	PLCHh	3
													PLCO	5
													POMO	15
													POZI	2
													PSCH	1
													Trifolium sp.	1
													TH	32
													BG	15
			TOTAL	**97**	**TOTAL**	**98**	**TOTAL**	**100**	**TOTAL**	**101**	**TOTAL**	**105**	**TOTAL**	**101**

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**	**62%**	BRMA	1	BRMA	1	BRMI	3	AICA	1	AICA	1	ACAMa	1
			BRMI	4	BRMI	30	DACA	34	BRMI	1	BRMI	1	AICA	1
			DACA	1	ERAR12	1	ERAR12	10	DACA	40	DACA	10	BRMI	3
			DECO	1	ERBO	2	ERBO	5	ELMA	1	ERBO	4	DACA	10
			ERBO	1	GEDI	1	FEMY	1	ERAR12	10	FEMY	1	ERAR12	1
			FEMY	1	HYGL	11	GAPO	1	ERBO	2	GEDI	1	ERBO	8
			GEDI	1	HYRA	3	HYGL	7	FEMY	1	HYGL	17	FEMY	1
			HYGL	12	LYHY	1	HYRA	3	HYGL	20	HYRA	5	HYGL	5
			HYRA	8	TH	40	LYAR	1	HYRA	5	ISCA	1	HYRA	20
			JUPH	1	BG	10	TH	10	ISHO	1	JUPH	1	JUPH	1
			LYHY	1			BG	25	TH	5	LYHY	1	LYAR	1
			LYMI	1					BG	13	RUAC	1	LYMI	1
			PLCO	3							TRIX	1	MIPA	2
			TH	49							TH	35	RUAC	6
			BG	15							BG	20	SIBE	1
													TH	35
													BG	3
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**101**	**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**	**31%**	BRMA	1	BRMA	2	BRMA	1	BRMA	1	BRMA	1	BAPI	1
			BRMI	1	BRMI	1	ERAR12	2	ERAR12	1	FEMY	1	BRMA	1
			ERAR12	1	HYGL	1	ERBO	3	ERBO	1	GAPO	1	BRMI	1
			FEMY	1	JUPH	35	FEMY	1	HYGL	2	ISCA	1	ERBO	1
			JUPH	25	LYHY	1	HYRA	3	HYRA	1	JUPH	29	GAPO	1
			LYHY	1	LYMI	1	ISCA	1	JUPH	30	LYHY	1	HYGL	2
			LYMI	1	TH	56	JUBUb	1	LOGA	1	SEGL	1	HYRA	8
			PLCHh	1	BG	3	JUPH	35	LYHY	1	TH	25	JUPH	23
			TH	58			LYHY	1	LYMI	1	BG	40	LYAR	1
			BG	10			LYMI	1	PLLA	1			LYHY	1
							TRSC	1	SEGL	1			SOAS	2
							TH	20	TH	30			TH	28
							BG	30	BG	29			BG	30
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 997 2018 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Acaena pinnatifida var. *californica*	California acaena	ACPIC	*Juncus phaeocephalus*	brown-headed rush	JUPH
Achillea millefolium	common yarrow	ACMI	*Lasthenia conjugens*	Contra Costa goldfields	LACO
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Lasthenia glaberrima*	smooth goldfields	LAGL3
Acmispon parviflorus	hill lotus	ACPA	*Leptosiphon bicolor*	true babystars	LEBI
Acmispon strigosus	strigose lotus	ACST	*Logfia gallica*	narrowleaf cottonrose	LOGA
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV	*Lupinus bicolor*	miniature lupine	LUBI
Aira caryophyllea	silvery hair-grass	AICA	*Lupinus nanus*	sky lupine	LUNA
Avena barbata	slender wild oat	AVBA	*Luzula comosa*	Pacific woodrush	LUCO6
Baccharis pilularis	coyote brush	BAPI	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Briza maxima	rattlesnake grass	BRMA	*Lysimachia minima*	chaffweed	LYMI
Briza minor	annual quaking grass	BRMI	*Lythrum hyssopifolia*	grass poly	LYHY
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Madia elegans*	common madia	MAEL
Bromus diandrus	ripgut grass	BRDI	*Madia gracilis*	gumweed	MAGR
Bromus hordeaceus	soft chess	BRHO	*Madia sativa*	coast tarweed	MASA
Calystegia subacaulis	hill morning glory	CASU	*Microseris paludosa*	marsh microseris	MIPA
Carduus pycnocephalus	Italian thistle	CAPY	*Phacelia malvifolia* var. *malvifolia*	stinging phacelia	PHMAM
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Chlorogalum pomeridianum	wavyleaf soap plant	CHPO	*Plantago coronopus*	cut-leaved plantain	PLCO
Cicendia quadrangularis	timwort	CIQU	*Plantago erecta*	California plantain	PLER
Cirsium quercetorum	brownie thistle	CIQU2	*Plantago lanceolata*	English plantain	PLLA
Corethrogyne filaginifolia	common sandaster	COFI	*Pogogyne zizyphoroides*	Sacramento mesa mint	POZI
Cotula coronopifolia	brass buttons	COCO	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Danthonia californica	California oat grass	DACA	*Primula clevelandii* var. *patula*	Padre's shooting star	PRCL
Deinandra corymbosa	coastal tarweed	DECO	*Pseudognaphalium californicum*	California everlasting	PSCA
Deschampsia danthonioides	annual hair grass	DEDA	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Diplacus aurantiacus	sticky monkey flower	DIAU	*Psilocarphus tenellus*	slender woolly-marbles	PSTE
Eleocharis acicularis	needle spikerush	ELAC	*Quercus agrifolia*	coast live oak	QUAG
Eleocharis macrostachya	pale spikerush	ELMA	*Ranunculus californicus*	California buttercup	RACA
Elymus triticoides	beardless wild rye	ELTR3	*Rumex acetosella*	sheep sorrel	RUAC
Erigeron canadensis	horseweed	ERCA	*Senecio glomeratus*	cutleaf burnweed	SEGL
Erodium botrys	long-beaked filaree	ERBO	*Sidalcea malviflora* ssp. *malviflora*	checkerbloom	SIMAM
Eryngium armatum	coyote thistle	ERAR12	*Silene gallica*	small-flower catchfly	SIGA
Festuca myuros	rattail sixweeks grass	FEMY	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Festuca perennis	rye grass	FEPE	*Soliva sessilis*	South American soliva	SOSE
Galium aparine	goose grass	GAAP	*Sonchus asper*	prickly sow thistle	SOAS
Galium porrigens	climbing bedstraw	GAPO	*Stipa pulchra*	purple needle grass	STPU
Gamochaeta ustulata	purple cudweed	GAUS	*Taraxia ovata*	sun cups	TAOV
Geranium dissectum	cut-leaved geranium	GEDI	*Toxicodendron diversilobum*	poison oak	TODI
Horkelia cuneata var. *cuneata*	wedge-leaved horkelia	HOCUC	*Trifolium hirtum*	rose clover	TRHI
Hypochaeris glabra	smooth cat's-ear	HYGL	*Trifolium* sp.		
Hypochaeris radicata	rough cat's-ear	HYRA	*Triglochin scilloides*	flowering quillwort	TRSC
Isoetes howellii	Howell's quillwort	ISHO	*Triteleia ixioides*	coast pretty face	TRIX
Isolepis carinata	keeled bulrush	ISCA	**Groundcover Codes**		
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	BG	Bare Ground	
Juncus capitatus	dwarf rush	JUCA	TH	Thatch/Duff/Algae	

Table B-5. Pond 3 North (Year 1 Post-Burn) Wetland Vegetation Transect Data by Stratum

POND 3 North			
Date	5/3/2018, 5/17/2018		
Surveying Personnel	Kayti Christianson, Julia Fields, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation	85	ELMA, LAGL3, LYHY	
Floating Vegetation	3	CAHE	
Submerged Vegetation			
Open Water	13		Depth on 5/3/2018: 7 cm
Notes			
Standing water with a depth of 7 cm was present during the May 3 monitoring event, but the vernal pool was dry by May 17. Strata 1 through 4 were repeated from 2015. Transects 1 and 2 were repeated, whereas Transect 3 was new in 2018. In 2015, stratum 3 was mapped but no transect was placed in the stratum as it did not support the wetland vegetation (Burleson, 2015). Stratum 4 consisted of Contra Costa goldfields and no transects were placed in this stratum; see CCG map for vegetative cover estimate. CCG occupied 29% relative cover of the wetland.			

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	6%	ELMA	65	ELMA	75	ELMA	70	COCO	1	COCO	1	COCO	1
			FEMY	1	FEPE	1	JUPH	1	ELMA	35	CRAQ	1	ELMA	30
			GEDI	1	POMO	1	LAGL3	1	LAGL3	3	ELMA	25	FEMY	1
			JUPH	1	TH	3	LYHY	2	LYHY	1	FEMY	1	LYHY	1
			PLCHh	1	BG	20	POMO	1	PLCHh	2	LAGL3	6	PLCHh	10
			POMO	1			TH	5	POMO	15	LYHY	1	POMO	10
			TH	5			BG	20	TH	5	PLCHh	15	TH	10
			BG	25					BG	40	POMO	10	BG	37
											TH	5		
											BG	35		
			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		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	10 m	18%	ELMA	27	ELMA	52	ELMA	33	ELMA	45	ELAC	1	COCO	1
			GEDI	3	FEPE	1	JUPH	1	GEDI	3	ELMA	47	ELMA	57
			JUPH	3	GEDI	1	PLCHh	13	JUPH	1	ERAR12	10	ERAR12	5
			PLCHh	2	TH	1	POMO	1	LYHY	1	JUPH	3	JUPH	8
			TH	35	BG	45	TH	2	PLCHh	4	PLCHh	2	LYHY	1
			BG	30			BG	50	POMO	1	PLCO	1	PLCHh	3
									TH	30	POMO	1	POMO	2
									BG	15	TH	25	TH	3
											BG	10	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		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**
3	**10 m**	**47%**	BRMI	1	AGLAV	2	AICA	1	ACPA	1	AICA	1	BRMI	10
			CRAQ	1	BRMI	1	BRHO	2	AICA	1	BRDI	2	BRTEt	1
			ERAR12	30	DEDA	1	DACA	20	BRDI	1	BRHO	4	DECO	2
			ISHO	3	ERAR12	25	ERAR12	4	BRHO	1	BRMI	3	ERAR12	5
			JUCA	1	FEMY	1	ERBO	2	BRMI	1	CAEX	1	FEMY	1
			JUPH	10	ISHO	2	FEMY	1	BRTEt	1	CAUN	1	FEPE	36
			LYAR	1	JUBUb	2	FEPE	1	DACA	20	DACA	2	HYRA	3
			LYMI	1	JUCA	1	HYGL	1	ERAR12	1	ERAR12	1	ISCA	1
			MIPA	3	JUPH	15	HYRA	5	FEMY	1	FEMY	1	ISCE	1
			TAOV	1	LYAR	1	ISHO	1	FEPE	10	FEPE	11	ISHO	1
			TH	4	LYHY	1	LYAR	15	HYRA	4	HYRA	5	JUPH	5
			BG	45	LYMI	1	MIPA	15	ISHO	1	ISHO	1	LYAR	2
					TH	4	TH	4	LYAR	15	JUPH	5	TH	2
					BG	43	BG	30	MIPA	10	LYAR	10	BG	30
									TH	5	BG	50		
									BG	27	TH	2		
			TOTAL	**101**	**TOTAL**	**100**	**TOTAL**	**102**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 3 North 2018 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 parviflorus	hill lotus	ACPA	*Juncus capitatus*	dwarf rush	JUCA
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV	*Juncus occidentalis*	western rush	JUOC
Aira caryophyllea	silvery hair-grass	AICA	*Juncus phaeocephalus*	brown-headed rush	JUPH
Allium hickmanii	Hickman's onion	ALHI	*Lasthenia conjugens*	Contra Costa goldfields	LACO
Avena barbata	slender wild oat	AVBA	*Lasthenia glaberrima*	smooth goldfields	LAGL3
Baccharis pilularis	coyote brush	BAPI	*Leptosiphon parviflorus*	variable linanthus	LEPA
Briza minor	annual quaking grass	BRMI	*Logfia filaginoides*	California cottonrose	LOFI
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Logfia gallica*	narrowleaf cottonrose	LOGA
Bromus carinatus	California brome	BRCA	*Lupinus bicolor*	miniature lupine	LUBI
Bromus diandrus	ripgut grass	BRDI	*Luzula comosa*	Pacific woodrush	LUCO6
Bromus hordeaceus	soft chess	BRHO	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Bromus madritensis ssp. *rubens*	red brome	BRMAR	*Lysimachia minima*	chaffweed	LYMI
Callitriche heterophylla var. *bolanderi*	Bolander's water starwort	CAHEB	*Lythrum hyssopifolia*	grass poly	LYHY
Calochortus uniflorus	pink star-tulip	CAUN	*Madia elegans*	common madia	MAEL
Carpobrotus chilensis	sea fig	CACH	*Madia gracilis*	gumweed	MAGR
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA	*Madia sativa*	coast tarweed	MASA
Castilleja exserta	purple owl's-clover	CAEX	*Microseris paludosa*	marsh microseris	MIPA
Centaurea melitensis	Maltese star-thistle	CEME	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Cerastium glomeratum	sticky mouse-ear chickweed	CEGL	*Plantago coronopus*	cut-leaved plantain	PLCO
Claytonia perfoliata	miner's lettuce	CLPE	*Plantago erecta*	California plantain	PLER
Cotula coronopifolia	brass buttons	COCO	*Pogogyne zizyphoroides*	Sacramento mesa mint	POZI
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Crassula connata	pygmy-weed	CRCO	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Cryptantha microstachys	popcorn flower	CRMI3	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Danthonia californica	California oat grass	DACA	*Psilocarphus tenellus*	slender woolly-marbles	PSTE
Deinandra corymbosa	coastal tarweed	DECO	*Rumex crispus*	curly dock	RUCR
Deschampsia danthonioides	annual hair grass	DEDA	*Sanicula crassicaulis*	Pacific sanicle	SACR
Eleocharis acicularis	needle spikerush	ELAC	*Schoenoplectus californicus*	California bulrush	SCCA
Eleocharis macrostachya	pale spikerush	ELMA	*Sidalcea malviflora* ssp. *malviflora*	checkerbloom	SIMAM
Erodium botrys	long-beaked filaree	ERBO	*Silene gallica*	small-flower catchfly	SIGA
Erodium cicutarium	redstem filaree	ERCI	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Eryngium armatum	coyote thistle	ERAR12	*Sonchus asper*	prickly sow thistle	SOAS
Festuca myuros	rattail sixweeks grass	FEMY	*Stipa pulchra*	purple needle grass	STPU
Festuca perennis	rye grass	FEPE	*Taraxia ovata*	sun cups	TAOV
Geranium dissectum	cut-leaved geranium	GEDI	*Trifolium angustifolium*	narrow-leaved clover	TRAN
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO	*Trifolium depauperatum*	sack clover	TRDE
Hordeum brachyantherum	meadow barley	HOBR	*Trifolium dubium*	little hop clover	TRDU
Hypochaeris glabra	smooth cat's-ear	HYGL	*Vicia sativa* ssp. *sativa*	spring vetch	VISAS
Hypochaeris radicata	rough cat's-ear	HYRA	**Groundcover Codes**		
Isoetes howellii	Howell's quillwort	ISHO	BG	Bare Ground	
Isolepis carinata	keeled bulrush	ISCA	TH	Thatch/Duff/Algae	
Isolepis cernua	low bulrush	ISCE			

Table B-6. Pond 3 South (Year 1 Post-Burn) Wetland Vegetation Transect Data by Stratum

POND 3 South			
Date	5/15/2018, 5/17/2018		
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 5/15/2018 survey. Strata 1 through 4 were repeated from 2016. Transects 1, 2, and 4 were repeated, whereas Transect 3 was relocated to an area with more representative vegetative composition. An upland stratum was mapped and occupied 1% relative cover of the 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**	**18%**	ELAC	1	CRAQ	1	CRAQ	1	DEDA	1	BRTEt	1	COCO	1
			ERAR12	5	ELMA	12	DEDA	1	ELAC	3	DEDA	1	CRAQ	1
			HYGL	1	ERAR12	15	ELAC	1	ELMA	20	ELAC	15	ELAC	7
			JUPH	40	LYHY	1	ELMA	10	ERAR12	15	ELMA	30	ELMA	25
			MALE	1	LYMI	1	ERAR12	30	JUPH	2	ERAR12	15	ERAR12	30
			PLCHh	1	PLCHh	1	LYHY	2	LYHY	1	JUPH	1	JUPH	1
			POMO	3	PLCO	2	PLCHh	2	PLCHh	1	LYHY	1	LYHY	1
			TH	5	POMO	12	PLCO	2	PLCO	7	MALE	3	MALE	3
			BG	43	PSTE	1	POMO	12	POMO	3	PLCHh	12	PLCHh	6
					TH	10	TH	10	PSTE	1	POMO	1	POMO	1
					BG	44	BG	29	TH	5	TH	5	TH	5
									BG	41	BG	15	BG	24
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**105**

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	1	BRMI	2	BRMI	4	BRMI	2	BAPI	1	BRMI	1
			BRTEt	4	DECO	2	BRTEt	1	BRTEt	1	BRMI	4	BRTEt	1
			DECO	2	DEDA	1	DECO	6	CEGL	1	CEGL	1	CAAMa	1
			ERAR12	35	ELAC	3	DEDA	1	DECO	12	DECO	5	CEGL	1
			ERBO	1	FEMY	1	ELMA	2	ERBO	5	DEDA	1	DECO	14
			FEMY	1	FEPE	1	ERBO	1	FEMY	1	ELAC	2	DEDA	1
			FEPE	10	JUPH	20	FEMY	1	FEPE	2	ELMA	1	ELAC	6
			GEDI	1	LYHY	2	FEPE	1	HYRA	1	ERAR12	6	ELMA	1
			JUPH	13	MALE	2	HYGL	1	ISHO	1	ERBO	1	ERBO	2
			LYHY	1	PLCO	1	JUPH	25	JUPH	20	FEMY	1	FEMY	1
			MALE	7	TH	20	LYAR	2	LYAR	1	FEPE	1	FEPE	1
			MIPA	1	BG	45	LYHY	1	MALE	8	GEDI	1	GEDI	1
2	**10 m**	**29%**	POMO	1			MALE	5	POMO	1	ISHO	1	HYRA	1
			TH	10			MIPA	1	TH	8	JUPH	30	ISCA	1
			BG	18			SIGA	3	BG	36	LYAR	1	ISHO	1
							TH	15			MALE	7	JUPH	17
							BG	30			MIPA	4	LYAR	1
											PLCO	1	LYHY	1
											POMO	1	MALE	3
											POMO	1	MIPA	4
											TH	5	POMO	1
											BG	23	RACA	1
													TH	10
													BG	28
			TOTAL	**106**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**99**	**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	AICA	1	AGLAV	1	AGLAV	1	AICA	1	AICA	1
			DACA	15	BRHO	1	AICA	1	AICA	1	BRHO	1	BRMI	1
			ERAR12	1	BRMI	1	BAPI	1	BRHO	1	BRMI	1	DACA	12
			ERBO	4	DACA	25	BRMI	1	BRMI	1	DACA	10	DECO	1
			FEMY	1	ERBO	2	CIQU	1	CRAQ	1	DECO	1	ERAR12	9
			GAPH	2	FEMY	3	CRAQ	1	DACA	15	ERAR12	4	ERBO	5
			HYRA	1	GAPH	4	DACA	10	DECO	1	ERBO	4	FEMY	2
			ISCA	1	HYGL	1	ERAR12	10	ERAR12	4	FEMY	3	GAPH	1
			ISHO	1	JUBUb	3	ERBO	2	ERBO	1	GAPH	1	HYRA	1
			JUBUb	2	JUPH	1	FEMY	2	FEMY	2	HYRA	1	JUBUb	1
			LOGA	2	LOGA	1	GAPH	2	GAPH	2	JUBUb	1	JUPH	1
3	**10 m**	**48%**	LYAR	2	LYAR	2	JUBUb	6	HYGL	1	LOGA	1	LOGA	1
			LYMI	1	LYHY	1	JUCA	1	JUBUb	1	LYAR	1	LYAR	2
			MAEX	1	MAEX	1	LYAR	1	JUPH	1	LYHY	1	LYHY	1
			PLCO	1	PLCO	2	LYHY	1	LOGA	1	LYMI	1	MAEX	1
			TH	5	SIBE	1	LYMI	1	LYAR	1	PLCO	5	PLCO	3
			BG	59	TH	10	PLCO	1	LYMI	1	TRDU	1	SIGA	1
					BG	40	POMO	1	MAEX	1	TH	8	TH	5
							PSTE	2	PLCO	3	BG	54	BG	53
							TRAN	1	POMO	1				
							TH	3	TH	8				
							BG	50	BG	51				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**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
4	10 m	4%	BRHO	1	BRMI	1	BRDI	1	BRHO	1	BRHO	1	BRDI	1
			BRMI	2	DECO	5	BRHO	5	BRMI	1	BRMI	1	BRMI	1
			DECO	5	ELMA	3	BRMI	1	BRTEt	1	BRTEt	1	BRMI	1
			ERBO	1	FEMY	15	BRTEt	1	DECO	2	DECO	1	BRTEt	1
			FEMY	2	FEPE	25	DACA	4	FEPE	15	ERAR12	8	DECO	12
			FEPE	18	GEDI	5	DECO	1	GEDI	12	FEPE	35	ERAR12	2
			GEDI	15	HYGL	2	ELMA	1	HYGL	1	GEDI	1	FEMY	1
			HYGL	5	HYRA	1	FEMY	10	HYRA	1	HOBR	1	FEPE	25
			JUPH	5	JUPH	5	FEPE	15	JUPH	20	JUPH	4	GEDI	8
			LYAR	2	LYAR	1	GEDI	7	LYHY	1	MALE	20	HOBR	1
			MAGR	1	LYHY	1	HYRA	3	MALE	10	MIPA	1	JUPH	10
			MALE	20	MAGR	1	LYHY	1	RACA	1	SIGA	1	LYHY	1
			MIPA	5	MALE	12	MALE	7	SIGA	1	TH	5	MALE	2
			SIGA	3	MIPA	1	SIGA	2	SOOL	1	BG	20	RACA	3
			SOOL	1	POMO	1	SOOL	1	TH	5			SIGA	1
			TH	4	RACA	3	TH	10	BG	28			BG	20
			BG	10	SIGA	1	BG	30					TH	10
					TH	2								
					BG	15								
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**101**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 3 South 2018 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 fasciculata	chamise	ADFA
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV
Aira caryophyllea	silvery hair-grass	AICA
Allium hickmanii	Hickman's onion	ALHI
Arctostaphylos tomentosa	woolly leaf manzanita	ARTO
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 menziesii	redmaids	CAME
Calochortus uniflorus	pink star-tulip	CAUN
Carpobrotus edulis	ice plant	CAED
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA
Castilleja attenuata	valley tassels	CAAT
Castilleja exserta ssp. *exserta*	purple owl's-clover	CAEXE
Centaurea melitensis	Maltese star-thistle	CEME
Cerastium glomeratum	sticky mouse-ear chickweed	CEGL
Cicendia quadrangularis	timwort	CIQU
Cotula coronopifolia	brass buttons	COCO
Crassula aquatica	aquatic pygmy-weed	CRAQ
Crassula connata	pygmy-weed	CRCO
Crassula tillaea	moss pygmy-weed	CRTI
Crocanthemum scoparium	peak rush-rose	CRSC*
Cryptantha micromeres	minute-flowered cryptantha	CRMI
Danthonia californica	California oat grass	DACA
Deinandra corymbosa	coastal tarweed	DECO
Deschampsia danthonioides	annual hair grass	DEDA
Eleocharis acicularis	needle spikerush	ELAC
Eleocharis macrostachya	pale spikerush	ELMA
Elymus triticoides	beardless wild rye	ELTR3
Erodium botrys	long-beaked filaree	ERBO
Erodium cicutarium	redstem filaree	ERCI
Eryngium armatum	coyote thistle	ERAR12
Festuca myuros	rattail sixweeks grass	FEMY
Festuca perennis	rye grass	FEPE
Galium californicum	California bedstraw	GACA
Gamochaeta ustulata	purple cudweed	GAUS
Gastridium phleoides	nit grass	GAPH
Geranium dissectum	cut-leaved geranium	GEDI
Hordeum brachyantherum	meadow barley	HOBR
Horkelia cuneata	wedge-leaved horkelia	HOCU
Hypericum anagalloides	creeping St. John's wort	HYAN
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 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
Lupinus concinnus	bajada lupine	LUCO
Lysimachia arvensis	scarlet pimpernel	LYAR
Lysimachia minima	chaffweed	LYMI
Lythrum hyssopifolia	grass poly	LYHY
Madia elegans	common madia	MAEL
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 mellita	skunk navarretia	NAME
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
Pseudognaphalium luteoalbum	weedy cudweed	PSLU
Pseudognaphalium stramineum	cottonbatting plant	PSST
Psilocarphus chilensis	round woolly-marbles	PSCH
Psilocarphus tenellus	slender woolly-marbles	PSTE
Ranunculus californicus	California buttercup	RACA
Rubus ursinus	California blackberry	RUUR
Rumex acetosella	sheep sorrel	RUAC
Rumex crispus	curly dock	RUCR
Sanicula crassicaulis	Pacific sanicle	SACR
Sidalcea malviflora ssp. *malviflora*	checkerbloom	SIMAM
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
Spergula arvensis	corn spurry	SPAR
Spergularia villosa	hairy sandspurry	SPVI
Taraxia ovata	sun cups	TAOV
Tribolium obliterum	capetown grass	TROB
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
Triphysaria pusilla	little owl's clover	TRPU
Vicia sativa ssp. *sativa*	spring vetch	VISAS
Zeltnera davyi	Davy's century	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff/Algae	

*USDA Plants hasn't changed the scientific name for this species yet. It is still listed as HESC (*Helianthemum scoparium*).

Table B-7. Pond 39 (Year 1 Post-Burn) Wetland Vegetation Transect Data by Stratum

POND 39			
Date	5/17/2018, 5/30/2018		
Surveying Personnel	Kayti Christianson, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at time of 5/17/2018 survey. Strata 1 and 3 were repeated from 2016. Stratum 2 was observed but was not mapped as it was insignificant to the overall wetland composition and was too small to place a transect within. Stratum 4 was new in 2018. Transect 1 was repeated from 2016, whereas Transect 3 was relocated to an area with more representative vegetative composition. Transect 4 was established in 2018. An upland stratum was mapped and occupied 9% relative cover of the 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%	ELAC	3	DEDA	1	ELAC	1
			ELMA	1	ELAC	15	ELMA	80
			HOBR	1	ELMA	60	FEMY	1
			JUPH	20	FEPE	1	FEPE	1
			LYHY	2	GEDI	2	LYHY	3
			PLCHh	28	LYHY	4	PLCHh	1
			POMO	15	PLCHh	6	POMO	1
			TH	5	POMO	1	RUCR	3
			BG	25	TH	6	TH	5
					BG	4	BG	8
			TOTAL	**100**	**TOTAL**	**100**	**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
3	10 m	56%	DACA	15	DECO	3	DACA	8	BRHO	1	BRDI	1	BRDI	2
			DECO	1	DISP	20	DISP	30	BRMI	1	BRHO	1	BRHO	1
			ERBO	1	ERCI	1	ERCI	1	DACA	2	DACA	1	DACA	3
			FEMY	1	FEBR	1	FEBR	1	DECO	3	DECO	3	DECO	1
			FEPE	20	FEPE	35	FEMY	1	DISP	4	ERBO	2	DISP	1
			MASA	3	GEDI	5	FEPE	35	FEMY	1	FEPE	20	ERBO	20
			PLCO	10	HYGL	1	MAEL	1	FEPE	35	GEDI	2	FEMY	1
			VISAn	1	LYMI	1	MASA	1	GEDI	1	HYGL	2	FEPE	20
			TH	5	MAEL	1	VISAn	1	HYGL	1	LYAR	1	TRAN	1
			BG	43	VISAn	1	TH	9	HYRA	2	TRAN	3	VISAn	3
					TH	11	BG	17	VISAn	2	VISAn	2	TH	25
					BG	20			TH	17	TH	17	BG	21
									BG	30	BG	45		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**105**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**99**

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**	**32%**	BRHO	2	AICA	1	ACPA	1	ACPA	3	ACPA	1	ACPA	2
			BRMI	1	BRHO	1	AICA	1	AICA	1	AICA	1	AICA	3
			DACA	12	BRMI	1	BRHO	1	DACA	30	BRDI	1	BRHO	1
			ERBO	1	DACA	15	DACA	15	DECO	1	BRHO	1	DACA	20
			FEMY	2	ERBO	1	FEBR	1	FEBR	1	DACA	40	DECO	1
			HYGL	1	FEBR	1	FEPE	1	GEDI	2	FEBR	1	ERBO	1
			JUPH	3	JUPH	2	HYGL	1	HYRA	1	FEMY	1	FEBR	2
			PLCO	4	LYAR	1	MAEX	1	SIMAm	8	HYGL	1	HYGL	1
			TRAN	15	PLCO	6	PLCO	4	TRAN	6	HYRA	1	LYAR	1
			TH	5	TRAN	30	TRAN	10	TH	27	JUPH	1	MAEL	1
			BG	54	VISAn	1	TH	20	BG	20	MAGR	1	MAEX	1
					TH	9	BG	44			PLCO	4	MAGR	2
					BG	30					SIMAm	1	PLCO	5
											TRAN	5	TRAN	1
											TH	20	TH	15
											BG	20	BG	43
			TOTAL	**100**	**TOTAL**	**99**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 39 2018 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI	*Logfia gallica*	narrowleaf cottonrose	LOGA
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Lupinus bicolor*	miniature lupine	LUBI
Acmispon parviflorus	hill lotus	ACPA	*Lupinus nanus*	sky lupine	LUNA
Aira caryophyllea	silvery hair-grass	AICA	*Luzula comosa*	Pacific woodrush	LUCO6
Avena barbata	slender wild oat	AVBA	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Baccharis pilularis	coyote brush	BAPI	*Lysimachia minima*	chaffweed	LYMI
Briza maxima	rattlesnake grass	BRMA	*Lythrum hyssopifolia*	grass poly	LYHY
Briza minor	annual quaking grass	BRMI	*Madia elegans*	common madia	MAEL
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	*Madia sativa*	coast tarweed	MASA
Calochortus albus	white globe lily	CAAL	*Medicago polymorpha*	California burclover	MEPO
Calochortus uniflorus	pink star-tulip	CAUN	*Microseris paludosa*	marsh microseris	MIPA
Castilleja densiflora ssp. *densiflora*	dense flower owl's clover	CADED	*Navarretia hamata* ssp. *parviloba*	hooked navarretia	NAHAP
Chlorogalum pomeridianum	wavyleaf soap plant	CHPO	*Oxalis corniculata*	creeping woodsorrel	OXCO
Cicendia quadrangularis	timwort	CIQU	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Clarkia purpurea ssp. *quadrivulnera*	winecup clarkia	CLPUQ	*Plantago coronopus*	cut-leaved plantain	PLCO
Cotula coronopifolia	brass buttons	COCO	*Plantago lanceolata*	English plantain	PLLA
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Pogogyne zizyphoroides*	Sacramento mesa mint	POZI
Danthonia californica	California oat grass	DACA	*Polygonum aviculare* ssp. *depressum*	prostrate knotweed	POAVD
Deinandra corymbosa	coastal tarweed	DECO	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Deschampsia danthonioides	annual hair grass	DEDA	*Potentilla* sp.		
Distichlis spicata	salt grass	DISP	*Psilocarphus tenellus*	slender wooly-heads	PSTE
Eleocharis acicularis	needle spikerush	ELAC	*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
Erodium botrys	long-beaked filaree	ERBO	*Rumex crispus*	curly dock	RUCR
Erodium cicutarium	redstem filaree	ERCI	*Rumex salicifolius*	willow dock	RUSA
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*	blue-eyed grass	SIBE
Festuca perennis	rye grass	FEPE	*Sonchus asper*	prickly sow-thistle	SOAS
Gamochaeta ustulata	purple cudweed	GAUS	*Sonchus oleraceus*	common sow thistle	SOOL
Geranium dissectum	cut-leaved geranium	GEDI	*Spergula arvensis*	corn spurry	SPAR
Heteromeles arbutifolia	toyon	HEAR	*Stipa pulchra*	purple needle grass	STPU
Hordeum brachyantherum	meadow barley	HOBR	*Taraxia ovata*	sun cups	TAOV
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	HOMAG	*Trifolium angustifolium*	narrow-leaved clover	TRAN
Horkelia cuneata	wedge-leaved horkelia	HOCU	*Trifolium dubium*	little hop clover	TRDU
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
Juncus balticus	baltic rush	JUBA	*Triteleia ixioides*	coast pretty face	TRIX
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	*Vicia hirsuta*	hairy vetch	VIHI
Juncus capitatus	dwarf rush	JUCA	*Vicia sativa* ssp. *nigra*	common vetch	VISAN
Juncus falcatus	falcate rush	JUFA	**Groundcover Codes**		
Juncus occidentalis	western rush	JUOC	BG	Bare Ground	
Juncus phaeocephalus	brown-headed rush	JUPH	TH	Thatch/Duff/Algae	
Lasthenia glaberrima	smooth goldfields	LAGL3			

Table B-8. Pond 40 North (Year 1 Post-Burn) Wetland Vegetation Transect Data by Stratum

POND 40 North			
Date	5/8/2018		
Surveying Personnel	Kayti Christianson, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at time of 5/8/2018 survey. Stratum 2 was repeated from 2015, whereas stratum 4 was new in 2018. Transect 2 was repeated but the number was changed to correspond with the appropriate stratum. In 2015 it was labeled Transect 1 while in 2018 it is Transect 2 (Burleson, 2015). Transect 4 was established in 2018.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
2	**5 m**	**26%**	COCO	1	COCO	4	BAPI	1
			ELMA	20	ELMA	30	ELMA	30
			ERCA	5	ERCA	2	GEDI	2
			GEDI	3	GEDI	2	LYHY	1
			HYGL	2	HYGL	10	NASQ	1
			LYHY	1	LYHY	1	PLCO	2
			PLCO	1	PLCO	5	PSLU	2
			SOOL	1	TH	25	TH	5
			TH	35	BG	20	BG	55
			BG	30				
			TOTAL	**99**	**TOTAL**	**99**	**TOTAL**	**99**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
4	**5 m**	**74%**	AVFA	2	AVFA	1	AVFA	1
			BRMI	1	BRMI	1	BRMI	1
			GAAP	1	ELMA	1	HYRA	1
			GEDI	5	GEDI	1	JUPH	30
			HYRA	2	HYRA	1	PLCO	5
			JUPH	60	JUPH	44	SIGA	3
			LYHY	1	LYHY	1	TH	15
			PLCO	2	PLCO	2	BG	45
			PSLU	1	TH	8		
			TH	5	BG	40		
			BG	15				
			TOTAL	**95**	**TOTAL**	**100**	**TOTAL**	**101**

Pond 40 North 2018 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI	*Lysimachia minima*	chaffweed	LYMI
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Lythrum hyssopifolia*	grass poly	LYHY
Adenostoma fasciculata	chamise	ADFA	*Madia elegans*	common madia	MAEL
Avena barbata	slender wild oat	AVBA	*Madia gracilis*	gumweed	MAGR
Avena fatua	wild oat	AVFA	*Madia sativa*	coast tarweed	MASA
Baccharis pilularis	coyote brush	BAPI	*Navarretia squarrosa*	skunkweed	NASQ
Briza minor	annual quaking grass	BRMI	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Plantago coronopus*	cut-leaved plantain	PLCO
Bromus hordeaceus	soft chess	BRHO	*Plantago lanceolata*	English plantain	PLLA
Castilleja densiflora ssp. *densiflora*	dense flower owl's clover	CADED	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Cicendia quadrangularis	timwort	CIQU	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Cotula coronopifolia	brass buttons	COCO	*Quercus agrifolia*	coast live oak	QUAG
Danthonia californica	California oat grass	DACA	*Ranunculus californicus*	California buttercup	RACA
Daucus pusillus	rattlesnake weed	DAPU	*Rumex crispus*	curly dock	RUCR
Deinandra corymbosa	coastal tarweed	DECO	*Sanicula crassicaulis*	Pacific sanicle	SACR
Drymocallis glandulosa var. *wrangelliana*	sticky cinquefoil	DRGLW	*Sidalcea malviflora* ssp. *malviflora*	checkerbloom	SIMAM
Eleocharis macrostachya	pale spikerush	ELMA	*Silene gallica*	small-flower catchfly	SIGA
Erigeron canadensis	horseweed	ERCA	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Erodium botrys	long-beaked filaree	ERBO	*Soliva sessilis*	South American soliva	SOSE
Eryngium armatum	coyote thistle	ERAR12	*Sonchus asper*	prickly sow thistle	SOAS
Festuca myuros	rattail sixweeks grass	FEMY	*Sonchus oleraceus*	common sow thistle	SOOL
Galium aparine	goose grass	GAAP	*Stachys ajugoides*	bugle hedge nettle	STAJ
Galium porrigens	climbing bedstraw	GAPO	*Taraxia ovata*	sun cups	TAOV
Gamochaeta ustulata	purple cudweed	GAUS	*Toxicodendron diversilobum*	poison oak	TODI
Geranium dissectum	cut-leaved geranium	GEDI	*Trifolium angustifolium*	narrow-leaved clover	TRAN
Hypochaeris glabra	smooth cat's-ear	HYGL	*Trifolium dubium*	little hop clover	TRDU
Hypochaeris radicata	rough cat's-ear	HYRA	*Vicia hirsuta*	hairy vetch	VIHI
Juncus occidentalis	western rush	JUOC	**Groundcover Codes**		
Juncus phaeocephalus	brown-headed rush	JUPH	BG	Bare Ground	
Logfia gallica	narrowleaf cottonrose	LOGA	TH	Thatch/Duff/Algae	

Table B-9. Pond 40 South (Year 1 Post-Burn) Wetland Vegetation Transect Data by Stratum

POND 40 South			
Date	5/8/2018		
Surveying Personnel	Kayti Christianson, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at time of 5/8/2018 survey. Strata 1 through 3 were repeated from 2016. 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	6%	ELMA	30	ELMA	12	DEDA	2
			FEPE	2	FEPE	1	ELMA	30
			HYRA	1	LYHY	1	PHLE	1
			LYHY	1	PLCHh	3	PLCHh	25
			PLCHh	4	PLCO	35	PLCO	20
			PLCO	25	POAVd	1	POMO	1
			POMO	8	POMO	2	TH	5
			VISA	2	RUCR	2	BG	15
			TH	10	TH	10		
			BG	27	BG	33		
			TOTAL	**110**	**TOTAL**	**100**	**TOTAL**	**99**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
2	5 m	21%	AICA	1	ERBO	4	BRHO	1
			BRHO	1	HYRA	6	FEMY	1
			BRMI	1	JUPH	13	HYRA	4
			ERBO	2	PLCO	3	JUPH	10
			FEMY	1	SIGA	1	LYHY	1
			HYRA	5	TH	5	PLCO	10
			JUPH	18	BG	68	SIGA	1
			PLCO	4			TH	17
			Pseudognaphalium sp.	1			BG	65
			RUAC	2				
			SIGA	1				
			TH	5				
			BG	60				
			TOTAL	**102**	**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**	**73%**	DECO	3	BRDI	1	BRHO	1	BRHO	1	DECO	8	DECO	3
			ERBO	1	BRHO	5	DACA	4	DACA	1	ERCI	12	ERCI	10
			ERCI	1	BRMI	1	FEMY	2	ELPA	2	FEMY	1	FEMY	10
			FEMY	2	DECO	10	FEPE	8	FEMY	1	FEPE	40	FEPE	18
			FEPE	16	ERBO	8	GEDI	1	FEPE	8	GEDI	10	GEDI	20
			GEDI	1	ERCI	10	PLCO	3	GEDI	1	HYGL	8	HYGL	2
			HYGL	1	FEMY	5	VISAs	1	HYRA	1	HYRA	1	HYRA	10
			HYRA	1	FEPE	10	TH	15	JUPH	1	MASA	2	TRDU	1
			RUAC	1	GEDI	8	BG	65	PLCO	15	RUAC	2	VISAs	1
			SIGA	1	HYGL	3			TRAN	1	VISAs	1	TH	15
			TRAN	1	HYRA	10			VISAs	3	TH	10	BG	10
			VISAs	3	MASA	1			TH	50	BG	10		
			TH	8	VISAs	3			BG	15				
			BG	60	TH	11								
					BG	15								
			TOTAL	**100**	**TOTAL**	**101**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**105**	**TOTAL**	**100**

Pond 40 South 2018 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Aira caryophyllea	silvery hair-grass	AICA	*Luzula comosa*	Pacific woodrush	LUCO6
Avena barbata	slender wild oat	AVBA	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Avena fatua	wild oat	AVFA	*Lythrum hyssopifolia*	grass poly	LYHY
Baccharis pilularis	coyote brush	BAPI	*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	*Medicago polymorpha*	California burclover	MEPO
Bromus hordeaceus	soft chess	BRHO	*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
Danthonia californica	California oat grass	DACA	*Plantago coronopus*	cut-leaved plantain	PLCO
Deinandra corymbosa	coastal tarweed	DECO	*Plantago lanceolata*	English plantain	PLLA
Deschampsia danthonioides	annual hair grass	DEDA	*Polygonum aviculare* ssp. *depressum*	prostrate knotweed	POAVD
Dichelostemma capitatum ssp. *capitatum*	bluedicks	DICAC	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Drymocallis glandulosa var. *wrangelliana*	sticky cinquefoil	DRGLW	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Eleocharis macrostachya	pale spikerush	ELMA	*Ranunculus californicus*	California buttercup	RACA
Eleocharis parishii	Parish's spikerush	ELPA	*Rumex acetosella*	sheep sorrel	RUAC
Erigeron canadensis	horseweed	ERCA	*Rumex crispus*	curly dock	RUCR
Erodium botrys	long-beaked filaree	ERBO	*Rumex salicifolius*	willow dock	RUSA
Erodium cicutarium	redstem filaree	ERCI	*Sidalcea malviflora* ssp. *malviflora*	checkerbloom	SIMAM
Eryngium armatum	coyote thistle	ERAR12	*Silene gallica*	small-flower catchfly	SIGA
Festuca myuros	rattail sixweeks grass	FEMY	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Festuca perennis	rye grass	FEPE	*Sonchus oleraceus*	common sow thistle	SOOL
Geranium dissectum	cut-leaved geranium	GEDI	*Taraxia ovata*	sun cups	TAOV
Hordeum brachyantherum	meadow barley	HOBR	*Trifolium angustifolium*	narrow-leaved clover	TRAN
Hypochaeris glabra	smooth cat's-ear	HYGL	*Trifolium dubium*	little hop clover	TRDU
Hypochaeris radicata	rough cat's-ear	HYRA	*Vicia sativa* ssp. *sativa*	spring vetch	VISAS
Isoetes howellii	Howell's quillwort	ISHO	**Groundcover Codes**		
Juncus occidentalis	western rush	JUOC	BG	Bare Ground	
Juncus phaeocephalus	brown-headed rush	JUPH	TH	Thatch/Duff/Algae	

Table B-10. Pond 43 (Year 1 Post-Burn) Wetland Vegetation Transect Data by Stratum

POND 43			
Date	5/10/2018, 5/14/2018		
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 5/10/2018 survey. All three strata were repeated from 2016. Transects 1 and 3 were repeated. Transect 2 was rotated slightly to stay within the boundary of stratum 2 and a new start point was established. An upland stratum was mapped and occupied 2% relative cover of the 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
			CIQU	1	CRAQ	1	CRAQ	1	CIQU	1	CRAQ	3	DECO	3
			CRAQ	1	DECO	1	DECO	1	CRAQ	1	DEDA	1	ELAC	1
			DECO	1	DEDA	3	DEDA	1	DECO	2	ELAC	1	ERAR12	2
			DEDA	1	ERAR12	5	ERAR12	3	DEDA	1	JUBUb	1	JUPH	10
			ERAR12	12	JUPH	10	JUPH	8	ERAR12	7	JUPH	1	LYAR	1
			GEDI	1	LYHY	1	LYAR	1	JUPH	15	LYHY	1	LYMI	1
			ISHO	1	LYMI	1	LYHY	1	LYMI	3	LYMI	1	MAEX	1
			JUPH	20	PLCHh	6	PLCHh	15	NAME	1	MAEX	1	NAME	3
1	**10 m**	**34%**	LYHY	1	POMO	28	POMO	20	PLCHh	10	NAME	1	PLCHh	1
			LYMI	2	POZI	3	POZI	1	POMO	20	PLCHh	20	POMO	30
			PLCHH	1	PSTE	1	PSTE	1	POZI	3	POMO	22	POZI	2
			POMO	1	TH	10	TH	12	PSTE	1	POZI	2	PSTE	1
			POZI	2	BG	30	BG	35	TH	15	PSTE	1	TH	25
			PSTE	1					BG	20	TH	25	BG	19
			TH	4							BG	20		
			BG	52										
			TOTAL	**102**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**101**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	**% Cover**	**Species**	**% Cover**	**Species**	**% Cover**
			BRHO	1	BRHO	1	AICA	1
			BRTEt	1	BRMI	2	BRMI	1
			DECO	1	BRTEt	1	BRMI	1
			DEDA	1	DECO	1	BRTEt	2
			ELAC	2	DEDA	1	CRCO	1
			ERAR12	25	ERAR12	1	DECO	2
			ISHO	1	ISHO	1	DEDA	1
			JUBUb	1	JUPH	40	ELAC	1
			JUPH	15	LYAR	1	ERAR12	5
			LYAR	1	LYHY	1	GAUS	1
			LYHY	1	LYMI	2	ISHO	1
			LYMI	1	PLCHh	2	JUBUb	1
2	**5 m**	**48%**	PLCHh	1	*Poa* sp.	1	JUCA	1
			POMO	1	POMO	1	JUPH	30
			POZI	1	POZI	2	LYAR	2
			PSTE	2	TH	5	LYHY	1
			TH	19	BG	37	LYMI	4
			BG	25			PLCHh	5
							POMO	1
							POZI	1
							PSTE	1
							TRBA	1
							TH	10
							BG	25
			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**
			ACAMa	2	ACAMa	8	ACAMa	2
			AICA	1	AICA	1	AICA	5
			BRHO	1	BRHO	1	BRHO	1
			BRMI	1	BRMI	1	BRMI	1
			CRCO	1	DACA	25	DACA	4
			DACA	30	DECO	2	DECO	10
			DECO	3	FEMY	1	FEMY	5
			FEMY	1	HYGL	1	GEDI	1
			HYGL	1	HYRA	3	HYGL	1
			HYRA	4	JUPH	5	HYRA	2
3	**5 m**	**16%**	JUBUb	1	LOGA	1	JUBUB	3
			JUPH	3	LYAR	1	JUCA	1
			LYAR	2	LYMI	1	JUPH	7
			MIPA	1	TRDU	1	LYAR	5
			PLCO	1	TRDU	1	LYMI	1
			TH	30	TH	23	MAEX	1
			BG	17	BG	24	PSTE	1
							TRDU	1
							TH	17
							BG	30
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**99**

Pond 43 2018 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Juncus phaeocephalus*	brown-headed rush	JUPH
Aira caryophyllea	silvery hair-grass	AICA	*Logfia gallica*	narrowleaf cottonrose	LOGA
Baccharis pilularis	coyote brush	BAPI	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Briza minor	annual quaking grass	BRMI	*Lysimachia minima*	chaffweed	LYMI
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Lythrum hyssopifolia*	grass poly	LYHY
Bromus hordeaceus	soft chess	BRHO	*Madia exigua*	small tarweed	MAEX
Castilleja attenuata	valley tassels	CAAT	*Madia gracilis*	gumweed	MAGR
Cicendia quadrangularis	timwort	CIQU	*Madia sativa*	coast tarweed	MASA
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Microseris paludosa*	marsh microseris	MIPA
Crassula connata	pygmy-weed	CRCO	*Navarretia mellita*	skunk navarretia	NAME
Danthonia californica	California oat grass	DACA	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Deinandra corymbosa	coastal tarweed	DECO	*Plantago coronopus*	cut-leaved plantain	PLCO
Deschampsia danthonioides	annual hair grass	DEDA	*Plantago erecta*	California plantain	PLER
Eleocharis acicularis	needle spikerush	ELAC	*Pogogyne zizyphoroides*	Sacramento mesa mint	POZI
Erodium botrys	long-beaked filaree	ERBO	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Eryngium armatum	coyote thistle	ERAR12	*Psilocarphus tenellus*	slender woolly-marbles	PSTE
Festuca myuros	rattail sixweeks grass	FEMY	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Gamochaeta ustulata	purple cudweed	GAUS	*Soliva sessilis*	South American soliva	SOSE
Geranium dissectum	cut-leaved geranium	GEDI	*Sonchus asper*	prickly sow thistle	SOAS
Horkelia cuneata	wedge-leaved horkelia	HOCU	*Sonchus oleraceus*	common sow thistle	SOOL
Hypochaeris glabra	smooth cat's-ear	HYGL	*Tribolium obliterum*	capetown grass	TROB
Hypochaeris radicata	rough cat's-ear	HYRA	*Trifolium barbigerum*	bearded clover	TRBA
Isoetes howellii	Howell's quillwort	ISHO	*Trifolium dubium*	little hop clover	TRDU
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	*Triphysaria pusilla*	little owl's clover	TRPU
Juncus capitatus	dwarf rush	JUCA	**Groundcover Codes**		
Juncus effusus	common rush	JUEF	BG	Bare Ground	
Juncus occidentalis	western rush	JUOC	TH	Thatch/Duff/Algae	

Table B-11. Pond 35 (Year 1 Post-Mastication) Wetland Vegetation Transect Data by Stratum

POND 35			
Date	5/2/2018		
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 5/2/2018 survey. Strata 1, 2, and 3 and corresponding transects were repeated from 2016, while stratum 4 and its corresponding transect were new in 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
			COCO	5	COCO	1	ELMA	2	COCO	1	ELMA	5	COCO	1
			ELMA	1	ELMA	1	HYRA	3	ELMA	1	LYHY	1	ELMA	4
			VEPEx	1	PLCHh	8	PLCHh	30	LYHY	1	PLCHh	20	LYHY	2
			LYHY	1	PLCO	80	PLCO	60	PLCHh	55	PLCO	70	PLCHh	50
1	**10 m**	**21%**	PLCHh	30	PSCH	10	PSCH	1	PLCO	40	PSCH	1	PLCO	35
			PLCO	55	TH	2	SIGA	1	PSCH	1	TH	1	POAVd	1
			PSCH	10	BG	2	TH	4	TH	3	BG	2	PSCH	1
			TH	1			BG	2	BG	2			TH	3
			BG	3									BG	5
			TOTAL	**107**	**TOTAL**	**104**	**TOTAL**	**103**	**TOTAL**	**104**	**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
			HYRA	1	CIQU	1	BRTEt	1	HYGL	1	CRAQ	1	HYGL	1
			LOGA	1	DEDA	1	COCO	1	PLCO	28	GEDI	1	PLCO	25
			LYHY	1	ELMA	1	ELMA	1	PSCH	1	HYGL	1	PSCH	1
			PLCO	50	HYGL	1	HOBR	1	TH	35	HYRA	2	TH	30
			PSCH	2	LOGA	1	HYRA	1	BG	35	LOGA	1	BG	43
			TH	15	PLCHh	1	ISHO	1			PLCO	33		
2	**10 m**	**41%**	BG	30	PLCO	45	LOGA	1			PSCH	1		
					PSCH	4	LYHY	1			TH	50		
					TH	25	PLCO	55			BG	10		
					BG	20	PSCH	3						
							TH	20						
							BG	15						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**101**	**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**	**13%**	ACPA	1	BRMI	1	BRMI	1	BRHO	1	HOBR	30	HOBR	50
			BRMI	3	COCO	1	COCO	1	COCO	1	HYRA	1	HYRA	2
			CEGL	1	CRAQ	1	CRAQ	1	FEPE	3	LYAR	1	PLCHh	1
			CIQU	1	DEDA	4	DEDA	1	HOBR	30	LYHY	1	PLCO	20
			COCO	1	ELAC	2	HOBR	25	HYRA	1	PLCHh	2	PSCH	4
			DEDA	8	FEBR	1	LYHY	1	LYHY	1	PLCO	15	SOAS	2
			LYHY	1	HOBR	5	PLCHh	2	PLCHh	1	PSCH	5	TH	20
			PLCHh	1	LYHY	1	PLCO	25	PLCO	30	SOAS	1	BG	2
			PLCO	40	PLCHh	5	PSCH	30	PSCH	10	TH	30		
			PSCH	45	PLCO	20	TH	4	TH	12	BG	15		
			TH	1	PSCH	30	BG	10	BG	10				
			BG	2	SIGA	1								
					TH	1								
					BG	30								
			TOTAL	**105**	**TOTAL**	**103**	**TOTAL**	**101**	**TOTAL**	**100**	**TOTAL**	**101**	**TOTAL**	**101**

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**	**25%**	AVBA	1	ACPA	1	ACWR	1	BRTEt	1	ACWR	1	ERBO	8
			BRDI	1	ACWR	1	AICA	1	DACA	1	BRMI	1	FEPE	47
			BRHO	2	AICA	1	AVFA	2	DEDA	1	BRTEt	1	PLCO	15
			BRTEt	2	AVBA	1	BRHO	1	ERBO	15	ERBO	15	TRAN	20
			DACA	30	BRHO	1	BRMI	1	FEPE	10	FEPE	5	TH	2
			ERBO	20	ERBO	30	ERBO	10	HYGL	1	LYAR	1	BG	8
			FEMY	1	FEBR	1	FEBR	1	HYRA	1	PLCO	40		
			FEPE	1	FEPE	2	FEPE	2	ISHO	1	PSCH	1		
			HYGL	1	HYRA	1	GEDI	1	PLCO	6	TRAN	1		
			HYRA	1	PLCO	6	HYGL	1	TRAN	20	TH	2		
			LYHY	1	TRAN	45	HYRA	1	TH	10	BG	32		
			PLCO	1	TH	15	ISHO	1	BG	33				
			TH	2	BG	5	JUBUb	1						
			BG	40			PLCO	1						
							PSCH	1						
							TRAN	55						
							TH	10						
							BG	10						
			TOTAL	**104**	**TOTAL**	**110**	**TOTAL**	**101**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 35 2018 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Acmispon parviflorus	hill lotus	ACPA	*Hordeum brachyantherum*	meadow barley	HOBR
Acmispon wrangelianus	Chilean trefoil	ACWR	*Hordeum marinum* ssp. *gussoneanum*	Mediterranean barley	HOMAG
Aira caryophyllea	silvery hair-grass	AICA	*Hypochaeris glabra*	smooth cat's-ear	HYGL
Avena barbata	slender wild oat	AVBA	*Hypochaeris radicata*	rough cat's-ear	HYRA
Avena fatua	wild oat	AVFA	*Isoetes howellii*	Howell's quillwort	ISHO
Baccharis pilularis	coyote brush	BAPI	*Juncus bufonius* var. *bufonius*	common toad rush	JUBUB
Briza minor	annual quaking grass	BRMI	*Logfia gallica*	narrowleaf cottonrose	LOGA
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Lupinus bicolor*	miniature lupine	LUBI
Bromus diandrus	ripgut grass	BRDI	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Bromus hordeaceus	soft chess	BRHO	*Lythrum hyssopifolia*	grass poly	LYHY
Bromus madritensis ssp. *rubens*	red brome	BRMAR	*Madia* sp.		
Castilleja densiflora ssp. *densiflora*	dense flower owl's clover	CADED	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Cerastium glomeratum	sticky mouse-ear chickweed	CEGL	*Plantago coronopus*	cut-leaved plantain	PLCO
Cicendia quadrangularis	timwort	CIQU	*Plantago lanceolata*	English plantain	PLLA
Cotula coronopifolia	brass buttons	COCO	*Polygonum aviculare* ssp. *depressum*	prostrate knotweed	POAVD
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Cyperus eragrostis	tall cyperus	CYER	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Danthonia californica	California oat grass	DACA	*Psilocarphus tenellus*	slender woolly-marbles	PSTE
Deschampsia danthonioides	annual hair grass	DEDA	*Quercus agrifolia*	coast live oak	QUAG
Eleocharis acicularis	needle spikerush	ELAC	*Rumex acetosella*	sheep sorrel	RUAC
Eleocharis macrostachya	pale spikerush	ELMA	*Rumex crispus*	curly dock	RUCR
Eleocharis sp.			*Senecio glomeratus*	cutleaf burnweed	SEGL
Elymus triticoides	beardless wild rye	ELTR3	*Silene gallica*	small-flower catchfly	SIGA
Erodium botrys	long-beaked filaree	ERBO	*Sonchus asper*	prickly sow thistle	SOAS
Erodium cicutarium	redstem filaree	ERCI	*Stachys ajugoides*	bugle hedge nettle	STAJ
Eryngium armatum	coyote thistle	ERAR12	*Trifolium angustifolium*	narrow-leaved clover	TRAN
Festuca bromoides	brome fescue	FEBR	*Trifolium dubium*	little hop clover	TRDU
Festuca myuros	rattail sixweeks grass	FEMY	*Trifolium glomeratum*	clustered clover	TRGL
Festuca perennis	rye grass	FEPE	*Trifolium hirtum*	rose clover	TRHI
Galium aparine	goose grass	GAAP	*Veronica peregrina* ssp. *xalapensis*	speedwell	VEPEX
Gamochaeta ustulata	purple cudweed	GAUS	**Groundcover Codes**		
Geranium dissectum	cut-leaved geranium	GEDI	BG	Bare Ground	
Heliotropium curassavicum var. oculatum	Chinese pusley	HECUO	TH	Thatch/Duff/Algae	
Heterotheca grandiflora	telegraph weed	HEGR			

Table B-12. Pond 42 (Year 1 Post-Mastication and Post-Burn) Wetland Vegetation Transect Data by Stratum

POND 42			
Date	5/31/2018		
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 5/31/2018 survey. Strata 1 through 4 were repeated from 2017. Transects 1, 3, and 4 were repeated, whereas Transect 2 was relocated because the previous location was no longer within the correct stratum. An upland stratum was mapped and occupied 19% relative cover of the 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	4 m	4%	ELAC	40	ELAC	15	CIQU	1
			ERAR12	10	ERAR12	30	DEDA	1
			JUPH	3	LYHY	5	ELAC	25
			LYHY	3	PLCHh	6	ERAR12	25
			PLCHh	1	POZI	1	ISHO	1
			PSTE	1	PSTE	1	JUPH	3
			TH	17	TH	10	LYHY	2
			BG	25	BG	32	LYMI	1
							PLCHh	3
							POZI	1
							PSTE	2
							TH	5
							BG	30
			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	5%	ELMA	25	ELAC	4	ELAC	3
			LAGL3	1	ELMA	25	ELMA	10
			LYHY	1	PHLE	6	PHLE	25
			PLCHh	5	POMO	3	POMO	8
			VEPEx	1	TH	20	TH	36
			TH	59	BG	42	BG	18
			BG	8				
			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
			DEDA	1	BRMI	1	BRMI	1	BRMI	2	BRHO	1	BRMI	1
			ELAC	25	COCO	1	BRTEt	1	DECO	3	BRMI	1	DEDA	1
			ELMA	15	DEDA	1	CIQU	1	DIAU	1	DEDA	1	ELAC	10
			ERAR12	30	ELAC	6	DEDA	1	ELAC	4	DIAU	1	ERAR12	45
			JUPH	10	ERAR12	4	DIAU	1	ERAR12	12	ELAC	5	FEMY	1
			LAGL3	1	JUPH	22	ELAC	8	JUPH	20	ERAR12	30	ISHO	1
			PLCHh	1	LYHY	2	ERAR12	18	LYAR	6	HYRA	1	JUPH	8
			TH	15	LYMI	1	HYRA	1	LYHY	2	ISHO	1	PLCHh	1
			BG	2	PLCHh	3	ISHO	1	LYMI	1	JUPH	15	POMO	1
3	**10 m**	**50%**			TH	15	JUPH	25	*Pseudognaphalium sp.*	1	LYAR	2	PSTE	1
					BG	45	LYAR	1	PSTE	1	LYHY	1	TH	27
							LYHY	2	SOOL	1	LYMI	1	BG	3
							LYMI	1	TH	20	PLCHh	1		
							PLCHh	1	BG	26	POMO	1		
							POMO	1			*Pseudognaphalium sp.*	1		
							Pseudognaphalium sp.	1			PSTE	1		
							SOOL	1			SOOL	1		
							TH	14			TH	20		
							BG	20			BG	15		
			TOTAL	**100**	**TOTAL**	**101**	**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
			BRHO	1	BRHO	1	AICA	1
			BRTEt	1	CEME	1	BRDI	1
			DACA	25	DACA	25	BRMI	1
			DECO	15	DECO	12	BRTEt	1
			ERBO	1	ERBO	1	CEME	1
			HYGL	1	FEMY	1	DACA	22
			HYRA	2	HYGL	1	DECO	20
			LYAR	2	LOFI	1	ERBO	1
			MAGR	1	LYAR	2	FEMY	1
4	**5 m**	**23%**	SIBE	4	PLER	1	GAPH	2
			TH	12	SIBE	1	HYGL	2
			BG	35	TH	10	JUBUb	1
					BG	43	LOFI	2
							LYAR	2
							MIPA	1
							PLER	1
							TH	5
							BG	35
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 42 2018 Species List

Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI
Acmispon heermannii var. *orbicularis*	round-leaved Heermann's lotus	ACHEO
Acmispon parviflorus	hill lotus	ACPA
Adenostoma fasciculata	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 tomentosa	woolly leaf manzanita	ARTO
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 breweri	Brewer's redmaids	CABR
Callitriche marginata	California water-starwort	CAMA
Calochortus albus	white globe lily	CAAL
Calystegia subacaulis	hill morning glory	CASU
Carduus pycnocephalus	Italian thistle	CAPY
Carpobrotus edulis	ice plant	CAED
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA
Castilleja densiflora	dense flower owl's clover	CADE
Ceanothus thyrsiflorus var. *griseus*	Carmel ceanothus	CETHG
Centaurea melitensis	Maltese star-thistle	CEME
Cerastium glomeratum	sticky mouse-ear chickweed	CEGL
Chlorogalum pomeridianum	wavyleaf soap plant	CHPO
Cicendia quadrangularis	timwort	CIQU
Cirsium brevistylum	Indian thistle	CIBR
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
Dichelostemma capitatum ssp. *capitatum*	bluedicks	DICAC
Diplacus aurantiacus	sticky monkey flower	DIAU
Drymocallis glandulosa var. *wrangelliana*	sticky cinquefoil	DRGLW
Eleocharis acicularis	needle spikerush	ELAC
Eleocharis macrostachya	pale spikerush	ELMA
Elymus glaucus	blue wild-rye	ELGL
Epilobium ciliatum ssp. *watsonii*	willow herb	EPCIW
Erigeron canadensis	horseweed	ERCA
Eriodictyon californicum	yerba santa	ERCA6
Eriophyllum confertiflorum	golden yarrow	ERCO
Erodium botrys	long-beaked filaree	ERBO
Eryngium armatum	coyote thistle	ERAR12
Festuca myuros	rattail sixweeks grass	FEMY
Galium aparine	goose grass	GAAP
Galium porrigens	climbing bedstraw	GAPO
Gamochaeta ustulata	purple cudweed	GAUS
Garrya elliptica	coast silk tassel	GAEL
Gastridium phleoides	nit grass	GAPH
Geranium dissectum	cut-leaved geranium	GEDI
Heterocodon rariflorum	western pearlflower	HERA
Heteromeles arbutifolia	toyon	HEAR
Horkelia cuneata var. *cuneata*	wedge-leaved horkelia	HOCUC
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
Iris douglasiana	Douglas iris	IRDO
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 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 gallica	narrowleaf cottonrose	LOGA
Logfia filaginoides	California cottonrose	LOFI
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
Melilotus indicus	Indian sweetclover	MEIN
Microseris paludosa	marsh microseris	MIPA
Nuttallanthus texanus	blue toadflax	NUTE
Phacelia malvifolia var. *malvifolia*	stinging phacelia	PHMAM
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
Pogogyne zizyphoroides	Sacramento mesa mint	POZI
Polypogon interruptus	ditch polypogon	POIN
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
Psilocarphus tenellus	slender woolly-marbles	PSTE
Quercus agrifolia	coast live oak	QUAG
Ribes malvaceum	chaparral currant	RIMA
Ribes speciosum	fuchsia-flower gooseberry	RISP
Rubus ursinus	California blackberry	RUUR
Rumex salicifolius	willow dock	RUSA
Senecio glomeratus	cutleaf burnweed	SEGL
Senecio sylvaticus	woodland ragwort	SESY
Silene gallica	small-flower catchfly	SIGA
Silybum marianum	milk thistle	SIMA
Sisyrinchium bellum	western blue-eyed grass	SIBE
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Stachys bullata	California hedge nettle	STBU
Stipa pulchra	purple needle grass	STPU
Taraxia ovata	sun cups	TAOV
Toxicodendron diversilobum	poison oak	TODI
Toxicoscordion fremontii	Fremont's star lily	TOFR
Tribolium obliterum	capetown grass	TROB
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
Triglochin scilloides	flowering quillwort	TRSC
Triphysaria pusilla	little owl's clover	TRPU
Triteleia laxa	common triteleia	TRLA
Veronica peregrina ssp. *xalapensis*	speedwell	VEPEX
Vicia americana ssp. *americana*	American vetch	VIAMA
Vicia hirsuta	hairy vetch	VIHI
Xanthium strumarium	rough cocklebur	XAST
Zeltnera davyi	Davy's centuary	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff/Algae	

Table B-13. Pond 44 (Year 1 Post-Mastication) Wetland Vegetation Transect Data by Stratum

POND 44			
Date	5/10/2018, 5/14/2018		
Surveying Personnel	Kayti Christianson, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at time of 5/10/2018 survey. Strata 1 and 3 were repeated from 2016, whereas stratum 4 was new in 2018. Transect 3 was repeated, whereas Transect 1 was adjusted slightly to stay within the boundary of stratum 1 and a new start point was established. Transect 4 was established in 2018. An upland stratum was mapped and occupied 11% relative cover of the 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	61%	AGLAV	1	AGLAV	5	AGLAV	18
			BRMI	1	BRMI	1	CIQU	1
			BRTEt	1	BRTEt	1	DEDA	1
			CIQU	1	CIQU	1	ERAR12	22
			ELAC	30	DEDA	1	HYGL	1
			ERAR12	37	ELAC	18	ISHO	1
			HECUo	2	ERAR12	30	JUBUb	1
			JUCA	1	FEMY	1	JUCA	1
			LAGL3	1	ISHO	2	LYMI	12
			LYHY	1	JUCA	1	PLCHh	3
			LYMI	1	LYHY	1	POMO	1
			PLCHh	3	LYMI	3	POZI	1
			POMO	10	PLCHh	15	PSTE	3
			POZI	1	POMO	1	TRDU	2
			PSTE	3	POZI	2	TH	2
			TRDU	1	PSTE	5	BG	30
			TH	4	TRDU	1		
			BG	2	TH	2		
					BG	15		
			TOTAL	**101**	**TOTAL**	**106**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
3	5 m	17%	ACPA	3	ACPA	1	ACPA	1
			AICA	1	AICA	1	AICA	1
			BRHO	1	APOC	1	BRHO	1
			BRMI	1	BRHO	1	BRMI	1
			CAAT	1	BRMI	1	CAAT	1
			CIQU	1	CAAT	1	DACA	20
			DACA	25	DACA	30	ERBO	3
			ERBO	2	ERBO	1	FEMY	1
			GEDI	1	FEMY	1	HYGL	2
			HYRA	4	GEDI	1	JUCA	1
			LYAR	1	HYGL	2	LYAR	2
			LYMI	1	ISHO	1	LYMI	1
			MAGR	5	JUOC	2	MAEX	1
			PLCO	5	LYAR	1	MAGR	2
			POMO	1	LYMI	1	PLCO	8
			PSTE	1	MAGR	4	PLER	1
			TRDU	5	PLCO	6	POZI	1
			TH	10	POMO	1	TAOV	1
			BG	31	TAOV	2	TRDU	6
					TRDU	10	TRPU	2
					TRPU	1	TH	20
					TH	20	BG	23
					BG	10		
			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	11%	AGLAV	3	AGLAV	1	AGLAV	4
			BRMI	1	BRMI	1	BRMI	1
			CIQU	1	BRTEt	1	CIQU	1
			DECO	2	CIQU	1	DEDA	1
			ERAR12	10	DECO	1	ERAR12	10
			GAUS	1	ERAR12	10	GAUS	1
			ISCA	1	GAUS	1	ISHO	1
			ISHO	2	ISHO	1	JUBUb	1
			JUCA	1	JUBUb	3	JUCA	1
			JUPH	32	JUCA	1	JUPH	35
			LYAR	1	JUPH	20	LYHY	1
			LYHY	1	LYHY	1	LYMI	3
			LYMI	3	LYMI	3	PLCHh	2
			PLCHh	1	PLCHh	2	*Poa* sp.	1
			POZI	1	POMO	1	POMO	1
			PSTE	6	POZI	1	PSTE	3
			SOOL	1	PSTE	15	SOOL	1
			TH	16	TH	18	TH	18
			BG	16	BG	18	BG	15
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**101**

Pond 44 2018 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Acmispon parviflorus	hill lotus	ACPA	*Juncus phaeocephalus*	brown-headed rush	JUPH
Agrostis exarata	spike bent grass	AGEX	*Lasthenia glaberrima*	smooth goldfields	LAGL3
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV	*Lepechinia calycina*	pitcher sage	LECA
Aira caryophyllea	silvery hair-grass	AICA	*Luzula comosa*	Pacific woodrush	LUCO6
Allium hickmanii	Hickman's onion	ALHI	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Aphanes occidentalis	western lady's mantle	APOC	*Lysimachia minima*	chaffweed	LYMI
Avena barbata	slender wild oat	AVBA	*Lythrum hyssopifolia*	grass poly	LYHY
Avena fatua	wild oat	AVFA	*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	*Navarretia hamata* ssp. *parviloba*	hooked navarretia	NAHAP
Bromus diandrus	ripgut grass	BRDI	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Bromus hordeaceus	soft chess	BRHO	*Plantago coronopus*	cut-leaved plantain	PLCO
Castilleja attenuata	valley tassels	CAAT	*Plantago erecta*	California plantain	PLER
Cicendia quadrangularis	timwort	CIQU	*Poa* sp.		
Crocanthemum scoparium	peak rush-rose	CRSC*	*Pogogyne zizyphoroides*	Sacramento mesa mint	POZI
Danthonia californica	California oat grass	DACA	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Deinandra corymbosa	coastal tarweed	DECO	*Primula clevelandii* var. *patula*	Padre's shooting star	PRCL
Deschampsia danthonioides	annual hair grass	DEDA	*Psilocarphus tenellus*	slender woolly-marbles	PSTE
Eleocharis acicularis	needle spikerush	ELAC	*Quercus agrifolia*	coast live oak	QUAG
Eleocharis macrostachya	pale spikerush	ELMA	*Rumex acetosella*	sheep sorrel	RUAC
Erodium botrys	long-beaked filaree	ERBO	*Silene gallica*	small-flower catchfly	SIGA
Eryngium armatum	coyote thistle	ERAR12	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Festuca myuros	rattail sixweeks grass	FEMY	*Sonchus asper*	prickly sow thistle	SOAS
Galium porrigens	climbing bedstraw	GAPO	*Sonchus oleraceus*	common sow thistle	SOOL
Gamochaeta ustulata	purple cudweed	GAUS	*Stipa pulchra*	purple needle grass	STPU
Geranium dissectum	cut-leaved geranium	GEDI	*Taraxia ovata*	sun cups	TAOV
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO	*Toxicodendron diversilobum*	poison oak	TODI
Horkelia cuneata	wedge-leaved horkelia	HOCU	*Trifolium depauperatum*	sack clover	TRDE
Hypochaeris glabra	smooth cat's-ear	HYGL	*Trifolium dubium*	little hop clover	TRDU
Hypochaeris radicata	rough cat's-ear	HYRA	*Trifolium microcephalum*	small head clover	TRMI
Isolepis carinata	keeled bulrush	ISCA	*Trifolium variegatum*	variegated clover	TRVA
Isoetes howellii	Howell's quillwort	ISHO	*Triphysaria pusilla*	little owl's clover	TRPU
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	**Groundcover Codes**		
Juncus capitatus	dwarf rush	JUCA	BG	Bare Ground	
Juncus occidentalis	western rush	JUOC	TH	Thatch/Duff/Algae	

*USDA Plants hasn't changed the scientific name for this species yet. It is still listed as HESC (*Helianthemum scoparium*).

Table B-14. Pond 60 (Year 1 Post-Mastication) Wetland Vegetation Transect Data by Stratum

POND 60			
Date	6/14/2018		
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 6/14/2018 survey. Strata 1 through 4 were repeated from 2015. However, all transect locations were new. Transect 1 was established in stratum 1 because in 2015 this stratum was inundated. Transects 2, 3, and 4 were relocated to areas 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	35	ELMA	35	DISP	1	ELMA	50	ELMA	35	ELMA	45
			TH	60	TH	35	ELMA	25	TH	42	TH	61	TH	51
			BG	5	BG	30	MALE	1	BG	8	BG	4	BG	4
							TH	53						
							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		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	10 m	41%	ELMA	15	ELMA	15	DISP	25	DISP	20	DISP	6	DISP	5
			DISP	15	DISP	5	ELMA	12	ELMA	15	ELMA	15	ELMA	20
			TH	65	TH	78	TH	62	TH	55	JUPH	10	SOOL	1
			BG	5	BG	2	BG	1	BG	10	TH	56	TH	49
											BG	15	BG	25
			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
3	10 m	14%	JUPH	40	JUPH	45	JUPH	45	ELMA	4	JUPH	50	JUPH	38
			ELMA	10	DISP	9	ELMA	13	JUPH	33	DISP	6	ELMA	5
			DISP	2	ELMA	3	DISP	6	DISP	12	ELMA	1	DISP	1
			TH	47	TH	42	TH	34	TH	50	RUCR	1	TH	55
			BG	1	BG	1	BG	2	BG	1	TH	38	BG	1
											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**	**35%**	DISP	12	BRMI	1	DISP	7	COCO	1	BRMI	1	BRMI	1
			ELAC	1	COCO	1	ELMA	10	DISP	12	DISP	5	CAAMa	1
			ELMA	5	DISP	10	HYRA	1	ELMA	4	ELAC	5	DISP	1
			GAUS	1	ELAC	1	JUPH	8	ERAR12	5	ELMA	6	ELAC	20
			HYRA	1	ELMA	3	LYHY	1	HYRA	1	ERAR12	18	ELMA	2
			LYHY	1	FEPE	1	POMO	5	JUPH	4	LYHY	1	ERAR12	3
			PHLE	1	HYRA	1	SEGL	2	LYHY	1	POMO	2	HYRA	2
			POMO	15	JUPH	2	STAJ	1	PHLE	2	SEGL	2	JUPH	2
			SEGL	1	LYHY	1	TH	70	POMO	2	STAJ	13	LYHY	1
			TH	57	POMO	18	BG	4	SEGL	1	TH	43	POMO	1
			BG	5	STAJ	2			TH	59	BG	5	SEGL	1
					TH	35			BG	8			STAJ	14
					BG	24							TH	13
													BG	38
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**109**	**TOTAL**	**100**	**TOTAL**	**101**	**TOTAL**	**100**

Pond 60 2018 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	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Agrostis avenacea	Pacific bent grass	AGAV	*Lysimachia minima*	chaffweed	LYMI
Avena barbata	slender wild oat	AVBA	*Lythrum hyssopifolia*	grass poly	LYHY
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	*Malvella leprosa*	alkali mallow	MALE
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Microseris paludosa*	marsh microseris	MIPA
Bromus diandrus	ripgut grass	BRDI	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
Bromus hordeaceus	soft chess	BRHO	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA	*Plantago coronopus*	cut-leaved plantain	PLCO
Cotula coronopifolia	brass buttons	COCO	*Plantago lanceolata*	English plantain	PLLA
Danthonia californica	California oat grass	DACA	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Deinandra corymbosa	coastal tarweed	DECO	*Pseudognaphalium californicum*	California everlasting	PSCA
Diplacus aurantiacus	sticky monkey flower	DIAU	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Distichlis spicata	salt grass	DISP	*Pseudognaphalium ramosissimum*	pink everlasting	PSRA
Eleocharis acicularis	needle spikerush	ELAC	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Eleocharis macrostachya	pale spikerush	ELMA	*Rumex acetosella*	sheep sorrel	RUAC
Elymus triticoides	beardless wild rye	ELTR3	*Rumex crispus*	curly dock	RUCR
Erigeron canadensis	horseweed	ERCA	*Senecio glomeratus*	cutleaf burnweed	SEGL
Erodium botrys	long-beaked filaree	ERBO	*Silene gallica*	small-flower catchfly	SIGA
Eryngium armatum	coyote thistle	ERAR12	*Silybum marianum*	milk thistle	SIMA
Euthamia occidentalis	western goldenrod	EUOC	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Festuca perennis	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
Geranium dissectum	cut-leaved geranium	GEDI	*Toxicodendron diversilobum*	poison oak	TODI
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO	*Triglochin scilloides*	flowering quillwort	TRSC
Hypericum perforatum ssp. *perforatum*	Klamathweed	HYPEP	**Groundcover Codes**		
Hypochaeris glabra	smooth cat's-ear	HYGL	BG	Bare Ground	
Hypochaeris radicata	rough cat's-ear	HYRA	TH	Thatch/Duff/Algae	

Table B-15. Pond 61 (Year 1 Post-Mastication) Wetland Vegetation Transect Data by Stratum

POND 61			
Date	5/7/2018, 5/30/2018		
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 5/7/2018 survey. Strata 1 through 4 were repeated from 2017. Transect 1 was adjusted slightly to stay within the boundary of stratum 1. Transects 3 and 4 were repeated in 2018. Stratum 2 consisted of Contra Costa goldfields and no transect was placed in this stratum; see CCG map for vegetative cover estimate. CCG occupied 5% relative cover of wetland. An upland stratum was mapped and occupied 32% 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**	**0.4%**	BRTEt	1	CRAQ	1	CRAQ	1	CRAQ	2	CRAQ	1	BRTEt	1
			CIQU	1	ELAC	8	ELMA	2	ELMA	1	ELMA	1	CRAQ	1
			CRAQ	1	ELMA	2	LACO	1	LACO	3	LACO	3	ELMA	2
			ELAC	10	ISHO	20	LAGL3	4	LAGL3	1	LAGL3	3	ERAR12	1
			ELMA	4	LACO	1	LYHY	1	LYHY	2	LYHY	3	LACO	2
			LAGL3	10	LAGL3	12	PLCHh	30	PLCHh	50	LYMI	1	LAGL3	2
			LYHY	3	LYHY	1	POMO	10	POMO	5	PLCHh	60	LYHY	1
			LYMI	1	LYMI	1	POZI	1	PSTE	1	POMO	3	PLCHh	20
			PLCHh	15	PLCHh	6	PSTE	1	TH	20	POZI	1	POMO	2
			POMO	10	POMO	15	TH	30	BG	20	PSTE	1	POZI	1
			POZI	1	POZI	1	BG	19			TH	10	PSTE	3
			PSTE	3	PSTE	1					BG	15	TH	9
			TH	10	TH	10							BG	55
			BG	30	BG	31								
			TOTAL	**100**	**TOTAL**	**110**	**TOTAL**	**100**	**TOTAL**	**105**	**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
3	**10 m**	**2%**	BRTEt	3	BRTEt	1	BRTEt	1	DEDA	18	BRTEt	3	BRMI	1
			CIQU	1	DEDA	28	DEDA	15	ERAR12	7	DEDA	30	BRTEt	20
			DEDA	3	ERAR12	4	ERAR12	4	GEDI	1	ELAC	4	DECO	1
			ELAC	25	GEDI	2	GEDI	2	ISHO	1	ERAR12	10	DEDA	23
			ERAR12	1	ISHO	1	ISHO	1	JUPH	10	HYRA	1	ERAR12	2
			HYRA	1	JUPH	8	JUPH	25	LAGL3	2	JUPH	8	GEDI	1
			ISHO	3	LAGL3	3	LAGL3	1	LYHY	1	LAGL3	2	HYRA	3
			JUPH	3	PLCHh	25	LYHY	1	PLCHh	7	LYHY	1	JUPH	6
			LAGL3	1	POMO	1	PLCHh	3	POMO	3	PLCHh	6	LAGL3	4
			LYHY	5	PSCH	1	POMO	1	TH	30	POMO	1	PLCHh	15
			MIPA	3	SOOL	1	SOAS	1	BG	20	SOOL	1	POMO	15
			PLCHh	20	TH	23	SOOL	1			TH	16	POZI	1
			POMO	1	BG	2	TH	34			BG	15	PSCH	1
			TH	22			BG	10					TH	5
			BG	8									BG	2
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**98**	**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**	**61%**	BRMA	10	BRHO	1	AICA	1	BRHO	1	AICA	1	BRHO	1
			BRMI	1	BRMA	6	BRMA	15	BRMA	4	BRMA	20	BRMA	1
			BRTEt	1	BRTEt	1	BRMI	1	BRMI	1	BRMI	1	BRMI	1
			CAAMa	1	DACA	16	BRTEt	2	BRTEt	1	DACA	14	BRTEt	1
			DACA	10	DECO	1	DACA	7	DACA	32	DECO	1	CIQU	1
			ERAR12	3	ERBO	1	DECO	3	ERBO	1	ERBO	4	DACA	5
			ERBO	1	FEMY	1	ERBO	4	HYGL	1	GEDI	2	DECO	3
			HYRA	2	JUPH	6	FEMY	1	HYRA	1	HYRA	2	ERBO	4
			ISHO	2	MIPA	12	HYGL	1	ISHO	1	ISCA	1	FEMY	1
			JUPH	6	TH	52	ISCA	1	JUCA	1	ISHO	1	GEDI	3
			LYAR	1	BG	3	ISHO	1	JUPH	5	JUPH	8	ISHO	1
			MIPA	15			JUPH	5	LYAR	1	LYAR	2	JUBUb	1
			TH	50			LYAR	1	LYMI	1	LYHY	1	JUPH	18
			BG	2			LYHY	1	MAGR	1	MIPA	2	LYAR	6
							MIPA	1	MIPA	8	SIGA	1	LYHY	1
							Pseudognaphalium sp.	1	TH	35	TH	14	MIPA	1
							SOOL	1	BG	5	BG	25	PLCHh	2
							TH	28					SOOL	1
							BG	25					TAOV	3
													TH	30
													BG	20
			TOTAL	**105**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**105**

Pond 61 2018 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Acaena pinnatifida var. californica	California acaena	ACPIC	*Isoetes howellii*	Howell's quillwort	ISHO
Achillea millefolium	common yarrow	ACMI	*Isolepis carinata*	keeled bulrush	ISCA
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Juncus bufonius* var. *bufonius*	common toad rush	JUBUB
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV	*Juncus capitatus*	dwarf rush	JUCA
Agrostis pallens	seashore bent grass	AGPA	*Juncus occidentalis*	western rush	JUOC
Aira caryophyllea	silvery hair-grass	AICA	*Juncus phaeocephalus*	brown-headed rush	JUPH
Allium hickmanii	Hickman's onion	ALHI	*Lasthenia conjugens*	Contra Costa goldfields	LACO
Arctostaphylos tomentosa	woolly leaf manzanita	ARTO	*Lasthenia glaberrima*	smooth goldfields	LAGL3
Avena barbata	slender wild oat	AVBA	*Leptosiphon parviflorus*	variable linanthus	LEPA
Avena fatua	wild oat	AVFA	*Logfia gallica*	narrowleaf cottonrose	LOGA
Baccharis pilularis	coyote brush	BAPI	*Lupinus nanus*	sky lupine	LUNA
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 elegans*	common madia	MAEL
Calandrinia ciliata	red maids	CACI	*Madia gracilis*	gumweed	MAGR
Callitriche marginata	California water-starwort	CAMA	*Madia sativa*	coast tarweed	MASA
Calochortus uniflorus	pink star-tulip	CAUN	*Melica californica*	California melic	MECA
Calystegia subacaulis	hill morning glory	CASU	*Microseris paludosa*	marsh microseris	MIPA
Carduus pycnocephalus	Italian thistle	CAPY	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Castilleja densiflora	dense flower owl's clover	CADE	*Plantago coronopus*	cut-leaved plantain	PLCO
Centaurea melitensis	Maltese star-thistle	CEME	*Plantago erecta*	California plantain	PLER
Chlorogalum pomeridianum	wavyleaf soap plant	CHPO	*Pogogyne zizyphoroides*	Sacramento mesa mint	POZI
Cicendia quadrangularis	timwort	CIQU	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Cirsium quercetorum	brownie thistle	CIQU2	*Pseudognaphalium californicum*	California everlasting	PSCA
Corethrogyne filaginifolia	common sandaster	COFI	*Pseudognaphalium ramosissimum*	pink everlasting	PSRA
Cotula coronopifolia	brass buttons	COCO	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Psilocarphus tenellus*	slender woolly-marbles	PSTE
Crocanthemum scoparium	peak rush-rose	CRSC*	*Quercus agrifolia*	coast live oak	QUAG
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	*Sanicula crassicaulis*	Pacific sanicle	SACR
Dichelostemma capitatum ssp. *capitatum*	Bluedicks	DICAC	*Senecio glomeratus*	cutleaf burnweed	SEGL
Eleocharis acicularis	needle spikerush	ELAC	*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 asper*	prickly sow thistle	SOAS
Erodium cicutarium	redstem filaree	ERCI	*Sonchus oleraceus*	common sow thistle	SOOL
Eryngium armatum	coyote thistle	ERAR12	*Stachys ajugoides*	bugle hedge nettle	STAJ
Eschscholzia californica	California poppy	ESCA	*Stipa pulchra*	purple needle grass	STPU
Festuca myuros	rattail sixweeks grass	FEMY	*Taraxia ovata*	sun cups	TAOV
Festuca perennis	rye grass	FEPE	*Toxicodendron diversilobum*	poison oak	TODI
Galium aparine	goose grass	GAAP	*Trifolium microcephalum*	small head clover	TRMI
Galium porrigens	climbing bedstraw	GAPO	*Trifolium variegatum*	variegated clover	TRVA
Gamochaeta ustulata	purple cudweed	GAUS	*Triglochin scilloides*	flowering quillwort	TRSC
Geranium dissectum	cut-leaved geranium	GEDI	*Vicia benghalensis*	purple vetch	VIBE
Heteromeles arbutifolia	toyon	HEAR	**Groundcover Codes**		
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	HOMAG	BG	Bare Ground	
Hypochaeris glabra	smooth cat's-ear	HYGL	TH	Thatch/Duff/Algae	
Hypochaeris radicata	rough cat's-ear	HYRA			

*USDA Plants hasn't changed the scientific name for this species yet. It is still listed as HESC (*Helianthemum scoparium*).

Table B-16. Pond 73 (Year 1 Post-Mastication) Wetland Vegetation Transect Data by Stratum

POND 73			
Date	5/14/2018		
Surveying Personnel	Kayti Christianson, Elena Loke		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry at time of 5/14/2018 survey. All three strata and corresponding transects were identified and established in 2018. An upland stratum was mapped and occupied 3% relative cover of the 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**	**2%**	ELMA	70	ELMA	85	ELMA	65
			LAGL3	4	LAGL3	1	PHLE	1
			PLCHh	4	PLCHh	1	PLCHh	1
			TH	20	TH	15	TH	35
			BG	5	BG	2	BG	2
			TOTAL	**103**	**TOTAL**	**104**	**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
2	**10 m**	**73%**	ELAC	9	ELAC	4	DEDA	1	ELAC	4	ELAC	25	ELAC	15
			ELMA	5	ELMA	8	ELAC	30	ELMA	5	ELMA	5	ELMA	2
			JUPH	42	JUPH	60	ELMA	2	JUPH	40	JUPH	30	JUPH	40
			LAGL3	1	LAGL3	3	ERAR12	2	TH	55	LAGL3	3	LAGL3	1
			TH	46	TH	30	JUPH	25	BG	0	TH	35	*Madia* sp.	1
			BG	0	BG	0	PLCHh	1			BG	3	TH	45
							TH	40					BG	0
							BG	2						
			TOTAL	**103**	**TOTAL**	**105**	**TOTAL**	**103**	**TOTAL**	**104**	**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
4	**10 m**	**22%**	CIQU	1	ERAR12	40	AICA	1	BRMI	1	BRMI	1	BRMI	1
			DEDA	1	ISHO	3	ERAR12	55	ERAR12	45	ERAR12	50	ERAR12	45
			ERAR12	25	JUPH	3	ISHO	2	ISHO	3	ISHO	1	HERA	1
			ISHO	5	TH	50	JUPH	3	JUPH	10	JUPH	6	ISHO	1
			JUCA	1	BG	5	MAEX	1	LYMI	1	LYMI	1	JUPH	4
			JUPH	5			MIPA	2	MAEX	1	MAEX	1	MAEX	1
			LYHY	1			POMO	1	POMO	1	POMO	1	PSTE	1
			LYMI	1			PSTE	1	PSTE	1	TH	36	TH	44
			PLCHh	1			TH	32	TH	35	BG	3	BG	2
			TH	35			BG	2	BG	2				
			BG	15										
			TOTAL	**91**	**TOTAL**	**101**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 73 2018 Species List

Species Name	Common Name	Species Code
Acmispon americanus var. americanus	Spanish lotus	ACAMA
Achillea millefolium	common yarrow	ACMI
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV
Aira caryophyllea	silvery hair-grass	AICA
Aphanes occidentalis	western lady's mantle	APOC
Avena barbata	slender wild oat	AVBA
Baccharis pilularis	coyote brush	BAPI
Bromus hordeaceus	soft chess	BRHO
Briza maxima	rattlesnake grass	BRMA
Briza minor	annual quaking grass	BRMI
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA
Calandrinia menziesii	redmaids	CAME
Cerastium glomeratum	sticky mouse-ear chickweed	CEGL
Cicendia quadrangularis	timwort	CIQU
Conium maculatum	poison hemlock	COMA
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
Eleocharis macrostachya	pale spikerush	ELMA
Eryngium armatum	coyote thistle	ERAR12
Erodium botrys	long-beaked filaree	ERBO
Erodium cicutarium	redstem filaree	ERCI
Festuca myuros	rattail sixweeks grass	FEMY
Galium aparine	goose grass	GAAP
Galium porrigens	climbing bedstraw	GAPO
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
Eleocharis acicularis	needle spikerush	ELAC
Isoetes howellii	Howell's quillwort	ISHO
Juncus bufonius var. *bufonius*	common toad rush	JUBUB
Juncus capitatus	dwarf rush	JUCA
Juncus phaeocephalus	brown-headed rush	JUPH
Lasthenia glaberrima	smooth goldfields	LAGL3
Leptosiphon parviflorus	variable linanthus	LEPA
Logfia gallica	narrowleaf cottonrose	LOGA
Lysimachia arvensis	scarlet pimpernel	LYAR
Lythrum hyssopifolia	grass poly	LYHY
Lysimachia minima	chaffweed	LYMI
Madia exigua	small tarweed	MAEX
Madia gracilis	gumweed	MAGR
Madia sativa	coast tarweed	MASA
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
Polypogon monspeliensis	rabbitfoot grass	POMO
Pogogyne zizyphoroides	Sacramento mesa mint	POZI
Pseudognaphalium luteoalbum	weedy cudweed	PSLU
Pseudognaphalium stramineum	cottonbatting plant	PSST
Psilocarphus tenellus	slender woolly-marbles	PSTE
Rumex acetosella	sheep sorrel	RUAC
Rumex crispus	curly dock	RUCR
Senecio glomeratus	cutleaf burnweed	SEGL
Sisyrinchium bellum	western blue-eyed grass	SIBE
Silene gallica	small-flower catchfly	SIGA
Sidalcea malviflora ssp. *malviflora*	checkerbloom	SIMAM
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Taraxia ovata	sun cups	TAOV
Toxicodendron diversilobum	poison oak	TODI
Trifolium barbigerum	bearded clover	TRBA
Trifolium depauperatum	sack clover	TRDE
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff/Algae	

This page intentionally left blank

APPENDIX C

Stratum Cover by Vernal Pool

This page intentionally left blank

Table C-1. Pond 5 (Reference) Wetland Vegetation Cover by Stratum

POND 5			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**40%**	CRTR	0.8
		ELMA	34.2
		MALE	1.5
		TH	7.2
		BG	56.3
		TOTAL	**100.0**
2	**3%**	CRTR	0.7
		DISP	19.0
		ELMA	22.3
		LYHY	0.3
		MALE	4.0
		POMO	0.7
		TH	4.0
		BG	50.3
		TOTAL	**101.3**
3	**11%**	BRMI	1.2
		DISP	28.0
		ELAC	0.2
		ELMA	14.5
		ERCA	0.2
		HYRA	0.2
		JUBA	0.3
		LYHY	0.8
		POMO	0.2
		PSLU	0.5
		PSST	6.0
		RUCR	0.8
		SEGL	0.8
		SIGA	0.2
		SOOL	0.3
		STAJ	12.2
		TH	23.5
		BG	9.8
		TOTAL	**99.7**

POND 5			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**5%**	ACAMa	0.2
		BAPI	0.2
		BRMI	1.2
		CAAMa	0.2
		DISP	6.0
		ERAR	0.0
		ERBO	0.2
		HYRA	0.2
		JUPH	33.2
		LYAR	0.2
		LYHY	1.2
		LYMI	1.0
		PLCO	0.5
		POMO	0.3
		PSLU	2.2
		PSRA	0.2
		PSST	0.2
		RUAC	1.2
		SEGL	1.3
		SOOL	0.2
		STAJ	0.8
		TH	21.7
		BG	27.7
		TOTAL	**99.7**

Table C-1 (continued). Pond 5 (Reference) Wetland Vegetation Cover by Stratum

POND 5			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
5	**20%**	ACAMa	0.3
		AICA	0.3
		BAPI	0.2
		BRMI	0.3
		DISP	24.5
		ELAC	0.7
		ELTR3	7.0
		ERCA	1.7
		GEDI	0.2
		JUBA	10.0
		LYAR	9.3
		LYHY	0.8
		LYMI	0.3
		NUTE	0.5
		PLCHh	0.2
		POMO	0.5
		PSLU	1.0
		PSST	3.8
		QUAG	0.2
		SEGL	1.0
		SIGA	0.2
		SOAM	1.0
		SOAS	1.0
		SOOL	0.5
		STAJ	0.7
		TODI	0.2
		ZEDA	0.5
		TH	15.7
		BG	18.0
		TOTAL	**100.5**

POND 5			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
6	**21%**	CRTR	0.3
		DISP	10.8
		ELMA	23.2
		JUBUb	0.2
		LYHY	0.5
		MALE	0.5
		PHLE	0.3
		POMO	19.5
		PSLU	1.0
		ZEDA	0.2
		TH	16.0
		BG	27.5
		TOTAL	**100.0**

Table C-2. Pond 101 East (West) (Reference) Wetland Vegetation Cover by Stratum

POND 101 East (West)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	5%	AGAV	2.0
		ALSA	8.2
		ELAC	0.2
		ELMA	17.8
		FEMY	0.2
		GNPA	1.7
		HECUo	0.5
		LAGL3	0.2
		LYHY	4.5
		MALE	8.5
		PHLE	1.7
		POAVd	9.7
		POMO	8.8
		PSLU	0.2
		PSST	0.2
		ROCU	1.3
		RUCR	0.5
		TRSC	0.2
		Unk Apiaceae	0.2
		VEBR	0.3
		TH	17.2
		BG	18.0
		TOTAL	**101.8**
2	40%	ALSA	0.2
		ELMA	42.2
		GNPA	0.2
		HECUo	0.2
		LAGL3	0.7
		MALE	5.2
		PHLE	1.7
		POMO	0.2
		SOOL	0.3
		TH	47.5
		BG	2.2
		TOTAL	**100.3**

POND 101 East (West)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	12%	AGAV	0.5
		DISP	1.7
		ELMA	19.8
		ERCA	0.3
		ERCI	0.3
		FEMY	0.3
		FEPE	0.5
		GEDI	3.5
		GNPA	0.3
		HECUo	0.5
		HYGL	0.3
		LAGL3	2.5
		LYHY	0.2
		PHLE	3.7
		PLCHh	14.5
		POAVd	2.0
		POMO	3.3
		Pseudognaphalium sp.	0.3
		RUCR	3.0
		SOOL	0.3
		STAJ	2.0
		TH	27.3
		BG	12.7
		TOTAL	**100.0**

Table C-2 (continued). Pond 101 East (West) (Reference) Wetland Vegetation Cover by Stratum

POND 101 East (West)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**18%**	ACAMa	0.2
		BAPI	0.2
		BRMI	1.2
		DISP	33.3
		ELMA	3.0
		ERBO	0.5
		ERCA	0.5
		GEDI	5.2
		HECUo	1.0
		HYGL	0.3
		HYRA	0.3
		JUPH	1.0
		LYAR	0.2
		LYHY	1.5
		MASA	0.7
		PLCHh	0.8
		POMO	4.0
		PSLU	1.3
		RUCR	0.5
		SOOL	0.8
		TRMI	0.5
		VISAn	0.5
		TH	35.0
		BG	7.3
		TOTAL	**99.8**

POND 101 East (West)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
5	**21%**	BAPI	0.2
		BRHO	0.3
		BRMI	0.7
		ELAC	7.8
		ELMA	2.8
		ERBO	1.2
		ERCI	0.2
		FEMY	0.8
		FEPE	33.8
		GAUS	0.7
		GEDI	0.8
		HOBR	0.0
		HYGL	0.3
		HYRA	0.8
		LYHY	0.7
		LYMI	0.5
		MALE	3.5
		PLCHh	0.2
		RUCR	0.5
		SOAS	0.2
		SOOL	0.8
		Vicia sp.	0.2
		TH	31.7
		BG	11.0
		TOTAL	**99.7**
6	**4%**	BRMI	0.3
		DEDA	0.3
		ERCA	0.7
		FEMY	0.3
		GEDI	0.7
		HYGL	0.7
		JUBA	1.0
		JUPH	39.3
		PLCO	1.0
		Pseudognaphalium sp.	1.0
		RUAC	7.0
		RUCR	0.3
		STAJ	0.7
		VISAn	1.0
		TH	30.0
		BG	16.0
		TOTAL	**100.3**

Table C-3. Pond 101 East (East) (Reference) Wetland Vegetation Cover by Stratum

POND 101 East (East)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	7%	ELMA	6.2
		ERCI	0.5
		LYHY	0.3
		MALE	41.5
		Rumex sp.	2.7
		TH	0.8
		BG	48.0
		TOTAL	**100.0**
2	20%	ELMA	66.7
		GAUS	0.5
		LYHY	1.2
		MALE	6.5
		POMO	0.5
		TH	8.0
		BG	17.3
		TOTAL	**100.7**
5	30%	ACAMa	0.2
		AGLAV	0.2
		AGPA	1.2
		BRMI	0.7
		ELAC	1.7
		ERBO	0.5
		ERCA	0.2
		HECUo	2.0
		LYAR	0.3
		LYHY	0.5
		POMO	0.2
		PORI	0.2
		PSLU	3.8
		PSST	19.0
		RUAC	5.7
		STAJ	4.3
		Trifolium sp.	0.2
		TRMI	0.2
		VISAn	2.0
		TH	25.5
		BG	31.2
		TOTAL	**99.5**

POND 101 East (East)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
6	29%	CAPR	29.5
		JUBA	36.0
		PSLU	1.5
		RUAC	16.5
		RUCR	0.5
		TH	13.2
		BG	4.5
		TOTAL	**101.7**
7	14%	AGPA	0.7
		ELMA	2.5
		GNPA	1.0
		JUBUb	59.2
		LYHY	10.2
		MALE	6.8
		POMO	5.0
		PORI	0.5
		PSLU	0.3
		ROCU	0.5
		RUCO	0.2
		STAJ	3.0
		Trifolium sp.	0.2
		Unk herb	0.2
		TH	3.2
		BG	11.2
		TOTAL	**104.5**

Table C-4. Pond 997 (Reference) Wetland Vegetation Cover by Stratum

POND 997			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	5%	AICA	0.2
		BRMI	0.2
		CIQU	0.3
		DEDA	0.0
		ELAC	0.3
		ELMA	1.0
		ERAR12	14.5
		ERBO	1.2
		GAUS	0.2
		HYGL	0.2
		JUBUb	0.5
		JUCA	0.3
		JUPH	0.2
		LACO	0.3
		LYHY	0.5
		LYMI	0.8
		PLCHh	1.3
		PLCO	3.2
		POMO	9.8
		POZI	0.3
		Pseudognaphalium sp.	0.2
		PSCH	1.3
		SIGA	0.2
		Trifolium sp.	0.2
		TH	41.8
		BG	21.2
		TOTAL	**100.2**
2 (CCG)	**1%**	**-**	**-**

POND 997			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	62%	ACAMa	0.2
		AICA	0.5
		BRMA	0.3
		BRMI	7.0
		DACA	15.8
		DECO	0.2
		ELMA	0.2
		ERAR12	3.7
		ERBO	3.7
		FEMY	0.8
		GAPO	0.2
		GEDI	0.5
		HYGL	12.0
		HYRA	7.3
		ISCA	0.2
		ISHO	0.2
		JUPH	0.5
		LYAR	0.3
		LYHY	0.5
		LYMI	0.3
		MIPA	0.3
		PLCO	0.5
		RUAC	1.2
		SIBE	0.2
		TRIX	0.2
		TH	29.0
		BG	14.3
		TOTAL	**100.0**

Table C-4 (continued). Pond 997 (Reference) Wetland Vegetation Cover by Stratum

POND 997			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
5	**31%**	BAPI	0.2
		BRMA	1.2
		BRMI	0.5
		ERAR12	0.7
		ERBO	0.8
		FEMY	0.5
		GAPO	0.3
		HYGL	0.8
		HYRA	2.0
		ISCA	0.3
		JUBUb	0.2
		JUPH	29.5
		LOGA	0.2
		LYAR	0.2
		LYHY	1.0
		LYMI	0.7
		PLCHh	0.2
		PLLA	0.2
		SEGL	0.3
		SOAS	0.3
		TRSC	0.2
		TH	36.2
		BG	23.7
		TOTAL	**100.0**
Upland	**1%**	-	-

Table C-5. Pond 3 North (Year 1 Post-Burn) Wetland Vegetation Cover by Stratum

POND 3 North			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**6%**	COCO	0.5
		CRAQ	0.2
		ELMA	50.0
		FEMY	0.5
		FEPE	0.2
		GEDI	0.2
		JUPH	0.3
		LAGL3	1.7
		LYHY	0.8
		PLCHh	4.7
		POMO	6.3
		TH	5.5
		BG	29.5
		TOTAL	**100.3**
2	**18%**	COCO	0.2
		ELAC	0.2
		ELMA	43.5
		ERAR12	2.5
		FEPE	0.2
		GEDI	1.2
		JUPH	2.7
		LYHY	0.3
		PLCHh	4.0
		PLCO	0.2
		POMO	0.8
		TH	16.0
		BG	28.3
		TOTAL	**100.0**

POND 3 North			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**47%**	ACPA	0.2
		AGLAV	0.3
		AICA	0.5
		BRDI	0.5
		BRHO	1.2
		BRMI	2.7
		BRTEt	0.3
		CAEX	0.2
		CAUN	0.2
		CRAQ	0.2
		DACA	7.0
		DECO	0.3
		DEDA	0.2
		ERAR12	11.0
		ERBO	0.3
		FEMY	0.8
		FEPE	9.7
		HYGL	0.2
		HYRA	2.8
		ISCA	0.2
		ISCE	0.2
		ISHO	1.5
		JUBUb	0.3
		JUCA	0.3
		JUPH	5.8
		LYAR	7.3
		LYHY	0.2
		LYMI	0.3
		MIPA	4.7
		TAOV	0.2
		TH	3.5
		BG	37.5
		TOTAL	**100.5**
4 (CCG)	**29%**	-	-

Table C-6. Pond 3 South (Year 1 Post-Burn) Wetland Vegetation Cover by Stratum

POND 3 South			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**18%**	BRTEt	0.2
		COCO	0.2
		CRAQ	0.5
		DEDA	0.5
		ELAC	4.5
		ELMA	16.2
		ERAR12	18.3
		HYGL	0.2
		JUPH	7.3
		LYHY	1.0
		LYMI	0.2
		MALE	1.2
		PLCHh	3.8
		PLCO	1.8
		POMO	5.3
		PSTE	0.3
		TH	6.7
		BG	32.7
		TOTAL	**100.8**

POND 3 South			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
2	**29%**	BRMI	2.3
		BAPI	0.2
		BRTEt	1.2
		CAAMa	0.2
		CEGL	0.5
		DECO	6.8
		DEDA	0.7
		ELAC	1.8
		ELMA	0.7
		ERAR12	6.8
		ERBO	1.7
		FEMY	1.0
		FEPE	2.7
		GEDI	0.5
		HYGL	0.2
		HYRA	0.3
		ISCA	0.2
		ISHO	0.5
		JUPH	20.8
		LYAR	0.8
		LYHY	0.8
		MALE	5.3
		MIPA	1.7
		PLCO	0.3
		POMO	0.8
		RACA	0.2
		SIGA	0.5
		TH	11.3
		BG	30.0
		TOTAL	**100.8**

Table C-6 (continued). Pond 3 South (Year 1 Post-Burn) Wetland Vegetation Cover by Stratum

POND 3 South			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	48%	AGLAV	0.3
		AICA	1.0
		BAPI	0.2
		BRHO	0.5
		BRMI	0.8
		CIQU	0.2
		CRAQ	0.3
		DACA	14.5
		DECO	0.5
		ERAR12	4.7
		ERBO	3.0
		FEMY	2.2
		GAPH	2.0
		HYGL	0.3
		HYRA	0.5
		ISCA	0.2
		ISHO	0.2
		JUBUb	2.3
		JUCA	0.2
		JUPH	0.5
		LOGA	1.0
		LYAR	1.5
		LYHY	0.7
		LYMI	0.7
		MAEX	0.7
		PLCO	2.5
		POMO	0.3
		PSTE	0.3
		SIBE	0.2
		SIGA	0.2
		TRAN	0.2
		TRDU	0.2
		TH	6.5
		BG	51.2
		TOTAL	**100.3**

POND 3 South			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	4%	BRDI	0.3
		BRHO	1.3
		BRMI	1.3
		BRTEt	0.7
		DACA	0.7
		DECO	4.3
		ELMA	0.7
		ERAR12	1.7
		ERBO	0.2
		FEMY	4.7
		FEPE	22.2
		GEDI	8.0
		HOBR	0.3
		HYGL	1.3
		HYRA	0.8
		JUPH	7.3
		LYAR	0.5
		LYHY	0.7
		MAGR	0.3
		MALE	11.8
		MIPA	1.2
		POMO	0.2
		RACA	1.2
		SIGA	1.5
		SOOL	0.5
		TH	6.0
		BG	20.5
		TOTAL	**100.2**

Table C-7. Pond 39 (Year 1 Post-Burn) Wetland Vegetation Cover by Stratum

POND 39			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**3%**	DEDA	0.3
		ELAC	6.3
		ELMA	47.0
		FEMY	0.3
		FEPE	0.7
		GEDI	0.7
		HOBR	0.3
		JUPH	6.7
		LYHY	3.0
		PLCHh	11.7
		POMO	5.7
		RUCR	1.0
		TH	5.3
		BG	12.3
		TOTAL	**101.3**
3	**56%**	BRDI	0.5
		BRHO	0.5
		BRMI	0.2
		DACA	4.8
		DECO	1.8
		DISP	9.2
		ERBO	3.8
		ERCI	0.3
		FEBR	0.3
		FEMY	0.7
		FEPE	27.5
		GEDI	1.3
		HYGL	0.7
		HYRA	0.3
		LYAR	0.2
		LYMI	0.2
		MAEL	0.3
		MASA	0.7
		PLCO	1.7
		TRAN	0.7
		VISAn	1.7
		TH	14.0
		BG	29.3
		TOTAL	**100.7**
4	**32%**	ACPA	1.2
		AICA	1.2
		BRDI	0.2
		BRHO	1.0
		BRMI	0.3
		DACA	22.0
		DECO	0.3
		ERBO	0.5
		FEBR	1.0
		FEMY	0.5
		FEPE	0.2
		GEDI	0.3
		HYGL	0.7
		HYRA	0.3
		JUPH	1.0
		LYAR	0.3
		MAEL	0.2
		MAEX	0.3
		MAGR	0.5
		PLCO	3.8
		SIMAm	1.5
		TRAN	11.2
		VISAn	0.2
		TH	16.0
		BG	35.2
		TOTAL	**99.8**
Upland	**9%**	-	-

Table C-8. Pond 40 North (Year 1 Post-Burn)
Wetland Vegetation Cover by Stratum

POND 40 North			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
2	**26%**	BAPI	0.3
		COCO	1.7
		ELMA	26.7
		ERCA	2.3
		GEDI	2.3
		HYGL	4.0
		LYHY	1.0
		NASQ	0.3
		PLCO	2.7
		PSLU	0.7
		SOOL	0.3
		TH	21.7
		BG	35.0
		TOTAL	**99.0**
4	**74%**	AVFA	1.3
		BRMI	1.0
		ELMA	0.3
		GAAP	0.3
		GEDI	2.0
		HYRA	1.3
		JUPH	44.7
		LYHY	0.7
		PLCO	3.0
		PSLU	0.3
		SIGA	1.0
		TH	9.3
		BG	33.3
		TOTAL	**98.7**

Table C-9. Pond 40 South (Year 1 Post-Burn) Wetland Vegetation Cover by Stratum

POND 40 South			
Stratum	Relative % Cover of Wetland	Species	% Cover
1	6%	DEDA	0.7
		ELMA	24.0
		FEPE	1.0
		HYRA	0.3
		LYHY	0.7
		PHLE	0.3
		PLCHh	10.7
		PLCO	26.7
		POAVd	0.3
		POMO	3.7
		RUCR	0.7
		VISA	0.7
		TH	8.3
		BG	25.0
		TOTAL	**103.0**
2	21%	AICA	0.3
		BRHO	0.7
		BRMI	0.3
		ERBO	2.0
		FEMY	0.7
		HYRA	5.0
		JUPH	13.7
		LYHY	0.3
		PLCO	5.7
		Pseudognaphalium sp.	0.3
		RUAC	0.7
		SIGA	1.0
		BG	64.3
		TH	9.0
		TOTAL	**104.0**

POND 40 South			
Stratum	Relative % Cover of Wetland	Species	% Cover
3	73%	BRDI	0.2
		BRHO	1.2
		BRMI	0.2
		DACA	0.8
		DECO	4.0
		ELPA	0.3
		ERBO	1.5
		ERCI	5.5
		FEMY	3.5
		FEPE	16.7
		GEDI	6.8
		HYGL	2.3
		HYRA	3.8
		JUPH	0.2
		MASA	0.5
		PLCO	3.0
		RUAC	0.5
		SIGA	0.2
		TRAN	0.3
		TRDU	0.2
		VISAs	2.0
		TH	18.2
		BG	29.2
		TOTAL	**101.0**

Table C-10. Pond 43 (Year 1 Post-Burn) Wetland Vegetation Cover by Stratum

POND 43			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	34%	CIQU	0.3
		CRAQ	1.2
		DECO	1.3
		DEDA	1.2
		ELAC	0.3
		ERAR12	4.8
		GEDI	0.2
		ISHO	0.2
		JUBUb	0.2
		JUPH	10.7
		LYAR	0.3
		LYHY	0.7
		LYMI	1.3
		MAEX	0.3
		NAME	0.8
		PLCHH	8.8
		POMO	20.2
		POZI	2.2
		PSTE	1.0
		TH	15.2
		BG	29.3
		TOTAL	**100.5**

POND 43			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
2	48%	AICA	0.3
		BRHO	0.7
		BRMI	1.3
		BRTEt	1.3
		CRCO	0.3
		DECO	1.3
		DEDA	1.0
		ELAC	1.0
		ERAR12	10.3
		GAUS	0.3
		ISHO	1.0
		JUBUb	0.7
		JUCA	0.3
		JUPH	28.3
		LYAR	1.3
		LYHY	1.0
		LYMI	2.3
		PLCHh	2.7
		Poa sp.	0.3
		POMO	1.0
		POZI	1.3
		PSTE	1.0
		TRBA	0.3
		BG	29.0
		TH	11.3
		TOTAL	**100.0**

Table C-10 (continued). Pond 43 (Year 1 Post-Burn) Wetland Vegetation Cover by Stratum

POND 43			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**16%**	ACAMa	4.0
		AICA	2.3
		BRHO	1.0
		BRMI	1.0
		CRCO	0.3
		DACA	19.7
		DECO	5.0
		FEMY	2.3
		GEDI	0.3
		HYGL	1.0
		HYRA	3.0
		JUBUb	1.3
		JUCA	0.3
		JUPH	5.0
		LOGA	0.3
		LYAR	2.7
		LYMI	0.7
		MAEX	0.3
		MIPA	0.3
		PLCO	0.3
		PSTE	0.3
		TRDU	1.0
		TH	23.3
		BG	23.7
		TOTAL	**99.7**
Upland	**2%**	-	-

Table C-11. Pond 35 (Year 1 Post-Mastication) Wetland Vegetation Cover by Stratum

POND 35			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	21%	COCO	1.3
		ELMA	2.3
		HYRA	0.5
		LYHY	0.8
		PLCHh	32.2
		PLCO	56.7
		POAVd	0.2
		PSCH	4.0
		SIGA	0.2
		VEPEX	0.2
		TH	2.3
		BG	2.7
		TOTAL	**103.3**
2	41%	BRTEt	0.2
		CIQU	0.2
		COCO	0.2
		CRAQ	0.2
		DEDA	0.2
		ELMA	0.3
		GEDI	0.2
		HOBR	0.2
		HYGL	0.7
		HYRA	0.7
		ISHO	0.2
		LOGA	0.7
		LYHY	0.3
		PLCHh	0.2
		PLCO	39.3
		PSCH	2.0
		TH	29.2
		BG	25.5
		TOTAL	**100.2**

POND 35			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	13%	ACPA	0.2
		BRHO	0.2
		BRMI	0.8
		CEGL	0.2
		CIQU	0.2
		COCO	0.7
		CRAQ	0.3
		DEDA	2.2
		ELAC	0.3
		FEBR	0.2
		FEPE	0.5
		HOBR	23.3
		HYRA	0.7
		LYAR	0.2
		LYHY	0.8
		PLCHh	2.0
		PLCO	25.0
		PSCH	20.7
		SIGA	0.2
		SOAS	0.5
		TH	11.3
		BG	11.5
		TOTAL	**101.8**

Table C-11 (continued). Pond 35 (Year 1 Post-Mastication) Wetland Vegetation Cover by Stratum

POND 35			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**25%**	ACPA	0.2
		ACWR	0.5
		AICA	0.3
		AVBA	0.3
		AVFA	0.3
		BRDI	0.2
		BRHO	0.7
		BRMI	0.3
		BRTEt	0.7
		DACA	5.2
		DEDA	0.2
		ERBO	16.3
		FEBR	0.3
		FEMY	0.2
		FEPE	11.2
		GEDI	0.2
		HYGL	0.5
		HYRA	0.7
		ISHO	0.3
		JUBUb	0.2
		LYAR	0.2
		LYHY	0.2
		PLCO	11.5
		PSCH	0.3
		TRAN	23.5
		TH	6.8
		BG	21.3
		TOTAL	**102.5**

Table C-12. Pond 42 (Year 1 Post-Mastication and Post-Burn) Wetland Vegetation Cover by Stratum

POND 42			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**4%**	CIQU	0.3
		DEDA	0.3
		ELAC	26.7
		ERAR12	21.7
		ISHO	0.3
		JUPH	2.0
		LYHY	3.3
		LYMI	0.3
		PLCHh	3.3
		POZI	0.7
		PSTE	1.3
		TH	10.7
		BG	29.0
		TOTAL	**100.0**
2	**5%**	ELAC	2.3
		ELMA	20.0
		LAGL3	0.3
		LYHY	0.3
		PHLE	10.3
		PLCHh	1.7
		POMO	3.7
		VEPEx	0.3
		TH	38.3
		BG	22.7
		TOTAL	**100.0**

POND 42			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**50%**	BRHO	0.2
		BRMI	1.0
		BRTEt	0.2
		CIQU	0.2
		COCO	0.2
		DECO	0.5
		DEDA	0.8
		DIAU	0.5
		ELAC	9.7
		ELMA	2.5
		ERAR12	23.2
		FEMY	0.2
		HYRA	0.3
		ISHO	0.5
		JUPH	16.7
		LAGL3	0.2
		LYAR	1.5
		LYHY	1.2
		LYMI	0.7
		PLCHh	1.2
		POMO	0.5
		Pseudognaphalium sp.	0.5
		PSTE	0.5
		SOOL	0.5
		TH	18.5
		BG	18.5
		TOTAL	**100.2**

Table C-12 (continued). Pond 42 (Year 1 Post-Mastication and Post-Burn) Wetland Vegetation Cover by Stratum

POND 42			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**23%**	AICA	0.3
		BRDI	0.3
		BRHO	0.7
		BRMI	0.3
		BRTEt	0.7
		CEME	0.7
		DACA	24.0
		DECO	15.7
		ERBO	1.0
		FEMY	0.7
		GAPH	0.7
		HYGL	1.3
		HYRA	0.7
		JUBUb	0.3
		LOFI	1.0
		LYAR	2.0
		MAGR	0.3
		MIPA	0.3
		PLER	0.7
		SIBE	1.7
		TH	9.0
		BG	37.7
		TOTAL	**100.0**
Upland	**18%**	**-**	**-**

Table C-13. Pond 44 (Year 1 Post-Mastication) Wetland Vegetation Cover by Stratum

POND 44			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	61%	AGLAV	8.0
		BRMI	0.7
		BRTEt	0.7
		CIQU	1.0
		DEDA	0.7
		ELAC	16.0
		ERAR12	29.7
		FEMY	0.3
		HECUo	0.7
		HYGL	0.3
		ISHO	1.0
		JUBUb	0.3
		JUCA	1.0
		LAGL3	0.3
		LYHY	0.7
		LYMI	5.3
		PLCHh	7.0
		POMO	4.0
		POZI	1.3
		PSTE	3.7
		TRDU	1.3
		TH	2.7
		BG	15.7
		TOTAL	**102.3**

POND 44			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	17%	ACPA	1.7
		AICA	1.0
		APOC	0.3
		BRHO	1.0
		BRMI	1.0
		CAAT	1.0
		CIQU	0.3
		DACA	25.0
		ERBO	2.0
		FEMY	0.7
		GEDI	0.7
		HYGL	1.3
		HYRA	1.3
		ISHO	0.3
		JUCA	0.3
		JUOC	0.7
		LYAR	1.3
		LYMI	1.0
		MAEX	0.3
		MAGR	3.7
		PLCO	6.3
		PLER	0.3
		POMO	0.7
		POZI	0.3
		PSTE	0.3
		TAOV	1.0
		TRDU	7.0
		TRPU	1.0
		TH	16.7
		BG	21.3
		TOTAL	**100.0**

Table C-13 (continued). Pond 44 (Year 1 Post-Mastication) Wetland Vegetation Cover by Stratum

POND 44			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**11%**	AGLAV	2.7
		BRMI	1.0
		BRTEt	0.3
		CIQU	1.0
		DECO	1.0
		DEDA	0.3
		ERAR12	10.0
		GAUS	1.0
		ISCA	0.3
		ISHO	1.3
		JUBUb	1.3
		JUCA	1.0
		JUPH	29.0
		LYAR	0.3
		LYHY	1.0
		LYMI	3.0
		PLCHh	1.7
		Poa sp.	0.3
		POMO	0.7
		POZI	0.7
		PSTE	8.0
		SOOL	0.7
		TH	17.3
		BG	16.3
		TOTAL	**100.3**
Upland	**11%**	-	-

Table C-14. Pond 60 (Year 1 Post-Mastication)
Wetland Vegetation Cover by Stratum

POND 60			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**10%**	DISP	0.2
		ELMA	37.5
		MALE	0.2
		TH	50.3
		BG	11.8
		TOTAL	**100.0**
2	**41%**	DISP	12.7
		ELMA	15.3
		JUPH	1.7
		SOOL	0.2
		TH	60.8
		BG	9.7
		TOTAL	**100.3**
3	**14%**	DISP	6.0
		ELMA	6.0
		JUPH	41.8
		RUCR	0.2
		TH	44.3
		BG	1.7
		TOTAL	**100.0**
4	**35%**	BRMI	0.5
		CAAMa	0.2
		COCO	0.3
		DISP	7.8
		ELAC	4.5
		ELMA	5.0
		ERAR12	4.3
		FEPE	0.2
		GAUS	0.2
		HYRA	1.0
		JUPH	2.7
		LYHY	1.0
		PHLE	0.5
		POMO	7.2
		SEGL	1.2
		STAJ	5.0
		TH	46.2
		BG	14.0
		TOTAL	**101.7**

Table C-15. Pond 61 (Year 1 Post-Mastication) Wetland Vegetation Cover by Stratum

POND 61			
Stratum	Relative % Cover of Wetland	Species	% Cover
1	0.4%	BRTEt	0.3
		CIQU	0.2
		CRAQ	1.2
		ELAC	3.0
		ELMA	2.0
		ERAR12	0.2
		ISHO	3.3
		LACO	1.7
		LAGL3	5.3
		LYHY	1.8
		LYMI	0.5
		PLCHh	30.2
		POMO	7.5
		POZI	0.8
		PSTE	1.7
		TH	14.8
		BG	28.3
		TOTAL	**102.8**
2 (CCG)	**5%**	-	-
3	2%	BRMI	0.2
		BRTEt	4.7
		CIQU	0.2
		DECO	0.2
		DEDA	19.5
		ELAC	4.8
		ERAR12	4.7
		GEDI	1.0
		HYRA	0.8
		ISHO	1.0
		JUPH	10.0
		LAGL3	2.2
		LYHY	1.3
		MIPA	0.5
		PLCHh	12.7
		POMO	3.7
		POZI	0.2
		PSCH	0.3
		SOAS	0.2
		SOOL	0.5
		TH	21.7
		BG	9.5
		TOTAL	**99.7**

POND 61			
Stratum	Relative % Cover of Wetland	Species	% Cover
4	61%	AICA	0.3
		BRHO	0.5
		BRMA	9.3
		BRMI	0.8
		BRTEt	1.0
		CAAMa	0.2
		CIQU	0.2
		DACA	14.0
		DECO	1.3
		ERAR12	0.5
		ERBO	2.5
		FEMY	0.5
		GEDI	0.8
		HYGL	0.3
		HYRA	0.8
		ISCA	0.3
		ISHO	1.0
		JUBUb	0.2
		JUCA	0.2
		JUPH	8.0
		LYAR	1.8
		LYHY	0.5
		LYMI	0.2
		MAGR	0.2
		MIPA	6.5
		PLCHh	0.3
		Pseudognaphalium sp.	0.2
		SIGA	0.2
		SOOL	0.3
		TAOV	0.5
		TH	34.8
		BG	13.3
		TOTAL	**101.7**
Upland	**32%**	-	-

Table C-16. Pond 73 (Year 1 Post-Mastication) Wetland Vegetation Cover by Stratum

POND 73			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**2%**	ELMA	73.3
		LAGL3	1.7
		PHLE	0.3
		PLCHh	2.0
		TH	23.3
		BG	3.0
		TOTAL	**103.7**
2	**73%**	DEDA	0.2
		ELAC	14.5
		ELMA	4.5
		ERAR	0.0
		JUPH	39.5
		LAGL3	1.3
		Madia sp.	0.2
		PLCHh	0.2
		TH	41.8
		BG	0.8
		TOTAL	**103.0**
4	**22%**	AICA	0.2
		BRMI	0.5
		CIQU	0.2
		DEDA	0.2
		ERAR12	43.3
		HERA	0.2
		ISHO	2.5
		JUCA	0.2
		JUPH	5.2
		LYHY	0.2
		LYMI	0.5
		MAEX	0.7
		MIPA	0.3
		PLCHh	0.2
		POMO	0.5
		PSTE	0.5
		TH	38.7
		BG	4.8
		TOTAL	**98.7**
Upland	**3%**	-	-

APPENDIX D

CTS and Aquatic Invertebrate Data from Aquatic Surveys at Vernal Pools Monitored in 2018

This page intentionally left blank

Table D-1. CTS Aquatic Survey Results for Vernal Pools Monitored in 2018 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	4/25/2018	0	-	-	-	-	-	-	-	4 hrs 30 min
	5/23/2018	0	-	-	-	-	-	-	-	5 min
101 East (West)	NS									
101 East (East)	4/27/2018	2	2	118	118	118	60	55-65	N/A	1 hr 30 min
	5/23/2018	0	-	-	-	-	-	-	-	19 min 30 sec
997	NS									
3 North	4/26/2018	0	-	-	-	-	-	-	-	8 min
3 South	NS									
39	4/26/2018	0	-	-	-	-	-	-	-	3 min
40 North	NS									
40 South	NS									
43	NS									
35	NS									
42	4/25/2018	0	-	-	-	-	-	-	-	20 min
44	NS									
60	4/26/2018	0	-	-	-	-	-	-	-	1hr
	5/23/2018	0	-	-	-	-	-	-	-	34 min
	6/18/2018	0	-	-	-	-	-	-	-	5 min 14 sec
61	NS									
73	4/26/2018	0	-	-	-	-	-	-	-	1 min

NS – not surveyed due to insufficient depth for wildlife survey

Table D-2. Aquatic Invertebrates Observed During Aquatic Surveys at Vernal Pools Monitored in 2018

Aquatic Invertebrate	Vernal Pool						
	3 North	5	39	42	60	73	101 East (East)
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	●	●	-	-	●	-	●

Table D-3. Fairy Shrimp Aquatic Survey Results for Vernal Pools Monitored in 2018 at Former Fort Ord

Vernal Pool	Sampling Date	Abundance
39	4/26/2018	Low
42	4/25/2018	Low

This page intentionally left blank

APPENDIX E

Site Photos

This page intentionally left blank

Figure E-1. Pond 5 (Reference): Hydrology Photo Point on 3/20/2018

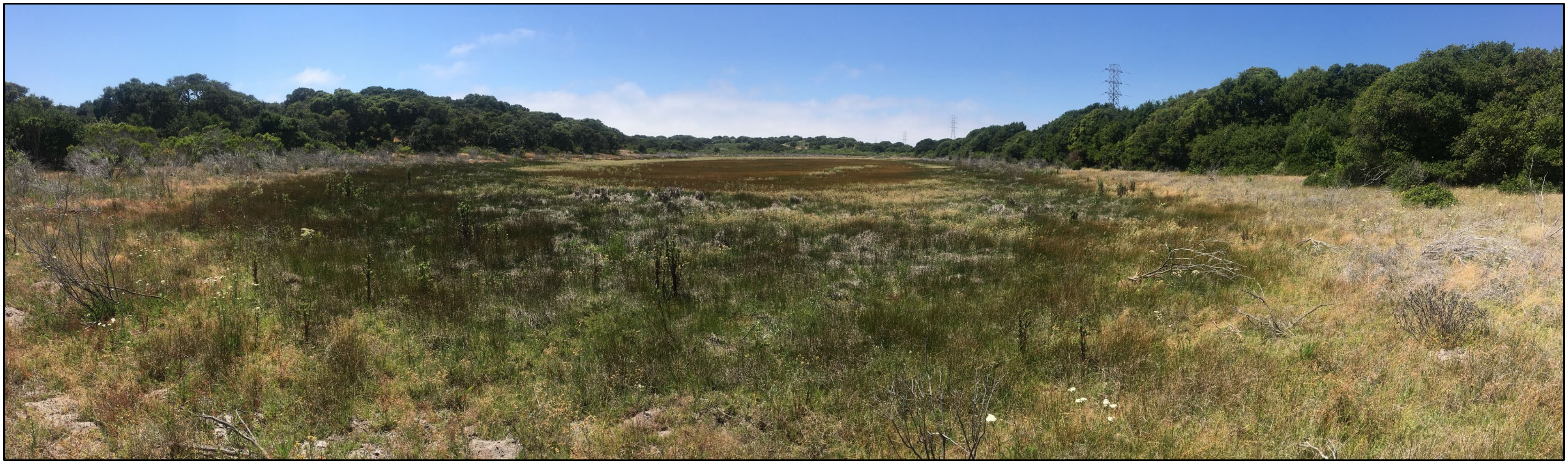


Figure E-2. Pond 5 (Reference): Vegetation Photo Point 1 on 6/8/2018

Figure E-3. Pond 5 (Reference): Vegetation Photo Point 2 on 6/8/2018

Figure E-4. Pond 101 East (West) (Reference): Hydrology Photo Point on 4/17/2018

Figure E-5. Pond 101 East (West) (Reference): Vegetation Photo Point on 6/1/2018

Figure E-6. Pond 101 East (East) (Reference): Hydrology Photo Point 1 on 2/16/2018

Figure E-7. Pond 101 East (East) (Reference): Hydrology Photo Point 2 on 2/16/2018

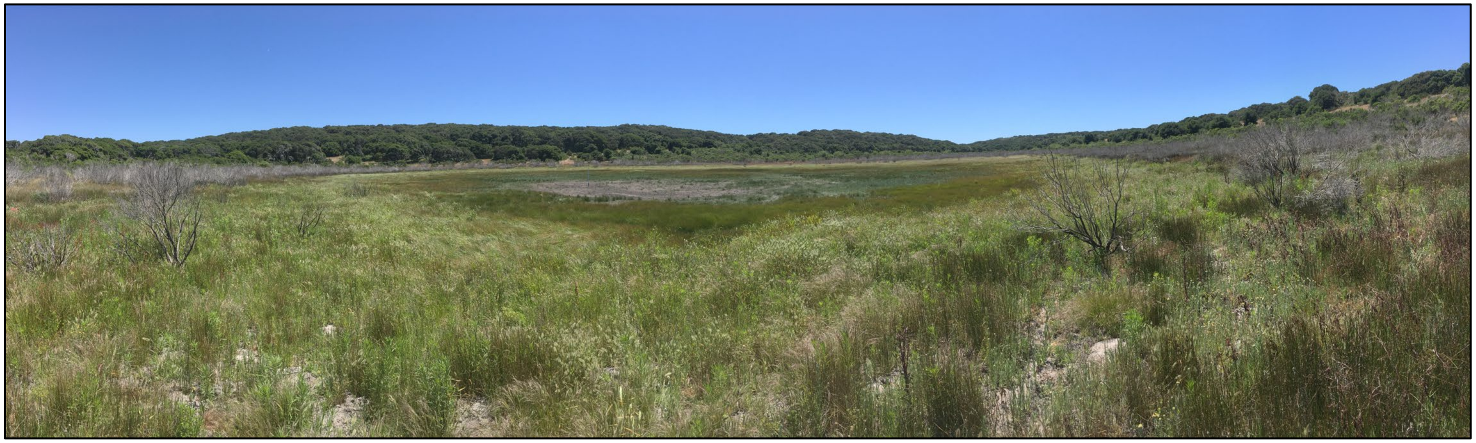


Figure E-8. Pond 101 East (East) (Reference): Vegetation Photo Point on 6/4/2018

Figure E-9. California Tiger Salamander (*Ambystoma californiense*) at Pond 101 East (East) (Reference) on 4/27/2018

Figure E-10. Vernal pool bent grass (*Agrostis lacuna-vernalis*) at Pond 101 East (East) (Reference) on 5/21/2018

Figure E- 11. Pond 997 (Reference): Hydrology Photo Point 1 on 2/23/2018

Figure E- 12. Pond 997 (Reference): Hydrology Photo Point 2 on 2/23/2018

Figure E- 13. Pond 997 (Reference): Vegetation Photo Point on 5/4/2018

Figure E-14. Contra Costa Goldfields (*Lasthenia conjugens*) at Pond 997 (Reference) on 4/18/2018

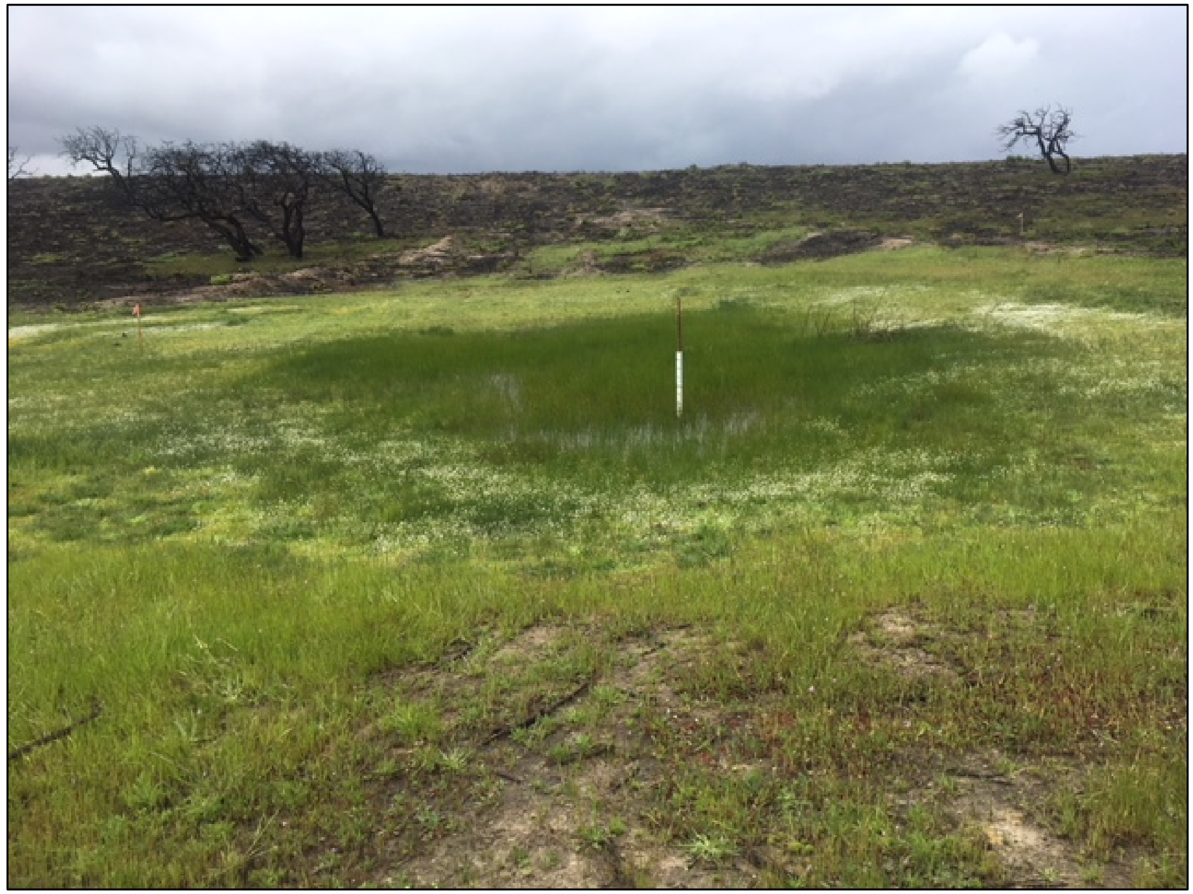


Figure E-15. Pond 3 North (Year 1 Post-Burn): Hydrology Photo Point 1 on 4/16/2018

Figure E-16. Pond 3 North (Year 1 Post-Burn): Hydrology Photo Point 2 on 4/16/2018

Figure E-17. Pond 3 North (Year 1 Post-Burn): Vegetation Photo Point on 5/3/2018

Figure E- 18. Vernal pool bent grass (*Agrostis lacuna-vernalis*) at Pond 3 North (Year 1 Post-Burn) on 5/17/2018

Figure E-19. Pond 3 South (Year 1 Post-Burn): Hydrology Photo Point 1 on 4/16/2018

Figure E-20. Pond 3 South (Year 1 Post-Burn): Hydrology Photo Point 2 on 4/16/2018

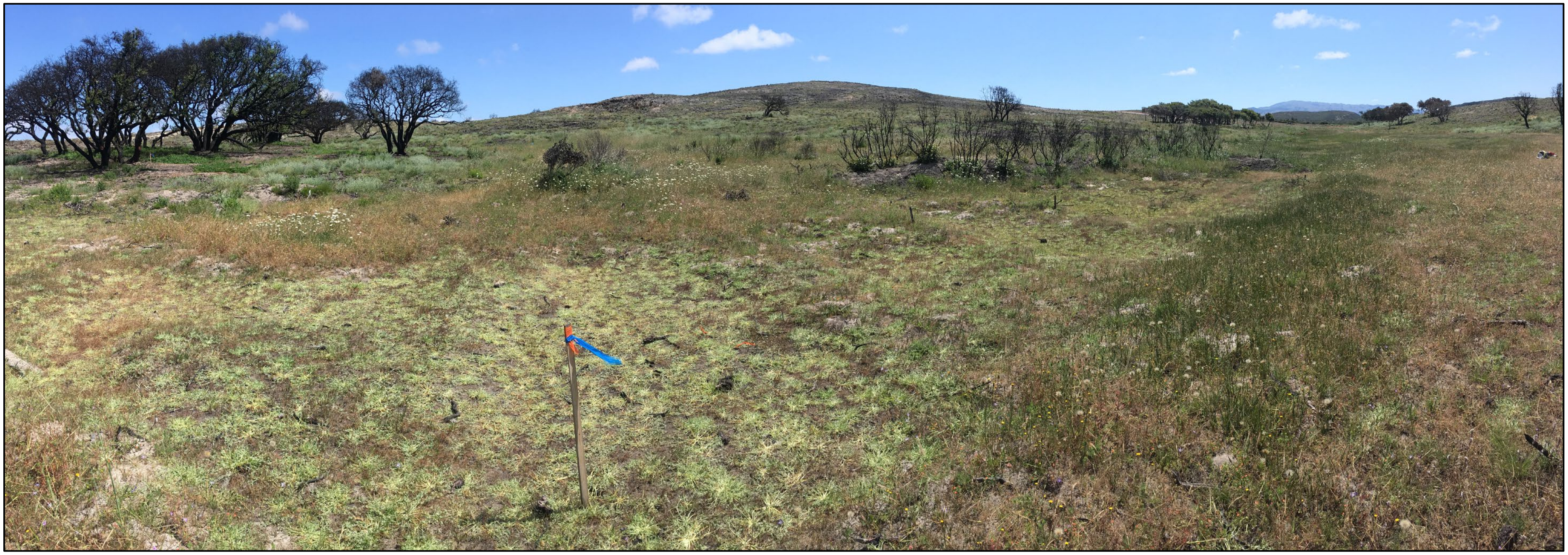


Figure E-21. Pond 3 South (Year 1 Post-Burn): Vegetation Photo Point 1 on 5/17/2018

Figure E-22. Pond 3 South (Year 1 Post-Burn): Vegetation Photo Point 2 on 5/17/2018

Figure E-23. Pond 39 (Year 1 Post-Burn): Hydrology Photo Point 1 on 3/16/2018

Figure E-24. Pond 39 (Year 1 Post-Burn): Hydrology Photo Point 2 on 3/19/2018

Figure E-25. Pond 39 (Year 1 Post-Burn): Vegetation Photo Point on 5/30/2018

Figure E-26. Pond 40 North (Year 1 Post-Burn): Hydrology Photo Point on 4/16/2018

Figure E-27. Pond 40 North (Year 1 Post-Burn): Vegetation Photo Point on 5/8/2018

Figure E-28. Pond 40 South (Year 1 Post-Burn): Hydrology Photo Point 1 on 2/20/2018

Figure E-29. Pond 40 South (Year 1 Post-Burn): Hydrology Photo Point 2 on 2/20/2018

Figure E-30. Pond 40 South (Year 1 Post-Burn): Vegetation Photo Point 1 on 5/8/2018

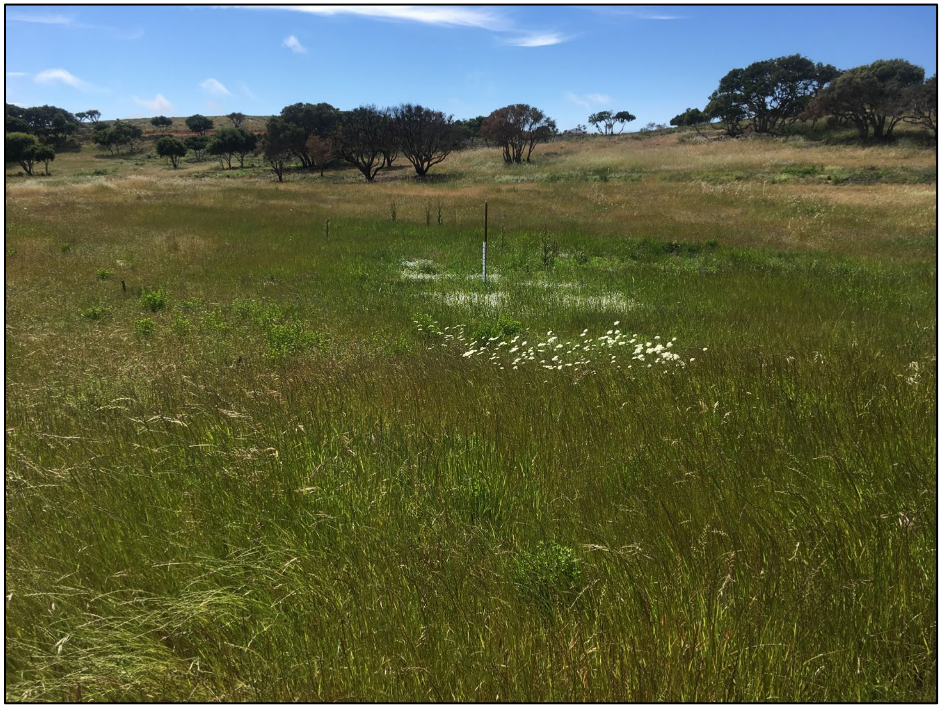


Figure E-31. Pond 40 South (Year 1 Post-Burn): Vegetation Photo Point 2 on 5/8/2018

Figure E-32. Pond 43 (Year 1 Post-Burn): Hydrology Photo Point on 1/16/2018

Figure E-33. Pond 43 (Year 1 Post-Burn) Vegetation Photo Point on 5/14/2018

Figure E-34. Pond 35 (Year 1 Post-Mastication): Hydrology Photo Point 1 on 2/20/2018

Figure E-35. Pond 35 (Year 1 Post-Mastication): Hydrology Photo Point 2 on 2/20/2018

Figure E-36. Pond 35 (Year 1 Post-Mastication): Vegetation Photo Point 1 on 5/2/2018

Figure E-37. Pond 35 (Year 1 Post-Mastication): Vegetation Photo Point 2 on 5/2/2018

Figure E-38. Pond 42 (Year 1 Post-Mastication and Post-Burn): Hydrology Photo Point on 4/16/2018

Figure E-39. Pond 42 (Year 1 Post-Mastication and Post-Burn): Vegetation Photo Point on 5/31/2018

Figure E-40. California fairy shrimp (*Linderiella occidentalis*) at Pond 42 (Year 1 Post-Mastication and Post-Burn) on 4/25/2018

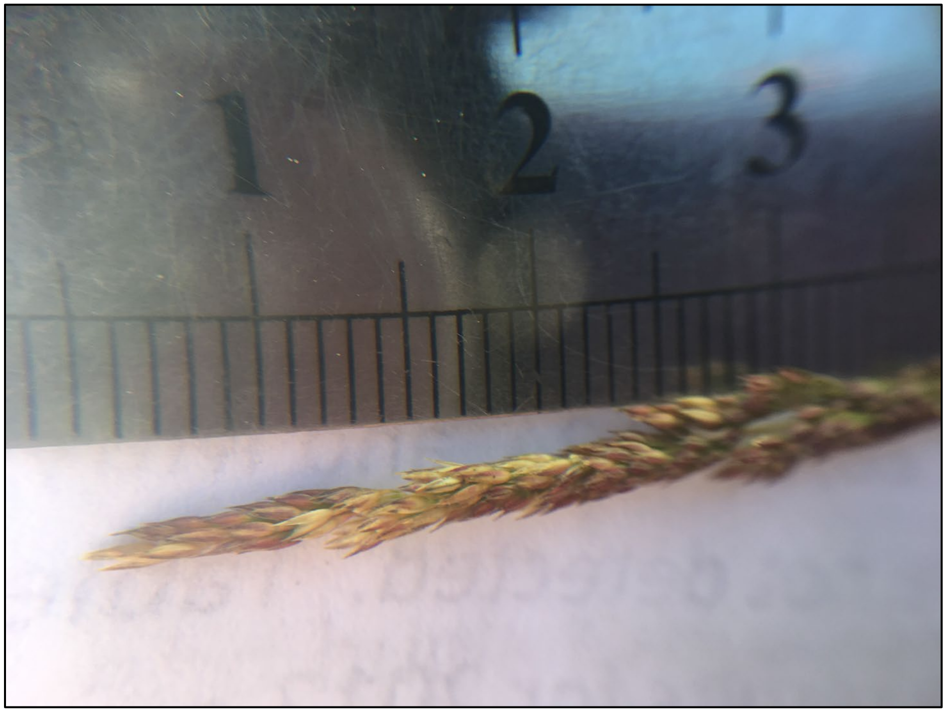


Figure E-41. Vernal pool bent grass (*Agrostis lacuna-vernalis*) at Pond 42 (Year 1 Post-Mastication and Post-Burn) on 6/1/2018

Figure E-42. Pond 44 (Year 1 Post-Mastication): Hydrology Photo Point 1 on 4/16/2018

Figure E-43. Pond 44 (Year 1 Post-Mastication): Hydrology Photo Point 2 on 4/16/2018

Figure E-44. Pond 44 (Year 1 Post-Mastication): Vegetation Photo Point on 5/10/2018

Figure E-45. Pond 60 (Year 1 Post-Mastication): Hydrology Photo Point on 4/17/2018

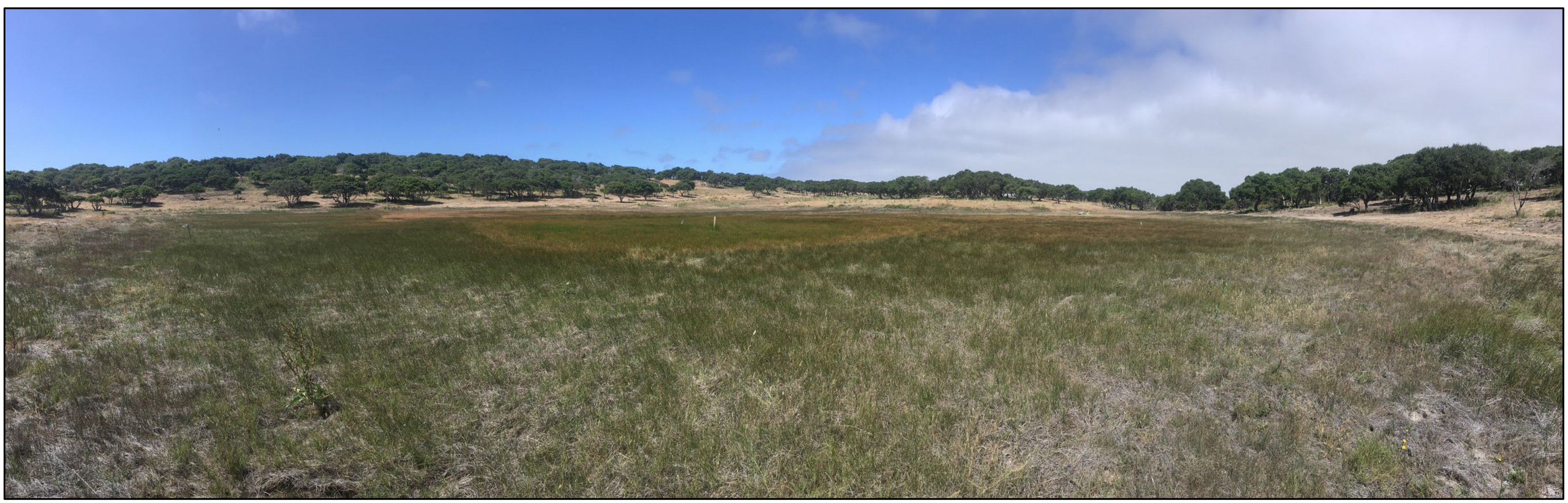


Figure E-46. Pond 60 (Year 1 Post-Mastication): Vegetation Photo Point on 6/14/2018

Figure E-47. Pond 61 (Year 1 Post-Mastication): Hydrology Photo Point 1 on 2/20/2018

Figure E-48. Pond 61 (Year 1 Post-Mastication): Hydrology Photo Point 2 on 2/20/2018

Figure E-49. Pond 61 (Year 1 Post-Mastication): Vegetation Photo Point 1 on 5/7/2018

Figure E-50. Pond 61 (Year 1 Post-Mastication): Vegetation Photo Point 2 on 5/7/2018

Figure E-51. Contra Costa Goldfields (*Lasthenia conjugens*) at Pond 61 (Year 1 Post-Mastication) on 4/17/2018

Figure E-52. Pond 73 (Year 1 Post-Mastication): Hydrology Photo Point 1 on 4/17/2018

Figure E-53. Pond 73 (Year 1 Post-Mastication): Hydrology Photo Point 2 on 4/17/2018

Figure E-54. Pond 73 (Year 1 Post-Mastication): Vegetation Photo Point 1 on 5/14/2018

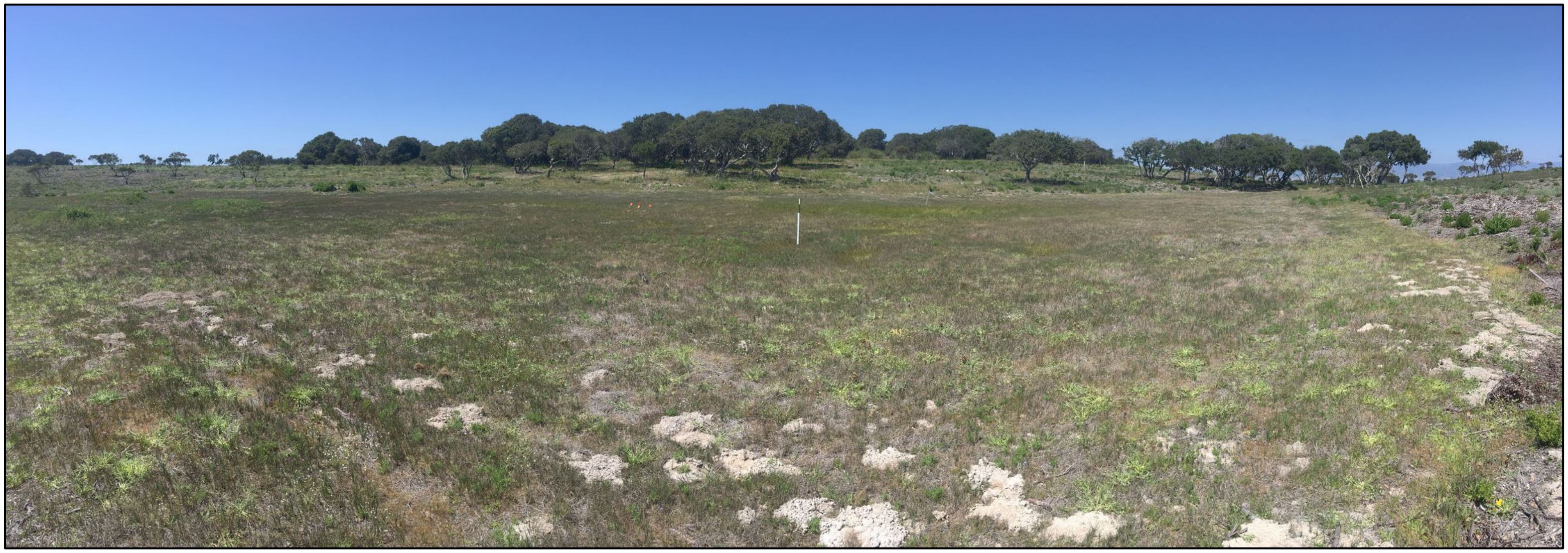


Figure E-55. Pond 73 (Year 1 Post-Mastication): Vegetation Photo Point 2 on 5/14/2018

Figure E-56. Vernal pool bent grass (*Agrostis lacuna-vernalis*) at Pond 73 (Year 1 Post-Mastication) on 5/14/2018

Figure E-57. Machine Gun Flats (Year 1 Post-Mastication): Hydrology Photo Point 1 on 4/18/2018

Figure E- 58. Machine Gun Flats (Year 1 Post-Mastication): Hydrology Photo Point 2 on 4/18/2018

Figure E-59. Pond 56 (Year 1 Post-Mastication): Hydrology Photo Point 1 on 4/17/2018

Figure E-60. Pond 56 (Year 1 Post-Mastication): Hydrology Photo Point 2 on 4/17/2018

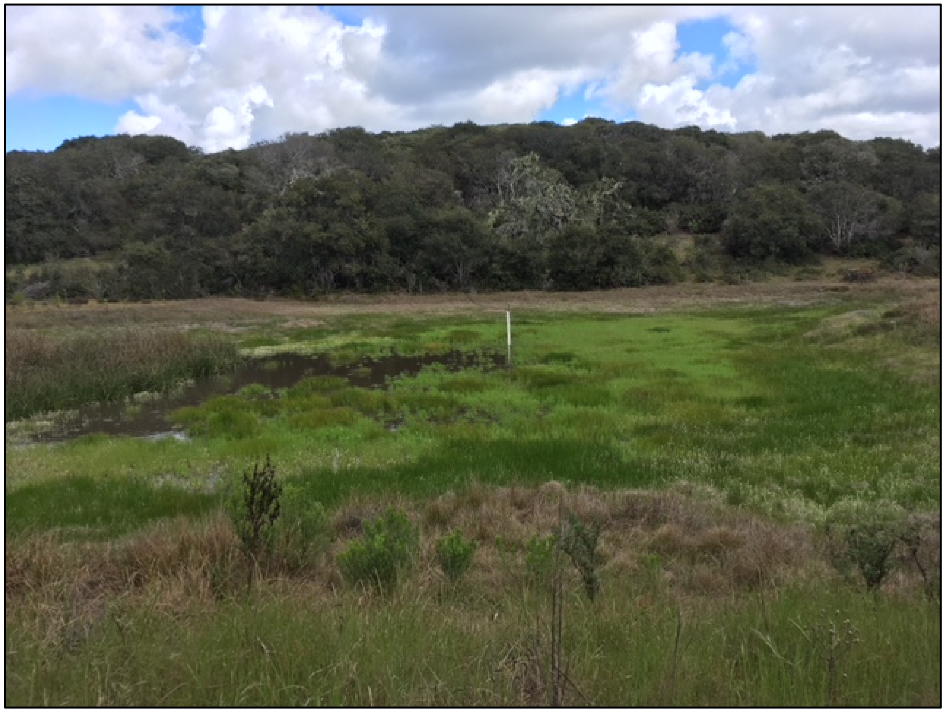


Figure E-61. Pond 16 (Year 2 Post-Mastication): Hydrology Photo Point 1 on 4/16/2018

Figure E-62. Pond 16 (Year 2 Post-Mastication): Hydrology Photo Point 2 on 4/16/2018

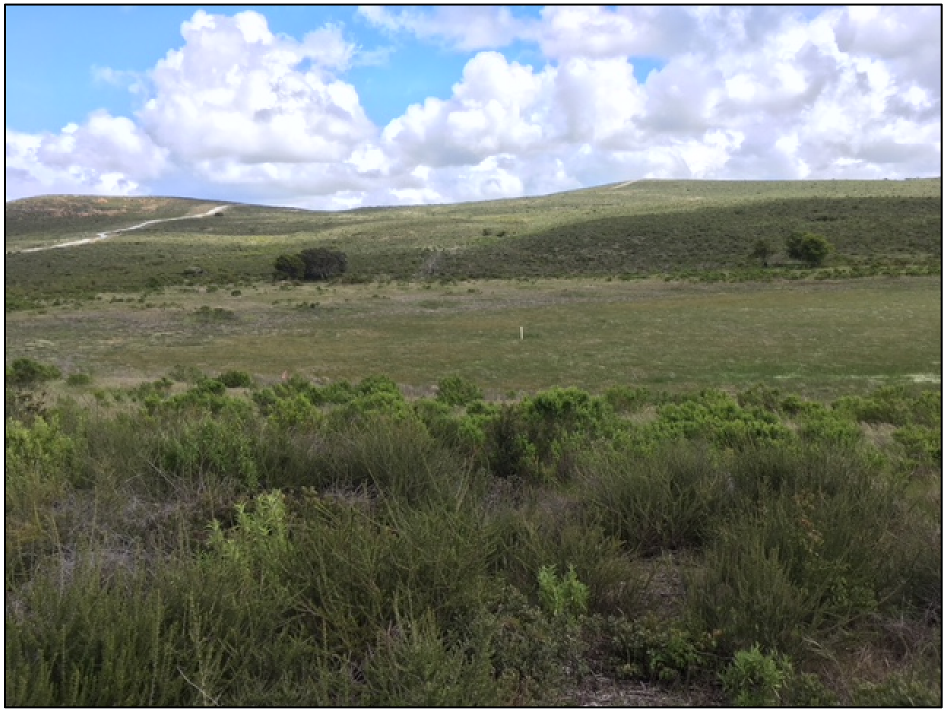


Figure E-63. Pond 54 (Year 2 Post-Mastication): Hydrology Photo Point 1 on 4/16/2018

Figure E-64. Pond 54 (Year 2 Post-Mastication): Hydrology Photo Point 2 on 4/16/2018

Figure E-65. Pond 72 (Year 2 Post-Mastication): Hydrology Photo Point 1 on 4/16/2018

Figure E-66. Pond 72 (Year 2 Post-Mastication): Hydrology Photo Point 2 on 4/16/2018

APPENDIX F

Historic Hydrology Monitoring Results for Reference and Remediated Vernal Pools

This page intentionally left blank

Table F-1. Pond 5 (Reference) Historic Hydrology Results on Former Fort Ord from 1994-2018

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	-	-	-	-	0	-
	1/23/2007	-	-	-	-	0	-
	3/6/2007	7.20	-	-	5.1 (NTU)	17	1.58
2012-2013	11/26/2012	-	-	-	-	0	-
	12/19/2012	-	-	-	-	0	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

Table F-1. Pond 5 (Reference) Historic Hydrology Results on Former Fort Ord from 1994-2018

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‡

‡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 5 was monitored nine years between 1994 and 2018. 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, ten 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
  - 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 January – May, five monitoring events
  - Inundated January 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

Table F-2. Pond 101 East (West) (Reference) Historic Hydrology Results on Former Fort Ord from 2001-2018

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*	0.11
	3/26/2001	-	-	-	-	>46*	0.14
	4/18/2001-4/19/2001	-	-	-	-	>5*	-
	5/23/2001-5/24/2001	-	-	-	-	-*	-
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

*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.

Pond 101 East (West) was monitored six years between 2001 and 2018. Pond 101 East (West) 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 (West) was recorded as inundated 0.11 acres in February and March
  - Early storms with cumulative precipitation below-normal (15.52 inches)
  - Data collected in February and March
  - 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 a 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 from 0.07-1.89 acres, mean 0.71 acres
  - Depth range from 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, nine monitoring events
  - Inundated January through June

- Inundation range 0.17-9.37 acres, mean 4.83 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
  - 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

Table F-3. Pond 101 East (East) (Reference) Historic Hydrology Results on Former Fort Ord from 2001-2018

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*	-
2006-2007	Dec	-	-	-	-	DRY	0.00
	Jan	-	-	-	-	DRY	0.00
	Feb	-	-	-	-	-	-
	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.

Table F-3. Pond 101 East (East) (Reference) Historic Hydrology Results on Former Fort Ord from 2001-2018

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

*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.

Pond 101 East (East) was monitored eight years between 2001 and 2018. 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 February-May
  - 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 from 1.23-3.24 acres, mean 2.59 acres
  - Depth range from 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, ten 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 152 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
  - 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 January – June, six monitoring events
  - Inundated January through May
  - Inundation range 0.04-2.09 acres, mean 1.42 acres
  - Depth range 14-48 cm, mean 36 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

Table F-4. Pond 997 (Reference) Historic Hydrology Results on Former Fort Ord from 2017-2018

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

†Water quality probe was horizontal for measurements.

Pond 997 was monitored two years between 2017 and 2018. 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, seven monitoring events
  - Inundated January through April
  - Inundation range 0.02-0.33 acres, mean 0.14 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 37.4 FNU
- 2017-2018
  - 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

Table F-5. Pond 3 North (Year 1 Post-Burn) Historic Hydrology Results on Former Fort Ord from 1997-2018

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

*Depths are estimations.

Pond 3 North was monitored four years between 1997 and 2018. Burn activities occurred in 2017. Pond 3 North is a post-burn vernal pool and was in year 1 of monitoring in 2018. 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 0.03 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 0.08 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
    - 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

Table F-6. Pond 3 South (Year 1 Post-Burn) Historic Hydrology Results on Former Fort Ord from 1997-2018

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

‡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 four years between 1997 and 2018. Burn activities occurred in 2017. Pond 3 South is a post-burn vernal pool and was in year 1 of monitoring in 2018. 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-May, four monitoring events
    - Inundated March through May
    - Inundation range 0.01-0.52 acres, mean 0.23 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
    - 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

Table F-7. Pond 39 (Year 1 Post-Burn) Historic Hydrology Results on Former Fort Ord from 1997-2018

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

§ 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.

Pond 39 was monitored four years between 1997 and 2018. Burn activities occurred in 2017. Pond 39 is a post-burn vernal pool and was in year 1 of monitoring in 2018. 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, four monitoring events
  - Inundated March through May
  - Inundation range 0.01-0.03 acres, mean 0.01 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
  - 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 January – May, five 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

Table F-8. Pond 40 North (Year 1 Post-Burn) Historic Hydrology Results on Former Fort Ord from 2015-2018

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

*No staff gauge. Cannot access ponds to measure depth due to potential for subsurface unexploded ordnance and other hazards. Depths are estimations.

Pond 40 North was monitored two years between 2015 and 2018. Burn activities occurred in 2017. Pond 40 North is a post-burn vernal pool and was in year 1 of monitoring in 2018. 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
  - 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 8.5 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

Table F-9. Pond 40 South (Year 1 Post-Burn) Historic Hydrology Results on Former Fort Ord from 1997-2018

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

Pond 40 South was monitored five years between 1997 and 2018. Burn activities occurred in 2017. Pond 40 South is a post-burn vernal pool and was in year 1 of monitoring in 2018. 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 December-May, five 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, six monitoring events
  - Inundated January through April
  - Inundation range 0.12-0.96 acres, mean 0.40 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
  - 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

Table F-10. Pond 43 (Year 1 Post-Burn) Historic Hydrology Results on Former Fort Ord from 1997-2018

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

Pond 43 was monitored five years between 1997 and 2018. Burn activities occurred in 2017. Pond 43 is a post-burn vernal pool and was in year 1 of monitoring in 2018. 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
  - 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
  - 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

Table F-11. Pond 35 (Year 1 Post-Mastication) Historic Hydrology Results on Former Fort Ord from 1994-2018

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
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

Pond 35 was monitored six years between 1994 and 2018. Mastication activities occurred in 2017. Pond 35 is a post-mastication vernal pool and was in year 1 of monitoring in 2018. The historic data and precipitation are summarized below:

- 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 only in March and April
  - 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 March-May, three 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
  - 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

Table F-12. Pond 42 (Year 1 Post-Mastication and Post-Burn) Historic Hydrology Results on Former Fort Ord from 1997-2018

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	-	-	-	0	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	~28*	0.34
	7/7/2017	-	-	-	-	DRY	0.00

*Decreased visibility due to emergent vegetation.

Table F-12. Pond 42 (Year 1 Post-Mastication and Post-Burn) Historic Hydrology Results on Former Fort Ord from 1997-2018

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

‡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 eight years between 1997 and 2018. Burn activities occurred in October 2017 and mastication activities occurred in the summer of 2018. Pond 42 is a post-mastication and post-burn vernal pool and was in year 1 of monitoring in 2018. 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 only in March, four monitoring events
  - 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, four 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, eight monitoring events
 - Inundated January through June
 - Inundation range 0.30-0.81 acres, mean 0.55 acres
 - Depth range ~28-76 cm, mean 61 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
  - 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

Table F-13. Pond 44 (Year 1 Post-Mastication) Historic Hydrology Results on Former Fort Ord from 1997-2018

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‡

‡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 four years between 1997 and 2018. Mastication activities occurred in 2017. Pond 44 is a post-mastication vernal pool and was in year 1 of monitoring in 2018. 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
  - 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

Table F-14. Pond 56 (Year 1 Post-Mastication) Historic Hydrology Results on Former Fort Ord from 2006-2018

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	0.00
	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

Pond 56 was monitored six years between 2006 and 2018. Mastication activities occurred in 2017. Pond 56 is a post-mastication vernal pool and was in year 1 of monitoring in 2018. 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 to May, three monitoring events
  - Inundated March to April
  - Inundation range 0.27-0.42 acres, mean 0.23 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 2.20 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
  - 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 January – July, six 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

Table F-15. Pond 60 (Year 1 Post-Mastication) Historic Hydrology Results on Former Fort Ord from 2014-2018

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

*Depths are estimations.
†Probe was on its side

Pond 60 was monitored three years between 2014 and 2018. Mastication activities occurred in 2017. Pond 60 is a post-mastication vernal pool and was in year 1 of monitoring in 2018. 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 1.38 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
  - 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, six monitoring events
  - Inundated January, and March through June
  - Inundation range 0.02-0.77 acres, mean 0.21 acres
  - Depth range 18-59 cm, mean 34.6 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

Table F-16. Pond 61 (Year 1 Post-Mastication) Historic Hydrology Results on Former Fort Ord from 2017-2018

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‡

‡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 two years between 2016 and 2018. Mastication activities occurred in 2017. Pond 61 is a post-mastication vernal pool and was in year 1 of monitoring in 2018. 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, six monitoring events
  - Inundated January through April
  - Inundation range 0.05-0.70 acres, mean 0.38 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
  - 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

Table F-17. Pond 73 (Year 1 Post-Mastication) Historic Hydrology Results on Former Fort Ord for 2017-2018

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

‡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 for the first time in 2017. Mastication activities occurred in 2017. Pond 73 is a post-mastication vernal pool and was in year 1 of monitoring in 2018. 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
  - 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 January – May, five 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

Table F-18. Machine Gun Flats (Year 1 Post-Mastication) Historic Hydrology Results on Former Fort Ord from 1997-2018

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

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

Machine Gun Flats was monitored seven years between 1997 and 2018. Mastication activities occurred in 2017. The water-years 1996-1997 and 1997-1998 are baseline, while all other years are remediation.

Machine Gun Flats is a post-mastication vernal pool and was in year 1 of monitoring in 2018. 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
    - 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, five monitoring events
  - Inundated January through March
  - Inundation range 0.07-4.44 acres, mean 2.20 acres
  - Depth range 30.48-31.75 cm, mean 30.90 cm
  - pH range 6.13-6.89, mean 6.51
  - turbidity range 11.8-126.0 NTU, mean 45.9 NTU
- 2017-2018
  - 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 January – July, six monitoring events
  - Inundated January through September
  - Inundation range 0.01-8.34 acres, mean 4.09 acres
  - Depth range 15-111 cm, mean 79 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

Table F-19. Pond 16 (Year 2 Post-Mastication) Historic Hydrology Results on Former Fort Ord from 1994-2018

Water-Year	Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Depth (cm)	Inundated Surface Area (acres)
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

*Depths are estimations.
†Water quality probe was horizontal for measurements.

Pond 16 was monitored six years between 1994 and 2018. Mastication activities occurred in 2016. Pond 16 is a post-mastication vernal pool and was in year 2 of monitoring in 2018. The historic data and precipitation are summarized below:

- 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 2014 – May 2015, five monitoring events
  - Inundated December - April
  - Inundation range 0-0.27 acres, mean 0.14 acres
  - Depth range from ~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, ten 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
  - 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 January – May, five 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

Table F-20. Pond 54 (Year 2 Post-Mastication) Historic Hydrology Results on Former Fort Ord from 2004-2018

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*	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

*Decreased visibility due to emergent vegetation.

Pond 54 was monitored two years between 2004 and 2017. Mastication activities occurred in 2015. Pond 54 is a post-mastication vernal pool and was in year 2 of monitoring in 2018. 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 – May, five 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, eight monitoring events
    - Inundated January through June
    - Inundation range 1.60-3.10 acres, mean 2.47 acres
    - Depth range 54-111 cm, mean 88.2 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
    - 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

Table F-21. Pond 72 (Year 2 Post-Mastication) Historic Hydrology Results on Former Fort Ord for 2018

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 (FNU)	17	0.001‡
	4/16/2018	6.53	12.85	11.86	12.1 (FNU)	36	0.36
	5/22/2018	-	-	-	-	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 72 was monitored for the first time in 2018. Mastication activities occurred in 2015. Pond 72 is a post-mastication vernal pool and was in year 2 of monitoring in 2018. There are no other historic wetland monitoring data. The 2018 data and precipitation are summarized below:

- 2017-2018
  - 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 January – May, five monitoring events
  - Inundated March and April
  - Inundation range 0.001-0.36 acres, mean xx acres
  - depth range 17-36 cm, mean 27 cm
  - pH range 6.37-6.53, mean 6.45
  - temperature range 10.12°-1285° 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

This page intentionally left blank

APPENDIX G

Vegetation Species Richness of Native and Non-Native Species and Wetland Indicator Category by Vernal Pool

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	0	0
2	4	2	0
3	7	9	0
4	10	11	0
5	16	11	0
6	7	3	0
Basin Total	56	32	0

Table G-2. Pond 101 East (West) (Reference) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 101 East (West)			
Stratum	**Native**	**Non-Native**	**Unidentified**
1	12	7	1
2	7	2	0
3	9	11	1
4	10	12	0
5	8	13	1
6	5	8	1
Basin Total	53	34	1

Table G-3. 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**
1	2	2	1
2	3	2	0
5	10	8	1
6	2	3	0
7	8	4	2
Basin Total	52	35	2

Table G-4. Pond 997 (Reference) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 997			
Stratum	**Native**	**Non-Native**	**Unidentified**
1	13	9	2
3	13	12	0
5	9	12	0
Basin Total	59	27	1

Table G-5. Pond 3 North (Year 1 Post-Burn) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 3 North			
Stratum	**Native**	**Non-Native**	**Unidentified**
1	5	6	0
2	5	6	0
3	18	12	0
Basin Total	52	30	0

Table G-6. Pond 3 South (Year 1 Post-Burn) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 3 South			
Stratum	**Native**	**Non-Native**	**Unidentified**
1	11	5	0
2	14	13	0
3	15	17	0
4	11	14	0
Basin Total	66	40	0

Table G-7. Pond 39 (Year 1 Post-Burn) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 39			
Stratum	Native	Non-Native	Unidentified
1	6	6	0
3	6	15	0
4	8	15	0
Basin Total	54	35	1

Table G-8. Pond 40 North (Year 1 Post-Burn) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 40 North			
Stratum	Native	Non-Native	Unidentified
2	4	7	0
4	3	8	0
Basin Total	34	23	0

Table G-9. Pond 40 South (Year 1 Post-Burn) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 40 South			
Stratum	Native	Non-Native	Unidentified
1	4	8	0
2	1	10	1
3	5	16	0
Basin Total	27	28	0

Table G-10. Pond 43 (Year 1 Post-Burn) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 43			
Stratum	Native	Non-Native	Unidentified
1	15	4	0
2	15	7	1
3	10	12	0
Basin Total	32	19	0

Table G-11. Pond 35 (Year 1 Post-Mastication) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 35			
Stratum	Native	Non-Native	Unidentified
1	4	6	0
2	9	7	0
3	8	12	0
4	8	17	0
Basin Total	28	34	2

Table G-12. Pond 42 (Year 1 Post-Mastication and Post-Burn) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 42			
Stratum	Native	Non-Native	Unidentified
1	10	1	0
2	6	2	0
3	14	9	1
4	9	11	0
Basin Total	91	35	0

Table G-13. Pond 44 (Year 1 Post-Mastication) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 44			
Stratum	Native	Non-Native	Unidentified
1	14	7	0
3	15	13	0
4	15	6	1
Basin Total	48	22	1

Table G-14. Pond 60 (Year 1 Post-Mastication) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 60			
Stratum	Native	Non-Native	Unidentified
1	3	0	0
2	3	1	0
3	3	1	0
4	9	7	0
Basin Total	33	26	0

Table G-15. Pond 61 (Year 1 Post-Mastication) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 61			
Stratum	**Native**	**Non-Native**	**Unidentified**
1	13	2	0
3	13	7	0
4	15	14	1
Basin Total	70	30	0

Table G-16. Pond 73 (Year 1 Post-Mastication) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 73			
Stratum	**Native**	**Non-Native**	**Unidentified**
1	4	0	0
2	7	0	1
4	11	5	0
Basin Total	41	27	0

Table G-17. Vegetation Species Richness of Native and Non-Native Species within Entire Vernal Pool Basin at Vernal Pools Monitored in 2018

Vernal Pool	Native	Non-Native	Unknown	Total
5	56	32	0	88
101 East (West)	53	34	1	88
101 East (East)	52	35	2	89
997	59	27	1	87
3 North	52	30	0	82
3 South	66	40	0	106
39	54	35	1	90
40 North	34	23	0	57
40 South	27	28	0	55
43	32	19	0	51
35	28	34	2	64
42	91	35	0	126
44	48	22	1	71
60	33	26	0	59
61	70	30	0	100
73	41	27	0	68

Table G-18. Pond 5 (Reference) Number of Wetland Plants by Indicator Category by Stratum

Pond 5						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	1	1	0	1	0	0
2	2	3	0	1	0	0
3	4	4	3	2	1	2
4	2	7	4	3	1	4
5	4	5	5	4	1	8
6	2	6	0	1	0	1
Basin Total	10	18	11	16	2	31

Table G-19. Pond 101 East (West) (Reference) Number of Wetland Plants by Indicator Category by Stratum

Pond 101 East (West)						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	6	5	4	2	0	3
2	2	4	0	1	1	1
3	5	4	3	2	1	6
4	3	4	4	3	2	6
5	4	2	3	6	1	6
6	1	3	3	3	1	3
Basin Total	12	19	14	13	3	27

Table G-20. 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**
1	2	0	0	1	0	2
2	2	1	0	1	0	1
5	3	4	4	3	2	3
6	0	3	1	1	0	0
7	4	6	0	1	1	2
Basin Total	9	21	13	13	4	30

Table G-21. Pond 997 (Reference) Number of Wetland Plants by Indicator Category by Stratum

Pond 997						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	5	9	2	3	0	5
3	4	4	5	5	0	7
5	4	4	2	5	0	6
Basin Total	11	13	11	14	0	38

Table G-22. Pond 3 North (Year 1 Post-Burn) Number of Wetland Plants by Indicator Category by Stratum

Pond 3 North						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	6	2	1	1	0	1
2	5	3	2	0	0	1
3	5	7	4	6	0	8
Basin Total	14	16	11	12	1	28

Table G-23. Pond 3 South (Year 1 Post-Burn) Number of Wetland Plants by Indicator Category by Stratum

Pond 3 South						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	7	5	1	1	0	2
2	5	5	5	5	0	7
3	5	8	4	8	0	7
4	2	4	5	5	1	8
Basin Total	13	19	16	16	2	40

Table G-24. Pond 39 (Year 1 Post-Burn) Number of Wetland Plants by Indicator Category by Stratum

Pond 39						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	4	4	2	1	0	1
3	0	2	5	4	1	9
4	0	2	5	5	1	10
Basin Total	10	16	11	14	2	37

Table G-25. Pond 40 North (Year 1 Post-Burn) Number of Wetland Plants by Indicator Category by Stratum

Pond 40 North						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
2	3	1	1	2	1	3
4	2	2	2	2	0	3
Basin Total	5	9	8	11	1	23

Table G-26. Pond 40 South (Year 1 Post-Burn) Number of Wetland Plants by Indicator Category by Stratum

Pond 40 South						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	3	3	4	1	1	0
2	1	1	2	6	0	2
3	0	2	4	6	1	8
Basin Total	4	12	10	10	2	17

Table G-27. Pond 43 (Year 1 Post-Burn) Number of Wetland Plants by Indicator Category by Stratum

Pond 43						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	7	7	2	0	0	3
2	6	7	3	3	0	4
3	1	3	5	6	0	7
Basin Total	7	11	7	8	1	17

Table G-28. Pond 35 (Year 1 Post-Mastication) Number of Wetland Plants by Indicator Category by Stratum

Pond 35						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	4	2	2	1	0	1
2	6	4	1	1	0	4
3	5	4	4	4	0	3
4	2	3	5	5	0	10
Basin Total	9	9	9	12	0	25

Table G-29. Pond 42 (Year 1 Post-Mastication and Post-Burn) Number of Wetland Plants by Indicator Category by Stratum

Pond 42						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	6	5	0	0	0	0
2	5	3	0	0	0	0
3	8	6	2	4	1	3
4	0	2	3	6	0	9
Basin Total	13	18	14	18	2	61

Table G-30. Pond 44 (Year 1 Post-Mastication) Number of Wetland Plants by Indicator Category by Stratum

Pond 44						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	7	7	1	3	0	3
3	3	4	4	7	0	10
4	6	8	2	1	1	4
Basin Total	9	11	9	10	1	31

Table G-31. Pond 60 (Year 1 Post-Mastication) 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	1	0
3	1	2	1	0	0	0
4	5	6	2	1	0	2
Basin Total	7	10	9	11	1	21

Table G-32. Pond 61 (Year 1 Post-Mastication) Number of Wetland Plants by Indicator Category by Stratum

Pond 61						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	9	5	0	0	0	1
3	6	6	1	2	1	4
4	4	6	3	6	1	10
Basin Total	14	16	11	13	2	44

Table G-33. Pond 73 (Year 1 Post-Mastication) Number of Wetland Plants by Indicator Category by Stratum

Pond 73						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	3	1	0	0	0	0
2	4	3	0	0	0	1
4	4	6	2	2	0	2
Basin Total	9	14	9	12	1	23

Table G-34. Wetland Plants by Indicator Category within Entire Vernal Pool Basin at Vernal Pools Monitored in 2018

Number of Wetland Plants Observed at Vernal Pools Monitored in 2018							
Vernal Pool	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**	**Total**
5	10	18	11	16	2	31	88
101 East (West)	12	19	14	13	3	27	88
101 East (East)	9	21	13	12	4	30	89
997	11	13	11	14	0	38	87
3 North	14	16	11	12	1	28	82
3 South	13	19	16	16	2	40	106
39	10	16	11	14	2	37	90
40 North	5	9	8	11	1	23	57
40 South	4	12	10	10	2	17	55
43	7	11	7	8	1	17	51
35	9	9	9	12	0	25	64
42	13	18	14	18	2	61	126
44	9	11	9	10	1	31	71
60	7	10	9	11	1	21	59
61	14	16	11	13	2	44	100
73	9	14	9	12	1	23	68

APPENDIX H

Species Composition of Follow-Up Wetland Vegetation Monitoring by Vernal Pool

This page intentionally left blank

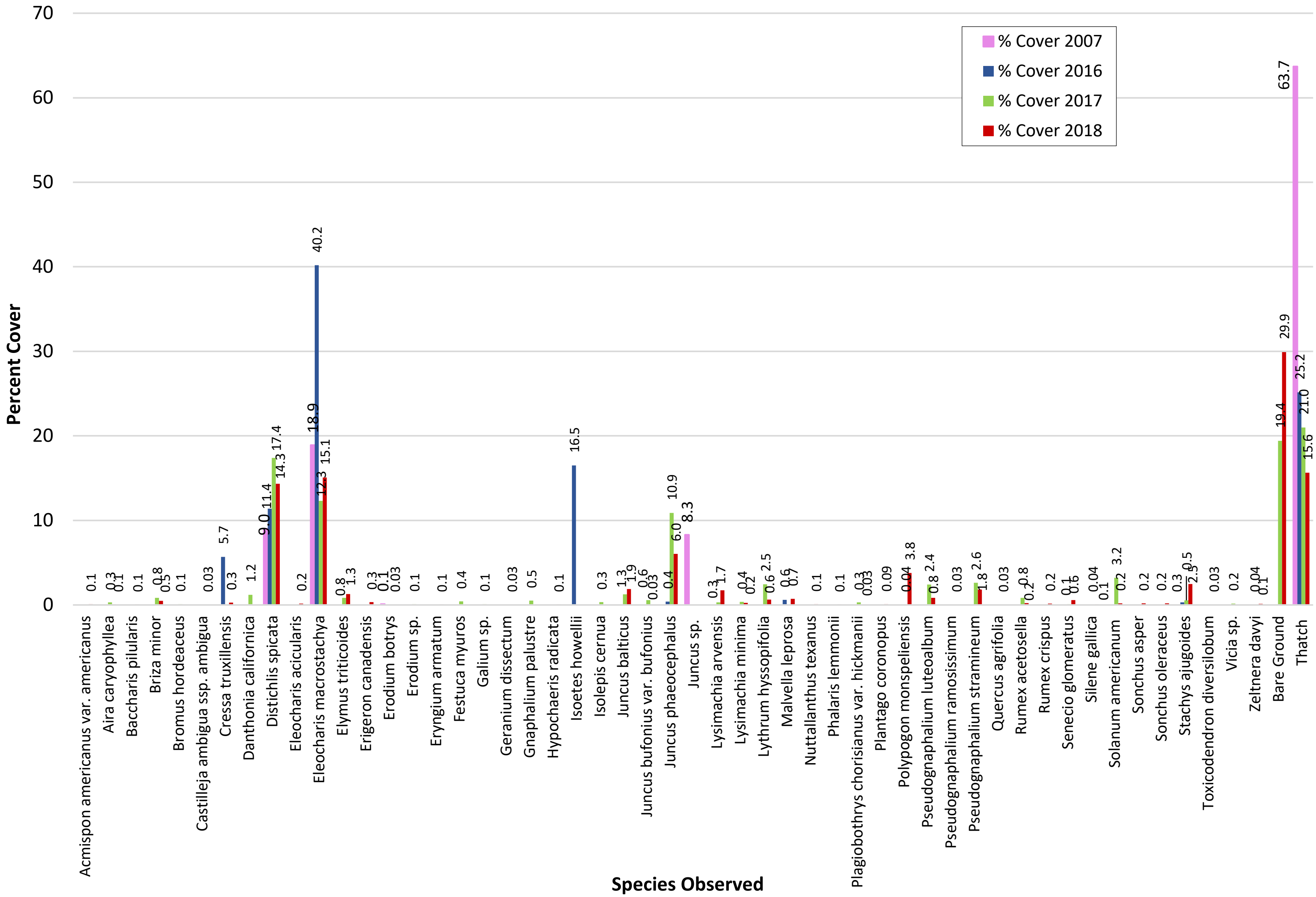


Figure H-1. Comparison Graph of Percent Cover by Wetland Plant Species for 2007, 2016, 2017, and 2018 at Pond 5 (Reference)

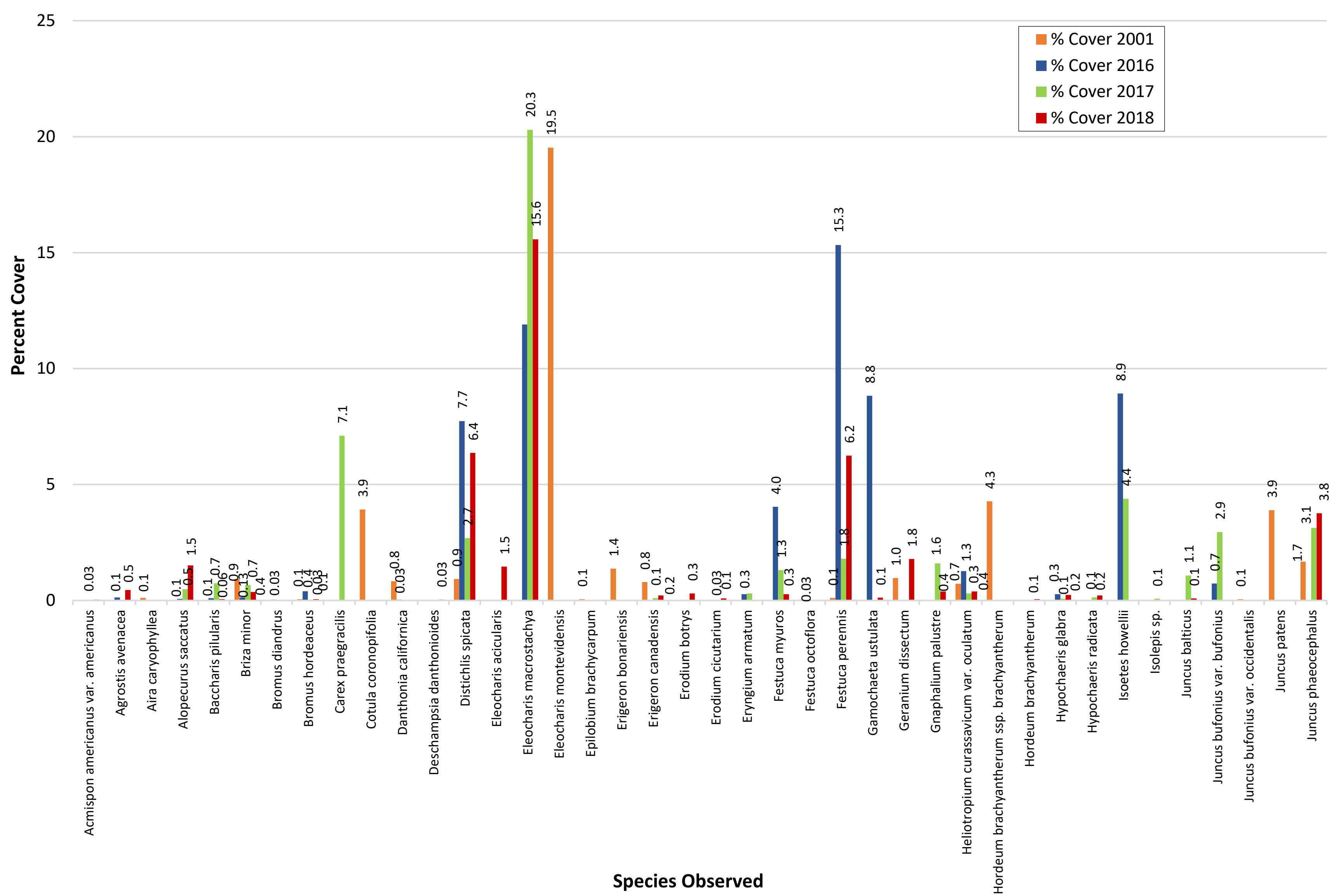


Figure H-2. Comparison Graph of Percent Cover by Wetland Plant Species for 2001, 2016, 2017, and 2018 at Pond 101 East (West) (Reference)

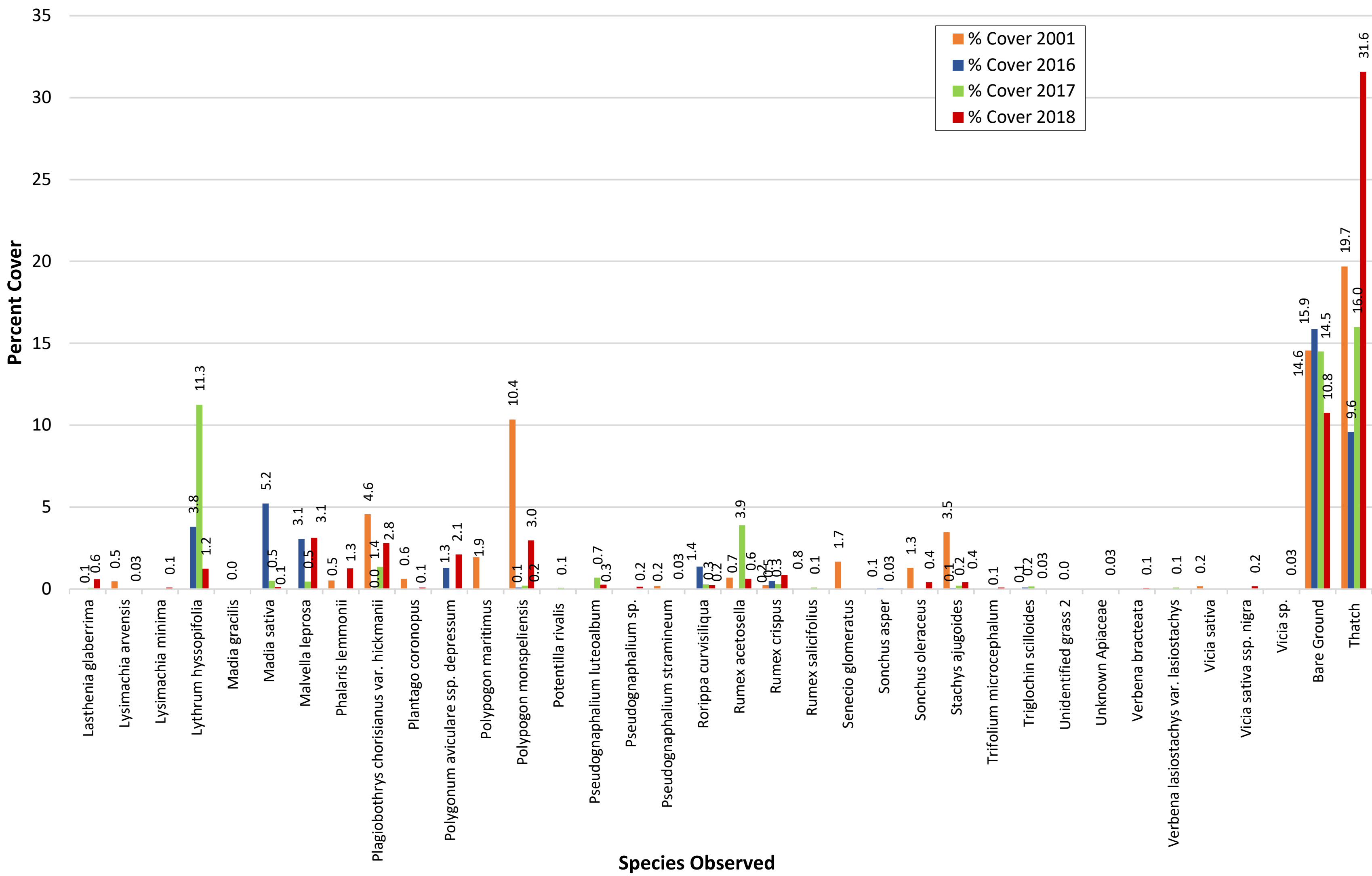


Figure H-2 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 2001, 2016, 2017, and 2018 at Pond 101 East (West) (Reference)

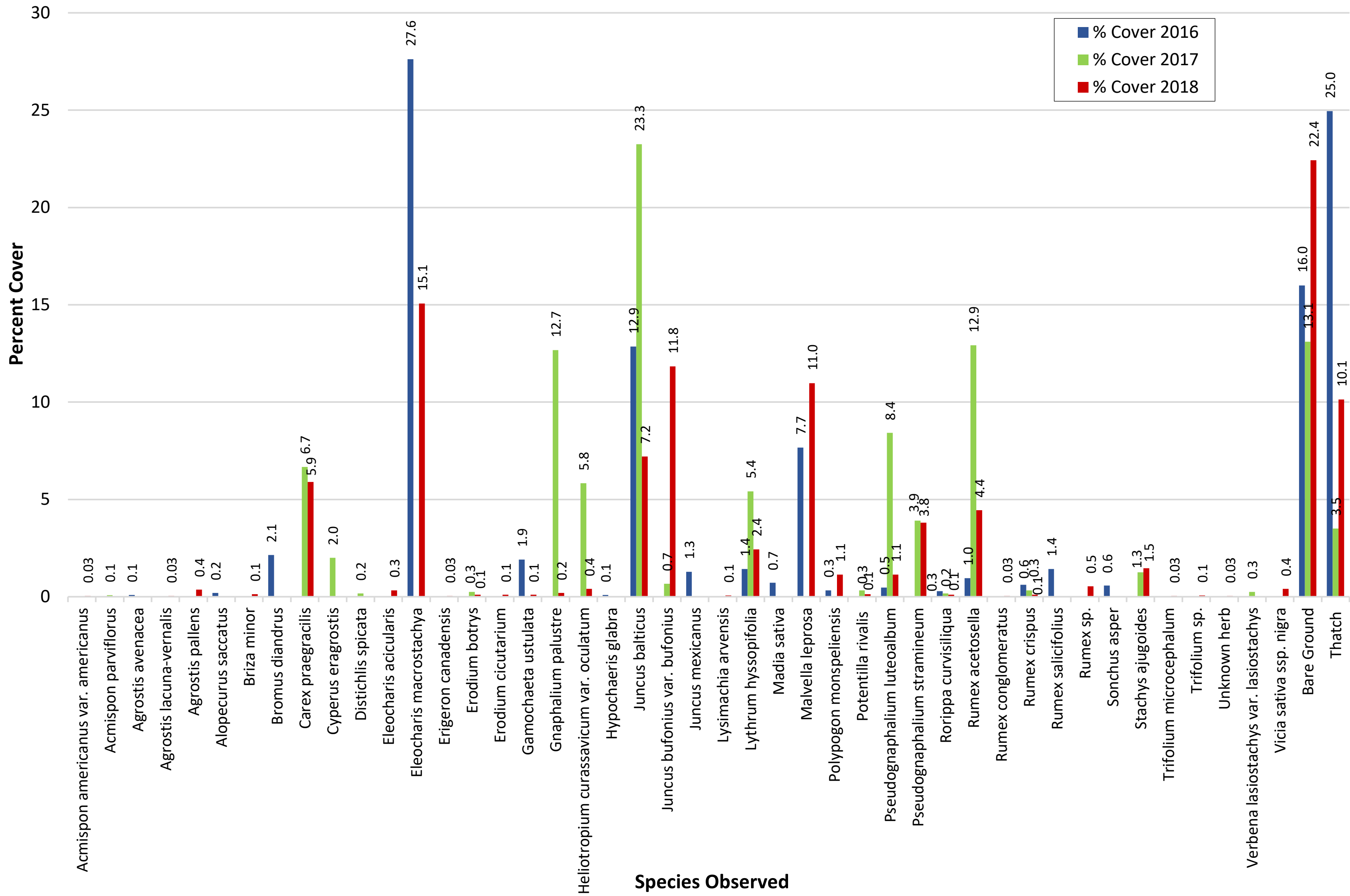


Figure H-3. Comparison Graph of Percent Cover by Wetland Plant Species for 2016, 2017, and 2018 at Pond 101 East (East) (Reference)

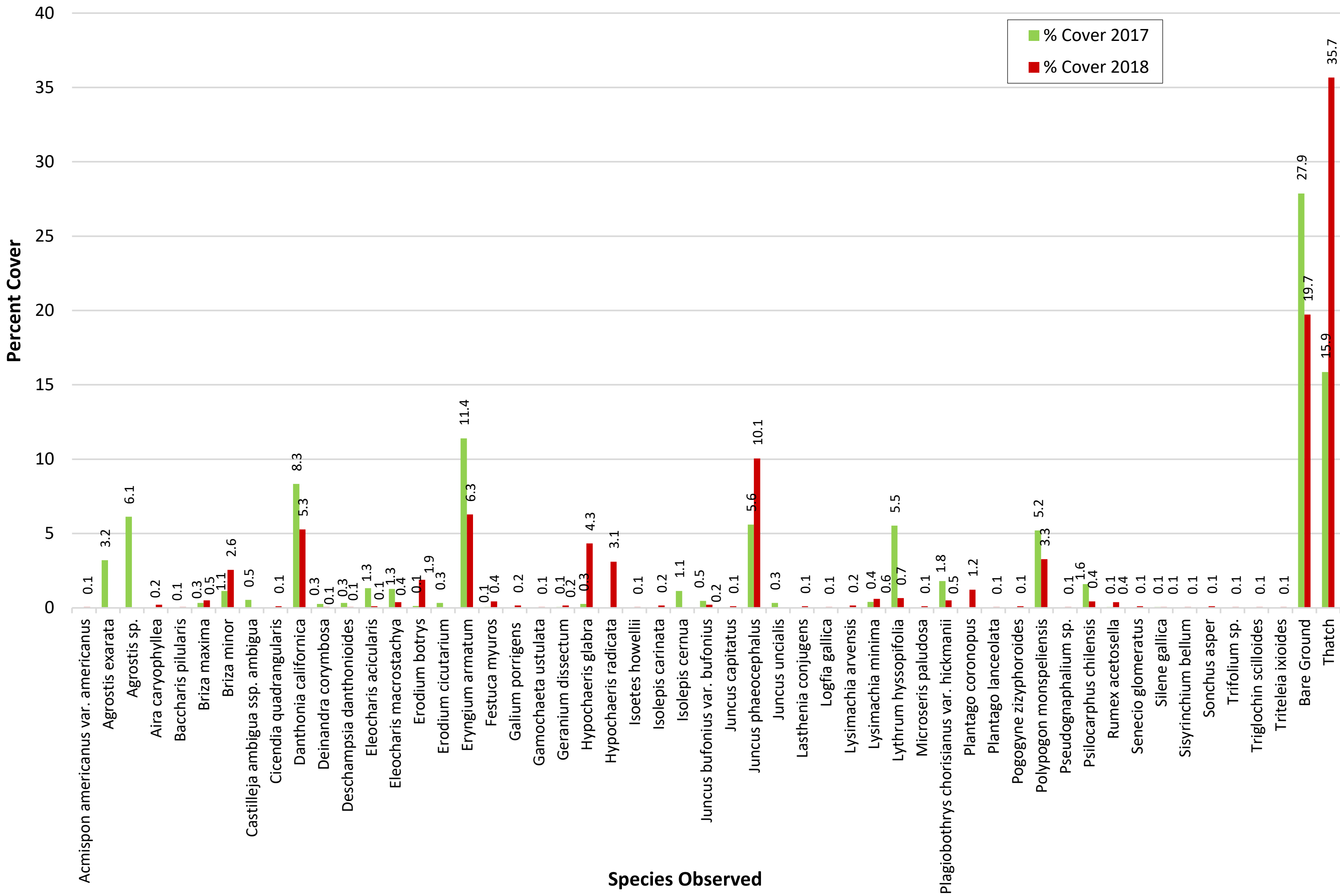


Figure H-4. Comparison Graph of Percent Cover by Wetland Plant Species for 2017 and 2018 at Pond 997 (Reference)

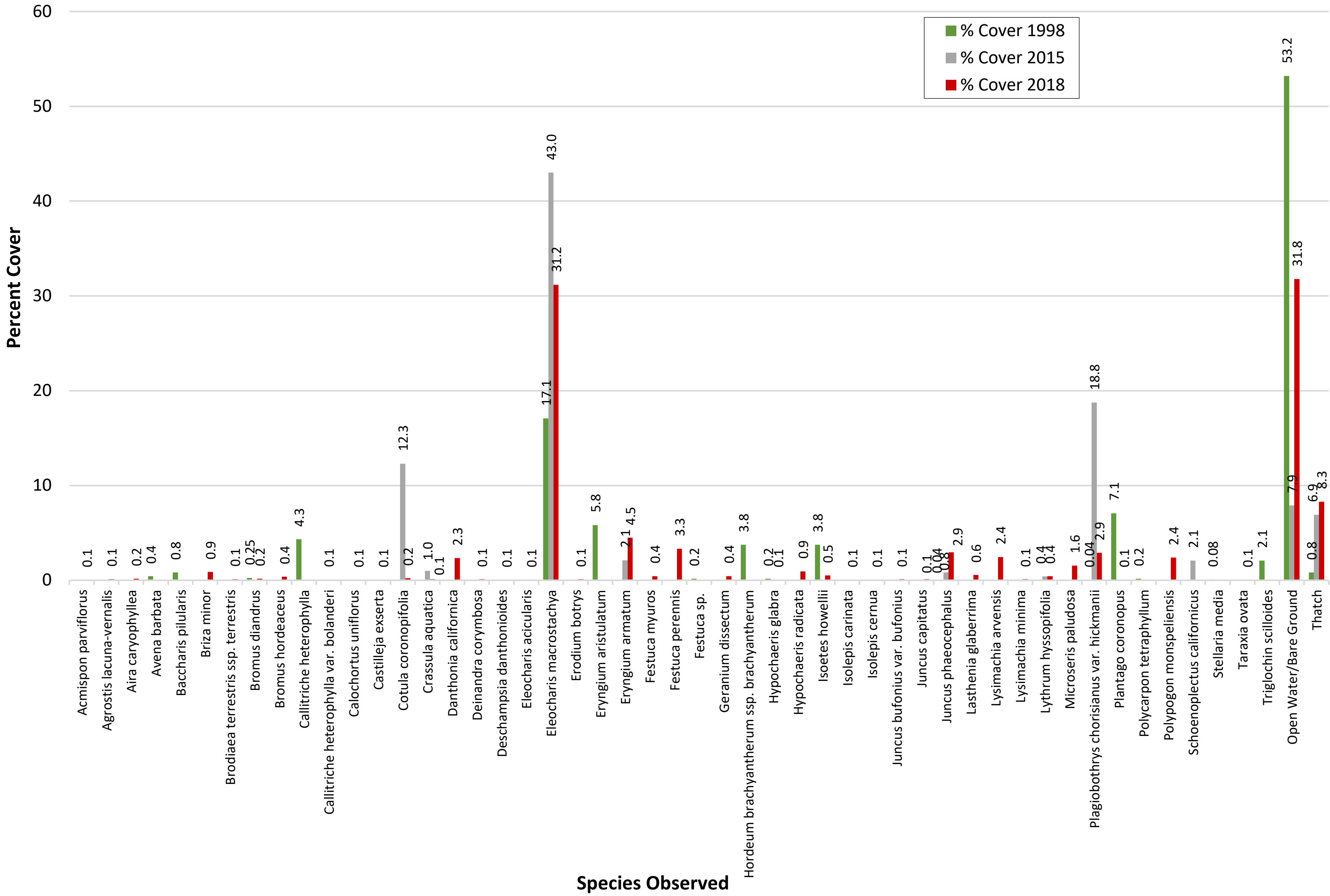


Figure H-5. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2015, and 2018 at Pond 3 North (Year 1 Post-Burn)

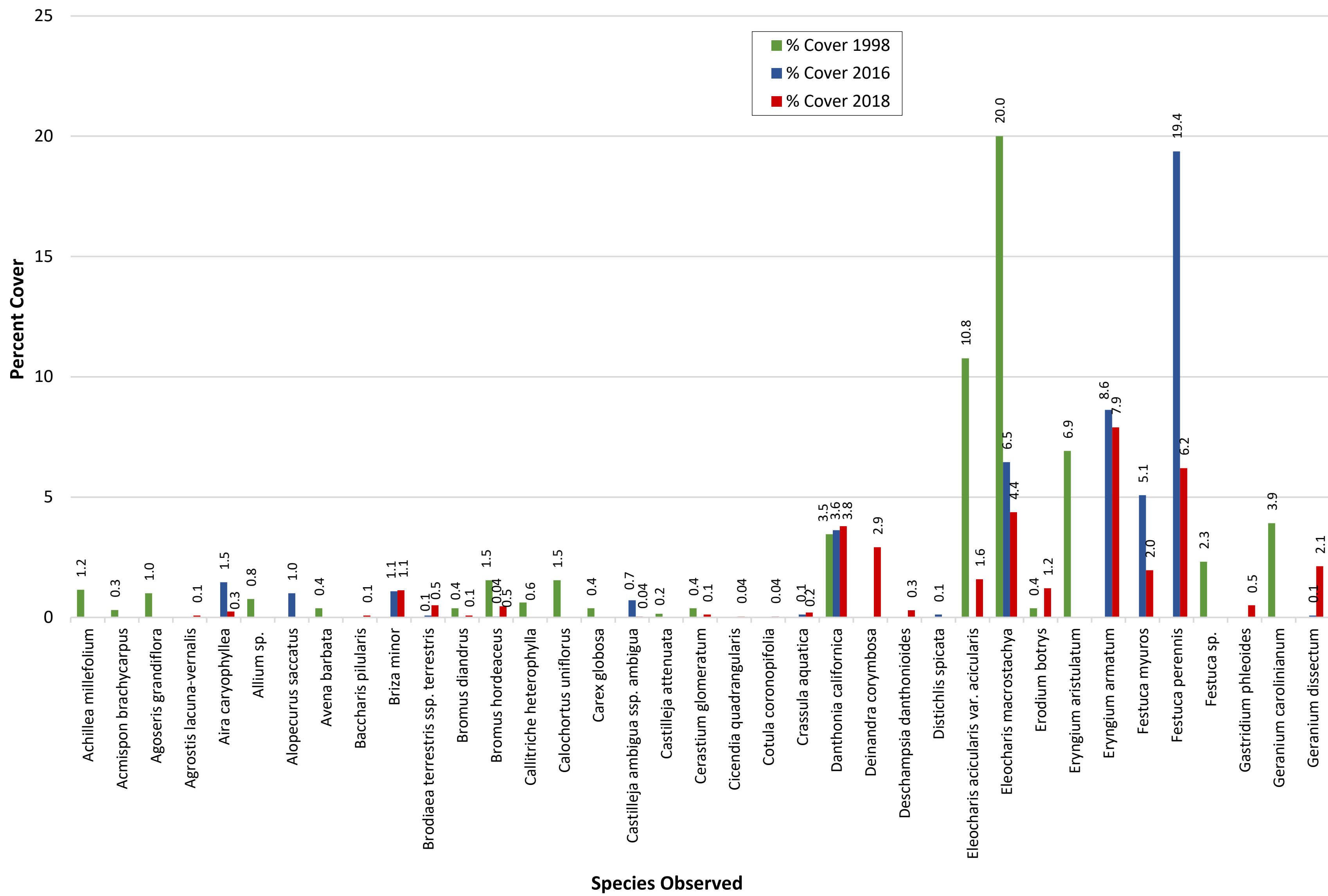


Figure H-6. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, and 2018 at Pond 3 South (Year 1 Post-Burn)

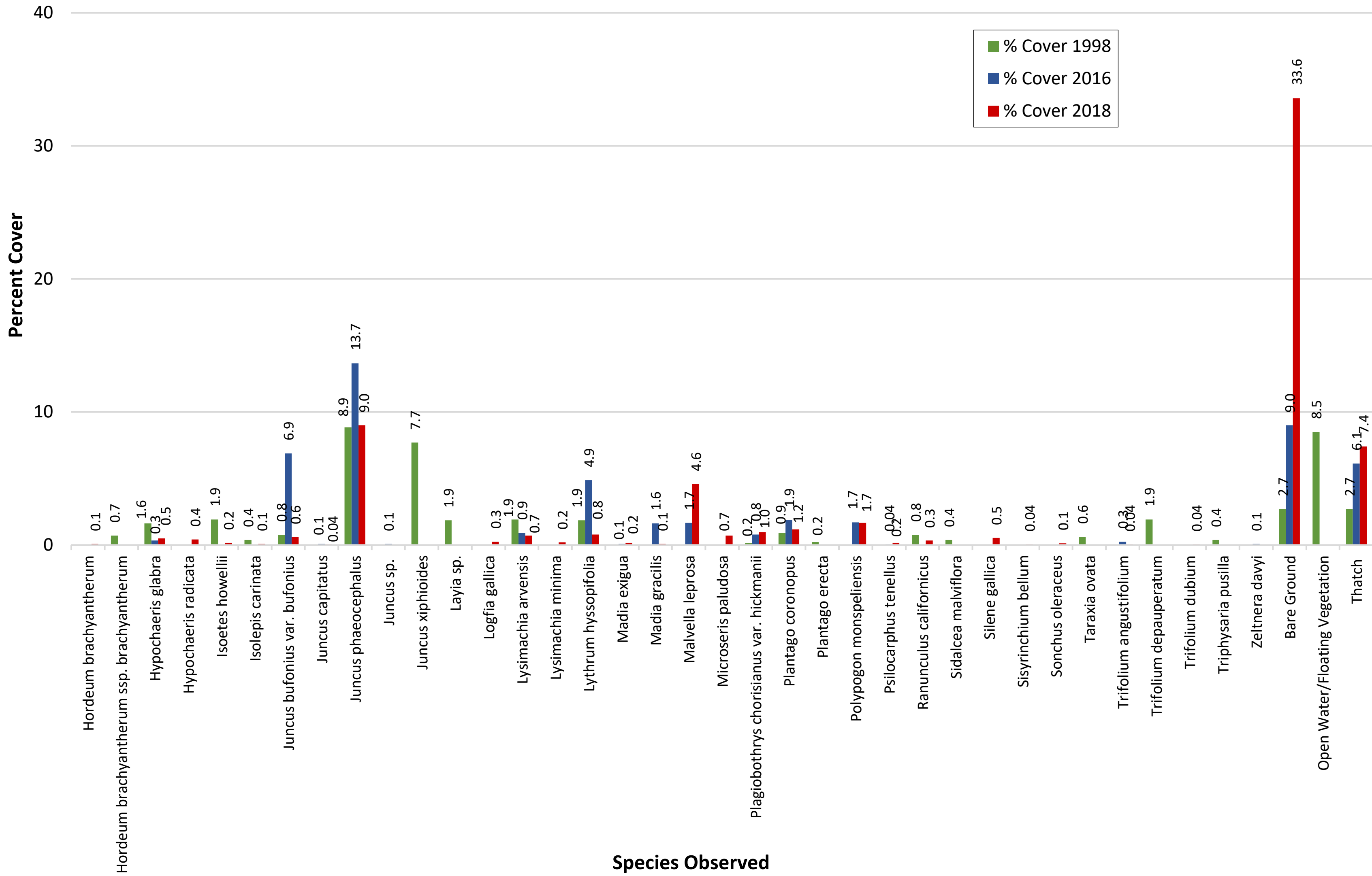


Figure H-6 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, and 2018 at Pond 3 South (Year 1 Post-Burn)

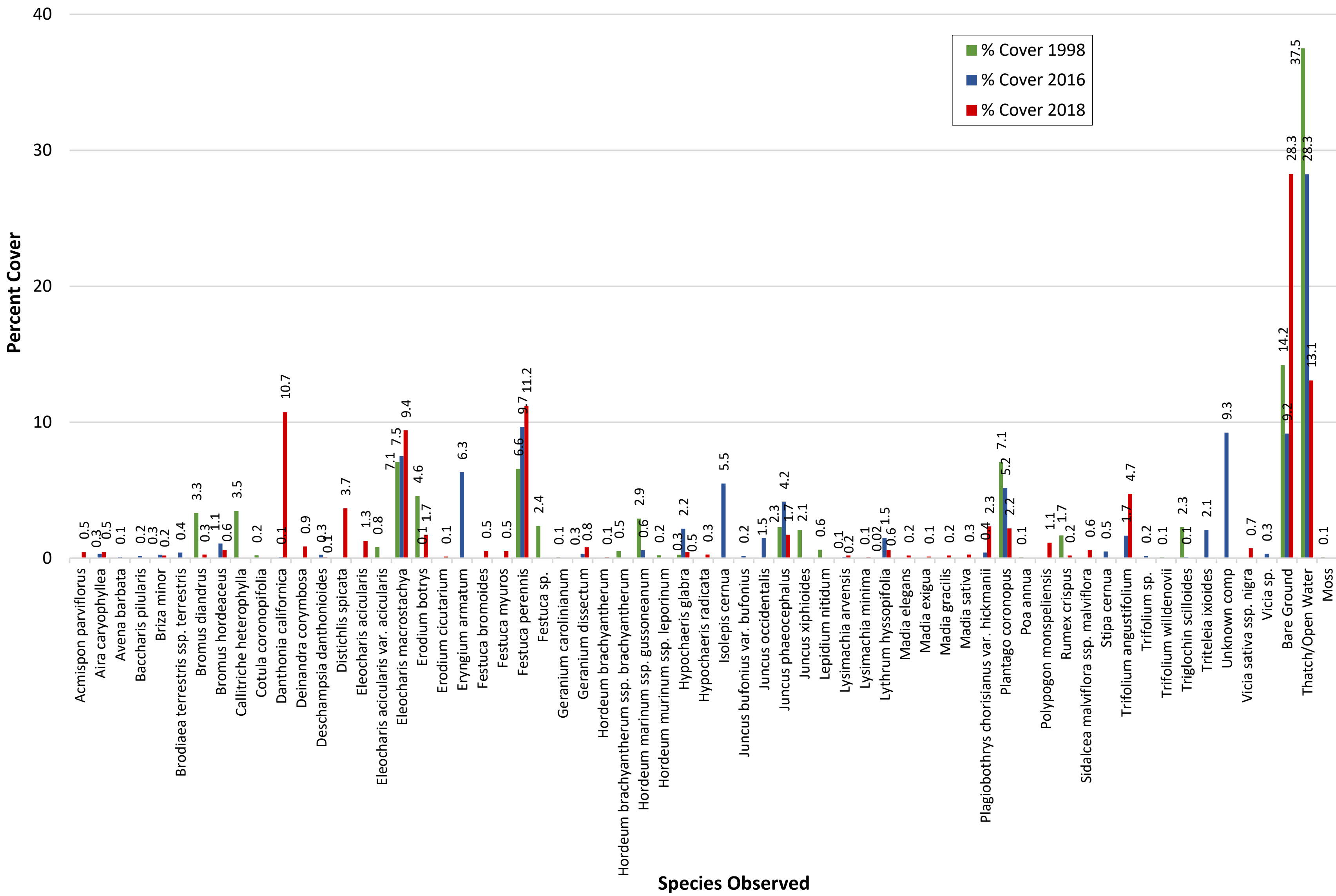


Figure H-7. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, and 2018 at Pond 39 (Year 1 Post-Burn)

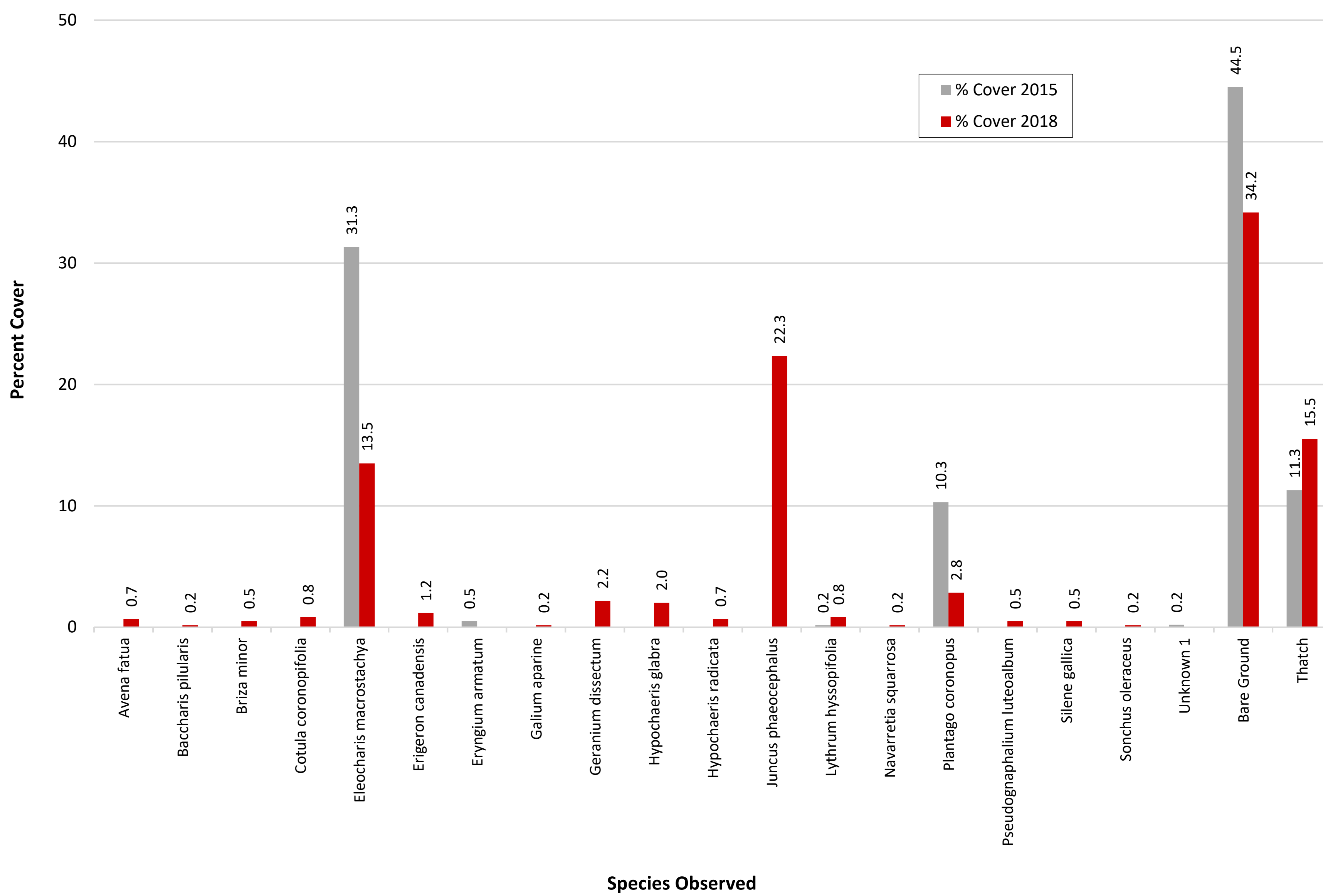


Figure H-8. Comparison Graph of Percent Cover by Wetland Plant Species for 2015 and 2018 at Pond 40 North (Year 1 Post-Burn)

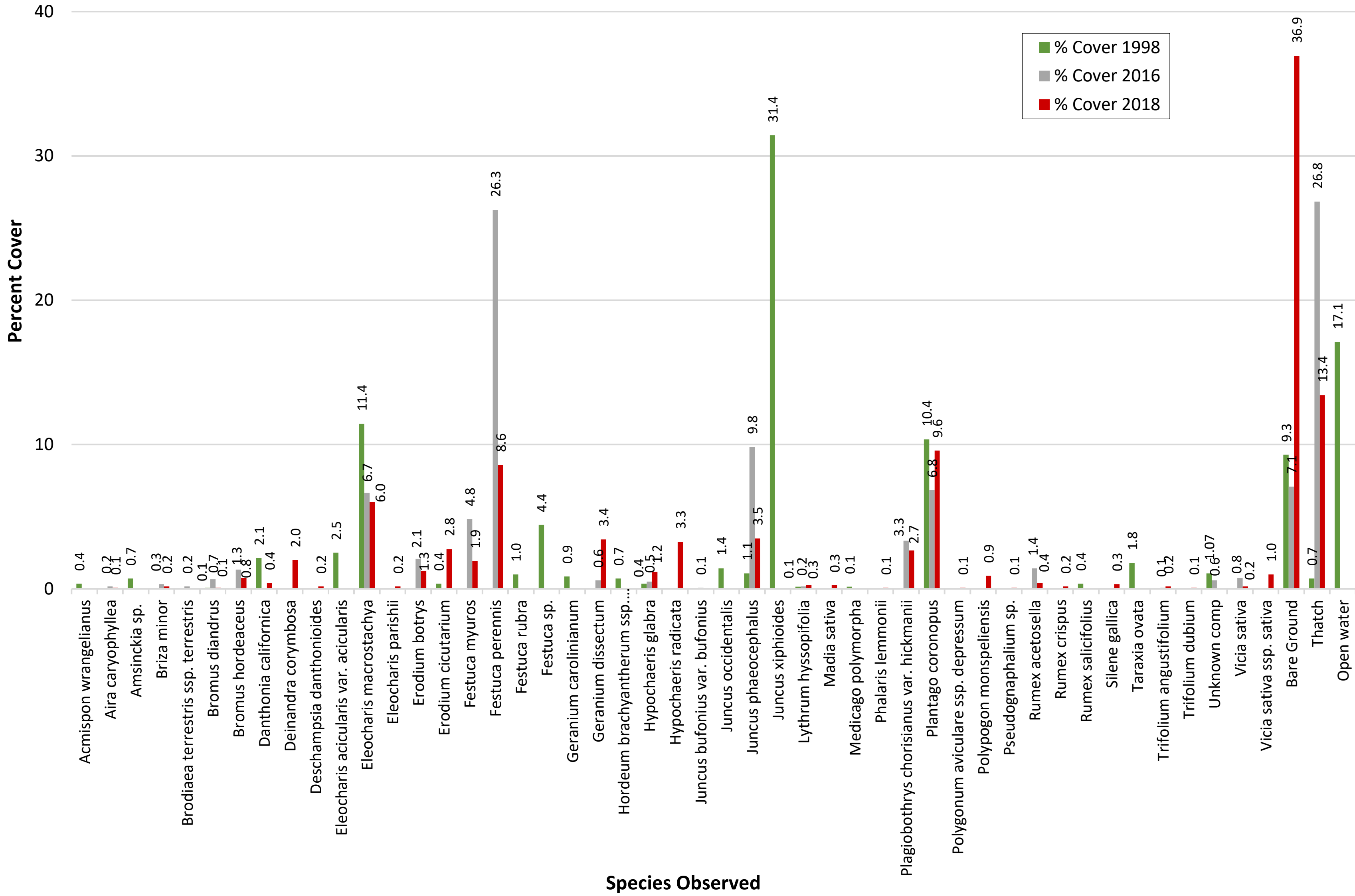
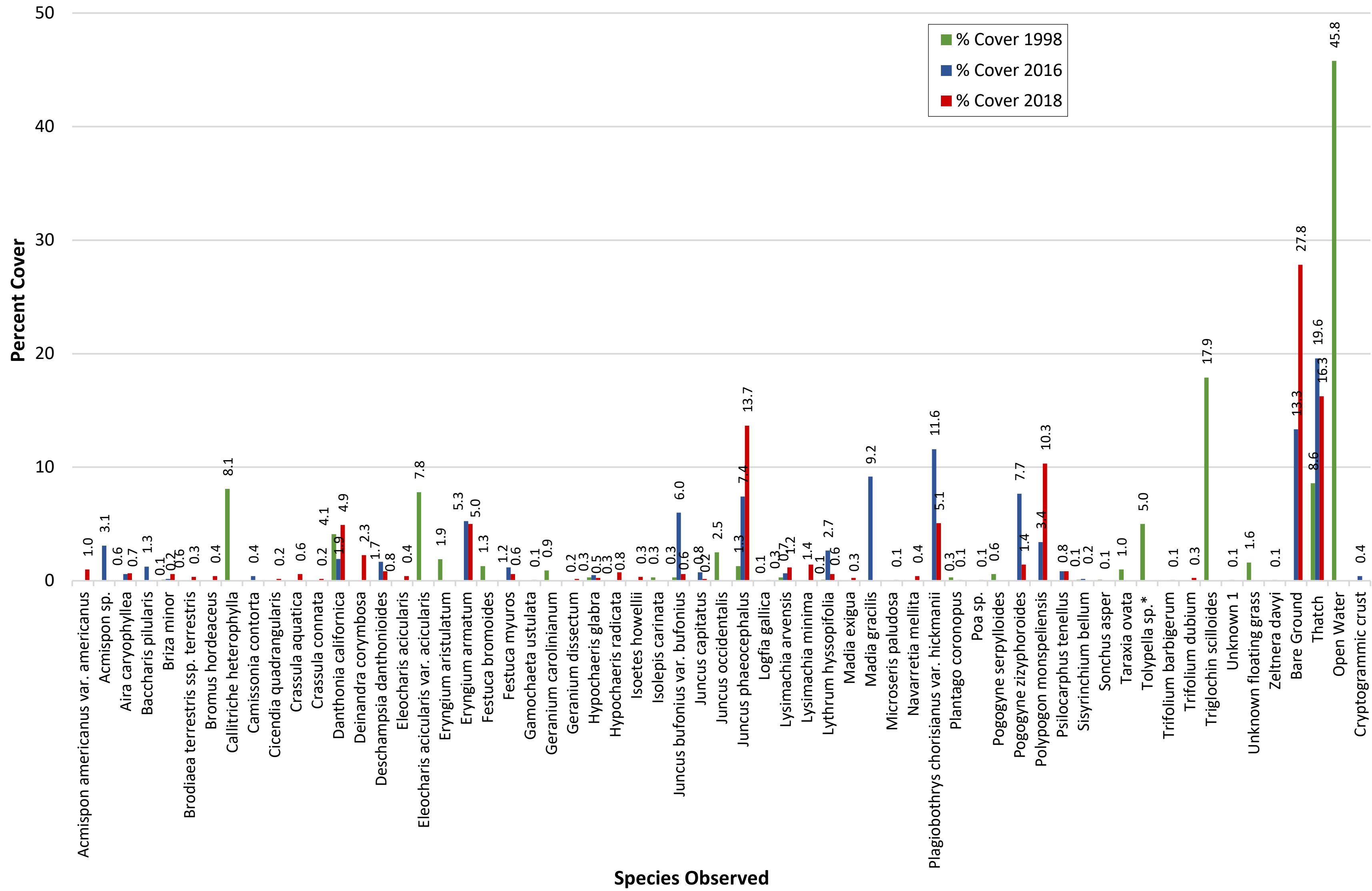


Figure H-9. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, and 2018 at Pond 40 South (Year 1 Post-Burn)



*Not listed in the Jepson Manual, CalFlora, or USDA Plants Database

Figure H-10. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, and 2018 at Pond 43 (Year 1 Post-Burn)

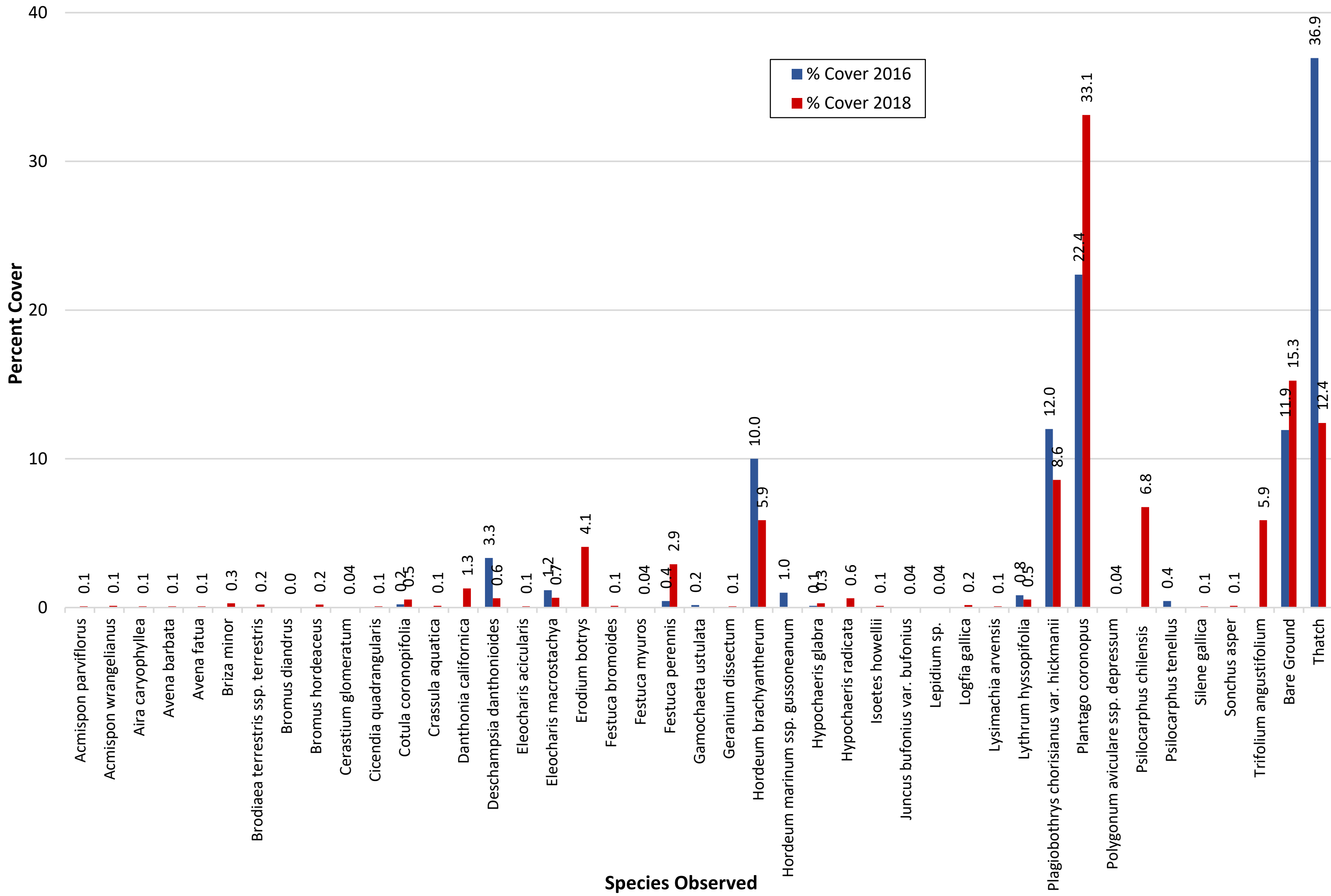


Figure H-11. Comparison Graph of Percent Cover by Wetland Plant Species for 2016 and 2018 at Pond 35 (Year 1 Post-Mastication)

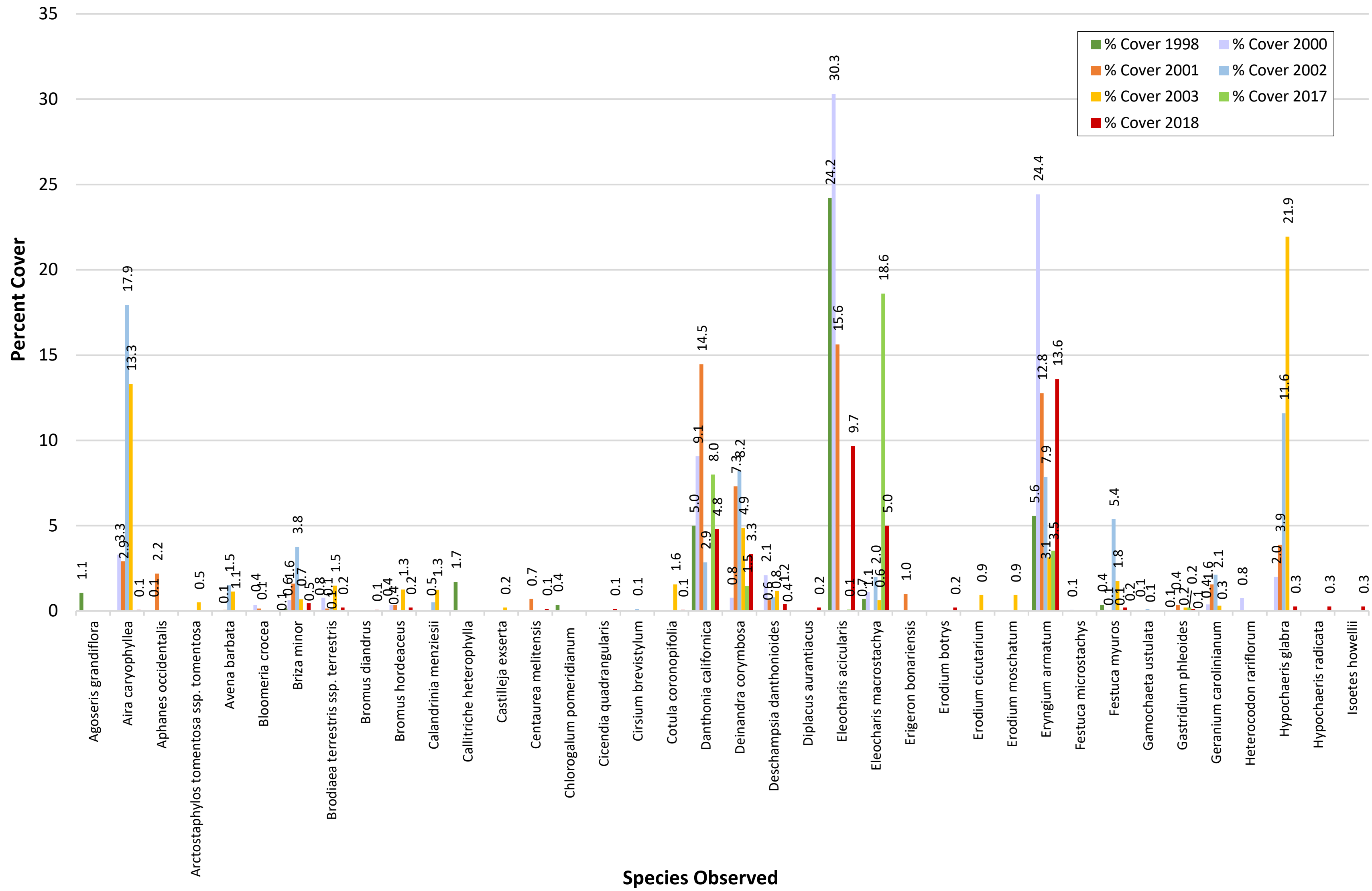
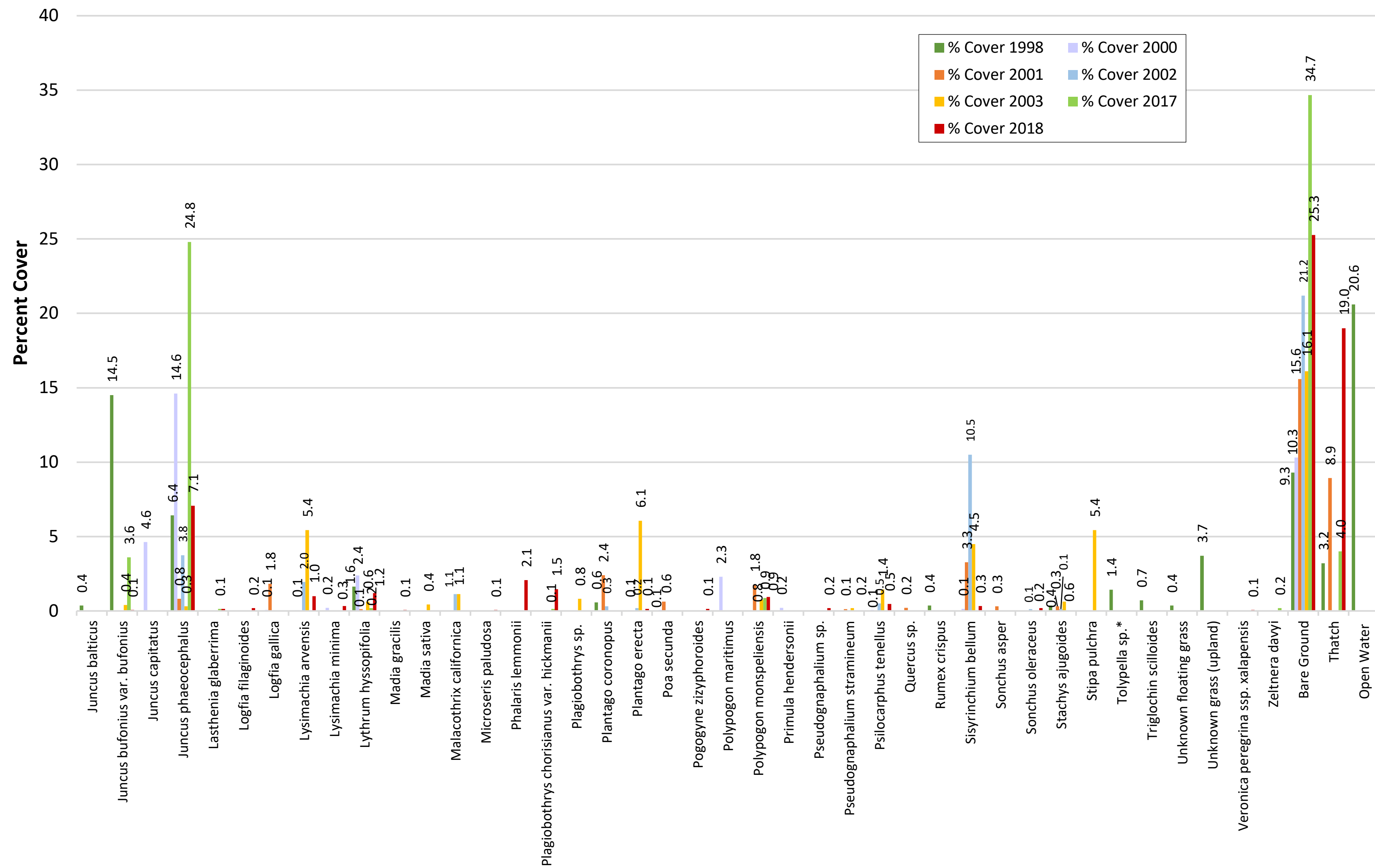


Figure H-12. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2000, 2001, 2002, 2003, 2017, and 2018 at Pond 42 (Year 1 Post-Mastication and Post-Burn)



*Not listed in the Jepson Manual, CalFlora, or USDA Plants Database

Figure H-12 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2000, 2001, 2002, 2003, 2017, and 2018 at Pond 42 (Year 1 Post-Mastication and Post-Burn)

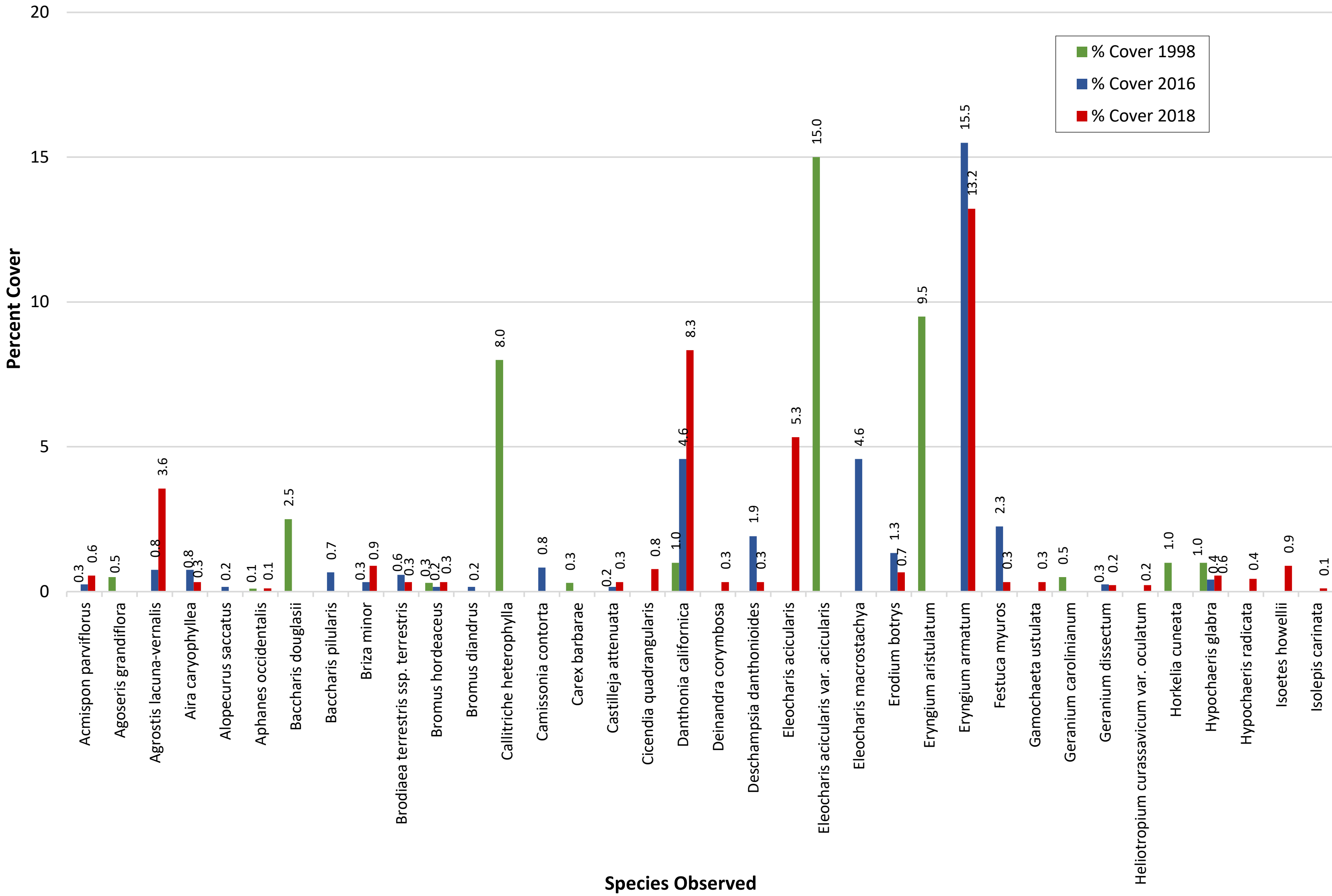
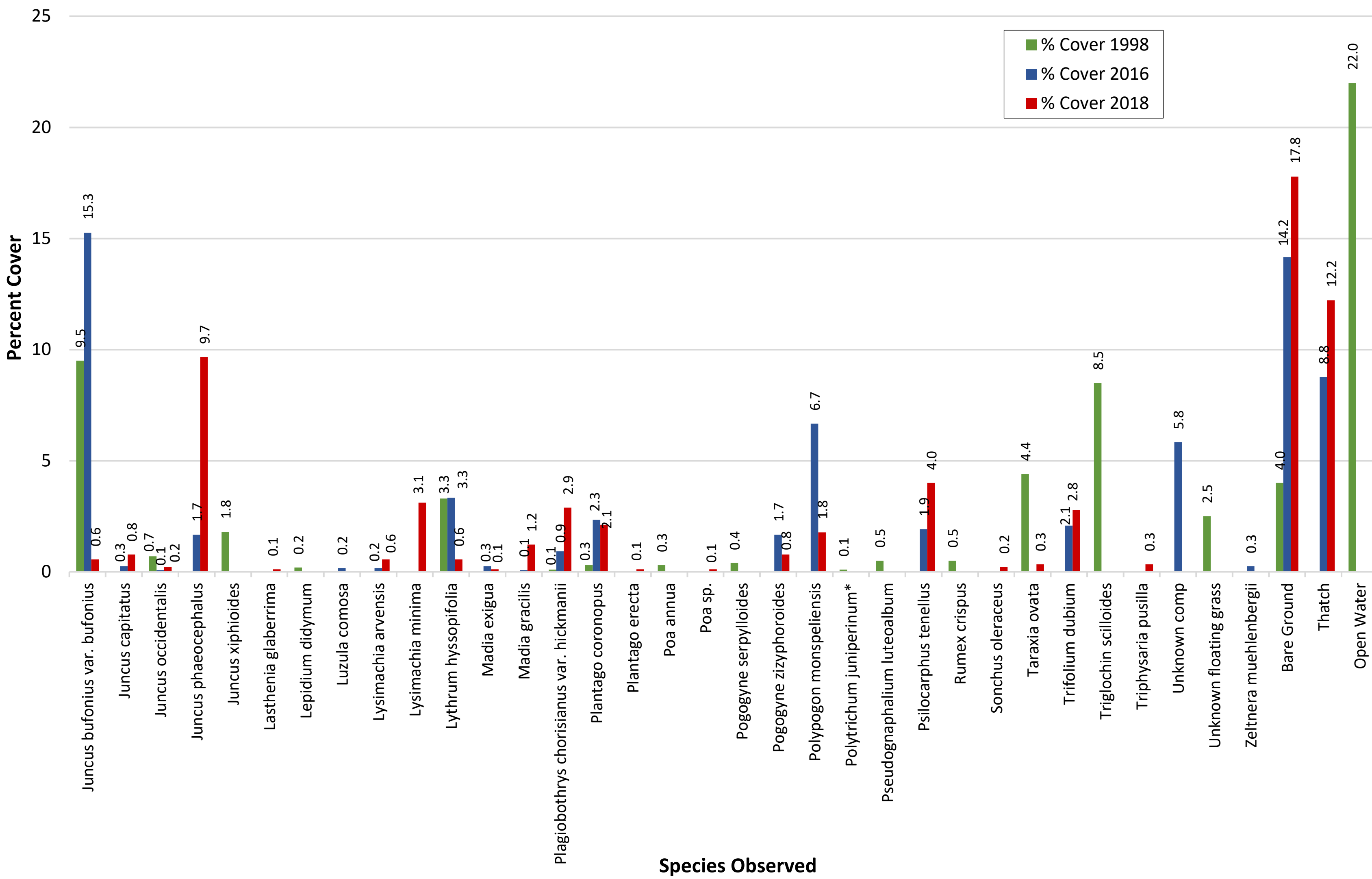


Figure H-13. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, and 2018 at Pond 44 (Year 1 Post-Mastication)



*Not listed in the Jepson Manual or CalFlora. USDA Plants Database reports as absent/unreported in California.

Figure H-13 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, and 2018 at Pond 44 (Year 1 Post-Mastication)

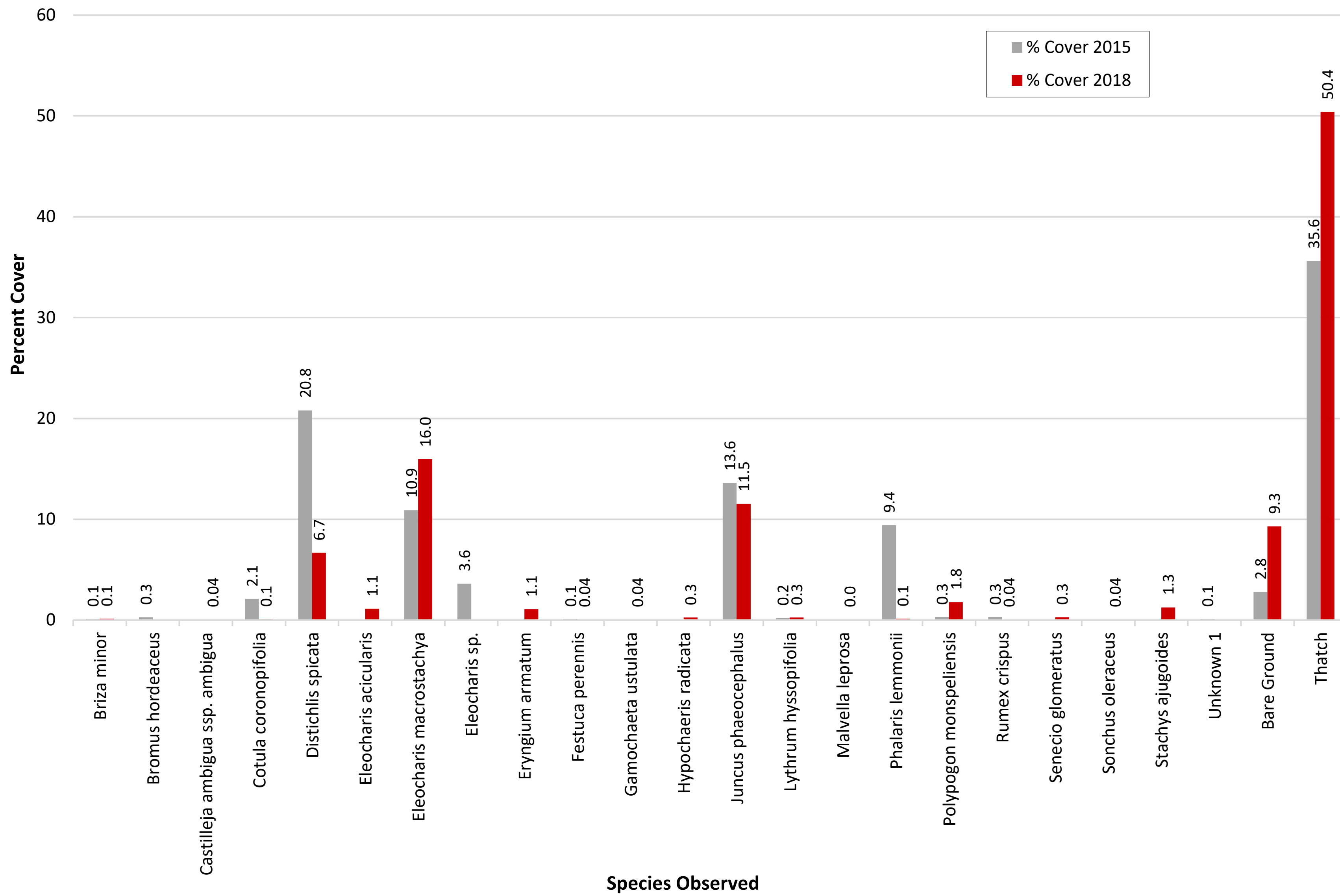


Figure H-14. Comparison Graph of Percent Cover by Wetland Plant Species for 2015 and 2018 at Pond 60 (Year 1 Post-Mastication)

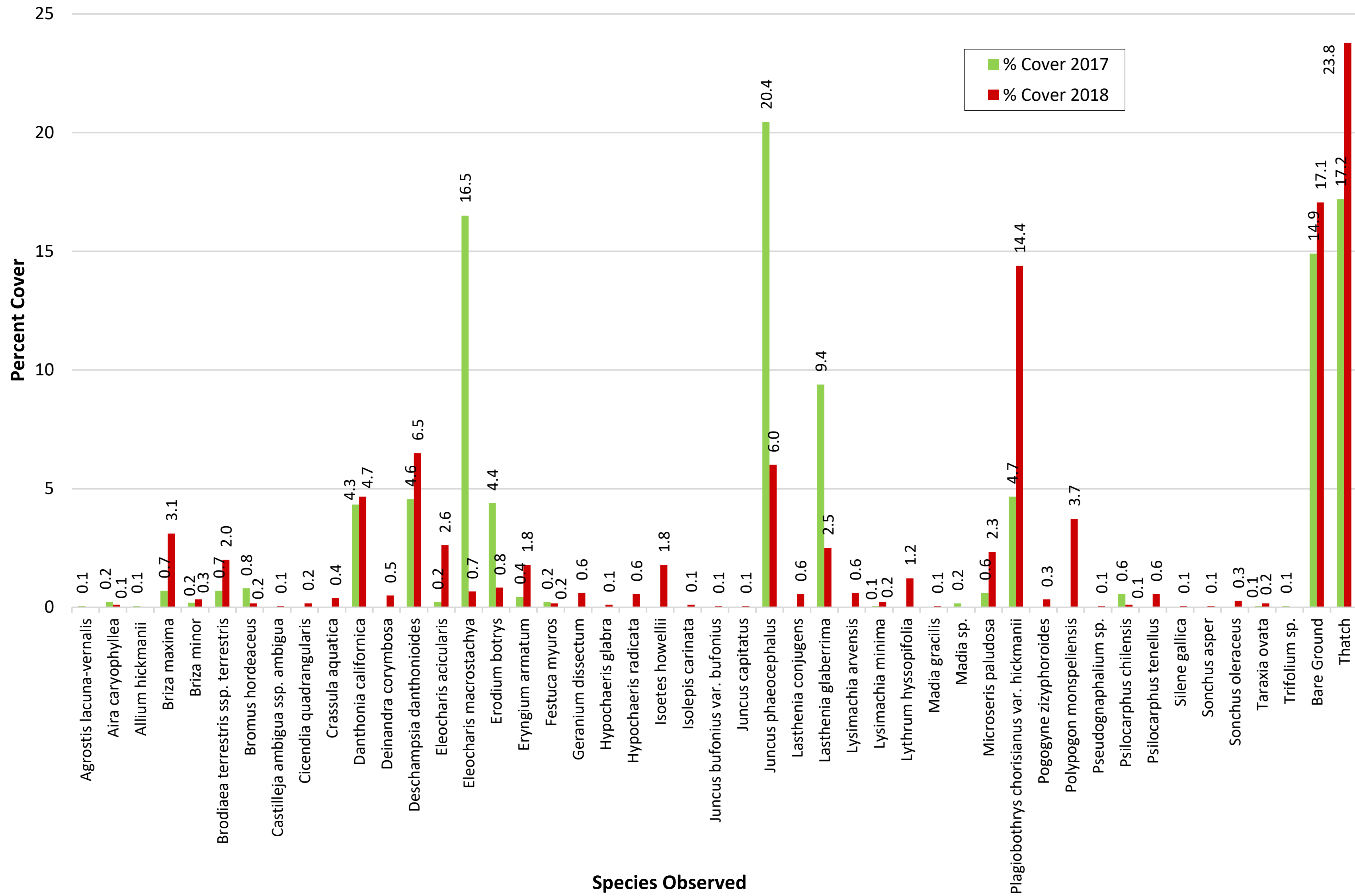


Figure H-15. Comparison Graph of Percent Cover by Wetland Plant Species for 2017 and 2018 at Pond 61 (Year 1 Post-Mastication)

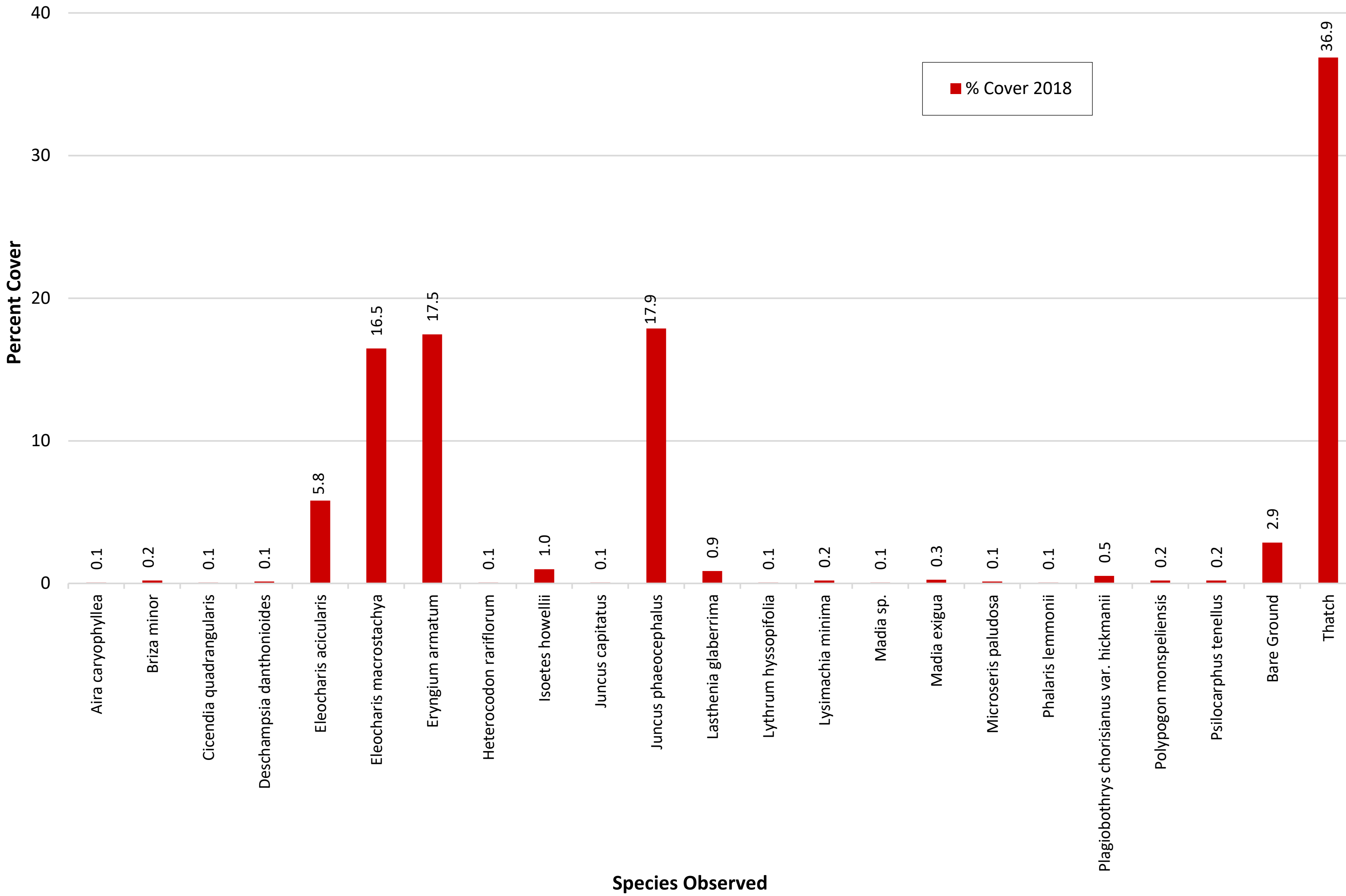


Figure H-16. Graph of Percent Cover by Wetland Plant Species for 2018 at Pond 73 (Year 1 Post-Mastication)