BW-2898
AR

2020 ANNUAL REPORT
WETLAND VEGETATION AND WILDLIFE MONITORING
CONTRACT NO. W91238-18-D-0007

FORMER FORT ORD

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

Prepared by:
Burleson Consulting Inc.
1900 Garden Road, Suite 210
Monterey, CA 93940

March 2021

This page intentionally left blank

CONTENTS

Section **Page**

FIGURES

TABLES

APPENDICES

ACRONYMS AND ABBREVIATIONS

BRAC	Base Realignment and Closure
Burleson	Burleson Consulting, Inc.
CCG	Contra Costa goldfields
Chenega	Chenega Tri Services, LLC
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
HLA	Harding Lawson and Associates
HMP	Habitat Management Plan
MEC	Munitions and Explosives of Concern
m	meter(s)
NCDC	National Climatic Data Center
NOAA	National Oceanic and Atmospheric Administration
NWSFO	National Weather Service Forecast Office
NL	Not Listed
OBL	Obligate Wetland Plant
PBO	Programmatic Biological Opinion
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

This page intentionally left blank

1 INTRODUCTION

The United States Army Corps of Engineers (USACE) contracted Burleson Consulting, Inc., A Terracon Company (Burleson) to conduct wetland vegetation and wildlife monitoring at former Fort Ord, Monterey County, California (see Figure 1-1). Wetland monitoring includes three types of monitoring: hydrology, vegetation, and wildlife. Burleson completed vegetation and wildlife monitoring. Hydrology monitoring was completed by Chenega Tri-Services, LLC (Chenega) and is reported separately (Chenega, 2021). These monitoring activities are centered around historic vernal pools on former Fort Ord.

The team monitored wetland vegetation including federally endangered Contra Costa goldfields (*Lasthenia conjugens;* CCG), the state and federally threatened California tiger salamander (*Ambystoma californiense*; CTS), 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 (PBO) 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*; 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 2020 included reference ponds 5, 101 East (East), 997; and remediated ponds 101 East (West), 41, 3 North, 3 South, 39, 40 North, 40 South, 43, 35, 42, 44, 56, 60, 61, 73, Machine Gun Flats, and 16 (see Figure 1-2 and Figure 1-3). The populations of CCG were mapped and evaluated at Ponds 997, 3 North, 3 South, 61 and Machine Gun Flats. Invertebrate and protocol-level CTS aquatic sampling surveys were completed only at vernal pools that held water long enough to trigger the wildlife surveys. For the 2019-2020 water-year, wildlife surveys were completed at all vernal pools except Pond 997, which did not hold sufficient depth to trigger the wildlife surveys.

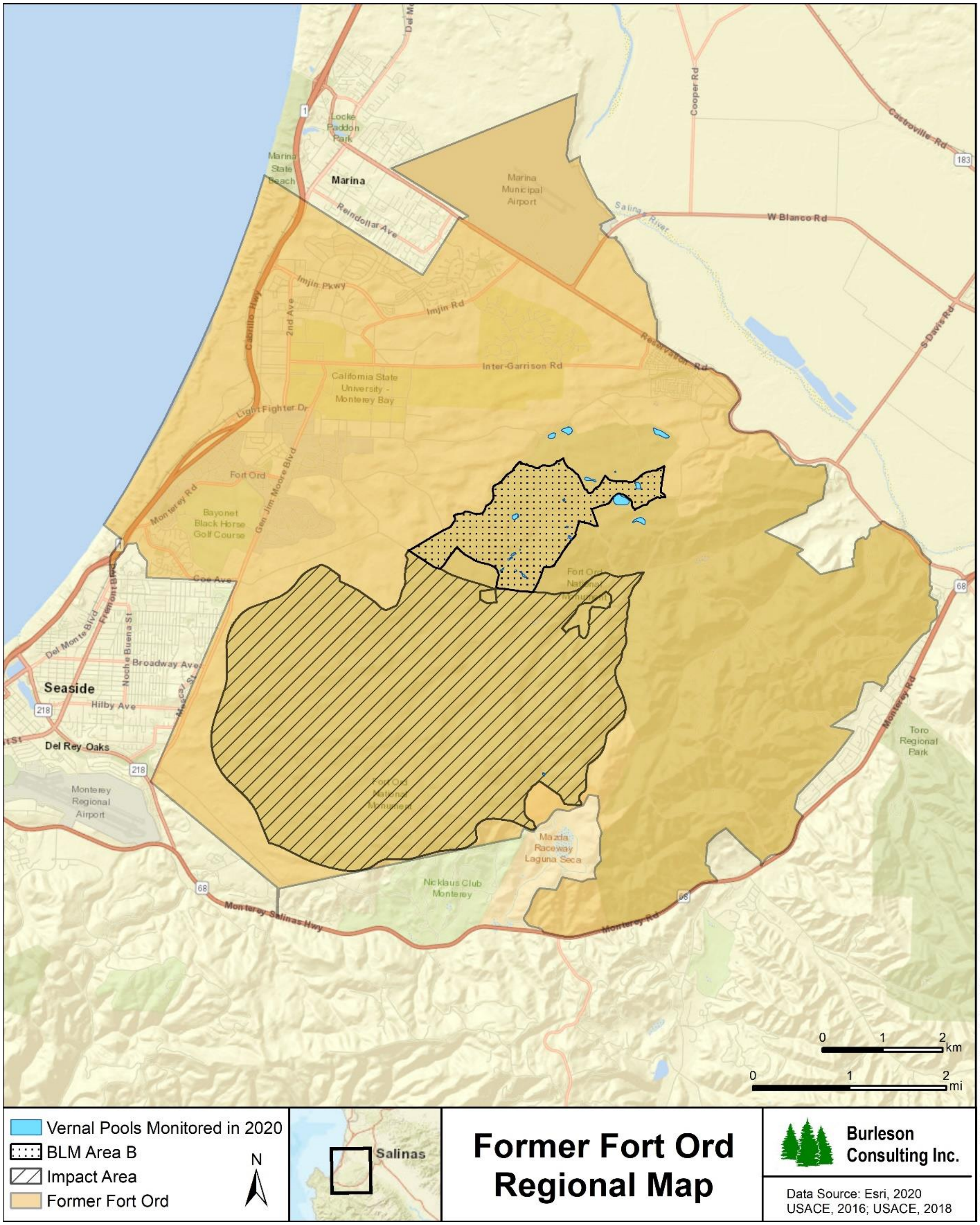


Figure 1-1. Location Map of Vernal Pools on Former Fort Ord

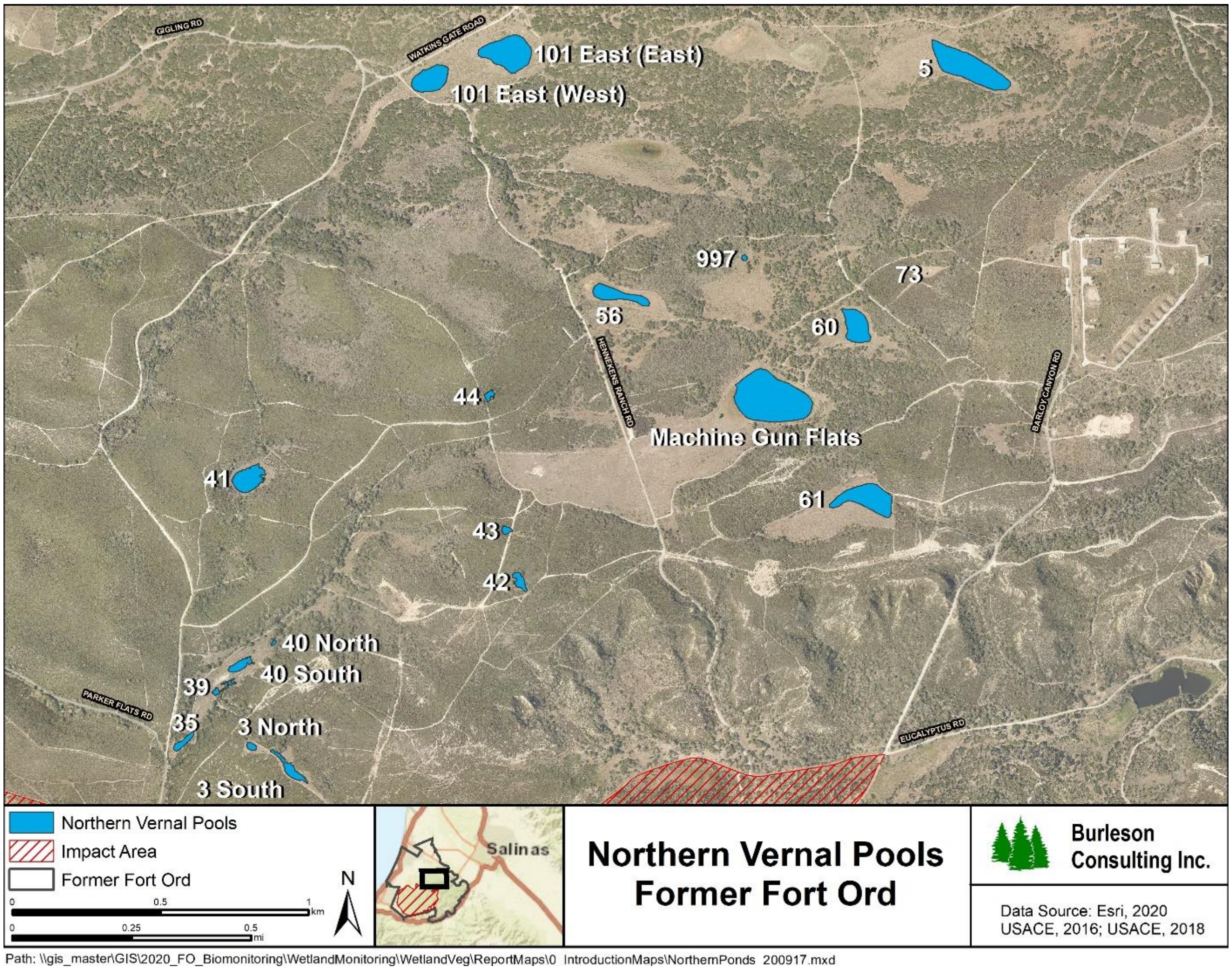


Figure 1-2. Location Map of Ponds 5, 101 East (East), 997, 101 East (West), 41, 3 North, 3 South, 39, 40 North, 40 South, 43, 35, 42, 44, 56, 60, 61, 73, and Machine Gun Flats

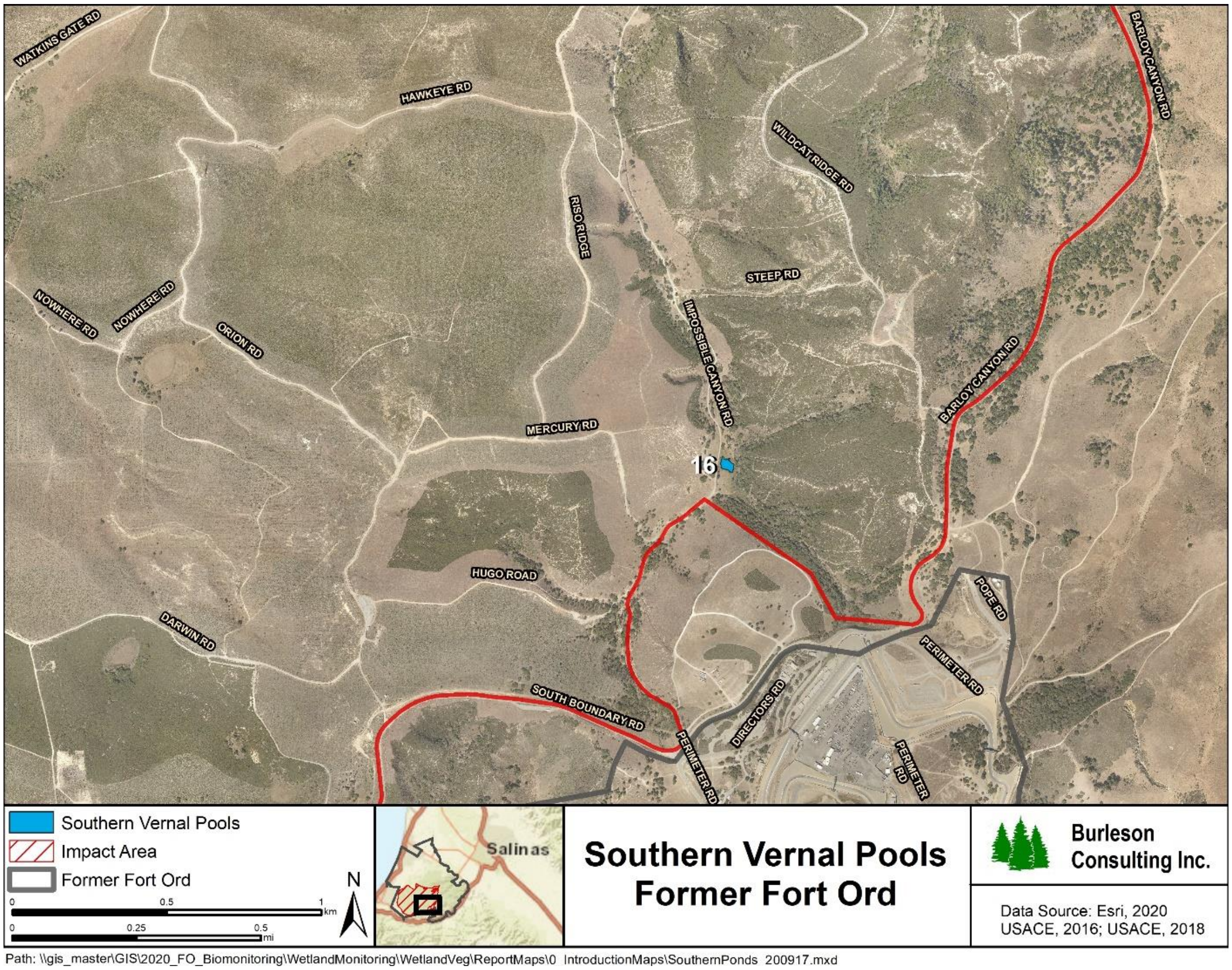


Figure 1-3. Location Map of Pond 16

In the 2019-2020 water-year, the Monterey Peninsula Regional Airport meteorological tower recorded precipitation that was within 1 inch of normal cumulative precipitation (Naval Postgraduate School Department of Meteorology, 2020; see Figure 1-4). Despite cumulative normal precipitation values, the water-year exhibited uncommon annual timing of precipitation with the bulk of rain falling in December and March. Typically, January and February are the months that receive the highest rainfall, but in 2020, there was no rainfall in February (see Figure 1-5). The National Weather Service Forecast Office (NWSFO) and Monterey Peninsula Regional Airport meteorological towers, approximately 5 miles southwest of Site 39 on former Fort Ord, recorded cumulative monthly precipitation values. The Monterey Peninsula Regional Airport tower replaced the NWSFO tower on April 1, 2019 and is located within 1 kilometer of the NWSFO tower. All values in this report are from the new Monterey Peninsula Regional Airport tower. NWSFO determines normal rainfall based on a 30-year average that at the end of each decade is moved forward another 10 years. Normal for the NWSFO tower is defined as the mean precipitation from years 1981-2010.

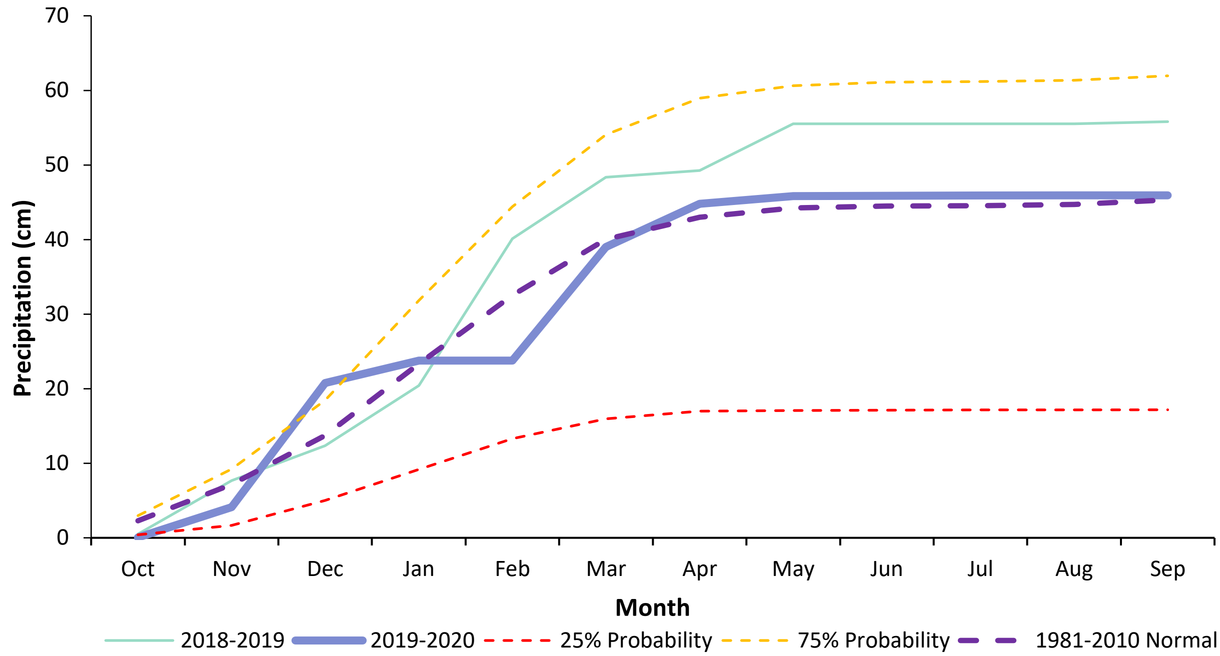


Figure 1-4. Cumulative Monthly Precipitation for the 2019-2020 Water-Year compared to the 30-Year Normal (mean 1981-2010), the 2018-2019 Water-Year, and the 25% and 75% Probabilities (NPS, 2020; National Climatic Data Center [NCDC] and National Oceanic and Atmospheric Administration [NOAA], 2020)

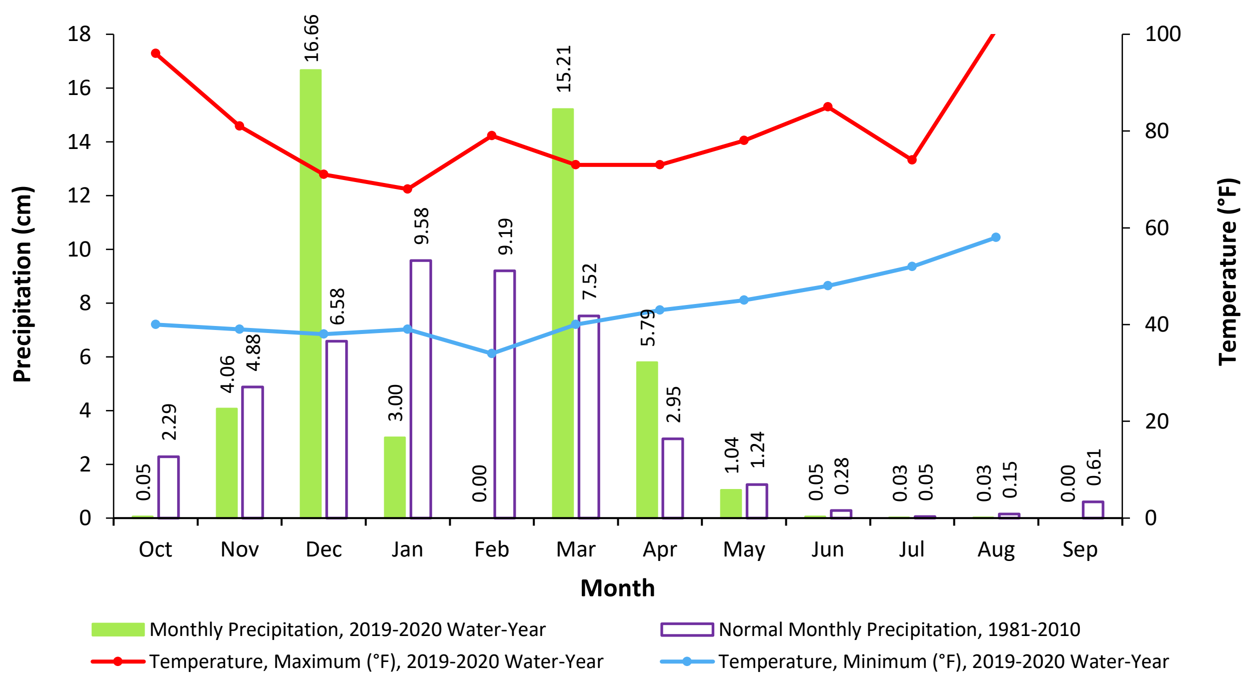


Figure 1-5. Monthly Precipitation, Maximum and Minimum Temperatures for the 2019-2020 Water-Year and Normal Monthly Precipitation (NPS, 2020).

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, PBO, 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 PBO outlines success criteria specifically for CTS and CCG. Reestablishment of these species will be considered successful if, at the end of monitoring, wetland function, wildlife usage, wetland plant cover, diversity and dominance, and CCG abundance are directly comparable to the conditions before remediation. Monitoring results guide decision-making to evaluate if and when corrective actions are necessary and to provide insight for potential mitigation or evaluation of monitoring methodologies. The objectives of monitoring were to document the ability of vernal pools to support CTS and fairy shrimp, understand hydrologic function and water quality conditions, document baseline conditions, and provide data for follow-up comparison. Table 1-1 presents the status of vernal pools monitored in 2020 at former Fort Ord.

Table 1-1. 2020 Monitoring Status of Vernal Pools on Former Fort Ord

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

2 METHODS

Sampling methods for wetland vegetation monitoring and aquatic surveys were consistent with the PBO and Wetland Plan (USFWS, 2017; Burleson, 2006).

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 PBO, the Army will conduct two years of pre-activity larval CTS sampling, to the extent possible, in the ponds where more than 50 percent of the watershed is affected by prescribed burns; thus, vernal pools may be monitored multiple years for baseline (USFWS, 2017). Additionally, at some ponds, baseline surveys were conducted more than 10 years ago and were sampled again to account for any changes that may have occurred over that period.

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

In 2016, vegetation within watershed and inundation area of Pond 16 was masticated. In 2017, vegetation within watersheds of Ponds 35, 42, 44, 56, 60, 61, 73, and Machine Gun Flats was masticated. In the same year, vegetation within watersheds of Ponds 3 North, 3 South, 39, 40 North, 40 South, 42, and 43 were prescribed burned. In 2018, vegetation in Pond 101 West, and 101 East (West) was masticated. Also, in 2018, Ponds 3 North, 3 South, 16, 35, 39, 40 North, 40 South, 41, 42, 43, 44, 60, 61, and 73 were investigated for geophysical anomalies that potentially represented munitions and explosives of concern (MEC) items, and all had subsurface munitions remediation except for Pond 40 North (KEMRON, 2020).

In 2020, Pond 101 East (West) was monitored for year 2 post-mastication. Ponds 16 and 41 were monitored for year 2 post-subsurface munitions remediation. Ponds 3 North, 3 South, 39, 40 South, and 43 were monitored for year 3 post-burn and year 2 post-subsurface munitions remediation. Pond 40 North was monitored for year 3 post-burn. Ponds 35, and 44, 60, 61, and 73 were monitored for year 3 post-mastication and year 2 post-subsurface munitions remediation. Pond 42 was monitored for year 3 post-mastication and post-burn and year 2 post-subsurface munitions remediation. Ponds 56 and Machine Guns Flats were monitored for year 3 post-mastication. Ponds 5, 101 East (East), and 997 are reference vernal pools. Ponds 40 North, 56, and Machine Gun Flats were in the final year of monitoring in 2020.

2.1 Vegetation Monitoring

Prior to collecting transect data, vernal pools were visited in early spring to assess the condition and initiate a list of plant species present. Vernal pools were visited more than once prior to collection of quadrat data to identify species present, evaluate vegetative strata, and determine the ideal time to collect data. Vegetation quadrat data were collected between May 8 and August 11, 2020. Data were collected as the vernal pools dried and the vegetation was sufficiently identifiable (see Appendices A, B, E, and F). Biologists visually assessed the historic vernal pool basins for each resource and identified homogeneous vegetative strata.

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

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

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

Plant species observed at each vernal pool were recorded. Most species were identified in the field using *The Plants of Monterey County, an Illustrated Field Key; Second Edition* (Matthews and Mitchell, 2015), *Monterey County Wildflowers, a Field Guide, First Edition* (Matthews and Mitchell, 2016), *Plants of San Francisco Bay Region, Mendocino to Monterey, Third Edition* (Beidleman and Kozloff, 2003) and *The Jepson Manual: Vascular Plants of California, Second Edition* (Baldwin *et al.*, 2012). Plants were categorized as native, non-native, or unidentified (see Appendix E Tables E-1 – E-21). 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 E Tables E-22 – E-42) (Lichvar *et al.*, 2016). When species could not be identified in the field, samples were collected from the vernal pool (not from the quadrats) and identified in the office.

Contra Costa goldfields (*Lasthenia conjugens*) and vernal pool bent grass (*Agrostis lacuna-vernalis)* were mapped using a Trimble® Juno ® T41 Series GPS unit. Contra Costa goldfield populations were mapped by creating polygons. Absolute cover was visually estimated for these polygons.

2.2 Wildlife Monitoring

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

Nets, boots, and other equipment were scrubbed with 10% diluted bleach solution and completely 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 dried at the end of each day. Cleaning solutions were applied to equipment in areas away from aquatic resources, on disturbed or developed roads to reduce contamination.

2.2.1 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 dip nets were used exclusively. Additional aquatic sampling was completed to provide additional insight into vernal pool function.

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

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

2.2.2 California Fairy Shrimp

Aquatic sampling for fairy shrimp and other aquatic invertebrates was conducted using a fine-meshed dip net and followed the *Interim Survey Guidelines to Permittees for Recovery Permits Under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods* (USFWS and California Department of Fish and Game, 1996). Representative portions of the bottom, edges, and vertical water column of each vernal pool were sampled. When fairy shrimp were present, the abundance was estimated by collecting 5-20 swipes throughout the vernal pool. The number of swipes relates to the size and complexity of the vernal pool and was consistent with the range of frequencies outlined in protocols from previous reports. More swipes occur at larger and/or more complex vernal pools than at small vernal pools. Following dip netting, the number of collected fairy shrimp were totaled and the abundance was reported as follows (see Appendix C Tables C-2 – C-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.

2.3 Evaluation for Data Quality Objectives and Success Criteria

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

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

Hydrological conditions, inundation areas, and water quality were assessed by Chenega using DQO 1, DQO 2, and DQO 4 and are not included in this report (Chenega, 2021).

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 5. DQOs 1 and 4 apply to depths and the relationship between water quality and wildlife presence and were assessed as part of the Hydrology Monitoring Annual Report (Chenega, 2021). For 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 that supported CTS and fairy shrimp prior to remediation activities should continue to support those species following such activities (Burleson, 2006).

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

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

These four conditions were assessed in conjunction with the DQOs. Wetland function was assessed with DQO 1, DQO 2, and DQO 4 and was discussed in the Hydrology Monitoring Annual Report (Chenega, 2021). 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, wetland vegetation, and wildlife presence or absence for all reference and post-remediation vernal pools were summarized by vernal pool. 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 presence or non-detection of CTS and fairy shrimp.

This page intentionally left blank

3 RESULTS

Vegetation monitoring was conducted at Ponds 5, 101 East (East), 997, 101 East (West), 41, 3 North, 3 South, 39, 40 North, 40 South, 43, 35, 42, 44, 56, 60, 61, 73, Machine Gun Flats, and 16. Across all monitored vernal pools, the mean number of native plant species was 18 and non-native species was 14 (see Table 3-1). Of these species, a mean of 18 were wetland species, either obligate (OBL), facultative wetland (FACW), or facultative (FAC) (see Table 3-2). In addition to vegetative strata mapping and transect surveys, populations of CCG were surveyed at Ponds 3 North, 3 South, 61, 997, and Machine Gun Flats.

Table 3-1. Vegetation Species Richness of Native and Non-Native Species Observed on Transects at Vernal Pools Monitored in 2020

Vernal Pool	Monitoring Status	Native	Non-Native
Pond 5	Reference	12	11
Pond 101 East (East)	Reference	24	19
Pond 997	Reference	27	14
Mean (Reference)	-	**21**	**15**
Pond 101 East (West)	Year 2 Post-Mastication	21	20
Pond 41	Year 2 Post-Subsurface Munitions Remediation	21	14
Pond 3 North	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	23	16
Pond 3 South	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	33	21
Pond 39	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	12	20
Pond 40 North	Year 3 Post-Burn	7	8
Pond 40 South	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	8	18
Pond 43	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	26	15
Pond 35	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	10	16
Pond 42	Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation	18	10
Pond 44	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	22	17
Pond 56	Year 3 Post-Mastication	13	5
Pond 60	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	9	7
Pond 61	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	24	12
Pond 73	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	14	9
Machine Gun Flats	Year 3 Post-Mastication	27	25
Pond 16	Year 2 Post-Subsurface Munitions Remediation	11	6
Mean (Remediated)	-	**18**	**14**
Mean (All)	-	**18**	**14**

Table 3-2. Vegetation Species Richness of Obligate and Facultative Wetland Species Observed on Transects at Vernal Pools Monitored in 2020

Vernal Pool	Monitoring Status	OBL	FACW	FAC	Wetland Species
Pond 5	Reference	4	7	3	14
Pond 101 East (East)	Reference	5	8	7	20
Pond 997	Reference	9	10	5	24
Mean (Reference)	-	**6**	**8**	**5**	**19**
Pond 101 East (West)	Year 2 Post-Mastication	6	11	6	23
Pond 41	Year 2 Post-Subsurface Munitions Remediation	5	8	6	19
Pond 3 North	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	7	10	6	23
Pond 3 South	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	9	12	8	29
Pond 39	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	2	2	5	9
Pond 40 North	Year 3 Post-Burn	2	4	4	10
Pond 40 South	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	4	3	5	12
Pond 43	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	9	11	4	24
Pond 35	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	6	3	4	13
Pond 42	Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation	7	7	4	18
Pond 44	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	7	8	5	20
Pond 56	Year 3 Post-Mastication	6	6	1	13
Pond 60	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	6	5	3	14
Pond 61	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	9	9	4	22
Pond 73	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	5	9	1	15
Machine Gun Flats	Year 3 Post-Mastication	5	12	10	27
Pond 16	Year 2 Post-Subsurface Munitions Remediation	2	5	1	7
Mean (Remediated)	-	**6**	**7**	**5**	**18**
Mean	-	**6**	**8**	**5**	**18**

Aquatic wildlife monitoring was conducted at Ponds 5, 101 East (East), 997, 101 East (West), 41, 3 North, 3 South, 39, 40 North, 40 South, 43, 35, 42, 44, 56, 60, 61, 73, Machine Gun Flats, and 16 (see Appendix C Tables C-1 – C-3). Pond 997 was the only vernal pool that did not hold sufficient depth to trigger the wildlife surveys in 2020. Vernal pools were sampled up to three times in March, April, and May. All vernal pools except Ponds 5, 3 North, 56, 60, and Machine Gun Flats were either dry in March or dried completely during the sampling period and were not sampled during all events. California tiger salamanders were only present in Pond 60 and Machine Gun Flats. A total of 13 individuals were observed at Pond 60 and 8 individuals at Machine Gun Flats. Fairy shrimp were present in 13 out of the 19 vernal pools sampled in 2020, ranging from low to high abundance (see Table 3-3).

Table 3-3. California Tiger Salamander and Fairy Shrimp Detections at Vernal Pools in 2020

Vernal Pool	Monitoring Status	CTS Detected	Fairy Shrimp Detected
Pond 5	Reference	No	No
Pond 101 East (East)	Reference	No	Yes (Moderate)
Pond 101 East (West)	Year 2 Post-Mastication	No	No
Pond 41	Year 2 Post-Subsurface Munitions Remediation	No	Yes (Moderate)
Pond 3 North	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	No	Yes (Low)
Pond 3 South	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	No	Yes (Moderate)
Pond 39	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	No	Yes (Low)
Pond 40 North	Year 3 Post-Burn	No	Yes (Moderate)
Pond 40 South	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	No	Yes (Low)
Pond 43	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	No	Yes (Moderate)
Pond 35	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	No	Yes (High)
Pond 42	Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation	No	Yes (High)
Pond 44	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	No	Yes (High)
Pond 56	Year 3 Post-Mastication	No	No
Pond 60	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	Yes	No
Pond 61	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	No	Yes (High)
Pond 73	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	No	Yes (Low)
Machine Gun Flats	Year 3 Post-Mastication	Yes	Yes (Low)
Pond 16	Year 2 Post-Subsurface Munitions Remediation	No	Yes (High)

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 2020, Pond 5 was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.1.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 5 on June 10, 2020. These monitoring data represent reference conditions. Pond 5 was dry by the June 10 monitoring event. Biologists identified five vegetative strata at the vernal pool (see Table 3-4 and Figure 3-1). Appendix B provides the species cover results for each stratum. Stratum 1 was repeated from 2016, 2018, and 2019. Strata 2, and 3 were repeated from 2016, 2017, 2018, and 2019. Stratum 6 was repeated from 2018 and 2019. Stratum 7 was repeated from 2019. Transect 1 was repeated from 2016, 2018, and 2019. Transect 2 was repeated from

2016. Transect 3 was relocated to a more representative location. Transect 6 was repeated from 2018 and 2019. Transect 7 was repeated from 2019.

Table 3-4. Pond 5 (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	35%
2	32%
3	12%
6	14%
7	7%

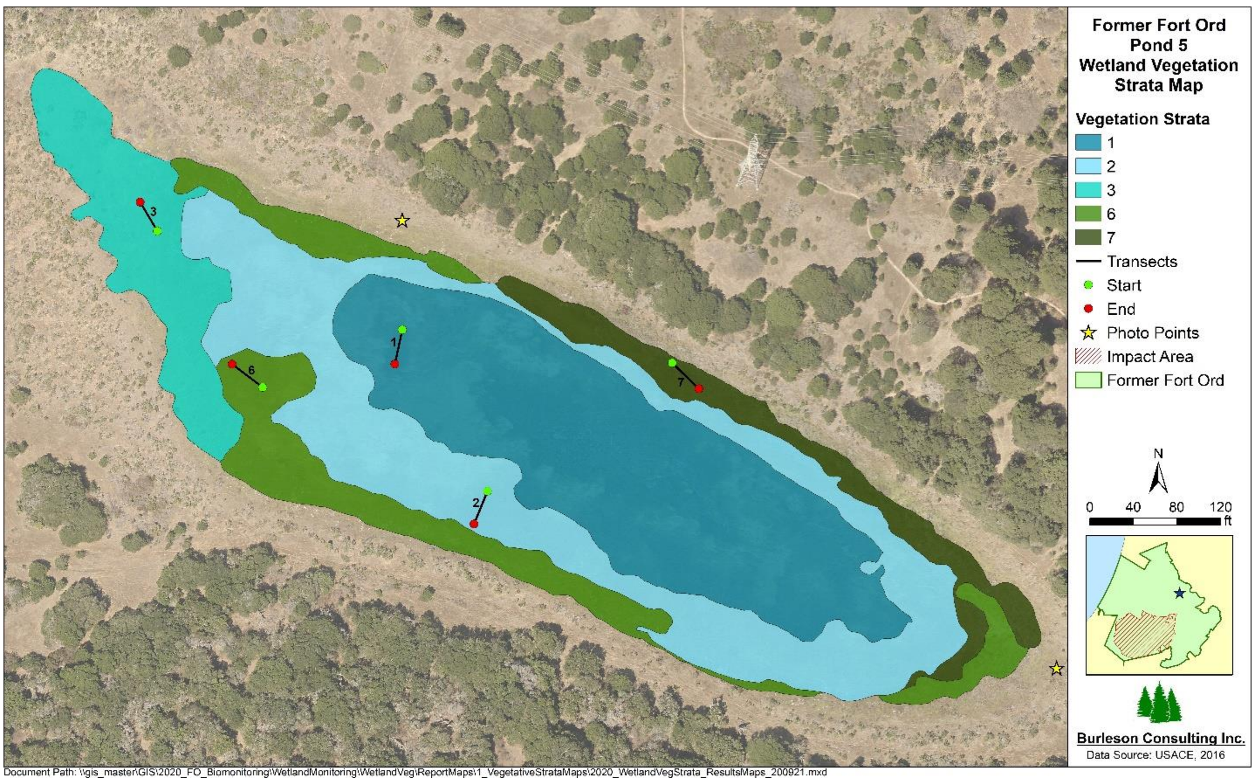


Figure 3-1. Pond 5 (Reference) Vegetation Strata and Transects on Former Fort Ord, 2020

Sixty-nine plant species were observed within the vernal pool basin boundary. Of these species, 39 were native and 30 were non-native. Eight species were OBL wetland plants, 21 were FACW or FAC, 17 were FACU or UPL, and 23 were not listed. Appendix E 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. Four plant species were observed along the transect. Of these species, two were native and two were non-native. Pale spikerush (*Eleocharis macrostachya)* was the dominant species, accounting for approximately 50% cover (see Appendix B Table B-1). Thatch was abundant accounting for approximately 46%. Other species included

Pacific bent grass (*Agrostis avenacea*), alkali mallow (*Malvella leprosa*), and rabbitfoot grass (*Polypogon monspeliensis*). Bare ground accounted for approximately 2%.

Transect 2 at Pond 5 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 was the dominant species, accounting for 35% (see Appendix B Table B-1). Thatch was abundant accounting for approximately 59%. Rabbitfoot grass and salt grass (*Distichlis spicata*) contributed approximately 4% and 2% cover, respectively. Other species included alkali mallow.

Transect 3 at Pond 5 consisted of a 10-m transect placed in stratum 3. Eighteen plant species were observed along the transect. Of these species, nine were native and nine were non-native. Bugle hedge nettle (*Stachys ajugoides*) was the dominant species, accounting for approximately 34% cover (see Appendix B Table B-1). Thatch was abundant accounting for 46% cover. Spreading alkaliweed (*Cressa truxillensis*), salt grass, pale spikerush, and Lemmon's canary grass (*Phalaris lemmonii*) contributed cover ranging from 2% to 4%. Smooth cat's-ear (*Hypochaeris glabra*), brown-headed rush (*Juncus phaeocephalus*), rabbitfoot grass and curly dock (*Rumex crispus*) each contributed approximately 1% cover. Other species included large-flowered agoseris (*Agoseris grandiflora*), annual quaking grass (*Briza minor*), horseweed (*Erigeron canadensis*), rough cat's ear (*Hypochaeris radicata*), grass poly (*Lythrum hyssopifolia*), Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*), weedy cudweed (*Pseudognaphalium luteoalbum*), and common sow thistle (*Sonchus oleraceus*). Bare ground accounted for approximately 2%.

Transect 6 at Pond 5 consisted of a 10-m transect placed in stratum 6. Seven plant species were observed along the transect. Of these species, five were native and two were non-native. Pale spikerush and rabbitfoot grass were the dominant species, accounting for approximately 10% and 6% cover, respectively (see Appendix B Table B-1). Thatch was abundant, accounting for approximately 73%. Salt grass, brown-headed rush, Lemmon's canary grass, rabbitfoot grass, and curly dock contributed cover ranging from 2% to 6% cover. Other species included spreading alkaliweed.

Transect 7 at Pond 5 consisted of a 10-m transect placed in stratum 7. Eight plant species were observed along the transect. Of these species, three were native and five were non-native. Baltic rush (*Juncus balticus*) was the dominant species, accounting for approximately 60% cover (see Appendix B Table B-1). Thatch was abundant, accounting for approximately 33%. Horseweed and *Pseudognaphalium* sp. each contributed 2% cover. Other species included Pacific bent grass, smooth cat's ear, rabbitfoot grass, cutleaf burnweed (*Senecio glomeratus*), and common sow thistle. Bare ground accounted for approximately 1%.

3.1.2 Wildlife Monitoring

Pond 5 was surveyed for CTS and fairy shrimp on March 17, April 15, and May 18, 2020. California tiger salamanders and fairy shrimp were not detected. Table 3-5 and Table 3-6 provide results of the CTS and fairy shrimp surveys in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

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

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
5	3/17/2020	0	-	-	-	-	-	-	-	30 min
	4/15/2020	0	-	-	-	-	-	-	-	4 hrs 30 min
	5/18/2020	0	-	-	-	-	-	-	-	1 hr

Table 3-6. Pond 5 (Reference) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/17/2020	Not detected
4/15/2020	Not detected
5/18/2020	Not detected

3.2 Pond 101 East (East)

Pond 101 East (East) is a reference vernal pool that was monitored as a control for comparison to the remediated vernal pools. In 2020, Pond 101 East (East) was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.2.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 101 East (East) on June 9, June 25, and July 2, 2020. These monitoring data represent reference conditions. Pond 101 East (East) was dry by May 26 (Chenega, 2021). Biologists identified six strata at the vernal pool (see Table 3-7 and Figure 3-2). Appendix B provides the species cover results within each stratum. Strata 1 and 2 were repeated from 2016, 2018, and 2019, whereas strata 5 and 6 were repeated from 2017, 2018, and 2019. Strata 4 was repeated from 2016. Stratum 8 was in a new location in 2020. Transects 1 and 6 were relocated because the previous locations were no longer within the correct strata. Transect 2 was repeated from 2016. Transects 4 and 5 were relocated to a more representative location and Transect 8 was new.

Table 3-7. Pond 101 East (East) (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	0.4%
2	38%
4	25%
5	3%
6	0.5%
8	34%

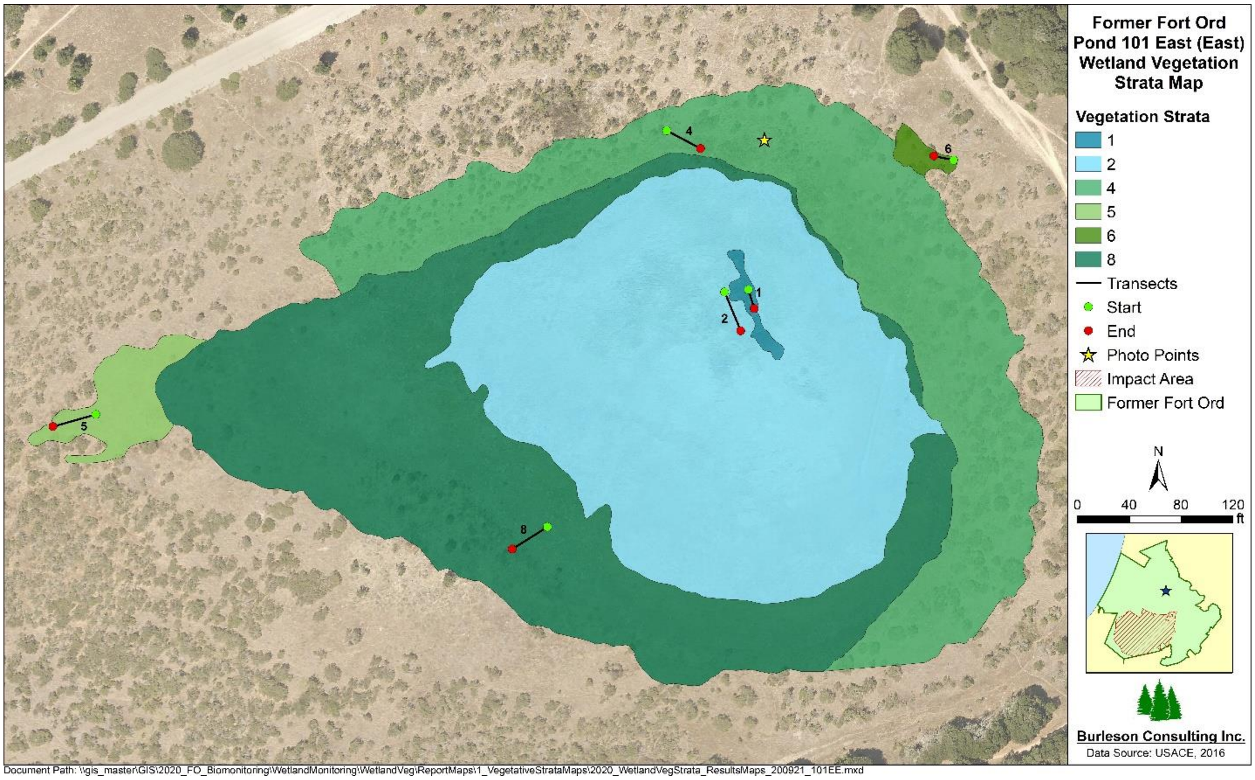


Figure 3-2. Pond 101 East (East) (Reference) Vegetation Strata and Transects on Former Fort Ord, 2020

Eighty-six plant species were observed within the vernal pool basin boundary. Of these species, 51 were native and 35 were non-native. Five species were OBL wetland plants, 31 were FACW or FAC, 20 were FACU or UPL, and 30 were not listed. Appendix E 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 5-m transect placed in stratum 1. Eight plant species were observed along the transect. Of these species, four were native and four were non-native. Alkali mallow was the dominant species, accounting for approximately 48% cover (see Appendix B Table B-2). Thatch was abundant, accounting for approximately 36%. Pale spikerush contributed approximately 7% cover while, curly dock and flowering quillwort each contributed approximately 1% cover. Other species included grass poly, rabbitfoot grass, western yellowcress (*Rorippa curvisiliqua*), and sheep sorrel. Bare ground accounted for approximately 7%.

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, two were native and three were non-native. Pale spikerush was the dominant species, accounting for approximately 56% cover (see Appendix B Table B-2). Thatch was abundant, accounting for approximately 33%. Curly dock contributed approximately 6% cover. Alkali mallow contributed 2% cover. Pacific bent grass and rabbitfoot grass were also present. Bare ground accounted for approximately 2%.

Transect 4 at Pond 101 East (East) consisted of a 10-m transect placed in stratum 4. Ten plant species were observed along the transect. Of these species, five were native and five were non-native. Baltic rush was the dominant species, accounting for approximately 49% cover (see Appendix B Table B-2).

Thatch was abundant, accounting for approximately 32%. Other species included tall annual willowherb (*Epilobium ciliatum*), rattail sixweeks grass (*Festuca myuros*), rabbitfoot grass, and spring vetch (*Vicia sativa* ssp. *sativa*). Bare ground accounted for approximately 2%.

Transect 5 at Pond 101 East (East) consisted of a 10-m transect placed in stratum 5. Twenty-four plant species were observed along the transect. Of these species, ten were native and 14 were non-native. Smooth cat's ear and Spanish lotus (*Acmispon americanus* var. *americanus*) were the dominant species, each accounting for approximately 12% cover (see Appendix B Table B-2). Bare ground and thatch were fairly abundant, accounting for approximately 21% and 18%, respectively. Sheep sorrel (*Rumex* acetosella) and bugle hedge nettle contributed approximately 8% and 6% cover, respectively. Annual quaking grass, Chinese pusley (*Heliotropium curassavicum* var. *oculatum*), gumweed (*Madia gracilis*), cottonbatting plant (*Pseudognaphalium stramineum*), and common vetch (*Vicia sativa* ssp. *nigra*) contributed cover ranging from 2% to 4%. Pacific bent grass, long-beaked filaree (*Erodium botrys*), horseweed, brome fescue (*Festuca bromoides*), rattail sixweeks grass, Baltic rush, weedy cudweed, common sow thistle, pin point clover (*Trifolium gracilentum*), small head clover (*Trifolium microcephalum*), and spring vetch each contributed approximately 1% cover. Other species included slender wild oat, coyote brush (*Baccharis pilularis*), scarlet pimpernel (*Lysimachia arvensis*), and rabbitfoot grass.

Transect 6 at Pond 101 East (East) consisted of a 10-m transect placed in stratum 6. Twelve plant species were observed along the transect. Of these species, four were native and eight were non-native. Clustered field sedge (*Carex praegracilis*) was the dominant species, accounting for approximately 42% cover (see Appendix B Table B-2). Bare ground and thatch were abundant, accounting for approximately, 26% and 25% cover, respectively. Sheep sorrel contributed approximately 4% while rattail fescue and common sow thistle each contributed approximately 1% cover. Other species included ripgut grass (*Bromus diandrus*), bull thistle (*Cirsium vulgare*), horseweed, cut-leaved geranium (*Geranium dissectum*), Baltic rush, cottonbatting plant, common vetch, and spring vetch.

Transect 8 at Pond 101 East (East) consisted of a 10-m transect placed in stratum 6. Twenty-five plant species were observed along the transect. Of these species, 14 were native and 11 were non-native. Brown-headed rush, Pacific bent grass, and bugle hedge nettle were the dominant species, accounting for approximately 16%, 16%, and 11% cover, respectively (see Appendix B Table B-2). Thatch was abundant, accounting for approximately 25% cover. Cut-leaved geranium and rabbitfoot grass contributed approximately 6% and 5% cover, respectively. Coast tarweed (*Madia sativa*), curly dock, variegated clover (*Trifolium variegatum*), common vetch, and spring vetch contributed cover ranging from 2% to 4%. Other species included Spanish lotus, large-flowered agoseris, annual quaking grass, tall annual willowherb, long-beaked filaree, horseweed, rattail sixweeks grass, Chinese pusley, smooth cat's-ear, alkali mallow, Lemmon's canary grass, common sow thistle, bearded clover (*Trifolium barbigerum*), pin point clover, and small head clover. Bare ground accounted for approximately 4%.

3.2.2 Wildlife Monitoring

Pond 101 East (East) was surveyed for CTS and fairy shrimp on April 17, 2020. California tiger salamanders were not detected during the April survey event; however, fairy shrimp were present in moderate abundance. No surveys were conducted in March or May due to insufficient vernal pool depth. Table 3-8 and Table 3-9 provide results of the CTS and fairy shrimp surveys completed in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-8. 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)	4/17/2020	0	-	-	-	-	-	-	-	3 hrs

Table 3-9. Pond 101 East (East) (Reference) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
4/17/2020	Moderate (15)

3.3 Pond 997

Pond 997 is a reference vernal pool that was monitored as a control for comparison to the remediated vernal pools. In 2020, Pond 997 was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.3.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 997 on June 2, 2020. These monitoring data represent reference conditions. Pond 997 was dry by April 28 (Chenega, 2021). Biologists identified four wetland strata at the vernal pool (see Table 3-10 and Figure 3-3). Appendix B provides the species cover results within each stratum. Strata 1, 2, and 3 were repeated from 2017, 2018, and 2019, whereas stratum 5 was repeated from 2018 and 2019. Transects 1 and 3 were repeated from 2017, 2018, and 2019. Transect 5 was relocated because the previous location was no longer within the correct stratum. Stratum 2 consisted of CCG and no transects were placed in this stratum. Figure 3-4 illustrates the extent and density of the CCG population at Pond 997.

Table 3-10. Pond 997 (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	6%
2 (CCG)	4%
3	78%
5	12%

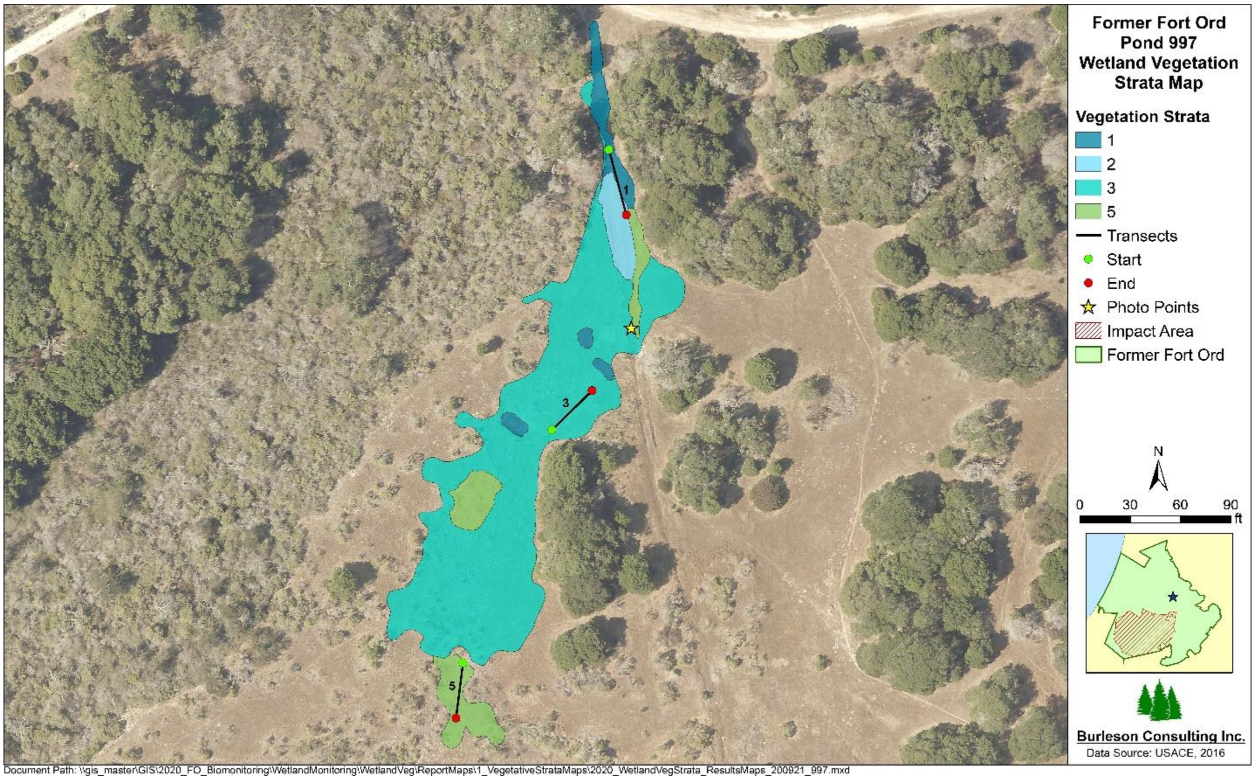


Figure 3-3. Pond 997 (Reference) Vegetation Strata and Transects on Former Fort Ord, 2020

Eighty-two plant species were observed within the vernal pool basin boundary. Of these species, 56 were native and 26 were non-native. Eleven species were OBL wetland plants, 25 were FACW or FAC, 14 were FACU or UPL, and 32 were not listed. Appendix E 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. Eighteen plant species were observed along the transect. Of these species, 13 were native and five were non-native. Coyote thistle (*Eryngium armatum*) and round woolly-marbles (*Psilocarphus chilensis*) were the dominant species, accounting for approximately 29% and 10% cover, respectively (see Appendix B Table B-3). Thatch and bare ground were fairly abundant, accounting for approximately 24% and 14%, respectively. Rabbitfoot grass contributed approximately 8%, while needle spikerush (*Eleocharis acicularis* var. *acicularis*) pale spikerush, common toad rush (*Juncus bufonius* var. *bufonius*), grass poly, chaffweed (*Lysimachia minima*), Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*), and cut-leaved plantain (*Plantago coronopus*) contributed cover ranging from 1% to 5%. Other species included annual quaking grass, aquatic pygmy-weed (*Crassula aquatica*), California waterwort (*Elatine californica*), smooth cat's-ear, Howell's quillwort (*Isoetes howellii*), round-fruited toad rush (*Juncus bufonius* var. *occidentalis*), brown-headed rush, and Contra Costa goldfields.

Stratum 2 consisted of CCG. Figure 3-4 illustrates the extent and density of the population at Pond 997. No transects were placed in stratum 2 to avoid disturbing the population.

Transect 3 at Pond 997 consisted of a 10-m transect placed in stratum 3. Thirty-two plant species were observed along the transect. Of these species, 17 were native and 14 were non-native, one species was unidentified. California oat grass (*Danthonia* californica) was the dominant species, accounting for approximately 24% cover (see Appendix B Table B-3). Thatch and bare ground were fairly abundant, each accounting for approximately 11%. Rattlesnake grass (*Briza maxima*), annual quaking grass, Johnny-Nip (*Castilleja ambigua* ssp. *ambigua*), coyote thistle, smooth cat's ear, gumweed, coast tarweed, cut-leaved geranium, and sheep sorrel contributed cover ranging from 3% to 6%. Hill lotus (*Acmispon parviflorus*), silvery hair-grass (*Aira caryophyllea*), coastal tarweed (*Deinandra corymbosa*), long-beaked filaree, brome fescue, rattail sixweeks grass, cut-leaved geranium, low bulrush (*Isolepis cernua*), common toad rush, scarlet pimpernel, grass poly, chaffweed, and coast pretty face (*Triteleia hyacinthina)* contributed cover ranging from 1% to 2%. Other species included dwarf brodiaea (*Brodiaea terrestris* ssp. *terrestris*), unknown grass, rough cat's-ear, keeled bulrush (*Isolepis carinata*), brown-headed rush, marsh microseris (*Microseris paludosa*), rabbitfoot grass, western blue-eyed grass (*Sisyrinchium bellum*), and Davy's centuary (*Zeltnera davyi*).

Transect 5 at Pond 997 consisted of a 10-m transect placed in stratum 5. Fourteen plant species were observed along the transect. Of these species, ten were native and 4 were non-native. Brown-headed rush was the dominant species, accounting for approximately 56% cover (see Appendix B Table B-3). Thatch was abundant, accounting for approximately 22%. Rattlesnake grass, California oat grass, coyote thistle, and grass poly contributed cover ranging from 2% to 6%. Other species included coyote brush (*Baccharis pilularis*), annual quaking grass, dwarf brodiaea, Johnny-Nip, cut-leaved geranium, common toad rush, chaffweed, coast tarweed, and Hickman's popcornflower. Bare ground accounted for 6%.

3.3.1.1 *Contra Costa Goldfields*

Contra Costa goldfields at Pond 997 were mapped on May 13, 2020: they occupied 0.02 acre, with a density of 10% cover. Figure 3-4 illustrates the extent of the CCG population at Pond 997.

Document Path: \\gis_master\GIS\2020_FO_Biomonitoring\WetlandMonitoring\WetlandVeg\ReportMaps\2_ContraCostaGoldfields\2020_WetlandVeg_CCG_200918_997.mxd

Figure 3-4. Contra Costa Goldfields Populations at Pond 997 (Reference), 2020

3.3.2 Wildlife Monitoring

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

3.4 Pond 101 East (West)

Pond 101 East (West)[1], a post-mastication remediation vernal pool, was in year 2 of monitoring in 2020. Pond 101 East (West) was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021). Prior to 2019, Pond 101 East (West) was a reference vernal pool.

3.4.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 101 East (West) on June 8, June 26, and July 14, 2020. These monitoring data represent year 2 post-mastication conditions. Pond 101 East (West) was dry by May 26 (Chenega, 2021). Biologists identified six strata at the vernal pool (see Table 3-11 and Figure 3-5). Appendix B provides the species cover results within each stratum. Strata 1, 2, 4, and 5 were repeated from 2016, 2017, 2018, and 2019. Stratum 6 was repeated from 2017, 2018, and 2019. Stratum 8 was repeated from 2019. Transects 1 and 5 were relocated to a more representative vegetative composition. Transects 2, 4, and 6 were relocated because the previous locations were no longer within the correct strata. Transect 8 was repeated from 2019.

Table 3-11. Pond 101 East (West) (Year 2 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	3%
2	10%
4	4%
5	44%
6	12%
8	4%
9	25%

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

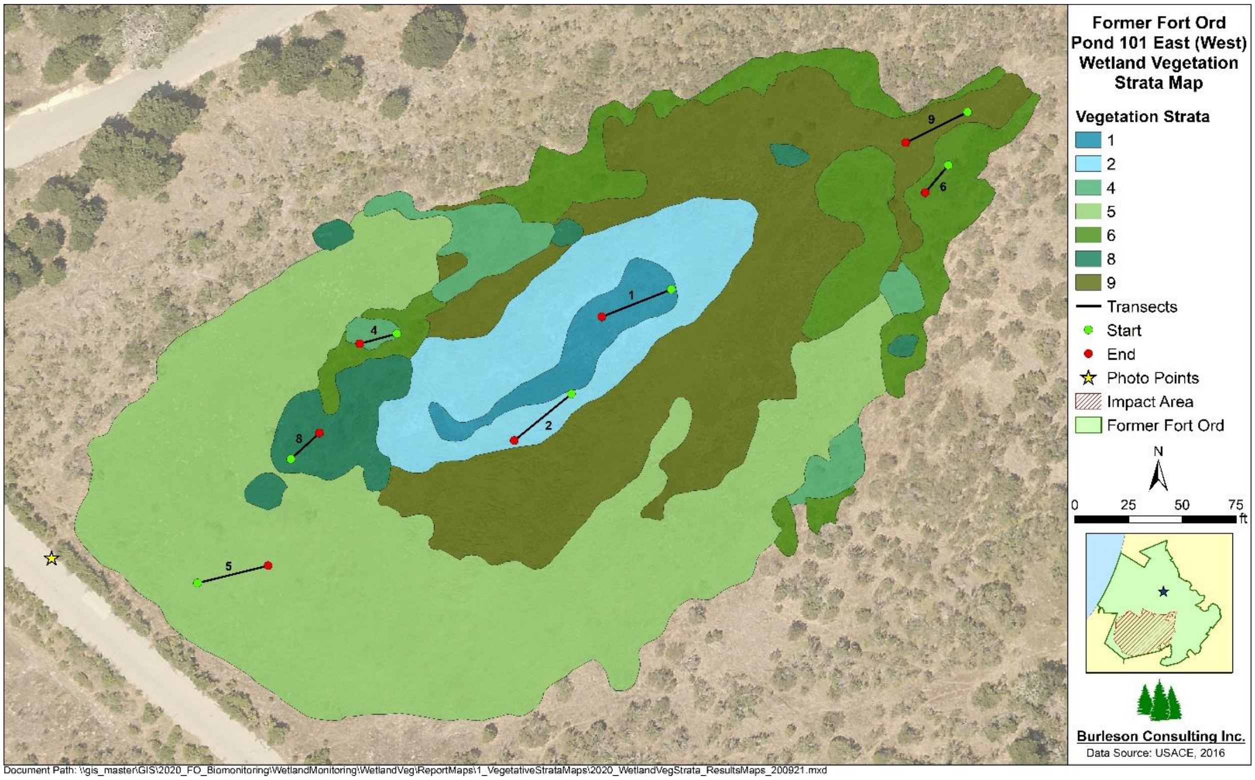


Figure 3-5. Pond 101 East (West) (Year 2 Post-Mastication) Vegetation Strata and Transects on Former Fort Ord, 2020

Seventy-five plant species were observed within the vernal pool basin boundary. Of these species, 41 were native and 34 were non-native. Nine species were OBL wetland plants, 31 were FACW or FAC, 15 were FACU or UPL, and 20 were not listed. Appendix E 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. Ten plant species were observed along the transect. Of these species, seven were native and three were non-native. Pale spikerush and alkali mallow were the dominant species, accounting for approximately 17% and 12% cover, respectively (see Appendix B Table B-4). Thatch was abundant, accounting for approximately 59%. Pacific foxtail (*Alopecurus saccatus*), lowland cudweed (*Gnaphalium palustre*), Chinese pusley, rabbitfoot grass, western yellowcress, and bracted verbena (*Verbena bracteata*), contributed cover ranging from approximately 1% to 3%. Other species included grass poly and lady's thumb (*Persicaria maculosa*). Bare ground accounted for approximately 3%.

Transect 2 at Pond 101 East (West) consisted of a 10-m transect placed in stratum 2. Four plant species were observed along the transect, all of which were native. Pale spikerush was the dominant species, accounting for approximately 43% cover (see Appendix B Table B-4). Thatch was abundant, accounting for approximately 54% cover. Smooth goldfields (*Lasthenia glaberrima*), alkali mallow, and Lemmon's canary grass contributed approximately 1% cover or less. Bare ground accounted for approximately 2% cover.

Transect 4 at Pond 101 East (West) consisted of a 10-m transect placed in stratum 4. Fifteen plant species were observed along the transect. Of these species, seven were native and eight were non-native. Coast tarweed and gumweed were the dominant species, accounting for approximately 31% and 16% cover, respectively (see Appendix B Table B-4). Thatch was abundant and accounted for approximately 28% cover. Pale spikerush, cut-leaved geranium, Chinese pusley, brown-headed rush, and sheep sorrel contributed cover ranging from 2% to 5%. Spanish lotus, annual quaking grass, scarlet pimpernel, cottonbatting plant, curly dock, and spring vetch each contributed approximately 1% cover. Other species included Italian rye grass (*Festuca perennis*) and weedy cudweed. Bare ground accounted for approximately 2%.

Transect 5 at Pond 101 East (West) consisted of a 10-m transect placed in stratum 5. Eleven plant species were observed along the transect. Of these species, four were native and seven were non-native. Italian rye grass was the dominant species, accounting for approximately 43% cover (see Appendix B Table B-4). Brome fescue contributed approximately 11% cover. Thatch was abundant, accounting for approximately 23% cover. Alkali mallow and pale spikerush contributed approximately 8% and 7% cover, respectively, while ripgut brome, annual quaking grass, salt grass, coyote thistle, cut-leaved geranium, smooth cat's-ear, and curly dock each contributed 1% cover or less. Bare ground accounted for approximately 4% cover.

Transect 6 at Pond 101 East (West) consisted of a 5-m transect placed in stratum 6. Nineteen plant species were observed along the transect. Of these species, six were native and 13 were non-native. Brown-headed rush was the dominant species, accounting for approximately 28% cover (see Appendix B Table B-4). Thatch was abundant, accounting for approximately 46% cover. Pacific bent grass, cut-leaved geranium, Baltic rush, coast tarweed, and common sow thistle contributed cover ranging from 2% to 4%. Other species included Spanish lotus, coyote brush, annual quaking grass, rattail sixweeks grass, Italian rye grass, smooth cat's-ear, rabbitfoot grass, cottonbatting plant, sheep sorrel, curly dock, cutleaf burnweed, prickly sow thistle (*Sonchus asper*), and common vetch. Bare ground accounted for approximately 4% cover.

Transect 8 at Pond 101 East (West) consisted of a 5-m transect placed in stratum 8. Twelve plant species were observed along the transect. Of these species, six were native and six were non-native. Western goldenrod (*Euthamia occidentalis*) and rabbitfoot grass were the dominant species, accounting for approximately 26% and 9% cover, respectively (see Appendix B Table B-4). Thatch was abundant, accounting for approximately 47%. Cut-leaved geranium and brown-headed rush each contributed approximately 2% cover. Annual quaking grass, needle spikerush, Italian rye grass, alkali mallow, Hickman's popcornflower, cottonbatting plant, sheep sorrel, and common sow thistle contributed 1% cover or less. Bare ground accounted for approximately 8% cover.

Transect 9 at Pond 101 East (West) consisted of a 10-m transect placed in stratum 9. Thirteen plant species were observed along the transect. Of these species, three were native and ten were non-native. Pacific bent grass was the dominant species, accounting for approximately 29% cover (see Appendix B Table B-4). Thatch was abundant, accounting for approximately 31%. Curly dock, Chinese pusley, rabbitfoot grass, and pale spikerush, contributed 8%, 8%, 7%, and 6% cover, respectively. Cut-leaved geranium contributed approximately 4% cover while, annual quaking grass, brome fescue, Italian rye grass, smooth cat's-ear, Baltic rush, common sow thistle, and spring vetch contributed 1% cover or less. Bare ground accounted for 2% cover.

3.4.2 Wildlife Monitoring

Pond 101 East (West) was surveyed for CTS and fairy shrimp on April 17, and May 19, 2020. California tiger salamanders and fairy shrimp were not detected. No surveys were conducted in March due to insufficient depth. Table 3-12 and Table 3-13 provide results of the CTS and fairy shrimp surveys completed in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-12. Pond 101 East (West) (Year 2 Post-Mastication) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
101 East (West)	4/17/2020	0	-	-	-	-	-	-	-	3 hrs
	5/19/2020	0	-	-	-	-	-	-	-	18 mins

Table 3-13. Pond 101 East (West) (Year 2 Post-Mastication) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
4/17/2020	Not detected
5/19/2020	Not detected

3.5 Pond 41

Pond 41, a post-subsurface munitions remediation vernal pool, was in year 2 of monitoring in 2020. Pond 41 was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.5.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 41 on June 1, 2020. These monitoring data represent year 2 post-subsurface munitions remediation conditions. Pond 41 was dry by May 26 (Chenega, 2021). Biologists identified four strata at the vernal pool (see Table 3-14 and Figure 3-6). Appendix B provides the species cover results within each stratum. Strata 1, 2, and 3 were repeated from 2016 and 2019. Stratum 4 was repeated from 2019. Transects 1 and 2 were repeated from 2016 and 2019, whereas Transect 4 was repeated from 2019. Transect 3 was relocated because the previous location was no longer within the stratum.

Table 3-14. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	14%
2	59%
3	21%
4	6%
Upland	1%

Figure 3-6. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2020

Sixty plant species were observed within the vernal pool basin boundary. Of these species, 39 were native and 21 were non-native. Six species were OBL wetland plants, 26 were FACW or FAC, 12 were FACU or UPL, and 16 were not listed. Appendix E identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 41 consisted of a 10-m transect placed in stratum 1. Nine plant species were observed along the transect. Of these species, eight were native and one was non-native. Pale spikerush and rabbitfoot grass were the dominant species, accounting for approximately 45% and 9% cover, respectively (see Appendix B Table B-5). Thatch was abundant, accounting for approximately 32%. Needle spikerush and Lemmon's canary grass each contributed approximately 4% cover, while annual hair grass (*Deschampsia danthonioides*), smooth goldfields, and bugle hedge nettle contributed cover ranging from 1% to 2%. Other species included alkali mallow and Hickman's popcornflower. Bare ground accounted for approximately 2%.

Transect 2 at Pond 41 consisted of a 10-m transect placed in stratum 2. Twelve plant species were observed along the transect. Of these species, nine were native and three were non-native. Rabbitfoot grass and cut-leaved geranium were the dominant species, accounting for approximately 30% and 16% cover, respectively (see Appendix B Table B-5). Thatch was fairly abundant, accounting for approximately 22% cover. Needle spikerush contributed approximately 9% cover, while annual hair grass, pale spikerush, brown-headed rush, alkali mallow, Lemmon's canary grass, and bugle hedge nettle contributed cover ranging from 2% to 5%. Smooth goldfields, Hickman's popcornflower, and curly dock, each contributed approximately 1% cover.

Transect 3 at Pond 41 consisted of a 10-m transect placed in stratum 3. Twenty plant species were observed along the transect. Of these species, nine were native and 11 were non-native. Brown-headed rush was the dominant species, accounting for approximately 58% cover (see Appendix B Table B-5). Thatch was abundant, accounting for approximately 22%. Annual quaking grass, needle spikerush, brome fescue, purple cudweed (*Gamochaeta ustulata*), cut-leaved geranium, Baltic rush, scarlet pimpernel, coast tarweed, gumweed, rabbitfoot grass, curly dock, and common sow thistle contributed cover ranging from 1% to 3%. Other species included soft chess (*Bromus hordeaceus*), annual hair grass, long-beaked filaree, horseweed, smooth cat's-ear, alkali mallow, and sheep sorrel. Bare ground accounted for approximately 3%.

Transect 4 at Pond 41 consisted of a 10-m transect placed in stratum 4. Twenty-two plant species were observed along the transect. Of these species, 12 were native and ten were non-native. California oat grass and gumweed were the dominant species, accounting for approximately 25% and 12% cover, respectively (see Appendix B Table B-5). Thatch was abundant, accounting for approximately 31% cover. Silvery hair-grass, coyote brush, annual quaking grass, dwarf brodiaea, Johnny-Nip, coyote thistle, rattail sixweeks grass, purple cudweed, cut-leaved geranium, smooth cat's-ear, cut-leaved plantain, rabbitfoot grass, and bugle hedge nettle contributed cover ranging from 1% to 3%. Other species included soft chess, brome fescue, brown-headed rush, Pacific woodrush (*Luzula comosa*), scarlet pimpernel, chaffweed, and coast tarweed. Bare ground accounted for approximately 14%.

3.5.2 Wildlife Monitoring

Pond 41 was surveyed for CTS and fairy shrimp on April 16, 2020. California tiger salamanders were not detected at the April survey event; however, fairy shrimp were present in moderate abundance. No surveys were conducted in March or May due to insufficient vernal pool depth. Table 3-15 and Table 3-16 provide results of the CTS and fairy shrimp surveys completed in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-15. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
41	4/16/2020	0	-	-	-	-	-	-	-	2 hrs 15 mins

Table 3-16. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
4/16/2020	Moderate (15)

3.6 Pond 3 North

Pond 3 North was in year 3 of monitoring for post-burn and year 2 for post-subsurface munitions remediation in 2020. Pond 3 North was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.6.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 3 North on June 5, June 18, and June 25, 2020. These monitoring data represent year 3 post-burn and year 2 post-subsurface munitions remediation conditions. Pond 3 North was dry by the June 25 monitoring event. Biologists identified three strata at the vernal pool (see Table 3-17 and Figure 3-7). Appendix B provides the species cover results within each stratum. Stratum 1 was repeated from 2015 and 2018. Strata 2, 3, and 4 were repeated from 2015, 2018, and 2019. Transect 1 was repeated from 2015 and 2018. Transect 2 was relocated because the previous location was no longer within the stratum. Transect 3 was repeated from 2018. Stratum 4 consisted of CCG and no transects were placed in this stratum. Figure 3-8 illustrates the extent and density of the goldfield population at Pond 3 North.

Table 3-17. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	11%
2	14%
3	37%
4 (CCG)	38%

Document Path: \\gis_master\GIS\2020_FO_Biomonitoring\WetlandMonitoring\WetlandVeg\ReportMaps\1_VegetativeStrataMaps\2020_WetlandVegStrata_ResultsMaps_200921.mxd

Figure 3-7. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2020

Seventy-four plant species were observed within the vernal pool basin boundary. Of these species, 46 were native and 28 were non-native. Eleven species were OBL wetland plants, 27 were FACW or FAC, 13 were FACU or UPL, and 23 were not listed. Appendix E 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. Four plant species were observed along the transect. Of these species, three were native and one was non-native. Pale spikerush was the dominant species, accounting for approximately 62% cover (see Appendix B Table B-6). Thatch and bare ground were fairly abundant, accounting for approximately 22% and 15%, respectively. Needle spikerush, smooth goldfields, and rabbitfoot grass contributed approximately 1% cover or less.

Transect 2 at Pond 3 North consisted of a 10-m transect placed in stratum 2. Seventeen plant species were observed along the transect. Of these species, eleven were native and six were non-native. Pale spikerush was the dominant species, accounting for approximately 13% cover (see Appendix B Table B-6). Thatch and bare ground were abundant, accounting for approximately 28% and 23%, respectively. Rabbitfoot grass, coyote thistle, and Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*) contributed approximately 8%, 7%, and 6% cover, respectively. Needle spikerush, common toad rush, grass poly, chaffweed, Hickman's popcornflower, cut-leaved plantain, Sacramento mesa mint (*Pogogyne zizyphoroides*), round woolly-marbles, and Davy's cenutuary contributed cover ranging from 1% to 4%. Other species included brass buttons (*Cotula coronopifolia*), annual hair grass, Italian rye grass, and Contra Costa goldfields.

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, 15 were native, 14 were non-native, and one was unidentified. Italian rye grass and California oat grass were the dominant species each accounting for approximately 16% cover (see Appendix B Table B-6). Bare ground and thatch were abundant, accounting for approximately 21% and 19% cover, respectively. Coyote thistle contributed 9% cover, while soft chess, Johnny-Nip, scarlet pimpernel, marsh microseris, and cut-leaved plantain contributed cover ranging from 2% to 3%. Hill lotus, silvery hair-grass, coyote brush, annual quaking grass, rattail sixweeks grass, brown-headed rush, grass poly, narrow-leaved clover (*Trifolium angustifolium*), and little hop clover (*Trifolium dubium*) each contributed approximately 1% cover. Other species included pink star-tulip (*Calochortus uniflorus*), coastal tarweed, horseweed, smooth car's-ear, common toad rush, narrowleaf cottonrose (*Logfia gallica*), chaffweed, Madia sp., gumweed, California plantain (*Plantago erecta*), rabbitfoot grass, common sow thistle, and Davy's centuary.

Stratum 4 consisted of CCG. Figure 3-8 illustrates the extent and density of the populations at 3 North. No transects were placed in stratum 4 to avoid disturbing the population.

3.6.1.1 *Contra Costa Goldfields*

Contra Costa goldfields at Pond 3 North were mapped on May 13, May 22, and May 27, 2020; they occupied 0.16 acre, with a density range of 5-45% cover. Figure 3-8 illustrates the extent of the CCG population at Pond 3 North.

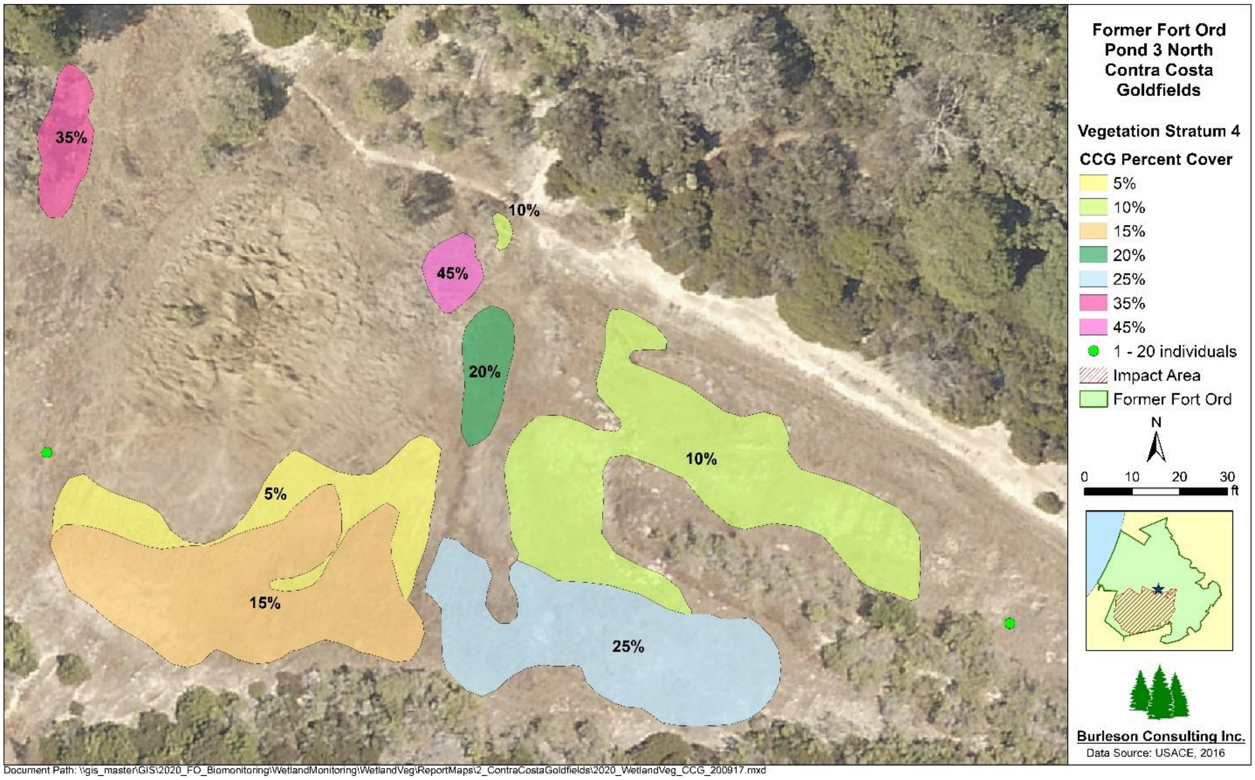


Figure 3-8. Contra Costa Goldfields Populations at Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation), 2020

3.6.2 Wildlife Monitoring

Pond 3 North was surveyed for CTS and fairy shrimp March 17, April 16, and May 20, 2020. California tiger salamanders were not detected; however, fairy shrimp were present in April in low abundance. Table 3-18 and Table 3-19 provide results of the CTS and fairy shrimp surveys conducted in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-18. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
3 North	3/17/2020	0	-	-	-	-	-	-	-	11 mins
	4/16/2020	0	-	-	-	-	-	-	-	30 mins
	5/20/2020	0	-	-	-	-	-	-	-	8 mins

Table 3-19. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/17/2020	Not detected
4/16/2020	Low (6)
5/20/2020	Not detected

3.7 Pond 3 South

Pond 3 South was in year 3 of monitoring for post-burn and year 2 for post-subsurface munitions remediation in 2020. Pond 3 North was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.7.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 3 South on May 26, 2020. These monitoring data represent year 3 post-burn and year 2 post-subsurface munitions remediation conditions. Pond 3 South was dry by the May 26 monitoring event. Biologists identified five strata at the vernal pool (see Table 3-20 and Figure 3-9). Appendix B provides the species cover results within each stratum. Strata 1 through 4 were repeated from 2016, 2018, and 2019. Transect 1 was repeated from 2016, 2018, and 2019, whereas Transects 2 through 4 were repeated from 2019. Stratum 5 consisted of CCG and no transects were placed in this stratum. Figure 3-10 illustrates the extent and density of the CCG population at Pond 3 South.

Table 3-20. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	17%
2	22%
3	47%
4	10%
5 (CCG)	0.1%
Upland	3%

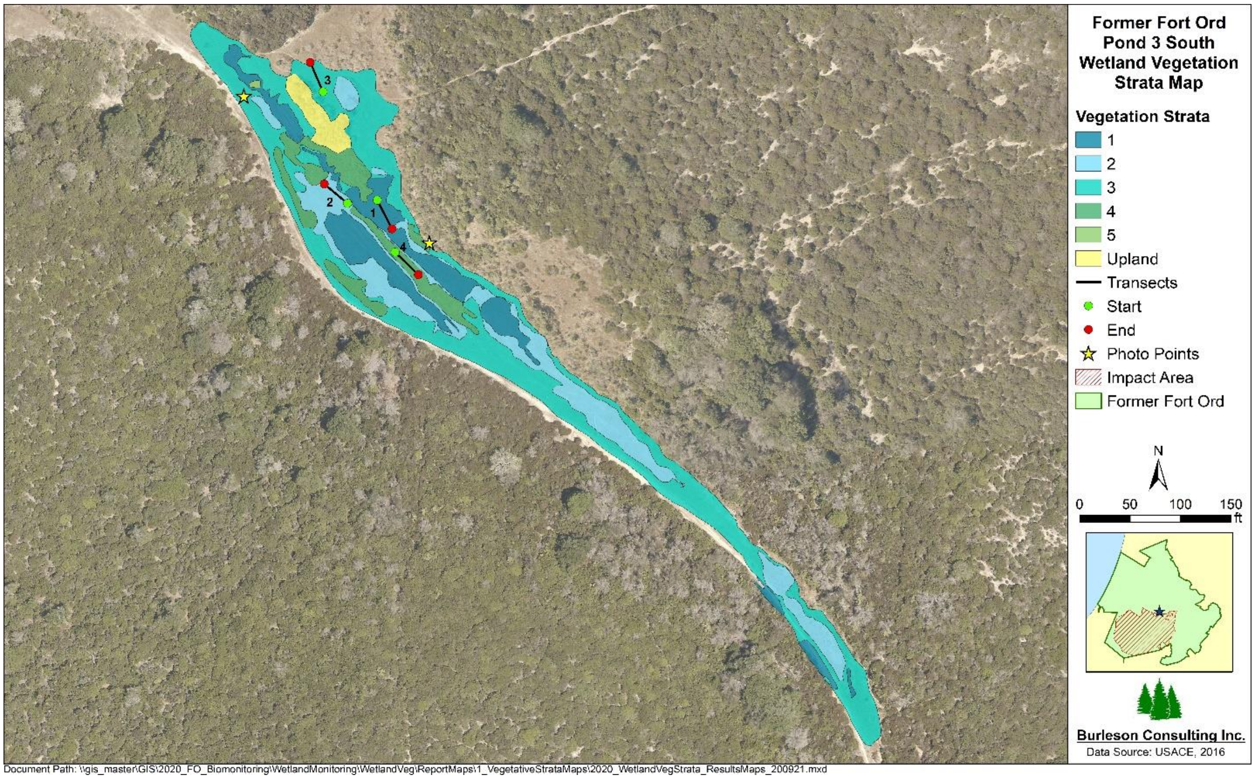


Figure 3-9. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2020

Ninety-two plant species were observed within the vernal pool basin boundary. Of these species, 60 were native and 32 were non-native. Nine species were OBL wetland plants, 33 were FACW or FAC, 15 were FACU or UPL, and 35 were not listed. Appendix E 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. Thirteen plant species were observed along the transect. Of these species, nine were native and four were non-native. Pale spikerush was the dominant species accounting for approximately 42% cover (see Appendix B Table B-7). Thatch was abundant, accounting for approximately 26%. Needle spikerush, coyote thistle, and cut-leaved plaintain contributed cover ranging from 3% to 7% cover. Brass buttons, brown-headed rush, smooth goldfields, grass poly, alkali mallow, Hickman's popcornflower, and rabbitfoot grass contributed cover ranging from 1% to 2%. Other species included aquatic pygmy-weed and annual hair grass. Bare ground accounted for 10%.

Transect 2 at Pond 3 South consisted of a 10-m transect placed in stratum 2. Thirty plant species were observed along the transect. Of these species, 18 were native and 12 were non-native. Brown-headed rush was the dominant species, accounting for approximately 50% cover (see Appendix B Table B-7). Thatch and bare ground were present, accounting for approximately 16% and 7% cover, respectively. Dwarf brodiaea, needle spikerush, Italian rye grass, cut-leaved geranium, grass poly, cut-leaved plantain, and rabbitfoot grass, contributed cover ranging from 2% to 4%. Other species included silvery hair-grass, annual quaking grass, Johnny-Nip, California oat grass, annual hair grass, coyote thistle, brome fescue, rattail sixweeks grass, keeled bulrush, low bulrush, common toad rush, round-fruited toad rush, narrowleaf cottonrose, scarlet pimpernel, chaffweed, alkali mallow, marsh microseris, round woolly-marbles, California buttercup (*Ranunculus californicus*), small-flower catchfly (*Silene gallica*), variegated clover, and Davy's centuary.

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, 17 were native and 15 were non-native. California oat grass and grass poly were the dominant species, accounting for approximately 18% and 12% cover, respectively (see Appendix B Table B-7). Bare ground and thatch were abundant, accounting for approximately 22% and 21% cover, respectively. Common yarrow (*Achillea millefolium*), silvery hair-grass, annual quaking grass, dwarf brodiaea, Johnny-Nip, coyote thistle, long-beaked filaree, brome fescue, Italian rye grass, cut-leaved geranium, smooth cat's-ear, rough cat's ear, brown-headed rush, narrowleaf cottonrose, scarlet pimpernel, chaffweed, coast tarweed, cut-leaved plantain, California plantain, rabbitfoot grass, checkerbloom (*Sidalcea malviflora*), common sow thistle, and Davy's centuary contributed cover ranging from 1% to 2%. Other species included pink star-tulip, horseweed, nit grass (*Gastridium phleoides*), gumweed, marsh microseris, sun cups (*Taraxia ovata*), and bearded clover.

Transect 4 at Pond 3 South consisted of a 10-m transect placed in stratum 4. Twenty-three plant species were observed along the transect. Of these species, 13 were native and 10 were non-native. Italian rye grass and pale spikerush were the dominant species, accounting for approximately 41% and 9% cover, respectively (see Appendix B Table B-7). Thatch was fairly abundant, accounting for 17% cover. Soft chess, annual quaking grass, dwarf brodiaea, cut-leaved geranium, brown-headed rush, alkali mallow, common sow thistle, and little hop clover contributed cover ranging from 2% to 4%. Ripgut grass, pink star-tulip, horseweed, purple cudweed, smooth cat's-ear, scarlet pimpernel, grass poly, marsh microseris, cottonbatting plant, California buttercup, small-flower catchfly, bearded clover, and Davy's centuary each contributed 1% cover or less.

Stratum 5 consisted of CCG. Figure 3-10 illustrates the extent and density of the populations at 3 South. No transects were placed in stratum 5 to avoid disturbing the population.

3.7.1.1 *Contra Costa Goldfields*

Contra Costa goldfields at Pond 3 South were mapped on May 13, 2020: they occupied 0.002 acre, with a density of 5% cover. Figure 3-10 illustrates the extent of the CCG population at Pond 3 South.

Document Path: \\gis_master\GIS\2020_FO_Biomonitoring\WetlandMonitoring\WetlandVeg\ReportMaps\2_ContraCostaGoldfields\2020_WetlandVeg_CCG_200921_3S.mxd

Figure 3-10. Contra Costa Goldfield Occurrence at Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation), 2020

3.7.2 Wildlife Monitoring

Pond 3 South was surveyed for CTS and fairy shrimp on April 16, 2020. California tiger salamanders were not detected during the April survey event; however, fairy shrimp were present in moderate abundance. No surveys were conducted in March or May due to insufficient vernal pool depth. Table 3-21 and Table 3-22 provide results of the CTS and fairy shrimp surveys completed in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-21. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
3 South	4/16/2020	0	-	-	-	-	-	-	-	45 mins

Table 3-22. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
4/16/2020	Moderate (13)

3.8 Pond 39

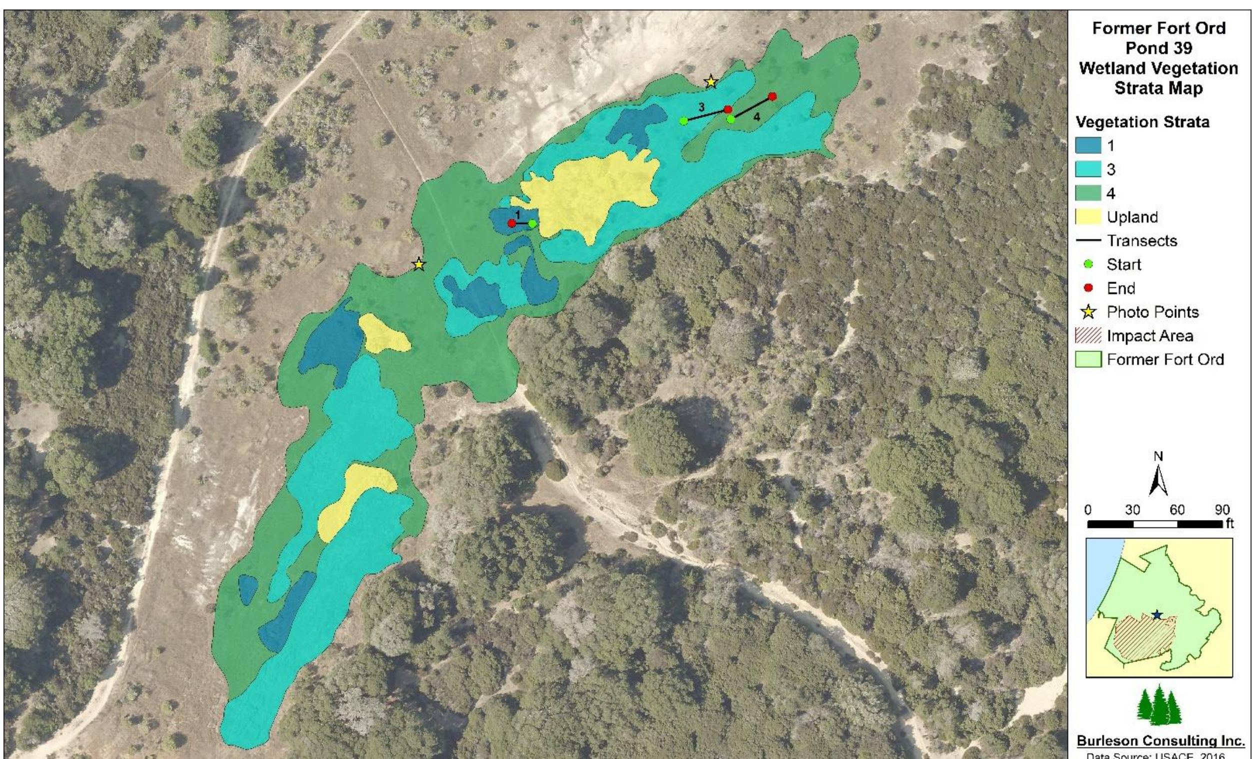
Pond 39 was in year 3 of monitoring for post-burn and year 2 for post-subsurface munitions remediation in 2020. Pond 39 was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.8.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 39 on May 22 and June 3, 2020. These monitoring data represent year 3 post-burn and year 2 post-subsurface munitions remediation conditions. Pond 39 was dry by May 26 (Chenega, 2021). Biologists identified three strata at the vernal pool (see Table 3-23 and Figure 3-11). Appendix B provides the species cover results within each stratum. Strata 1 and 3 were repeated from 2016, 2018, and 2019. Stratum 4 was repeated from 2018 and 2019. Transect 1 was repeated from 2016 and 2018. Transect 3 was repeated from 2018 and 2019. Transect 4 was repeated from 2018.

Table 3-23. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	9%
3	38%
4	44%
Upland	9%



Document Path: \\gis_master\GIS\2020_FO_Biomonitoring\WetlandMonitoring\WetlandVeg\ReportMaps\1_VegetativeStrataMaps\2020_WetlandVegStrata_ResultsMaps_200921.mxd

Figure 3-11. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2020

Eighty-five plant species were observed within the vernal pool basin boundary. Of these species, 53 were native and 32 were non-native. Seven species were OBL wetland plants, 30 were FACW or FAC, 15 were FACU or UPL, and 33 were not listed. Appendix E 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. Two native plant species were observed along the transect. Pale spikerush accounting for approximately 73% and needle spikerush accounted for approximately 2% cover (see Appendix B Table B-8). Thatch was fairly abundant, accounting for approximately 20%. Bare ground accounted for approximately 5% cover.

Transect 3 at Pond 39 consisted of a 10-m transect placed in stratum 3. Eighteen plant species were observed along the transect. Of these species, 6 were native and 12 were non-native. Italian rye grass was the dominant species, accounting for approximately 38% cover (see Appendix B Table B-8). Thatch was fairly abundant, accounting for approximately 19%. California oat grass contributed approximately 13% cover, while western rush (*Juncus occidentalis*) contributed approximately 8%. Salt grass, rattail sixweeks grass, cut-leaved geranium, and cut-leaved plantain contributed cover ranging from 3% to 5%. Other species included silvery hair-grass, slender wild oat (*Avena barbata*), ripgut grass, soft chess, annual quaking grass, dwarf brodiaea, long-beaked filaree, gumweed, little hop clover, common vetch, and Davy's centuary. Bare ground accounted for approximately 2%.

Transect 4 at Pond 39 consisted of a 10-m transect placed in stratum 4. Twenty-six plant species were observed along the transect. Of these species, 7 were native and 19 were non-native. California oat grass and cut-leaved plantain were the dominant species, accounting for approximately 27% and 13% cover, respectively (see Appendix B Table B-8). Thatch was abundant, accounting for approximately 25%. Spanish lotus, hill lotus, silvery hair-grass, soft chess, annual quaking grass, long-beaked filaree, brome fescue, rattail sixweeks grass, cut-leaved geranium, smooth cat's ear, rough cat's-ear, gumweed, English plantain (*Plantago lanceolata)*, sun cups, narrow-leaved clover, and little hop clover contributed cover ranging from 1% to 5%. Other species included slender wild oat, ripgut grass, dense flower owl's clover (*Castilleja densiflora*), western rush, scarlet pimpernel, hairy vetch (*Vicia hirsuta)*, common vetch, and spring vetch. Bare ground was also present and accounted for approximately 8%.

3.8.2 Wildlife Monitoring

Pond 39 was surveyed for CTS and fairy shrimp on March 17 and April 16, 2020. California tiger salamanders were not detected; however, fairy shrimp were present in April in low abundance. No further surveys were conducted in May due to insufficient vernal pool depth. Table 3-24 and Table 3-25 provide results of the CTS and fairy shrimp surveys completed in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-24. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
39	3/17/2020	0	-	-	-	-	-	-	-	5 mins
	4/16/2020	0	-	-	-	-	-	-	-	17 mins

Table 3-25. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/17/2020	Not detected
4/16/2020	Low (5)

3.9 Pond 40 North

Pond 40 North, a post-burn vernal pool, was in year 3 of monitoring in 2020. Pond 40 North was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.9.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 40 North on June 16, 2020. These monitoring data represent year 3 post-burn conditions. Pond 40 North was dry by the June 16 monitoring event. Biologists identified three strata at the vernal pool (see Table 3-26 and Figure 3-12). Appendix B provides the species cover results within each stratum. Stratum 2 was repeated from 2015, 2018, and 2019, whereas stratum 3 was repeated from 2015 and 2019. Stratum 4 was repeated from 2018 and 2019. Transect 2 was repeated from 2015, 2018, and 2019. Transect 3 was relocated because the previous location was no longer within the correct stratum. Transect 4 was repeated from 2019.

Table 3-26. Pond 40 North (Year 3 Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
2	33%
3	41%
4	26%

Figure 3-12. Pond 40 North (Year 3 Post-Burn) Vegetation Strata and Transects on Former Fort Ord, 2020

Fifty-nine plant species were observed within the vernal pool basin boundary. Of these species, 31 were native and 28 were non-native. Four species were OBL wetland plants, 17 were FACW or FAC, 14 were FACU or UPL, and 24 were not listed. Appendix E 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. Three native plant species were observed along the transect. Pale spikerush was the dominant species, accounting for approximately 53% cover (see Appendix B Table B-9). Thatch and bare ground were abundant, accounting for approximately 26% and 20%, respectively. Purple cudweed and chaffweed contributed 1% cover or less.

Transect 3 at Pond 40 North consisted of a 5-m transect placed in stratum 3. Seven plant species were observed along the transect. Of these species, three were native and four were non-native. Coyote thistle and pale spikerush were the dominant species, accounting for approximately 22% and 13% cover, respectively (see Appendix B Table B-9). Thatch and bare ground were abundant, accounting for approximately 30% and 13%, respectively. Brown-headed rush and cut-leaved plantain each contributed approximately 9%, while Italian rye grass, rabbitfoot grass, and curly dock contributed cover ranging from 1% to 2%.

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, five were native and six were non-native. Brown-headed rush and cut-leaved plantain were the dominant species, accounting for approximately 33% and 15% cover, respectively (see Appendix B Table B-9). Thatch was abundant, accounting for approximately 36%.

Cut-leaved geranium contributed approximately 3% cover, while annual quaking grass, coastal tarweed, coyote thistle, grass poly, gumweed, rabbitfoot grass, curly dock, and small-flower catchfly contributed 1% cover or less. Bare ground accounted for approximately 7%.

3.9.2 Wildlife Monitoring

Pond 40 North was surveyed for CTS and fairy shrimp on April 16, and May 20, 2020. California tiger salamanders were not detected; however, fairy shrimp were present in April in moderate abundance. No surveys were conducted in March due to insufficient vernal pool depth. Table 3-27 and Table 3-28 provide results of the CTS and fairy shrimp surveys completed in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-27. Pond 40 North (Year 3 Post-Burn) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
40 North	4/16/2020	0	-	-	-	-	-	-	-	18 mins
	5/20/2020	0	-	-	-	-	-	-	-	10 mins

Table 3-28. Pond 40 North (Year 3 Post-Burn) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
4/16/2020	Moderate (36)
5/20/2020	Not detected

3.10 Pond 40 South

Pond 40 South was in year 3 of monitoring for post-burn and year 2 for post-subsurface munitions remediation in 2020. Pond 40 South was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.10.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 40 South on May 27, 2020. These monitoring data represent year 3 post-burn and year 2 post-subsurface munitions remediation conditions. Pond 40 South was dry by April 29 (Chenega, 2021). Biologists identified three strata at the vernal pool (see Table 3-29 and Figure 3-13). Appendix B provides the species cover results within each stratum. Strata 1 through 3 were repeated from 2016, 2018, and 2019. Transects 1 and 2 were repeated from 2016, 2018, and 2019. Transect 3 was repeated from 2016.

Table 3-29. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	6%
2	12%
3	82%

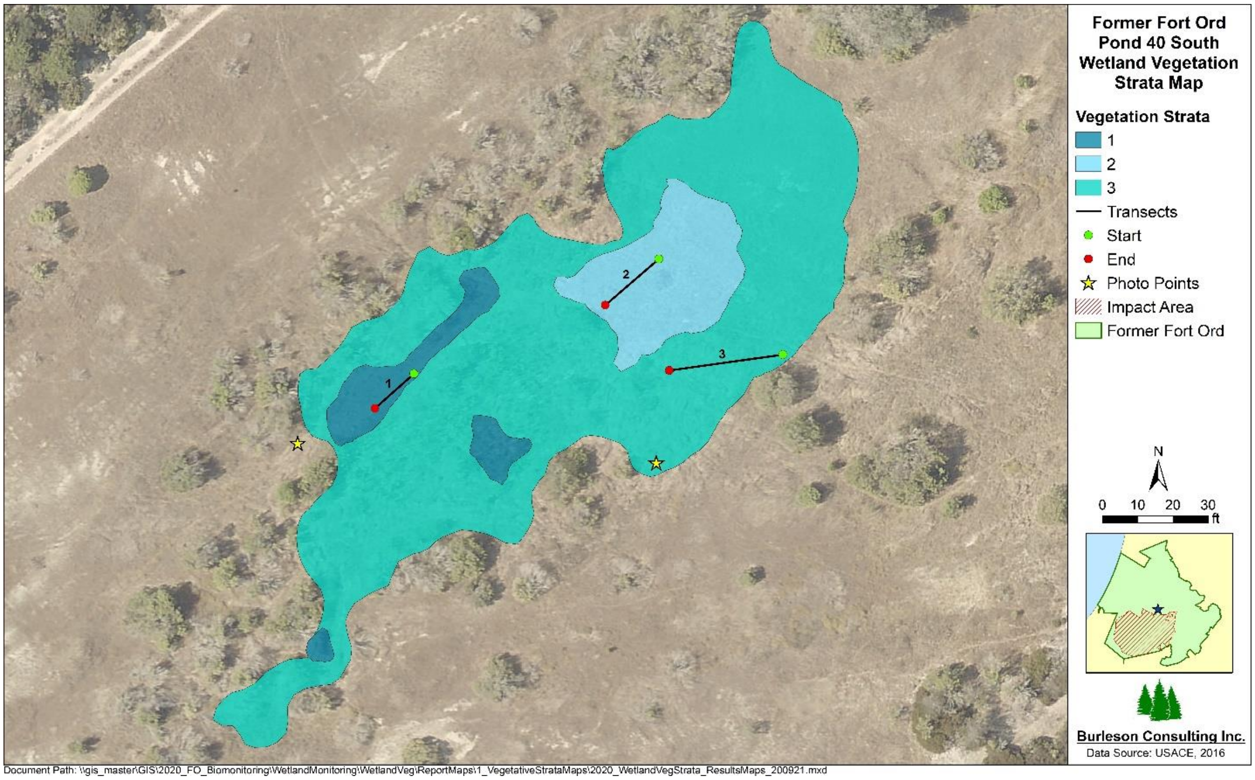


Figure 3-13. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2020

Sixty-six plant species were observed within the vernal pool basin boundary. Of these species, 36 were native and 30 were non-native. Five species were OBL wetland plants, 24 were FACW or FAC, 16 were FACU or UPL, and 21 were not listed. Appendix E identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 40 South consisted of a 5-m transect placed in stratum 1. Ten plant species were observed along the transect. Of these species, five were native and five were non-native. Hickman's popcornflower was the dominant species, accounting for approximately 50% cover (see Appendix B Table B-10). Thatch was abundant, accounting for approximately 20%. Needle spikerush contributed approximately 8% cover, while pale spikerush, cut-leaved plantain, and curly dock contributed cover ranging from 3% to 5%. Other species included Italian rye grass, brown-headed rush, grass poly, Lemmon's canary grass, and rabbitfoot grass. Bare ground accounted for approximately 5% 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 and 11 were non-native. Cut-leaved plantain, smooth cat's ear, and brown-headed rush were the dominant species, accounting for approximately 11%, 9%, and 7% cover, respectively (see Appendix B Table B-10). Thatch and bare ground were abundant, accounting for approximately 30% and 19%, respectively. Silvery hair-grass and narrow-leaved clover each contributed 6% cover. Soft chess, annual quaking grass, long-beaked filaree, sheep sorrel, and small-flower catchfly contributed cover ranging from 2% to 4%. Other species included brome fescue and little hop clover.

Transect 3 at Pond 40 South consisted of a 10-m transect placed in stratum 3. Fourteen plant species were observed along the transect. Of these species, four were native and ten were non-native. Italian rye grass was the dominant species accounting for approximately 35% cover (see Appendix B Table B-10). Thatch was abundant, accounting for approximately 37%. California oat grass, brome fescue, cut-leaved geranium, and coast tarweed contributed cover ranging from 3% to 7%. Ripgut grass, soft chess, brown-headed rush, gumweed, and sheep sorrel contributed cover ranging from 1% to 2%. Other species included annual quaking grass, long-beaked filaree, rattail sixweeks grass, and smooth cat's-ear. Bare ground accounted for approximately 4%.

3.10.2 Wildlife Monitoring

Pond 40 South was surveyed for CTS and fairy shrimp on April 16, 2020. California tiger salamanders were not detected in April; however, fairy shrimp were present in low abundance. No surveys were conducted in March or May due to insufficient vernal pool depth. Table 3-30 and Table 3-31 provide results of the CTS and fairy shrimp surveys completed in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-30. Pond 40 South (Year 3 Post-Burn) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
40 South	4/16/2020	0	-	-	-	-	-	-	-	4 mins

Table 3-31. Pond 40 South (Year 3 Post-Burn) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
4/16/2020	Low (1)

3.11 Pond 43

Pond 43 was in year 3 of monitoring for post-burn and year 2 for post-subsurface munitions remediation in 2020. Pond 43 was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.11.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 43 on May 28, 2020. These monitoring data represent year 3 post-burn and year 2 post-subsurface munitions remediation conditions. Pond 43 was dry by May 26 (Chenega, 2021). Biologists identified three strata at the vernal pool (see Table 3-32 and Figure 3-14). Appendix B provides the species cover results within each stratum. All three strata were repeated from 2016, 2018, and 2019. Transects 1 and 3 were repeated from 2016, 2018, and 2019. Transect 2 was relocated because the previous location was no longer within the correct stratum.

Table 3-32. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	46%
2	37%
3	15%
Upland	1%

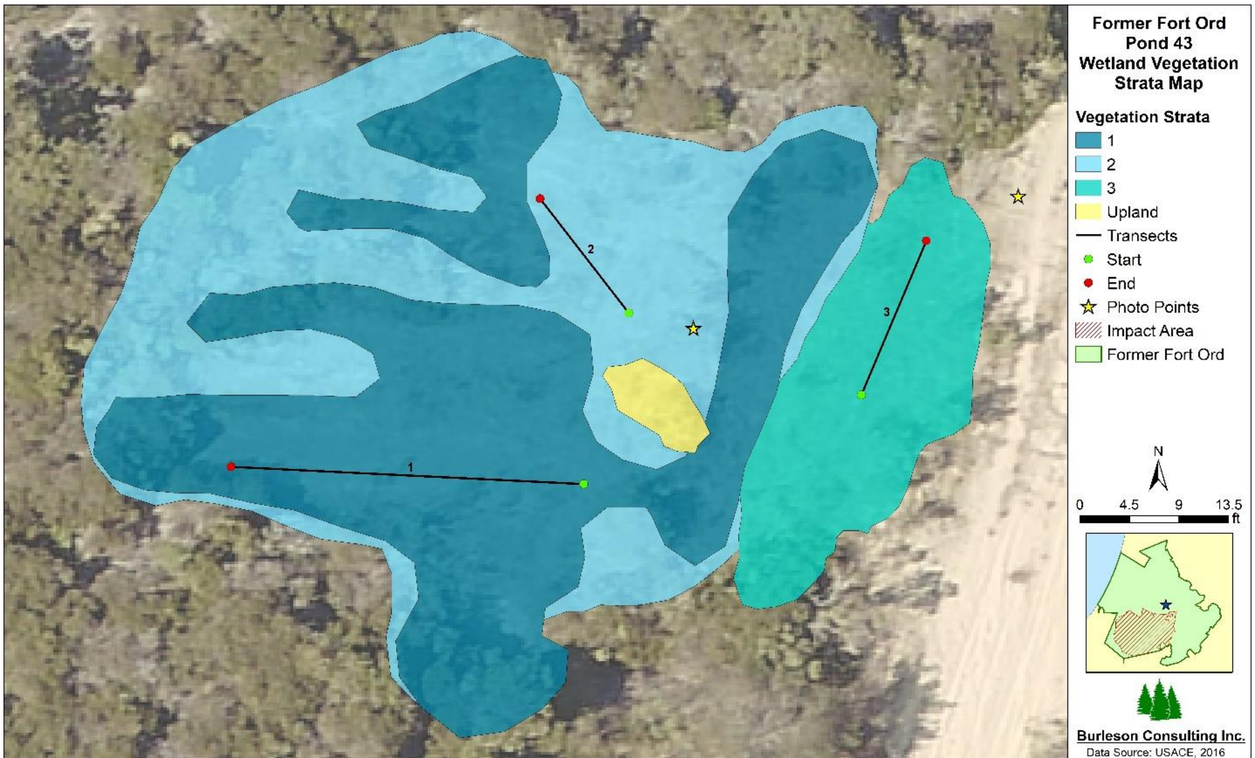


Figure 3-14. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2020

Eight-six plant species were observed within the vernal pool basin boundary. Of these species, 62 were native, 23 were non-native, and one was unidentified. Ten species were OBL wetland plants, 25 were FACW or FAC, 12 were FACU or UPL, and 39 were not listed. Appendix E 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. Fifteen plant species were observed along the transect. Of these species, 13 were native and two were non-native. Coyote thistle, Hickman's popcornflower, pale spikerush, and smooth goldfields were the dominant species, accounting for approximately 11%, 9%, 8%, and 8% cover, respectively (see Appendix B Table B-11). Thatch was abundant, accounting for approximately 31%. Sacramento mesa mint (*Pogogyne zizyphoroides*) contributed approximately 7%, while needle spikerush contributed approximately 5% cover. Aquatic pygmy-weed, low bulrush, brown-headed rush, grass poly, chaffweed, rabbitfoot grass, and round woolly-marbles contributed cover ranging from 1% to 2%. Other species included annual hair grass and flowering quillwort (*Triglochin scilloides*). Bareground contributed approximately 12%.

Transect 2 at Pond 43 consisted of a 10-m transect placed in stratum 2. Twenty-six plant species were observed along the transect. Of these species, 15 were native and 11 were non-native. Brown-headed rush was the dominant species, accounting for approximately 42% cover (see Appendix B Table B-11). Bare ground and thatch were fairly abundant, accounting for approximately 21% and 10%, respectively. Annual quaking grass, coastal tarweed, annual hair grass, cut-leaved geranium, smooth cat's-ear, dwarf rush (*Juncus capitatus*), western rush, grass poly, chaffweed, gumweed, coast tarweed, Hickman's popcornflower, rabbitfoot grass, Sacramento mesa mint, round woolly-marbles, western blue-eyed grass, and common sow thistle contributed cover ranging from 1% to 4%. Other species included silvery hair-grass, coyote brush, soft chess, coyote thistle, brome fescue, purple cudweed, common toad rush, and weedy cudweed.

Transect 3 at Pond 43 consisted of a 5-m transect placed in stratum 3. Twenty-seven plant species were observed along the transect. Of these species, fifteen 15 were native and 12 were non-native. California oat grass was the dominant species, accounting for 45% cover (see Appendix B Table B-11). Spanish lotus contributed approximately 6% cover, while coastal tarweed, coyote thistle, gumweed, cut-leaved plantain, and little hop clover contributed cover ranging from 2% to 5%. Silvery hair-grass, soft chess, annual quaking grass, brome fescue, purple cudweed, cut-leaved geranium, smooth cat's-ear, grass poly, and small tarweed each contributed approximately 1% cover. Other species included timwort (*Cicendia quadrangularis*), common toad rush, western rush, brown-headed rush, scarlet pimpernel, chaffweed, rabbitfoot grass, round woolly-marbles, western blue-eyed grass, Capetown grass (*Tribolium obliterum*) and Davy's centaury. Bare ground and thatch accounted for approximately 11% and 7%, respectively.

3.11.2 Wildlife Monitoring

Pond 43 was surveyed for CTS and fairy shrimp April 15, 2020. California tiger salamanders were not detected in April; however, fairy shrimp were present in moderate abundance. No surveys were conducted in March or May due to insufficient vernal pool depth. Table 3-33 and Table 3-34 provide results of the CTS and fairy shrimp surveys completed in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-33. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
43	4/15/2020	0	-	-	-	-	-	-	-	15 mins

Table 3-34. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
4/15/2020	Moderate (40)

3.12 Pond 35

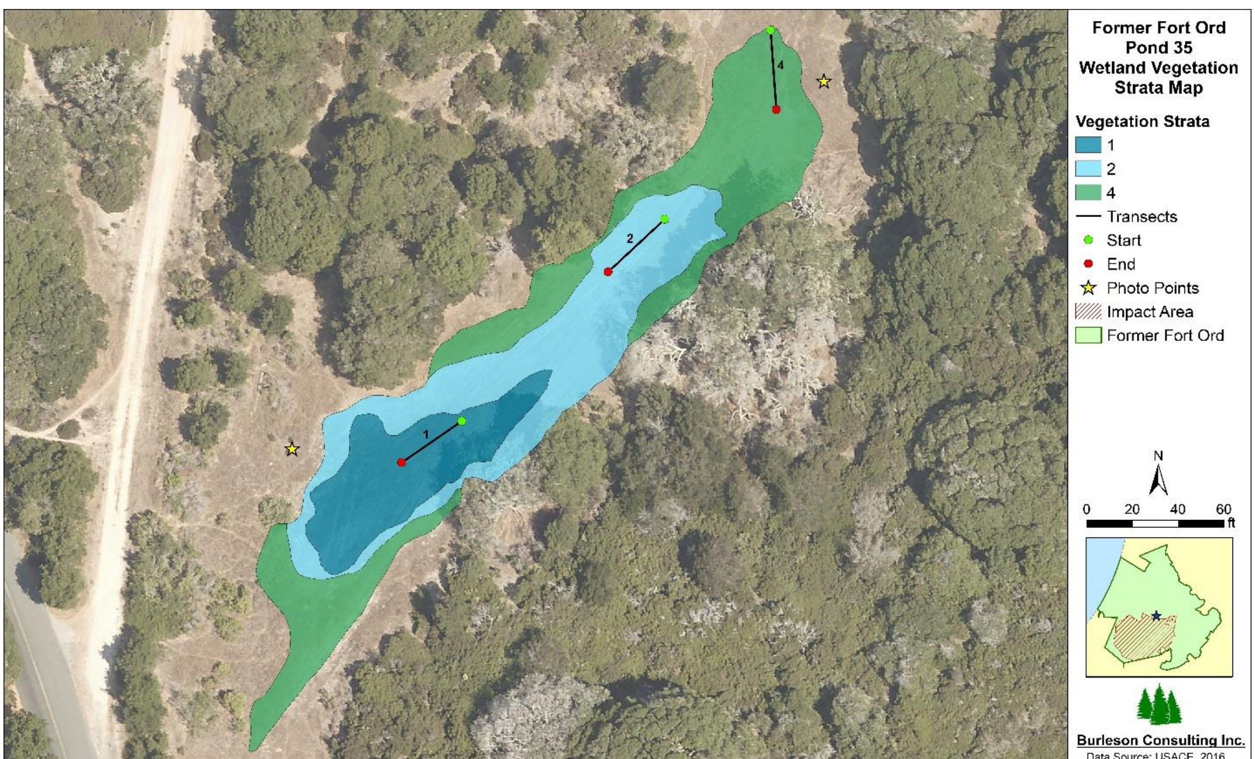
Pond 35 was in year 3 of monitoring for post-mastication and year 2 for post-subsurface munitions remediation in 2020. Pond 35 was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.12.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 35 on May 21, 2020. These data represent year 3 post-mastication and year 2 post-subsurface munitions remediation conditions. Pond 35 was dry by the May 21 monitoring event. Biologists identified three strata at the vernal pool (see Table 3-35 and Figure 3-15). Appendix B provides the species cover results within each stratum. Strata 1 and 2 were repeated from 2016, 2018, and 2019. Stratum 4 was repeated from 2018 and 2019. Transects 1 and 2 were repeated from 2016, 2018, and 2019. Transect 4 was relocated because the previous location was no longer within the stratum.

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

Stratum	Percentage
1	20%
3	36%
4	44%



Document Path: \\gis_master\GIS\2020_FO_Biomonitoring\WetlandMonitoring\WetlandVeg\ReportMaps\1_VegetativeStrataMaps\2020_WetlandVegStrata_ResultsMaps_200921.mxd

Figure 3-15. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2020

Sixty plant species were observed within the vernal pool basin boundary. Of these species, 29 were native and 31 were non-native. Seven species were OBL wetland plants, 13 were FACW or FAC, 12 were FACU or UPL, and 28 were not listed. Appendix E identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 35 consisted of a 10-m transect placed in stratum 1. Nine plant species were observed along the transect. Of these species, five were native and four were non-native. Cut-leaved plantain and Hickman's popcornflower were the dominant species, accounting for approximately 35% and 26% cover, respectively (see Appendix B Table B-12). Grass poly contributed 9% cover, while brass buttons, pale spikerush, smooth goldfields, round woolly-marbles, and flowering quillwort contributed cover ranging from 1% to 2%. Other species included Italian rye grass. Bare ground and thatch each accounted for approximately 12%.

Transect 2 at Pond 35 consisted of a 10-m transect placed in stratum 2. Eight plant species were observed along the transect. Of these species, three were native and five were non-native. Cut-leaved plantain was the dominant species, accounting for approximately 37% cover (see Appendix B Table B-12). Thatch and bare ground were abundant, each accounted for approximately 28%. Narrow-leaved clover contributed approximately 5% cover, while round woolly-marbles contributed approximately 2% cover. Other species included annual hair grass, Italian rye grass, smooth cat's-ear, grass poly, and holly leaf navarretia (*Navarretia atractyloides*).

Transect 4 at Pond 35 consisted of a 10-m transect placed in stratum 4. Seventeen plant species were observed along the transect. Of these species, three were native and fourteen were non-native. Italian rye grass and California oat grass were the dominant species, each accounting for approximately 28% cover (see Appendix B Table B-12). Thatch was abundant, accounting for 19%. Narrow-leaved clover contributed approximately 11%, while silvery hair-grass, ripgut grass, soft chess, long-beaked filaree, brome fescue, rattail sixweeks grass, cut-leaved geranium, smooth cat's-ear, and cut-leaved plantain contributed cover ranging from 1% to 2%. Other species included slender wild oat, annual quaking grass, dwarf brodiaea, meadow barley (*Hordeum branchyantherum*), and little hop clover. Bare ground accounted for approximately 3%.

3.12.2 Wildlife Monitoring

Pond 35 was surveyed for CTS and fairy shrimp on April 16, 2020. California tiger salamanders were not detected in April; however, fairy shrimp were present in high abundance. No surveys were conducted in March or May due to insufficient vernal pool depth. Table 3-36 and Table 3-37 provide results of the CTS and fairy shrimp surveys completed in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-36. Pond 35 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
35	4/16/2020	0	-	-	-	-	-	-	-	21 mins

Table 3-37. Pond 35 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
4/16/2020	High (186)

3.13 Pond 42

Pond 42 was in year 3 for post-mastication and post-burn and year 2 for post-subsurface munitions remediation in 2020. Pond 42 was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.13.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 42 on June 15, 16, and 26, 2020. These monitoring data represent year 3 post-mastication and post-burn and year 2 post-subsurface munitions remediation conditions. Pond 42 was dry by the June 26 monitoring event. Biologists identified five strata at the vernal pool (see Table 3-38 and Figure 3-16). Appendix B provides the species cover results within each stratum. Strata 1 through 4 were repeated from 2017, 2018, and 2019. Stratum 5 was repeated from 2019. Transect 1 was relocated to an area with more representative vegetative composition. Transect 2 was repeated from 2018 and 2019. Transects 3 and 5 were relocated because the previous locations were no longer within the correct strata. Transect 4 was repeated from 2017, 2018, and 2019.

Table 3-38. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	11%
2	10%
3	41%
4	14%
5	6%
Upland	17%

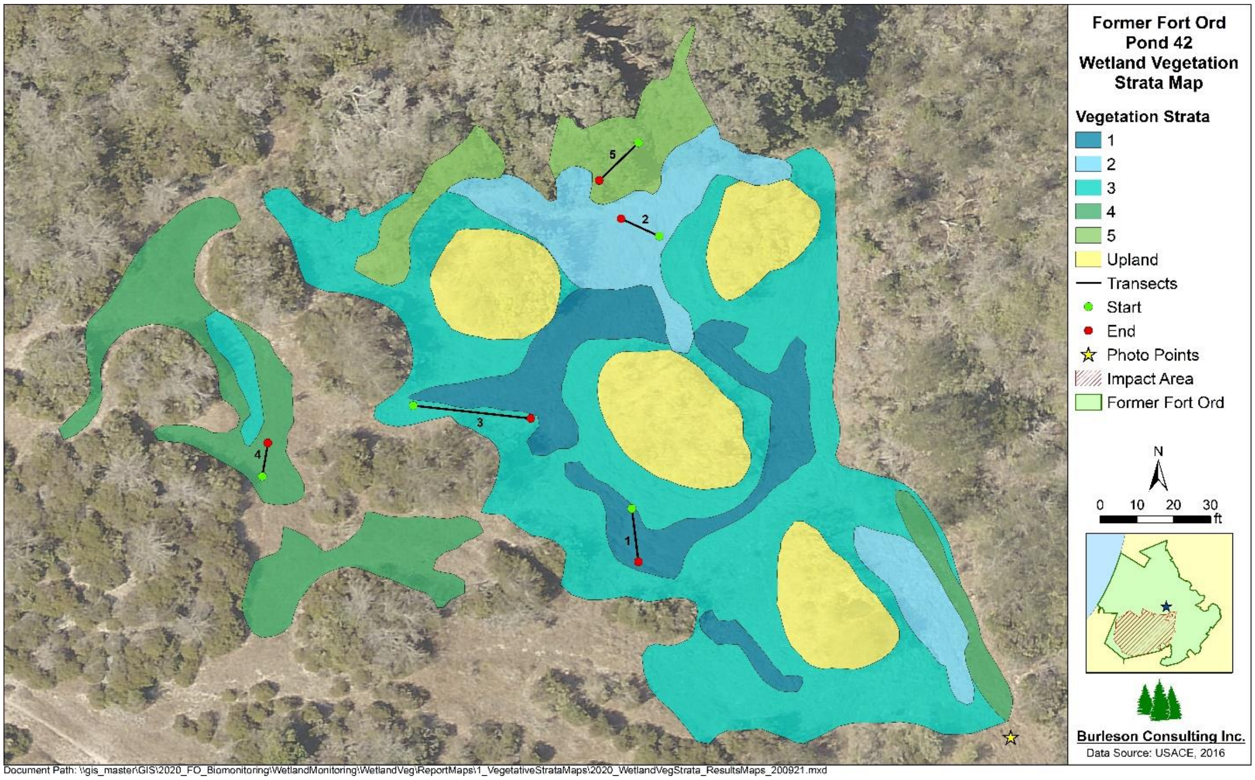


Figure 3-16. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2020

Ninety-three plant species were observed within the vernal pool basin boundary. Of these species, 57 were native, 33 were non-native, and three were unidentified. Eleven species were OBL wetland plants, 29 were FACW or FAC, 16 were FACU or UPL, and 37 were not listed. Appendix E identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Transect 1 at Pond 42 consisted of a 5-m transect placed in stratum 1. Eight plant species were observed along the transect. Of these species, six were native and two were non-native. Needle spikerush was the dominant species, accounting for approximately 37% cover (see Appendix B Table B-13). Thatch was abundant, accounting for approximately 29%. Brown-headed rush contributed 11%, while coyote thistle and pale spikerush contributed approximately 4% and 3% cover, respectively. Other species included smooth goldfields, grass poly, Hickman’s popcornflower, and rabbitfoot grass. Bare ground accounted for approximately 12% cover.

Transect 2 at Pond 42 consisted of a 5-m transect placed in stratum 2. Ten plant species were observed along the transect. Of these species, six were native, two were non-native, and one was unidentified. Pale spike-rush was the dominant species, accounting for approximately 42% (see Appendix B Table B-13). Thatch was abundant, accounting for approximately 49% cover. Rabbitfoot grass contributed 4%, while needle spikerush contributed 2%. Other species included coyote thistle, Howell’s quillwort, smooth goldfields, grass poly, Hickman’s popcornflower, and *Pseuodognaphalium* sp.

Transect 3 at Pond 42 consisted of a 10-m transect placed in stratum 3. Twenty plant species were observed along the transect. Of these species, twelve were native, seven were non-native, and one was unidentified. Brown-headed rush, needle spikerush, and coyote thistle were the dominant species, accounting for approximately 35%, 17%, and 15% cover, respectively (see Appendix B Table B-13). Thatch was fairly abundant, accounting for approximately 17%. Rabbitfoot grass contributed 6% cover, while vernal pool bent grass, dwarf brodiaea, brass buttons, annual hair grass, smooth goldfields, grass poly, chaffweed, and Hickman's popcornflowercontributed cover ranging from 1% to 3%. Other species included timwort, western pearlflower (*Heterocodon rariflorum*), smooth cat's-ear, scarlet pimpernel, *Pseudognaphalium sp.*, round woolly-marbles, cutleaf burnweed, and common sow thistle. Bare ground accounted for approximately 4% cover.

Transect 4 at Pond 42 consisted of a 5-m transect placed in stratum 4. Fifteen plant species were observed along the transect. Of these species, seven were native and eight were non-native. Coastal tarweed and California oat grass were the dominant species, accounting for approximately 27% and 19% cover, respectively (see Appendix B Table B-13). Bare ground and thatch were abundant, accounting for approximately 24% and 19% cover, respectively. Silvery hair-grass, annual quaking grass, brome fescue, nit grass, purple cudweed, smooth cat's-ear, scarlet pimpernel, rabbitfoot grass, and Davy's centuary contributed cover ranging from 1% to 2%. Other species included slender wild oat, dwarf brodiaea, coyote thistle, and California plantain.

Transect 5 at Pond 42 consisted of a 5-m transect placed in stratum 5. Four plant species were observed along the transect. One species was native, two were non-native, and one was unidentified. Brass buttons was the dominant species accounting for approximately 63% cover (see Appendix B Table B-13). Thatch was abundant, contributing 30% cover. Rabbitfoot grass accounted for 5% cover, while horseweed and *Pseudognaphalium* sp. were less than 1%. Bare ground accounted for approximately 2% cover.

3.13.2 Wildlife Monitoring

Pond 42 was surveyed for CTS and fairy shrimp on April 15, and May 19, 2020. California tiger salamanders were not detected; however, fairy shrimp were present in April in high abundance. No surveys were conducted in March due to insufficient vernal pool depth. Table 3-39 and Table 3-40 provide results of the CTS and fairy shrimp surveys completed in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-39. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
42	4/15/2020	0	-	-	-	-	-	-	-	1 hr 30 mins
	5/19/2020	0	-	-	-	-	-	-	-	26 mins

Table 3-40. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
4/15/2020	High (125)
5/19/2020	Not detected

3.14 Pond 44

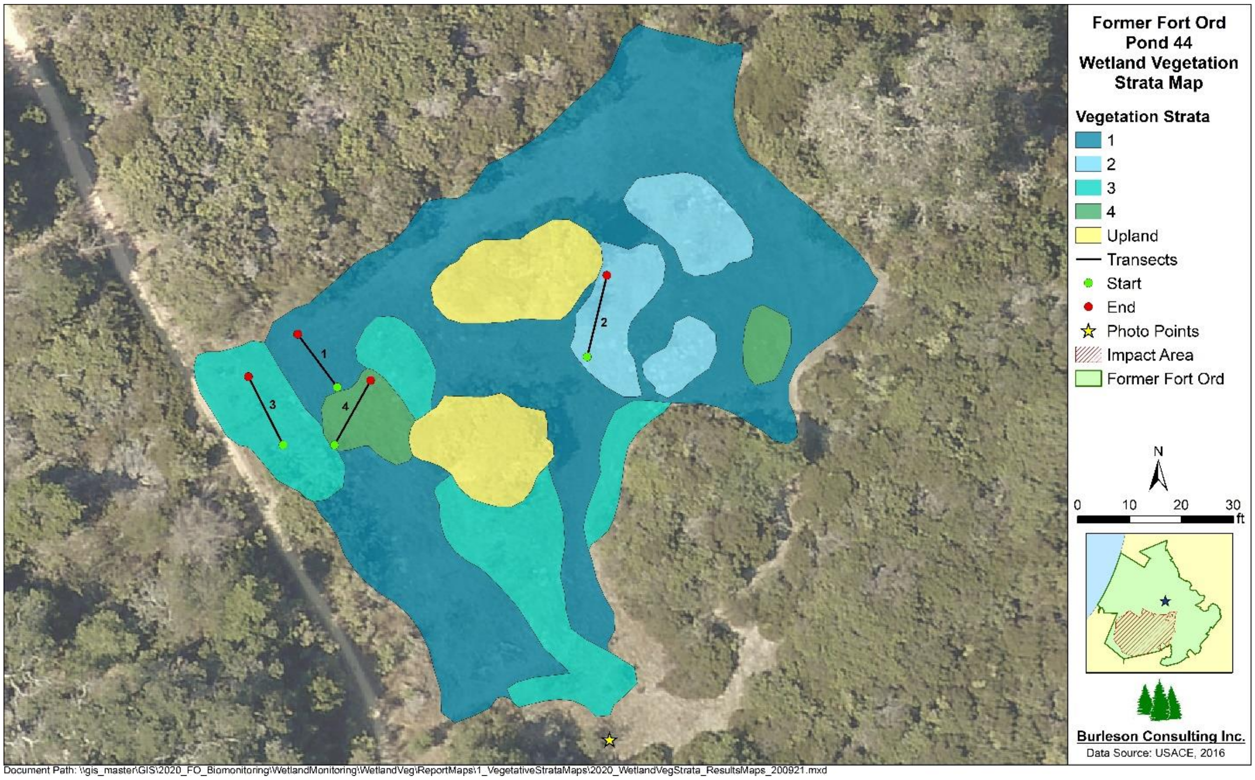
Pond 44, a post-mastication vernal pool, was in year 3 of monitoring in 2020. Pond 44 was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.14.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 44 on May 28 and June 1, 2020. These monitoring data represent year 3 post-mastication and year 2 post-subsurface munitions remediation conditions. Pond 44 was dry by May 26 (Chenega, 2021). Biologists identified four strata at the vernal pool (see Table 3-41 and Figure 3-17). All vegetative strata within the basin were mapped and tabulated. Appendix B provides the species cover results within each stratum. Strata 1 and 3 were repeated from 2016, 2018, and 2019, whereas stratum 4 was repeated from 2018 and 2019. Strata 2 was repeated from 2016. Transect 1 was repeated from 2018 and 2019. Transect 2 was relocated because the previous location was no longer within the correct stratum. Transect 3 was repeated from 2016, 2018, and 2019, whereas Transect 4 was relocated to an area with more representative vegetative composition.

Table 3-41. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	59%
2	9%
3	18%
4	4%
Upland	11%



Document Path: \\gis_master\GIS\2020_FO_Biomonitoring\WetlandMonitoring\WetlandVeg\ReportMaps\1_VegetativeStrataMaps\2020_WetlandVegStrata_ResultsMaps_200921.mxd

Figure 3-17. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2020

Sixty-seven plant species were observed within the vernal pool basin boundary. Of these species, 41 were native and 26 were non-native. Five species were OBL wetland plants, 21 were FACW or FAC, 13 were FACU or UPL, and 28 were not listed. Appendix E 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. Eighteen plant species were observed along the transect. Of these species, ten were native and eight were non-native. Coyote thistle, rabbitfoot grass, and round woolly-marbles were the dominant species, accounting for approximately 12%, 11%, and 10% cover, respectively (see Appendix B Table B-14). Bare ground and thatch were fairly abundant, accounting for approximately 20% and 17%, respectively. Common toad rush accounted for approximately 7% cover, while grass poly and Hickman's popcornflower each contributed 6% cover. Vernal pool bent grass, annual quaking grass, needle spikerush, brown-headed rush, chaffweed, cut-leaved plantain, Sacramento mesa mint, and little hop clover from 1% to 4%. Other species included long-beaked filaree, brome fescue, smooth cat's-ear, and smooth goldfields.

Transect 2 at Pond 44 consisted of a 5-m transect placed in stratum 2. Seventeen plant species were observed along the transect. Of these species, 12 were native and five were non-native. Common toad rush and grass poly were the dominant species, accounting for approximately 18% and 12% cover, respectively (see Appendix B Table B-14). Thatch was abundant, accounting for approximately 27% cover. Rabbitfoot grass, Hickman's popcornflower, and coyote thistle contributed approximately 9%, 7%, and 5% cover, respectively. Vernal pool bent grass, annual quaking grass, dwarf brodiaea, annual hair grass, needle spikerush, brown-headed rush, chaffweed, cut-leaved plantain, and round woolly-marbles contributed cover ranging from 1% to 2%. Other species included aquatic pygmy-weed, pale spikerush, and dwarf rush. Bare ground accounted for approximately 8% cover.

Transect 3 at Pond 44 consisted of a 5-m transect placed in stratum 3. Twenty-five plant species were observed along the transect. Of these species, 13 were native and 12 were non-native. California oat grass was the dominant species, accounting for approximately 47% cover (see Appendix B Table B-14). Gumweed and cut-leaved plantain contributed approximately 12% and 11% cover, respectively. Hill lotus, silvery hair-grass, slender wild oat, rattlesnake grass, dwarf brodiaea, coyote thistle, nit grass, smooth cat's-ear, common toad rush, brown-headed rush, scarlet pimpernel, chaffweed, rabbitfoot grass, little hop clover, and little owl's clover (*Triphysaria pusilla*) contributed cover ranging from 1% to 4%. Other species included valley tassels, needle spikerush, rattail sixweeks grass, cut-leaved geranium, sun cups, hop clover, and Davy's centuary. Bare ground and thatch were minimal, accounting for approximately 4% and 1%, respectively.

Transect 4 at Pond 44 consisted of a 5-m transect placed in stratum 4. Twenty-one plant species were observed along the transect. Of these species, 13 were native and eight were non-native. Brown-headed rush was the dominant species, accounting for approximately 36% cover (see Appendix B Table B-14). Thatch and bare ground were fairly abundant, accounting for approximately 15% and 11%, respectively. Coyote thistle and needle spikerush accounted for approximately 11% and 8% cover, respectively. Annual quaking grass, dwarf brodiaea, annual hair grass, common toad rush, smooth goldfields, chaffweed, Hickman's popcornflower, cut-leaved plantain, rabbitfoot grass, round woolly marbles, little hop clover, and variegated clover contributed cover ranging from 1% to 5%. Other species included vernal pool bent grass, cut-leaved geranium, smooth cat's-ear, dwarf rush, and Sacramento mesa mint.

3.14.2 Wildlife Monitoring

Pond 44 was surveyed for CTS and fairy shrimp April 15, 2020. California tiger salamanders were not detected in April; however, fairy shrimp were present in high abundance. No surveys were conducted in March or May due to insufficient vernal pool depth. Table 3-42 and Table 3-43 provide results of the CTS and fairy shrimp surveys completed in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-42. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
44	4/15/2020	0	-	-	-	-	-	-	-	21 mins

Table 3-43. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
4/15/2020	High (258)

3.15 Pond 56

Pond 56, a post-mastication vernal pool, was in year 3 of monitoring in 2020. Pond 56 was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.15.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 56 on June 16, July 14, and August 11, 2020. These monitoring data represent year 3 post-mastication conditions. Pond 56 was dry by August 3 (Chenega, 2021). Biologists identified five strata at the vernal pool (see Table 3-44 and Figure 3-18). Appendix B provides the species cover results within each stratum. Stratum 1 was repeated from 2016 and 2019. Strata 2 through 4 were repeated from 2015, 2016, and 2019 whereas stratum 5 was repeated from 2015 and 2016. Transect 1 was repeated from 2016. Transects 2 and 5 were relocated to areas with more representative vegetative composition. Transects 3 and 4 were repeated from 2016.

Table 3-44. Pond 56 (Year 3 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	6%
2	5%
3	16%
4	24%
5	46%
Upland	3%

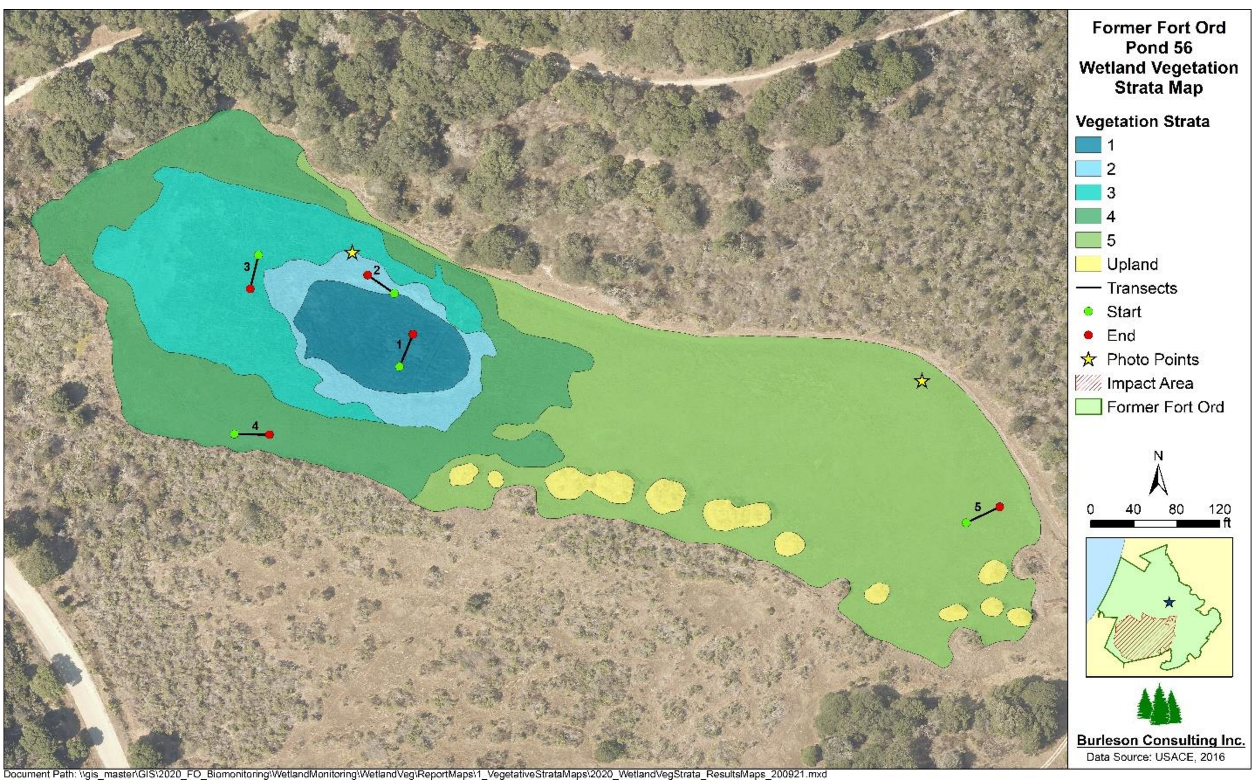


Figure 3-18. Pond 56 (Year 3 Post-Mastication) Vegetation Strata and Transects on Former Fort Ord, 2020

Sixty-seven plant species were observed within the vernal pool basin boundary. Of these species, 42 were native and 25 were non-native. Eight species were OBL wetland plants, 23 were FACW or FAC, 14 were FACU or UPL, and 22 were not-listed. Appendix E 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 56 consisted of a 10-m transect placed in stratum 1. Two native plant species were observed along the transect. Pale spikerush was the dominant species, accounting for approximately 46% cover (see Appendix B Table B-15). Thatch was abundant, accounting for approximately 48%. Alkali mallow contributed 4%. Bare ground accounted for approximately 2% cover.

Transect 2 at Pond 56 consisted of a 10-m transect placed in stratum 2. Four native plant species were observed along the transect. Salt grass and pale spikerush were the dominant species, accounting for approximately 25% and 8% cover, respectively (see Appendix B Table B-15). Thatch was abundant, accounting for 54% cover. Needle spikerush contributed 3%, while brown-headed rush contributed 2% cover. Bare ground accounted for approximately 8%.

Transect 3 at Pond 56 consisted of a 10-m transect placed in stratum 3. Three native plant species were observed along the transect. Pale spikerush was the dominant species, accounting for approximately 19% cover (see Appendix B Table B-15). Salt grass contributed 12%, while brown-headed rush contributed and 11% cover. Thatch was abundant accounting for approximately 55%. Bare ground accounted for approximately 3% cover.

Transect 4 at Pond 56 consisted of a 10-m transect placed in stratum 4. Eight plant species were observed along the transect. Of these species, six were native and two were non-native. Brown-headed rush was the dominant species, accounting for approximately 14% cover (see Appendix B Table B-15). Thatch was abundant, accounting for approximately 74% cover. Salt grass contributed approximately 5%, while grass poly, Lemmon's canary grass, Hickman's popcornflower, rabbitfoot grass, bugle hedge nettle, and flowering quillwort each contributed 1% cover or less. Bare ground accounted for approximately 2% cover.

Transect 5 at Pond 56 consisted of a 10-m transect placed in stratum 5. Thirteen plant species were observed along the transect. Of these species, eight were native and five were non-native. Brown-headed rush and coyote thistle were the dominant species, accounting for approximately 23% and 15% cover, respectively (see Appendix B Table B-15). Thatch was abundant, accounting for approximately 46%. Alkali mallow contributed approximately 6% cover, while Pacific bent grass, dwarf brodiaea, annual hair grass, salt grass, needle spikerush, grass poly, and rabbit foot grass contributed cover ranging from 1% to 2%. Other species included annual quaking grass, coastal tarweed, and long-beaked filaree. Bare ground accounted for approximately 2% cover.

3.15.2 Wildlife Monitoring

Pond 56 was surveyed for CTS and fairy shrimp on March 16, April 13, and May 19, 2020. California tiger salamanders and fairy shrimp were not detected. Table 3-45 and Table 3-46 provide results of the CTS and fairy shrimp surveys completed in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-45. Pond 56 (Year 3 Post-Mastication) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
56	3/16/2020	0	-	-	-	-	-	-	-	1 hr 36 mins
	4/13/2020	0	-	-	-	-	-	-	-	3 hrs 20 mins
	5/19/2020	0	-	-	-	-	-	-	-	30 mins

Table 3-46. Pond 56 (Year 3 Post-Mastication) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/16/2020	Not detected
4/13/2020	Not detected
5/19/2020	Not detected

3.16 Pond 60

Pond 60 was in year 3 post-mastication vernal pool monitoring and year 2 for post-subsurface munitions remediation in 2020. Pond 60 was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.16.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 60 on June 17 and August 11, 2020. These monitoring data represent year 3 post-mastication conditions. Pond 60 was dry by July 14 (Chenega, 2021). Biologists identified four strata at the vernal pool (see Table 3-47 and Figure 3-19). Appendix B provides the species cover results within each stratum. Strata 1 through 4 were repeated from 2015, 2018, and 2019. Transect 1 was relocated to an area with more representative vegetative composition. Transect 2 was repeated from 2018 and 2019, while Transect 3 was repeated from 2018. Transect 4 was repeated from 2015.

Table 3-47. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	7%
2	39%
3	13%
4	41%

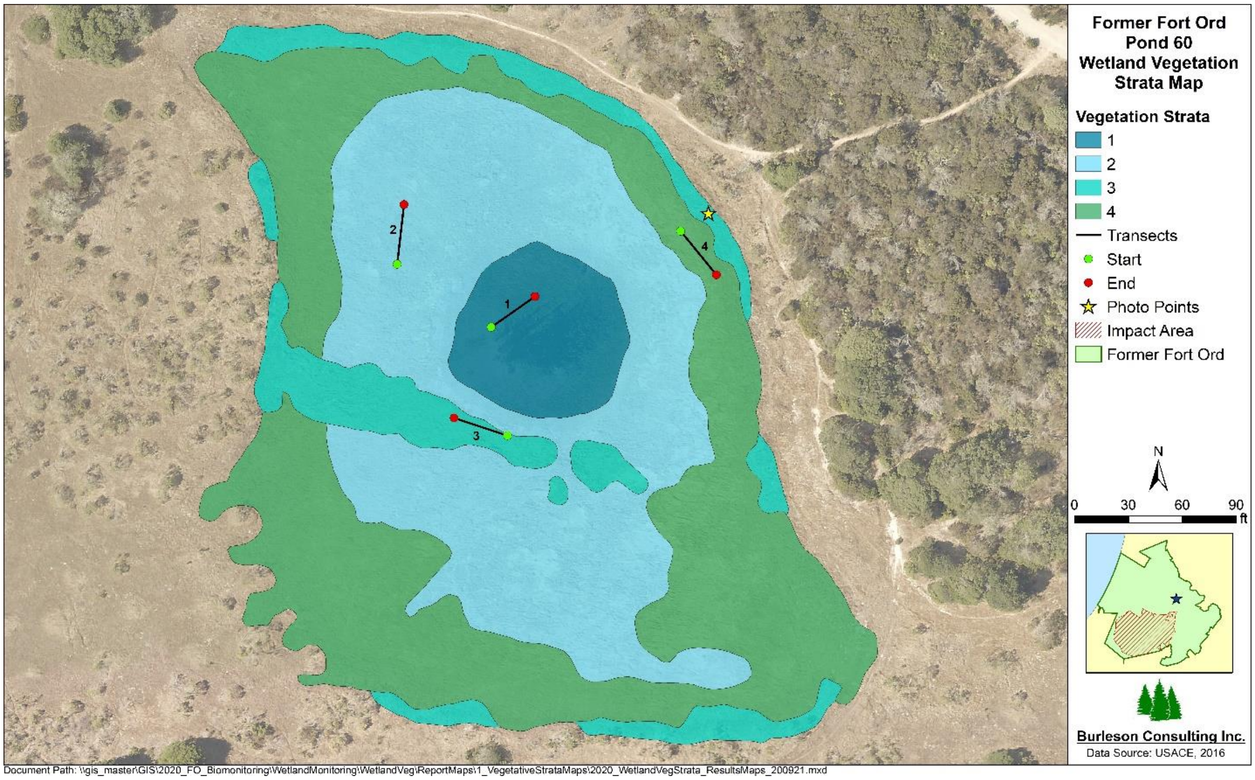


Figure 3-19. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2020

Fifty-seven plant species were observed within the vernal pool basin boundary. Of these species, 32 were native and 25 were non-native. Eight species were OBL wetland plants, 18 were FACW or FAC, 10 were FACU or UPL, and 21 were not listed. Appendix E 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. Two native plant species were observed along the transect. Pale spikerush was the dominant species, accounting for approximately 51% cover (see Appendix B Table B-16). Thatch was abundant accounting for approximately 45% cover. Alkali mallow was the other species observed which contributed 3% cover. Bare ground accounted for approximately 1%.

Transect 2 at Pond 60 consisted of a 10-m transect placed in stratum 2. Four plant species were observed along the transect. Three were native and one was non-native. Pale spikerush was the dominant species, accounting for approximately 44% cover (see Appendix B Table B-16). Thatch was abundant accounting for approximately 41% cover. Salt grass contributed approximately 7% cover, brown-headed rush was approximately 3% cover, while brass buttons was less than 1%. Bare ground accounted for approximately 5%.

Transect 3 at Pond 60 consisted of a 10-m transect placed in stratum 3. Three native plant species were observed along the transect. Brown-headed rush and pale spikerush were the dominant species, accounting for approximately 38% and 20% cover, respectively (see Appendix B Table B-16). Thatch was abundant accounting for approximately 37% cover. Salt grass contributed 4% cover, while bare ground accounted for approximately 2%.

Transect 4 at Pond 60 consisted of a 10-m transect placed in stratum 4. Seventeen plant species were observed along the transect. Of these species, nine were native and eight were non-native. Bugle hedge nettle and rabbitfoot grass were the dominant species, accounting for approximately 12% and 11% cover, respectively (see Appendix B Table B-16). Thatch was abundant accounting for approximately 47% cover. Salt grass contributed 9% cover, while needle spikerush and pale spikerush each contributed 5% cover. Annual quaking grass, horseweed, brown-headed rush, grass poly, and Lemmon's canary grass contributed cover ranging from 1% to 2%. Other species included silvery hair-grass, brass buttons, Howell's quillwort, weedy cudweed, cottonbatting plant, curly dock, and common sow thistle. Bare ground accounted for approximately 5%.

3.16.2 Wildlife Monitoring

Pond 60 was surveyed for CTS and fairy shrimp on March 16, April 14 and May 18, 2020. California tiger salamanders were present at all three monitoring events while fairy shrimp were not detected. Table 3-48 and Table 3-49 provide results of the CTS and fairy shrimp surveys completed in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-48. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
60	3/16/2020	1	1	16	16	16	7	7	7	1 hr
	4/14/2020	5	5	34	26-38	38	17	15-19	18	2 hrs 40 mins
	5/18/2020	7	7	88	70-101	N/A	49	41-55	52	1 hr

*The mean was rounded to the nearest whole number

Table 3-49. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/16/2020	Not detected
4/14/2020	Not detected
5/18/2020	Not detected

3.17 Pond 61

Pond 61 was in year 3 of monitoring for post-mastication and year 2 for post-subsurface munitions remediation in 2020. Pond 61 was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.17.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 61 on May 19, May 20, and June 3, 2020. These monitoring data represent year 3 post-mastication and year 2 post-subsurface munitions remediation conditions. Pond 61 was dry by April 29 (Chenega, 2021). Biologists identified four strata at the vernal pool (see Table 3-50 and Figure 3-20). Appendix B provides the species cover results within each stratum. Strata 1 through 4 were repeated from 2017, 2018, and 2019. Transect 1 was repeated from 2017, whereas Transect 3 was repeated from 2017, 2018, and 2019. Transect 4 was repeated from 2019. Stratum 2 consisted of CCG and no transect was placed in this stratum. Figure 3-20 illustrates the extent and density of the populations at Pond 61.

Table 3-50. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	1%
2 (CCG)	6%
3	3%
4	59%
Upland	32%

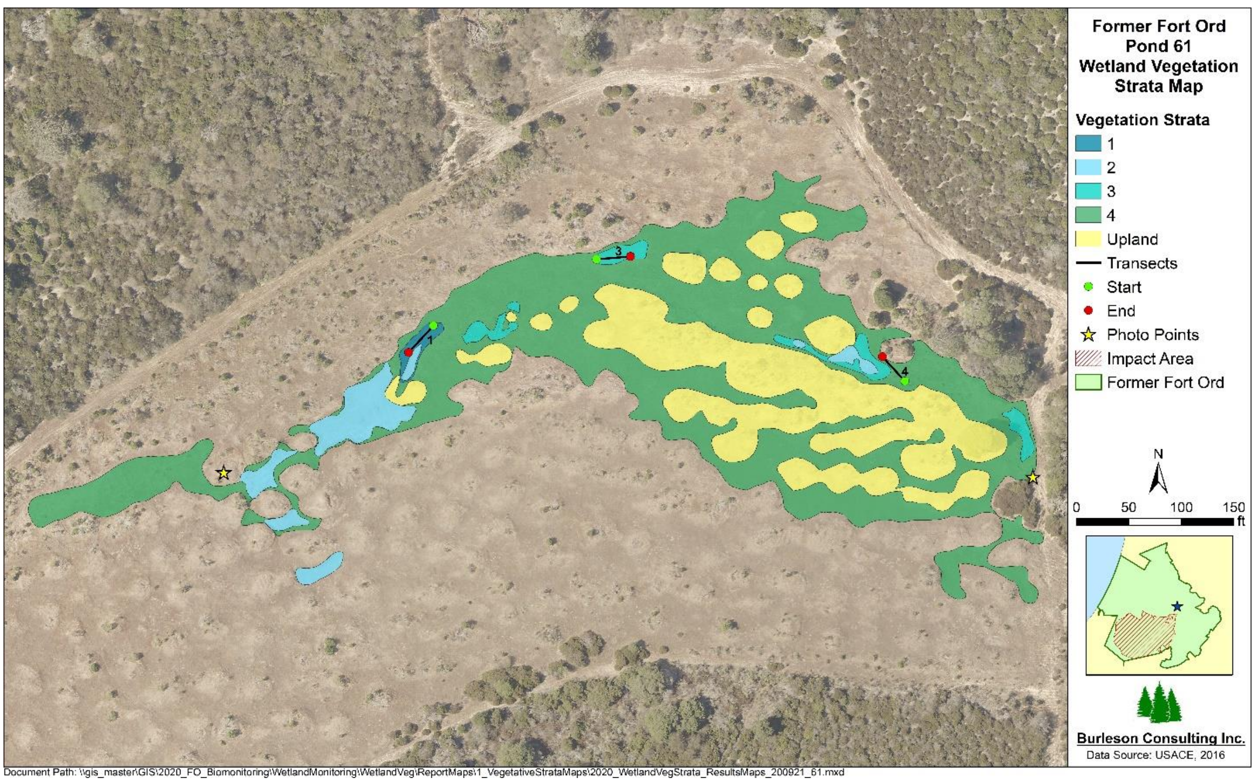


Figure 3-20. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2020

Ninety-eight plant species were observed within the vernal pool basin boundary. Of these species, 68 were native, 29 were non-native, and one was unidentified. Ten species were OBL wetland plants, 29 were FACW or FAC, 13 were FACU or UPL, and 46 were not listed. Appendix E 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. Fourteen plant species were observed along the transect. Of these species, 12 were native and two were non-native. Pale spikerush was the dominant species, accounting for approximately 21% cover (see Appendix B Table B-17). Bareground and thatch were abundant, accounting for approximately 34% and 25%, respectively. Howell's quillwort contributed 5% cover, while dwarf brodiaea, needle spikerush, Contra Costa goldfields, smooth goldfields, grass poly, Hickman's popcornflower, and flowering quillwort contributed cover ranging from 1% to 3%. Other species included aquatic pygmy-weed, chaffweed, rabbitfoot grass, Sacramento mesa mint, and round woolly-marbles.

Stratum 2 consisted of CCG. Figure 3-21 illustrates the extent and density of the populations at Pond 61. No transects were placed in stratum 2 to avoid disturbing the population.

Transect 3 at Pond 61 consisted of a 10-m transect placed in stratum 3. Twenty-six plant species were observed along the transect. Of these species, 17 were native, eight were non-native, and one was unidentified. Coyote thistle and Hickman's popcornflower were the dominant species, each accounting for approximately 17% (see Appendix B Table B-17). Thatch was fairly abundant, accounting for approximately 15% cover. Needle spikerush contributed 10% cover, while dwarf brodiaea, smooth goldfields, and grass poly each contributed approximately 7% cover. Annual quaking grass, cut-leaved geranium, Howell's quillwort, brown-headed rush, chaffweed, Sacramento mesa mint, round woolly-marbles, and common sow thistle contributed cover ranging from 1% to 3%. Other species included vernal pool bent grass, rattlesnake grass, timwort, California oat grass, annual hair grass, rattail sixweeks grass, smooth cat's-ear, gumweed, marsh microseris, rabbitfoot grass, variegated clover, and Unknown 1. Bare ground accounted for approximately 10%.

Transect 4 at Pond 61 consisted of a 10-m transect placed in stratum 4. Twenty plant species were observed along the transect. Of these species, 11 were native and nine were non-native. California oat grass and brown-headed rush were the dominant species, accounting for approximately 29% and 19% cover, respectively (see Appendix B Table B-17). Thatch was also fairly abundant and accounted for approximately 14% cover. Gumweed accounted for approximately 9% cover, while rattlesnake grass, coyote thistle, and cut-leaved geranium contributed cover ranging from 4% to 5%. Common yarrow, dwarf brodiaea, needle spikerush, smooth cat's-ear, chaffweed, coast tarweed, and marsh micoseris contributed cover ranging from 1% to 3%. Other species included Spanish lotus, silvery hair-grass, soft chess, annual quaking grass, rattail sixweeks grass, rough cat's-ear, and scarlet pimpernel. Bare ground accounted for approximately 5%.

3.17.1.1 *Contra Costa Goldfields*

Contra Costa goldfields at Pond 61 were mapped on April 28, May 13, and May 20, 2020; they occupied 0.15 acre with a density of 15-65% cover. Figure 3-21 illustrates the extent of the CCG population at Pond 61.

Document Path: \\gis_master\GIS\2020_FO_Biomonitoring\WetlandMonitoring\WetlandVeg\ReportMaps\2_ContraCostaGoldfields\2020_WetlandVeg_CCG_200917.mxd

Figure 3-21. Contra Costa Goldfields Populations at Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation), 2020

3.17.2 Wildlife Monitoring

Pond 61 was surveyed for CTS and fairy shrimp on April 14, 2020. California tiger salamanders were not detected in April; however, fairy shrimp were present in high abundance. No surveys were conducted in March or May due to insufficient vernal pool depth. Table 3-51 and Table 3-52 provide results of the CTS and fairy shrimp surveys completed in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-51. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
61	4/14/2020	0	-	-	-		-	-	-	21 mins

Table 3-52. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
4/14/2020	High (172)

3.18 Pond 73

Pond 73 was in year 3 of monitoring for post-mastication and year 2 for post-subsurface munitions remediation in 2020. Pond 73 was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.18.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 73 on June 3 and 4, 2020. These monitoring data represent year 3 post-mastication and year 2 post-subsurface munitions remediation conditions. Pond 73 was dry by the June 4 monitoring event. Biologists identified three strata at the vernal pool (see Table 3-53 and Figure 3-22). Appendix B provides the species cover results within each stratum. Strata 1 and 2 were repeated from 2017, 2018, and 2019, whereas stratum 4 was repeated from 2018 and 2019. Transect 1 was repeated from 2018 and 2019. Transect 2 was relocated to an area with more representative vegetative composition. Transect 4 was repeated from 2018.

Table 3-53. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	11%
2	46%
4	41%
Upland	2%

Figure 3-22. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2020

Sixty-nine plant species were observed within the vernal pool basin boundary. Of these species, 43 were native, 25 were non-native, and one was unidentified. Nine species were OBL wetland plants, 25 were FACW or FAC, ten were FACU or UPL, and 25 were not listed. Appendix E 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. Three plant species were observed along the transect. Of these species, two were native and one was non-native. Pale spikerush was the dominant species, accounting for approximately 64% cover (see Appendix B Table B-18). Thatch was abundant, accounting for approximately 32% cover. Brown-headed rush and rabbitfoot grass contributed 1% or less. Bare ground contributed approximately 3% cover.

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, six were native and two were non-native. Brown-headed rush was the dominant species accounting for approximately 68% (see Appendix B Table B-18). Thatch was also fairly abundant and contributed approximately 19% cover. Coyote thistle contributed 8% cover. Annual hair grass, needle spikerush, smooth goldfields, and rabbitfoot grass contributed cover ranging from 1% to 4%. Other species included cut-leaved geranium and Hickman's popcornflower.

Transect 4 at Pond 73 consisted of a 10-m transect placed in stratum 4. Twenty-one plant species were observed along the transect. Of these species, twelve were native and nine were non-native. Coyote thistle and rabbitfoot grass were the dominant species, accounting for approximately 31% and 23% cover, respectively (see Appendix B Table B-18). Bare ground and thatch accounted for approximately 9% and 8% cover, respectively. Brown-headed rush contributed 13%, while annual quaking grass, Johnny-Nip, coastal tarweed, annual hair grass, needle spikerush, smooth cat's-ear, dwarf rush, grass poly, chaffweed, round woolly-marbles, common sow thistle, and Davy's century contributed cover ranging from 1% to 2%. Other species included vernal pool bent grass, cut-leaved geranium, rough cat's-ear, common toad rush, dwarf rush, narrowleaf cottonrose, and Hickman's popcornflower.

3.18.2 Wildlife Monitoring

Pond 73 was surveyed for CTS and fairy shrimp on April 20, 2020. California tiger salamanders were not detected in April; however, one individual fairy shrimp was present. No surveys were conducted in March or May due to insufficient vernal pool depth. Table 3-54 and Table 3-55 provide results of the CTS and fairy shrimp surveys completed in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-54. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean	Range	Mode	Mean	Range	Mode	
73	4/20/2020	0	-	-	-	-	-	-	-	1 hr

Table 3-55. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
4/20/2020	Low (1)

3.19 Machine Gun Flats

Machine Gun Flats, a post-mastication vernal pool, was in year 3 of monitoring in 2020. Machine Gun Flats was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.19.1 Vegetation Monitoring

Vegetation monitoring was completed at Machine Gun Flats on May 29, June 4, June 5, and June 25, 2020. These monitoring data represent year 3 post-mastication conditions. Standing water with a depth of 85 cm was present during the June 25 monitoring event. Biologists identified nine strata at the vernal pool (see Table 3-56 and Figure 3-23). Appendix B provides the species cover results within each stratum. Strata 1 through 9 were repeated from 2019. Transects 3 and 5 were relocated to an area with more representative vegetative composition. All other transects were repeated from 2019.

Table 3-56. Machine Gun Flats (Year 3 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	0.3%
2	53%
3	1%
4	9%
5	5%
6	3%
7	6%
8	21%
9	2%

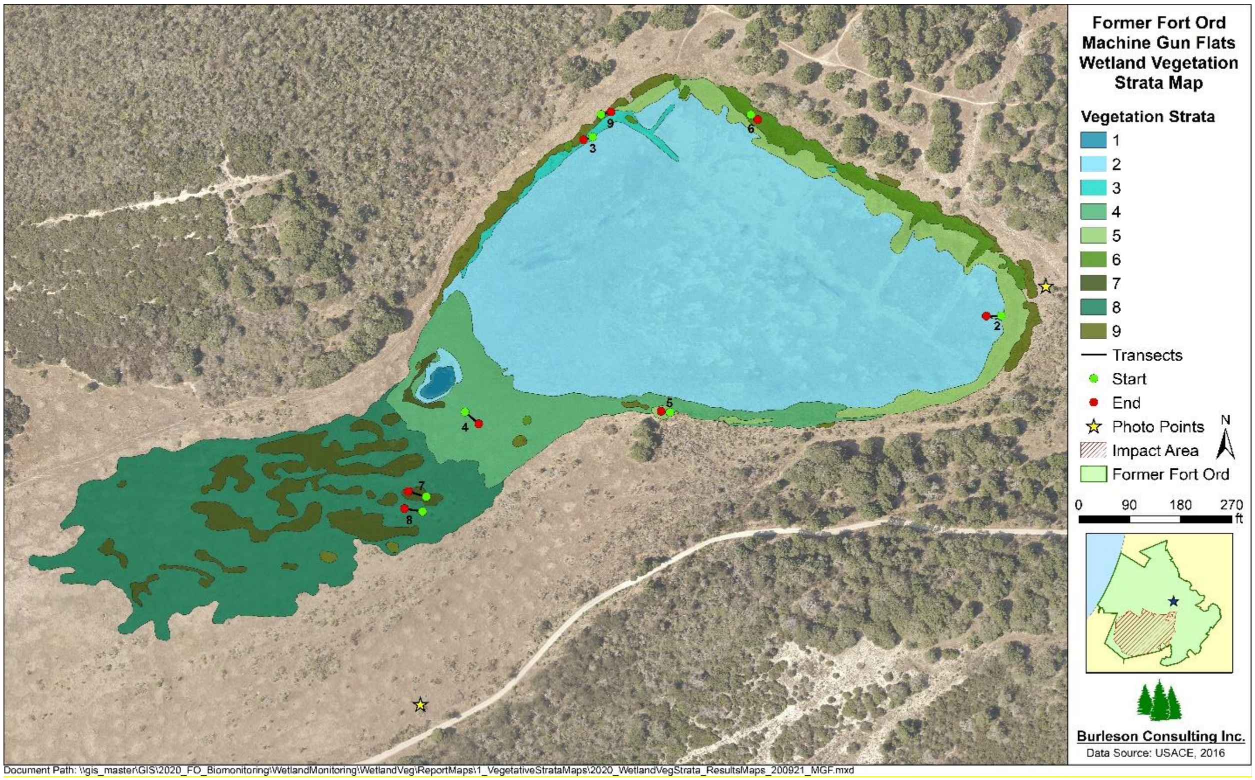


Figure 3-23. Machine Gun Flats (Year 3 Post-Mastication) Vegetation Strata and Transects on Former Fort Ord, 2020

One hundred twenty-three plant species were observed within the vernal pool basin boundary. Of these species, 77 were native, 43 were non-native, and three were unidentified. Nine species were OBL wetland plants, 41 were FACW or FAC, 24 were FACU or UPL, and 49 were not listed. Appendix E identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Stratum 1 consisted of the inundated area with about 21% emergent vegetation, 50% floating vegetation, and 29% open water. Emergent vegetation consisted of pale spikerush and water smartweed (*Persicaria amphibia*). Floating vegetation was longleaf pondweed (*Potamogeton nodosus*). No transects were placed in the stratum because it was inundated at the time of monitoring. Percent cover was visually assessed for this stratum.

Transect 2 at Machine Gun Flats consisted of a 10-m transect placed in stratum 2. Ten plant species were observed along the transect. Of these species, seven were native and three were non-native. Pale spikerush was the dominant species accounting for 15% cover (see Appendix B Table B-19). Thatch was very abundant, accounting for approximately 72%. Rabbitfoot grass contributed 5% cover, while Pacific bent grass, salt grass, brown-headed rush, and longleaf pondweed contributed cover ranging from 1% to 2%. Other species included needle spikerush, Baltic rush, grass poly, and alkali mallow. Bare ground accounted for approximately 2%.

Transect 3 at Machine Gun Flats consisted of a 5-m transect placed in stratum 3. Twenty-three plant species were observed along the transect. Of these species, eight were native and 15 were non-native. Rabbitfoot grass was the dominant species, accounting for approximately 14% cover (see Appendix B

Table B-19). Thatch was abundant, accounting for approximately 35% cover. Baltic rush contributed 6%, while Pacific bent grass, annual quaking grass, coastal tarweed, salt grass, long-beaked filaree, horseweed, cut-leaved geranium, smooth cat's-ear, rough cat's-ear, grass poly, alkali mallow, cut-leaved plantain, weedy cudweed, cutleaf burnweed, small-flower catchfly, prickly sow thistle, common sow thistle, and bugle hedge nettle contributed cover ranging from 1% to 4%. Other species included Italian thistle (*Carduus pycnocephalus*), beardless wild rye (*Elymus triticoides*), and cottonbatting plant. Bare ground accounted for approximately 9%.

Transect 4 at Machine Gun Flats consisted of a 10-m transect placed in stratum 4. Eighteen plant species were observed along the transect. Of these species, seven were native and 11 were non-native. Coyote thistle was the dominant species, accounting for approximately 19% cover (see Appendix B Table B-19). Salt grass contributed 10% cover, while coastal tarweed was 8% cover. Thatch was abundant, accounting for approximately 43%. Annual quaking grass, cut-leaved geranium, smooth cat's-ear, pale flax (Linum bienne), alkali mallow, common sow thistle, and bugle hedge nettle contributed cover ranging from 1% to 4%. Other species included silvery hair-grass, soft chess, long-beaked filaree, Italian rye grass, brown-headed rush, grass poly, cut-leaved plantain, and Davy's centuary. Bare ground accounted for approximately 2%.

Transect 5 at Machine Gun Flats consisted of a 5-m transect placed in stratum 5. Seven plant species were observed along the transect. Of these species, five were native and two were non-native. Baltic rush was the dominant species, accounting for 28% cover (see Appendix B Table B-19). Thatch and bare ground were abundant, accounting for approximately 44% and 23% cover, respectively. Needle spikerush contributed 2% cover, while cut-leaved geranium, brown-headed rush, and cottonbatting plant each contributed approximately 1% cover. Other species included Pacific bent grass and salt grass.

Transect 6 at Machine Gun Flats consisted of a 5-m transect placed in stratum 6. Eight plant species were observed along the transect. Of these species, four were native, three were non-native, and one was unidentified. Western goldenrod and Baltic rush were the dominant species, accounting for approximately 24% and 16% cover, respectively (see Appendix B Table B-19). Bare ground and thatch were abundant, accounting for approximately 28% and 26% cover, respectively. Needle spikerush, cut-leaved geranium, scarlet pimpernel, *Pseudognaphalium* sp., common sow thistle, and western vervain (*Verbena lasiostachys* var. *lasiostachys*) contributed 2% or less cover.

Transect 7 at Machine Gun Flats consisted of a 10-m transect placed in stratum 7. Twenty-nine plant species were observed along the transect. Of these species, 15 were native, 12 were non-native, and two were unidentified. Coyote thistle was the dominant species, accounting for approximately 18% cover (see Appendix B Table B-19). Bare ground and thatch were abundant, accounting for approximately 28% and 22%, respectively. Silvery hair-grass, Johnny-Nip, long-beaked filaree, brown-headed rush, cut-leaved plantain, and Davy's centuary contributed cover ranging from 2% to 7%. Vernal pool bent grass, annual quaking grass, dwarf brodiaea, California oat grass, brome fescue, smooth cat's-ear, common toad rush, chaffweed, *Madia* sp., round woolly-marbles, and sack clover (*Trifolim depauperatum*) each contributed 1% cover. Other species included valley tassels, coastal tarweed, rattail sixweeks grass, cut-leaved geranium, dwarf rush, scarlet pimpernel, grass poly, gumweed, common sow thistle, *Trifolium* sp., and variegated clover.

Transect 8 at Machine Gun Flats consisted of a 10-m transect placed in stratum 8. Eleven plant species were observed along the transect. Of these species, three were native and eight were non-native. Brome fescue and California oat grass were the dominant species, accounting for approximately 26%

and 22% cover, respectively (see Appendix B Table B-19). Thatch was abundant, accounting for approximately 30%. Dwarf brodiaea, long-beaked filaree, Italian rye grass, cut-leaved geranium, smooth cat's-ear, pale flax, grass poly, and gumweed contributed cover ranging from 1% to 4%. Other species included annual quaking grass. Bare ground accounted for approximately 7% cover.

Transect 9 at Machine Gun Flats consisted of a 5-m transect placed in stratum 9. Seventeen plant species were observed along the transect. Of these species, three were native, 13 were non-native, and one was unidentified. Beardless wild rye was the dominant species, accounting for approximately 39% cover (see Appendix B Table B-19). Thatch was abundant, accounting for approximately 31%. Needle spikerush, horseweed, smooth cat's-ear, sheep sorrel, and cutleaf burnweed contributed cover ranging from 2% to 6%. Slender wild oat, annual quaking grass, cut-leaved geranium, scarlet pimpernel, grass poly, cut-leaved plantain, rabbitfoot grass, *Pseudognaphlium* sp., weedy cudweed, prickly sow thistle, and common sow thistle contributed 1% cover or less. Bare ground accounted for 6% cover.

3.19.1.1 *Contra Costa Goldfields*

The area was surveyed four times between March and June and no individuals were detected.

3.19.2 Wildlife Monitoring

Machine Gun Flats was surveyed for CTS and fairy shrimp on March 16, April 14, and May 18, 2020. California tiger salamanders were present in March and April, while one individual fairy shrimp was present in April. Table 3-57 and Table 3-58 provide results of the CTS and fairy shrimp surveys completed in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-57. Machine Gun Flats (Year 3 Post-Mastication) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
Machine Gun Flats	3/16/2020	5	5	25	23-29	N/A	12	9-15	N/A	2 hrs 4 mins
	4/14/2020	3	3	36	26-51	N/A	23	19-29	N/A	8 hrs 12 mins
	5/18/2020	0	-	-	-	-	-	-	-	4 hrs 50 mins

*The mean was rounded to the nearest whole number

Table 3-58. Machine Gun Flats (Year 3 Post-Mastication) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
3/16/2020	Not detected
4/14/2020	Low (1)
5/18/2020	Not detected

3.20 Pond 16

Pond 16 was in year 2 for post-subsurface munitions remediation in 2020. Pond 16 was monitored for hydrology, vegetation, and wildlife. Hydrology results are reported separately in the Hydrology Monitoring Annual Report (Chenega, 2021).

3.20.1 Vegetation Monitoring

Vegetation monitoring was completed at Pond 16 on June 15 and August 11, 2020. These monitoring data represent year 2 post-subsurface munitions remediation conditions. Pond 16 was dry by the August 11 monitoring event. Biologists identified five strata at the vernal pool (see Table 3-59 and Figure 3-24). Appendix B provides the species cover results within each stratum. Strata 3 and 5 were repeated from 2015, 2017, and 2019. Strata 1, 4, and 6 were repeated from 2017 and 2019. Transects 3 and 5 were repeated from 2015, 2017, and 2019. Transect 4 was repeated from 2019, whereas Transect 6 was repeated from 2017 and 2019.

Table 3-59. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage
1	4%
3	34%
4	25%
5	33%
6	4%

Figure 3-24. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects on Former Fort Ord, 2020

Eighty-one species were observed within the vernal pool basin boundary. Of these species, 52 were native and 29 were non-native. Eight species were OBL wetland plants, 30 were FACW or FAC, 16 were FACU or UPL, and 27 were not listed. Appendix E identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum.

Stratum 1 at Pond 16 consisted of an estimated California bulrush (*Schoenoplectus californicus*) 65%, Chinese pusley 2%, bull thistle 1%, lowland cudweed 1%, alkali mallow 1%, thatch 5%, and bare ground 25% cover. No transects were placed in the stratum since the height and density of the California bulrush created accessibility issues. Percent cover was visually assessed for this stratum.

Transect 3 at Pond 16 consisted of a 10-m transect placed in stratum 3. Five plant species were observed along the transect. Of these species three were native and two were non-native. Pale spikerush was the dominant species, accounting for approximately 54% cover (see Appendix B Table B-20). Thatch was abundant, accounting for approximately 23% cover. Lowland cudweed contributed approximately 10%, while swamp pricklegrass (*Crypsis schoenoides*) contributed 5% cover. Other species included barnyard grass (*Echinochloa crus-galli*) and alkali mallow. Bare ground accounted for approximately 8% cover.

Transect 4 at Pond 16 consisted of a 10-m transect placed in stratum 4. Eight plant species were observed along the transect. Of these species six were native and two were non-native. Clustered field sedge was the dominant species, accounting for approximately 54% cover (see Appendix B Table B-20). Thatch was fairly abundant, accounting for approximately 20% cover. Baltic rush and California blackberry (*Rubus californica*) contributed approximately 13% and 9% cover, respectively. Seashore bent grass (*Agrostis pallens*), annual quaking grass, bull thistle, beardless wild rye, and brown-headed rush each contributed 1% cover or less. Bare ground accounted for approximately 1% cover.

Transect 5 at Pond 16 consisted of a 10-m transect placed in stratum 5. Three native plant species were observed along the transect. Whiteroot (*Carex barbarae*) and California blackberry were the dominant species, accounting for approximately 39% and 20% cover, respectively (see Appendix B Table B-20). Thatch was abundant, accounting for approximately 21% cover. West Coast Canada goldenrod (*Solidago elongata)* contributed approximately 10% cover. Bare ground accounted for 10% cover.

Transect 6 at Pond 16 consisted of a 5-m transect placed in stratum 6. Three plant species were observed along the transect. Of these species one was native and two were non-native. Baltic rush was the dominant species, accounting for approximately 72% cover (see Appendix B Table B-20). Thatch was abundant accounting for 23% cover. Other species included weedy cudweed and curly dock. Bare ground contributed approximately 4% cover.

3.20.2 Wildlife Monitoring

Pond 16 was surveyed for CTS and fairy shrimp on April 20 and May 19, 2020. California tiger salamanders were not detected; however, fairy shrimp were present in April in high abundance. No surveys were conducted in March due to insufficient vernal pool depth. Table 3-60 and Table 3-61 provide results of the CTS and fairy shrimp surveys completed in 2020. Invertebrate results for 2020 are provided in Appendix C (see Table C-2).

Table 3-60. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) CTS Aquatic Monitoring Results

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean *	Range	Mode	
16	4/20/2020	0	-	-	-	-	-	-	-	2 hrs
	5/19/2020	0	-	-	-	-	-	-	-	1 hr 10 mins

Table 3-61. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) Fairy Shrimp Monitoring Results

Sampling Date	Abundance (# Individuals)
4/20/2020	High (267)
5/19/2020	Not detected

4 DISCUSSION

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

- DQO 3: vegetation – similar hydrophytic vegetation as reference control wetlands
- DQO 5: wildlife – consistent with baseline and similar to reference control wetland trends

4.1 Pond 5 – Reference

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

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

Survey	Water-Year											
	1993-1994	1994-1995	1995-1996	2006-2007	2009-2010	2012-2013	2013-2014	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Hydrology	●	●	●	●		●	●	●	●	●	●	●
Vegetation	●	●	●	●				●	●	●	●	●
Wildlife	●	●	●	●	●			●	●	●	●	●

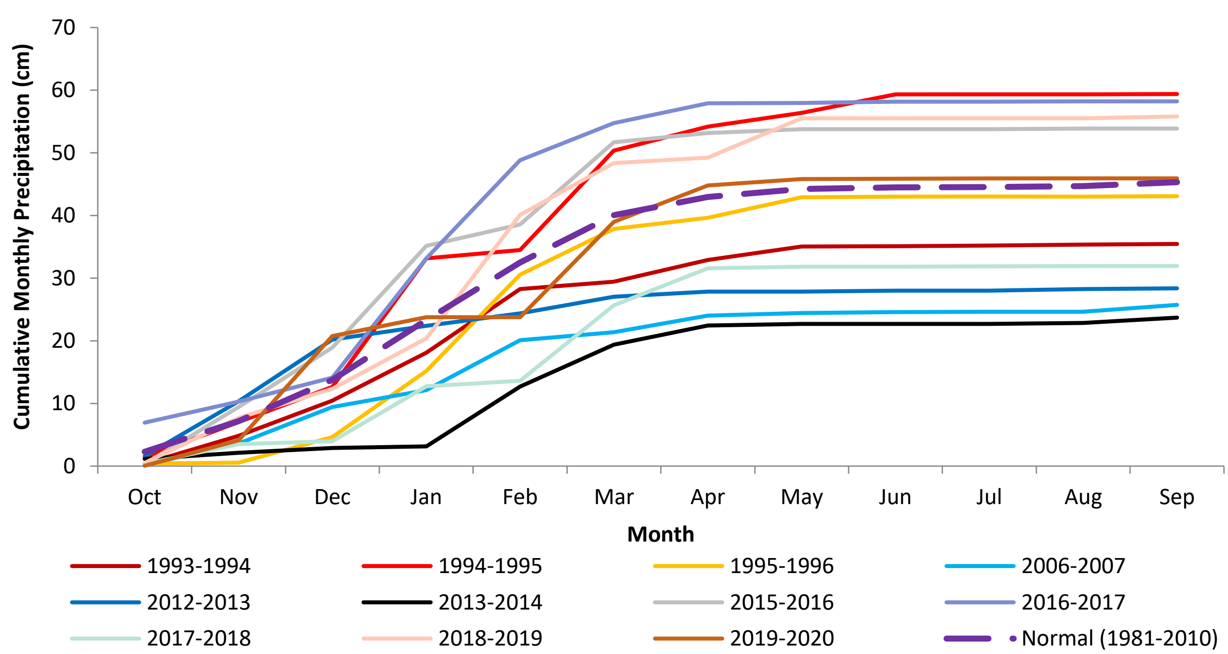


Figure 4-1. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 5 (Reference) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.1.1 Vegetation Monitoring

Vegetation data were collected at Pond 5 in 2007, 2016, 2017, 2018, 2019, and 2020 (Shaw, 2008; Burleson, 2017, 2018, 2019, and 2020). Data from 1994, 1995, and 1996 only represent dominant species and are not included in the following analyses because the data were collected using a different methodology than was used in more recent years (Jones and Stokes, 1996). In 2007, data were collected in three zones using a 1.0 m^2 quadrat placed at three locations within each zone, and data for all strata were combined for the entire pool to allow for comparison to other years. In years 2016-2020, data were collected using methodologies described in the Methods section of this report. Data from 2016 and 2020 were compared stratum-to-stratum in Table 4-2 as well as visually in Figure 4-2.

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

Stratum	Percentage	
	2016	2020
1	26%	35%
2	32%	32%
3	38%	12%
4	4%	N/A
6	N/A	14%
7	N/A	7%

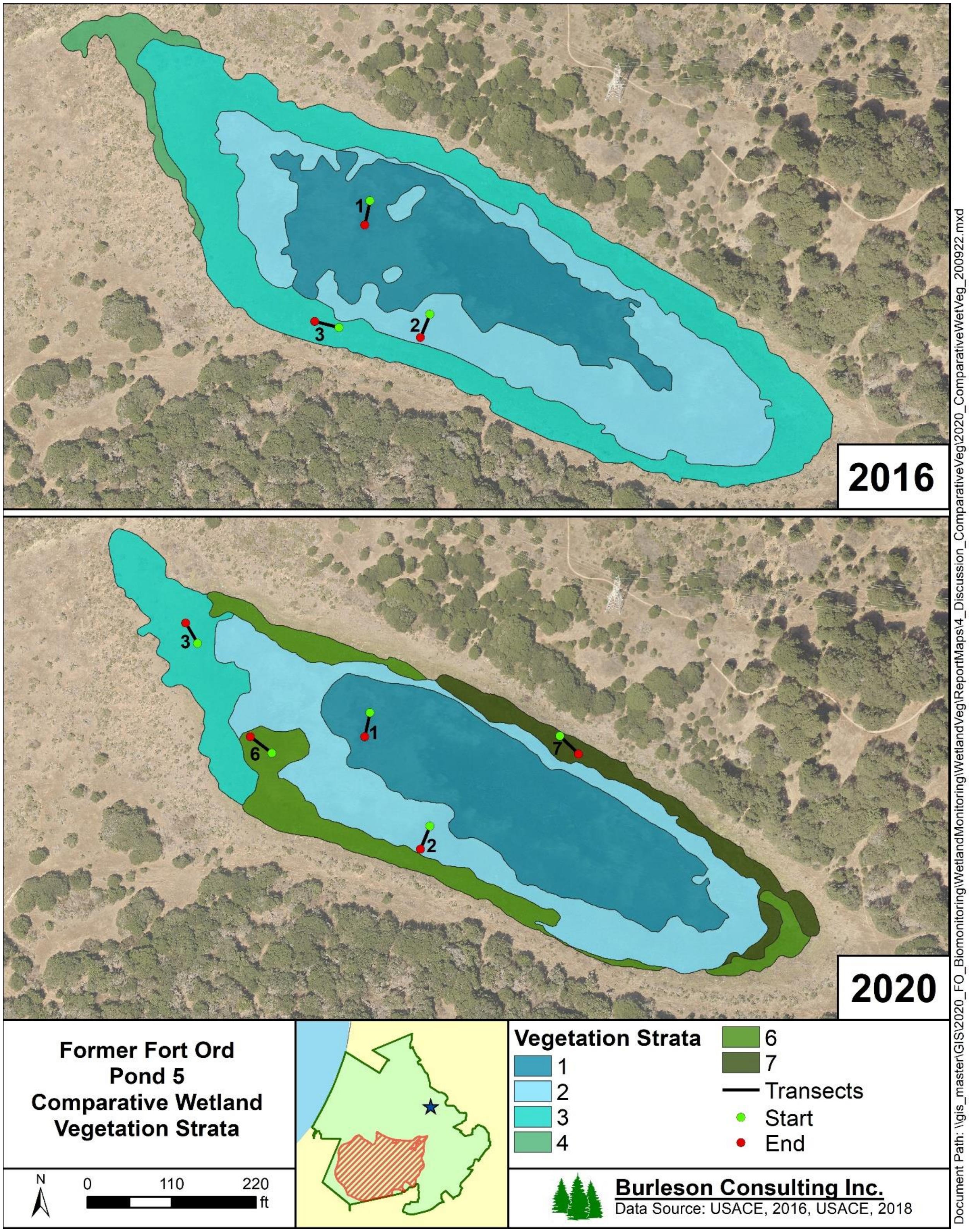


Figure 4-2. Pond 5 (Reference) Vegetation Strata and Transects for 2016 and 2020

The absolute percent vegetative cover observed in 2020 was comparable to previous years and most similar to 2018 (see Table 4-3). Vegetative cover ranged from 36.3% in 2007 to 76.0% in 2019, whereas thatch/bare ground ranged from 24.0% in 2019 to 63.7% in 2007.

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

Year	Vegetative Cover	Thatch/Bare Ground
2007	36.3%	63.7%
2016	75.1%	25.2%
2017	60.5%	40.4%
2018	54.6%	45.5%
2019	76.0%	24.0%
2020	47.6%	52.4%

Species richness increased between 2007 and 2018, subsequently decreased on transects in 2019 and decreased on both transects and overall basin in 2020 at Pond 5. Species richness on transects was 4, 7, 29, 41, 35, and 17 species in 2007, 2016, 2017, 2018, 2019, and 2020, respectively, whereas overall basin species richness was 26, 40, 73, 88, 94, and 69 species, respectively (see Table 4-4 and Appendix A Table A-1).

Species composition at Pond 5 varied between monitoring years; however, the dominant species in the vernal pool were pale spikerush (*Eleocharis macrostachya*) and salt grass (*Distichlis spicata*) in the majority of monitoring years. Baltic rush (*Juncus balticus)* and bugle hedge nettle (*Stachys ajugoides)* contributed greater cover in 2020 than has previously been observed. A complete comparison of species composition observed during the surveys at Pond 5 in 2007, 2016, 2017, 2018, 2019, and 2020 can be found in Appendix F. Figure 4-3 shows a subset of this comparison for species observed with a 2% cover or greater.

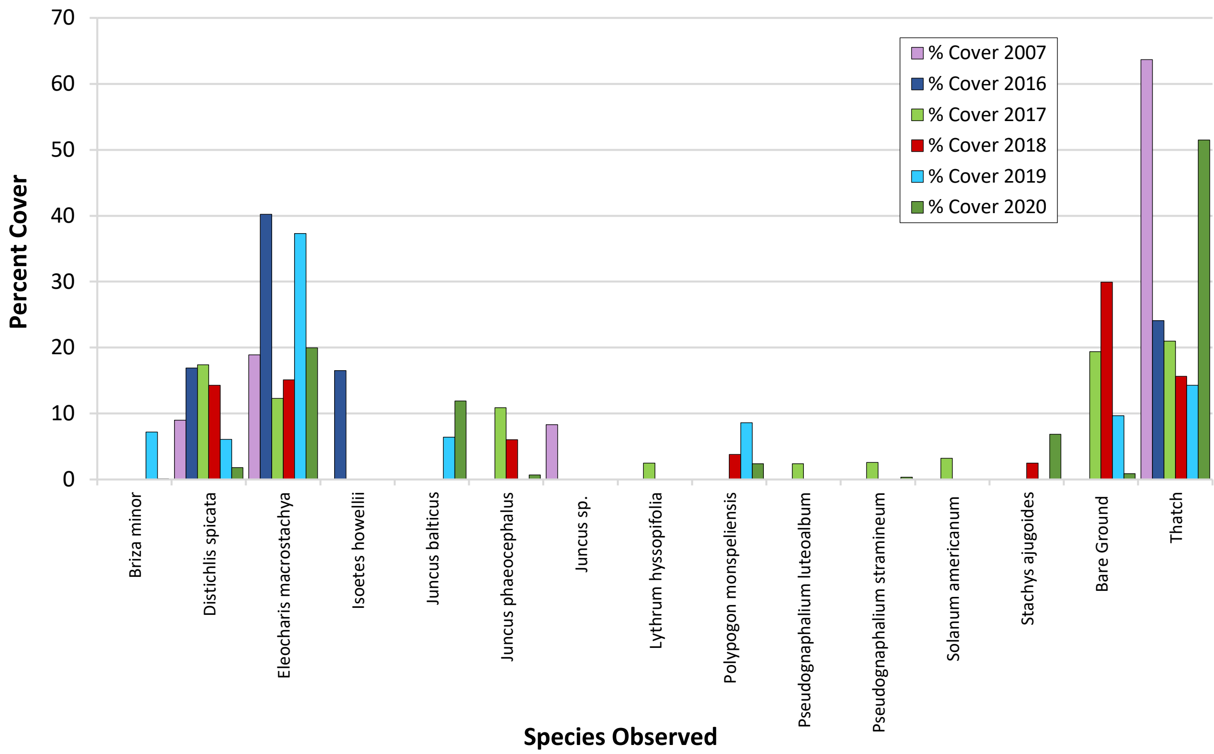


Figure 4-3. Percent Cover of Dominant Species at Pond 5 (Reference)

Native and non-native species richness on Pond 5 transects increased through time until 2018 and decreased in 2019 and 2020 (see Table 4-4). The relative percent cover of native species varied through time and the 2020 values were within the range observed in previous years. The relative percent cover of non-native species increased from 2016-2019 but decreased in 2020 (see Table 4-5).

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

Year	Native	Non-Native	Unidentified
2007	2	1	1
2016	7	0	0
2017	15	11	3
2018	25	16	0
2019	21	14	0
2020	12	11	0

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

Year	Native	Non-Native	Unidentified
2007	76.9%	0.3%	22.9%
2016	100.0%	0.0%	0.0%
2017	86.6%	12.9%	0.6%
2018	83.3%	16.7%	0.0%
2019	73.6%	26.4%	0.0%
2020	91.3%	8.7%	0.0%

Wetland and non-wetland species richness on Pond 5 transects increased through time until 2018 and decreased slightly in 2019 and 2020 (see Table 4-6). The relative percent cover of wetland and non-wetland species were within the range of previously observed values (see Table 4-7).

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

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2007	1	1	0	1	0	1
2016	3	3	0	1	0	0
2017	5	8	5	5	0	6
2018	5	11	7	8	1	9
2019	5	9	4	5	1	11
2020	4	7	3	3	1	5

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

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2007	52.1%	24.8%	0.0%	0.3%	0.0%	22.9%
2016	75.9%	23.3%	0.0%	0.8%	0.0%	0.0%
2017	26.3%	55.3%	9.6%	8.0%	0.0%	0.8%
2018	33.7%	50.5%	10.2%	3.3%	0.3%	2.0%
2019	51.9%	31.0%	10.3%	3.4%	0.1%	3.3%
2020	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%

4.1.1.1 *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 is used for comparison to remediated vernal pools.

4.1.1.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 5 is a reference vernal pool and not required to meet performance standards. The vernal pool provides a control for comparison to the remediated vernal pools.

4.1.2 Wildlife Monitoring

Wildlife data were collected at Pond 5 in 1994, 1995, 1996, 2007, 2010, 2016, 2017, 2018, 2019, and 2020 (Jones and Stokes, 1996; Shaw, 2008, 2011; Burleson, 2017, 2018, 2019, 2020). Fairy shrimp were present in 1995 and 2019. California tiger salamander larvae were observed in 1995, 2010, 2016, 2017, and 2019. Table 4-8 shows historic wildlife monitoring results.

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

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1994	Not detected	Not detected
1995	Abundant	Very low – moderate
1996	Not detected	Not detected
2007	Not detected	Not detected
2010	Few - Common	Not detected
2016	Common - Abundant (101, 75, 100)	Not detected
2017	Common (12, 18, 16)	Not detected
2018	Not detected	Not detected
2019	Common - Abundant (0, 165, 46)	Low (3)
2020	Not detected	Not detected

4.1.2.1 *Data Quality Objective 5*

California tiger salamanders were not detected in 2020. They were present in 1995, 2010, 2016, 2017, and 2019, but were not detected in 1994, 1996, 2007, 2018, or 2020. The variation in CTS presence may be associated with rainfall patterns and the resultant vernal pool habitat. Presence was always observed in the surveyed above-normal water years, however, CTS were only present once (2010) in a normal or below normal water-year (see Figure 4-1 and Table 4-8).

Fairy shrimp were not detected in 2020. Fairy shrimp were previously detected in 1995 and 2019.

4.1.2.2 *Performance Standard: Wildlife Usage*

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

4.1.3 Conclusion

Pond 5 is used for comparison to 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
Plant Cover & Species Diversity	DQO 3	Suitable for Comparison
Wildlife Usage	DQO 5	Suitable for Comparison

4.2 Pond 101 East (East) – Reference

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

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

Survey	Water-Year											
	1991-1992	2000-2001	2006-2007	2009-2010	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Hydrology		●	●		●	●	●	●	●	●	●	●
Vegetation								●	●	●	●	●
Wildlife	●	●	●	●				●	●	●	●	●

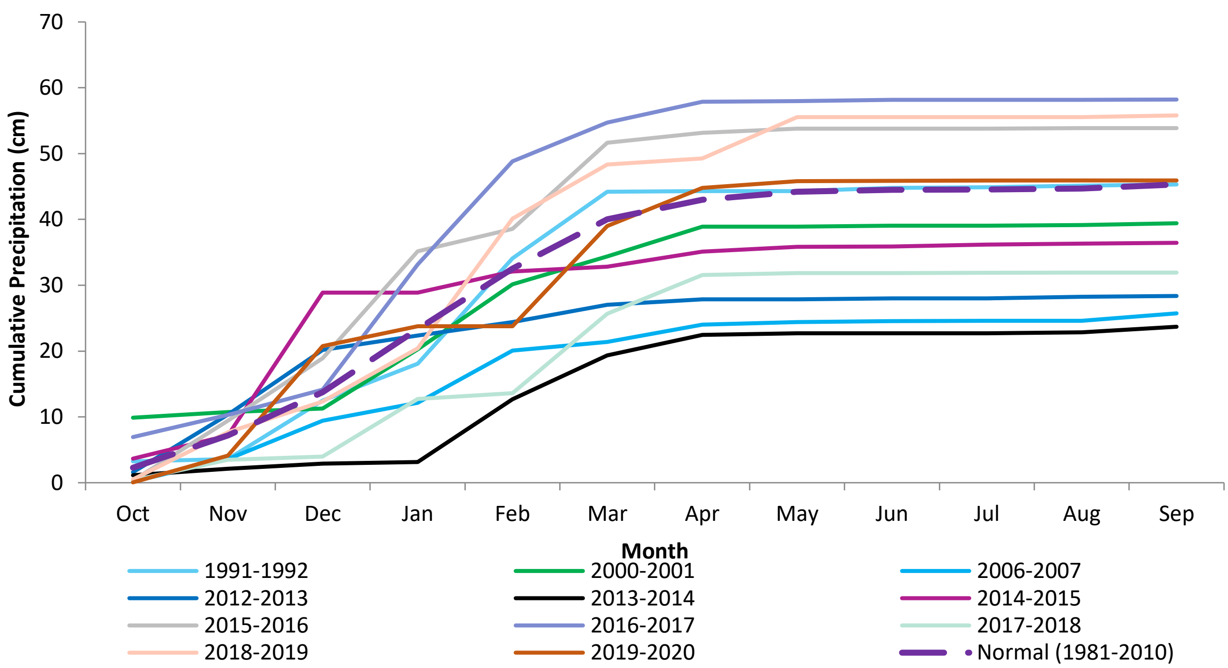


Figure 4-4. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 101 East (East) (Reference) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.2.1 Vegetation Monitoring

Vegetation data were collected at Pond 101 East (East) in 2016, 2017, 2018, 2019, and 2020 (Burleson, 2017, 2018, 2019, 2020). Data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2020 were compared stratum-to-stratum in Table 4-11 as well as visually in Figure 4-5.

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

Stratum	Percentage	
	2016	2020
1	0.4%	0.4%
2	48%	38%
3	44%	N/A
4	8%	25%
5	N/A	2%
6	N/A	0.5%
8	N/A	34%

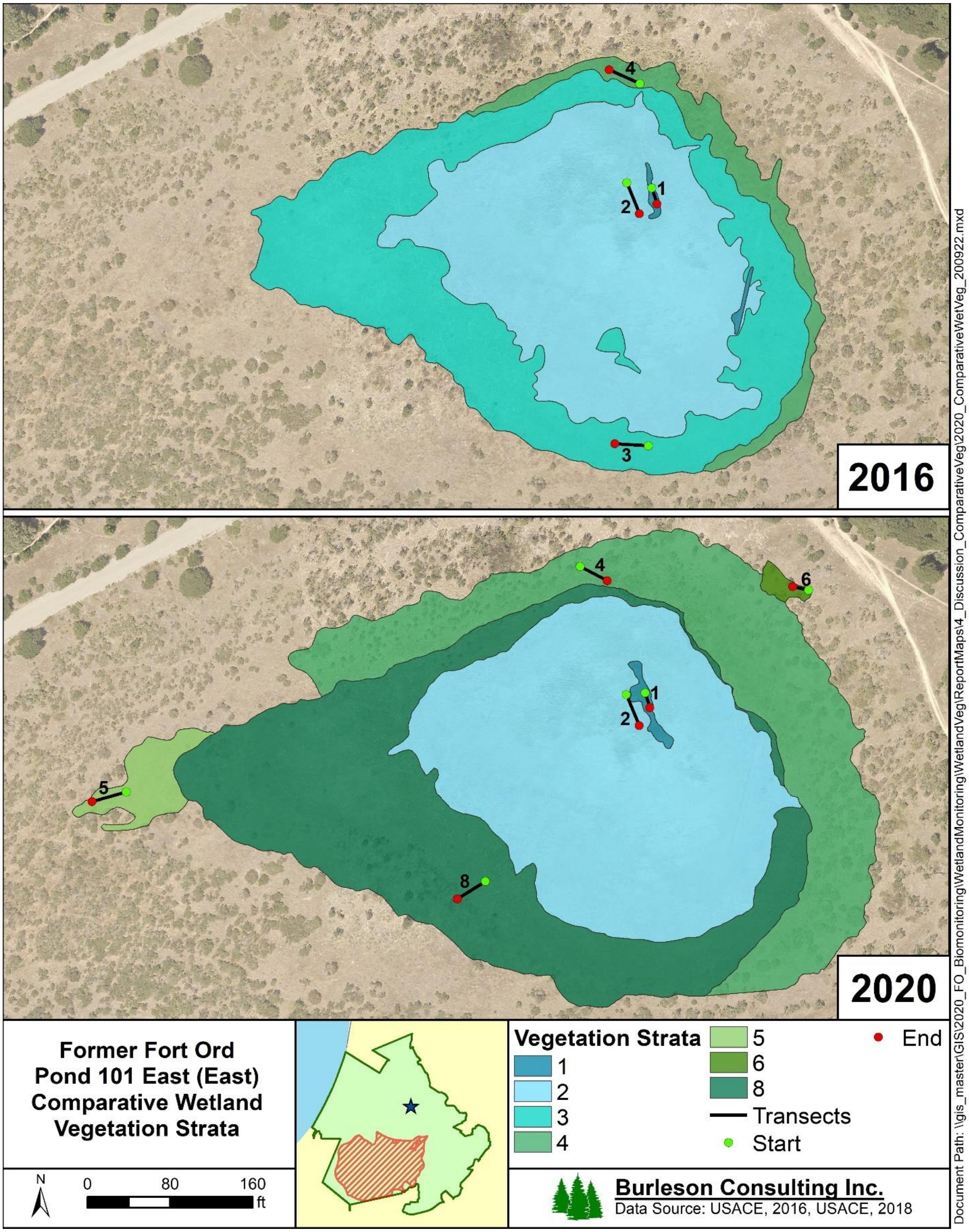


Figure 4-5. Pond 101 East (East) (Reference) Vegetation Strata and Transects for 2016 and 2020

The absolute percent vegetative cover observed in 2020 was comparable to previous years and most similar to 2016 (see Table 4-12). Vegetative cover ranged from 60.7% in 2016 to 84.6% in 2017, whereas thatch/bare ground ranged from 16.6% in 2017 to 41.0% in 2016.

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

Year	Vegetative Cover	Thatch/Bare Ground
2016	60.7%	41.0%
2017	84.6%	16.6%
2018	68.7%	32.6%
2019	72.6%	28.6%
2020	63.4%	36.6%

Species richness increased between 2016 and 2020 on the transects and fluctuated slightly in the overall basin between 2018 and 2020 at Pond 101 East (East). Species richness on transects was 18, 18, 32, 37, and 43 species in 2016, 2017, 2018, 2019, and 2020, respectively, whereas overall basin species richness was 37, 59, 89, 84, and 86 species, respectively (see Table 4-13 and Appendix A Table A-2).

Species composition at Pond 101 East (East) was variable through time, and the dominant species were different between years. Pale spikerush (*Eleocharis macrostachya*) and Baltic rush (*Juncus balticus*) were the dominant species in 2016 and 2020; Baltic rush (*Juncus balticus*) and purple cudweed (*Gnaphalium palustre*) were the dominant species in 2017; pale spikerush (*Eleocharis macrostachya*), common toadrush (*Juncus bufonius* var. *bufonius)* and alkali mallow (*Malvella leprosa*) were dominant in 2018, and pale spikerush (*Eleocharis macrostachya*), sheep sorrel (*Rumex acetosella*), and Baltic rush (*Juncus balticus*) were dominant in 2019. A complete comparison of species composition observed at Pond 101 East (East) in 2016, 2017, 2018, 2019, and 2020 can be found in Appendix F.

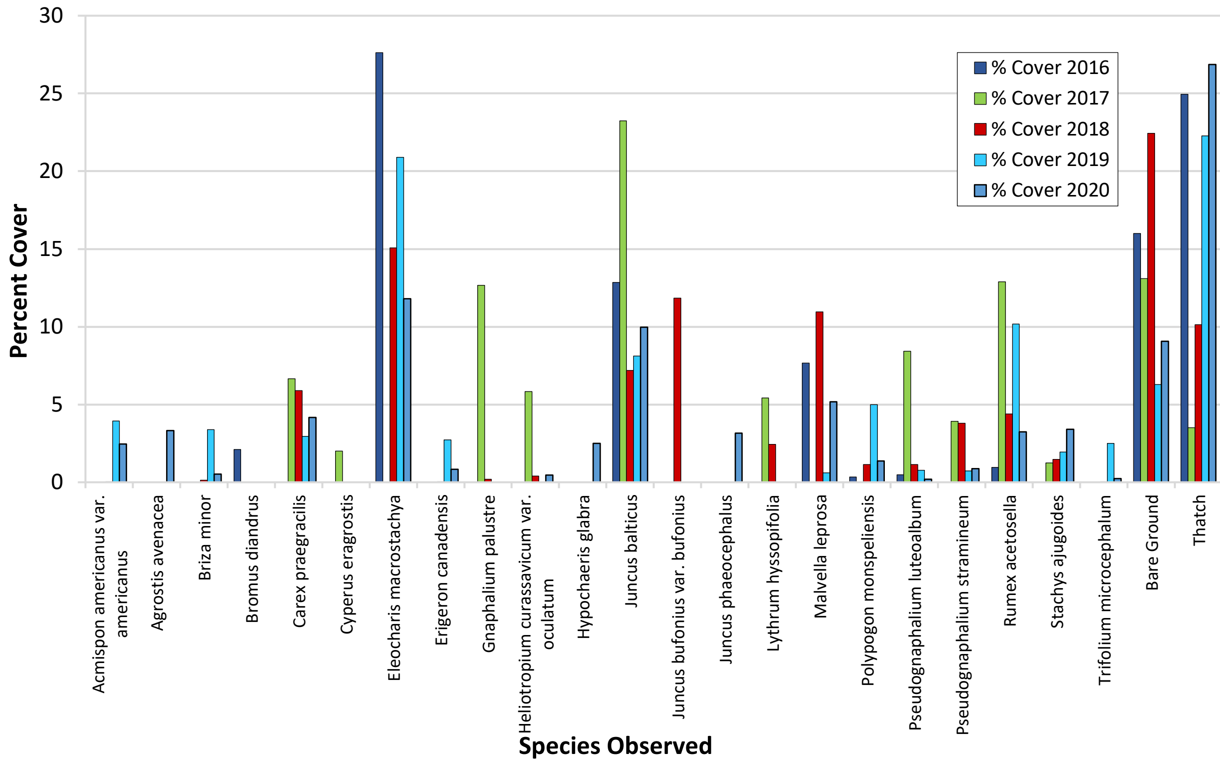


Figure 4-6. Percent Cover of Dominant Species at Pond 101 East (East) (Reference)

Native species richness on Pond 101 East (East) transects increased between 2016 and 2018, remained the same in 2019, and increased in 2020 (see Table 4-13). Non-native species richness was more variable between monitoring years, but generally increased by 2019 and remained the same in 2020. Native and non-native species relative percent cover were variable, and 2020 values were most similar to 2017 and 2019 (see Table 4-14).

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

Year	Native	Non-Native	Unidentified
2016	9	9	0
2017	13	5	0
2018	18	11	3
2019	18	19	0
2020	24	19	0

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

Year	Native	Non-Native	Unidentified
2016	88.9%	11.1%	0.0%
2017	67.7%	32.3%	0.0%
2018	84.4%	14.7%	0.9%
2019	64.7%	35.3%	0.0%
2020	72.2%	27.8%	0.0%

Wetland species richness on Pond 101 East (East) transects increased between 2016 and 2018, but was static in 2019 and increased in 2020 (see Table 4-15). Non-wetland species on transects increased from 2016 to 2019 and decreased in 2020. The relative percent cover of wetland species was variable between surveys with a decrease in 2019 and 2020 (see Table 4-16). The relative percent cover of non-wetland species was relatively static between surveys with a slight increase in 2018 and 2019 and a decrease in 2020.

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

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2016	3	6	1	3	0	5
2017	3	8	3	2	0	2
2018	5	9	5	4	2	7
2019	4	8	7	7	3	8
2020	5	8	7	6	3	14

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

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2016	48.4%	27.3%	1.0%	15.1%	0.0%	8.2%
2017	8.1%	64.0%	5.3%	15.6%	0.0%	7.0%
2018	28.2%	40.2%	6.0%	22.6%	1.1%	1.8%
2019	32.9%	24.0%	12.5%	19.4%	3.4%	7.7%
2020	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%

4.2.1.1 *Data Quality Objective 3*

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

4.2.1.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 101 East (East) is a reference vernal pool and not required to meet performance standards. The vernal pool provides a control for comparison to the remediated vernal pools.

4.2.2 Wildlife Monitoring

Wildlife data were collected at Pond 101 East (East) in 1992, 2001, 2007, 2010, 2016, 2017, 2018, 2019, and 2020 (Jones and Stokes, 1992; Harding ESE, 2002; Shaw, 2007; Shaw, 2011; Burleson, 2017, 2018, 2019, 2020). California tiger salamander larvae were observed in 1992, 2010, 2016, 2017, 2018, and 2019. Fairy shrimp were present in 2001, 2019, and 2020. Table 4-17 shows historic wildlife monitoring results.

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

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1992	Present*	Not detected*
2001	Not detected*	Moderate (100, 12)
2007	Not detected	Not detected
2010	Common*	Not detected*
2016	Common – Abundant (>101, 101, 67)	Not detected
2017	Common (36, 70, 5)	Not detected
2018	Few (2)	Not detected
2019	Common – Abundant (38, 212, 225)	Moderate (32)
2020	Not detected	Moderate (15)

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

4.2.2.1 *Data Quality Objective 5*

California tiger salamanders were not detected in 2020 although they were present in 1992, 2010, 2016, 2017, 2018, and 2019. The lack of CTS in 2001, 2007, and 2020 may have been associated with below-normal or normal precipitation; however, CTS were present in below-normal water-years 2010 and 2018.

Fairy shrimp were present in 2020. Fairy shrimp were not detected in 1992, 2007, 2010, 2016, 2017, or 2018, but were present in 2001 and 2019. It was possible that survey event timing prevented detections since previous fairy shrimp detections were made in February and March and surveys during years with no detections occurred later between March and May. However, this was not the case for surveys in 2020. Surveys occurred between March and May and fairy shrimp were present, suggesting that detection is likely associated with the timing of precipitation and resultant ponding, rather than specific months.

4.2.2.2 *Performance Standard: Wildlife Usage*

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

4.2.3 Conclusion

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

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

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	Suitable for Comparison
Wildlife Usage	DQO 5	Suitable for Comparison

4.3 Pond 997 – Reference

Pond 997 was monitored for four years as a reference vernal pool, although approximately 13% of vegetation within the Pond 997 watershed was masticated in 2017. Table 4-19 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 997 (see Figure 4-7). The 2016-2017 and 2018-2019 water-years were above-normal, whereas the 2019-2020 water-year was similar to the cumulative normal, and 2017-2018 water-year was below normal.

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

Survey	Water-Year			
	2016-2017	2017-2018	2018-2019	2019-2020
Hydrology	●	●	●	●
Vegetation	●	●	●	●
Wildlife	●		●	●

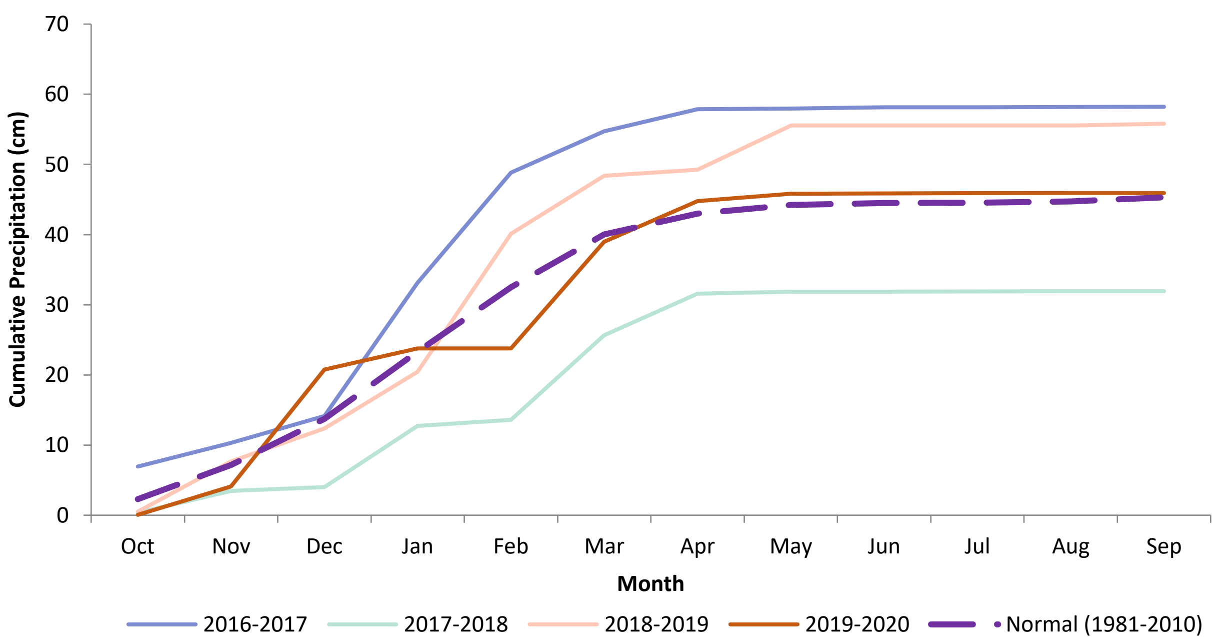


Figure 4-7. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 997 (Reference) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.3.1 Vegetation Monitoring

Vegetation data were collected at Pond 997 in 2017, 2018, 2019, and 2020 (Burleson, 2018, 2019, 2020). Data were collected using the methodology described in the Methods section of this report. Data from 2017 and 2020 were compared stratum-to-stratum in Table 4-20 as well as visually in Figure 4-8.

Pond 997 also supports a CCG population, located in stratum 2. The population was mapped and a visual estimate of percent cover was recorded in 2020 to compare to 2017, 2018, and 2019 (see Figure 4-10 in Section 4.3.1.1).

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

Stratum	Percentage	
	2017	2020
1	3%	6%
2 (CCG)	2%	4%
3	89%	78%
4	2%	N/A
5	N/A	12%
Upland	4%	N/A

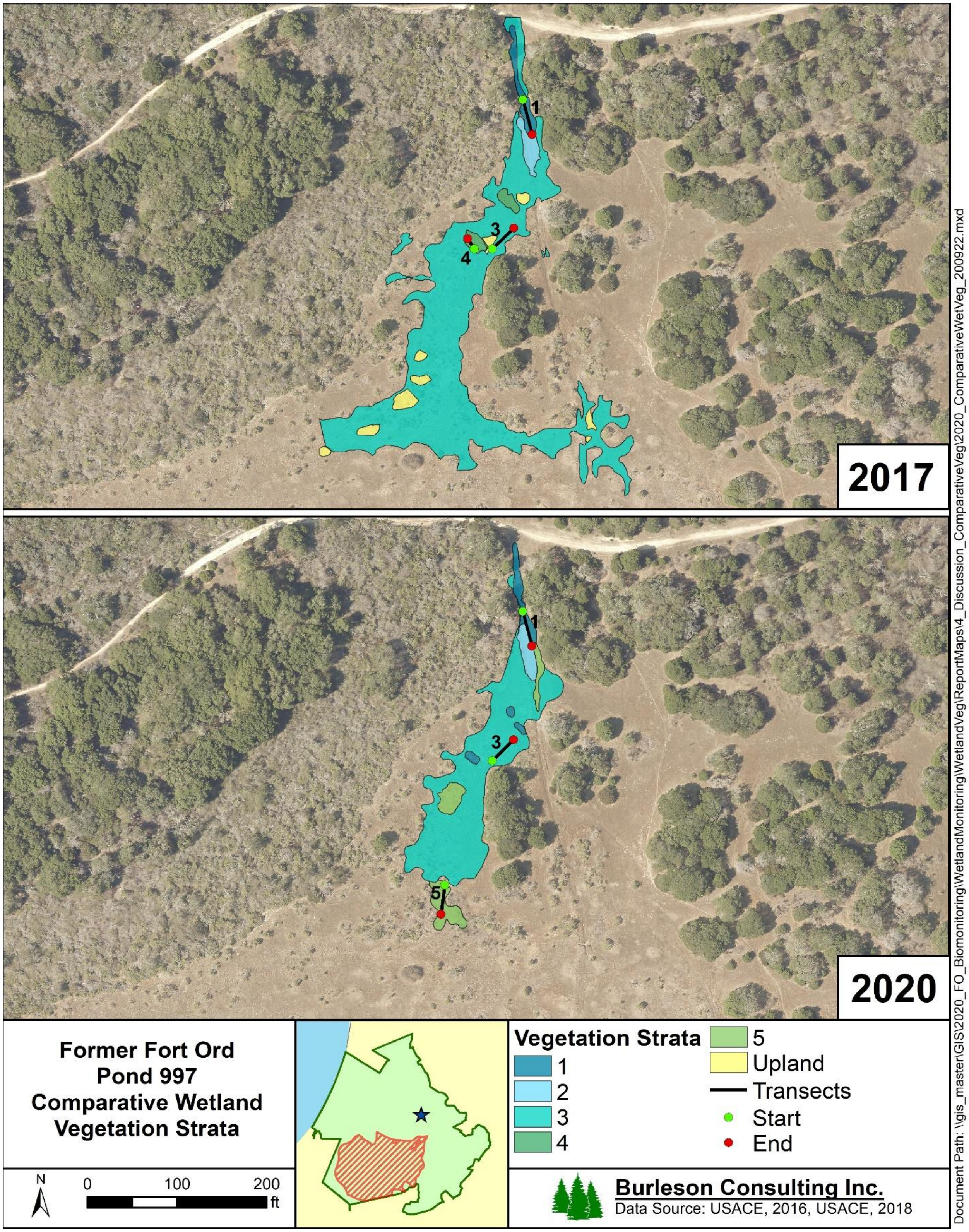


Figure 4-8. Pond 997 (Reference) Vegetation Strata and Transects for 2017 and 2020

The absolute percent vegetative cover observed in 2020 was comparable to previous years and most similar to 2019 (see Table 4-21). Vegetative cover ranged from 44.7% in 2018 to 73.3% in 2019, whereas thatch/bare ground ranged from 28.6% in 2019 to 55.4% in 2018.

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

Year	Vegetative Cover	Thatch/Bare Ground
2017	57.3%	43.7%
2018	44.7%	55.4%
2019	73.3%	28.6%
2020	70.2%	29.8%

Species richness on transects increased between 2017 and 2019 and decreased slightly in 2020. Species richness in the overall basin was the same as 2019 and slightly less than 2018 at Pond 997. Species richness on transects was 27, 45, 48, and 42 species in 2017, 2018, 2019, and 2020, respectively, whereas overall basin species richness was 65, 87, 82, and 82 species, respectively (see Table 4-22 and Appendix A Table A-3).

Species composition at Pond 997 was similar for all three years. Coyote thistle (*Eryngium armatum*) and brown-headed rush (*Juncus phaeocephalus*) were the dominant species in 2018, 2019, and 2020, while coyote thistle and California oatgrass (*Danthonia californica*) were dominant in 2017. A complete list of species observed at Pond 997 in 2017, 2018, 2019, and 2020, can be found in Appendix F. Figure 4-9 shows a subset of the observed species with a 2% cover or greater.

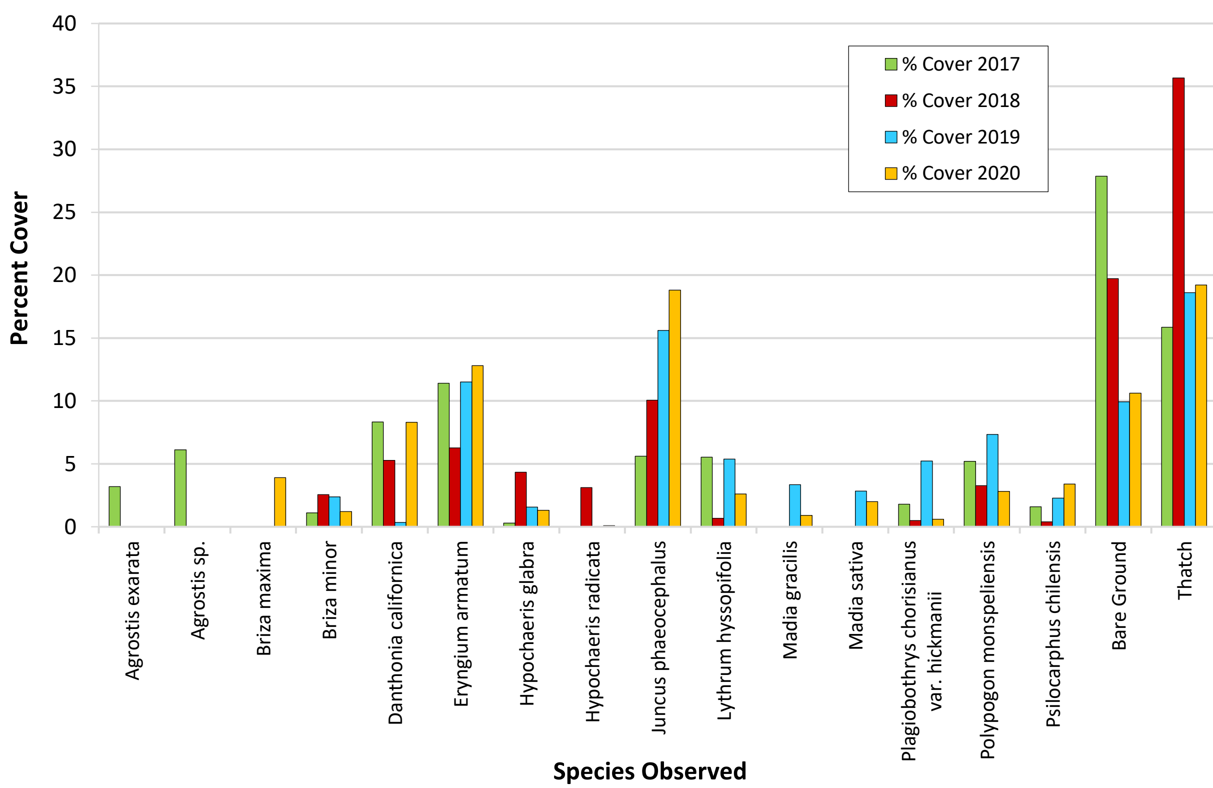


Figure 4-9. Percent Cover of Dominant Species at Pond 997 (Reference)

Native species richness on Pond 997 transects increased from 2017 to 2020 (see Table 4-22). Non-native species richness increased from 2017-2019 and decreased in 2020. Native relative percent cover was higher in 2020 than in previous years, while non-native cover was within the range of values observed in previous years (see Table 4-23).

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

Year	Native	Non-Native	Unidentified
2017	15	11	1
2018	24	19	2
2019	27	21	0
2020	27	14	1

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

Year	Native	Non-Native	Unidentified
2017	66.3%	23.0%	10.7%
2018	56.3%	43.5%	0.2%
2019	68.5%	31.5%	0.0%
2020	76.3%	23.6%	0.1%

Wetland and non-wetland species richness on Pond 997 transects increased from 2017 to 2019 and was static in 2020 (see Table 4-24). The relative percent cover of wetland and non-wetland species fluctuated between 2017 and 2020. Cover values from 2020 were within the range of values in previous years (see Table 4-25).

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

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2017	5	10	2	3	0	7
2018	8	10	5	8	0	14
2019	9	9	6	8	1	15
2020	9	10	5	5	0	13

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

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2017	19.3%	50.7%	16.5%	0.5%	0.0%	13.0%
2018	4.6%	47.5%	20.7%	14.2%	0.0%	13.0%
2019	18.7%	55.4%	4.6%	3.8%	0.3%	17.1%
2020	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%

4.3.1.1 *Contra Costa Goldfields*

Populations and cover estimates of CCG have been collected from 2017-2020, whereas in previous years its presence was noted (Burleson, 2018, 2019, 2020). The area of CCG at Pond 997 decreased from 0.02 acre in 2017 to 0.01 acre in 2018 and remained at 0.01 acre in 2019. The area increased in 2020 to 0.02 acre (see Figure 4-10). The density increased from 10% cover in 2017 to 25% cover in 2018 to 35% in 2019 and back to 10% cover in 2020. The CCG population was in a similar location in all survey years. Minor changes in population size can be attributed to natural fluctuation as no remediation has occurred in recent years.

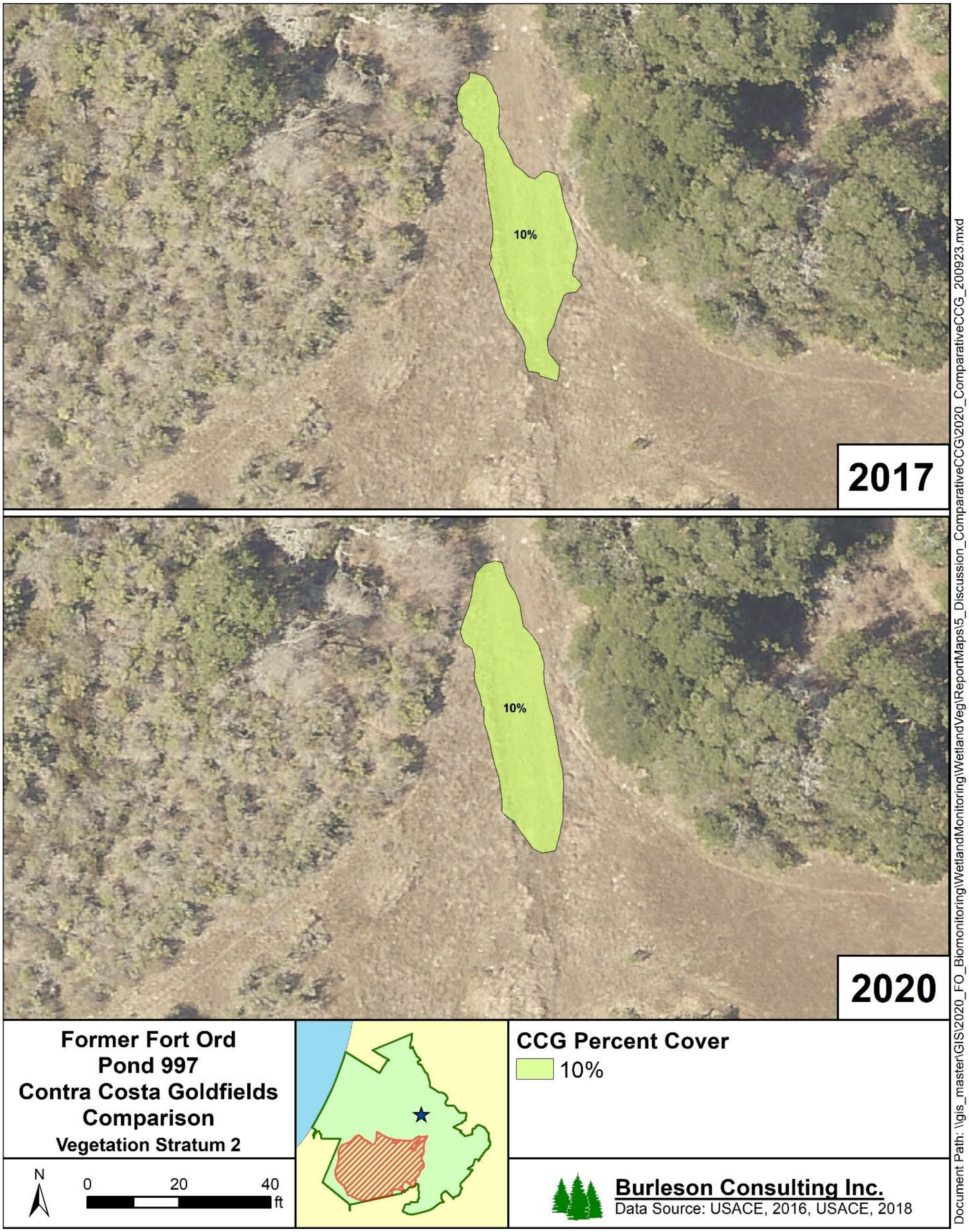


Figure 4-10. Contra Costa Goldfields Populations at Pond 997 (Reference) in 2017 and 2020

4.3.1.2 *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 remediated vernal pools.

4.3.1.3 *Performance Standard: Plant Cover and Species Diversity*

Pond 997 is a reference vernal pool and not required to meet performance standards. The vernal pool provides a control for comparison to the remediated vernal pools.

4.3.2 Wildlife Monitoring

Wildlife data were collected at Pond 997 in 2017 and 2019 (Burleson, 2018). California tiger salamander and fairy shrimp were not detected. The vernal pool did not hold sufficient depth for surveys to be completed in 2018 or 2020.

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

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

4.3.2.1 *Data Quality Objective 5*

Pond 997 was not surveyed in 2020. In the years when surveys were completed, CTS and fairy shrimp were not detected. Pond 997 may not provide suitable habitat for CTS or fairy shrimp.

4.3.2.2 *Performance Standard: Wildlife Usage*

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

4.3.3 Conclusion

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

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

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	Suitable for Comparison
Wildlife Usage	DQO 5	Suitable for Comparison

4.4 Pond 101 East (West) – Year 2

Pond 101 East (West) was monitored in 2020 as a year 2 post-mastication vernal pool. Pond 101 East (West) was monitored in previous years as a reference vernal pool. Vegetation in Pond 101 East (West) was masticated in 2018. Table 4-28 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 101 East (West) (see Figure 4-11). The 2015-2016, 2016-2017, and 2018-2019 water-years were above normal. All other monitoring was conducted either in a normal or below-normal water-year, drought year, or consecutive drought year.

Table 4-28. Pond 101 East (West) (Year 2 Post-Mastication) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year								
	1991-1992	2000-2001	2009-2010	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Hydrology		●		●	●	●	●	●	●
Vegetation		●			●	●	●	●	●
Wildlife	●	●	●		●	●		●	●

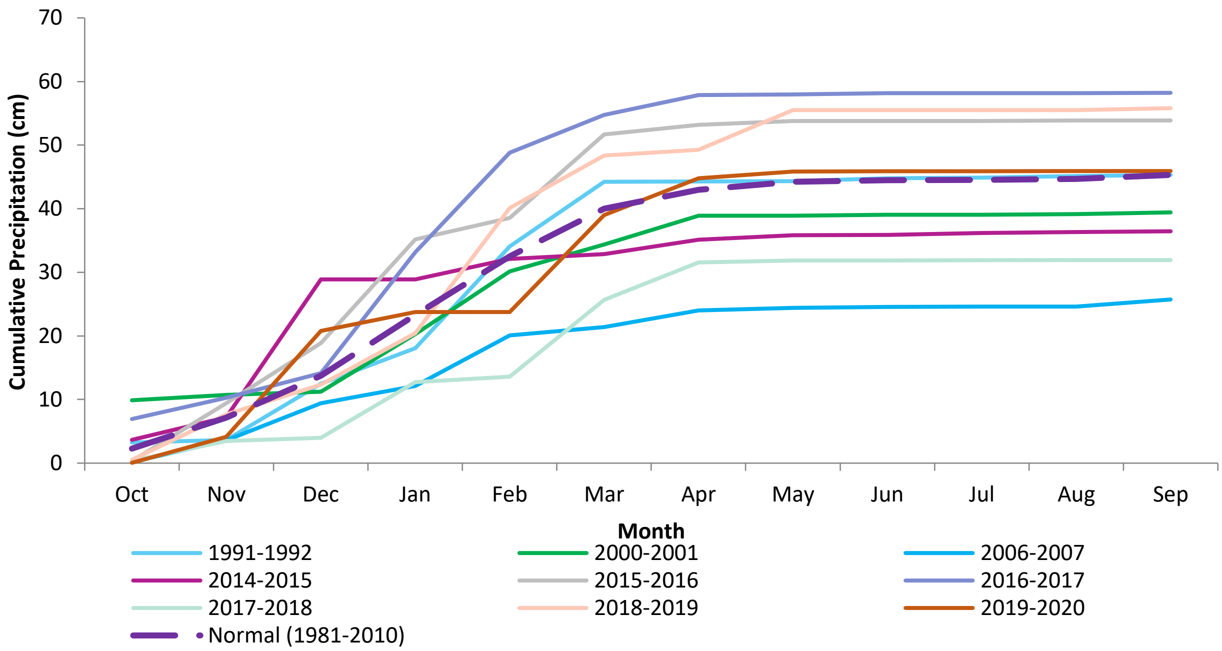


Figure 4-11. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 101 East (West) (Year 2 Post-Mastication) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.4.1 Vegetation Monitoring

Vegetation data were collected at Pond 101 East (West) in 2001, 2016, 2017, 2018, 2019, and 2020 (Harding ESE, 2002; Burleson, 2017, 2018, 2019, 2020). In 2001, data were collected along two 41-foot transects using 0.25 m^2 quadrats at 10-foot intervals, which alternated from the right to left of the transect. Because 2001 data were collected differently than in other years, strata were combined across the vernal pool to allow for comparison. In years 2016-2020, data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2020 were compared stratum-to-stratum in Table 4-29 as well as visually in Figure 4-12.

Table 4-29. Pond 101 East (West) (Year 2 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2020
1	13%	2%
2	37%	10%
3	12%	N/A
4	22%	4%
5	15%	44%
6	N/A	11%
8	N/A	4%
9	N/A	25%

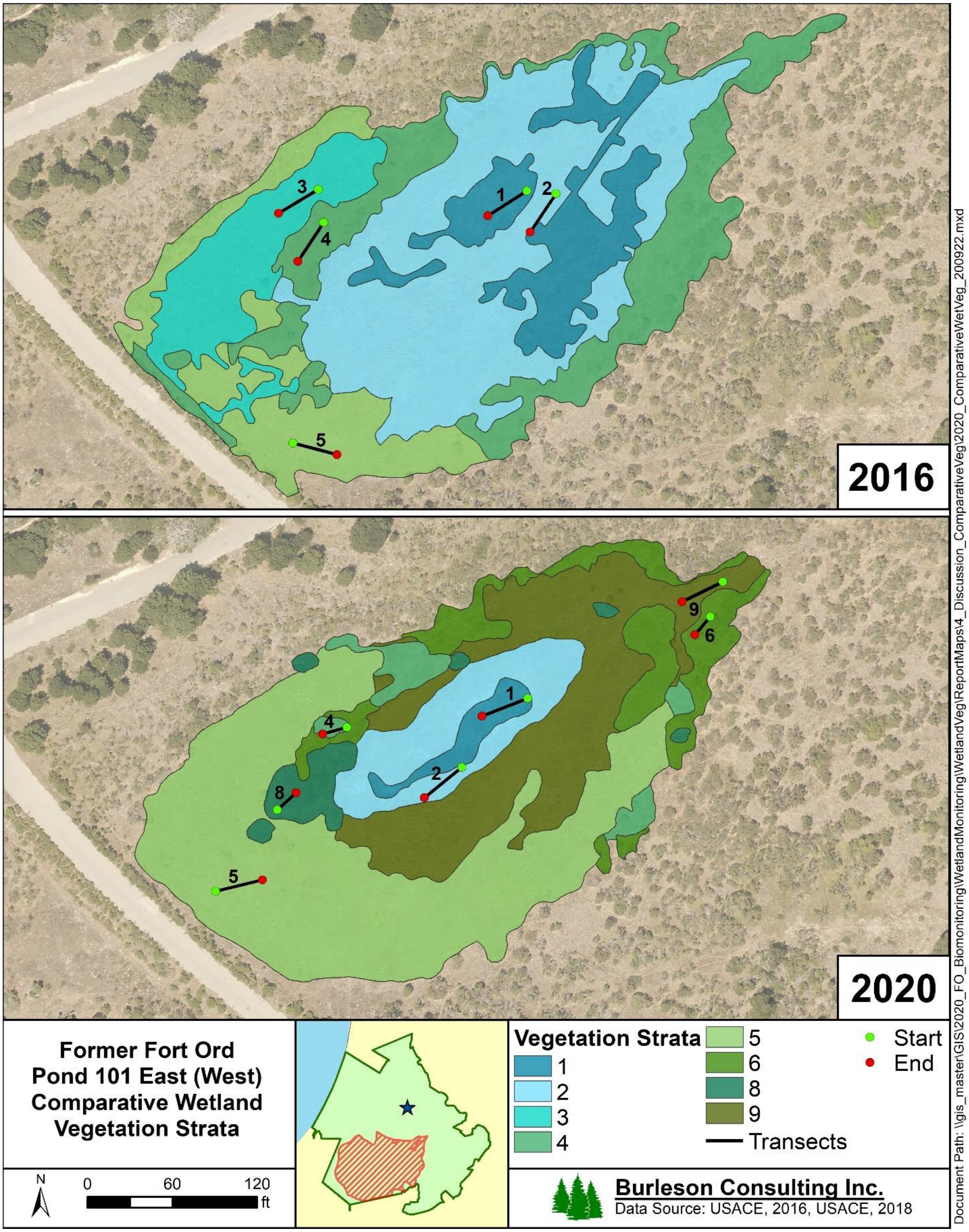


Figure 4-12. Pond 101 East (West) (Year 2 Post-Mastication) Vegetation Strata and Transects for 2016 and 2020

The absolute percent vegetative cover observed in 2020 was slightly less than baseline years and most similar to 2018 (see Table 4-30). Vegetative cover ranged in baseline years from 66.5% in 2001 to 75.9.0% in 2016, whereas thatch/bare ground ranged from 25.5.0% in 2016 to 34.3% in 2001. The 2020 Pond 101 East (West) values were within the ranges observed at the reference vernal pools (see Table 4-31).

Table 4-30. Pond 101 East (West) (Year 2 Post-Mastication) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2001*	66.5%	34.3%
2016*	75.9%	25.5%
2017*	69.0%	30.5%
2018*	58.1%	42.3%
2019	76.0%	24.0%
2020	55.4%	44.6%

*baseline year

Table 4-31. Pond 101 East (West) (Year 2 Post-Mastication) and Reference Vernal Pool Absolute Percent Cover in 2020

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	47.6%	52.4%
101 East (East)	63.4%	36.6%
997	70.2%	29.8%
101 East (West)	55.4%	44.6%

Species richness in 2020 was greater than in baseline years. Species richness on transects was 31, 30, 36, 50, 49, and 41 species in 2001, 2016, 2017, 2018, 2019, and 2020, respectively, whereas overall basin species richness was 58, 68, 88, 85, and 75 species in 2016, 2017, 2018, 2019, and 2020, respectively (see Table 4-32 and Appendix A Table A-4). The 2001 survey only included species observed on the transects and total vernal pool species richness was not recorded. Pond 101 East (West) species richness was similar to the reference vernal pools (see Table 4-32 and Appendix E Tables E-21 and E42).

Species composition at Pond 101 East (West) was variable through time, and the dominant species differed 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, 2018, and 2020, while pale spikerush and grass poly (*Lythrum hyssopifolia*) were the dominant species in 2017. Pale spikerush, Italian rye grass, and coast tarweed (*Madia sativa*) were the dominant species in 2019. A complete comparison of species composition observed at Pond 101 East (West) in 2001, 2016, 2017, 2018,2019, and 2020 can be found in Appendix F. Figure 4-13 shows a subset of this comparison for species observed with a 2% cover or greater.

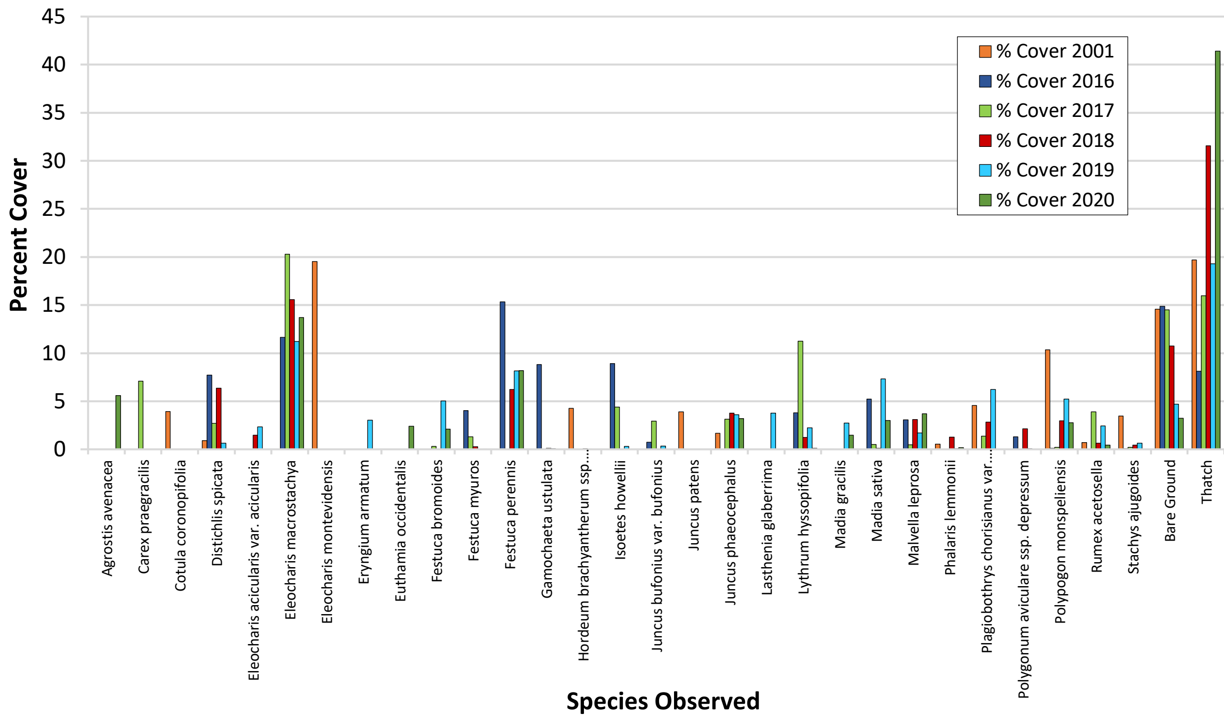


Figure 4-13. Percent Cover of Dominant Species at Pond 101 East (West) (Year 2 Post-Mastication)

Native and non-native species richness on Pond 101 East (West) transects was within the range of values observed in baseline years and most similar to 2018 (see Table 4-32). Native species richness in 2020 was within the range observed at reference vernal pools (see Table 4-33). However, non-native species richness was slightly greater than the values observed at reference vernal pools. The relative percent cover of native and non-native species varied through time, with less native species cover and slightly higher non-native species cover in 2020, than the values observed in baseline years of monitoring and reference vernal pools (see Table 4-34 and Table 4-35).

Table 4-32. Pond 101 East (West) (Year 2 Post-Mastication) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2001*	15	16	0
2016*	17	12	1
2017*	23	12	1
2018*	26	21	3
2019	29	19	1
2020	21	20	0

*baseline year

Table 4-33. Pond 101 East (West) (Year 2 Post-Mastication) and Reference Vernal Pool Native and Non-Native Species Richness in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	12	11	0
101 East (East)	24	19	0
997	27	14	1
101 East (West)	**21**	**20**	**0**

Table 4-34. Pond 101 East (West) (Year 2 Post-Mastication) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2001*	62.5%	37.5%	0.0%
2016*	65.6%	34.4%	0.0%
2017*	70.3%	29.6%	0.1%
2018*	67.1%	32.5%	0.3%
2019	63.4%	36.5%	0.1%
2020	56.4%	43.6%	0.0%

*baseline year

Table 4-35. Pond 101 East (West) (Year 2 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	91.3%	8.7%	0.0%
101 East (East)	72.2%	27.8%	0.0%
997	76.3%	23.6%	0.1%
101 East (West)	56.4%	43.6%	0.0%

Wetland and non-wetland species richness on Pond 101 East (West) transects were within the range of values in baseline years and values observed at reference vernal pools in 2020 (see Table 4-36 and Table 4-37). The relative percent cover of wetland species was generally lower in 2020 than observed in baseline years; however, non-wetland cover was within the range of values observed in baseline years (see Table 4-38). The wetland species relative percent cover was slightly lower than the ranges observed at the reference vernal pools in 2020 (see Table 4-39).

Table 4-36. Pond 101 East (West) (Year 2 Post-Mastication) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2001*	4	8	7	5	2	5
2016*	7	5	5	4	0	9
2017*	8	12	4	6	0	6
2018*	8	11	9	8	2	12
2019	7	15	10	4	3	10
2020	6	11	6	4	3	11

*baseline year

Table 4-37. Pond 101 East (West) (Year 2 Post-Mastication) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	7	3	3	1	5
101 East (East)	5	8	7	6	3	14
997	9	10	5	5	0	13
101 East (West)	6	11	6	4	3	11

Table 4-38. Pond 101 East (West) (Year 2 Post-Mastication) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2001*	20.9%	62.0%	5.1%	4.6%	2.2%	5.2%
2016*	34.5%	11.7%	22.8%	10.0%	0.0%	21.0%
2017*	55.1%	29.6%	4.2%	8.6%	0.0%	2.5%
2018*	38.6%	29.0%	17.0%	8.4%	1.0%	6.1%
2019	35.2%	20.2%	14.4%	5.7%	1.3%	23.2%
2020	25.3%	17.0%	19.9%	7.6%	1.0%	29.3%

*baseline year

Table 4-39. Pond 101 East (West) (Year 2 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%
101 East (East)	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%
997	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%
101 East (West)	25.3%	17.0%	19.9%	7.6%	1.0%	29.3%

4.4.1.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 101 East (West) was dominated by native and wetland plant species during year 2 post-mastication monitoring in 2020. Pond 101 East (West) was generally within range of the baseline and reference vernal pools, except that the relative percent cover of native species was less, whereas non-native was slightly more than the values observed in baseline years of monitoring and reference vernal pools. Similarly, the relative percent cover of wetland species was less than the values observed in baseline years and at reference vernal pools.

4.4.1.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 101 East (West), a post-mastication vernal pool, is not on track to meet the performance standard for year 2 in 2020. The species composition was similar to baseline years in 2016 and 2018, native and wetland species relative abundances were similar to baseline and reference vernal pool conditions; however, relative dominance as measured by cover of native species and wetland species were lower at Pond 101 East (West) than in baseline years and at reference vernal pools. This could be related to the unusual rainfall patterns in the 2019-2020 water-year which may have created a unique combination of environmental conditions favorable for non-native and non-wetland species. This vernal pool will continue to be monitored as specified in the PBO (USFWS, 2017).

4.4.2 Wildlife Monitoring

Wildlife data were collected at Pond 101 East (West) in 1992, 2001, 2010, 2016, 2017, 2019, and 2020 (Jones and Stokes, 1992; Harding ESE, 2002; Shaw, 2011; Burleson, 2017, 2018, 2019, 2020). California tiger salamander larvae were present in 1992, 2010, 2016, 2017, and 2019. Fairy shrimp were present in 2001 and 2019. Table 4-40 shows historic wildlife monitoring results.

Table 4-40. Pond 101 East (West) (Year 2 Post-Mastication) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1992	Present*	Not detected*
2001	Not detected*	Moderate (12, 100)*
2010	Common*	Not detected*
2016	Common - Abundant (>101, 103, 100)	Not detected
2017	Common (21, 39, 47)	Not detected
2019	Common – Abundant (56, 132, 144)	High (181)
2020	Not detected	Not detected

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

4.4.2.1 *Data Quality Objective 5*

California tiger salamanders were not detected in 2020, which was consistent with one of the baseline monitoring years, 2001. In all other baseline monitoring years (1992, 2010, 2016, and 2017) California tiger salamanders were present. Results in 2020 were consistent with reference vernal pools; CTS were not detected at Pond 5 or 101 East (East).

Fairy shrimp were not detected in 2020. Fairy shrimp presence in Pond 101 East (West) has been variable with more years of no detection than detection. Survey years with no detection were 1992, 2010, 2016, and 2017, while survey years with detection were 2001 and 2019. Results in 2020 were consistent with reference Pond 5. Fairy shrimp were present at Pond 101 East (East) but were not detected at Pond 5.

4.4.2.2 Performance Standard: Wildlife Usage

Pond 101 East (West) is a post-mastication remediation vernal pool in year 2 of monitoring and on track to meet DQO 5. DQOs 1 and 4 are analyzed in the Hydrology Monitoring Annual Report (Chenega, 2021)

4.4.3 Conclusion

Pond 101 East (West), a post-mastication vernal pool, was in year 2 of monitoring in 2020. The vernal pool is on track to meet DQO 5 for wildlife usage, but not on track to meet the plant cover and species diversity performance standard (see Table 4-41). Pond 101 East (West) will continue to be monitored in the future.

Table 4-41. Success at Pond 101 East (West) (Year 2 Post-Mastication) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	Not on track
Wildlife Usage	DQO 5	On track

4.5 Pond 41 – Year 2

Pond 41 was monitored in 2020 as a year 2 post-subsurface munitions remediation vernal pool. Pond 41 was monitored for baseline conditions in 1998, 2015, and 2016 and cleared of munitions in 2018. Table 4-42 summarizes surveys conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 41 (see Figure 4-14**).** The normal or above-normal water-years were 1997-1998, 2015-2016, and 2018-2019. Monitoring in 2014-2015 was conducted in a below-normal water-year. This year, 2019-2020, was similar to the cumulative normal water-year.

Table 4-42. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year				
	1997-1998	2014-2015	2015-2016	2018-2019	2019-2020
Hydrology	●	●	●	●	●
Vegetation			●	●	●
Wildlife	●		●	●	●

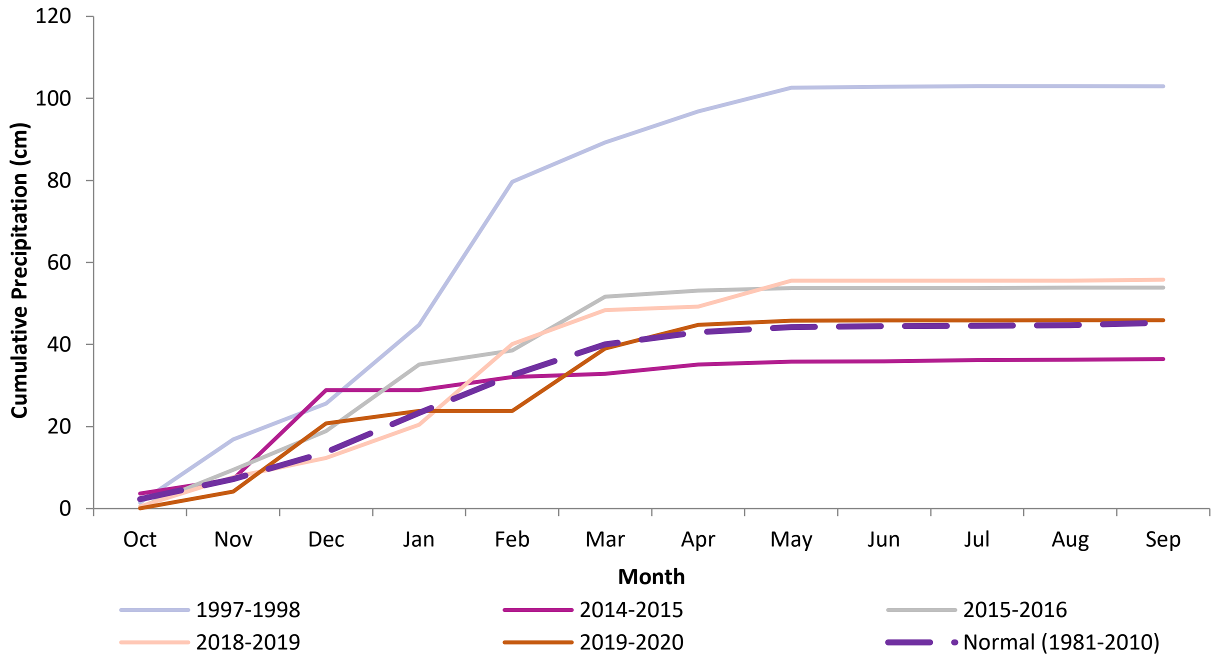


Figure 4-14. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.5.1 Vegetation Monitoring

Vegetation data were collected at Pond 41 in 2016, 2019, and 2020 (Burleson, 2017, 2020). Data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2020 were compared stratum-to-stratum in Table 4-43 as well as visually in Figure 4-15.

Table 4-43. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2020
1	29%	14%
2	52%	59%
3	27%	21%
4	N/A	5%
Upland	3%	1%

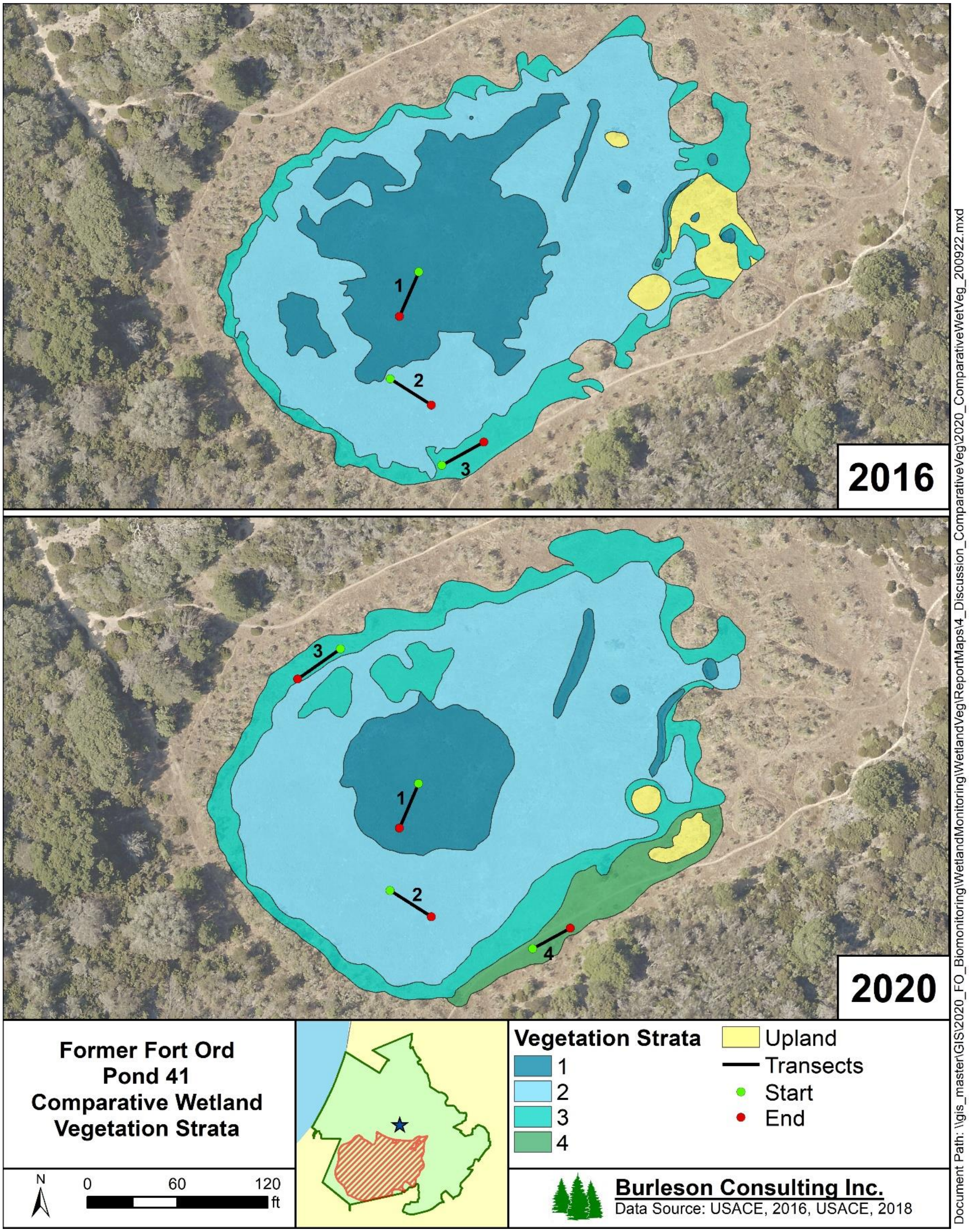


Figure 4-15. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2016 and 2020

The absolute percent vegetative cover observed in 2020 was slightly less than baseline but was within the range of values observed at the reference vernal pools (see Table 4-44). Pond 41 was most similar to reference vernal pool 997 (see Table 4-45).

Table 4-44. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2016*	71.7%	28.3%
2019	69.7%	30.3%
2020	68.9%	31.2%

*baseline year

Table 4-45. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2020

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	47.6%	52.4%
101 East (East)	63.4%	36.6%
997	70.2%	29.8%
41	68.9%	31.2%

Species richness in 2020 was greater than the baseline year of monitoring. Species richness on transects was 16, 33, and 35 species in 2016, 2019, and 2020 respectively. Basin species richness was 28, 75, and 60 species in 2016, 2019, and 2020, respectively (see Table 4-46 and Appendix A Table A-5). Pond 41 overall species richness was slightly lower than observed at the reference vernal pools but similar for transect values (see Table 4-47 and Appendix E Tables E-21 and E-42).

Species composition at Pond 41 was similar for all three monitoring years; the dominant species was either pale spikerush (*Eleocharis macrostachya*) or brown-headed rush (*Juncus phaeocephalus*). Other important species in 2016 were hedge nettle (*Stachys ajugoides*), alkali mallow (*Malvella leprosa*), Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*), and smooth goldfields (*Lasthenia glaberrima*). California oatgrass (*Danthonia californica*) and rabbitfoot grass (*Polygonum monspeliensis*) were prevalent in 2019 and 2020. A complete comparison of species composition observed at Pond 41 in 2016, 2019, and 2020 can be found in Appendix F. Figure 4-16 shows a subset of this comparison for species observed with a 2% cover or greater.

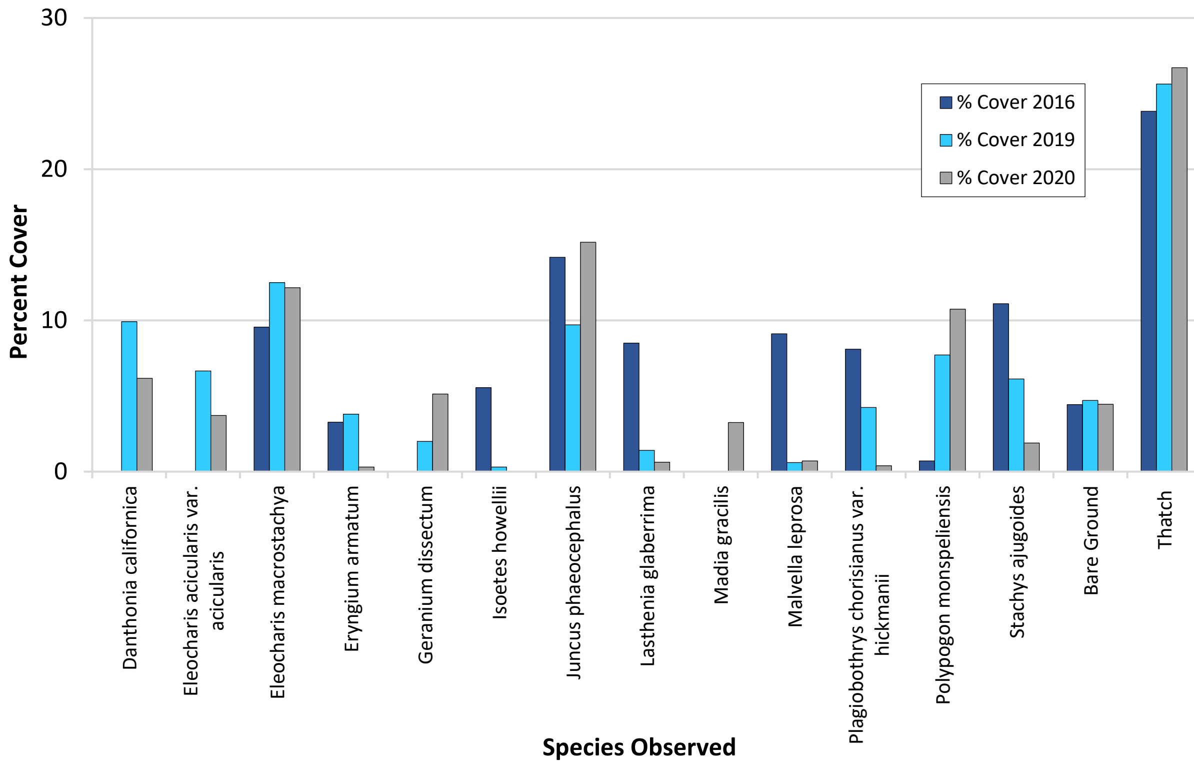


Figure 4-16. Percent Cover of Dominant Species at Pond 41 (Year 2 Post-Subsurface Munitions Remediation)

Native and non-native species richness on Pond 41 transects increased in 2020 (see Table 4-46). Native and non-native species richness in 2020 were within the range of values observed at the reference vernal pools (see Table 4-47). The relative percent cover of native species decreased and non-native species increased between 2016 and 2020 (see Table 4-48). The relative percent cover values of native and non-native species in Pond 41 were within 1.1% of the range of values observed in reference vernal pools (see Table 4-49).

Table 4-46. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2016*	9	7	0
2019	21	12	0
2020	21	14	0

*baseline year

Table 4-47. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	12	11	0
101 East (East)	24	19	0
997	27	14	1
41	21	14	0

Table 4-48. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2016*	97.1%	2.9%	0.0%
2019	82.8%	17.2%	0.0%
2020	71.1%	28.9%	0.0%

*baseline year

Table 4-49. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	91.3%	8.7%	0.0%
101 East (East)	72.2%	27.8%	0.0%
997	76.3%	23.6%	0.1%
41	71.1%	28.9%	0.0%

Wetland and non-wetland species richness on Pond 41 transects was greater in 2020 than baseline (see Table 4-50). The wetland and non-wetland species richness were within the range of values observed at the reference vernal pools (see Table 4-51). The relative percent cover of wetland and non-wetland species were less than the baseline values (see Table 4-52). The wetland and non-wetland species relative percent cover values were within the ranges observed at the reference vernal pools (see Table 4-53).

Table 4-50. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2016*	6	3	1	3	0	3
2019	7	7	5	6	2	6
2020	5	8	6	7	1	8

*baseline year

Table 4-51. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	7	3	3	1	5
101 East (East)	5	8	7	6	3	14
997	9	10	5	5	0	13
41	5	8	6	7	1	8

Table 4-52. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2016*	59.8%	25.4%	0.2%	12.9%	0.0%	1.7%
2019	45.1%	32.5%	15.7%	1.6%	0.5%	4.5%
2020	27.3%	42.3%	11.4%	2.4%	0.7%	15.8%

*baseline year

Table 4-53. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%
101 East (East)	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%
997	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%
41	27.3%	42.3%	11.4%	2.4%	0.7%	15.8%

4.5.1.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 41 was dominated by native and wetland plant species during year 2 post-subsurface munitions remediation monitoring in 2020. Pond 41 wetland vegetation results were generally within range of either baseline and/or reference vernal pools, except that the species richness as well as native and non-native cover results differed. Richness was greater than baseline years and less than the range of values at the reference vernal pools. Additionally, native cover was less than baseline and the reference vernal pools and non-native cover was greater than baseline years and reference. Both native and non-native cover were within 1.1% of the range of values observed at the reference vernal pools. Results are considered similar to reference.

4.5.1.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 41, a post-subsurface munitions remediation vernal pool, is on track to meet the performance standard for year 2 in 2020. The species composition and native and wetland species relative abundances were similar to baseline and/or reference vernal pool conditions. Species richness was greater than baseline, and less than the range of values observed at reference vernal pools. This is an acceptable difference since species richness has increased from baseline. In addition, native and non-native cover was within 1.1% of the range of values of the reference vernal pools. Pond 41 provided suitable wetland habitat in 2020.

4.5.2 Wildlife Monitoring

Wildlife data were collected at Pond 41 in 1998, 2016, 2019, and 2020 (HLA, 1998; Burleson, 2017, 2020). California tiger salamander larvae were observed in 2016 and 2019. Fairy shrimp were detected in 1998, 2019, and 2020. Table 4-54 shows historic wildlife monitoring results.

Table 4-54. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998*	Not detected	Low
2016*	Few (3)	Not detected
2019	Few – Common (2, 13, 9)	Low – High (122, 6)
2020	Not detected	Moderate (15)

*baseline year

4.5.2.1 *Data Quality Objective 5*

California tiger salamanders were not detected in 2020, which was consistent with one of the baseline monitoring years. California tiger salamanders were present in 2016 but were not detected in 1998. Results in 2020 were consistent with reference vernal pools; CTS were not detected at Pond 5 or 101 East (East).

Fairy shrimp were present in 2020, which was consistent with one of the baseline monitoring years. Fairy shrimp were present in 1998 but were not detected in 2016. It was possible that survey event timing prevented detection in 2016 because surveys occurred later in the year (April and May). However, in 2020, a very dry February followed by above-normal March and April rain events may have been favorable for later fairy shrimp detection. Results in 2020 were consistent with reference Pond 101 East (East). Fairy shrimp were present at Pond 101 East (East) but were not detected at Pond 5.

4.5.2.2 *Performance Standard: Wildlife Usage*

Pond 41 is a post-mastication remediation vernal pool in year 2 of monitoring and on track to meet DQO 5. Data quality objectives 1 and 4 were analyzed in the Hydrology Monitoring Annual Report (Chenega, 2021)

4.5.3 Conclusion

Pond 41, a post-subsurface munitions remediation vernal pool, was in year 2 of monitoring in 2020. The vernal pool is on track to meet the plant cover and species diversity performance standard and DQO 5 for wildlife usage (see Table 4-55). Pond 41 will continue to be monitored in the future.

Table 4-55. Success at Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 5	On track

4.6 Pond 3 North – Year 3 and Year 2

Pond 3 North was monitored in 2020 as a year 3 post-burn and year 2 post-subsurface munitions remediation vernal pool. Pond 3 North was monitored for baseline conditions in 1998, 2015, and 2016. Vegetation in Pond 3 North and within its watershed was burned in October 2017 as part of the prescribed burn of BLM Area B Subunit B. Pond 3 North had intrusive anomaly investigations in 2018. Table 4-56 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 3 North (see

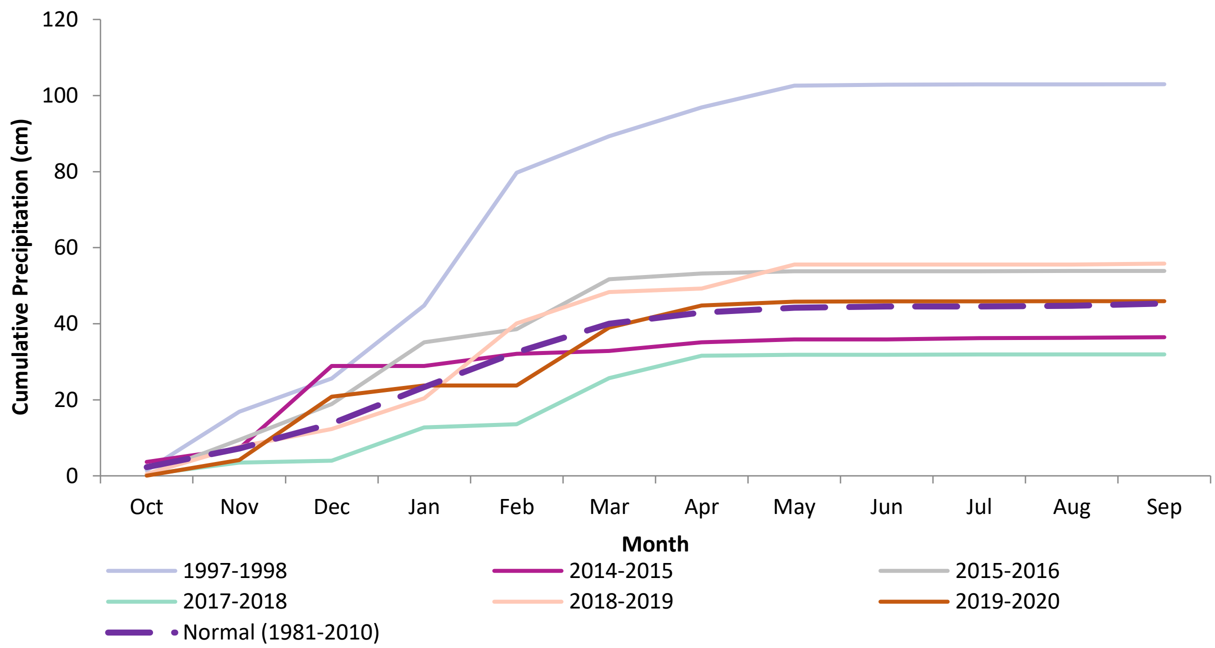


Figure 4-17). The 1997-1998, 2015-2016, and 2018-2019 water-years were above normal, whereas 2014-2015 and 2017-2018 water-years were below normal. This year, 2019-2020, was similar to the cumulative normal water-year.

Table 4-56. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year					
	1997-1998	2014-2015	2015-2016	2017-2018	2018-2019	2019-2020
Hydrology	●	●	●	●	●	●
Vegetation	●	●		●	●	●
Wildlife	●	●	●	●	●	●

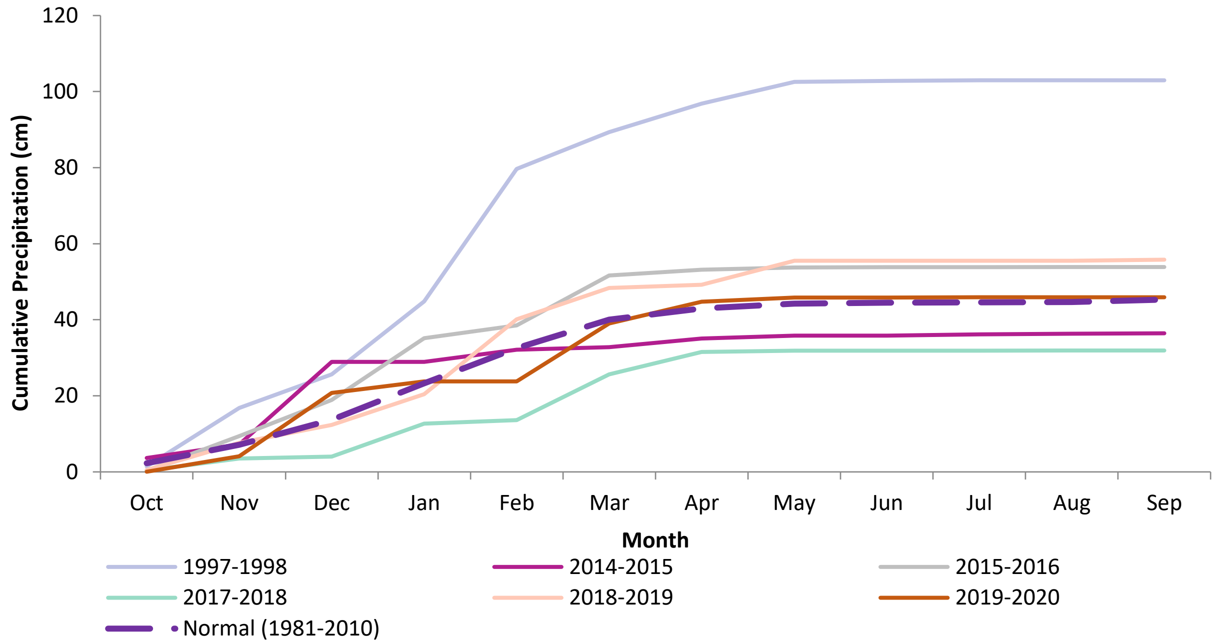


Figure 4-17. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.6.1 Vegetation Monitoring

Vegetation data were collected at Pond 3 North in 1998, 2015, 2018, 2019, and 2020 (HLA, 1998; Burleson, 2016, 2019, 2020). In 1998, data were collected along one transect with a length of 116 feet. Quadrats were placed at 10-foot intervals, alternating from right to left along the transect. Because 1998 data were collected differently than in other years, strata were combined across the vernal pool to allow for comparison. In 2015, 2018, 2019, and 2020, data were collected using the methodology described in the Methods section of this report. Data from 2015 and 2020 were compared stratum-to-stratum in Table 4-57 as well as visually in Figure 4-18.

Pond 3 North also supports a CCG population located in stratum 4. The population was mapped and a visual estimate of percent cover was recorded in 2020 to compare to 2015, 2016, 2018, and 2019 (see Figure 4-20 in Section 4.6.1.1). In 2015, vegetation monitoring was completed on April 22 and CCG monitoring was completed later May 19. The CCG was mapped as an overlay on top of the other strata, not as a separate stratum. Therefore, the acreage percentages for the basin did not include CCG.

Table 4-57. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2015	2020
1	16%	11%
2	14%	14%
3	70%	37%
4 (CCG)	N/A	38%

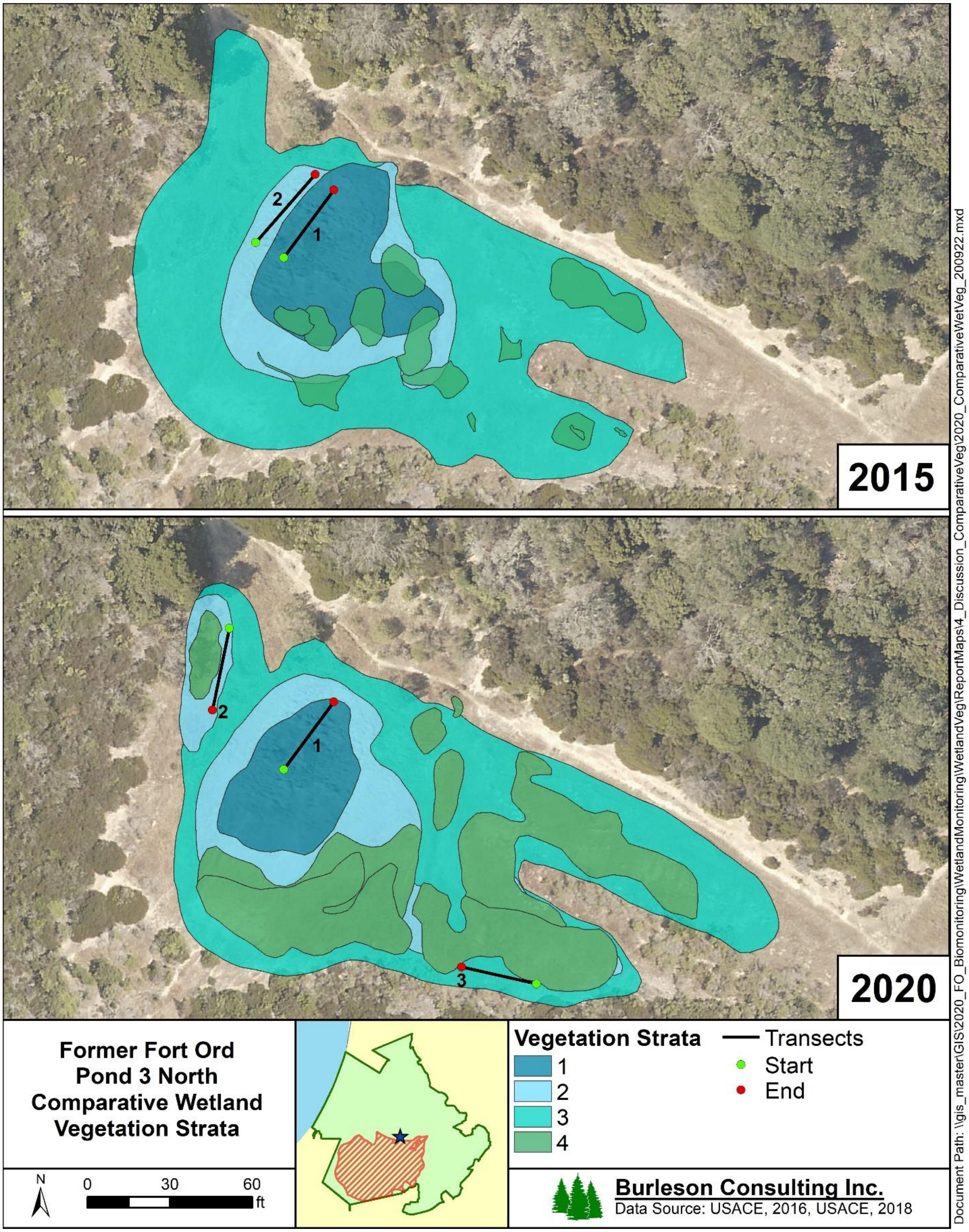


Figure 4-18. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2015 and 2020

The absolute percent vegetative cover observed in 2020 was within the range of values in baseline years and most similar to 1998 (see Table 4-58). Vegetative cover ranged in baseline years from 46.1% in 1998 to 80.6% in 2015, whereas thatch/bare ground ranged from 14.8% in 2015 to 54.0% in 1998. These values were also within the ranges observed at the reference vernal pools, and Pond 3 North was most similar to reference vernal pool 101 East (East) (see Table 4-59).

Table 4-58. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998*	46.1%	54.0%
2015*	80.6%	14.8%
2018	60.2%	40.1%
2019	72.7%	27.3%
2020	57.9%	42.1%

*baseline year

Table 4-59. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2020

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	47.6%	52.4%
101 East (East)	63.4%	36.6%
997	70.2%	29.8%
3 North	57.9%	42.1%

Species richness in 2020 was greater than in baseline years. Species richness on transects was 16, 9, 38, 22, and 40 species in 1998, 2015, 2018, 2019, and 2020, respectively, whereas overall basin species richness was 24, 82, 90, and 74 species in 2015, 2018, 2019, and 2020, respectively (see Table 4-60 and Appendix A Table A-6). The 1998 survey was limited to species observed on the transect and overall basin species richness was not recorded. Pond 3 North species richness was similar to the reference vernal pools (see Table 4-61 and Appendix E Tables E-21 and E-42).

Species composition at Pond 3 North was similar between monitoring years; the dominant species in all monitoring years was pale spikerush (*Eleocharis macrostachya*). Other important species in 2015 were brass buttons (*Cotula coronopifolia*) and Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*). Coyote thistle (*Eryngium armatum*) and rabbitfoot grass (*Polygonum monspeliensis*) provided moderate cover in 2019. In 2020, coyote thistle (*Eryngium armatum*), California oatgrass (*Danthonia californica*), and Italian ryegrass (*Festuca perennis*) were other important contributors. A complete comparison of species composition observed at Pond 3 North in 1998, 2015, 2018, 2019, and 2020 can be found in Appendix F. Figure 4-19 shows a subset of this comparison for species observed with a 2% cover or greater.

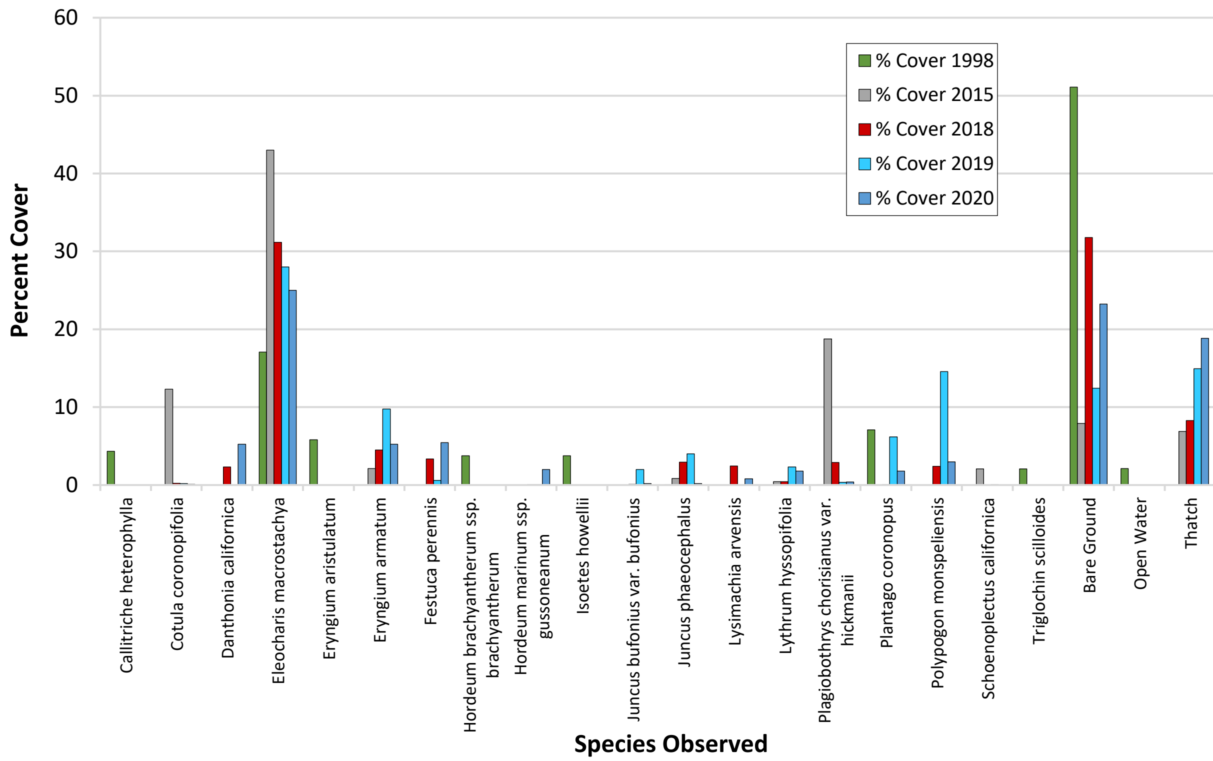


Figure 4-19. Percent Cover of Dominant Species at Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

Native and non-native species richness in 2020 were greater than baseline and very similar to 2018 (see Table 4-60). Native and non-native species richness was within the range of values observed in reference vernal pools (see Table 4-61). The relative percent cover of native species was less, and non-native species was more than the values observed in baseline years of monitoring (see Table 4-62). The relative percent cover values of native and non-native species in Pond 3 North were within 1.3% of the range of values observed in reference vernal pools (see Table 4-63).

Table 4-60. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998*	9	6	1
2015*	7	2	0
2018	22	16	0
2019	13	9	0
2020	23	16	1

*baseline year

Table 4-61. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	12	11	0
101 East (East)	24	19	0
997	27	14	1
3 North	23	16	1

Table 4-62. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1998*	81.9%	17.7%	0.4%
2015*	84.2%	15.8%	0.0%
2018	79.0%	21.0%	0.0%
2019	66.3%	33.7%	0.0%
2020	70.9%	28.9%	0.2%

*baseline year

Table 4-63. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	91.3%	8.7%	0.0%
101 East (East)	72.2%	27.8%	0.0%
997	76.3%	23.6%	0.1%
3 North	70.9%	28.9%	0.2%

Wetland and non-wetland species richness on Pond 3 North transects was greater than the baseline years and within the range of values observed at reference vernal pools (see Table 4-64 and Table 4-65). The relative percent cover of wetland species was less than the values observed in baseline, and non-wetland cover was greater than baseline (see Table 4-66). Wetland and non-wetland relative percent cover were within the range of values observed at reference vernal pools (see Table 4-67).

Table 4-64. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998*	6	2	1	1	0	6
2015*	7	2	0	0	0	0
2018	10	8	5	6	0	9
2019	6	6	5	0	1	4
2020	7	10	6	5	1	11

*baseline year

Table 4-65. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	7	3	3	1	5
101 East (East)	5	8	7	6	3	14
997	9	10	5	5	0	13
3 North	7	10	6	5	1	11

Table 4-66. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998*	71.9%	8.2%	15.4%	0.2%	0.0%	4.4%
2015*	96.4%	3.6%	0.0%	0.0%	0.0%	0.0%
2018	59.9%	17.1%	15.1%	3.6%	0.0%	4.3%
2019	45.2%	42.0%	10.9%	0.0%	0.2%	1.7%
2020	48.6%	18.4%	26.8%	2.2%	0.1%	3.8%

*baseline year

Table 4-67. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%
101 East (East)	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%
997	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%
3 North	48.6%	18.4%	26.8%	2.2%	0.1%	3.8%

4.6.1.1 *Contra Costa Goldfields*

The area of CCG at Pond 3 North increased between 2015 and 2019 and decreased slightly in 2020 (Burleson, 2016, 2017, 2019, 2020). The population occupied 0.04 acre in 2015, 0.13 acre in 2016, 0.14 acre in 2018, 0.18 acre in 2019, and 0.16 acre in 2020 (see Figure 4-20). The densities ranged between 5-75% cover. In 2020, the CCG population was in similar locations to previous years. This suggests that remedial burn activities in 2017 and post-subsurface munitions remediation in 2018 likely did not affect the population. Minor changes in population size can be attributed to natural fluctuation.

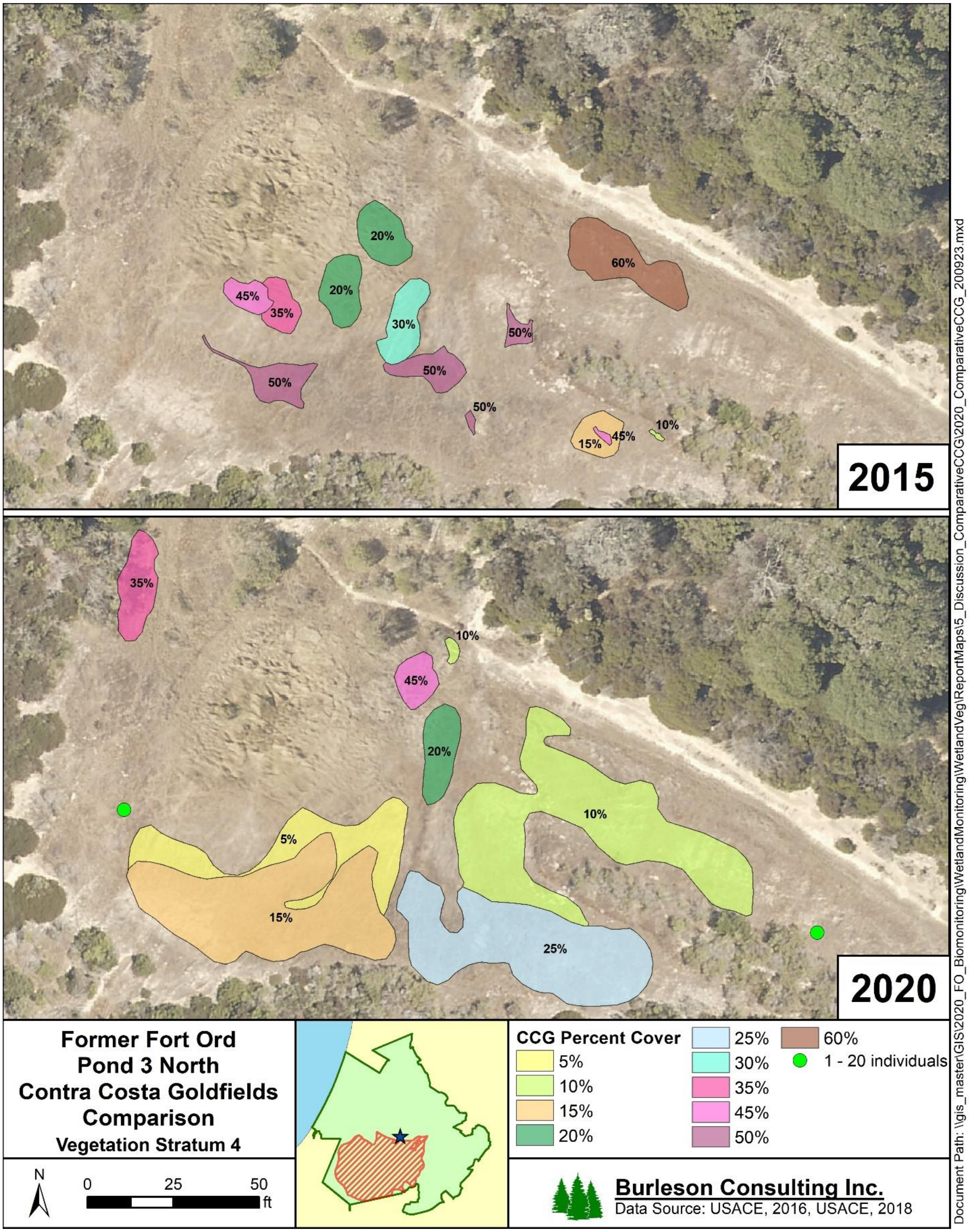


Figure 4-20. Contra Costa Goldfields Populations at Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) in 2015 and 2020

4.6.1.2 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 3 North was dominated by native and wetland plant species during year 3 post-burn and year 2 post-subsurface munitions remediation monitoring in 2020. Pond 3 North wetland vegetation results were generally within range of either baseline and/or reference vernal pools, except that the native and non-native cover results differed. Native cover was less than baseline and the reference vernal pools and non-native cover was greater than baseline years and reference. Both native and non-native cover were within 1.3% of the range of values observed at the reference vernal pools. Results are considered similar to reference.

4.6.1.3 *Performance Standard: Plant Cover and Species Diversity*

Pond 3 North, a post-burn and post-subsurface munitions remediation vernal pool, is on track to meet the performance standard for years 3 and 2, respectively, in 2020. The species composition, richness, and native and wetland species relative abundances were similar to baseline and/or reference vernal pool conditions. However, native and non-native cover was within 1.3% of the range of values of the reference vernal pools. Pond 3 North provided suitable wetland habitat in 2020.

4.6.2 Wildlife Monitoring

Wildlife data were collected at Pond 3 North in 1998, 2015, 2016, 2018, 2019, and 2020 (HLA, 1998; Burleson, 2016, 2017, 2019, 2020). California tiger salamander larvae were not detected in 2020 or previous survey years. Fairy shrimp were present in 1998, 2019, and 2020. Table 4-68 shows historic wildlife monitoring results.

Table 4-68. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998*	Not detected	High
2015*	Not detected	Not detected
2016*	Not detected	Not detected
2018	Not detected	Not detected
2019	Not detected	Low – Moderate (36, 72, 3)
2020	Not detected	Low (6)

*baseline year

4.6.2.1 *Data Quality Objective 5*

California tiger salamanders were not detected in 2020, which was consistent with baseline monitoring. No recorded observations of California tiger salamanders exist at Pond 3 North in any baseline year (1998, 2015, 2016). Results in 2020 were also consistent with reference vernal pools; CTS were not detected at Pond 5 or 101 East (East).

Fairy shrimp were present in 2020. Baseline monitoring results were variable for the species. Fairy shrimp were present in 1998 but were not detected in 2015 or 2016. It was possible survey event timing prevented detection in 2015 and 2016 because surveys occurred later in the year (late March through

May). However, in 2020, a very dry February followed by above-normal March and April rain events may have been favorable for later fairy shrimp detection. Results in 2020 were consistent with reference Pond 101 East (East). Fairy shrimp were present at Pond 101 East (East) but were not detected at Pond 5.

4.6.2.2 *Performance Standard: Wildlife Usage*

Pond 3 North was a post-burn and post-subsurface munitions remediation vernal pool in years 1 and 2 of monitoring and is on track to meet DQO 5. Data quality objectives 1 and 4 were analyzed in the Hydrology Monitoring Annual Report (Chenega, 2021)

4.6.3 Conclusion

Pond 3 North, a post-burn and post-subsurface munitions remediation vernal pool, was in years 3 and 2 of monitoring in 2020. The vernal pool is on track to meet the plant cover and species diversity performance standard and DQO 5 for wildlife usage (see Table 4-69). Pond 3 North will continue to be monitored in the future.

Table 4-69. Success at Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 5	On track

4.7 Pond 3 South – Year 3 and Year 2

Pond 3 South was monitored in 2020 as a year 3 post-burn and year 2 post-subsurface munitions remediation vernal pool. Pond 3 South was monitored for baseline conditions in 1998, 2015, and 2016. Vegetation in Pond 3 South and within its watershed was burned in October 2017 as part of the prescribed burn of BLM Area B Subunit B. Pond 3 South had intrusive anomaly investigations in 2018. Table 4-70 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 3 South (see Figure 4-21). The 1997-1998, 2015-2016, and 2018-2019 water-years were above-normal, whereas the 2014-2015 and 2017-2018 water-years were below-normal. This year, 2019-2020, was similar to the cumulative normal water-year.

Table 4-70. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year					
	1997-1998	2014-2015	2015-2016	2017-2018	2018-2019	2019-2020
Hydrology	●	●	●	●	●	●
Vegetation	●		●	●	●	●
Wildlife	●		●		●	●

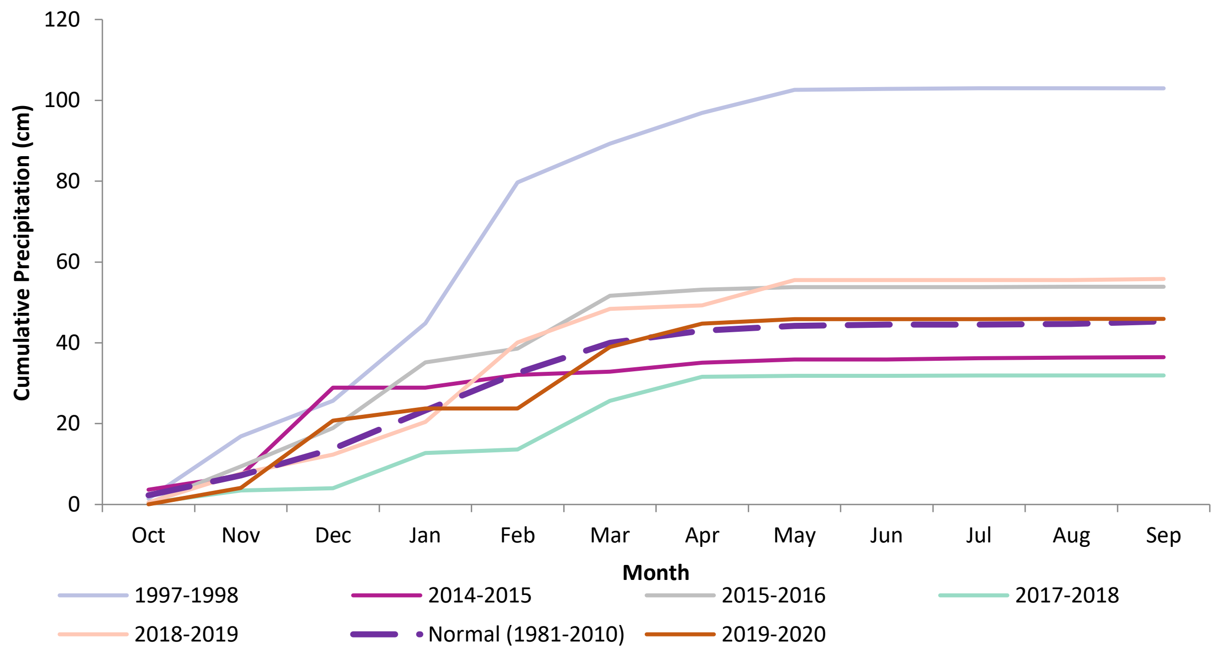


Figure 4-21. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.7.1 Vegetation Monitoring

Vegetation data were collected at Pond 3 South in 1998, 2016, 2018, 2019, and 2020 (HLA, 1998; Burleson, 2017, 2019, 2020). In 1998, data were collected along one transect with a length of 116 feet. Quadrats were placed at 10-foot intervals, alternating from right to left along the transect. Because 1998 data were collected differently than in other years, strata were combined across the vernal pool to allow for comparison. In 2016, 2018, 2019, and 2020 data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2020 were compared stratum-to-stratum in Table 4-71 as well as visually in Figure 4-22.

Pond 3 South also supports a CCG population, located in stratum 5. The population was mapped and a visual estimate of percent cover was recorded in 2020 to compare to 2018 and 2019 (see Figure 4-24 in Section 4.7.1.1).

Table 4-71. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2020
1	20%	17%
2	38%	22%
3	35%	47%
4	5%	10%
5 (CCG)	N/A	0.1%
Upland	2%	4%

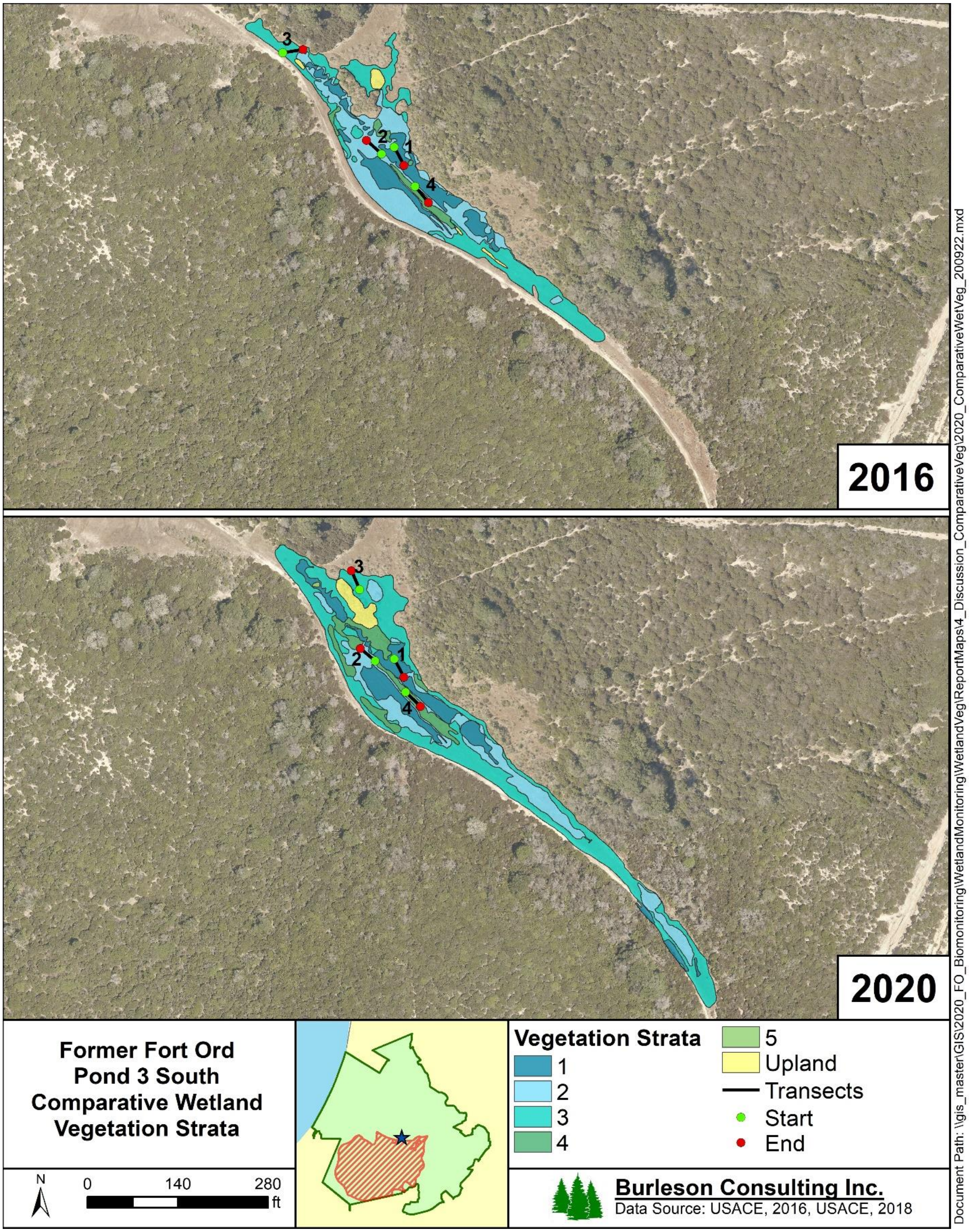


Figure 4-22. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2016 and 2020

The absolute percent vegetative cover observed in 2020 was less than baseline years (see Table 4-72). Vegetative baseline cover ranged from 82.8% in 2016 to 90.2% in 1998, whereas thatch/bare ground ranged from 13.9% in 1998 to 15.1% in 2016. Pond 3 South 2020 values were within the ranges observed at the reference vernal pools (Table 4-73).

Table 4-72. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998*	90.2%	13.9%
2016*	82.8%	15.1%
2018	59.4%	41.0%
2019	68.9%	31.2%
2020	69.8%	30.6%

*baseline year

Table 4-73. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2020

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	47.6%	52.4%
101 East (East)	63.4%	36.6%
997	70.2%	29.8%
3 South	69.8%	30.6%

Species richness in 2020 was greater than baseline years. Species richness on transects was 38, 30, 49, 55, and 54 species in 1998, 2016, 2018, 2019, and 2020, respectively, whereas overall basin species richness was 69, 106, 105, and 92 species in 2016, 2018, 2019, and 2020, respectively (see Table 4-74 and Appendix A Table A-7). The 1998 survey was limited to species on the transect and total vernal pool species richness was not recorded. Pond 3 South species richness was greater than the values observed at the reference vernal pools (see Table 4-75 and Appendix E Tables E-21 and E-42).

Species composition at Pond 3 South varied between monitoring years. Brown-headed rush (*Juncus phaeocephalus*) was an abundant species in all 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*) and Italian rye grass were the dominant species in 2018. Pale spikerush and Italian ryegrass were also major contributors to cover in 2020. A complete comparison of species composition observed at Pond 3 South in 1998, 2016, 2018, 2019, and 2020 can be found in Appendix F. Figure 4-23 shows a subset of this comparison for species observed with a 2% cover or greater.

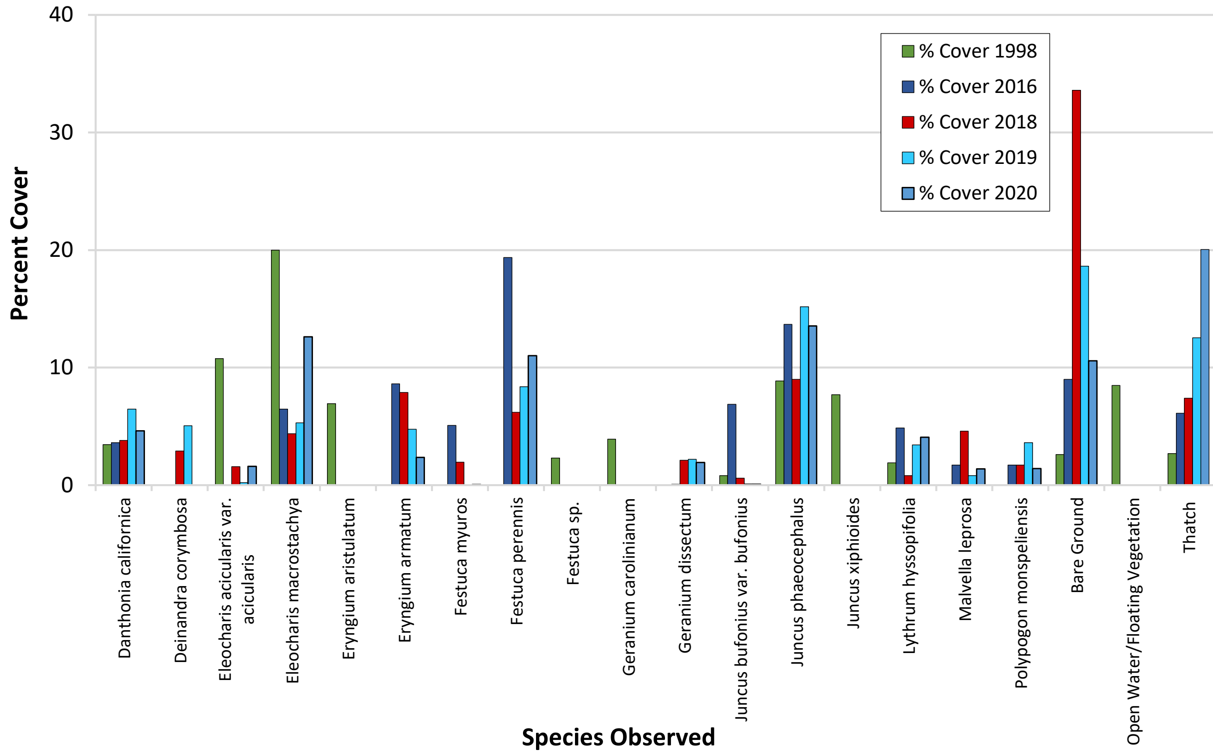


Figure 4-23. Percent Cover of Dominant Species at Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

Native species richness on Pond 3 South transects has been variable. Species richness in 2020 was greater than in baseline years and at 2020 reference vernal pools (see Table 4-74 and Table 4-75). The relative percent cover of native and non-native species was within the range of baseline years; however, native species cover was less, and the non-native was greater than the values observed at the reference vernal pools (see Table 4-76 and Table 4-77).

Table 4-74. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998*	26	9	3
2016*	16	13	1
2018	26	23	0
2019	34	20	1
2020	33	21	0

*baseline year

Table 4-75. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	12	11	0
101 East (East)	24	19	0
997	27	14	1
3 South	33	21	0

Table 4-76. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1998*	84.1%	10.4%	5.5%
2016*	55.0%	44.9%	0.1%
2018	65.7%	34.3%	0.0%
2019	65.9%	34.0%	0.2%
2020	61.7%	38.3%	0.0%

*baseline year

Table 4-77. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	91.3%	8.7%	0.0%
101 East (East)	72.2%	27.8%	0.0%
997	76.3%	23.6%	0.1%
3 South	61.7%	38.3%	0.0%

Wetland and non-wetland species richness in Pond 3 South was greater than baseline and reference vernal pools (see Table 4-78 and Table 4-79). The relative percent cover of wetland and non-wetland species were within the range of values observed in baseline years and at reference vernal pools (see Table 4-80 and Table 4-81).

Table 4-78. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998*	9	6	5	4	0	14
2016*	5	7	5	5	0	8
2018	9	11	6	10	1	12
2019	10	13	9	9	1	13
2020	9	12	8	10	1	14

*baseline year

Table 4-79. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	7	3	3	1	5
101 East (East)	5	8	7	6	3	14
997	9	10	5	5	0	13
3 South	9	12	8	10	1	14

Table 4-80. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998*	55.8%	14.5%	10.0%	3.8%	0.0%	15.9%
2016*	14.8%	39.5%	32.4%	10.1%	0.0%	3.2%
2018	14.1%	33.6%	22.5%	16.1%	0.2%	13.5%
2019	15.4%	37.9%	25.8%	2.4%	1.3%	17.2%
2020	27.9%	27.2%	28.0%	6.3%	1.2%	9.4%

*baseline year

Table 4-81. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%
101 East (East)	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%
997	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%
3 South	27.9%	27.2%	28.0%	6.3%	1.2%	9.4%

4.7.1.1 *Contra Costa Goldfields*

The area of CCG at Pond 3 South increased between 2018 and 2019 then decreased slightly in 2020 (Burleson, 2019, 2020). A single CCG plant was documented at Pond 3 South for the first time in 2018. The population occupied 0.003 acre in 2019 and 0.002 acre in 2020. The densities ranged between 5-10% (see Figure 4-24). In 2020, the CCG population was in a similar location to previous years indicating that post-subsurface munitions remediation likely did not affect the population. Minor changes in population size can be attributed to natural fluctuation.

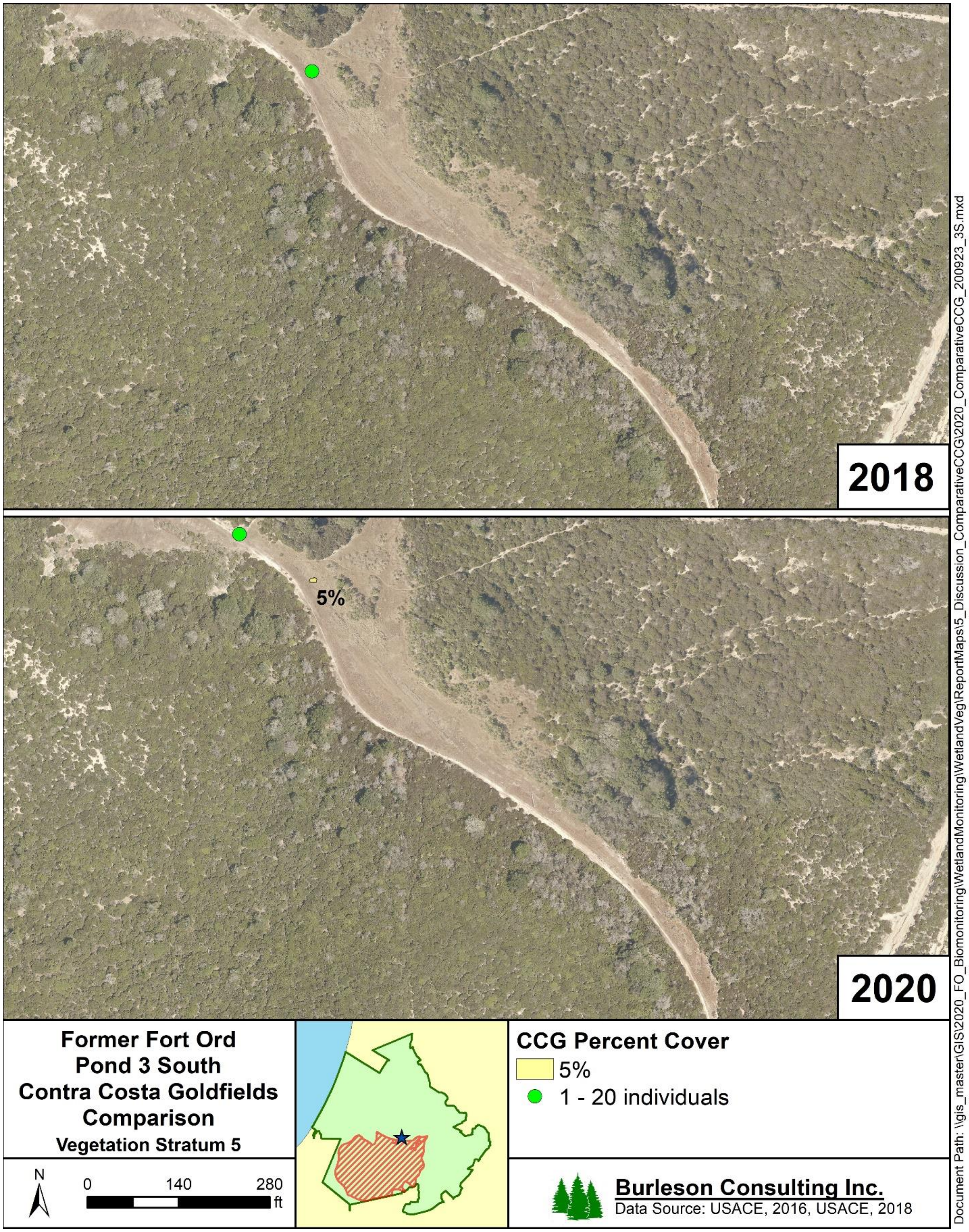


Figure 4-24. Contra Costa Goldfields Populations at Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) in 2018 and 2020

4.7.1.2 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 3 South was dominated by native and wetland plant species during year 3 post-burn and year 2 post-subsurface munitions remediation monitoring in 2020. Pond 3 South wetland vegetation results were generally within range of either baseline and/or reference vernal pools; however, species richness in 2020 was greater than baseline and reference vernal pools. This occurred in 2019 (Yr 2/Yr 1) as well.

4.7.1.3 *Performance Standard: Plant Cover and Species Diversity*

Pond 3 South, a post-burn and post-subsurface munitions remediation vernal pool, is on track to meet the performance standard for years 3 and 2, respectively, in 2020. The species composition, richness, and native and wetland species relative abundances were similar to baseline and reference vernal pool conditions; however, native species richness was greater. Pond 3 South provided suitable wetland habitat in 2020.

4.7.2 Wildlife Monitoring

Wildlife data were collected at Pond 3 South in 1998, 2016, 2019, and 2020 (HLA, 1998; Burleson, 2017, 2020). California tiger salamander larvae were not detected in 2020 or any previous year. Fairy shrimp were present in 1998, 2019, and 2020. Table 4-82 shows historic wildlife monitoring results.

Table 4-82. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998*	Not detected	Moderate
2016*	Not detected	Not detected
2019	Not detected	Low – Moderate (21, 44, 5)
2020	Not detected	Moderate (13)

*baseline year

4.7.2.1 *Data Quality Objective 5*

California tiger salamanders were not detected in 2020, which was consistent with baseline monitoring. No recorded observations of California tiger salamanders exist at Pond 3 South in any baseline year (1998, 2016). Results in 2020 were also consistent with reference vernal pools; CTS were not detected at Pond 5 or 101 East (East).

Fairy shrimp were present in 2020. Baseline monitoring results were variable for the species. Fairy shrimp were present in 1998 but were not detected in 2016. It was possible survey event timing prevented detection in 2016 because surveys occurred later in the year (late March through May). However, in 2020, a very dry February followed by above-normal March and April rain events may have been favorable for later fairy shrimp detection. Results in 2020 were consistent with reference Pond 101 East (East). Fairy shrimp were present at Pond 101 East (East) but were not detected at Pond 5.

4.7.2.2 *Performance Standard: Wildlife Usage*

Pond 3 South is a post-burn and post-subsurface munitions remediation vernal pool in years 1 and 2 on track to meet DQO 5. Data quality objectives 1 and 4 were analyzed in the Hydrology Monitoring Annual Report (Chenega, 2021)

4.7.3 Conclusion

Pond 3 South, a post-burn and post-subsurface munitions remediation vernal pool, was in years 3 and 2 of monitoring in 2020. The vernal pool is on track to meet the plant cover and species diversity performance standard and DQO 5 for wildlife usage (see Table 4-83). Pond 3 South will continue to be monitored in the future.

Table 4-83. Success at Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 5	On track

4.8 Pond 39 – Year 3 and Year 2

Pond 39 was monitored in 2020 as a year 3 post-burn and year 2 post-subsurface munitions remediation vernal pool. Pond 39 was monitored for baseline conditions in 1998, 2015, and 2016. Vegetation in Pond 39 and within its watershed was burned in October 2017 as part of the prescribed burn of BLM Area B Subunit B. Pond 39 had intrusive anomaly investigations in 2018. Table 4-84 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 39 (see Figure 4-25). The 1997-1998, 2015-2016, and 2018-2019 water-years were above normal, whereas the 2014-2015 and 2017-2018 water-years were below normal. This year, 2019-2020, was similar to the cumulative normal water-year.

Table 4-84. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year					
	1997-1998	2014-2015	2015-2016	2017-2018	2018-2019	2019-2020
Hydrology	●	●	●	●	●	●
Vegetation	●		●	●	●	●
Wildlife	●		●	●	●	●

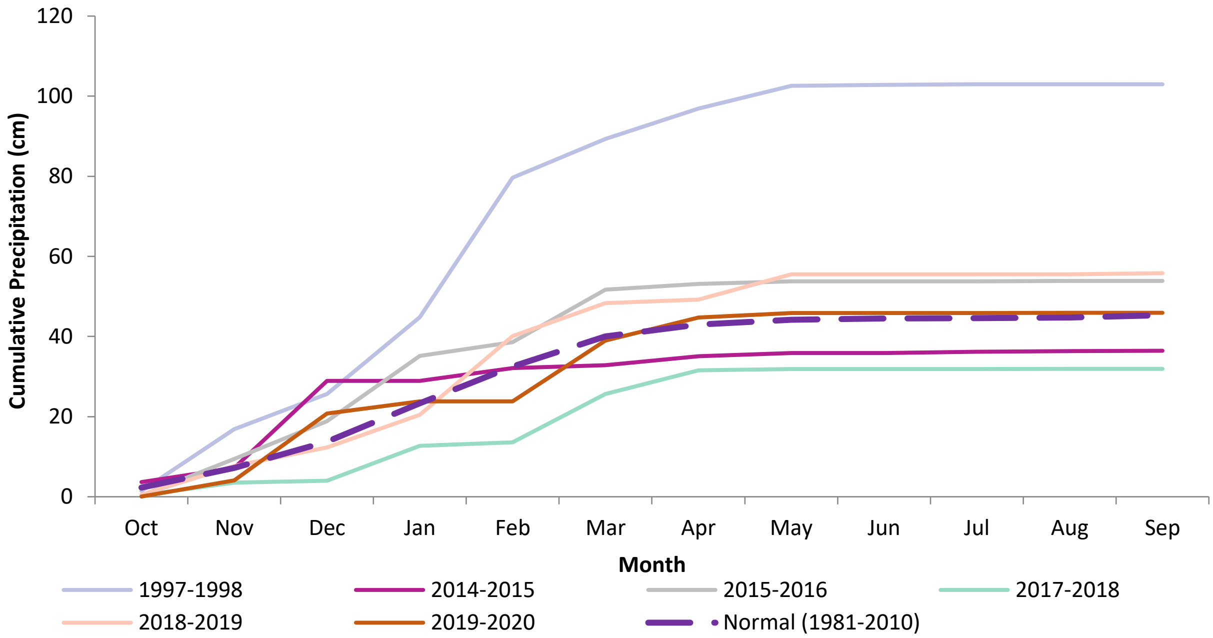


Figure 4-25. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.8.1 Vegetation Monitoring

Vegetation data were collected at Pond 39 in 1998, 2016, 2018, 2019, and 2020 (HLA, 1998; Burleson, 2017, 2019, 2020). In 1998, data were collected along one transect with a length of 239 feet. Quadrats were placed at 10-foot intervals, alternating from right to left along the transect. Because 1998 data were collected differently than in other years, strata were combined across the vernal pool to allow for comparison. In 2016, 2018, 2019, and 2020, data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2020 were compared stratum-to-stratum in Table 4-85 as well as visually in Figure 4-26.

Table 4-85. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2020
1	5%	9%
2	8%	N/A
3	87%	38%
4	N/A	44%
Upland	N/A	9%

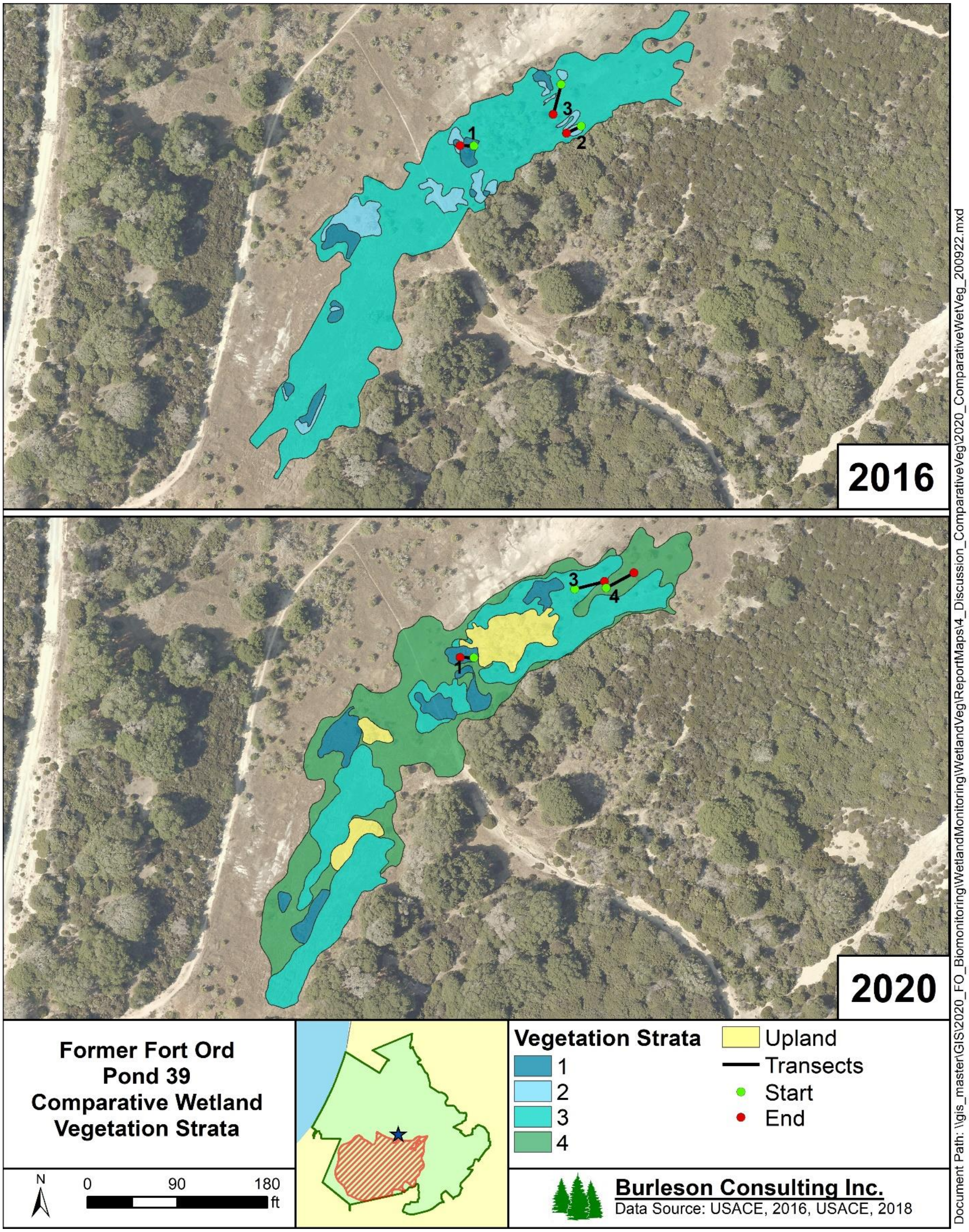


Figure 4-26. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2016 and 2020

Absolute percent vegetative cover was greater in 2020 than in baseline years (see Table 4-86). Vegetative cover ranged in baseline years from 48.7% in 1998 to 61.9% in 2016, whereas thatch/bare ground ranged from 37.4% in 2016 to 51.8% in 1998. The absolute percent vegetative cover of Pond 39 in 2020 was also greater than values observed at the reference vernal pools and was most similar to Pond 997 (see Table 4-87).

Table 4-86. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998*	48.7%	51.8%
2016*	61.9%	37.4%
2018	59.1%	41.3%
2019	75.2%	25.3%
2020	73.4%	26.6%

*baseline year

Table 4-87. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2020

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	47.6%	52.4%
101 East (East)	63.4%	36.6%
997	70.2%	29.8%
39	73.4%	26.6%

Species richness in 2020 was greater than in baseline years. Species richness on transects was 22, 30, 35, 46, and 32 species in 1998, 2016, 2018, 2019, and 2020, respectively, whereas overall basin species richness was 61, 90, 98, and 85 species in 2016, 2018, 2019, and 2020, respectively (see Table 4-88 and Appendix A Table A-8). The 1998 survey was limited to species on the transect and overall basin species richness was not recorded. Pond 39 species richness was similar to reference vernal pools (see Table 4-89 and Appendix E Tables E-21 and E-42).

Species composition at Pond 39 was similar between monitoring years; two of the dominant species were pale spikerush (*Eleocharis macrostachya*) and Italian rye grass (*Festuca perennis*) in all monitoring years. Cut-leaved plantain (*Plantago coronopus*) and California oat grass (*Danthonia californica*) were also dominant in 1998, 2018, 2019, and 2020. Narrow-leaved clover (*Trifolium angustifolium*) was dominant in 2019. A complete comparison of species composition observed at Pond 39 in 1998, 2016, 2018, and 2019 can be found in Appendix F. Figure 4-27 shows a subset of this comparison for species observed with a 2% cover or greater.

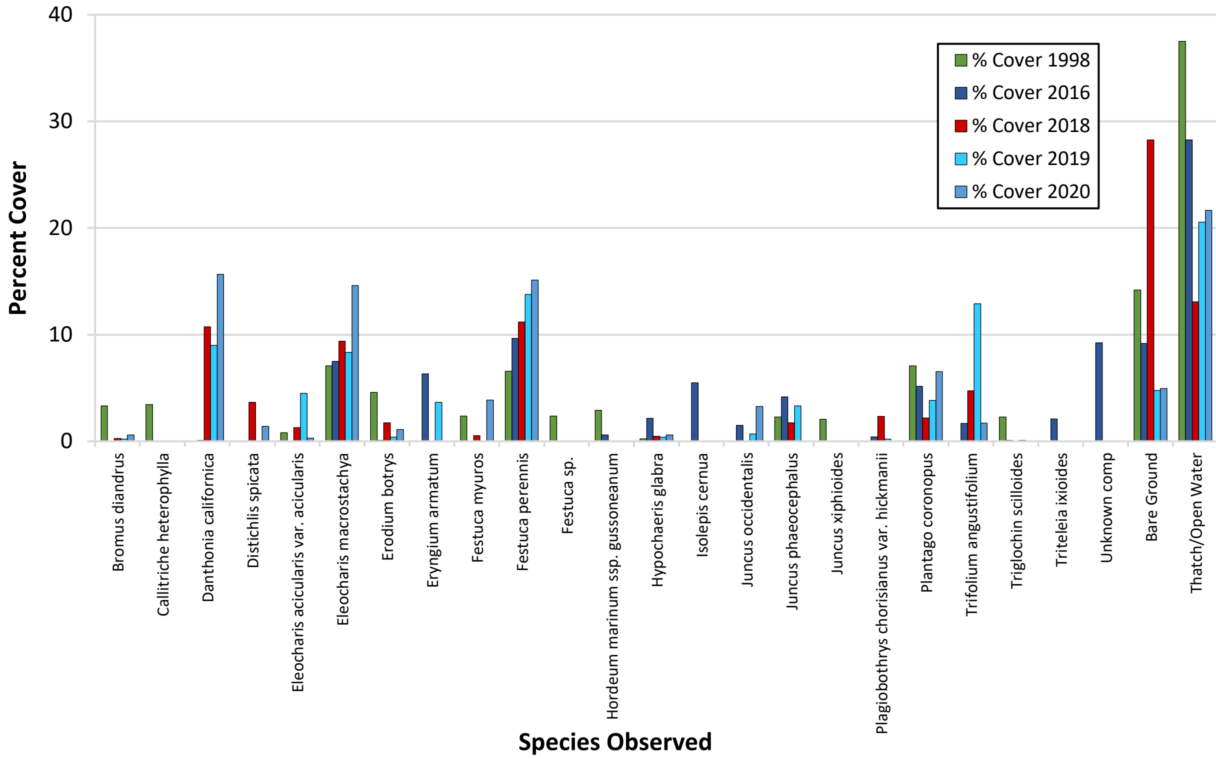


Figure 4-27. Percent Cover of Dominant Species at Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

Native species richness on Pond 39 transects was within the range of values observed in baseline years and values at reference vernal pools. Non-native richness was greater than baseline and reference richness (see Table 4-88 and see Table 4-89). The relative percent cover of native species cover was greater than the values observed in baseline, while non-native cover was within the range of values observed in baseline years (see Table 4-90). Pond 39 native cover was less than and non-native cover was greater than the values observed at reference vernal pools (see Table 4-91).

Table 4-88. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998*	10	11	1
2016*	14	13	3
2018	16	19	0
2019	25	19	2
2020	12	20	0

*baseline year

Table 4-89. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	12	11	0
101 East (East)	24	19	0
997	27	14	1
39	12	20	0

Table 4-90. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1998*	39.8%	60.2%	0.0%
2016*	47.1%	37.1%	15.7%
2018	54.3%	45.7%	0.0%
2019	46.8%	53.0%	0.2%
2020	52.0%	48.0%	0.0%

*baseline year

Table 4-91. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	91.3%	8.7%	0.0%
101 East (East)	72.2%	27.8%	0.0%
997	76.3%	23.6%	0.1%
39	52.0%	48.0%	0.0%

Wetland species richness on Pond 39 transects was less than baseline and non-wetland species richness was greater than baseline (see Table 4-92). Pond 39 wetland species richness was generally lower than reference vernal pools and non-wetland species richness was generally within the range of reference vernal pools in 2020 (see Table 4-93). The relative percent cover of wetland species was greater than baseline years and non-wetland cover was within the range of baseline (see Table 4-94). The relative percent cover of wetland and non-wetland species were within the range of values observed at the reference vernal pools (Table 4-95).

Table 4-92. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998*	7	2	6	3	0	4
2015*	5	5	7	3	0	10
2018	4	7	6	5	1	12
2019	6	9	6	4	2	19
2020	2	2	5	7	2	14

*baseline year

Table 4-93. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	7	3	3	1	5
101 East (East)	5	8	7	6	3	14
997	9	10	5	5	0	13
39	2	2	5	7	2	14

Table 4-94. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998*	32.8%	5.8%	38.9%	14.5%	0.0%	7.9%
2015*	24.2%	20.1%	28.9%	2.4%	0.0%	24.4%
2018	23.0%	12.4%	41.9%	6.1%	1.2%	15.3%
2019	18.2%	14.7%	36.4%	2.1%	1.3%	27.3%
2020	20.3%	6.4%	51.7%	10.3%	0.3%	11.1%

*baseline year

Table 4-95. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%
101 East (East)	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%
997	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%
39	20.3%	6.4%	51.7%	10.3%	0.3%	11.1%

4.8.1.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations and possibly historic disturbance to this area. Some variability is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 39 was dominated by native and wetland plant species during year 3 post-burn and year 2 post-subsurface munitions remediation monitoring in 2020. For Pond 39, most of the wetland vegetation results were outside of the range of either baseline and/or reference vernal pools. Non-native richness were slightly more than the values observed in baseline years of monitoring and reference vernal pools, and wetland species richness was less than baseline and reference. Native cover was greater than baseline but less than reference.

4.8.1.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 39, a post-burn and post-subsurface munitions remediation vernal pool, is not on track to meet the performance standard for years 3 and 2, respectively, in 2020. The species composition was similar to baseline and/or reference vernal pool conditions. However, there was an increase in non-native and non-wetland species and a decrease in wetland richness. The valley in Unit B where Pond 39 is located has historically been heavily disturbed which is likely why, in some years, non-native and non-wetland richness is high. Additionally, unusual patterns in rainfall in the 2019-2020 water-year may have created a unique combination of environmental conditions favorable for non-native and non-wetland species at Pond 39. Fortunately, the relative abundance of native and wetland species, although less than reference, increased when compared to baseline. This vernal pool should continue to be monitored as recommended in the PBO (see USFWS, 2017).

4.8.2 Wildlife Monitoring

Wildlife data were collected at Pond 39 in 1998, 2016, 2018, 2019, and 2020 (HLA, 1998; Burleson, 2017, 2019, 2020). California tiger salamander larvae were not detected in 2020 or previous survey years. Fairy shrimp were present in 1998, 2018, 2019, and 2020. Table 4-96 shows historic wildlife monitoring results.

Table 4-96. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998*	Not detected	Moderate
2016*	Not detected	Not detected
2018	Not detected	Low (8)
2019	Not detected	Low – Moderate (71, 37, 7)
2020	Not detected	Low (5)

*baseline year

4.8.2.1 *Data Quality Objective 5*

California tiger salamanders were not detected in 2020, which was consistent with baseline monitoring conducted in 1998 and 2016. Results in 2020 were also consistent with reference vernal pools; CTS were not detected at Pond 5 or 101 East (East).

Fairy shrimp were present in 2020, which was consistent with the 1998 baseline monitoring year. It was possible that survey event timing prevented detection in 2016 because surveys occurred later in the year (April and May). However, in 2020, a very dry February followed by above-normal March and April rain events may have been favorable for later fairy shrimp detection. Results in 2020 were consistent with reference Pond 101 East (East). Fairy shrimp were present at Pond 101 East (East) but were not detected at Pond 5.

4.8.2.2 *Performance Standard: Wildlife Usage*

Pond 39 was a post-burn and post-subsurface munitions remediation vernal pool in years 2 and 3 of monitoring and is on track to meet DQO 5. Data quality objectives 1 and 4 were analyzed in the Hydrology Monitoring Annual Report (Chenega, 2021)

4.8.3 Conclusion

Pond 39, a post-burn and post-subsurface munitions remediation vernal pool, was in years 3 and 2 of monitoring in 2020. The vernal pool is on track to meet DQO 5 for wildlife usage, but not on track to meet the plant cover and species diversity performance standard (see Table 4-97). Pond 39 will continue to be monitored in the future.

Table 4-97. Success at Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	Not on track
Wildlife Usage	DQO 5	On track

4.9 Pond 40 North – Year 3

Pond 40 North was monitored in 2020 as a year 3 post-burn vernal pool. Pond 40 North was monitored for baseline conditions in 2015. Vegetation in Pond 40 North and within its watershed was burned in October 2017 as part of the prescribed burn of BLM Area B Subunit B. Pond 40 North had anomaly investigations and it was determined no subsurface remediation was necessary at that pond. Year 3 is the final year of monitoring for Pond 40 North. Table 4-98 summarizes the years that monitoring occurred and surveys conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 40 North (see Figure 4-28). The 2014-2015 and 2017-2018 water-years were below normal, while 2018-2019 was above normal. This year, 2019-2020, was similar to the cumulative normal water-year.

Table 4-98. Pond 40 North (Year 3 Post-Burn) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year			
	2014-2015	2017-2018	2018-2019	2019-2020
Hydrology	●	●	●	●
Vegetation	●	●	●	●
Wildlife	●		●	●

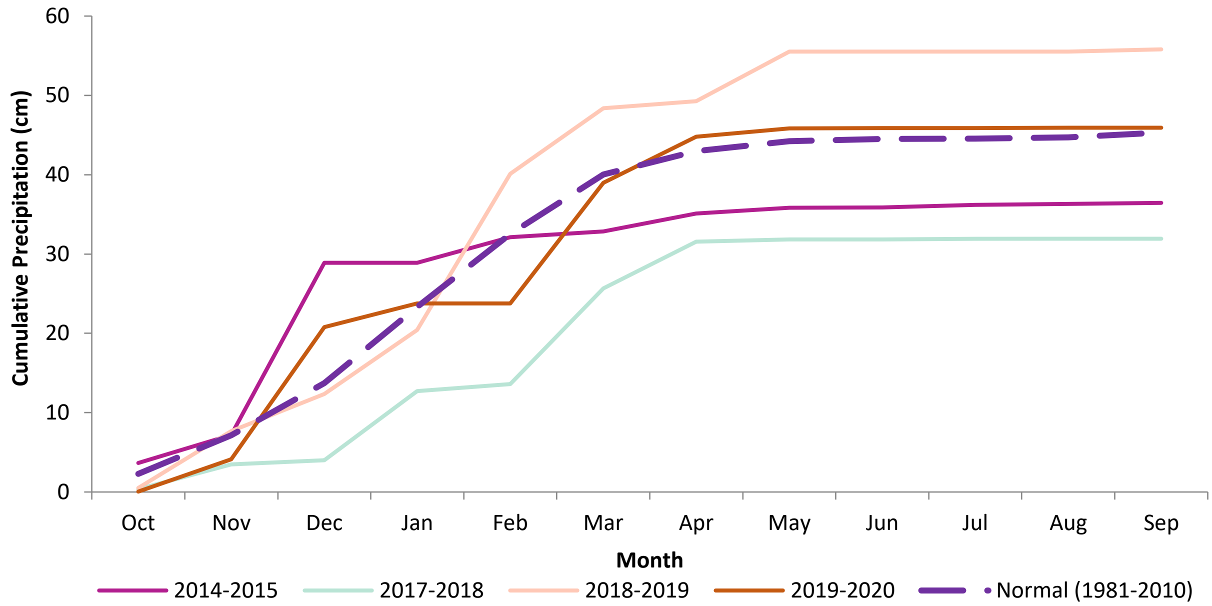


Figure 4-28. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 40 North (Year 3 Post-Burn) North Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.9.1 Vegetation Monitoring

Vegetation data were collected at Pond 40 North in 2015, 2018, 2019, and 2020 (Burleson., 2016, 2019, 2020). In 2015, 2018, and 2019, data were collected using the methodology described in the Methods section of this report. Data from 2015 and 2020 were compared stratum-to-stratum in Table 4-99 as well as visually in Figure 4-29.

Table 4-99. Pond 40 North (Year 3 Post-Burn) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2015	2020
1	2%	N/A
2	40%	33%
3	58%	41%
4	N/A	26%

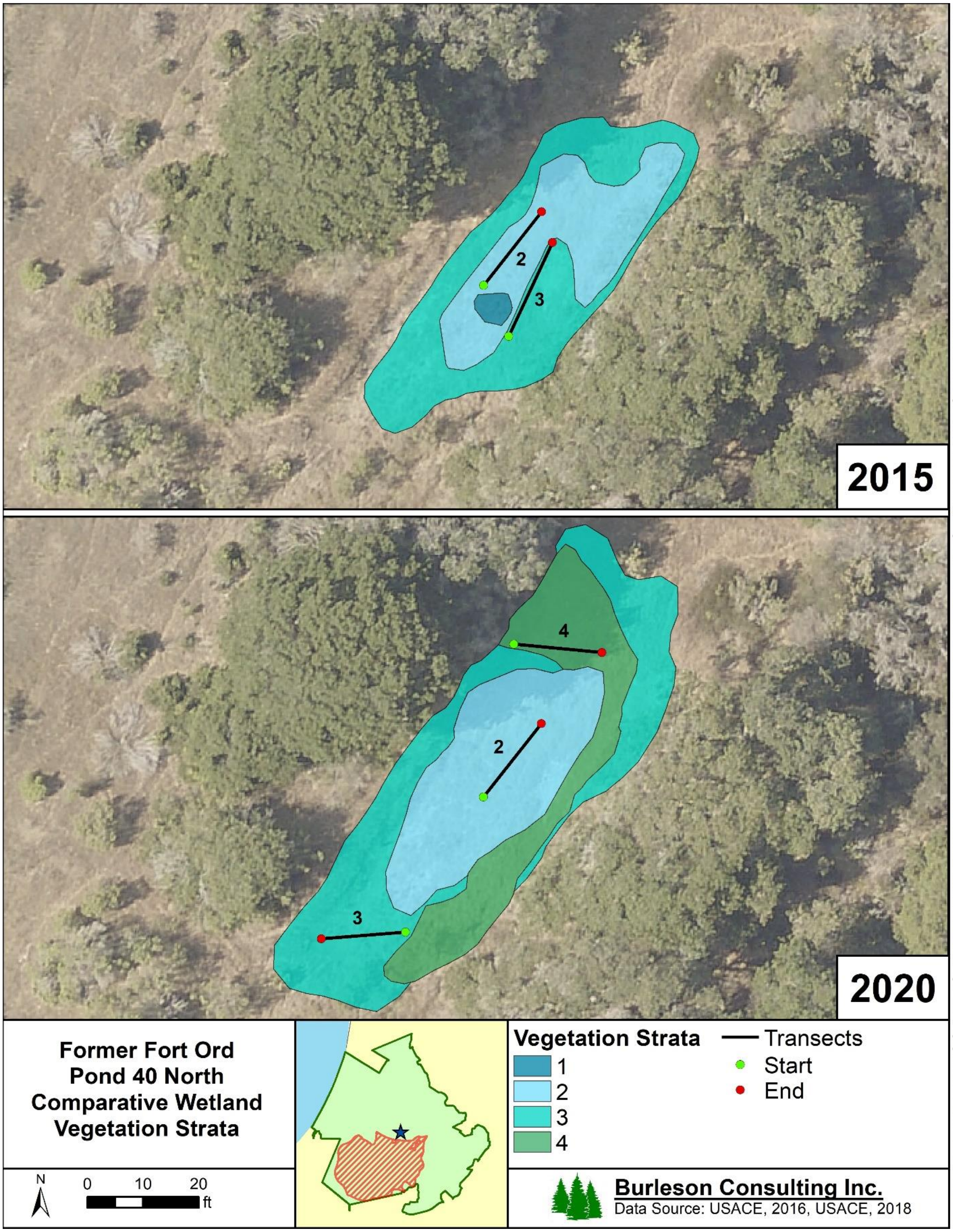


Figure 4-29. Pond 40 North (Year 3 Post-Burn) Vegetation Strata and Transects for 2015 and 2020. The 2020 transect 2 in stratum 2 was identified as transect 1 in 2015 (Burleson *et* al., 2016). The transect number was edited for the comparison map.

Absolute percent vegetative cover observed in 2020 at Pond 40 North was greater than the baseline year and was within the range of values observed at the reference vernal pools (see Table 4-100 and Table 4-101).

Table 4-100. Pond 40 North (Year 3 Post-Burn) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2015*	42.5%	55.8%
2018	49.2%	49.7%
2019	59.6%	40.8%
2020	56.1%	43.9%

*baseline year

Table 4-101. Pond 40 North (Year 3 Post-Burn) and Reference Vernal Pool Absolute Percent Cover in 2020

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	47.6%	52.4%
101 East (East)	63.4%	36.6%
997	70.2%	29.8%
40 North	56.1%	43.9%

Species richness in 2020 was greater than the baseline year. Species richness on transects was 5, 17, 22, and 15 species in 2015, 2018, 2019, and 2020, respectively, whereas overall basin species richness was 27, 57, 59, and 59 species, in 2015, 2018, 2019, and 2020, respectively (see Table 4-102 and Appendix A Table A-9). 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 4-103 and Appendix E Tables E-21 and E-42).

Species composition at Pond 40 North was similar across monitoring years. Pale spikerush (*Eleocharis macrostachya*) was the dominant species in 2015 and 2020, whereas brown-headed rush (*Juncus phaeocephalus*) was the dominant species in 2018 and 2019. Pale spikerush was still an important species that provided moderate cover in 2018 and 2019. A complete comparison of species composition observed at Pond 40 North in 2015, 2018, and 2019 can be found in Appendix F. Figure 4-30 shows a subset of this comparison for species observed with a 2% cover or greater.

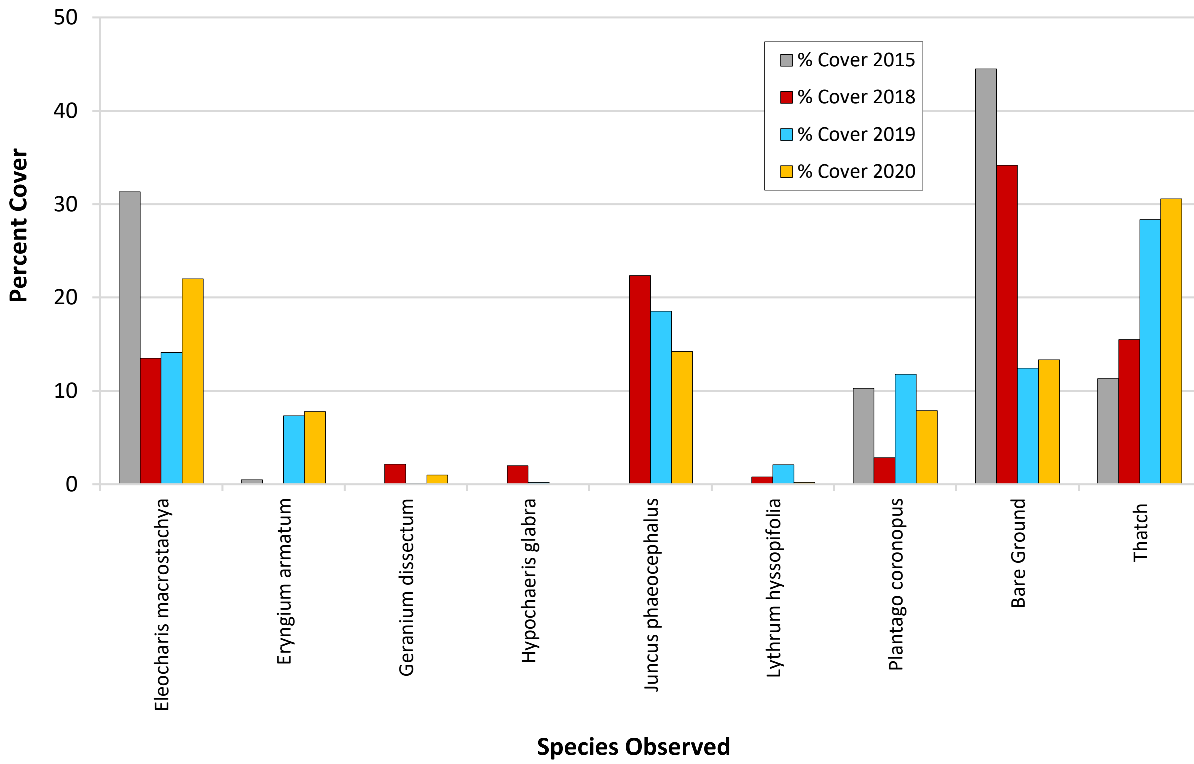


Figure 4-30. Percent Cover of Dominant Species at Pond 40 North (Year 3 Post-Burn)

Native and non-native species richness on Pond 40 North transects increased between baseline and 2020 (Yr 3) with the greatest number in 2019 (Yr 2). More non-native species than native species were observed in follow-up years than in baseline (see Table 4-102). This is likely due to consecutive years of drought prior to the baseline year of monitoring. Pond 40 North native and non-native species richness were lower than the ranges observed at the reference vernal pools in 2020 (Yr 3), 2019 (Yr 2), and 2018 (Yr 3) (see Table 4-103, Burleson, 2019, 2020). Vegetation in reference vernal pools was not monitored in 2015, the baseline year for Pond 40 North. The relative percent cover of native species was greater than baseline, while non-native cover was less than baseline in 2020 (Yr 3). There were minor fluctuations of cover values between follow-up monitoring years but all values were within 6% or less of baseline (see Table 4-104). Pond 40 North was within the range of native and non-native relative percent cover values observed at the reference vernal pools in 2020 (Yr 3), 2019 (Yr 2), and 2018 (Yr 1) (see Table 4-105 Burleson, 2019, 2020).

Table 4-102. Pond 40 North (Year 3 Post-Burn) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2015*	2	2	1
2018	6	11	0
2019	9	12	1
2020	7	8	0

*baseline year

Table 4-103. Pond 40 North (Year 3 Post-Burn) and Reference Vernal Pool Native and Non-Native Species Richness in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	12	11	0
101 East (East)	24	19	0
997	27	14	1
40 North	7	8	0

Table 4-104. Pond 40 North (Year 3 Post-Burn) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2015*	74.9%	24.6%	0.5%
2018	76.3%	23.7%	0.0%
2019	70.9%	28.4%	0.7%
2020	79.8%	20.2%	0.0%

*baseline year

Table 4-105. Pond 40 North (Year 3 Post-Burn) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	91.3%	8.7%	0.0%
101 East (East)	72.2%	27.8%	0.0%
997	76.3%	23.6%	0.1%
40 North	79.8%	20.2%	0.0%

Wetland species richness values on Pond 40 North transects were greater in 2020 (Yr 3), 2019 (Yr 2), and 2018 (Yr 1) than baseline, whereas non-wetland species richness was slightly higher than baseline in 2019 (Yr 2) and 2018 (Yr 1) and the same in 2020 (Yr 3) (see Table 4-106). Wetland and non-wetland species richness at the vernal pool was lower than the ranges observed at the reference vernal pools in 2020 (see Table 4-107). The relative percent cover of wetland species was slightly less than the value observed in the baseline year of monitoring. This was true in 2019 (Yr 2) and 2018 (Yr 1) as well, by 2020 (Yr) the wetland cover was within 2.7% of baseline. Non-wetland species cover was the same as baseline in 2020 (see Table 4-108). The wetland relative percent cover values in 2020 (Yr 3) were most similar to those observed at reference Pond 5 (see Table 4-109).

Table 4-106. Pond 40 North (Year 3 Post-Burn) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2015*	2	1	1	0	0	1
2018	3	2	2	4	1	5
2019	4	4	4	2	1	7
2020	2	4	4	0	0	5

*baseline year

Table 4-107. Pond 40 North (Year 3 Post-Burn) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	7	3	3	1	5
101 East (East)	5	8	7	6	3	14
997	9	10	5	5	0	13
40 North	2	4	4	0	0	5

Table 4-108. Pond 40 North (Year 3 Post-Burn) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2015*	74.1%	1.2%	24.2%	0.0%	0.0%	0.5%
2018	30.8%	46.4%	6.8%	4.4%	0.3%	11.2%
2019	29.7%	45.5%	20.9%	0.4%	0.4%	3.2%
2020	39.6%	41.2%	16.0%	0.0%	0.0%	3.2%

*baseline year

Table 4-109. Pond 40 North (Year 3 Post-Burn) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%
101 East (East)	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%
997	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%
40 North	39.6%	41.2%	16.0%	0.0%	0.0%	3.2%

4.9.1.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations and possibly historic disturbance to this area. Some variability is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Despite slightly higher non-native species richness than native, vegetative cover in Pond 40 North was dominated by native and wetland plant species during year 3 post-burn monitoring in 2020. Pond 40 North wetland vegetation results were generally similar to baseline and reference vernal pools. Although there has been an increase in non-native species richness compared to baseline, there has also been an increase in native species richness and by 2020 (Yr 3) the ratio of native to non-native species was similar to baseline. The species richness for Pond 40 North has been lower than reference vernal pools, likely due to its small size, rather than from the effects of remediation.

4.9.1.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 40 North, a post-burn vernal pool, met the performance standard for year 3 in 2020. The species composition, richness, and native and wetland species relative abundances were generally similar to baseline and reference vernal pool conditions. The ratio of non-native species richness to native was similar to baseline conditions. In the baseline year, two native and two non-native species were observed, but by 2020, seven native and eight non-native species were observed. Additionally, native cover in 2020 was greater than baseline. Pond 40 North provided suitable wetland habitat in 2020 and was not impacted by burning.

4.9.2 Wildlife Monitoring

Wildlife data were collected at Pond 40 North in 2015, 2019, and 2020 (Burleson *et al.*, 2016, 2020). California tiger salamander larvae were not detected any year. Fairy shrimp were present at Pond 40 North in 2019 and 2020. Table 4-110 shows historic wildlife monitoring results.

Table 4-110. Pond 40 North (Year 3 Post-Burn) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2015*	Not detected	Not detected
2019	Not detected	Moderate – High (121, 57, 259)
2020	Not detected	Moderate (36)

*baseline year

4.9.2.1 *Data Quality Objective 5*

California tiger salamanders were not detected in 2020, which was consistent with baseline monitoring. Results in 2020 were also consistent with reference vernal pools; CTS were not detected at Pond 5 or 101 East (East).

Fairy shrimp were present in 2020, which was not consistent with baseline monitoring in 2015 where they were not detected. It was possible that late survey event timing combined with a below-normal consecutive drought year prevented detection in 2015. In 2019, early fairy shrimp surveys occurred, whereas in 2020, a very dry February followed by above-normal March and April rain events may have been favorable for later fairy shrimp detection. Results in 2020 were consistent with reference Pond 101 East (East). Fairy shrimp were present at Pond 101 East (East) but were not detected at Pond 5.

4.9.2.2 *Performance Standard: Wildlife Usage*

Pond 40 North was a post-burn vernal pool in the final year of monitoring. Pond 40 North met DQO 5. Fairy shrimp were present in 2019 and 2020 but not in baseline, likely because the 2015 survey occurred too late in the season during a below normal, consecutive drought water-year. Data quality objectives 1 and 4 were analyzed in the Hydrology Monitoring Annual Report (Chenega, 2021).

4.9.3 Conclusion

Pond 40 North, a post-burn vernal pool, was in the final year (Yr 3) of monitoring in 2020. The vernal pool met the plant cover and species diversity performance standard and met DQO 5 for wildlife usage (see Table 4-111). No further monitoring is recommended for Pond 40 North.

Table 4-111. Success at Pond 40 North (Year 3 Post-Burn) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	Met
Wildlife Usage	DQO 5	Met

4.10 Pond 40 South – Year 3 and Year 2

Pond 40 South was monitored in 2020 as a year 3 post-burn and year 2 post-subsurface munitions remediation vernal pool. Pond 40 South was monitored for baseline conditions in 1998, 2015, 2016, and 2017. Vegetation in Pond 40 South and within its watershed was burned in October 2017 as part of the prescribed burn of BLM Area B Subunit B. Pond 40 South had intrusive anomaly investigations in 2018. Table 4-112 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 40 South (see Figure 4-31). The 1997-1998, 2015-2016, 2016-2017, and 2018-2019 water-years were above normal, whereas 2014-2015 and 2017-2018 water-years were below normal. This year, 2019-2020, was similar to the cumulative normal water-year.

Table 4-112. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year						
	1997-1998	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Hydrology	●	●	●	●	●	●	●
Vegetation	●		●		●	●	●
Wildlife	●		●			●	●

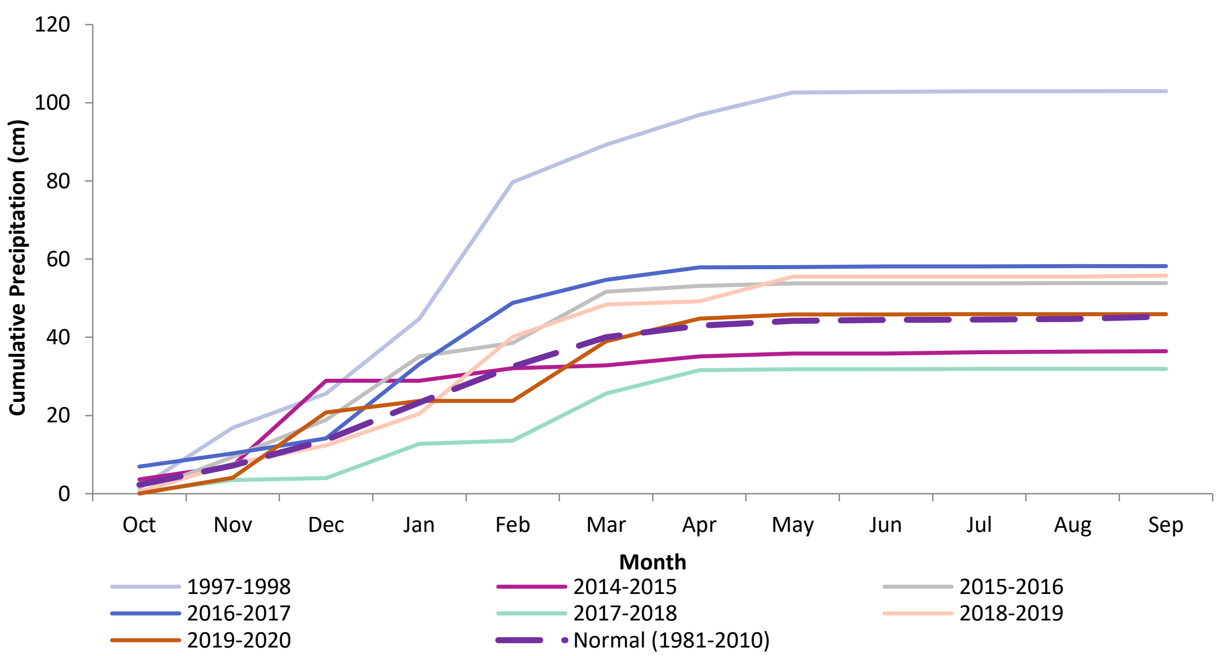


Figure 4-31. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.10.1 Vegetation Monitoring

Vegetation data were collected at Pond 40 South in 1998, 2016, 2018, 2019, and 2020 (HLA, 1998; Burleson, 2017, 2019). In 1998, data were collected along one transect with a length of 135 feet. Quadrats were placed at 10-foot intervals, alternating from right to left along the transect. Because 1998 data were collected differently than in other years, strata were combined across the vernal pool to allow for comparison. In 2016, 2018, 2019, and 2020 data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2020 were compared stratum-to-stratum in Table 4-113 as well as visually in Figure 4-32.

Table 4-113. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2020
1	9%	6%
2	26%	12%
3	65%	82%

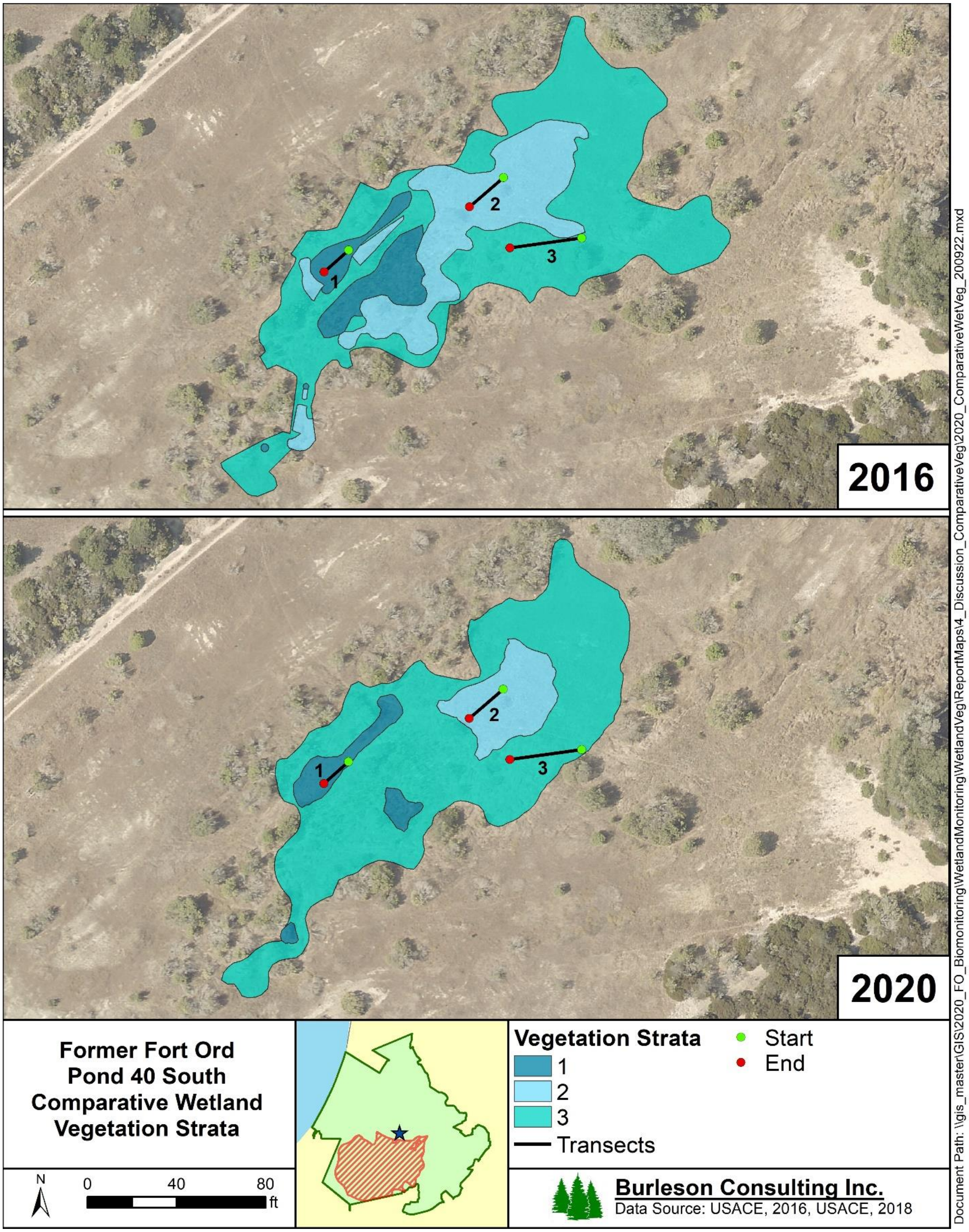


Figure 4-32. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2016 and 2020

Absolute percent vegetative cover observed in 2020 was less than the range of values observed in the baseline years of monitoring (see Table 4-114). The 2020 Pond 40 South cover and bare ground values were within the ranges observed at the reference vernal pools and most similar to Pond 101 East (East) (see Table 4-115).

Table 4-114. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998*	72.7%	27.1%
2016*	66.7%	33.9%
2018	51.9%	50.3%
2019	78.6%	22.6%
2020	61.2%	38.8%

*baseline year

Table 4-115. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2020

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	47.6%	52.4%
101 East (East)	63.4%	36.6%
997	70.2%	29.8%
40 South	61.2%	38.8%

Overall species richness in 2020 was greater than the baseline years of monitoring. Species richness on transects was 21, 20, 32, 41, and 26 species in 1998, 2016, 2018, 2019, and 2020, respectively, whereas overall basin species richness was 27, 55, 75, and 66, species in 2016, 2018, 2019, and 2020, respectively (see Table 4-116 and Appendix A Table A-10). The 1998 survey was limited to species on the transect and overall basin species richness was not recorded. Pond 40 South species richness was within the range observed on transects at the reference vernal pools but below the ranges observed for the entire basin (see Table 4-117 and Appendix E Tables E-21 and E-42).

Species composition in Pond 40 South varied between monitoring years, as did the dominant species. The dominant species included iris-leaved rush (*Juncus xiphioides*) in 1998, Italian rye grass (*Festuca perennis*) in 2016, and cut-leaved plantain *(Plantago coronopus*) and Italian rye grass co-dominance in 2018. In 2019 and 2020, Italian rye grass and Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*) were the dominant species. Pale spikerush (*Eleocharis macrostachya*) and cut-leaved plantain were present at moderate cover in all four years. A complete comparison of species composition observed at Pond 40 South in 1998, 2016, and 2018 can be found in Appendix F. Figure 4-33 shows a subset of this comparison for species observed with a 2% cover or greater.

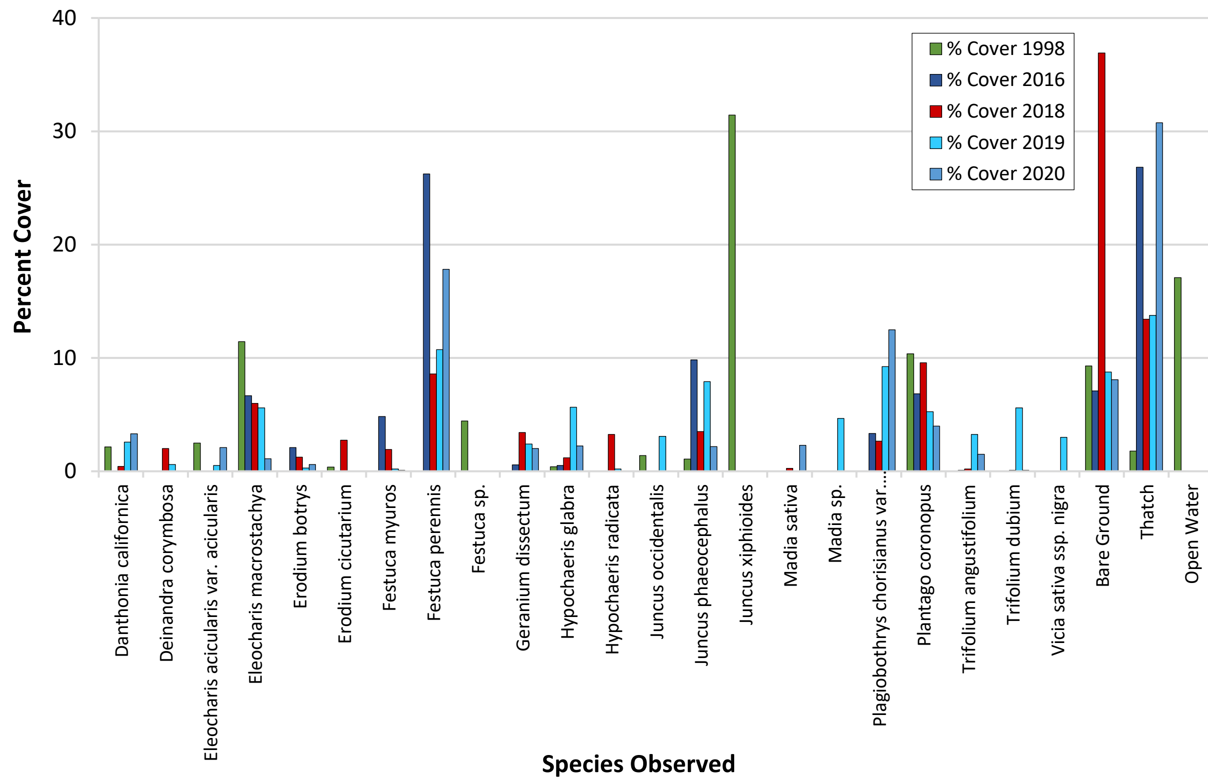


Figure 4-33. Percent Cover of Dominant Species at Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

Native species richness on Pond 40 South transects was within the range of values observed in baseline years, while non-native species richness was greater than baseline (see Table 4-116). Pond 40 South native species richness in 2020 was less than reference pools, whereas non-native species richness was within the range observed at reference vernal pools (see Table 4-117). The relative percent cover of native species and non-native species was within the range of previous years (see Table 4-118). However, Pond 40 South was well below the range of native relative percent cover at the reference vernal pools in 2020 and above the range of non-native relative percent cover (see Table 4-119).

Table 4-116. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998*	12	6	3
2016*	5	14	1
2018	9	22	1
2019	17	23	1
2020	8	18	0

*baseline year

Table 4-117. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	12	11	0
101 East (East)	24	19	0
997	27	14	1
40 South	8	18	0

Table 4-118. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1998*	75.7%	15.7%	8.5%
2016*	30.1%	69.0%	0.9%
2018	29.4%	70.5%	0.2%
2019	41.5%	52.6%	5.9%
2020	39.0%	61.0%	0.0%

*baseline year

Table 4-119. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	91.3%	8.7%	0.0%
101 East (East)	72.2%	27.8%	0.0%
997	76.3%	23.6%	0.1%
40 South	39.0%	61.0%	0.0%

Wetland species richness on Pond 40 South transects was greater in 2020 than baseline years, while non-wetland species were within the baseline year range (see Table 4-120). The wetland species richness at Pond 40 South was less than the values observed at the reference vernal pools, while non-wetland species were within the range observed at reference vernal pools (see Table 4-121). The relative percent cover of wetland species was lower in 2020 than baseline years, whereas non-wetland species cover was within the range observed in baseline (see Table 4-122). The relative percent cover of wetland and non-wetland species were within the range of values observed at the reference vernal pools in 2020 (see Table 4-123).

Table 4-120. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998*	4	4	3	1	0	9
2016*	3	2	3	5	1	6
2018	3	5	6	7	2	9
2019	4	6	5	8	2	16
2020	4	3	5	6	0	8

*baseline year

Table 4-121. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	7	3	3	1	5
101 East (East)	5	8	7	6	3	14
997	9	10	5	5	0	13
40 South	4	3	5	6	0	8

Table 4-122. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998*	62.6%	4.9%	18.6%	0.2%	0.0%	13.8%
2016*	15.3%	14.9%	50.1%	14.8%	1.1%	3.9%
2018	17.2%	9.3%	36.6%	14.9%	2.2%	19.7%
2019	19.7%	15.7%	24.9%	9.7%	3.9%	26.1%
2020	26.0%	4.1%	44.1%	7.5%	0.0%	18.3%

*baseline year

Table 4-123. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%
101 East (East)	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%
997	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%
40 South	26.0%	4.1%	44.1%	7.5%	0.0%	18.3%

4.10.1.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 40 South was dominated by non-native and wetland plant species during year 3 post-burn and year 2 post-subsurface munitions remediation monitoring in 2020. Pond 40 South wetland vegetation results were generally within range of baseline and/or reference vernal pools, however, non-native species richness was greater than baseline and non-native cover was greater than reference vernal pools. Additionally, wetland species richness was greater than baseline but less than reference.

4.10.1.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 40 South, a post-burn and post-subsurface munitions remediation vernal pool, is on track to meet the performance standard for years 3 and 2, respectively, in 2020. The species composition, richness, and native and wetland species relative abundances were similar to baseline in 2016 but Pond 40 South was different from the reference vernal pools in regard to non-native species richness and relative percent cover. Non-native species richness increased between 2016 and 2020. The valley in Unit B where Pond 40 South is located has historically been heavily disturbed which is likely why non-native richness and cover is high. Additionally, unusual patterns in rainfall in the 2019-2020 water-year may have created a unique combination of environmental conditions favorable for non-native species at Pond 40 South.

4.10.2 Wildlife Monitoring

Wildlife data were collected at Pond 40 South in 1998, 2016, 2019, and 2020 (HLA, 1998; Burleson, 2017, 2020). California tiger salamander larvae were not detected in 2020 or any previous year. Fairy shrimp were present in 2019 and 2020. Table 4-124 shows historic wildlife monitoring results.

Table 4-124. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998*	Not detected	Not detected
2016*	Not detected	Not detected
2019	Not detected	Moderate (13, 12)
2020	Not detected	Low (1)

*baseline year

4.10.2.1 *Data Quality Objective 5*

California tiger salamanders were not detected in 2020, which was consistent with baseline monitoring conducted in 1998 and 2016. Results in 2020 were also consistent with reference vernal pools; CTS were not detected at Pond 5 or 101 East (East).

Fairy shrimp were present in 2020, which was not consistent with baseline monitoring. Fairy shrimp were not detected in 1998 or 2016. It was possible that survey timing prevented detection in 2016 because surveys occurred later in the year (April and May). However, in 2020, a very dry February followed by above-normal March and April rain events may have been favorable for later fairy shrimp detection. Results in 2020 were consistent with reference Pond 101 East (East). Fairy shrimp were present at Pond 101 East (East) but were not detected at Pond 5.

4.10.2.2 *Performance Standard: Wildlife Usage*

Pond 40 South, a post-burn and post-subsurface munitions remediation vernal pool, is on track to meet DQO 5. Fairy shrimp were present in 2019 and 2020 but not baseline, likely because the 2016 survey occurred too late in the season for detection (April and May). It is unclear, however, why fairy shrimp were not detected in 1998. Data quality objectives 1 and 4 were analyzed in the Hydrology Monitoring Annual Report (Chenega, 2021).

4.10.3 Conclusion

Pond 40 South, a post-burn and post-subsurface munitions remediation vernal pool, was in years 3 and 2 of monitoring in 2020. The vernal pool is on track to meet the plant cover and species diversity performance standard and DQO 5 for wildlife usage (see Table 4-125). Pond 40 South will continue to be monitored in the future.

Table 4-125. Success at Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 5	On track

4.11 Pond 43 – Year 3 and Year 2

Pond 43 was monitored in 2020 as a year 3 post-burn and year 2 post-subsurface munitions remediation vernal pool. Pond 43 was monitored for baseline conditions in 1998, 2000, 2015, and 2016. Vegetation in Pond 43 and within its watershed was burned in October 2017 as part of the prescribed burn of BLM Area B Subunit B. Pond 43 had intrusive anomaly investigations in 2018. Table 4-126 summarizes the years that monitoring occurred and surveys conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 43 (see Figure 4-34). The 1997-1998, 2015-2016, and 2018-2019 water-years were above normal, whereas the, 2014-2015 and 2017-2018 water-years were below normal. This year 2019-2020, as well as the 1999-2000 water-year, were similar to the cumulative normal.

Table 4-126. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year						
	1997-1998	1999-2000	2014-2015	2015-2016	2017-2018	2018-2019	2019-2020
Hydrology	●	●	●	●	●	●	●
Vegetation	●			●	●	●	●
Wildlife	●	●		●		●	●

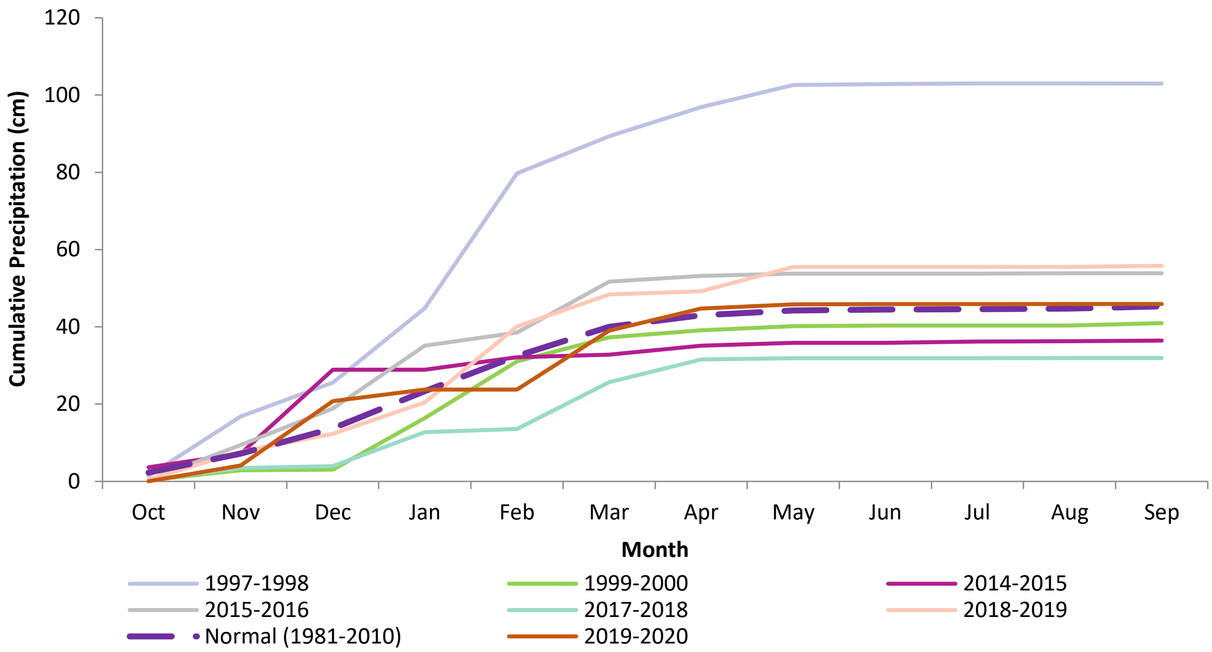


Figure 4-34. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.11.1 Vegetation Monitoring

Vegetation data were collected at Pond 43 in 1998, 2016, 2018, 2019, and 2020 (HLA, 1998; Burleson, 2017, 2019). In 1998, data were collected along one transect with a length of 75 feet. Quadrats were placed at 10-foot intervals, alternating from right to left along the transect. Because 1998 data were collected differently than in other years, strata were combined across the vernal pool to allow for comparison. In 2016, 2018, 2019, and 2020, data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2020 were compared stratum-to-stratum in Table 4-127 as well as visually in Figure 4-35.

Table 4-127. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2020
1	19%	46%
2	50%	37%
3	27%	15%
Upland	3%	2%

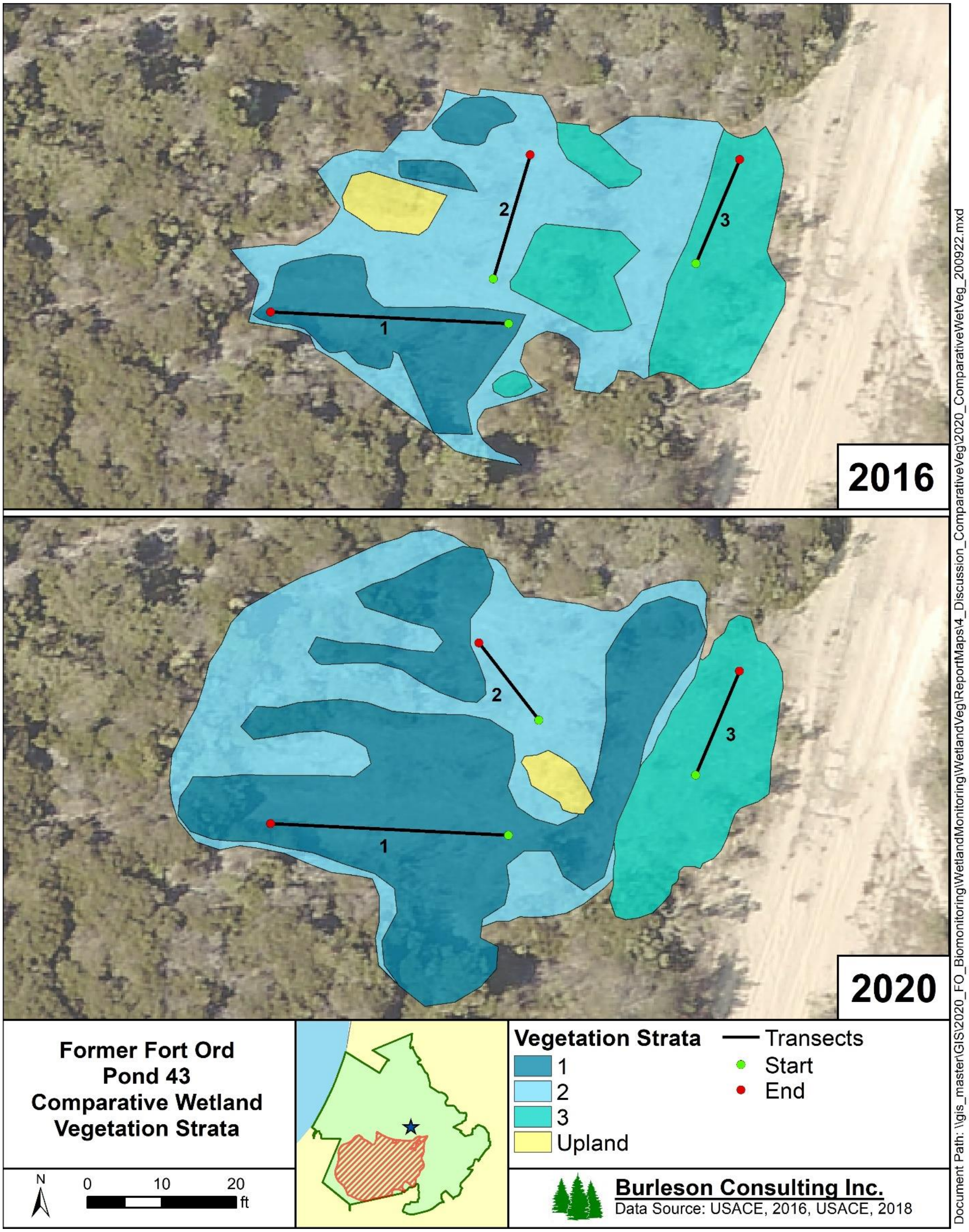


Figure 4-35. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2016 and 2020

Absolute percent vegetative cover and thatch/bare ground cover in 2020 were very similar to the 2016 baseline values (see Table 4-128). The absolute percent vegetative cover of Pond 43 in 2020 was within the range of values observed at the reference vernal pools and most similar to Pond 101 East (East) (see Table 4-129).

Table 4-128. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998*	55.9%	54.4%
2016*	66.5%	33.3%
2018	56.1%	44.1%
2019	63.9%	37.3%
2020	66.3%	33.8%

*baseline year

Table 4-129. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2020

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	47.6%	52.4%
101 East (East)	63.4%	36.6%
997	70.2%	29.8%
43	66.3%	33.8%

Species richness in 2020 was greater than in baseline years. Species richness on transects was 22, 24, 37, 45, and 41 species in 1998, 2016, 2018, 2019, and 2020, respectively, whereas overall basin species richness was 35, 51, 103, and 86 species in 2016, 2018, 2019, and 2020, respectively (see Table 4-130 and Appendix A Table A-11). The 1998 survey was limited to species on the transect and overall basin species richness was not recorded. The 2020 species richness results for transects and the overall basin were greater than baseline years. Pond 43 species richness was within the range observed on transects at the reference vernal pools but greater than the values observed for the entire basin (see Table 4-131 and Appendix E Tables E-21 and E-42).

Species composition and dominant species at Pond 43 were variable across monitoring years. Flowering quillwort (*Triglochin scilloides*) was the dominant species in 1998, Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*) was the dominant species in 2016, and brown-headed rush (*Juncus phaeocephalus*) and rabbitfoot grass (*Polypogon monspeliensis*) were the dominant species in 2018 and 2019. In 2020, brown-headed rush and California oatgrass (*Danthonia californica*) were the dominant species. A complete comparison of species composition observed at Pond 43 in 1998, 2016, 2018, and 2019 can be found in Appendix F. Figure 4-36 shows a subset of this comparison for species observed with a 2% cover or greater.

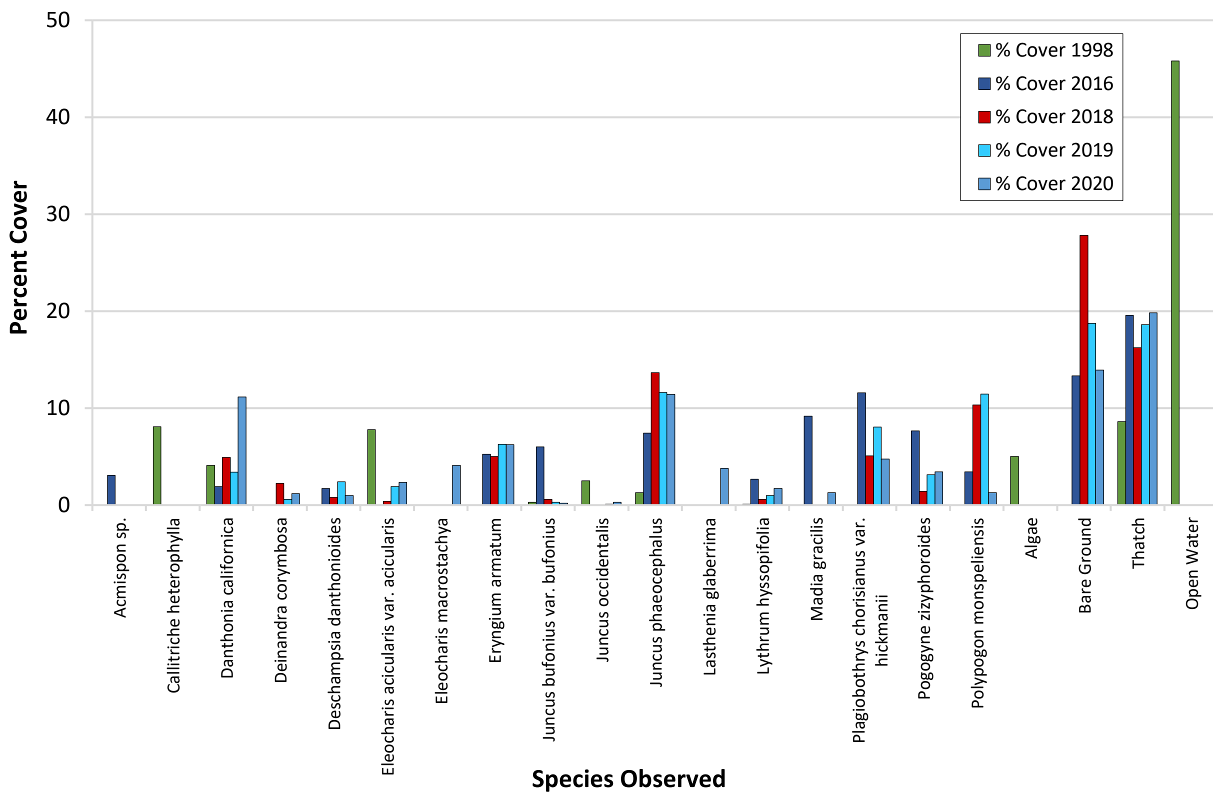


Figure 4-36. Percent Cover of Dominant Species at Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

Native and non-native species richness on Pond 43 transects increased between baseline and 2020 (see Table 4-130). Native and non-native species richness were within the range of values observed at the reference vernal pools (see Table 4-131). The relative percent cover of native species was greater than the baseline values, whereas the relative percent cover of non-native species was within the range of baseline values (see Table 4-132). Pond 43 was within the range of native and non-native relative percent cover values observed at the reference vernal pools in 2020 and was most similar to reference Pond 5 (see Table 4-133).

Table 4-130. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998*	13	7	2
2016*	13	8	2
2018	22	14	1
2019	30	14	1
2020	26	15	0

*baseline year

Table 4-131. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	12	11	0
101 East (East)	24	19	0
997	27	14	1
43	26	15	0

Table 4-132. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1998*	83.7%	4.5%	11.8%
2016*	80.3%	14.9%	4.8%
2018	71.2%	28.7%	0.1%
2019	73.2%	26.7%	0.1%
2020	87.0%	13.0%	0.0%

*baseline year

Table 4-133. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	91.3%	8.7%	0.0%
101 East (East)	72.2%	27.8%	0.0%
997	76.3%	23.6%	0.1%
43	87.0%	13.0%	0.0%

Wetland and non-wetland species richness on Pond 43 transects were greater in 2020 than in baseline years and within the range of values observed at reference vernal pools (see Table 4-134 and Table 4-135). Relative percent cover of wetland species was greater in 2020 than in baseline years and non-wetland relative percent cover was within the range of values observed in baseline years (see Table 4-136). Relative percent cover values were within the ranges observed at the reference vernal pools in 2020 (see Table 4-137).

Table 4-134. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998*	6	5	4	1	0	6
2016*	4	6	3	3	0	7
2018	7	8	6	6	0	10
2019	8	10	7	5	0	15
2020	9	11	4	4	1	12

*baseline year

Table 4-135. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	7	3	3	1	5
101 East (East)	5	8	7	6	3	14
997	9	10	5	5	0	13
43	9	11	4	4	1	12

Table 4-136. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998*	64.6%	8.6%	8.6%	0.2%	0.0%	18.1%
2016*	34.2%	36.0%	4.1%	3.8%	0.0%	21.9%
2018	16.5%	57.2%	13.1%	5.1%	0.0%	8.2%
2019	24.2%	56.3%	6.6%	4.8%	0.0%	8.1%
2020	31.6%	35.8%	19.7%	3.1%	0.4%	9.3%

*baseline year

Table 4-137. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%
101 East (East)	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%
997	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%
43	31.6%	35.8%	19.7%	3.1%	0.4%	9.3%

4.11.1.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 43 was dominated by native and wetland plant species during year 3 post-burn and year 2 post-subsurface munitions remediation monitoring in 2020. Pond 43 wetland vegetation results were within range of baseline and/or reference vernal pools.

4.11.1.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 43, a post-burn and post-subsurface munitions remediation vernal pool, is on track to meet the performance standard for years 3 and 2, respectively, in 2020. The species composition, richness, and native and wetland species relative abundances were similar to baseline and/or reference vernal pool conditions. Pond 43 provided suitable wetland habitat in 2020.

4.11.2 Wildlife Monitoring

Wildlife data were collected at Pond 43 in 1998, 2000, 2016, 2019, and 2020 (HLA, 1998, 2000; Burleson, 2017, 2020). California tiger salamander larvae were not detected in any survey year. Fairy shrimp were present in 1998, 2019, and 2020. Table 4-138 shows historic wildlife monitoring results.

Table 4-138. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998*	Not detected	Moderate
2000*	Not detected	Not detected
2016*	Not detected	Not detected
2019	Not detected	High (135, 210)
2020	Not detected	Moderate (40)

*baseline year

4.11.2.1 *Data Quality Objective 5*

California tiger salamanders were not detected in 2020, which was consistent with baseline monitoring conducted in 1998 and 2000. Results in 2020 were also consistent with reference vernal pools; CTS were not detected at Pond 5 or 101 East (East).

Fairy shrimp were present in 2020. Baseline monitoring results varied by year. Fairy shrimp were present in 1998 but were not detected in 2000 or 2016. It was possible survey timing prevented detection in 2016 because surveys occurred later in the year (April and May). However, in 2020, a very dry February followed by above-normal March and April rain events may have been favorable for later fairy shrimp detection. Results in 2020 were consistent with reference Pond 101 East (East). Fairy shrimp were present at Pond 101 East (East) but were not detected at Pond 5.

4.11.2.2 *Performance Standard: Wildlife Usage*

Pond 43, a post-burn and post-subsurface munitions remediation vernal pool, is on track to meet DQO 5. Data quality objectives 1 and 4 were analyzed in the Hydrology Monitoring Annual Report (Chenega, 2021).

4.11.3 Conclusion

Pond 43, a post-burn and post-subsurface munitions remediation vernal pool, was in years 3 and 2 of monitoring in 2020. The vernal pool is on track to meet the plant cover and species diversity performance standard and DQO 5 for wildlife usage (see Table 4-139). Pond 43 will continue to be monitored in the future.

Table 4-139. Success at Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 5	On track

*Fairy shrimp and CTS depth requirements were not met in 2019, but fairy shrimp were present.

4.12 Pond 35 – Year 3 and Year 2

Pond 35 was monitored in 2020 as a year 3 post-mastication and year 2 post-subsurface munitions remediation vernal pool. Pond 35 was monitored for baseline conditions in 1992, 1994, 1995, 1996, 2015, and 2016. Vegetation within the Pond 35 watershed was masticated in summer of 2017 in preparation for a prescribed burn of BLM Area B Subunit B. Vegetation within and immediately around Pond 35 was not burned, although parts of the Pond 35 watershed were burned in October 2017. Pond 35 had intrusive anomaly investigations in 2018. Table 4-140 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 35 (see Figure 4-37). The 1994-1995, 1995-1996, 2015-2016, 2018-2019, and 2019-2020 water-years were either normal or above-normal, whereas all other monitoring was conducted during a below-normal water-year, drought year, or consecutive drought year.

Table 4-140. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year								
	1991-1992	1993-1994	1994-1995	1995-1996	2014-2015	2015-2016	2017-2018	2018-2019	2019-2020
Hydrology	•	•	•	•	•	•	•	•	•
Vegetation		•	•	•		•	•	•	•
Wildlife		•	•	•				•	•

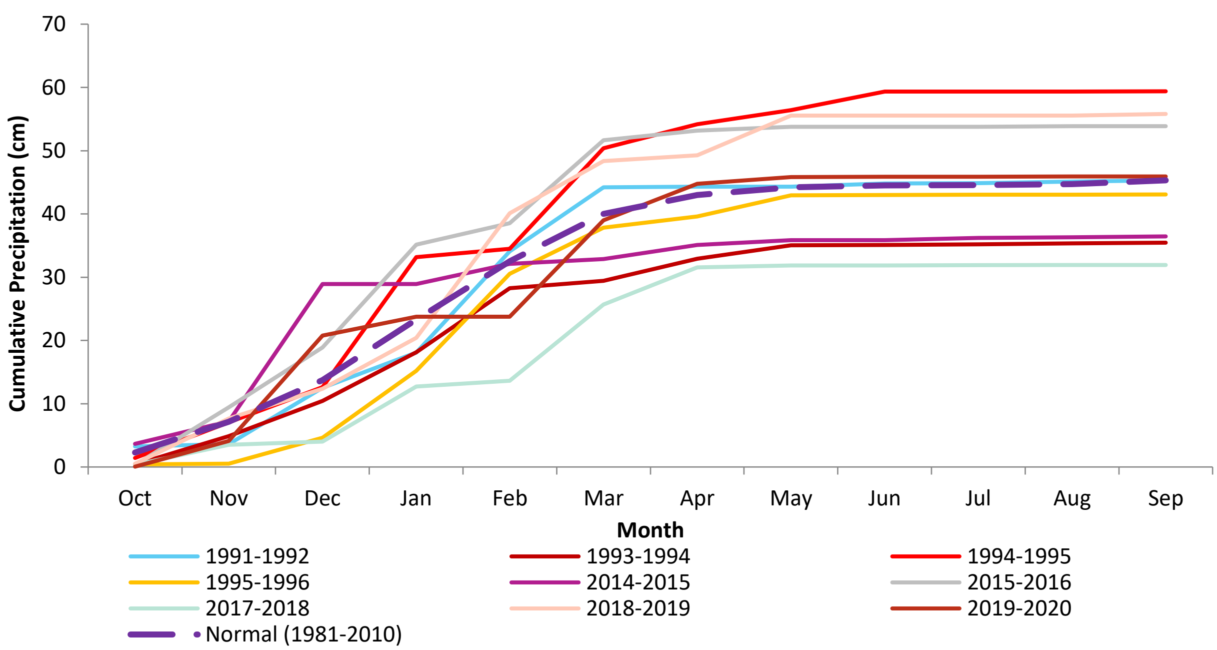


Figure 4-37. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.12.1 Vegetation Monitoring

Vegetation data were collected at Pond 35 in 2016, 2018, 2019, and 2020 (Burleson, 2017, 2019). Data from 1994, 1995, and 1996 only represent dominant species and are not included in the following analyses because the data were collected using a different methodology than was used in more recent years (Jones and Stokes, 1996). In 2016, 2018, 2019, and 2020, data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2020 were compared stratum-to-stratum in Table 4-141 as well as visually in Figure 4-38.

Table 4-141. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2020
1	28%	20%
2	39%	36%
3	33%	N/A
4	N/A	44%

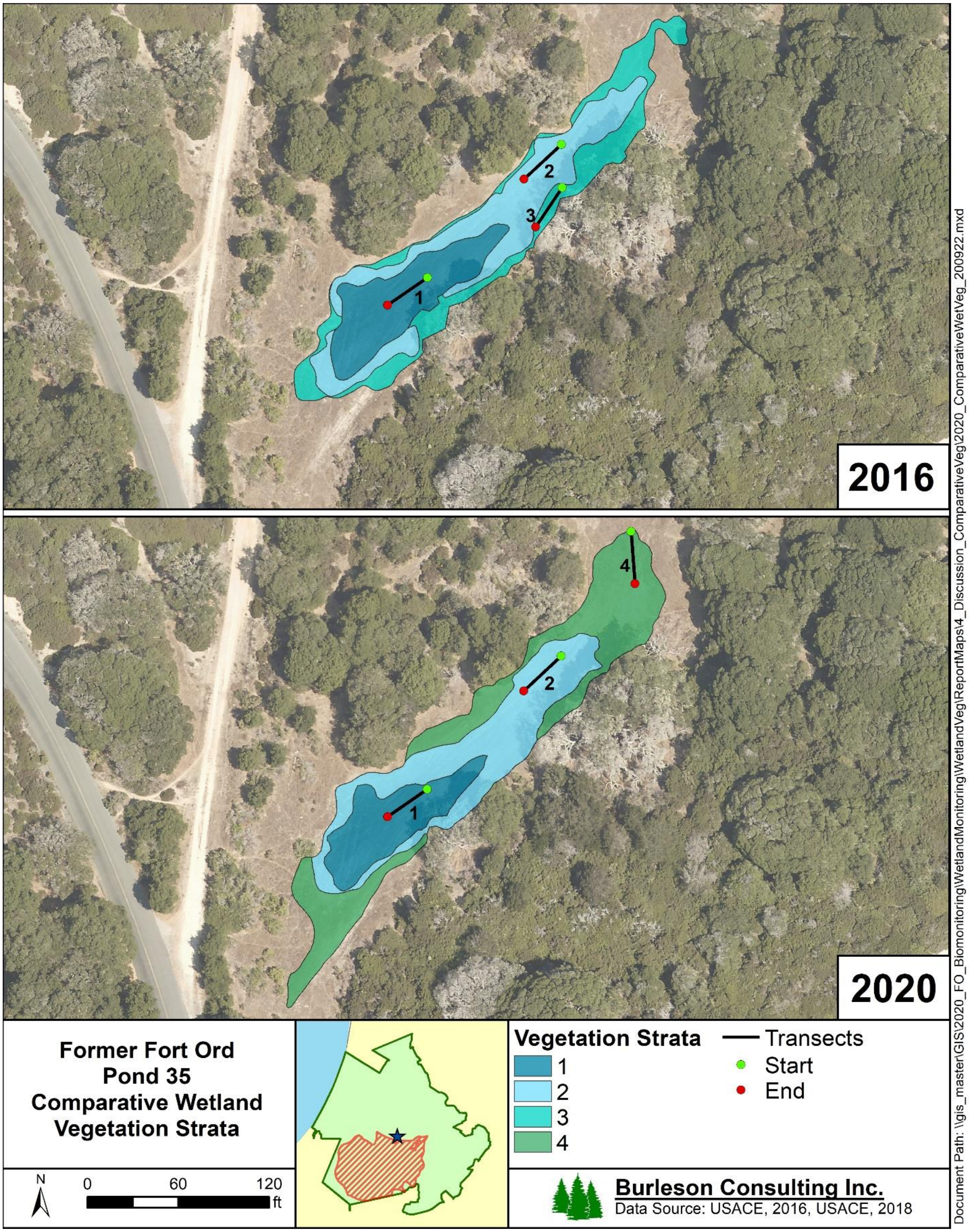


Figure 4-38. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2016 and 2020

Absolute percent vegetative cover observed in 2020 was greater than the baseline year and within the range of values observed at the reference vernal pools. (see Table 4-142 and Table 4-143).

Table 4-142. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2016*	52.1%	48.9%
2018	74.3%	27.7%
2019	59.5%	39.8%
2020	66.3%	33.7%

*baseline year

Table 4-143. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2020

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	47.6%	52.4%
101 East (East)	63.4%	36.6%
997	70.2%	29.8%
35	66.3%	33.7%

Species richness in 2020 was greater than the baseline year of monitoring. Species richness on transects was 12, 38, 25, and 26 species in 2016, 2018, 2019, and 2020, respectively, whereas overall basin species richness was 35, 64, 79, and 60 species, respectively (see Table 4-144 and Appendix A Table A-12). Pond 35 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 4-145 and Appendix E Tables E-21 and E-42).

Species composition at Pond 35 was similar across years, and the dominant species was either cut-leaved plantain (*Plantago coronopus*) or Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*) with fluctuations between years. Other dominant species included meadow barley (*Hordeum brachyantherum*) in 2016 and Italian rye grass (*Festuca perennis*) in 2020. A complete comparison of species composition observed at Pond 35 in 2016, 2018, 2019, and 2020 can be found in Appendix F. Figure 4-39 shows a subset of this comparison for species observed with a 2% cover or greater.

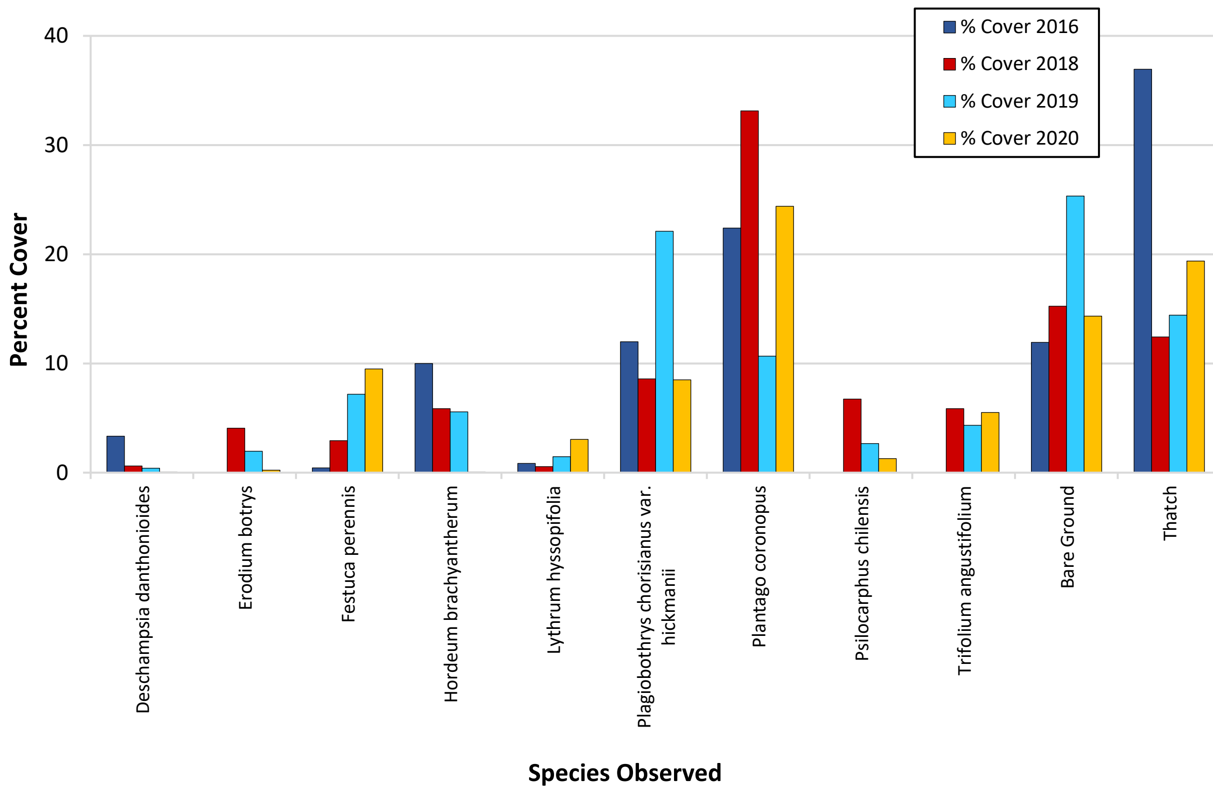


Figure 4-39. Percent Cover of Dominant Species at Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation)

Native and non-native species richness on Pond 35 transects increased from baseline to 2020 (see Table 4-144). Pond 35 native species richness was less than reference vernal pool values in 2020, and non-native species richness was in the range of values at reference vernal pools (see Table 4-145). The relative percent cover of native species was less than baseline, and non-native cover was greater than baseline. Pond 35 native relative percent cover was less than reference vernal pools in 2020 and non-native relative percent cover was greater than reference vernal pools (see Table 4-146 and Table 4-147).

Table 4-144. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2016*	6	6	0
2018	14	23	1
2019	10	15	0
2020	10	16	0

*baseline year

Table 4-145. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	12	11	0
101 East (East)	24	19	0
997	27	14	1
35	10	16	0

Table 4-146. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2016*	52.0%	48.0%	0.0%
2018	33.2%	66.7%	0.1%
2019	53.8%	46.2%	0.0%
2020	31.4%	68.6%	0.0%

*baseline year

Table 4-147. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	91.3%	8.7%	0.0%
101 East (East)	72.2%	27.8%	0.0%
997	76.3%	23.6%	0.1%
35	31.4%	68.6%	0.0%

Wetland and non-wetland species richness on Pond 35 transects were greater in 2020 than baseline (see Table 4-148). The relative percent cover of wetland species was lower and the non-wetland cover was greater than the baseline values (see Table 4-150). The wetland species richness was slightly less than values observed at reference vernal pools, but non-wetland species richness, and relative cover of wetland and non-wetlands species were within the ranges observed at the reference vernal pools (see Table 4-149 and Table 4-151).

Table 4-148. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2016*	5	2	3	0	0	2
2018	7	5	6	7	0	13
2019	6	3	5	4	0	7
2020	6	3	4	5	0	8

*baseline year

Table 4-149. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	7	3	3	1	5
101 East (East)	5	8	7	6	3	14
997	9	10	5	5	0	13
35	6	3	4	5	0	8

Table 4-150. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2016*	28.1%	25.6%	45.7%	0.0%	0.0%	0.5%
2018	14.4%	18.0%	50.8%	7.0%	0.0%	9.8%
2019	41.7%	14.5%	30.9%	4.0%	0.0%	9.0%
2020	19.8%	2.1%	65.5%	1.8%	0.0%	10.9%

*baseline year

Table 4-151. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%
101 East (East)	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%
997	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%
35	19.8%	2.1%	65.5%	1.8%	0.0%	10.9%

4.12.1.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations and possibly historic disturbance to this area. Some variability is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 35 was dominated by non-native and wetland plant species during year 3 post-mastication and year 2 post-subsurface munitions remediation monitoring in 2020. Pond 35 had higher non-native cover compared to baseline and reference vernal pools, and higher non-native richness compared to baseline. These results were similar to those observed in 2018 (Yr 1). It is unclear whether mastication or subsurface munitions remediation caused these changes. More likely it is related to a prolonged drought prior to baseline monitoring as well as historic disturbance. Pond 35 may have high non-native cover and richness due to close proximity to Parker Flats Road and Watkin's Gate Road. The 1996 Annual Wetland Monitoring Report noted Pond 35 as slightly to moderately disturbed, that it may have silt from erosion of adjacent roads, and that it ponded in old tire depressions (Jones and Stokes, 1996). Pale spikerush, an obligate native species, and

English plantain (*Plantago lanceolata*), a facultative non-native species, were noted as the two dominant species in 1994. English plantain is indicative of disturbance (Cal-IPC, 2020).

4.12.1.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 35, a post-mastication and post-subsurface munitions remediation vernal pool, is not on track to meet the performance standard for years 3 and 2, respectively, in 2020. Species composition and wetland species relative abundances were similar to baseline in 2016, but Pond 35 was different from baseline and reference vernal pools regarding non-native species richness and relative percent cover. Non-native species richness and cover increased between 2016 and 2020 and should be closely monitored in future years. The valley in Unit B where Pond 35 is located has historically been heavily disturbed which is likely why, in some years, non-native richness and cover are high. Additionally unusual rainfall patterns in the 2019-2020 water-year may have created a unique combination of environmental conditions favorable for non-native species at Pond 35. However, it is more likely related to historic disturbance and proximity to roads.

4.12.2 Wildlife Monitoring

Wildlife data were collected at Pond 35 in 1992, 1994, 1995, 1996, 2019, and 2020 (Jones and Stokes, 1992, 1996; Burleson, 2020). California tiger salamander larvae were not detected in any previous survey year. Fairy shrimp were present in 1994, 1995, 1996, 2019, and 2020. Table 4-152 shows historic wildlife monitoring results.

Table 4-152. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1992*	Not detected	Not detected
1994*	Not detected	Low-High
1995*	Not detected	Moderate-High
1996*	Not detected	Low (1)
2019	Not detected	Moderate (74, 50)
2020	Not detected	High (186)

*baseline year

4.12.2.1 *Data Quality Objective 5*

California tiger salamanders were not detected in 2020, which was consistent with baseline monitoring conducted in 1992, 1994, 1995, and 1996. Results in 2020 were also consistent with reference vernal pools; CTS were not detected at Pond 5 or 101 East (East).

Fairy shrimp were present in 2020, which was generally consistent with baseline monitoring. Fairy shrimp were present in 1994, 1995, and 1996, but were not detected in 1992. Results in 2020 were consistent with reference Pond 101 East (East). Fairy shrimp were present at Pond 101 East (East) but were not detected at Pond 5.

4.12.2.2 *Performance Standard: Wildlife Usage*

Pond 35, a post-mastication and post-subsurface munitions remediation vernal pool, is on track to meet DQO 5. Data quality objectives 1 and 4 were analyzed in the Hydrology Monitoring Annual Report (Chenega, 2021).

4.12.3 Conclusion

Pond 35, a post-mastication and post-subsurface munitions remediation vernal pool, was in years 3 and 2 of monitoring in 2020. The vernal pool is on track to meet DQO 5 for wildlife usage but not on track for the plant cover and species diversity performance standard (see Table 4-153). This is due to high non-native richness and cover. Pond 35 will continue to be monitored in the future.

Table 4-153. Success at Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	Not on track
Wildlife Usage	DQO 5	On track

4.13 Pond 42 – Year 3 and Year 2

Pond 42 was monitored in 2020 as a year 3 post-mastication and post-burn and year 2 post-subsurface munitions remediation vernal pool. Vegetation in Pond 42 and within its watershed was masticated in the summer of 2018 and burned in October 2017 as part of the prescribed burn of BLM Area B Subunit B. Pond 42 had intrusive anomaly investigations in 2018. Pond 42 was first monitored for baseline in 1998. Following MEC remediation activities, Pond 42 was monitored annually from 2000 to 2003. Additional baseline surveys occurred in 2015 and 2017. Table 4-154 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 42 (see Figure 4-40). The above-normal water-years were 1997-1998, 2016-2017, and 2018-2019. This year, 2019-2020, was similar to the cumulative normal water-year. Other monitoring years were below-normal water-year, drought year, or consecutive drought year.

Table 4-154. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year									
	1997-1998	1999-2000	2000-2001	2001-2002	2002-2003	2014-2015	2016-2017	2017-2018	2018-2019	2019-2020
Hydrology	●	●	●	●	●	●	●	●	●	●
Vegetation	●	●	●	●	●		●	●	●	●
Wildlife	●	●	●	●	●			●	●	●

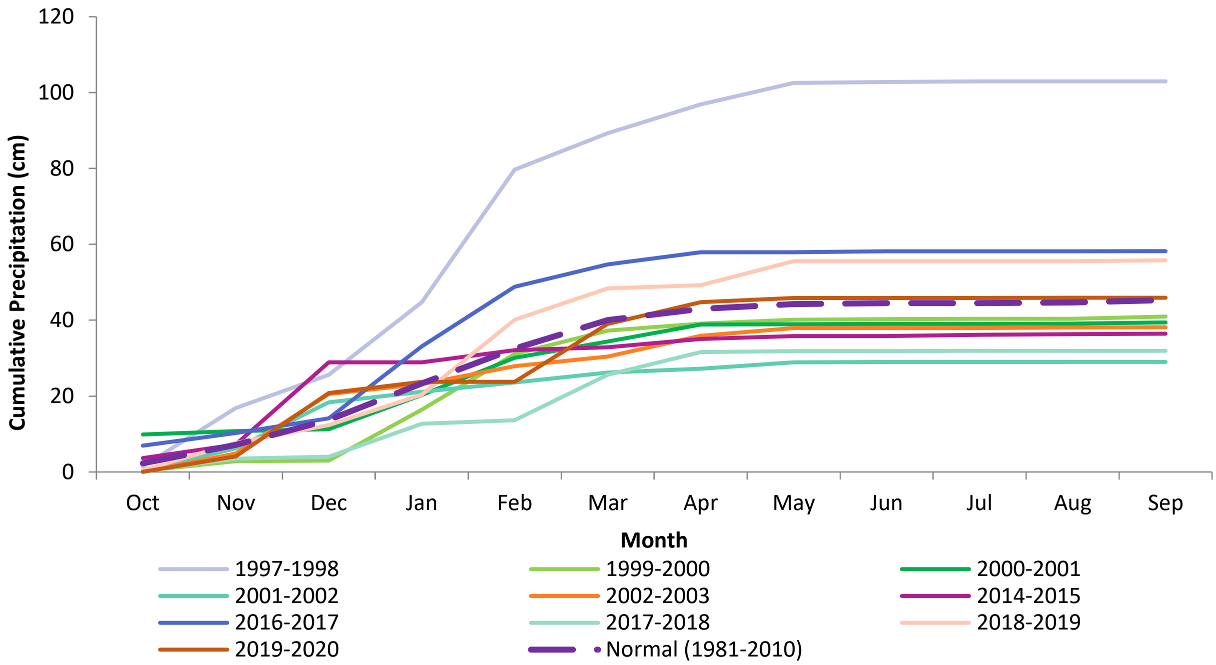


Figure 4-40. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.13.1 Vegetation Monitoring

Vegetation data were collected at Pond 42 in 1998, 2000, 2001, 2002, 2003, 2017, 2018, 2019, and 2020 (HLA, 1998, 2001; Harding ESE, 2002; MACTEC, 2003, 2004; Burleson, 2018, 2019, 2020). In 1998, 2000, 2001, 2002, and 2003 data were collected along transects in lengths varying from 50 to 241 feet. In 2000, 0.25 m^2 quadrats were placed at intervals ranging from 10 to 20 feet, whereas in 1998, 2001, 2002, and 2003, quadrats were placed at 10-foot intervals. Quadrats were placed at the given intervals, alternating from right to left along the transect. In 1998, 2000, 2001, 2002, and 2003, transects of varying lengths were in areas of representative transitional and emergent habitats. Due to differing methodologies, data for all strata in each respective year before 2017 were combined to compare to 2017 through 2020. In 2017, 2018, 2019, and 2020, data were collected using the methodology described in the Methods section of this report. Data from 2017 and 2020 were compared stratum-to-stratum in Table 4-155 as well as visually in Figure 4-41.

Table 4-155. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2017	2020
Open Water	4%	N/A
1	8%	11%
2	9%	10%
3	52%	41%
4	10%	14%
5	N/A	7%
Upland	17%	17%

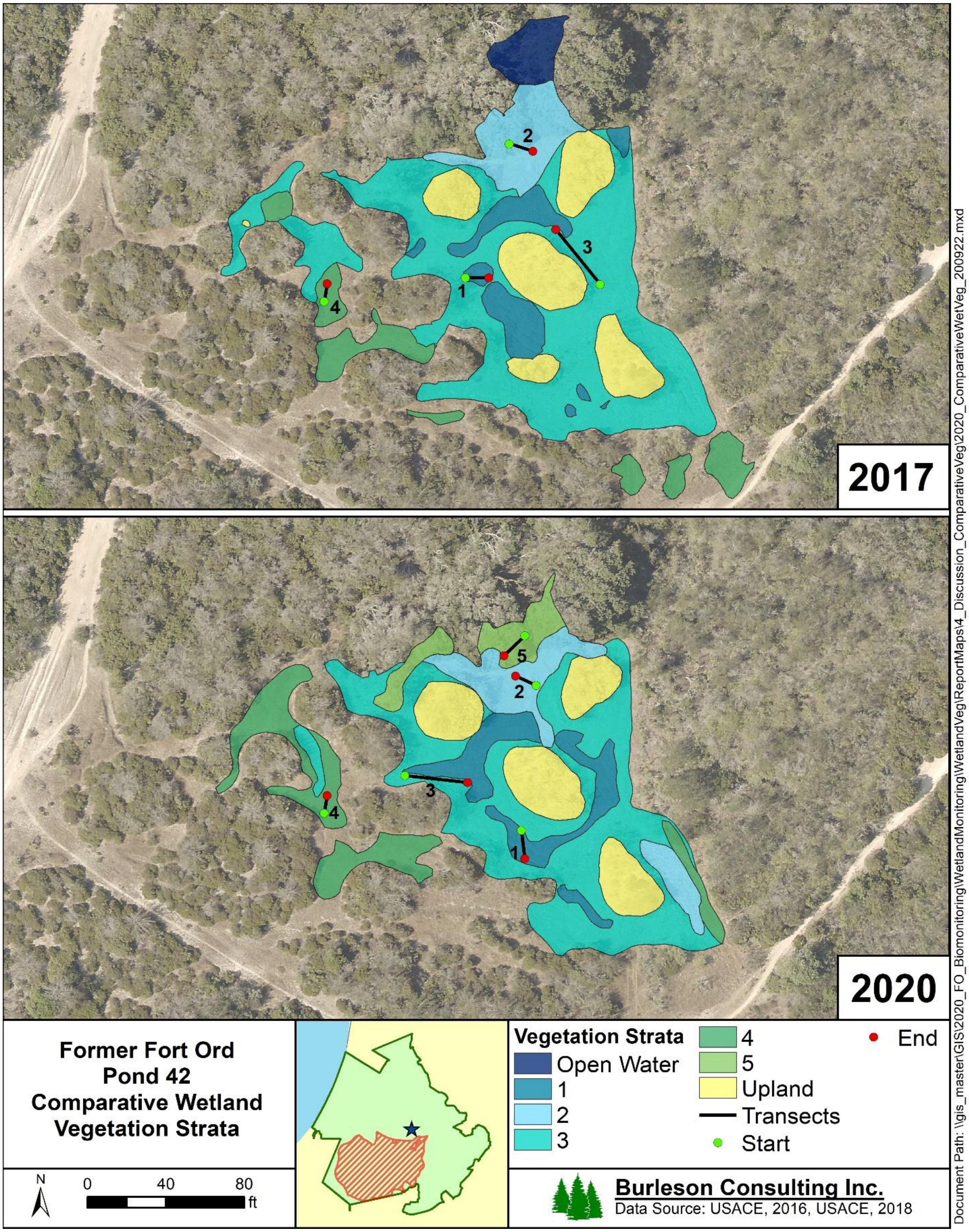


Figure 4-41. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2017 and 2020

Absolute percent vegetative cover and thatch/bare ground cover were very similar to the 1998 and 2017 baseline years of monitoring (see Table 4-156). The absolute percent vegetative cover of Pond 42 in 2020 was within the range of values observed at the reference vernal pools and most similar to Pond 101 East (East) (see Table 4-157).

Table 4-156. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998*	69.6%	33.1%
2000	101.5%	10.3%
2001	77.5%	24.5%
2002	83.5%	21.2%
2003	84.6%	16.1%
2017*	61.9%	38.7%
2018	55.8%	44.3%
2019	70.2%	29.8%
2020	65.1%	34.4%

*baseline year

Table 4-157. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2020

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	47.6%	52.4%
101 East (East)	63.4%	36.6%
997	70.2%	29.8%
42	65.1%	34.4%

Species richness in 2020 was within the range of values observed in the baseline years of monitoring. Species richness on transects was 20, 31, 28, 24, 32, 14, 40, 27, and 28 in 1998, 2000, 2001, 2002, 2003, 2017, 2018, 2019, and 2020, respectively. Overall basin species richness values were only recorded in 2017-2020 and were 78, 126, 77, and 93 species, respectively (see Table 4-158 and Appendix A Table A-13). Pond 42 species richness was within the range observed on transects at the reference vernal pools but greater than the ranges observed for the entire basin (see Table 4-159 and Appendix E Tables E-21 and E-42).

Species composition and dominant species at Pond 42 were variable across monitoring years. Pale spikerush (*Eleocharis macrostachya*) and brown-headed rush (*Juncus phaeocephalus*) were the two dominant species in 2017, whereas needle spikerush (*Eleocharis acicularis* var. *acicularis*) and coyote thistle (*Eryngium armatum*) were the dominant species in 2018 and 2019. Rabbitfoot grass (*Polypogon monspeliensis*) was another important species in 2019. In 2020, the dominant species were brown-headed rush, needle spike rush, and brass buttons (*Cotula coronopifolia*). A complete comparison of species composition observed during the surveys at Pond 42 in 1998, 2000, 2001, 2002, 2003, 2017, 2018 and 2019, can be found in Appendix F. Figure 4-42 shows a subset of this comparison for species observed with a 2% cover or greater.

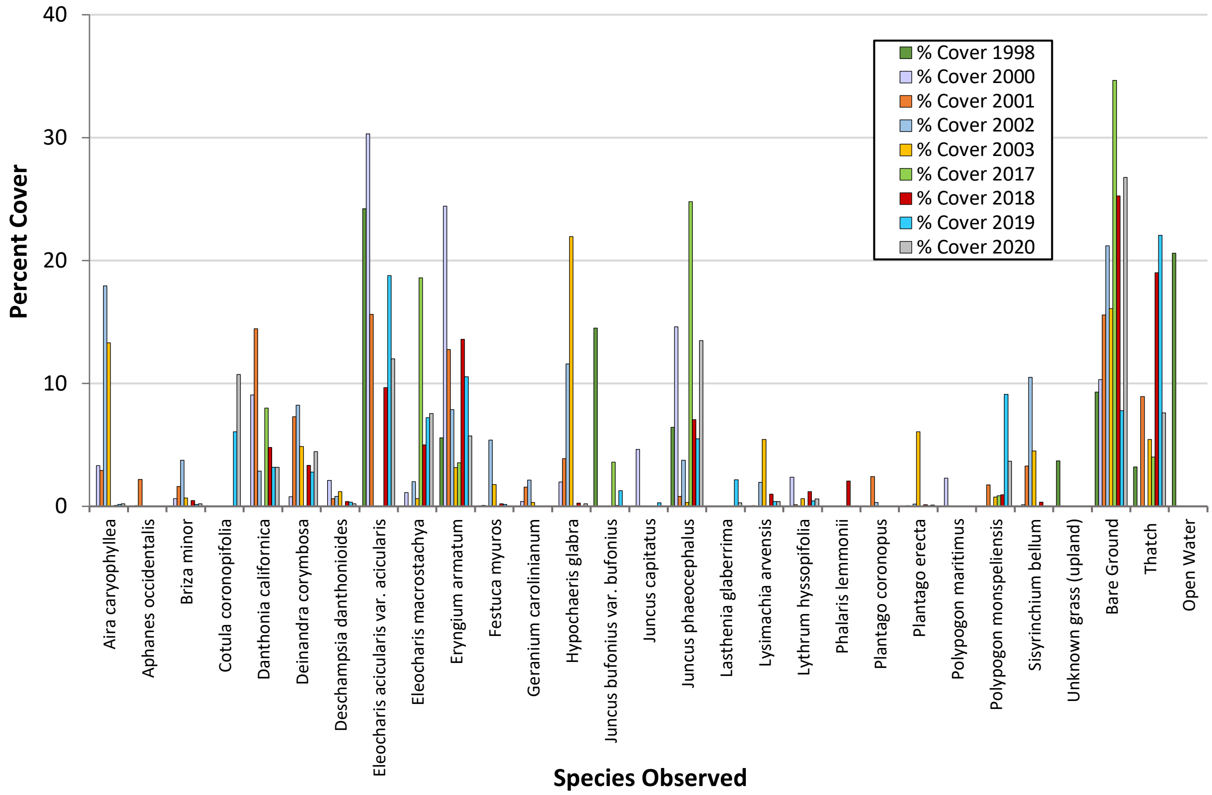


Figure 4-42. Percent Cover of Dominant Species at Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

Native and non-native species richness on Pond 42 transects was greater in 2020 than baseline (see Table 4-158). Pond 42 native species richness was within the range of values observed at reference vernal pools, whereas non-native species richness was less than the values observed at the reference vernal pools (see Table 4-159). The relative percent cover of native species was less than baseline years and the non-native cover was greater than baseline (see Table 4-160). Pond 42 native vegetation percent cover was less than reference vernal pools and non-native percent cover was within the range of values observed at reference vernal pools (see Table 4-161).

Table 4-158. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998*	12	5	3
2000	20	11	1
2001	14	13	1
2002	16	8	0
2003	19	12	1
2017*	10	4	0
2018	24	15	1
2019	16	11	0
2020	18	10	0

*baseline year

Table 4-159. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	12	11	0
101 East (East)	24	19	0
997	27	14	1
42	18	10	0

Table 4-160. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1998*	87.7%	4.4%	7.9%
2000	84.4%	15.6%	0.0%
2001	77.4%	22.4%	0.3%
2002	49.0%	51.0%	0.0%
2003	40.4%	58.7%	1.0%
2017*	97.8%	2.2%	0.0%
2018	90.0%	9.7%	0.4%
2019	75.5%	24.5%	0.0%
2020	74.8%	25.2%	0.0%

*baseline year

Table 4-161. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	91.3%	8.7%	0.0%
101 East (East)	72.2%	27.8%	0.0%
997	76.3%	23.6%	0.1%
42	74.8%	25.2%	0.0%

Wetland and non-wetland species richness on Pond 42 transects were greater in 2020 than the baseline year of monitoring and within the range of values observed at the reference vernal pools (see Table 4-162 and Table 4-163). The relative percent cover of wetland species was within ranges of previous baseline years, whereas non-wetland cover was slightly greater than baseline (see Table 4-164). Relative percent cover of wetland and non-wetland species were within the range of values observed at reference vernal pools (see Table 4-165).

Table 4-162. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998*	6	4	4	1	0	5
2000	5	5	4	6	0	11
2001	3	5	4	6	0	10
2002	3	4	4	2	1	10
2003	5	6	3	4	0	14
2017*	5	4	1	2	0	2
2018	9	10	3	7	1	10
2019	6	7	3	5	0	6
2020	7	7	4	2	1	7

*baseline year

Table 4-163. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	7	3	3	1	5
101 East (East)	5	8	7	6	3	14
997	9	10	5	5	0	13
42	7	7	4	2	1	7

Table 4-164. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998*	42.2%	38.6%	8.7%	0.5%	0.0%	10.0%
2000	35.7%	40.9%	10.3%	8.4%	0.0%	4.7%
2001	20.7%	24.8%	24.0%	7.2%	0.0%	23.3%
2002	3.1%	27.4%	10.6%	27.9%	0.2%	30.7%
2003	5.8%	12.2%	7.5%	19.5%	0.0%	55.0%
2017*	30.9%	53.0%	12.9%	0.4%	0.0%	2.7%
2018	33.0%	44.8%	11.2%	2.3%	0.4%	8.4%
2019	50.3%	38.5%	5.3%	1.3%	0.0%	4.6%
2020	49.0%	36.0%	5.8%	0.9%	0.1%	8.2%

*baseline year

Table 4-165. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%
101 East (East)	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%
997	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%
42	49.0%	36.0%	5.8%	0.9%	0.1%	8.2%

4.13.1.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 42 was dominated by native and wetland plant species during year 3 post-mastication and post-burn and year 2 post-subsurface munitions remediation monitoring in 2020. Pond 42 wetland vegetation results were within range of baseline and/or reference vernal pools.

4.13.1.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 42, a post-mastication, post-burn, and post-subsurface munitions remediation vernal pool, is on track to meet the performance standard for years 3, 3, and 2, respectively, in 2020. The species composition, richness, and native and wetland species relative abundances were similar to baseline and/or reference vernal pool conditions. Pond 42 provided suitable wetland habitat in 2020.

4.13.2 Wildlife Monitoring

Wildlife data were collected at Pond 42 in 1998, 2000, 2001, 2002, 2003, 2018, 2019, and 2020 (HLA, 1998, 2001, 2002; MACTEC, 2003, 2004, Burleson, 2019, 2020). California tiger salamander larvae were observed in 2000. Fairy shrimp were present in all years. Table 4-166 shows historic wildlife monitoring results.

Table 4-166. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998*	Not detected	Low-Moderate
2000	Common (13)	High – Very High (318, 123)
2001	Not detected	Low (2)
2002	Not detected	High-Very High (250, 1000s)
2003	Not detected	High (low 100s)
2018	Not detected	Low
2019	Not detected	High (217)
2020	Not detected	High (125)

*baseline year

4.13.2.1 *Data Quality Objective 5*

California tiger salamanders were not detected in 2020, which was consistent with baseline monitoring. Results in 2020 were also consistent with reference vernal pools; CTS were not detected at Pond 5 or 101 East (East).

Fairy shrimp were present in 2020, which was consistent with previous baseline monitoring. Fairy shrimp were observed in 1998, 2000, 2001, 2002, and 2003. Results in 2020 were consistent with reference Pond 101 East (East). Fairy shrimp were present at Pond 101 East (East) but were not detected at Pond 5.

4.13.2.2 *Performance Standard: Wildlife Usage*

Pond 42, a post-mastication, post-burn, and post-subsurface munitions remediation vernal pool, is on track to meet DQO 5. California tiger salamanders were present in one of the five previous years but were not detected in 2020. If there is no detection of CTS in future monitoring years, this vernal pool may have been impacted by remediation and steps should be considered for corrective action. Data quality objectives 1 and 4 were analyzed in the Hydrology Monitoring Annual Report (Chenega, 2021).

4.13.3 Conclusion

Pond 42, a post-mastication, post-burn, and post-subsurface munitions remediation vernal pool, was in years 3, 3, and 2 of monitoring in 2020. The vernal pool is on track to meet the plant cover and species diversity performance standard and the DQO 5 for wildlife usage (see Table 4-167). Pond 42 will continue to be monitored in the future.

Table 4-167. Success at Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 5	On track

4.14 Pond 44 – Year 3 and Year 2

Pond 44 was monitored in 2020 as a year 2 post-subsurface munitions remediation and year 3 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 the summer of 2017 in preparation for a prescribed burn of BLM Area B Subunit B. Pond 44 had intrusive anomaly investigations in 2018. Table 4-168 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 44 (see Figure 4-43). The 1997-1998, 2015-2016, and 2018-2019, water-years were above normal, whereas the 2014-2015 and 2017-2018 water-years were below normal. This year, 2019-2020, was similar to the cumulative normal water-year.

Table 4-168. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year					
	1997-1998	2014-2015	2015-2016	2017-2018	2018-2019	2019-2020
Hydrology	●	●	●	●	●	●
Vegetation	●		●	●	●	●
Wildlife	●				●	●

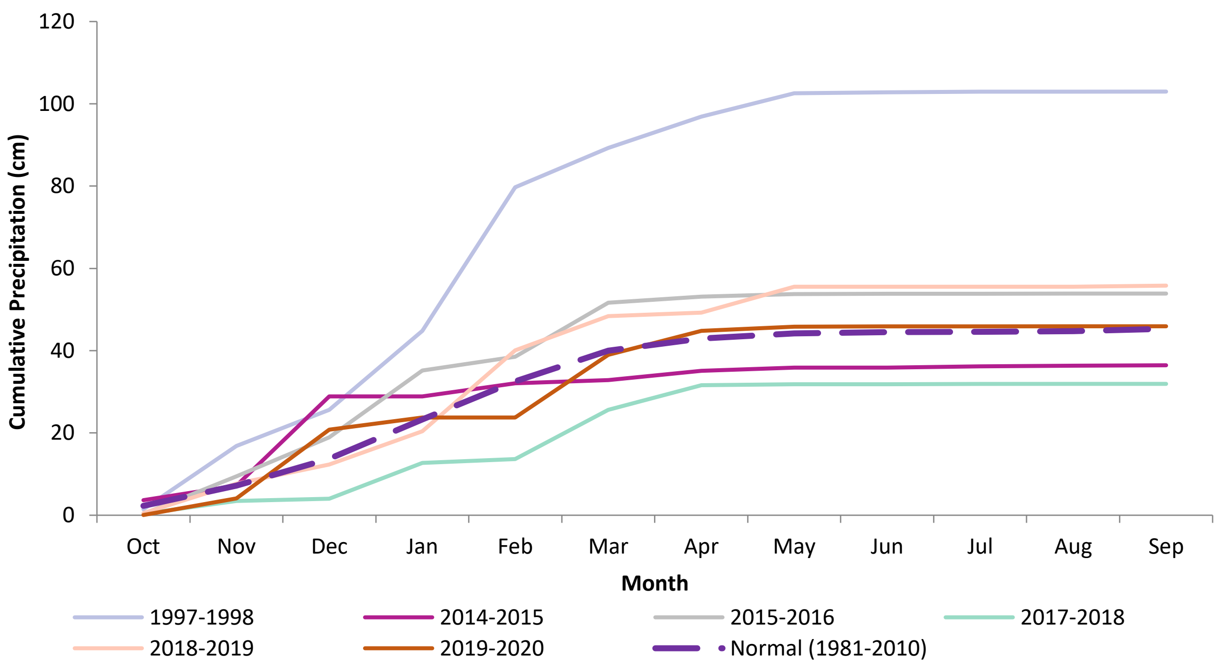


Figure 4-43. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.14.1 Vegetation Monitoring

Vegetation data were collected at Pond 44 in 1998, 2016, 2018, 2019, and 2020 (HLA, 1998; Burleson, 2017, 2019, 2020). In 1998, data were collected along two transects close to 50 feet in length. Quadrats were placed at 10-foot intervals, alternating from right to left along the transect. Because 1998 data were collected differently than in other years, strata were combined across the vernal pool to allow for comparison. In 2016, 2018, 2019, and 2020, data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2020 were compared stratum-to-stratum in Table 4-169 as well as visually in Figure 4-44**.**

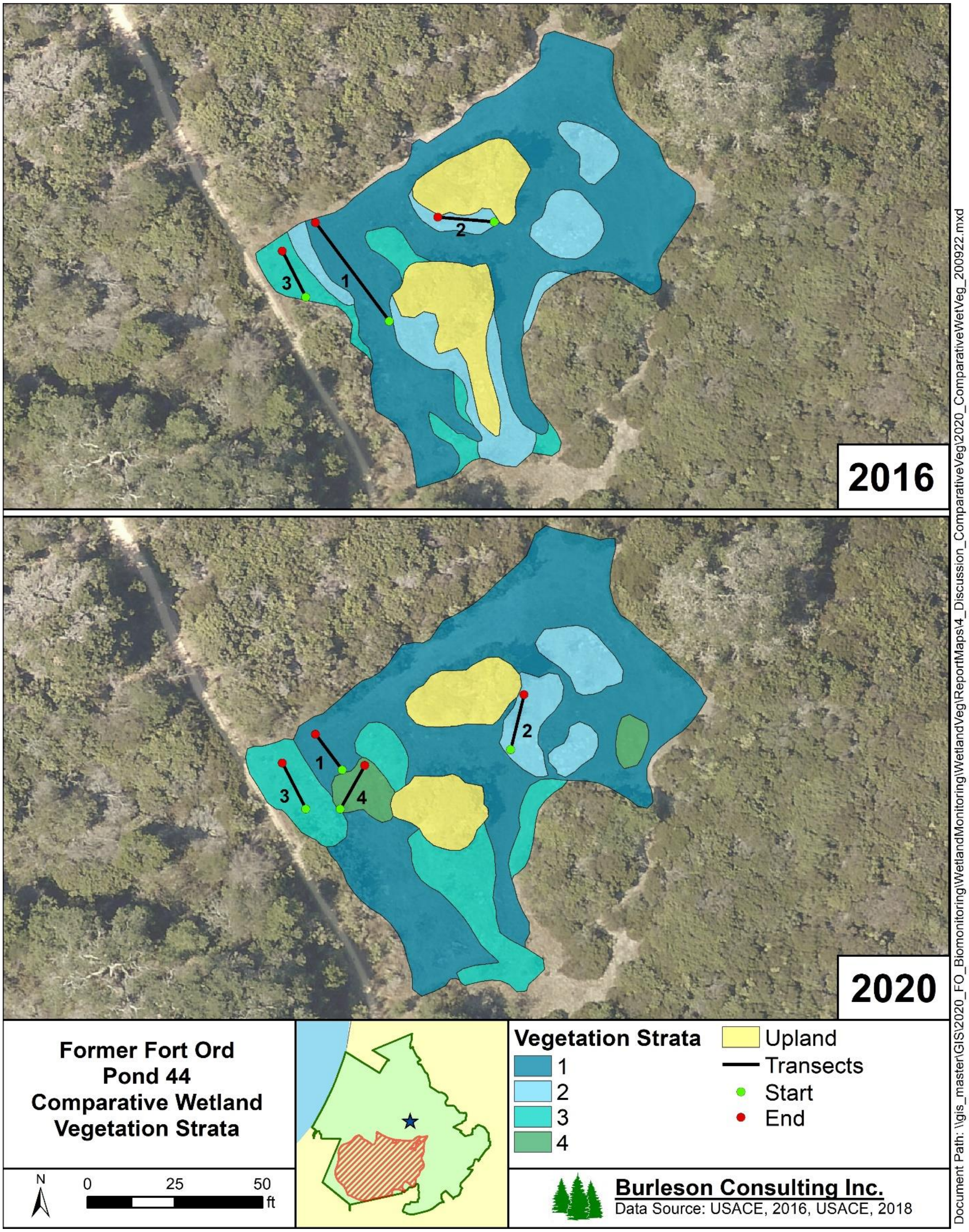


Figure 4-44. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2016 and 2020

Table 4-169. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2020
1	60%	59%
2	17%	9%
3	7%	18%
4	N/A	4%
Upland	16%	10%

The absolute percent vegetative cover and thatch/bare ground cover of Pond 44 were very similar to the 1998 baseline year of monitoring (see Table 4-170). The absolute percent vegetative cover of Pond 44 in 2020 was greater than the values observed at the reference vernal pools (see Table 4-171).

Table 4-170. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1998*	72.8%	26.0%
2016*	78.6%	22.9%
2018	70.9%	30.0%
2019	67.7%	32.2%
2020	74.4%	25.8%

*baseline year

Table 4-171. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2020

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	47.6%	52.4%
101 East (East)	63.4%	36.6%
997	70.2%	29.8%
44	74.4%	25.8%

Species richness in 2020 was greater than in baseline years. Species richness on transects was 26, 36, 44, 44, and 39 species in 1998, 2016, 2018, 2019, and 2020 respectively, whereas overall basin species richness was 47, 71, 74, and 67 species in 2016, 2018, 2019, and 2020, respectively (see Table 4-172 and Appendix A Table A-14). Pond 44 species richness was within the range observed on transects at the reference vernal pools but was slightly less than the values observed for the entire basin (see Table 4-173 and Appendix E Tables E-21 and E-42).

Species composition at Pond 44 differed among the monitoring years, however, the dominant species were fairly similar. The dominant species in 1998 was needle spikerush. In 2016, 2017, 2018, and 2020 the dominant species was coyote thistle (*Eryngium armatum*). In 2020, California oatgrass (*Danthonia californica*) and brown-headed rush (*Juncus phaeocephalus*) were also dominant species. A complete comparison of species composition observed at Pond 44 in 1998, 2016, and 2018 can be found in Appendix F. Figure 4-45 shows a subset of this comparison for species observed with a 2% cover or greater.

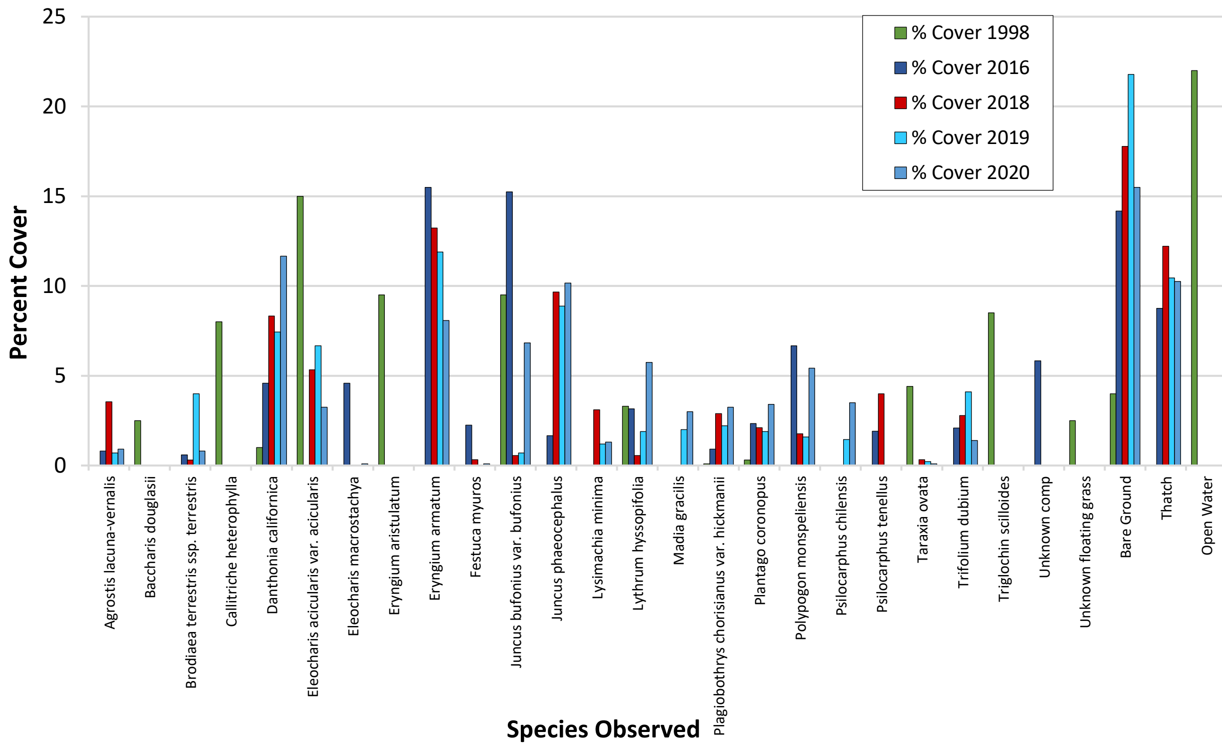


Figure 4-45. Percent Cover of Dominant Species at Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation)

Native and non-native species richness on Pond 44 transects were greater in 2020 than in baseline years (see Table 4-172). Pond 44 native and non-native species richness in 2020 were within the range of values observed at the reference vernal pools (see Table 4-173). The relative percent cover of native and non-native species were within the range observed in the baseline years and the range observed at reference vernal pools (see Table 4-174 and Table 4-175).

Table 4-172. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1998*	17	8	2
2016*	21	14	1
2018	28	15	1
2019	28	15	1
2020	22	17	0

*baseline year

Table 4-173. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	12	11	0
101 East (East)	24	19	0
997	27	14	1
44	22	17	0

Table 4-174. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1998*	87.6%	8.8%	3.4%
2016*	66.5%	26.1%	7.4%
2018	82.1%	17.7%	0.2%
2019	78.2%	21.7%	0.2%
2020	74.0%	26.0%	0.0%

*baseline year

Table 4-175. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	91.3%	8.7%	0.0%
101 East (East)	72.2%	27.8%	0.0%
997	76.3%	23.6%	0.1%
44	74.0%	26.0%	0.0%

Wetland species richness and relative percent cover on Pond 44 transects were greater in 2020 than in baseline years, while the non-wetland species richness and cover were within the range of values observed in baseline years (see Table 4-176 and Table 4-178). The wetland and non-wetland species richness and relative percent cover at Pond 44 were within the ranges observed at the reference vernal pools in 2020 (see Table 4-177 and Table 4-179).

Table 4-176. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998*	7	4	5	1	0	9
2016*	5	9	5	6	0	10
2018	8	9	4	7	1	15
2019	7	10	6	4	1	16
2020	7	8	5	6	0	13

*baseline year

Table 4-177. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	7	3	3	1	5
101 East (East)	5	8	7	6	3	14
997	9	10	5	5	0	13
44	7	8	5	6	0	13

Table 4-178. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1998*	63.5%	15.2%	3.3%	0.4%	0.0%	14.1%
2016*	15.8%	53.8%	9.7%	8.7%	0.0%	4.7%
2018	20.7%	46.9%	16.8%	8.0%	0.3%	7.4%
2019	19.9%	39.9%	17.4%	8.2%	0.2%	14.4%
2020	17.6%	49.3%	22.1%	2.9%	0.0%	8.2%

*baseline year

Table 4-179. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%
101 East (East)	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%
997	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%
44	17.6%	49.3%	22.1%	2.9%	0.0%	8.2%

4.14.1.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 44 was dominated by native and wetland plant species during year 3 post-mastication and year 2 post-subsurface munitions remediation monitoring in 2020. Pond 44 wetland vegetation results were greater or within range of baseline and/or reference vernal pools.

4.14.1.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 44, a post-mastication and post-subsurface munitions remediation vernal pool, is on track to meet the performance standard for years 3 and 2, respectively, in 2020. The species composition, richness, and native and wetland species relative abundances were similar to baseline and/or reference vernal pool conditions. Pond 44 provided suitable wetland habitat in 2020.

4.14.2 Wildlife Monitoring

Wildlife data were collected at Pond 44 in 1998, 2019, and 2020 (HLA, 1998; Burleson, 2020). California tiger salamanders were not detected in any year, whereas fairy shrimp were present in all years. Table 4-180 shows historic wildlife monitoring results.

Table 4-180. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998*	Not detected	Moderate
2019	Not detected	Very High (650, 370)
2020	Not detected	High (258)

*baseline year

4.14.2.1 *Data Quality Objective 5*

California tiger salamanders were not detected in 2020, which was consistent with baseline monitoring. Results in 2020 were also consistent with reference vernal pools; CTS were not detected at Pond 5 or 101 East (East).

Fairy shrimp were present in 2020, which was consistent with previous baseline monitoring. Results in 2020 were consistent with reference Pond 101 East (East). Fairy shrimp were present at Pond 101 East (East) but were not detected at Pond 5.

4.14.2.2 *Performance Standard: Wildlife Usage*

Pond 44, a post-burn and post-subsurface munitions remediation vernal pool, is on track to meet DQO 5. Data quality objectives 1 and 4 were analyzed in the Hydrology Monitoring Annual Report (Chenega, 2021).

4.14.3 Conclusion

Pond 44, a post-mastication and post-subsurface munitions remediation vernal pool, was in years 3 and 2 of monitoring in 2020. The vernal pool is on track to meet the plant cover and species diversity performance standard and DQO 5 for wildlife usage (see Table 4-181). Pond 44 will continue to be monitored in the future.

Table 4-181. Success at Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 5	On track

4.15 Pond 56 – Year 3

Pond 56 was monitored in 2020 as a year 3 post-mastication vernal pool. Pond 56 was monitored for baseline conditions in 2007, 2013, 2014, 2015, and 2016. Vegetation within the watershed of Pond 56 was masticated in the summer of 2017 in preparation for a prescribed burn in 2017 and to support MEC remediation in BLM Area B Subunit B-3 East. Vegetation within the watershed was masticated in 2017 to support MEC remediation activities and prepare areas for prescribed burning. Prior to the 2017 mastication, Pond 56 was used as a reference vernal pool. Year 3 is the final year of monitoring for Pond 56. Table 4-182 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph indicates precipitation for the years that monitoring was conducted at Pond 56 (see Figure 4-46). The 2015-2016 and 2018-2019 water-years were above normal, whereas all other monitoring was conducted during a normal or below-normal water-year, drought year, or consecutive drought year. This year, 2019-2020, was similar to the cumulative normal water-year.

Table 4-182. Pond 56 (Year 3 Post-Mastication) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year							
	2006-2007	2012-2013	2013-2014	2014-2015	2015-2016	2017-2018	2018-2019	2019-2020
Hydrology	●	●	●	●	●	●	●	●
Vegetation	●			●	●		●	●
Wildlife	●	●	●	●	●		●	●

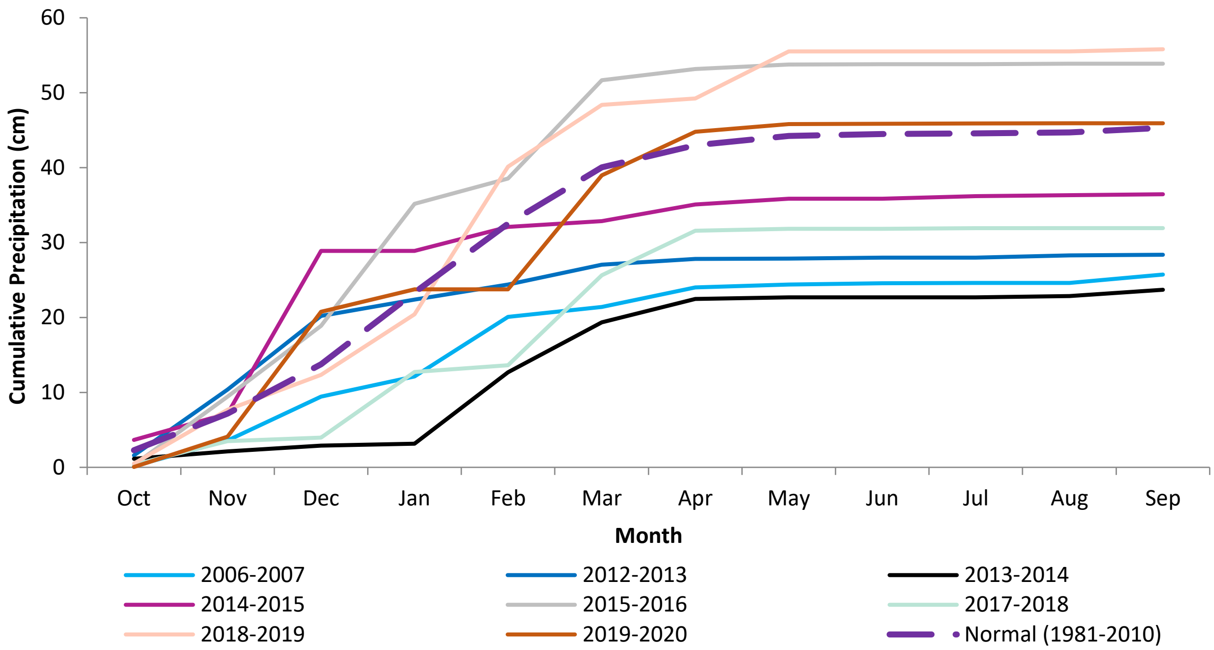


Figure 4-46. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 56 (Year 3 Post-Mastication) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.15.1 Vegetation Monitoring

Vegetation data were collected at Pond 56 in 2007, 2015, 2016, 2019, and 2020 (Shaw, 2008; Burleson, 2016, 2017, 2020). In 2007, data were collected in three zones using a 1.0 m^2 quadrat placed at three locations within each zone, and data for all strata were combined for the entire pool to allow for comparison. In 2015, 2016, 2019, and 2020 data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2020 and were compared stratum-to-stratum in Table 4-183 as well as visually in Figure 4-47.

Table 4-183. Pond 56 (Year 3 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2016	2020
1	4%	6%
2	6%	5%
3	12%	16%
4	50%	24%
5	22%	46%
6	3%	N/A
Upland	3%	3%

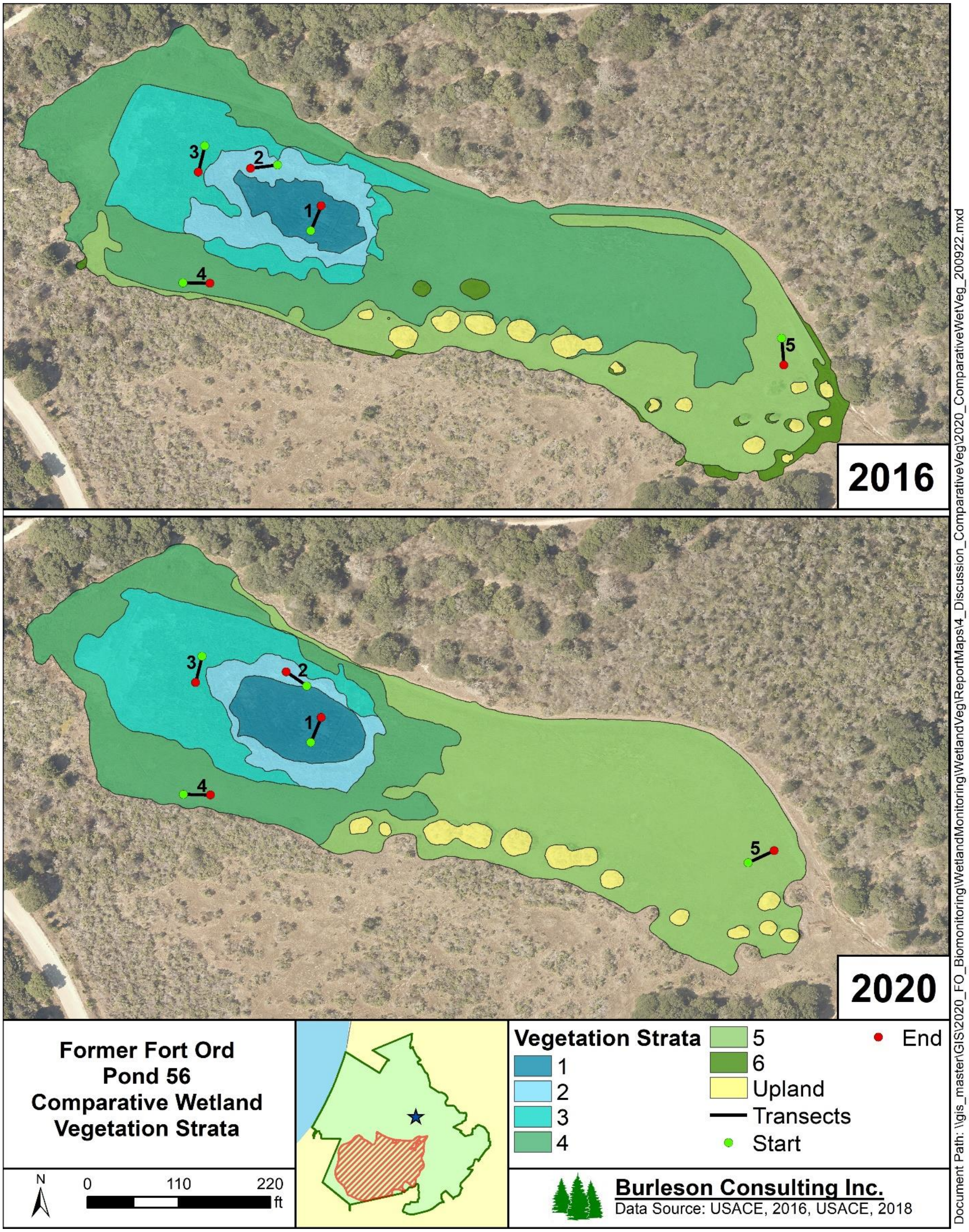


Figure 4-47. Pond 56 (Year 3 Post-Mastication) Vegetation Strata and Transects for 2016 and 2020

Absolute percent vegetative cover observed in 2020 was within the range of values in the baseline years of monitoring (see Table 4-184). The absolute percent vegetative cover of Pond 56 was less than values observed at the reference vernal pools while thatch/bare ground was greater (see Table 4-185).

Table 4-184. Pond 56 (Year 3 Post-Mastication) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2007*	34.5%	65.6%
2015*	74.4%	24.6%
2016*	70.2%	26.6%
2019	60.1%	39.9%
2020	41.1%	58.9%

*baseline year

Table 4-185. Pond 56 (Year 3 Post-Mastication) and Reference Vernal Pool Absolute Percent Cover in 2020

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	47.6%	52.4%
101 East (East)	63.4%	36.6%
997	70.2%	29.8%
56	41.1%	58.9%

Species richness in 2020 was within the range of values observed in the baseline years of monitoring. Species richness on transects was 17, 18, 12, 15, and 18 species in 2007, 2015, 2016, 2019, and 2020, respectively, whereas overall basin species richness was 38, 41, 79, and 67 species in 2015, 2016, 2019, and 2020, respectively (see Table 4-186 and Appendix A Table A-15). Pond 56 species richness for transects as well as the overall basin was less than the values observed at the reference vernal pools (see Table 4-187 and Appendix E Tables E-21 and E-42).

Species composition at Pond 56 was fairly similar among the monitoring years with differing dominant species between the years. Salt grass (*Distichlis spicata*) and pale spikerush (*Eleocharis macrostachya*) were important species in all years. The dominant species in 2007 was saltgrass, and the dominant species in 2015 was bugle hedge nettle (*Stachys ajugoides*). In 2016, 2019, and 2020, the two dominant species were pale spikerush and brown-headed rush (*Juncus phaeocephalus*). A complete comparison of species composition observed at Pond 56 in 2007, 2015, 2016, and 2019 can be found in Appendix F. Figure 4-48 shows a subset of this comparison for species observed with a 2% cover or greater.

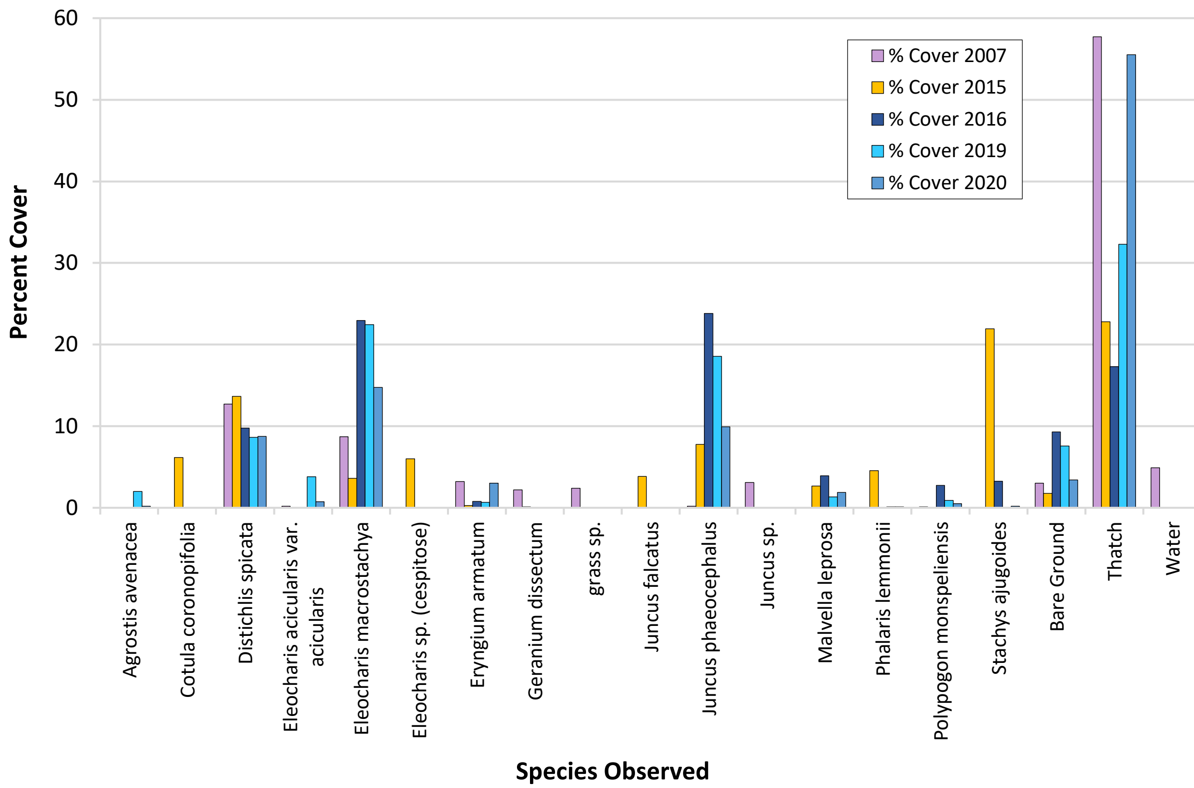


Figure 4-48. Percent Cover of Dominant Species at Pond 56 (Year 3 Post-Mastication)

Native species richness on Pond 56 transects was greater than baseline years in 2020 (Yr 3) and the same as baseline years in 2019 (Yr 2). Non-native species richness was within the range of values observed in baseline years of monitoring for both 2020 (Yr 3) and 2019 (Yr 2) (see Table 4-186). Pond 56 native species richness in 2020 was within the range of values observed at the reference vernal pools, whereas non-native richness was less (see Table 4-187). The relative percent cover of native species was greater than baseline and reference vernal pool values and non-native cover was lower in 2020 (Yr 3) (see Table 4-188 and Table 4-189).

Table 4-186. Pond 56 (Year 3 Post-Mastication) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2007*	9	6	2
2015*	11	6	1
2016*	8	4	0
2019	11	4	0
2020	13	5	0

*baseline year

Table 4-187. Pond 56 (Year 3 Post-Mastication) and Reference Vernal Pool Native and Non-Native Species Richness in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	12	11	0
101 East (East)	24	19	0
997	27	14	1
56	13	5	0

Table 4-188. Pond 56 (Year 3 Post-Mastication) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2007*	75.9%	8.1%	15.9%
2015*	80.7%	11.3%	8.1%
2016*	95.6%	4.4%	0.0%
2019	94.1%	5.9%	0.0%
2020	97.6%	2.4%	0.0%

*baseline year

Table 4-189. Pond 56 (Year 3 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	91.3%	8.7%	0.0%
101 East (East)	72.2%	27.8%	0.0%
997	76.3%	23.6%	0.1%
56	97.6%	2.4%	0.0%

Wetland and non-wetland species richness on Pond 56 transects in 2020 (Yr 3) and 2019 (Yr 2) were similar to the values observed in previous baseline years but less than the values observed at the reference vernal pools (see Table 4-190 and Table 4-191). The relative percent cover of wetland species in 2020 (Yr 3) and 2019 (Yr 2) were within 0.1% of the 2016 baseline values. For non-wetland species, the relative percent cover in 2020 (Yr 3) and 2019 (Yr 2) were within 2.9% of the 2016 baseline values. (see Table 4-192). The relative percent cover of wetland and non-wetland species were within the range of values observed in 2020 (Yr 3) (see Table 4-193).

Table 4-190. Pond 56 (Year 3 Post-Mastication) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2007*	6	4	2	2	0	3
2015*	5	5	2	1	0	5
2016*	5	4	1	2	0	0
2019	5	6	1	1	0	2
2020	6	6	1	2	0	3

*baseline year

Table 4-191. Pond 56 (Year 3 Post-Mastication) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	7	3	3	1	5
101 East (East)	5	8	7	6	3	14
997	9	10	5	5	0	13
56	6	6	1	2	0	3

Table 4-192. Pond 56 (Year 3 Post-Mastication) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2007*	29.3%	47.0%	0.6%	0.9%	0.0%	22.3%
2015*	44.7%	40.4%	2.5%	3.6%	0.0%	8.7%
2016*	41.4%	52.9%	0.1%	5.6%	0.0%	0.0%
2019	45.9%	48.2%	0.2%	2.2%	0.0%	3.5%
2020	39.4%	55.0%	0.1%	4.7%	0.0%	0.8%

*baseline year

Table 4-193. Pond 56 (Year 3 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%
101 East (East)	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%
997	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%
56	39.4%	55.0%	0.1%	4.7%	0.0%	0.8%

4.15.1.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 56 was dominated by native and wetland plant species during year 3 post-mastication monitoring in 2020 as well as previous years of monitoring. Pond 56 wetland vegetation results were within range of baseline and/or reference vernal pools.

4.15.1.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 56, a post-mastication vernal pool, met the performance standard for year 3 in 2020. The species composition, richness, and native and wetland species relative abundances were similar to baseline and reference vernal pool conditions. Pond 56 provided suitable wetland habitat in 2020 and was not impacted by mastication efforts.

4.15.2 Wildlife Monitoring

Wildlife data were collected at Pond 56 in 2007, 2013, 2014, 2015, 2016, 2019, and 2020 (Shaw, 2008; Tetra Tech, 2014, 2015; Burleson*,* 2016, 2017, 2020). California tiger salamander larvae were observed in 2015, 2016, and 2019. Fairy shrimp were present in 2007, 2013, and 2019. Table 4-194 shows historic wildlife monitoring results.

Table 4-194. Pond 56 (Year 3 Post-Mastication) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2007*	Not detected	Moderate (23, 20)
2013*	Not detected	Present
2014*	Not detected	Not detected
2015*	Few – Common (14, 13, 1)	Not detected
2016*	Common – Abundant (28, 101)	Not detected
2019	Common (20, 19, 10)	Moderate (22)
2020	Not detected	Not detected

*baseline year

4.15.2.1 *Data Quality Objective 5*

California tiger salamanders were not detected in 2020, which was consistent with some baseline surveys. Baseline monitoring results varied where CTS were observed in 2015 and 2016 but were not detected in 2007, 2013, and 2014. Results in 2020 were consistent with reference vernal pools; CTS were not detected at Pond 5 or 101 East (East).

Fairy shrimp were not detected in 2020, which was consistent with some baseline surveys. Baseline monitoring in 2007 and 2013 yielded detections, while the species was not detected in 2014, 2015, or 2016. Results in 2020 were consistent with reference Pond 5. Fairy shrimp were present at Pond 101 East (East) but were not detected at Pond 5.

4.15.2.2 *Performance Standard: Wildlife Usage*

Pond 56, a post-mastication vernal pool, was in the final year of monitoring and met DQO 5. California tiger salamanders were present in 2019 (Yr 2) but were not detected in 2020 (Yr 3). This trend was also observed at reference vernal pools Pond 5 and 101 East (East). California tiger salamanders were present during baseline surveys in 2015 and 2016 but were not detected in 2007, 2013, or 2014. Fairy shrimp were present in 2019 (Yr 2) but were not detected in 2020 (Yr 3). In baseline surveys, fairy shrimp detection was variable; moderate numbers were observed in 2007 and presence noted in 2013. However, fairy shrimp were not detected in 2014, 2015, and 2016. Therefore, the 2020 result is similar to baseline data. Data quality objectives 1 and 4 were analyzed in the Hydrology Monitoring Annual Report (Chenega, 2021).

4.15.3 Conclusion

Pond 56, a post-mastication vernal pool, was in the final year (Yr 3) of monitoring in 2020. The vernal pool met the plant cover and species diversity performance standard and met DQO 5 for wildlife usage (see Table 4-195). No further monitoring is recommended for Pond 56.

Table 4-195. Success at Pond 56 (Year 3 Post-Mastication) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	Met
Wildlife Usage	DQO 5	Met

4.16 Pond 60 – Year 3 and Year 2

Pond 60 was monitored in 2020 as a year 3 post-mastication vernal pool and year 2 post-subsurface munitions remediation. Pond 60 was monitored for baseline conditions in 2015 and 2016. Grasses and shrubs in and around Pond 60 were masticated in the summer of 2017 to support MEC remediation activities. Pond 60 had intrusive anomaly investigations in 2018. Table 4-196 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 60 (see Figure 4-49). The 2015-2016 and 2018-2019 water-years were above normal, whereas the 2014-2015 and 2017-2018 water-years were below normal. This year, 2019-2020, was similar to the cumulative normal water-year.

Table 4-196. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year				
	2014-2015	2015-2016	2017-2018	2018-2019	2019-2020
Hydrology	●	●	●	●	●
Vegetation	●		●	●	●
Wildlife	●	●	●	●	●

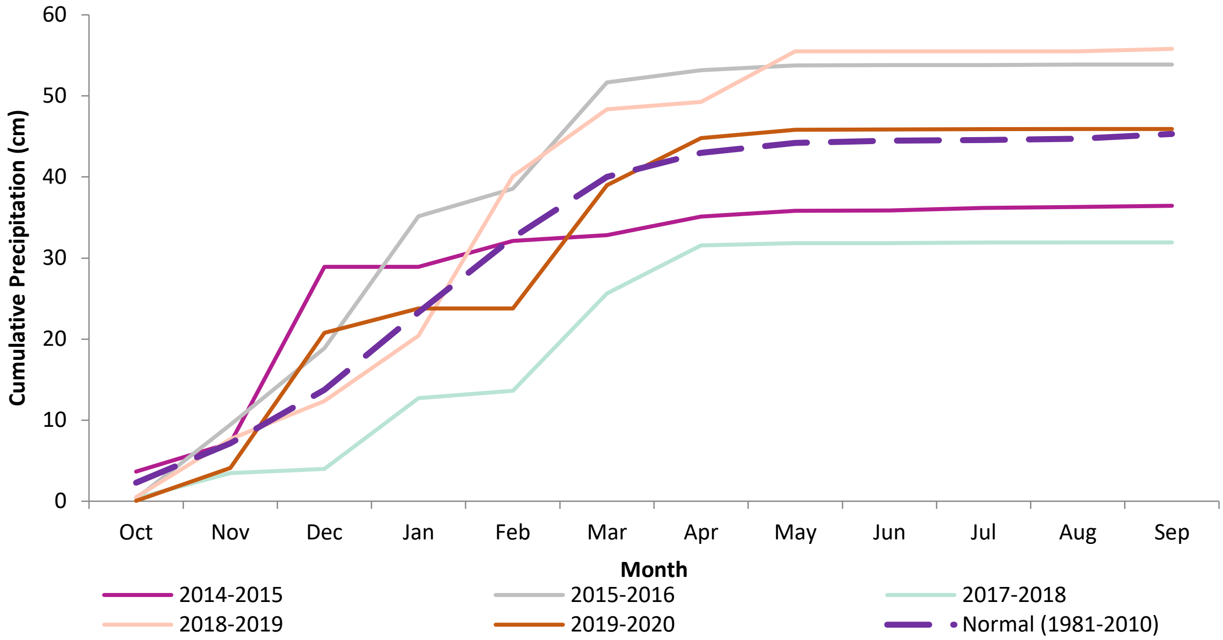


Figure 4-49. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.16.1 Vegetation Monitoring

Vegetation data were collected at Pond 60 in 2015, 2018, 2019, and 2020 (Burleson, 2016, 2019, 2020). In 2015, 2018, 2019, and 2020, data were collected using the methodology described in the Methods section of this report. Data from 2015 and 2020 were compared stratum-to-stratum in Table 4-197 as well as visually in Figure 4-50.

Table 4-197. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2015	2020
1	7%	7%
2	35%	39%
3	3%	13%
4	27%	41%
5	2%	N/A
6	26%	N/A

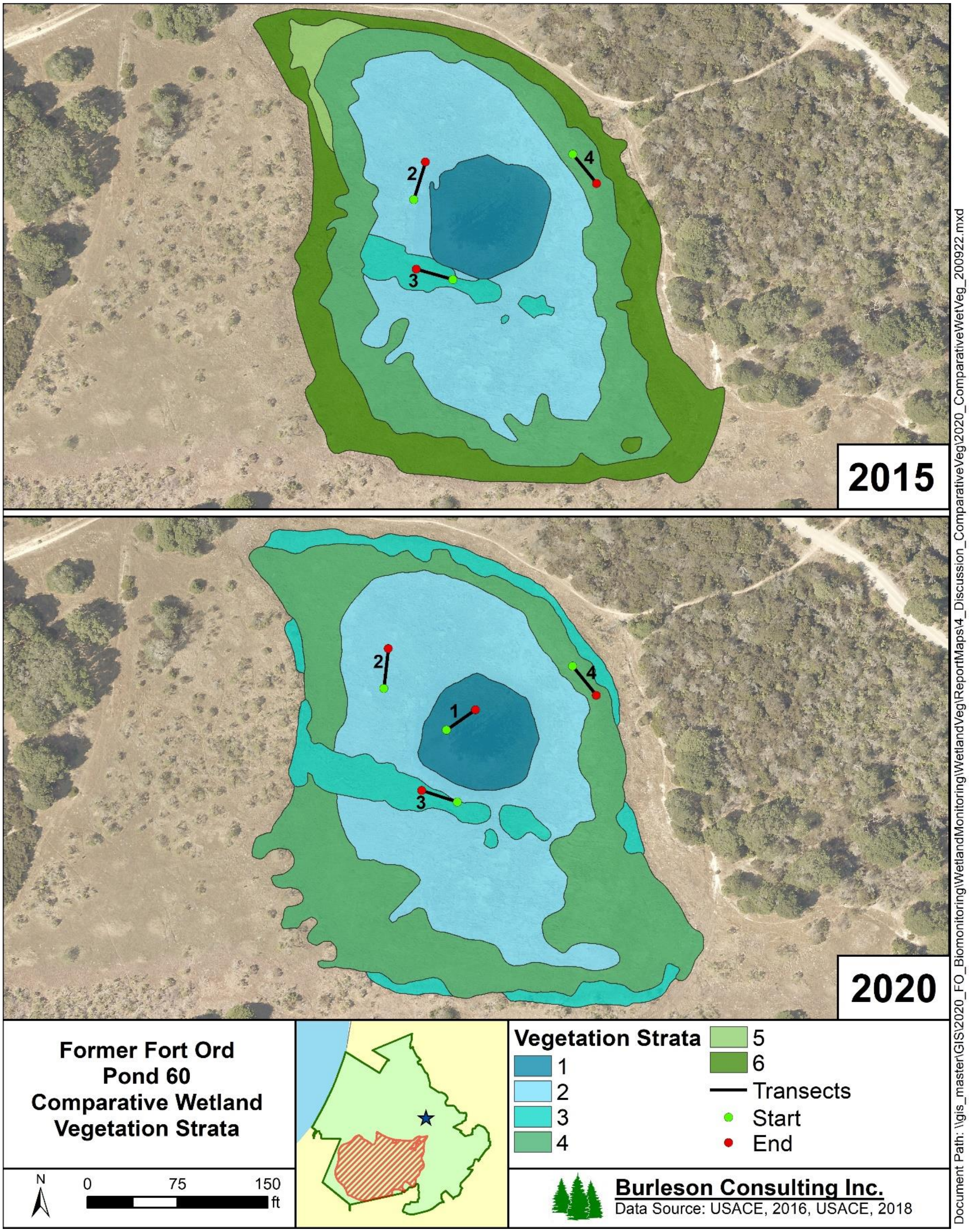


Figure 4-50. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2015 and 2020

Absolute percent vegetative cover at Pond 60 decreased between baseline and 2020 (see Table 4-198). The absolute percent vegetative cover of Pond 60 in 2020 was within the range of values observed at the reference vernal pools and most similar to Pond 5 (see Table 4-199).

Table 4-198. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2015*	61.8%	38.4%
2018	40.8%	59.7%
2019	77.5%	22.5%
2020	53.8%	45.5%

*baseline year

Table 4-199. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2020

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	47.6%	52.4%
101 East (East)	63.4%	36.6%
997	70.2%	29.8%
60	53.8%	45.5%

Species richness in 2020 was greater than the baseline year of monitoring. Species richness on transects was 13, 19, 14, and 16 species in 2015, 2018, 2019, and 2020, respectively, whereas overall basin species richness increased and was 30, 59, 46, and 57 species, respectively (see Table 4-200 and Appendix A Table A-16). Pond 60 species richness was lower than the values observed at the reference vernal pools on transects and for the entire basin (see Table 4-201 and Appendix E Tables E-21 and E-42).

Species composition at Pond 60 was similar in 2015, 2018, 2019, and 2020. The dominant species in all years were salt grass (*Distichlis spicata*), brown-headed rush (*Juncus phaeocephalus*), and pale spikerush (*Eleocharis macrostachya*). A complete comparison of species composition observed at Pond 60 in 2015, 2018, 2019, and 2020 can be found in Appendix F. Figure 4-51 shows a subset of this comparison for species observed with a 2% cover or greater.

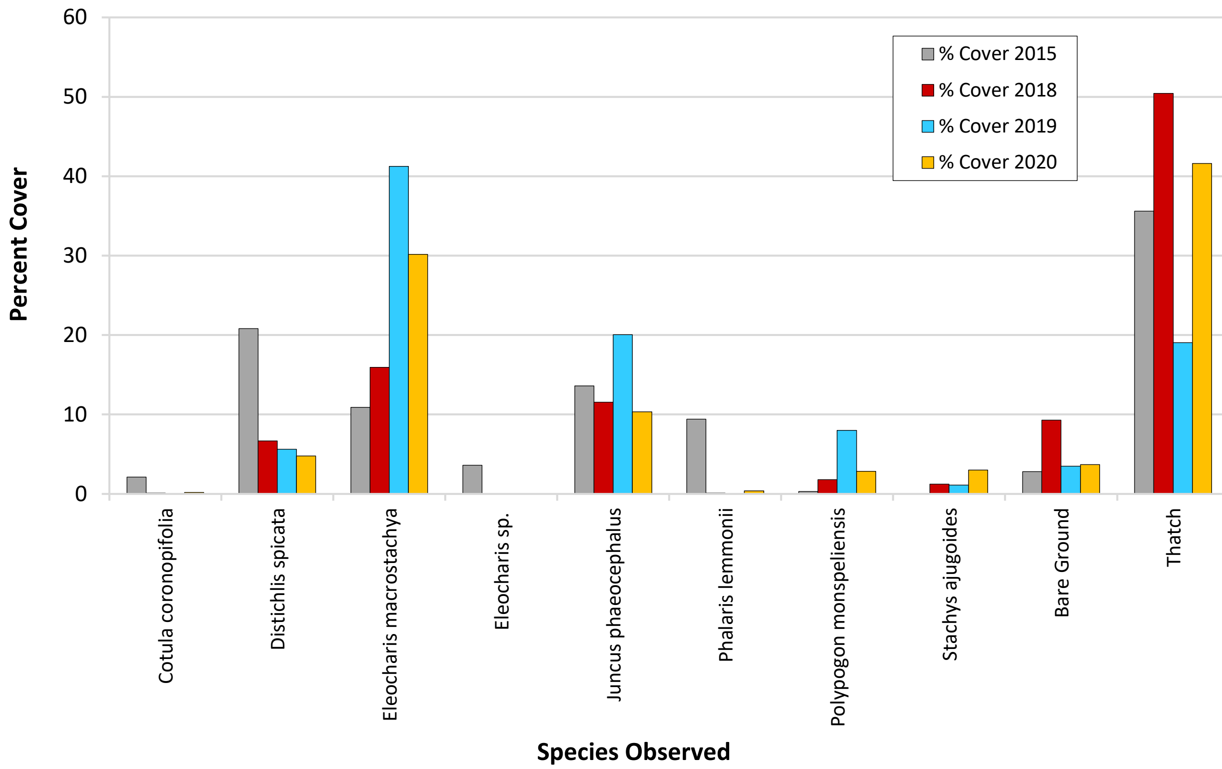


Figure 4-51. Percent Cover of Dominant Species at Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation)

Native species richness on Pond 60 transects was greater than in the baseline year, whereas non-native species richness was the same as baseline (see Table 4-200). Pond 60 native and non-native species richness in 2020 were considerably less than the values observed in reference vernal pools (see Table 4-201). Pond 60 relative percent cover of native species was greater than in baseline years and at the reference vernal pools, whereas the non-native species cover was greater than baseline but less than reference (see Table 4-202 and Table 4-203).

Table 4-200. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2015*	4	7	2
2018	10	9	0
2019	7	7	0
2020	9	7	0

*baseline year

Table 4-201. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	12	11	0
101 East (East)	24	19	0
997	27	14	1
60	9	7	0

Table 4-202. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2015*	88.5%	5.5%	6.0%
2018	92.8%	7.2%	0.0%
2019	88.3%	11.7%	0.0%
2020	93.3%	6.7%	0.0%

*baseline year

Table 4-203. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	91.3%	8.7%	0.0%
101 East (East)	72.2%	27.8%	0.0%
997	76.3%	23.6%	0.1%
60	93.3%	6.7%	0.0%

Wetland and non-wetland species richness on Pond 60 transects were greater than in the baseline year (see Table 4-204). The wetland species richness was within the range observed at reference vernal pools, whereas the non-wetland richness was less than the reference vernal pool values (see Table 4-205). Relative percent cover of wetland and non-wetland species was greater in 2020 than the baseline year of monitoring (see Table 4-206). The relative percent cover of wetland species was greater than the values observed at the reference vernal pools while non-wetland species cover was less than reference (see Table 4-207).

Table 4-204. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2015*	3	4	3	1	0	2
2018	5	6	3	2	1	2
2019	6	4	2	2	0	0
2020	6	5	3	1	1	0

*baseline year

Table 4-205. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	7	3	3	1	5
101 East (East)	5	8	7	6	3	14
997	9	10	5	5	0	13
60	6	5	3	1	1	0

Table 4-206. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2015*	21.4%	71.4%	0.8%	0.4%	0.0%	6.0%
2018	45.8%	52.1%	0.5%	0.7%	0.1%	0.8%
2019	56.2%	43.5%	0.2%	0.1%	0.0%	0.0%
2020	64.5%	34.2%	0.9%	0.4%	0.1%	0.0%

*baseline year

Table 4-207. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%
101 East (East)	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%
997	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%
60	64.5%	34.2%	0.9%	0.4%	0.1%	0.0%

4.16.1.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 60 was dominated by native and wetland plant species during year 3 post-mastication and year 2 post-subsurface munitions remediation monitoring in 2020. Pond 60 native and wetland vegetation covers were greater than baseline and reference. Additionally, native species richness was greater than baseline but less than reference.

4.16.1.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 60, a post-mastication and post-subsurface munitions remediation vernal pool, is on track to meet the performance standard for year 3 and year 2. 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 2020.

4.16.2 Wildlife Monitoring

Wildlife data were collected at Pond 60 in 2015, 2016, 2018, 2019, and 2020 (Burleson, 2016, 2017, 2019, 2020). California tiger salamander larvae were observed in 2015, 2016, 2019, and 2020. Fairy shrimp were present in 2019. Table 4-208 shows historic wildlife monitoring results.

Table 4-208. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2015*	Common (23, 19, 28)	Not detected
2016*	Few – Common (3, 11, 7)	Not detected
2018	Not detected	Not detected
2019	Few – Common (5, 53, 18)	Low (6)
2020	Few (1, 5, 7)	Not detected

*baseline year

4.16.2.1 *Data Quality Objective 5*

California tiger salamanders were present in 2020, which is consistent with baseline monitoring. The species was observed in baseline years 2015 and 2016. Results in 2020 differed from the reference vernal pools; CTS were not detected at Pond 5 or 101 East (East).

Fairy shrimp were not detected in 2020, which was consistent with baseline monitoring. Results in 2020 were also consistent with reference Pond 5. Fairy shrimp were present at Pond 101 East (East) but were not detected at Pond 5.

4.16.2.2 *Performance Standard: Wildlife Usage*

Pond 60, a post-mastication and post-subsurface munitions remediation vernal pool, is on track to meet DQO 5. Data quality objectives 1 and 4 were analyzed in the Hydrology Monitoring Annual Report (Chenega, 2021).

4.16.3 Conclusion

Pond 60, a post-mastication and post-subsurface munitions remediation vernal pool, was in year 3 and year 2 of monitoring in 2020. The vernal pool is on track to meet the plant cover and species diversity performance standard and DQO 5 for wildlife usage standards (see Table 4-209). Pond 60 will continue to be monitored in the future.

Table 4-209. Success at Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 5	On track

4.17 Pond 61 – Year 3 and Year 2

Pond 61 was monitored in 2020 as a year 3 post-mastication and year 2 post-subsurface munitions remediation vernal pool. Although limited subsurface remediation occurred at this vernal pool in 1999, the Army did not conduct monitoring prior to 2017 and it is assumed that 2017 represents baseline conditions. Less than 50 percent of the watershed of Pond 61 was masticated in the summer of 2017 to support MEC remediation in BLM Area B Subunits B-3 East and B2-A. Pond 61 had intrusive anomaly investigations in 2018. Table 4-210 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 61 (see Figure 4-52). The 2016-2017 and 2018-2019 water-years were above normal, whereas the 2017-2018 water-year was below normal. This year, 2019-2020, was similar to the cumulative normal water-year.

Table 4-210. Summary of Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year			
	2016-2017	2017-2018	2018-2019	2019-2020
Hydrology	●	●	●	●
Vegetation	●	●	●	●
Wildlife	●		●	●

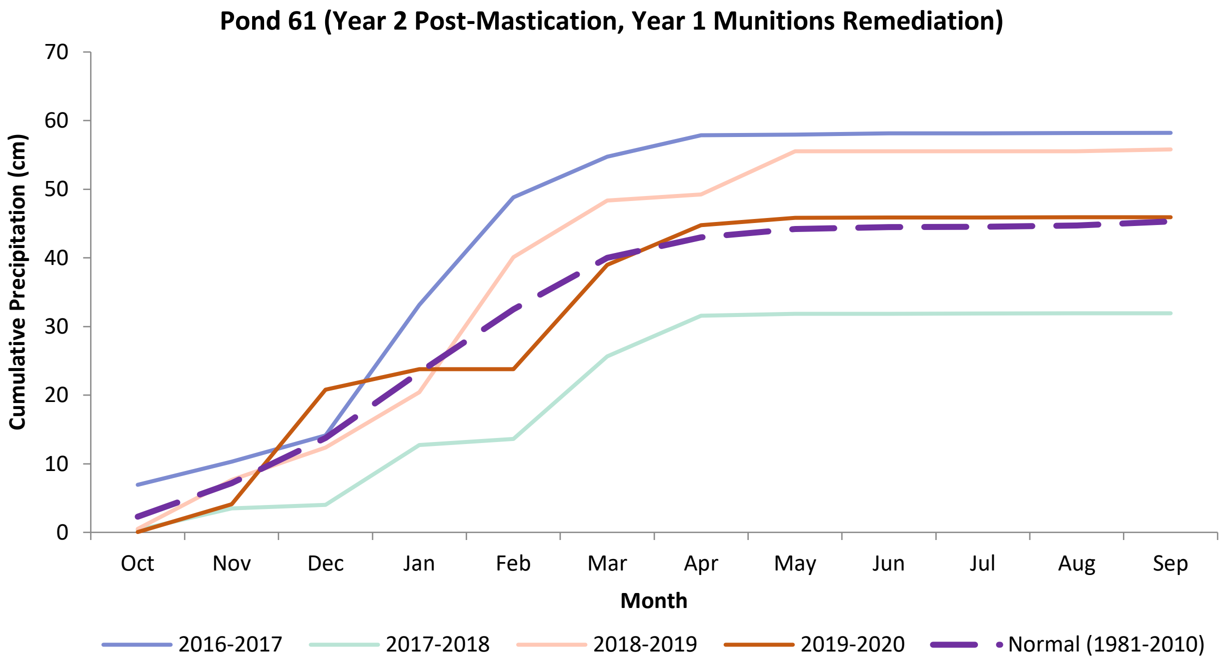


Figure 4-52. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.17.1 Vegetation Monitoring

Vegetation data were collected at Pond 61 in 2017, 2018, 2019, and 2020 (Burleson, 2018, 2019, 2020). Baseline vegetation data were collected at Pond 61 in 2017. Data were collected using the methodology described in the Methods section of this report. Data from 2017 and 2020 were compared stratum-to-stratum in Table 4-211 as well as visually in Figure 4-53**.**

Pond 61 also supports a CCG population, which is represented by stratum 2. The population was mapped and a visual estimate of percent cover was recorded in 2020 to compare to 2017, 2018, and 2019 (see Figure 3-21 in Section 3.17.1.1).

Table 4-211. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2017	2020
1	1%	1%
2 (CCG)	5%	6%
3	7%	3%
4	54%	59%
Upland	33%	31%

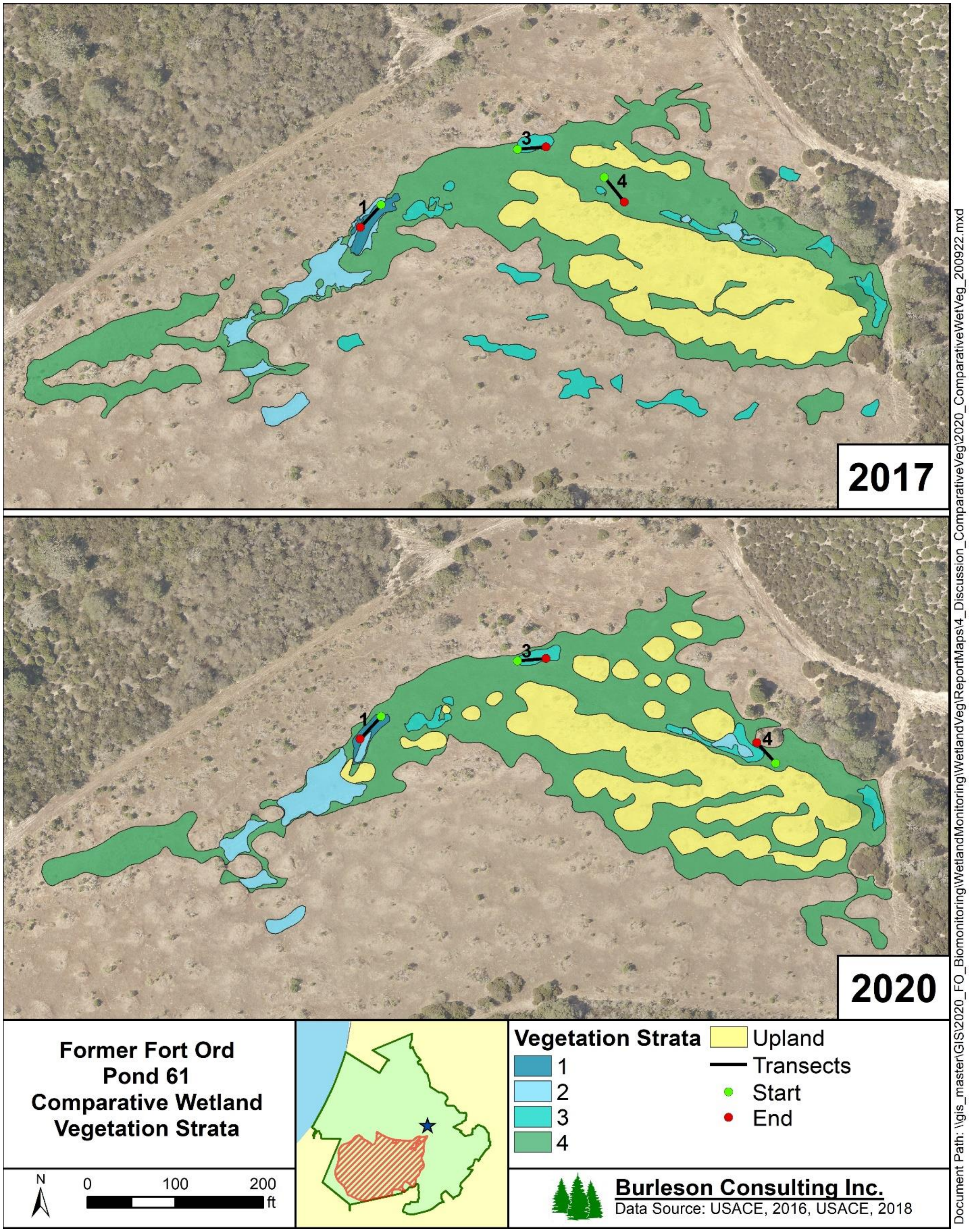


Figure 4-53. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2017 and 2020

Absolute percent vegetative cover decreased slightly between baseline and 2020 (see Table 4-212). Pond 61 vegetative cover was within the range of values observed at the reference vernal pools and was most similar to Pond 101 East (East) (see Table 4-213).

Table 4-212. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2017*	69.4%	32.1%
2018	60.6%	40.8%
2019	66.6%	35.7%
2020	66.1%	34.0%

*baseline year

Table 4-213. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2020

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	47.6%	52.4%
101 East (East)	63.4%	36.6
997	70.2%	29.8%
61	66.1%	34.0%

Species richness on transects in 2020 was greater than the baseline year; however, the overall basin species richness was two species less than baseline. Species richness on transects was 23, 41, 47, and 36 species in 2017, 2018, 2019, and 2020, respectively, whereas overall basin species richness was 100, 100, 119, and 98 species, respectively (see Table 4-214 and Appendix A Table A-17). Pond 61 species richness was within the range observed on transects at the reference vernal pools and greater than the values observed for the entire basin (see Table 4-215 and Appendix E Tables E-21 and E-42).

Species composition at Pond 61 varied in 2017, 2018, 2019, and 2020; however, the dominant species were similar. The dominant species in 2017 and 2018 were brown-headed rush (*Juncus phaeocephalus*) and pale spikerush (*Eleocharis macrostachya*), and Hickman's popcornflower (*Plagiobothrys chorisianus* var. *hickmanii*), respectively. In 2019, the dominant species was brown-headed rush. The dominant species in 2020 was California oatgrass (*Danthonia californica*) with pale spikerush, coyote thistle (*Eryngium armatum*), and brown-headed rush. A complete list of species composition observed during the surveys at Pond 61 in 2017, 2018, 2019, and 2020 can be found in Appendix F. Figure 4-54 shows a subset of this comparison for species observed with a 2% cover or greater.

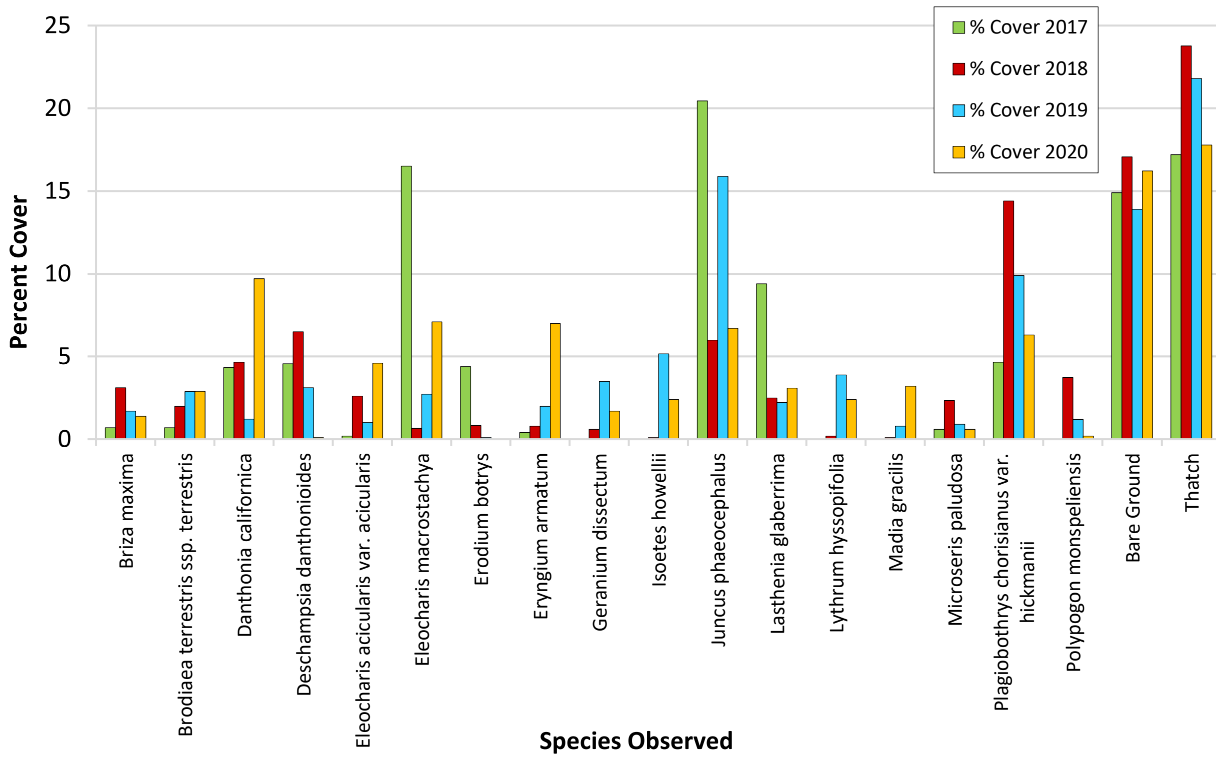


Figure 4-54. Percent Cover of Dominant Species at Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation)

Native and non-native species richness on Pond 61 transects were greater in 2020 than baseline (see Table 4-214). Native and non-native species richness were within the range observed at reference vernal pools (see Table 4-215). The relative percent cover of native and non-native species were within 2% of baseline values (see Table 4-216). Pond 61 native and non-native relative percent cover were within the range of values observed at the reference vernal pools (Table 4-217).

Table 4-214. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2017*	15	6	2
2018	24	16	1
2019	32	13	2
2020	24	12	0

*baseline year

Table 4-215. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	12	11	0
101 East (East)	24	19	0
997	27	14	1
61	24	12	0

Table 4-216. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2017*	90.3%	9.4%	0.3%
2018	80.1%	19.8%	0.1%
2019	79.0%	18.3%	2.8%
2020	88.7%	11.3%	0.0%

*baseline year

Table 4-217. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	91.3%	8.7%	0.0%
101 East (East)	72.2%	27.8%	0.0%
997	76.3%	23.6%	0.1%
61	88.7%	11.3%	0.0%

Wetland and non-wetland species richness on Pond 61 transects were greater in 2020 than the baseline year (see Table 4-218). Wetland species richness was within the range of values observed at reference vernal pools (see Table 4-219). The relative percent cover of wetland and non-wetland species was lower than in the baseline year (see Table 4-220). However, the wetland relative and non-wetland relative percent cover were within the range of values observed at reference vernal pools (see Table 4-221).

Table 4-218. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2017*	4	6	2	5	0	6
2018	10	10	3	7	1	10
2019	11	11	6	4	1	14
2020	9	9	4	5	1	8

*baseline year

Table 4-219. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	7	3	3	1	5
101 East (East)	5	8	7	6	3	14
997	9	10	5	5	0	13
61	9	9	4	5	1	8

Table 4-220. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2017*	44.3%	37.6%	6.5%	8.2%	0.0%	3.3%
2018	40.6%	31.7%	9.3%	3.2%	0.5%	14.9%
2019	39.0%	36.8%	3.6%	0.3%	0.3%	19.9%
2020	42.2%	24.4%	15.3%	1.2%	0.3%	16.6%

*baseline year

Table 4-221. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%
101 East (East)	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%
997	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%
61	42.2%	24.4%	15.3%	1.2%	0.3%	16.6%

4.17.1.1 *Contra Costa Goldfields*

The area of CCG at Pond 61 decreased slightly from 0.14 acre in 2017 to 0.12 acre in 2018 and 0.11 acre in 2019, but increased in 2020 to 0.15 acre (Burleson, 2018, 2019, 2020) (see Figure 4-55). The density ranged from 10-65% in 2017, 5-65% in 2018, 5-85% in 2019, and 15-65% in 2020. In 1999, 2000, 2002, 2017, 2018, and 2019 the CCG population was in similar locations as 2020 and within the range of 0.09-0.14 acre (HLA, 2000, 2001; MACTEC, 2003; Burleson, 2018, 2019, 2020). Results suggest that mastication activities in 2017 and post-subsurface munitions remediation in 2019 did not affect the population. Minor changes in population size can be attributed to natural fluctuation. In 2019, this area was disturbed by wild pig rooting. This disturbance does not appear to have had a negative impact on the CCG population at Pond 61.

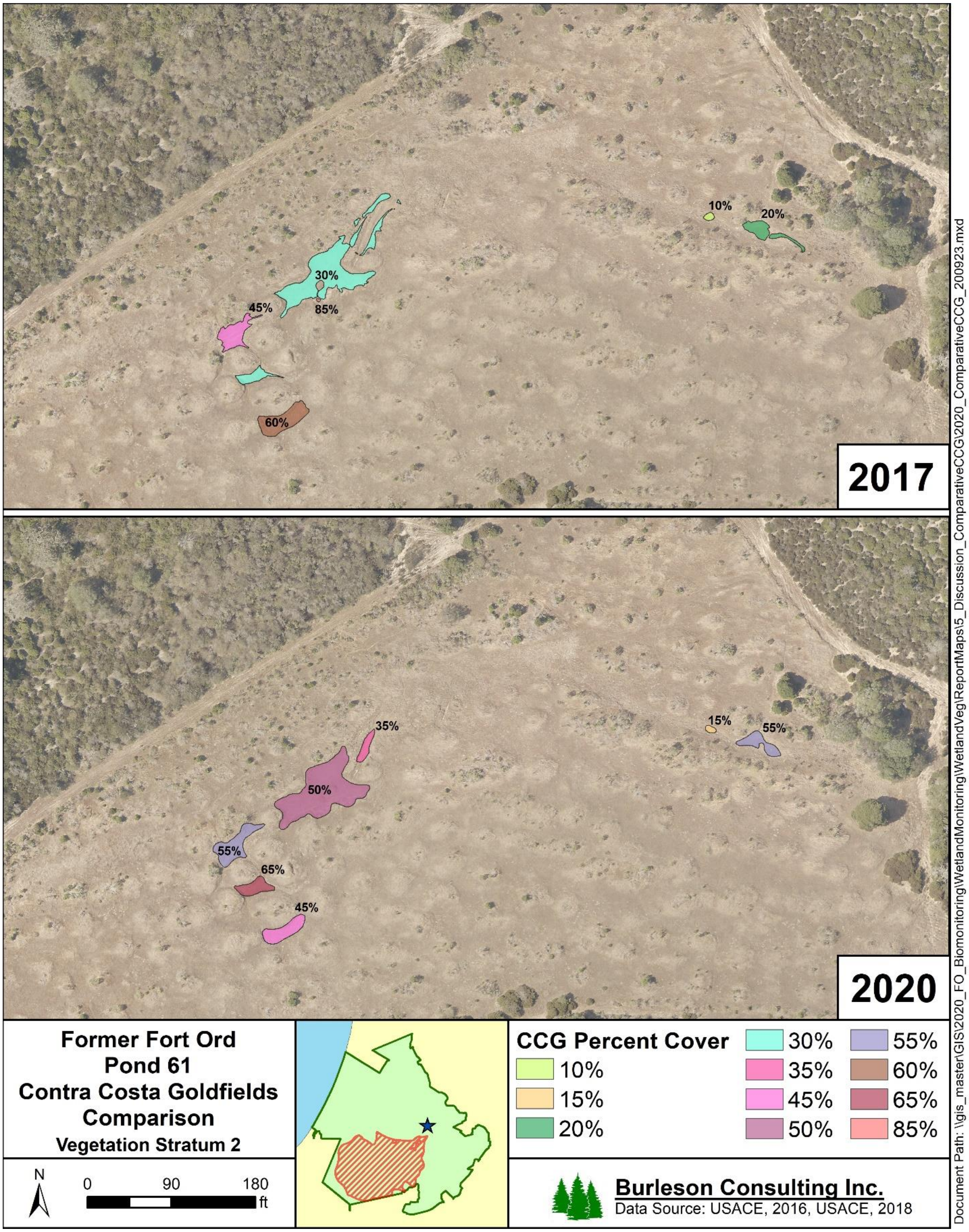


Figure 4-55. Contra Costa Goldfields Populations at Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) in 2017 and 2020

4.17.1.2 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 61 was dominated by native and wetland plant species during year 3 post-mastication and year 2 post-subsurface munitions remediation monitoring in 2020. Pond 61 wetland vegetation results were generally within the range of baseline and reference vernal pools.

4.17.1.3 *Performance Standard: Plant Cover and Species Diversity*

Pond 61, a post-mastication and post-subsurface munitions remediation vernal pool, is on track to meet the performance standard for years 3 and 2, respectively. 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 2020.

4.17.2 Wildlife Monitoring

Wildlife data were collected at Pond 61 in 2017, 2019, and 2020 (Burleson, 2018, 2020). California tiger salamander larvae were not observed in any year. Fairy shrimp were present in 2019 and 2020. Table 4-222 shows historic wildlife monitoring results.

Table 4-222. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2017*	Not detected	Not detected
2019	Not detected	High (162)
2020	Not detected	High (172)

*baseline year

4.17.2.1 *Data Quality Objective 5*

California tiger salamanders were not detected in 2020, which was consistent with the baseline survey in 2017. Results in 2020 were also consistent with reference vernal pools; CTS were not detected at Pond 5 or 101 East (East).

Fairy shrimp were present in 2020, which was not consistent with the baseline survey. Fairy shrimp were not detected in 2017. It was possible survey timing prevented detection in 2017 because surveys occurred later in the year (late March). However, in 2020 a very dry February followed by above-normal March and April rain events may have been favorable for later fairy shrimp detection. Results in 2020 were consistent with reference Pond 101 East (East). Fairy shrimp were present at Pond 101 East (East) but were not detected at Pond 5.

4.17.2.2 *Performance Standard: Wildlife Usage*

Pond 61, a post-mastication and post-subsurface munitions remediation vernal pool, is on track to meet DQO 5. Fairy shrimp were present in 2019 and 2020 but not baseline. DQOs 1 and 4 were analyzed in the Hydrology Monitoring Annual Report (Chenega, 2021).

4.17.3 Conclusion

Pond 61, a post-mastication and post-subsurface munitions remediation vernal pool, was in years 3 and 2 of monitoring in 2020. The vernal pool is on track to meet the plant cover and species diversity performance standard and DQO 5 for wildlife usage (see Table 4-223). Pond 61 will continue to be monitored in the future.

Table 4-223. Success at Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 5	On track

4.18 Pond 73 – Year 3 and Year 2

Pond 73 was monitored in 2020 as a year 3 post-mastication and year 2 post-subsurface munitions remediation vernal pool. Vegetation within the Pond 73 watershed was masticated in the summer of 2017 to support MEC remediation in BLM Area B Subunit B-3 East. Pond 73 had intrusive anomaly investigations in 2018. Baseline inundation and vegetation surveys were recorded in 2017 but no baseline depth, water quality, or wildlife monitoring had been conducted. Table 4-224 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 73 (see Figure 4-56). The 2016-2017 and 2018-2019 water-years were above-normal, whereas the 2017-2018 water-year was below normal. This year, 2019-2020, was similar to the cumulative normal water-year.

Table 4-224. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year			
	2016-2017	2017-2018	2018-2019	2019-2020
Hydrology	●	●	●	●
Vegetation	●	●	●	●
Wildlife		●	●	●

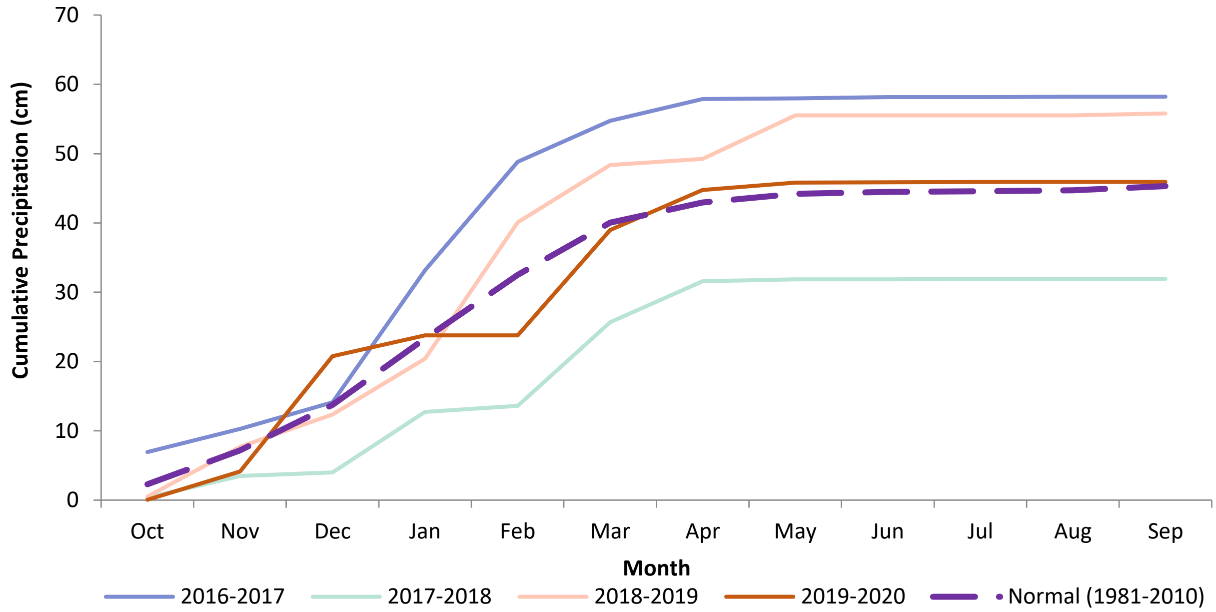


Figure 4-56. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.18.1 Vegetation Monitoring

Vegetation data were collected at Pond 73 in 2017, 2018, 2019, and 2020 (Burleson, 2019, 2020). Baseline vegetation data were collected at Pond 73 in 2017 by DD&A and provided by the Army in 2018. Data were collected using the methodology described in the Methods section of this report. Data from 2017 and 2020 were compared stratum-to-stratum in Table 4-226 as well as visually in Figure 4-57.

Table 4-225. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2017	2020
1	9%	11%
2	71%	46%
3	17%	N/A
4	N/A	41%
Upland	3%	2%

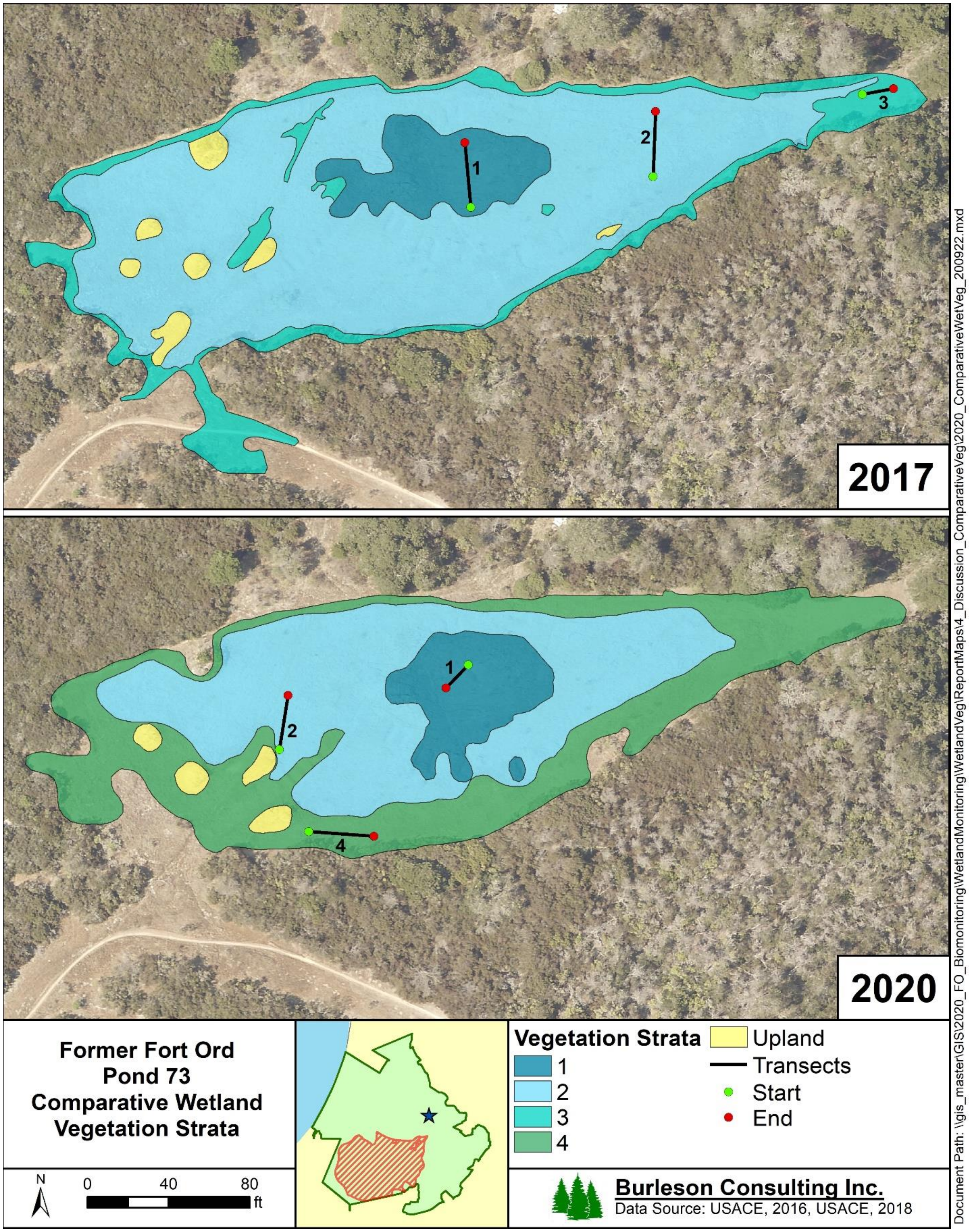


Figure 4-57. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2017 and 2020

The absolute percent vegetative cover decreased between baseline and 2020 (see Table 4-226). Pond 73 vegetative cover was greater than the values observed in reference vernal pools with less thatch/bare ground cover (see Table 4-227).

Table 4-226. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2017*	82.6%	16.9%
2018	61.8%	39.7%
2019	65.9%	34.1%
2020	78.9%	21.2%

*baseline year

Table 4-227. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2020

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	47.6%	52.4%
101 East (East)	63.4%	36.6%
997	70.2%	29.8%
73	78.9%	21.2%

Species richness in 2020 was greater than baseline. Species richness on transects was 6, 21, 17, and 23 species in 2017, 2018, 2019, and 2020, respectively, whereas overall basin species richness was 49, 68, 62, and 68 species, respectively (see Table 4-228 and Appendix A Table A-18). Pond 73 species richness was within the ranges observed at reference vernal pools and most similar to reference vernal pool Pond 5 (see Table 4-229 and Appendix E Tables E-21 and E-42).

Species composition at Pond 73 was similar between 2017, 2018, 2019, and 2020. The dominant species in all survey years were brown-headed rush (*Juncus phaeocephalus*) and pale spikerush (*Eleocharis macrostachya*). In 2018, 2019, and 2020 coyote thistle (*Eryngium armatum*) was a third dominant species. A complete comparison of species composition observed at Pond 73 in 2017, 2018, 2019, and 2020 can be found in Appendix F. Figure 4-58 shows a subset of this comparison for species observed with a 2% cover or greater.

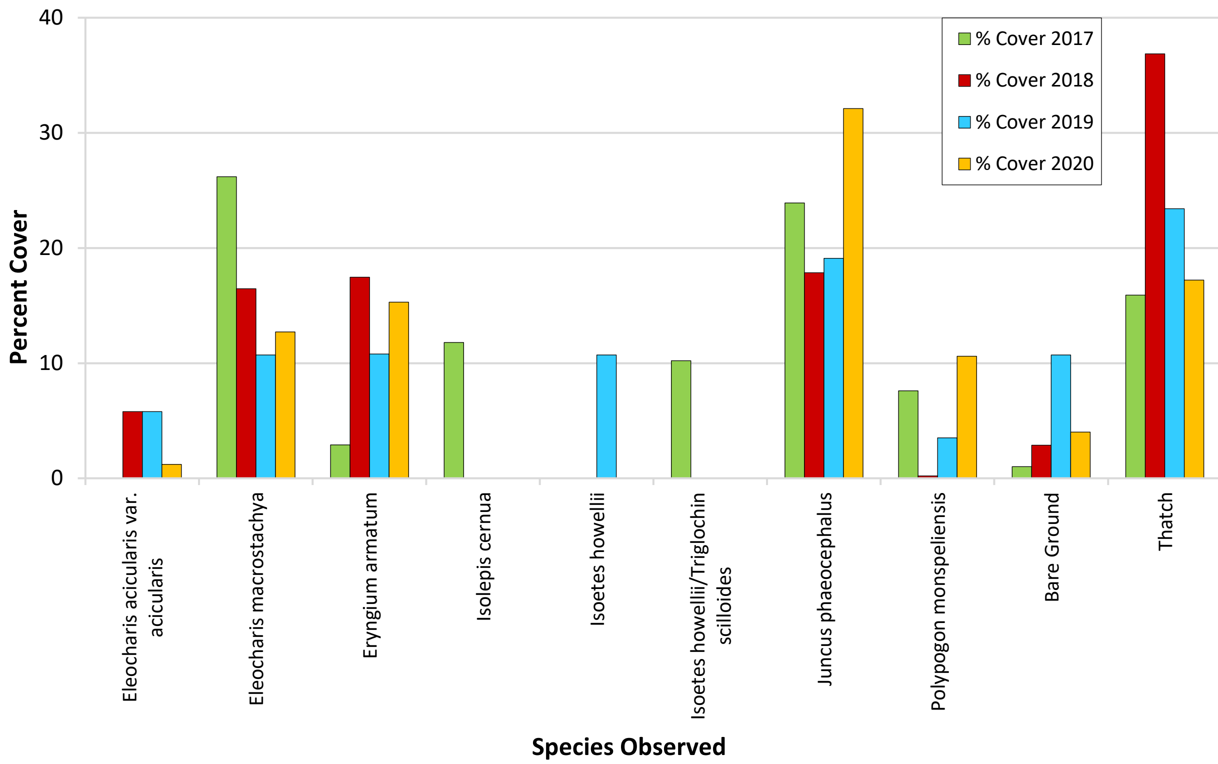


Figure 4-58. Percent Cover of Dominant Species at Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation)

Native and non-native species richness on Pond 73 transects was greater in 2020 than baseline (see Table 4-228). The native species richness was within the range of values observed at reference vernal pools, whereas non-native species richness was less than reference (see Table 4-229). The relative percent cover of native species was less than baseline and the non-native species cover was greater than baseline (see Table 4-230). Pond 73 relative percent cover of native and non-native species were within the range of values observed at reference vernal pools (see Table 4-231).

Table 4-228. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2017*	5	1	0
2018	15	5	1
2019	14	3	0
2020	14	9	0

*baseline year

Table 4-229. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	12	11	0
101 East (East)	24	19	0
997	27	14	1
73	14	9	0

Table 4-230. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2017*	90.8%	9.2%	0.0%
2018	98.9%	1.0%	0.1%
2019	91.9%	8.1%	0.0%
2020	83.4%	16.6%	0.0%

*baseline year

Table 4-231. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	91.3%	8.7%	0.0%
101 East (East)	72.2%	27.8%	0.0%
997	76.3%	23.6%	0.1%
73	83.4%	16.6%	0.0%

Wetland and non-wetland species richness on Pond 73 transects were greater in 2020 than baseline (see Table 4-232). Pond 73 wetland species richness was within the range of values observed at the reference vernal pools, while non-wetland species richness was less than the reference vernal pools (see Table 4-233). The relative percent cover of wetland and non-wetland species was slightly greater in 2020 than the baseline year of monitoring (see Table 4-234). Pond 73 wetland species relative percent cover values were greater than reference vernal pools in 2020, whereas non-wetland species cover was lower than reference vernal pools (see Table 4-235).

Table 4-232. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2017*	3	3	0	0	0	0
2018	7	7	2	2	0	3
2019	7	7	1	0	0	2
2020	5	9	1	2	1	5

*baseline year

Table 4-233. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	7	3	3	1	5
101 East (East)	5	8	7	6	3	14
997	9	10	5	5	0	13
73	5	9	1	2	1	5

Table 4-234. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2017*	46.0%	41.6%	0.0%	0.0%	0.0%	12.3%
2018	40.3%	58.3%	0.4%	0.2%	0.0%	0.8%
2019	46.8%	52.6%	0.1%	0.0%	0.0%	0.5%
2020	19.4%	77.0%	0.5%	0.3%	0.3%	2.4%

*baseline year

Table 4-235. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%
101 East (East)	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%
997	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%
73	19.4%	77.0%	0.5%	0.3%	0.3%	2.4%

4.18.1.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 73 was dominated by native and wetland plant species during year 3 post-mastication and year 2 post-subsurface munitions remediation monitoring in 2020. Pond 73 wetland vegetation results were generally within range of baseline and/or reference vernal pools; however, relative percent cover of wetland species was greater in 2020 than baseline and reference vernal pools. Additionally, non-wetland cover was greater than baseline but less than the values observed at the reference vernal pools.

4.18.1.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 73, a post-mastication and post-subsurface munitions remediation vernal pool, is on track to meet the performance standard for years 3 and 2, respectively. The species composition, richness, and native and wetland species relative abundances were similar to baseline and/or reference vernal pool conditions, with minor differences in non-wetland cover and greater wetland cover. Pond 73 provided suitable wetland habitat in 2020.

4.18.2 Wildlife Monitoring

Wildlife data were collected at Pond 73 in 2018, 2019, and 2020. California tiger salamander larvae were not observed in any year. Fairy shrimp were present in 2019 and 2020. No baseline historic wildlife data were available for comparison. Table 4-236 shows historic wildlife monitoring results.

Table 4-236. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2018	Not detected	Not detected
2019	Not detected	Present*
2020	Not detected	Low (1)

*Fairy shrimp present during CTS survey, not during the fairy shrimp survey.

4.18.2.1 *Data Quality Objective 5*

California tiger salamanders were not detected in 2020 at Pond 73. This was similar to 2019 (Yr 2/1) and 2018 (Yr 1); however, no baseline wildlife data were available for comparison. Results in 2020 were also consistent with reference vernal pools; CTS were not detected at Pond 5 or 101 East (East).

Fairy shrimp were present in 2020 at Pond 73, which was consistent with 2019 (Yr 2/1) results. No baseline wildlife data were available for comparison. Results in 2020 were consistent with reference Pond 101 East (East). Fairy shrimp were present at Pond 101 East (East) but were not detected at Pond 5.

4.18.2.2 *Performance Standard: Wildlife Usage*

Pond 73, a post-mastication and post-subsurface munitions remediation vernal pool, is on track to meet DQO5. The vernal pool was only evaluated against the previous monitoring years as there were no baseline wildlife data.

4.18.3 Conclusion

Pond 73, a post-mastication and post-subsurface munitions remediation vernal pool, was in years 3 and 2 of monitoring in 2020. The vernal pool was evaluated for DQO 5 against previous monitoring years and reference vernal pools because there were no baseline wildlife data. Pond 73 is on track to meet the plant cover and species diversity performance standard and DQO 5 for wildlife usage (see Table 4-237). Pond 73 will continue to be monitored in the future.

Table 4-237. Success at Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 5	On track*

*Only evaluated against years 1 and 2, no baseline data.

4.19 Machine Gun Flats – Year 3

Machine Gun Flats was monitored in 2020 as a year 3 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 with follow-up monitoring in 2000, 2001, 2002, and 2003 (HLA, 2001; Harding, 2002; MACTEC, 2003, MACTEC, 2004). Vegetation within the watershed of Machine Gun Flats was masticated in the summer of 2017 to support MEC remediation in BLM Area B Subunit B-3 East. No vegetation mastication occurred within the boundary of the maximum inundation area of the Machine Gun Flats vernal pool. Year 3 is the final year of monitoring for Machine Gun Flats. Table 4-238 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Machine Gun Flats (see Figure 4-59). The 1997-1998 and 2018-2019 water-years were above normal, whereas all other monitoring occurred in normal or below-normal water-years. This year, 2019-2020, was similar to the cumulative normal water-year.

Table 4-238. Machine Gun Flats (Year 3 Post-Mastication) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year								
	1996-1997	1997-1998	1999-2000	2000-2001	2001-2002	2002-2003	2017-2018	2018-2019	2019-2020
Hydrology	●	●	●	●	●	●	●	●	●
Vegetation	●		●	●	●	●		●	●
Wildlife	●	●	●	●	●	●		●	●

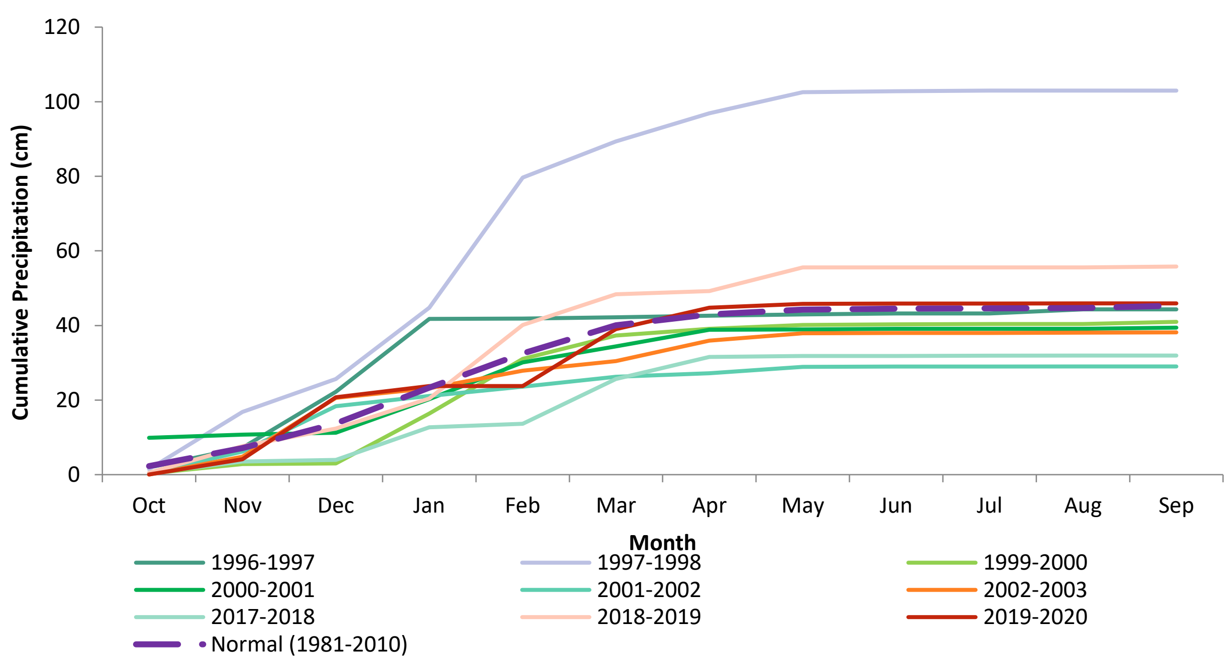


Figure 4-59. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Machine Gun Flats (Year 3 Post-Mastication) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.19.1 Vegetation Monitoring

Vegetation data were collected at Machine Gun Flats in 1997, 2000, 2001, 2002, 2003, and 2019 (HLA, 1997, 2001; Harding ESE, 2002; MACTEC, 2003, 2004; Burleson, 2020). In 1997, 2000, 2001, 2002, and 2003, data were collected along transects in lengths varying from 50 to 241 feet. In 2000, 0.25 m^2 quadrats were placed at intervals ranging from 10 to 20 feet, whereas in 1998, 2001, 2002, and 2003, quadrats were placed at 10-foot intervals. Quadrats were placed at the given intervals, alternating from right to left along the transect. In 1997, 2000, 2001, 2002, and 2003, transects of varying lengths were in areas of representative transitional and emergent habitats. Due to differing methodologies, data for all strata in each respective year before 2019 were combined to compare to 2019 and 2020. In 2019 and 2020, data were collected using the methodology described in the Methods section of this report. Data from 2019 and 2020 and were compared stratum-to-stratum in Table 4-239 as well as visually in Figure 4-61.

Table 4-239. Machine Gun Flats (Year 3 Post-Mastication) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2019	2020
1	0.3%	0.3%
2	61%	53%
3	0.4%	1%
4	8%	9%
5	2%	5%
6	1%	3%
7	10%	6%
8	15%	21%
9	2%	2%
Upland	0.1%	N/A

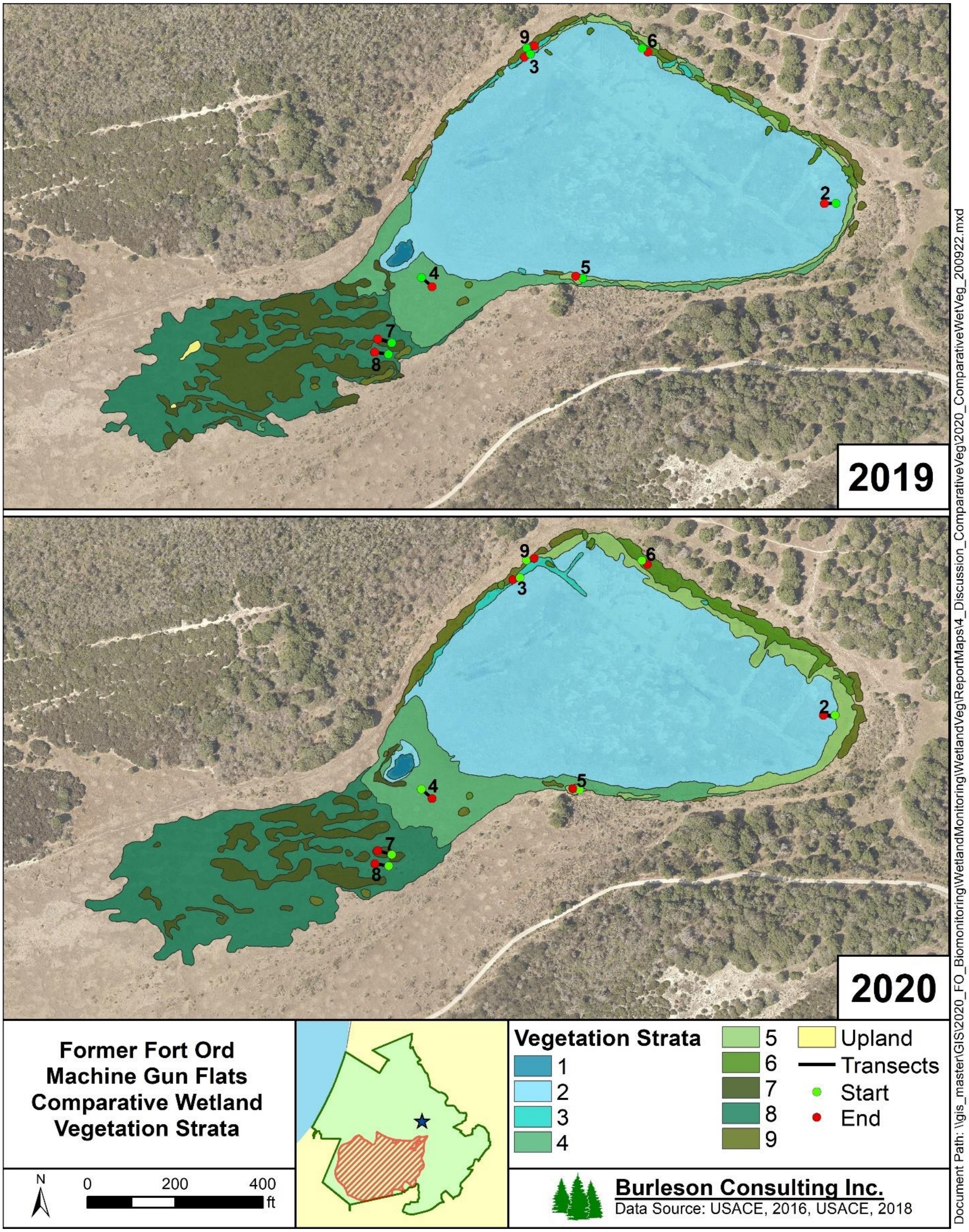


Figure 4-60. Machine Gun Flats (Year 3 Post-Mastication) Vegetation Strata and Transects for 2019 and 2020

Absolute percent vegetative cover in 2020 was significantly less than baseline (see Table 4-240). The absolute percent vegetative cover at Machine Gun Flats in 2020 was within the range of values observed at the reference vernal pools and was most similar to Pond 5 (see Table 4-241).

Table 4-240. Machine Gun Flats (Year 3 Post-Mastication) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
1997*	111.6%	16.7%
2000	111.3%	5.6%
2001	61.7%	39.2%
2002	100.6%	5.1%
2003	106.7%	2.1%
2019	61.4%	38.6%
2020	48.8%	51.1%

*baseline year

Table 4-241. Machine Gun Flats (Year 3 Post-Mastication) and Reference Vernal Pool Absolute Percent Cover in 2020

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	47.6%	52.4%
101 East (East)	63.4%	36.6%
997	70.2%	29.8%
Machine Gun Flats	48.8%	51.1%

Species richness on transects in 2020 was greater than in baseline years. Species richness on transects was 48, 34, 46, 47, 50, 52, and 55 species in 1997, 1999, 2000, 2001, 2003, 2019, and 2020 respectively, whereas overall basin species richness was 131 in 2019 and 123 in 2020 (see Table 4-242 and Appendix A Table A-19). The 1997-2003 surveys were limited to species on the transects and may underrepresent total vernal pool species richness. Machine Gun Flats species richness was greater than at the reference vernal pools (see Table 4-243 and Appendix E Tables E-21 and E-42).

Species composition at Machine Gun Flats differed among the monitoring years, but the dominant species were generally the same. The dominant species in 1997, 2000, 2001, and 2019, were pale spikerush (*Eleocharis macrostachya*) and brown-headed rush (*Juncus phaeocephalus*). In 2002, the dominant species was *Juncus* sp. and in 2003, the dominant species was smooth cat's-ear (*Hypochaeris glabra*). Beardless wild rye (*Elymus triticoides*) was another important species in 1997, 2000, and 2020. In 2020, coyote thistle (*Eryngium armatum*) was the dominant species. A complete comparison of species composition observed at Machine Gun Flats in 1997, 2000, 2001, 2002, 2003, 2019, and 2020 can be found in Appendix F. Figure 4-61 shows a subset of this comparison for species observed with a 2% cover or greater.

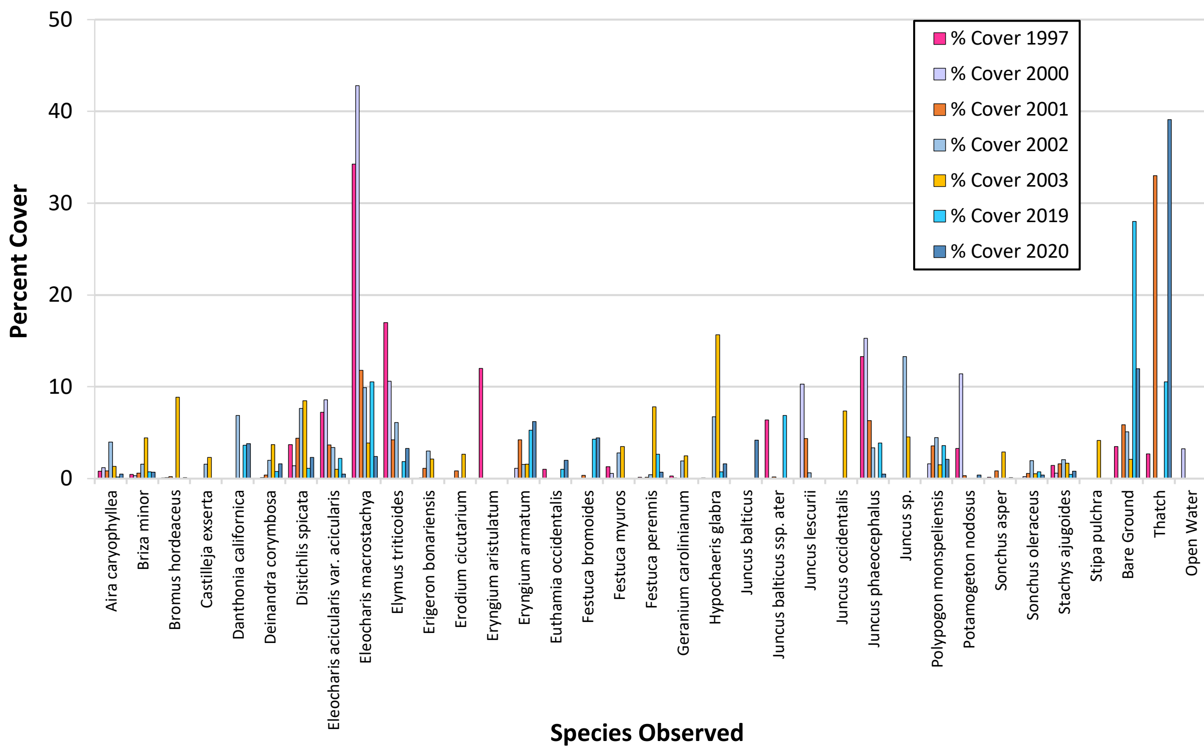


Figure 4-61. Percent Cover of Dominant Species at Machine Gun Flats (Year 3 Post-Mastication)

Native species richness on Machine Gun Flats transects was greater in 2020 (Yr 3) and 2019 (Yr 2) than the baseline year of monitoring. Non-native species richness was slightly greater than baseline in 2020 (Yr 3) but less than baseline in 2019 (Yr 2) (see Table 4-242). Machine Gun Flats native species richness in 2020 was within the range for values observed at the reference vernal pools, while non-native species richness was greater than reference (see Table 4-243). The relative percent cover of native and non-native species was within the range of previous monitoring years; however, native species cover was lower than baseline and non-native cover was greater (see Table 4-244). The relative percent cover of native species was less than the values observed at the reference vernal pools and non-native species was greater than the reference vernal pools (see Table 4-245).

Table 4-242. Machine Gun Flats (Year 3 Post-Mastication) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
1997*	21	24	3
2000	15	19	0
2001	21	23	2
2002	23	21	3
2003	24	25	1
2019	31	21	0
2020	27	25	3

*baseline year

Table 4-243. Machine Gun Flats (Year 3 Post-Mastication) and Reference Vernal Pool Native and Non-Native Species Richness in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	12	11	0
101 East (East)	24	19	0
997	27	14	1
Machine Gun Flats	27	25	3

Table 4-244. Machine Gun Flats (Year 3 Post-Mastication) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
1997*	92.8%	6.3%	0.8%
2000	92.5%	7.5%	0.0%
2001	75.9%	21.9%	2.2%
2002	52.1%	34.0%	13.9%
2003	41.0%	54.7%	4.2%
2019	69.5%	30.5%	0.0%
2020	64.3%	35.3%	0.4%

*baseline year

Table 4-245. Machine Gun Flats (Year 3 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	91.3%	8.7%	0.0%
101 East (East)	72.2%	27.8%	0.0%
997	76.3%	23.6%	0.1%
Machine Gun Flats	64.3%	35.3%	0.4%

Wetland and non-wetland species richness on Machine Gun Flats transects in 2020 (Yr 3) and 2019 (Yr 2) both had greater wetland species richness than baseline. The non-wetland species richness was also slightly higher than baseline in 2020 (Yr 3) but lower in 2019 (Yr 2) (see Table 4-246). Machine Gun Flats wetland species richness in 2020 (Yr 3) and 2019 (Yr 2) was greater than the range observed at the reference vernal pools, whereas non-wetland species richness was within the range of reference in 2019 (Yr 2) and slightly greater than reference values in 2020 (Yr 3) (see Table 4-247). The relative percent cover of wetland and non-wetland species differed from baseline in 2020 (Yr 3) and 2019 (Yr 2). Relative percent wetland species cover was significantly lower in 2019 and 2020 compared to baseline, while the relative percent cover of non-wetland species was higher than baseline for those years. 2019 and 2020 relative percent cover values were most similar to previous monitoring years between 2000 and 2003 (see Table 4-248). The relative percent cover values for wetland and non-wetland species in 2020 (Yr 3) were within the range observed at the reference vernal pools (see Table 4-249).

Table 4-246. Machine Gun Flats (Year 3 Post-Mastication) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1997*	11	8	7	10	0	13
2000	8	8	7	6	1	4
2001	6	9	8	10	1	12
2002	4	10	8	7	1	17
2003	5	8	7	11	1	18
2019	7	14	8	7	1	15
2020	5	12	10	10	1	17

*baseline year

Table 4-247. Machine Gun Flats (Year 3 Post-Mastication) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	7	3	3	1	5
101 East (East)	5	8	7	6	3	14
997	9	10	5	5	0	13
Machine Gun Flats	5	12	10	10	1	17

Table 4-248. Machine Gun Flats (Year 3 Post-Mastication) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1997*	54.1%	22.4%	17.0%	3.8%	0.0%	2.7%
2000	58.3%	27.3%	10.7%	2.9%	0.2%	0.6%
2001	28.7%	41.2%	11.9%	11.4%	0.9%	6.0%
2002	17.0%	21.3%	17.0%	13.1%	1.9%	29.6%
2003	7.9%	19.4%	14.1%	20.9%	0.5%	37.2%
2019	24.3%	37.4%	18.7%	5.7%	1.2%	12.7%
2020	9.2%	38.6%	20.9%	6.0%	0.8%	24.5%

*baseline year

Table 4-249. Machine Gun Flats (Year 3 Post-Mastication) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%
101 East (East)	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%
997	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%
Machine Gun Flats	9.2%	38.6%	20.9%	6.0%	0.8%	24.5%

4.19.1.1 *Contra Costa Goldfields*

The area of CCG cover at Machine Gun Flats decreased dramatically between previous follow-up monitoring years (1999, 2000, 2002, and 2003) and 2020. The number of recorded CCG individuals in previous years ranged between 6,426 in 1999 and 74,643 in 2003; however, only one individual CCG was documented in 2019 and none were observed in 2020 (see Figure 4-62). The density was relatively low for these areas in 1999 and 2000 and recorded as 2-10% cover (HLA, 2000, 2001).

It is unclear why the CCG population at Machine Gun Flats has decreased but it is unlikely related to remediation activities because the mastication occurred outside of the CCG occupied areas and no other vegetation monitoring results indicate similar decreases following mastication within the watershed. Additionally, the species was observed in highest population numbers following subsurface remediation activities in 1999-2000. Native and wetland vegetation diversity and cover are following trends observed in previous years and at the reference vernal pools. The species reported as associated with the CCG population in past reports are still present in the area where the single individual was located in 2019 and areas where historic polygons of CCG have been mapped. The population of CCG however, does not match trends observed at other vernal pools.

It is possible that the years from 1999-2003 were particularly favorable for CCG, however, one would expect similar results from recent water-years. Water-years 1998-1999 and 1999-2000 were both similar to cumulative normal, whereas 2001-2002 and 2002-2003 were both below normal. Inundation and depth were not recorded in 1999. Inundation in 2000 was a maximum of 10.65 acres and Machine Gun Flats held water from January to June. Inundations in 2002 and 2003 were 3.49 and 4.44 acres maximums and held water from January-April and January-March, respectively. One consideration is the El Nino water-year prior to monitoring in 1999 in contrast with historic drought prior to recent monitoring.

The water-year preceding monitoring, 1997-1998, was an exceptionally wet El Nino year with cumulative precipitation more than twice that of normal, which resulted in the largest inundation area of Machine Gun Flats on record (Figure 4-59). Data from January 15, 1998 shows inundation extended in the southwest of Machine Gun Flats to cover a portion of area known to support CCG, and it is safe to assume that the maximum inundation area that year was not recorded because of additional precipitation that occurred after that date (Chenega 2021). Even though water-years 1998-1999 and 1999-2000 were similar to cumulative normal, and 2001-2002 and 2002-2003 were both below normal, the record inundation in 1998 may have set up ideal conditions for CCG in the following years which were observed in record numbers between 1999 and 2003.

Soil pit analyses conducted at Machine Gun Flats and two other vernal pools in 1996 confirmed presence of Antioch soils, which typically consist of a surface layer of very fine sandy loam approximately 20 inches thick and a clay subsoil extending to a depth of 67 inches (Burleson 2006). During precipitation events, initially it takes a certain amount of precipitation for the sandy loam layer to become saturated, after which it takes even more precipitation for the clay layer to start absorbing water. As the clay layer becomes saturated with water it expands and decreases in permeability. Once the clay layer becomes completely saturated, any additional input in water to the basin will result in ponding. The exceptionally high precipitation in 1998 may have caused the underlaying clay layer to become fully saturated which resulted in record inundated area at Machine Gun Flats. In the following years, water saturation of the underlaying clay layer likely remained high, causing longer inundation periods in the depressions containing CCG seeds even when cumulative precipitation was below normal.

Conversely, recent surveys at Machine Gun Flats followed a record drought period between fall 2011 and fall 2015, which had the opposite effect on the underlying clay layer. As the clay layer dries, it may become more prone to absorption of water from the overlying loam thereby depleting the loam of water that would otherwise support CCG. In such conditions, even an above-normal water-year may not cause sufficient inundation as the absorptive capacity of the underlying clay layer is much greater when it is dry. Water-years 2017-2018, 2018-2019, and 2019-2020 were below, above, and normal respectively. During that period, the largest inundation occurred on March 7, 2019 where it extended toward the SW area but did not cover the historic CCG occupied area, and it retreated the following month. This implies that inundation extent and duration of vernal pools is not only dependent on level of precipitation in any given year, but also on precipitation patterns leading up to that year. This may explain why years with similar cumulative precipitation may result in different inundation regimes.

Drought induced dehydrated soils and insufficient precipitation may be the reasons why the areas historically occupied by CCG at Machine Gun Flats did not become inundated between 2018 and 2020 (Burleson 2019, Burleson 2020, Chenega 2021). Since CCG appears to thrive in pools with longer inundation regimes, warmer waters, neutral water pH, and greater native species richness, insufficient inundation period may be a reason behind the decline of CCG population at Machine Gun Flats (Tannaourji 2009). This also implies that if future precipitation patterns create sufficient inundation periods at Machine Gun Flats, the species may reappear at this location as it is known to do (USFWS 2017). Recent activities related to MEC cleanup are unlikely to have caused the observed declines of CCG population as they were limited to mastication of vegetation within the watershed of Machine Gun Flats, but no mastication nor subsurface activities occurred within the vernal pool basin. Thus, the observed differences in duration or extent of inundation from previous years may have been due to changes in precipitation patterns.

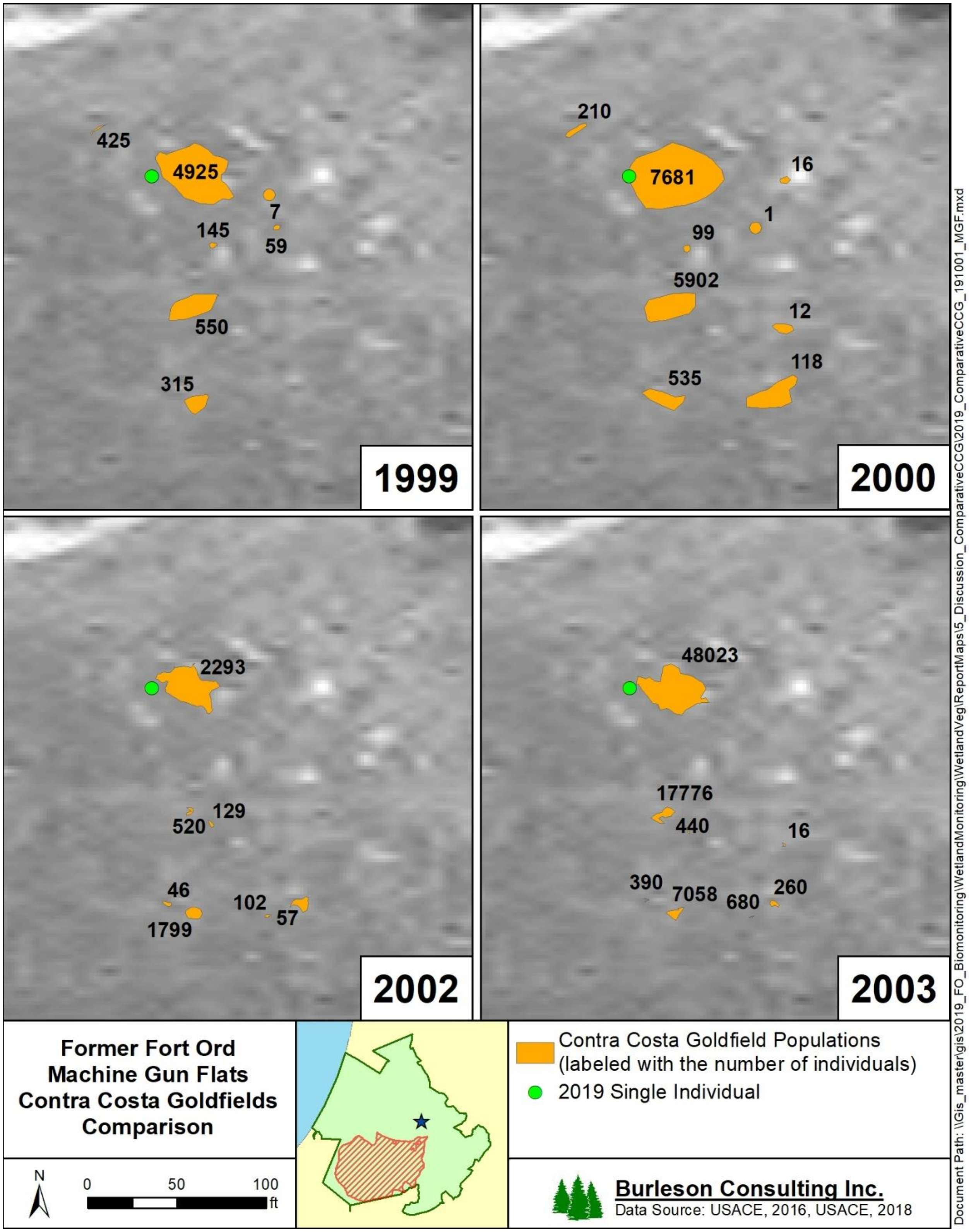


Figure 4-62. Contra Costa Goldfields Populations at Machine Gun Flats (Year 3 Post-Mastication) in 1999, 2000, 2002, 2003, and 2019

4.19.1.2 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations as well as differing methodologies. In 1997, 2000, 2001, 2002, and 2003 the transects were placed in "transitional and emergent habitats" and "sampling characterized wetland-influenced vegetation and associated transitional herbaceous species" which differs from the methods in 2019 and 2020 which focused on placing transects within the wetland in representative locations in each stratum (MACTEC, 2003). Vegetative cover at Machine Gun Flats was dominated by native and wetland plant species during year 3 post-mastication monitoring in 2020. Machine Gun Flats wetland vegetation results were generally within range of reference vernal pools but lower than baseline values in 1997. Native and wetland species richness in 2020 were greater than baseline and reference vernal pools. Native cover was lower and non-native cover was greater than baseline and reference vernal pools. Both, however, were within the range of previous monitoring years. Native cover was within 5.5% of reference vernal pool 101 East (East) in 2020.

Dramatic changes in the CCG population were observed at Machine Gun Flats. Areas that historically supported thousands of CCG individuals no longer support CCG. Only one individual was identified in the entire Machine Gun Flats vicinity in 2019 and there were no detections in 2020. It is unlikely that the decrease in observed CCG individuals was related to the mastication effort.

4.19.1.3 *Performance Standard: Plant Cover and Species Diversity*

Machine Gun Flats, a post-mastication vernal pool, did not meet the performance standard for year 3 in 2020. The species composition, richness, and native and wetland species relative abundances were similar to baseline, previous monitoring years, and/or reference vernal pool conditions; however, native and wetland species richness were greater. Machine Gun Flats provided suitable wetland habitat in 2020, but the CCG population is no longer comparable to baseline conditions.

4.19.2 Wildlife Monitoring

Wildlife data were collected at Machine Gun Flats in 1998, 2000, 2001, 2002, 2003, 2019, and 2020 (HLA, 1998, 2001; Harding ESE, 2002; MACTEC, 2003, 2004; Burleson, 2020). California tiger salamander larvae were present in 2003, 2019, and 2020. Fairy shrimp were present in all years. Table 4-250 shows historic wildlife monitoring results.

Table 4-250. Machine Gun Flats (Year 3 Post-Mastication) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1998*	Not detected	Low - Very High
2000	Not detected	Very High (1260, 1485)
2001	Not detected	Low - Very High (740, 3)
2002	Not detected	Very High (1000s, 1000s)
2003	Present	Very High (10,000s, 1,000s)
2019	Common (11, 61, 40)	Moderate – High (277, 13)
2020	Few (5, 3)	Low (1)

*baseline year

4.19.2.1 *Data Quality Objective 5*

California tiger salamanders were present in 2020, which was inconsistent with the baseline survey. California tiger salamanders were not detected in 1998. Results in 2020 also differed from the reference vernal pools; CTS were not detected at Pond 5 or 101 East (East).

Fairy shrimp were present in 2020, which was consistent with the baseline survey. Baseline monitoring in 1998 yielded detections. Results in 2020 were consistent with reference Pond 101 East (East). Fairy shrimp were present at Pond 101 East (East) but were not detected at Pond 5.

4.19.2.2 *Performance Standard: Wildlife Usage*

Machine Gun Flats, a post-mastication vernal pool, was in the final year of monitoring and met DQO 5. CTS and fairy shrimp were present in 2020 (Yr 2) and 2019 (Yr 1). In previous years of monitoring, CTS were present in 2003 but were not detected in 1998, 2000, 2001, or 2002. Fairy shrimp have been present in every year of monitoring. DQOs 1 and 4 were analyzed in the Hydrology Monitoring Annual Report (Chenega, 2021).

4.19.3 Conclusion

Machine Gun Flats, a post-mastication vernal pool, was in the final year (Yr 3) of monitoring in 2020. The vernal pool met DQO 5 for wildlife usage but did not meet the plant cover and species diversity performance standard, due to a dramatic decrease in the CCG population (see Table 4-251).

Table 4-251. Success at Machine Gun Flats (Year 3 Post-Mastication) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	Not met
Wildlife Usage	DQO 5	Met

4.20 Pond 16 –Year 2

Pond 16 was monitored in 2020 as a year 2 post-subsurface munitions remediation vernal pool. Pond 16 was monitored for baseline conditions in 1992, 1994, 1995, 1996, 2009, and 2015. Vegetation within Pond 16 and immediately around it was masticated in the summer of 2016 in preparation for a prescribed burn in Unit 31. Less than 50 percent of the Pond 16 watershed was masticated, and limited vegetation mastication occurred within the inundation area. Pond 16 had intrusive anomaly investigations in 2018. Table 4-252 summarizes the years that monitoring occurred and surveys conducted. The cumulative precipitation graph shows precipitation for years in which monitoring was conducted at Pond 16 (see Figure 4-63). The 1994-1995, 2016-2017, and 2018-2019 water-years were above normal. This year, 2019-2020, as well as 1991-1992 and 1995-1996 were similar to the cumulative normal water-year. Below-normal and drought water years occurred in 1993-1994 and 2014-2015.

Table 4-252. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife

Survey	Water-Year									
	1991-1992	1993-1994	1994-1995	1995-1996	2008-2009	2014-2015	2016-2017	2017-2018	2018-2019	2019-2020
Hydrology	●	●	●	●		●	●	●	●	●
Vegetation		●	●	●		●	●		●	●
Wildlife	●	●	●	●	●	●			●	●

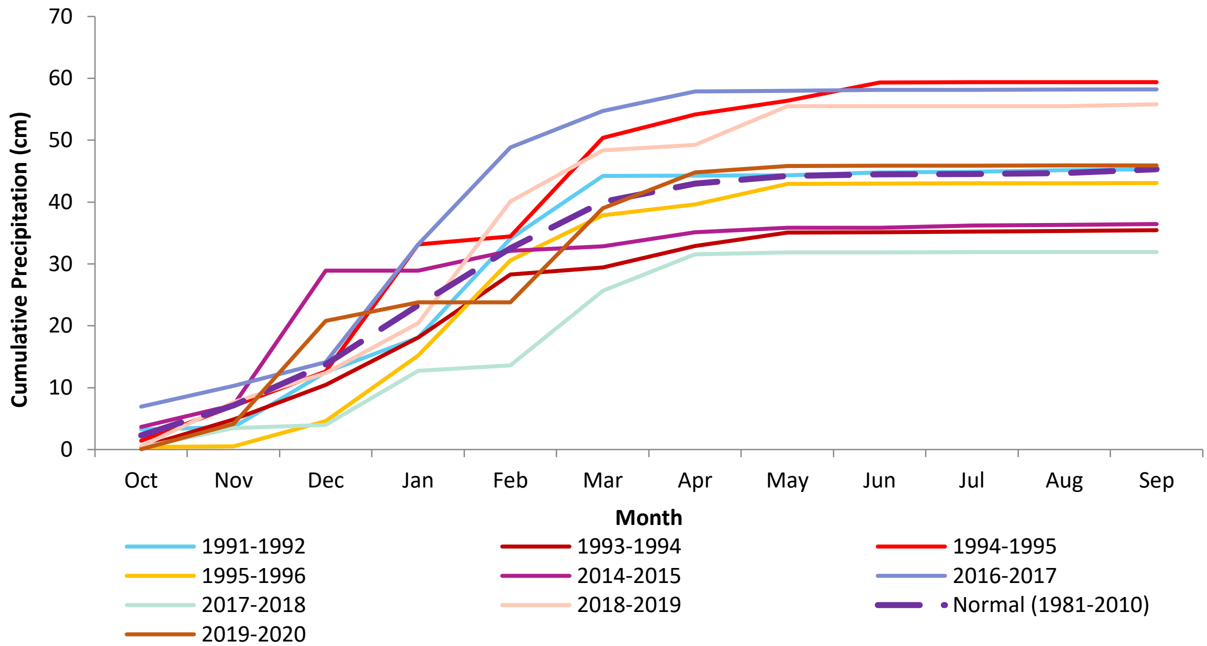


Figure 4-63. Cumulative Monthly Precipitation for Years that Hydrology Monitoring Occurred at Pond 16 (Year 2 Post-Subsurface Munitions Remediation) Compared to the 30-Year Normal (mean 1981-2010) (NPS, 2020; NCDC NOAA, 2018)

4.20.1 Vegetation Monitoring

Vegetation data were collected at Pond 16 in 2015, 2017, 2019, and 2020 (Burleson, 2016, 2018, 2020). Data from 1994, 1995, and 1996 only represent dominant species and are not included in the following analyses because the data were collected using a different methodology than was used in 2015 and 2017 (Jones and Stokes, 1996). In 2015, 2017, 2019, and 2020, data were collected using the methodology described in the Methods section of this report. Data from 2015 and 2020 were compared stratum-to-stratum in Table 4-253 as well as visually in Figure 4-64.

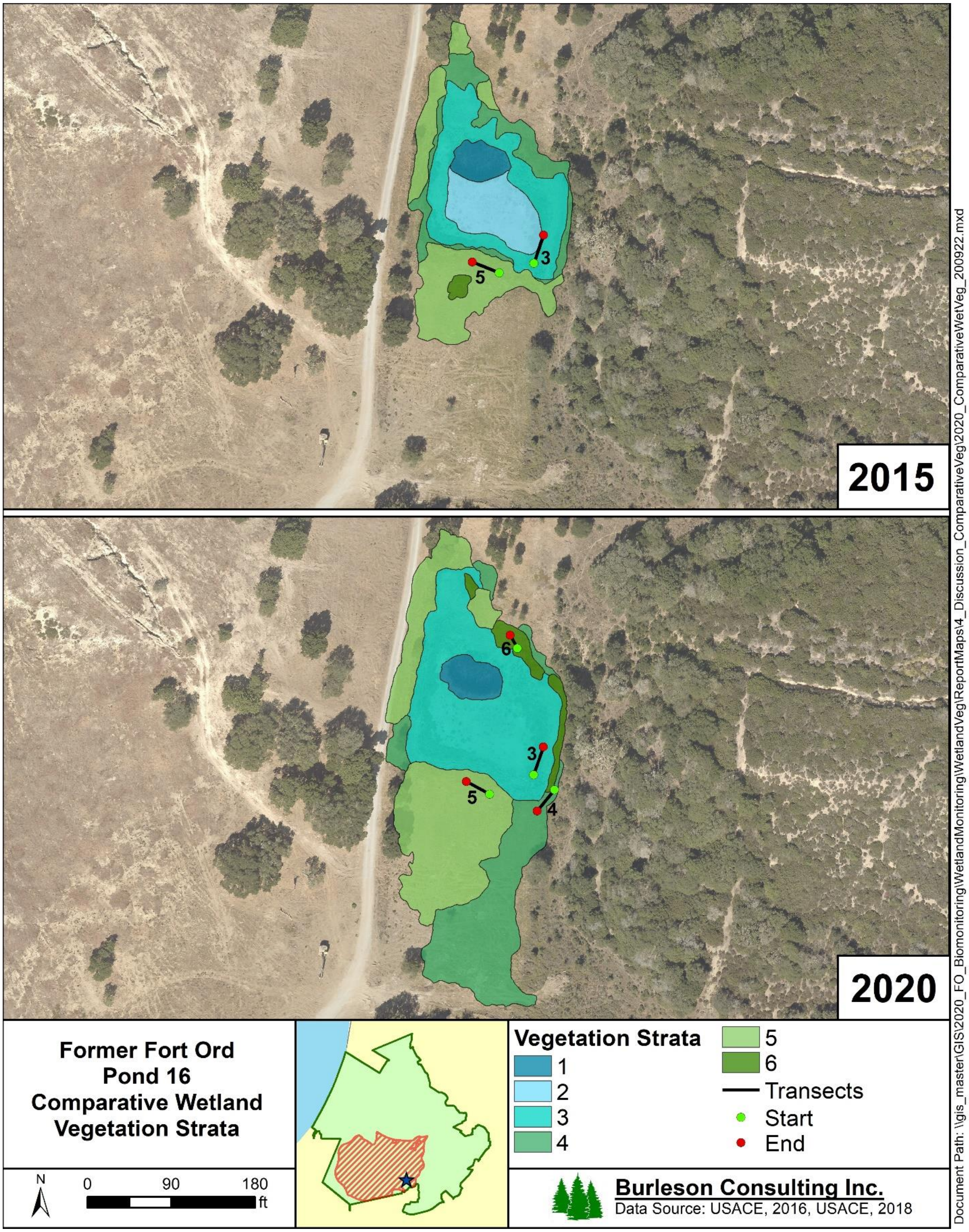


Figure 4-64. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) Vegetation Strata and Transects for 2015 and 2020

Table 4-253. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary

Stratum	Percentage	
	2015	2020
1	8%	4%
2	24%	N/A
3	44%	34%
4	24%	25%
5	N/A	33%
6	N/A	4%
7	N/A	N/A

Absolute percent vegetative cover increased between baseline and 2020 (see Table 4-254). The absolute percent vegetative cover was slightly greater than the values observed at the reference vernal pools while thatch/bare ground cover was less (see Table 4-255).

Table 4-254. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) Absolute Percent Cover

Year	Vegetative Cover	Thatch/Bare Ground
2015*	59.1%	38.8%
2017	77.8%	21.8%
2019	70.6%	29.5%
2020	72.1%	27.8%

*baseline year

Table 4-255. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2020

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	47.6%	52.4%
101 East (East)	63.4%	36.6%
997	70.2%	29.8%
16	72.1%	27.8%

Species richness in 2020 was greater than the baseline year of monitoring. Species richness on transects was 8, 24, 29, and 17 species in 2015, 2017, 2019, and 2020, respectively, whereas overall basin species richness was 49, 86, 83, and 81 species in 2015, 2017, 2019, and 2020 respectively (see Table 4-256 and Appendix A Table A-16). Pond 16 species richness was less than the values observed on transects at the reference vernal pools but was within the ranges observed for the entire basin (see Table 4-257 and Appendix E Tables E-21 and E-42).

Species composition and the dominant species at Pond 16 were similar between the monitoring years. The dominant species in 2015 was whiteroot (*Carex barbarae*) and the dominant species in 2017, 2019, and 2020 was pale spike rush (*Eleocharis macrostachya*). Whiteroot and clustered field sedge (*Carex praegracilis*) were also important species in 2017, 2019, and 2020. A complete comparison of species composition observed at Pond 16 in 2015, 2017, and 2019 can be found in Appendix F. Figure 4-45 shows a subset of this comparison for species observed with a 2% cover or greater.

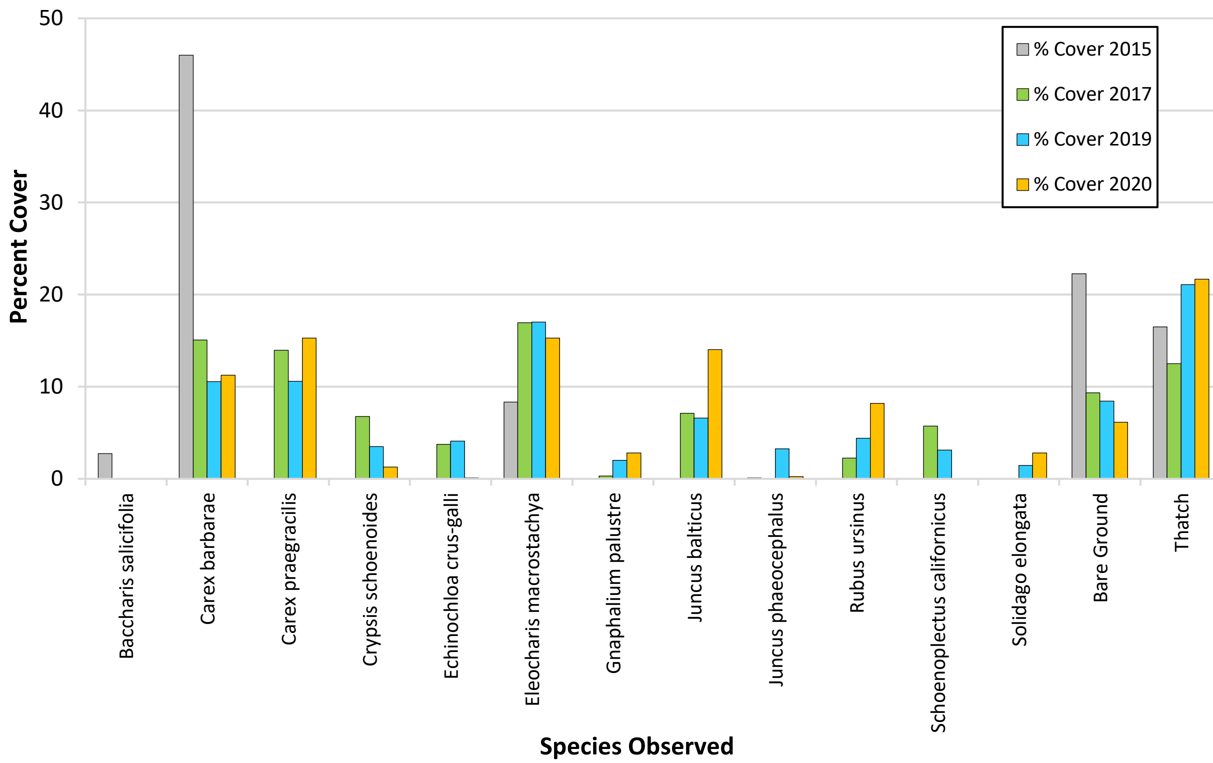


Figure 4-65. Percent Cover of Dominant Species at Pond 16 (Year 2 Post-Subsurface Munitions Remediation)

Native and non-native species richness on Pond 16 transects was greater in 2020 than the baseline year of monitoring (see Table 4-256). Pond 16 native and non-native species richness in 2020 was less than the range observed at the reference vernal pools (see Table 4-257). The relative percent cover of native and non-native species were within 2% of the baseline values (see Table 4-258). Pond 16 native relative percent cover was greater than in reference vernal pools and the non-native relative percent cover was less than reference (see Table 4-259).

Table 4-256. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness

Year	Native	Non-Native	Unidentified
2015*	5	2	1
2017	13	11	0
2019	16	10	3
2020	11	6	0

*baseline year

Table 4-257. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	12	11	0
101 East (East)	24	19	0
997	27	14	1
16	**11**	**6**	**0**

Table 4-258. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants

Year	Native	Non-Native	Unidentified
2015*	98.2%	1.1%	0.7%
2017	82.9%	17.1%	0.0%
2019	85.1%	14.5%	0.4%
2020	97.3%	2.7%	0.0%

*baseline year

Table 4-259. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2020

Vernal Pool	Native	Non-Native	Unidentified
5	91.3%	8.7%	0.0%
101 East (East)	72.2%	27.8%	0.0%
997	76.3%	23.6%	0.1%
16	**97.3%**	**2.7%**	**0.0%**

Wetland and non-wetland species richness on Pond 16 transects were greater in 2020 than in baseline (see Table 4-260). Wetland species richness was less than reference vernal pool values and non-wetland species richness was within the range of values (see Table 4-261). The relative percent cover of wetland species was lower than the baseline year whereas non-wetland species cover was greater (see Table 4-262). Relative percent cover of wetland and non-wetland species were within the range of values observed at the reference vernal pools (see Table 4-263).

Table 4-260. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC*	FACU*	UPL	
2015†	1	3	2	0	0	2
2017	4	5	4	8	1	2
2019	4	6	6	8	1	4
2020	2	5	6	3	1	0

*Values in this table changed from past reports, RUUR was incorrectly coded as FACU instead of FAC. The edits have been reflected in the 2020 report and deliverable.
†baseline year

Table 4-261. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	7	3	3	1	5
101 East (East)	5	8	7	6	3	14
997	9	10	5	5	0	13
16	**2**	**5**	**6**	**3**	**1**	**0**

Table 4-262. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC*	FACU*	UPL	
2015†	14.1%	5.2%	79.3%	0.0%	0.0%	1.4%
2017	37.9%	29.4%	27.4%	2.6%	0.4%	2.4%
2019	33.6%	34.1%	27.3%	3.5%	0.0%	1.4%
2020	**23.0%**	**45.0%**	**27.3%**	**4.7%**	**0.1%**	**0.0%**

*Values in this table changed from past reports, RUUR was incorrectly coded as FACU instead of FAC. The edits have been reflected in the 2020 report and deliverable.
†baseline year

Table 4-263. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2020

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	56.5%	38.1%	2.0%	1.2%	0.1%	2.0%
101 East (East)	24.2%	31.1%	6.5%	15.5%	3.3%	19.5%
997	6.7%	59.0%	16.1%	3.2%	0.0%	15.0%
16	**23.0%**	**45.0%**	**27.3%**	**4.7%**	**0.1%**	**0.0%**

4.20.1.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition. Vegetative cover in Pond 16 was dominated by native and wetland plant species during year 2 post-subsurface munitions remediation monitoring in 2020. Pond 16 wetland vegetation results were similar to baseline and/or reference year of monitoring; however, species richness was greater in 2020 than baseline. Relative percent cover of native species was greater than and non-native species cover was less than reference vernal pools values.

4.20.1.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 16, a post-subsurface munitions remediation vernal pool, is on track to meet the performance standard for year 2. The species composition, richness, and native and wetland species relative abundances were similar to baseline and/or reference vernal pool conditions. Pond 16 provided suitable wetland habitat in 2020.

4.20.2 Wildlife Monitoring

Wildlife data were collected at Pond 16 in 1992, 1994, 1995, 1996, 2009, 2015, 2019, and 2020 (USACE 1992, Jones & Stokes 1996; Shaw, 2010; Burleson, 2016, 2020). California tiger salamander larvae were observed in 2009, 2015, and 2019. Fairy shrimp were present at Pond 16 in every monitoring year except 2015. Table 4-264 shows historic wildlife monitoring results.

Table 4-264. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) Historic Wildlife Monitoring Results

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1992	Not detected	Present
1994	Not detected	Very Low - High
1995	Not detected	Low - High
1996	Not detected	Present
2009	Common	Moderate - High (32, 105)
2015†	Few – Common (13, 1)	Not detected
2019	Few – Common (5, 87, 46)	Present*
2020	Not detected	High (267)

*Fairy shrimp detected during CTS survey, no fairy shrimp survey was conducted in March due to the presence of CTS eggs.
†baseline year

4.20.2.1 *Data Quality Objective 5*

California tiger salamanders were not detected in 2020. California tiger salamanders were observed in 2009 and 2015 but were not detected in 1992, 1994, 1995, or 1996. Results in 2020 were consistent with reference vernal pools; CTS were not detected at Pond 5 or 101 East (East).

Fairy shrimp were present in 2020, which was consistent with all but one baseline survey. Baseline monitoring in 1992, 1994, 1995, 1996, and 2009 yielded presence of fairy shrimp, but not in 2015. Results in 2020 were consistent with reference Pond 101 East (East). Fairy shrimp were present at Pond 101 East (East) but were not detected at Pond 5.

4.20.2.2 *Performance Standard: Wildlife Usage*

Pond 16, a post-mastication and post-subsurface munitions remediation vernal pool, is on track to meet DQO 5. DQOs 1 and 4 were analyzed in the Hydrology Monitoring Annual Report (Chenega, 2021).

4.20.3 Conclusion

Pond 16, a post-mastication and post-subsurface munitions remediation vernal pool, was in years 4 and 2 of monitoring in 2020. The vernal pool is on track to meet the plant cover and species diversity performance standard and DQO 5 for wildlife usage (see Table 4-265). Pond 16 will continue to be monitored in the future.

Table 4-265. Success at Pond 16 (Year 2 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives

Performance Standard	Applicable DQO	Success
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 5	On track

This page intentionally left blank

5 CONCLUSION

A normal cumulative rainfall but unusual precipitation frequency in 2020 resulted in late and irregular ponding for several vernal pools, some of which dried out once or twice between larger rain events (Chenega, 2021). Conditions were generally similar for wetland vegetation and wildlife compared to baseline years and reference vernal pools. Fourteen remediated vernal pools were monitored for years 2 through 4. Three were not on track to meet the wetland vegetation performance standard and all were on track to meet the wildlife usage data quality objective (see Table 5-1). Ponds 40 North, 56, and Machine Gun Flats were in their final year of monitoring. Machine Gun Flats did not meet the performance standard for wetland vegetation primarily due to a lack of detection of CCG. Ponds 56 and 40 North met both the wetland vegetation and wildlife usage requirements and no further monitoring is recommended.

Wetland vegetation trends were variable across vernal pools; however, 13 vernal pools met the performance standard. All vernal pools supported a majority of wetland species and relative percent cover was dominated by wetland species. Native species richness was variable but decreased on average from 2019 to 2020. Non-native species richness increased by one species on average from 2019 to 2020. Variability is expected in vernal pools that have dynamic conditions in response to the amount of precipitation and the resulting hydroperiod (Bauder, 2000; Bauder, 2005; Mulhouse *et al*., 2005; Witham *et al*., 1998). From 2019 to 2020, total vegetative cover decreased while cover of thatch and bare ground increased at 14 out of 20 vernal pools monitored in these years. This was likely due to a lower cumulative water year in 2020 than 2019 as well as late rain events. The late rain events may have created less favorable conditions for native species as well. Native vernal pool species are highly adapted to the conditions in a normal water year. The growing season was much shorter in 2020 since inundation at many of the vernal pools was late and irregular (Chenega, 2021). Both the decrease in vegetative cover and decrease in native species cover is likely related to the water-year and not remediation activities.

The three vernal pools that did not meet the wetland vegetation performance standard were Ponds 101 East (West), 35, and 39. At Pond 101 East (West), the relative dominance as measured by cover of native species and wetland species were lower than in baseline years and at reference vernal pools. This is likely related to the water year. However, Ponds 35 and 39, both had an increase in non-native species richness compared to baseline and reference vernal pools. In addition, at Pond 35 there was an increase in non-native cover and at Pond 39 an increase in non-wetland species and a decrease in wetland richness. Pond 40 South has had high non-native richness and cover in baseline as well as follow up years of monitoring. Ponds 35, 39, and 40 South are in a valley in Unit B that was historically used for bivouac and engineer field training (Gilbane, 2015). There was likely earthwork that could have involved demolition and mine or booby-trap training. The Army historically used this area for rifle, grenade, and rocket training which likely involved placement of targets such as tanks. The level of disturbance in this area is much higher than other vernal pools that are monitored, which coupled with the unusual rainfall patterns, may explain why Ponds 35 and 39 do not meet the vegetative performance standards.

The 2019-2020 water-year did not provide favorable conditions for CTS usage but was suitable for fairy shrimp as measured by presence of wildlife. Pond 997 was the only vernal pool that did not fill to the required 10 cm to trigger the wildlife survey. All the remediated vernal pools had wildlife presence similar to baseline years of monitoring, despite the low numbers of CTS. California tiger salamanders were observed in two vernal pools: Machine Gun Flats and Pond 60. The greatest number in one survey event was seven individuals at Pond 60 in May. Fairy shrimp were observed at 15 out of 20 vernal pools monitored in 2020 even though early fairy shrimp surveys did not occur in 2020. The late-season detections are likely related to the precipitation pattern in the 2019-2020 water-year with very dry January and February months and unusually large late rain events.

Ponds 101 East (West), 41, 3 North, 3 South, 39, 40 South, 43, 35, 42, 44, 60, 61, 73, and 16 will continue to be monitored. Ponds 40 North and 56 have met performance standards and do not require additional monitoring for wetland vegetation or wildlife usage. Machine Gun Flats did not meet the wetland vegetation performance standard for CCG. This is likely related to fluctuations in multi-year precipitation patterns and insufficient inundation of the CCG occupied area and is unlikely related to remediation activity.

Table 5-1. 2020 Remediated Vernal Pools and Performance Standards Status

Vernal Pool	Monitoring Status	Wetland Vegetation	Wildlife
		DQO 3 (richness and cover)	DQO 5 (wildlife presence)
Pond 101 East (West)	Year 2 Post-Mastication	Not on track	On track
Pond 41	Year 2 Post-Subsurface Munitions Remediation	On track	On track
Pond 3 North	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	On track	On track
Pond 3 South	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	On track	On track
Pond 39	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	Not on track	On track
Pond 40 North	Year 3 Post-Burn	Met	Met
Pond 40 South	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	On track	On track
Pond 43	Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation	On track	On track
Pond 35	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	Not on track	On track
Pond 42	Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation	On track	On track
Pond 44	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	On track	On track
Pond 56	Year 3 Post-Mastication	Met	Met
Pond 60	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	On track	On track
Pond 61	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	On track	On track
Pond 73	Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation	On track	On track*
Machine Gun Flats	Year 3 Post-Mastication	Not met	Met
Pond 16	Year 2 Post-Subsurface Munitions Remediation	On track	On track

*Only evaluated against year 1 and 2, no baseline data.

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.

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., 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.

Burleson Consulting, Inc. 2019. 2018 Annual Wetland Vegetation and Wildlife Monitoring Report. Prepared for the Department of the Army, U.S. Army Corps of Engineers, Sacramento, CA.

Cal-IPC. 2020. *Plantago lanceolata* (English plantain) Profile. [Internet]. Accessed on November 3, 2020. Available at https://www.cal-ipc.org/plants/profile/plantago-lanceolata-profile/

Chenega. 2021. 2020 Annual Hydrology Monitoring Report. Prepared for the Department of the Army, U.S. Army Corps of Engineers, Sacramento, CA.

Esri. 2018. 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.

Gilbane. 2015. Remedial Investigation/Feasibility Study BLM Area B and MRS-16, 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.

KEMRON Environmental Services. 2020. BLM Area B Track 2 Ponds Geophysical Anomaly Investigation Technical Information Paper Former Fort Ord, California. Prepared for U. S. Department of the Army, 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, 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.

Mulhouse JM, D De Steven, RF Lide, RR Sharitz. 2005. "Effects of Dominant Species on Vegetation Change in Carolina Bay Wetlands following a Multi-Year Drought." The Journal of the Torrey Botanical Society, Vol. 132, No. 3. Torrey Botanical Society. pp. 411-420.

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 October 20, 2018. Available at: http://www.ncdc.noaa.gov/cdo-web/datatools/normals

Naval Postgraduate School Department of Meteorology (NPSDM). 2020. Monthly Precipitation Summaries for the Monterey Region. [Internet]. Accessed October 8, 2020. Available at: http://met.nps.edu/~ldm/renard_wx/

Tannaourji, Danielle Nicole. 2009. Ecological factors suitable for the endangered *Lasthenia conjugens* (Asteraceae). [Internet]. Accessed February 23, 2021. Available at: https://scholarworks.sjsu.edu/etd_theses/3723

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. 1992. Flora and Fauna Baseline Study of Fort Ord, California. Prepared for Army Corps of Engineers, 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.

APPENDIX A

Vegetation Transect Data

This page intentionally left blank

Table A-1. Pond 5 (Reference) Wetland Vegetation Transect Data by Stratum

POND 5			
Date	6/10/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 6/10/2020. Stratum 1 was repeated from 2016, 2018, and 2019. Strata 2, and 3 were repeated from 2016, 2017, 2018, and 2019. Stratum 6 was repeated from 2018 and 2019. Stratum 7 was repeated from 2019. Transect 1 was repeated from 2016, 2018, and 2019. Transect 2 was repeated from 2016. Transect 3 was relocated to a more representative location. Transect 6 was repeated from 2018 and 2019. Transect 7 was repeated from 2019.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
1	**10 m**	**35%**	ELMA	60	ELMA	50	AGAV	1	ELMA	50	ELMA	45	ELMA	50
			POMO	1	MALE	1	ELMA	48	POMO	1	MALE	1	MALE	1
			TH	39	POMO	1	POMO	1	TH	49	POMO	1	POMO	1
					TH	48	TH	50			BG	8	BG	2
											TH	45	TH	46
			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**	**32%**	DISP	1	DISP	2	DISP	3	DISP	3	DISP	2	DISP	3
			ELMA	36	ELMA	30	ELMA	40	ELMA	32	ELMA	36	ELMA	36
			POMO	6	POMO	3	POMO	4	POMO	4	MALE	1	POMO	3
			TH	57	TH	65	TH	53	TH	61	POMO	2	TH	58
											TH	59		
			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
			DISP	5	DISP	4	AGGR	1	DISP	3	BRMI	1	BRMI	1
			ELMA	6	ELMA	4	CRTR	10	ELMA	5	DISP	2	DISP	5
			GEDI	3	ERCA	1	DISP	4	GEDI	2	ELMA	2	ELMA	5
			PHLE	2	HYGL	1	ELMA	2	HYGL	2	PHLE	2	GEDI	1
			STAJ	32	HYRA	2	ERCA	1	JUPH	2	POMO	2	HYGL	1
			BG	2	PHLE	4	GEDI	3	LYHY	1	RUCR	2	JUPH	1
			TH	50	POMO	1	HYGL	1	PHLE	1	STAJ	50	PHLE	1
3	10 m	12%			STAJ	25	PHLE	3	PLCHh	1	BG	1	PLCHh	1
					BG	1	STAJ	9	POMO	2	TH	38	POMO	2
					TH	57	BG	2	PSLU	1			RUCR	1
							TH	64	SOOL	1			STAJ	45
									STAJ	45			BG	1
									BG	2			TH	35
									TH	32				
			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
			CRTR	1	CRTR	1	DISP	3	DISP	4	DISP	4	DISP	2
			DISP	1	DISP	3	ELMA	9	ELMA	4	ELMA	4	ELMA	3
			ELMA	18	ELMA	24	JUPH	5	JUPH	2	JUPH	2	JUPH	2
			JUPH	2	JUPH	4	PHLE	1	PHLE	1	PHLE	3	PHLE	7
6	10 m	14%	PHLE	2	PHLE	1	POMO	4	POMO	16	POMO	8	POMO	1
			POMO	2	POMO	3	RUCR	3	RUCR	4	TH	79	TH	85
			RUCR	3	RUCR	4	TH	75	TH	69				
			TH	71	TH	60								
			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
			ERCA	7	ERCA	2	AGAV	1	JUBA	53	JUBA	60	JUBA	80
			HYGL	6	JUBA	45	JUBA	65	POMO	1	PSST	3	BG	1
			JUBA	55	PSST	1	POMO	1	BG	1	SEGL	2	TH	19
			POMO	1	BG	1	PSST	1	TH	45	BG	1		
7	10 m	7%	PSST	5	TH	51	BG	1			TH	34		
			SEGL	3			TH	31						
			SOOL	1										
			BG	2										
			TH	20										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 5 2020 Species List

Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI
Acmispon americanus var. americanus	Spanish lotus	ACAMA
Agoseris grandiflora	large-flowered agoseris	AGGR
Agrostis avenacea	Pacific bent grass	AGAV
Aira caryophyllea	silvery hair-grass	AICA
Avena barbata	slender wild oat	AVBA
Baccharis glutinosa	marsh baccharis	BAGL
Baccharis pilularis	coyote brush	BAPI
Briza maxima	rattlesnake grass	BRMA
Briza minor	annual quaking grass	BRMI
Bromus diandrus	ripgut grass	BRDI
Bromus hordeaceus	soft chess	BRHO
Carduus pycnocephalus	Italian thistle	CAPY
Cirsium brevistylum	Indian thistle	CIBR
Clinopodium douglasii	yerba buena	CLDO
Cotula coronopifolia	brass buttons	COCO
Cressa truxillensis	spreading alkaliweed	CRTR
Cynosurus echinatus	bristly dogtail grass	CYEC
Cyperus eragrostis	tall cyperus	CYER
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 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
Eryngium armatum	coyote thistle	ERAR12
Euthamia occidentalis	western goldenrod	EUOC
Festuca myuros	rattail sixweeks grass	FEMY
Festuca perennis	Italian rye grass	FEPE
Galium aparine	goose grass	GAAP
Gamochaeta ustulata	purple cudweed	GAUS
Geranium dissectum	cut-leaved geranium	GEDI
Heliotropium curassavicum var. oculatum	Chinese pusley	HECUO
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
Isoetes howellii	Howell's quillwort	ISHO
Juncus balticus	Baltic rush	JUBA
Juncus phaeocephalus	brown-headed rush	JUPH
Lactuca serriola	prickly lettuce	LASE
Lysimachia arvensis	scarlet pimpernel	LYAR
Lythrum hyssopifolia	grass poly	LYHY
Madia gracilis	gumweed	MAGR
Madia sativa	coast tarweed	MASA
Malvella leprosa	alkali mallow	MALE
Phalaris lemmonii	Lemmon's canary grass	PHLE
Plagiobothrys chorisianus var. hickmanii	Hickman's popcornflower	PLCHH
Plantago coronopus	cut-leaved plantain	PLCO
Plantago lanceolata	English plantain	PLLA
Polypogon monspeliensis	rabbitfoot grass	POMO
Pseudognaphalium californicum	California everlasting	PSCA
Pseudognaphalium luteoalbum	weedy cudweed	PSLU
Pseudognaphalium ramosissimum	pink everlasting	PSRA
Pseudognaphalium stramineum	cottonbatting plant	PSST
Rumex acetosella	sheep sorrel	RUAC
Rumex crispus	curly dock	RUCR
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
Torilis arvensis	tall sock destroyer	TOAR
Toxicodendron diversilobum	poison oak	TODI
Verbena lasiostachys var. lasiostachys	western vervain	VELAL
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff/Algae	
AL	Algae	

Table A-2. Pond 101 East (East) (Reference) Wetland Vegetation Transect Data by Stratum

POND 101 East (East)			
Date	6/9/2020, 6/25/2020, 7/2/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 6/25/2020. Strata 1 and 2 were repeated from 2016, 2018, and 2019, whereas strata 5 and 6 were repeated from 2017, 2018, and 2019. Strata 4 was repeated from 2016. Stratum 8 was in a new location in 2020. Transects 1 and 6 were relocated because the previous locations were no longer within the correct strata. Transect 2 was repeated from 2016. Transects 4 and 5 were relocated to a more representative location and Transect 8 was new.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
1	5 m	0.4%	MALE	28	MALE	60	ELMA	7
			ELMA	10	ELMA	3	LYHY	1
			TH	62	RUCR	1	MALE	55
					BG	3	POMO	1
					TH	33	ROCU	1
							RUAC	1
							RUCR	1
							TRSC	2
							BG	18
							TH	13
			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	38%	AGAV	2	AGAV	1	ELMA	55	ELMA	69	AGAV	1	ELMA	60
			ELMA	40	ELMA	60	MALE	1	POMO	1	ELMA	50	MALE	2
			MALE	5	POMO	1	POMO	2	RUCR	6	MALE	1	POMO	1
			RUCR	5	RUCR	3	RUCR	7	BG	4	RUCR	8	RUCR	8
			BG	1	TH	35	BG	2	TH	20	BG	4	TH	29
			TH	47			TH	33	ELMA	69	TH	36		
			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	25%	ERCA	2	JUBA	56	GEDI	3	EPBR	1	ERCA	3	ERCA	6
			GEDI	6	RUAC	8	JUBA	45	GEDI	2	FEMY	1	GEDI	4
			JUBA	37	BG	1	RUAC	8	JUBA	65	GEDI	2	JUBA	36
			POMO	1	TH	35	RUSA	5	RUAC	12	JUBA	54	POMO	2
			RUAC	5			BG	1	VELAI	1	RUAC	4	RUSA	5
			RUSA	6			TH	38	BG	2	RUSA	7	BG	2
			VELAI	12					TH	17	VISAs	2	TH	45
			BG	1							BG	2		
			TH	30							TH	25		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
5	10 m	3%	ACAMa	18	ACAMa	20	ACAMa	10	ACAMa	6	ACAMa	2	ACAMa	15
			AGAV	1	AGAV	1	BRMI	4	BAPI	2	AVBA	1	AGAV	1
			BRMI	3	BRMI	2	ERBO	2	BRMI	5	BRMI	1	ERCA	3
			ERBO	2	ERCA	1	FEBR	4	ERBO	2	ERBO	2	FEBR	1
			FEMY	1	FEMY	1	HYGL	20	ERCA	1	ERCA	3	FEMY	1
			HECUo	3	HECUo	8	MAGR	7	FEBR	1	FEBR	1	HECUo	2
			HYGL	8	HYGL	8	PSLU	1	HYGL	12	FEMY	1	HYGL	16
			JUBA	1	JUBA	2	PSST	1	JUBA	2	HYGL	8	PSLU	1
			PSST	12	LYAR	1	RUAC	6	PSLU	1	MAGR	1	PSST	3
			RUAC	8	MAGR	2	STAJ	8	RUAC	6	PSLU	1	RUAC	12
			TRGR	2	POMO	1	TRMI	1	STAJ	15	PSST	4	SOOL	2
			TRMI	1	PSLU	2	VISAs	3	TRMI	1	RUAC	6	STAJ	4
			VISAn	2	PSST	5	BG	11	VISAn	2	SOOL	1	TRGR	1
			BG	25	RUAC	10	TH	22	BG	14	STAJ	3	VISAn	2
			TH	13	STAJ	8			TH	30	VISAn	3	VISAs	1
					TRMI	2					BG	45	BG	20
					VISAn	2					TH	17	TH	15
					VISAs	2								
					BG	10								
					TH	12								
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
6	5 m	1%	BRDI	1	CAPR	30	CAPR	50
			CAPR	45	FEMY	2	JUBA	1
			CIVU	1	GEDI	1	RUAC	3
			ERCA	1	RUAC	6	BG	23
			PSST	1	SOOL	1	TH	23
			RUAC	2	VISAn	1		
			SOOL	1	VISAs	1		
			BG	26	BG	28		
			TH	22	TH	30		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transcect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
8	**10 m**	**34%**	AGAV	48	AGAV	5	ACAMa	3	AGAV	14	AGAV	15	AGAV	1
			ERCA	1	EPBR	2	AGAV	10	AGGR	2	ERBO	1	BRMI	1
			GEDI	8	ERCA	2	EPBR	1	GEDI	3	GEDI	5	FEMY	1
			JUPH	6	GEDI	12	ERCA	2	HYGL	1	HYGL	1	HECUo	1
			MALE	3	JUPH	19	GEDI	5	JUPH	25	JUPH	35	JUPH	2
			RUCR	3	POMO	15	HYGL	1	POMO	1	MASA	3	MASA	20
			SOOL	1	RUCR	2	JUPH	8	RUCR	1	POMO	3	POMO	2
			STAJ	4	STAJ	8	PHLE	1	STAJ	18	RUCR	2	STAJ	16
			TRGR	1	TRGR	1	POMO	10	TRVA	3	VISAn	1	TRBA	1
			VISAn	2	TRVA	1	RUCR	3	VISAn	3	BG	5	TRGR	1
			VISAs	6	VISAn	5	STAJ	18	VISAs	2	TH	29	TRMI	2
			BG	5	VISAs	9	TRVA	6	BG	2			VISAn	2
			TH	12	BG	4	VISAs	6	TH	25			BG	5
					TH	15	BG	2					TH	45
							TH	25						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**101**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 101 East (East) 2020 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI	Layia platyglossa	tidy-tips	LAPL
Acmispon americanus var. americanus	Spanish lotus	ACAMA	Lonicera involucrata var. ledebourii	black twinberry	LOINL
Agoseris grandiflora	large-flowered agoseris	AGGR	Lysimachia arvensis	scarlet pimpernel	LYAR
Agrostis avenacea	Pacific bent grass	AGAV	Lysimachia minima	chaffweed	LYMI
Agrostis exarata	spike bent grass	AGEX	Lythrum hyssopifolia	grass poly	LYHY
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV	Madia gracilis	gumweed	MAGR
Agrostis pallens	seashore bent grass	AGPA	Madia sativa	coast tarweed	MASA
Aira caryophyllea	silvery hair-grass	AICA	Malvella leprosa	alkali mallow	MALE
Alopecurus saccatus	Pacific foxtail	ALSA	Microseris paludosa	marsh microseris	MIPA
Avena barbata	slender wild oat	AVBA	Phalaris lemmonii	Lemmon's canary grass	PHLE
Baccharis pilularis	coyote brush	BAPI	Plantago lanceolata	English plantain	PLLA
Briza maxima	rattlesnake grass	BRMA	Poa pratensis	Kentucky blue grass	POPR
Briza minor	annual quaking grass	BRMI	Polypogon monspeliensis	rabbitfoot grass	POMO
Bromus diandrus	ripgut grass	BRDI	Pseudognaphalium luteoalbum	weedy cudweed	PSLU
Bromus hordeaceus	soft chess	BRHO	Pseudognaphalium stramineum	cottonbatting plant	PSST
Carduus pycnocephalus	Italian thistle	CAPY	Ranunculus californicus	California buttercup	RACA
Carex praegracilis	clustered field sedge	CAPR	Ribes divaricatum var. pubiflorum	spreading gooseberry	RIDIP
Centaurea melitensis	Maltese star-thistle	CEME	Rorippa curvisiliqua	western yellowcress	ROCU
Cirsium brevistylum	Indian thistle	CIBR	Rubus ursinus	California blackberry	RUUR
Cirsium vulgare	bull thistle	CIVU	Rumex acetosella	sheep sorrel	RUAC
Clarkia purpurea ssp. quadrivulnera	winecup clarkia	CLPUQ	Rumex crispus	curly dock	RUCR
Conium maculatum	poison hemlock	COMA	Rumex salicifolius	willow dock	RUSA
Cynosurus echinatus	bristly dogtail grass	CYEC	Senecio glomeratus	cutleaf burnweed	SEGL
Cyperus eragrostis	tall cyperus	CYER	Silene gallica	small-flower catchfly	SIGA
Eleocharis macrostachya	pale spikerush	ELMA	Solanum americanum	small-flowered nightshade	SOAM
Elymus glaucus	blue wild-rye	ELGL	Sonchus asper	prickly sow thistle	SOAS
Epilobium brachycarpum	tall annual willowherb	EPBR	Sonchus oleraceus	common sow thistle	SOOL
Epilobium ciliatum	fringed willowherb	EPCI	Stachys ajugoides	bugle hedge nettle	STAJ
Erigeron canadensis	horseweed	ERCA	Stachys bullata	California hedge nettle	STBU
Erodium botrys	long-beaked filaree	ERBO	Torilis arvensis	tall sock destroyer	TOAR
Erodium cicutarium	redstem filaree	ERCI	Toxicodendron diversilobum	poison oak	TODI
Euthamia occidentalis	western goldenrod	EUOC	Trifolium angustifolium	narrow-leaved clover	TRAN
Festuca myuros	rattail sixweeks grass	FEMY	Trifolium barbigerum	bearded clover	TRBA
Festuca perennis	Italian rye grass	FEPE	Trifolium depauperatum	sack clover	TRDE
Galium aparine	goose grass	GAAP	Trifolium gracilentum	pin point clover	TRGR
Gamochaeta ustulata	purple cudweed	GAUS	Trifolium microcephalum	small head clover	TRMI
Geranium dissectum	cut-leaved geranium	GEDI	Trifolium variegatum	variegated clover	TRVA
Heliotropium curassavicum var. oculatum	Chinese pusley	HECUO	Triglochin scilloides	flowering quillwort	TRSC
Heterotheca grandiflora	telegraph weed	HEGR	Verbena lasiostachys var. lasiostachys	western vervain	VELAL
Hordeum brachyantherum	meadow barley	HOBR	Vicia sativa ssp. nigra	common vetch	VISAN
Hypochaeris glabra	smooth cat's-ear	HYGL	Vicia sativa ssp. sativa	spring vetch	VISAS
Hypochaeris radicata	rough cat's-ear	HYRA	**Groundcover Codes**		
Juncus balticus	Baltic rush	JUBA	BG	Bare Ground	
Juncus falcatus	falcate rush	JUFA	TH	Thatch/Duff	
Juncus phaeocephalus	brown-headed rush	JUPH	AL	Algae	

Table A-3. Pond 997 (Reference) Wetland Vegetation Transect Data by Stratum

POND 997			
Date	6/2/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 6/2/2020. Strata 1, 2, and 3 were repeated from 2017, 2018, and 2019, whereas stratum 5 was repeated from 2018 and 2019. Transects 1 and 3 were repeated from 2017, 2018, and 2019. Transect 5 was relocated because the previous location was no longer within the correct stratum. Stratum 2 consisted of CCG and no transects were placed in this stratum.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
			BRMI	1	ELMA	1	ELACa	2	CRAQ	1	ELACa	2	ERAR12	70
			ELACa	3	ERAR12	14	ELMA	3	ELACa	2	ELCA	1	LACO	1
			ELMA	3	HYGL	1	ERAR12	4	ELCA	1	ELMA	1	LYHY	2
			ERAR12	35	JUBUb	1	JUPH	2	ERAR12	27	ERAR12	25	LYMI	1
			HYGL	1	JUBUo	1	LYHY	4	JUBUb	1	ISHO	2	PLCHh	2
			JUBUb	2	LYHY	15	LYMI	1	LYMI	1	LACO	1	POMO	3
			LYHY	4	PLCHh	3	PLCHh	1	PLCHh	1	LYHY	3	BG	1
1	**10 m**	**6%**	PLCHh	1	POMO	15	PLCO	2	PLCO	2	LYMI	1	TH	20
			POMO	18	PSCH	25	POMO	10	POMO	3	PLCHh	1		
			PSCH	11	BG	15	PSCH	18	PSCH	2	PLCO	2		
			BG	16	TH	9	BG	31	BG	3	POMO	1		
			TH	5			TH	22	TH	56	PSCH	5		
											BG	20		
											TH	35		
			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	78%	BRMA	15	AICA	3	AICA	3	AICA	5	ACPA	4	ACPA	3
			BRMI	2	BRMA	8	BRMA	4	BRMA	4	AICA	1	AICA	2
			DACA	8	BRMI	6	BRMI	3	BRMI	4	BRMA	1	BRMA	3
			DECO	1	CAAMa3	15	CAAMa3	3	BRTEt	1	BRMI	2	BRMI	1
			ERAR12	2	DACA	15	DACA	50	CAAMa3	9	BRTEt	1	DACA	5
			FEBR	7	DECO	1	DECO	2	DACA	33	DACA	30	DECO	3
			GEDI	2	ERAR12	15	ERAR12	4	ERAR12	10	DECO	3	ERAR12	4
			HYGL	4	ERBO	2	FEBR	1	ERBO	1	FEMY	1	ERBO	2
			HYRA	1	FEBR	1	FEMY	1	FEMY	1	GEDI	2	FEMY	1
			LYHY	2	FEMY	1	HYGL	3	HYGL	3	HYGL	5	GEDI	2
			LYMI	3	GRASS1	1	ISCE	1	ISCE	2	JUPH	1	HYGL	4
			PLCO	18	HYGL	2	JUBUb	2	JUBUb	2	LYHY	1	JUBUb	1
			POMO	1	ISCA	1	LYAR	1	LYHY	1	MAGR	7	LYAR	2
			BG	16	ISCE	1	LYHY	1	LYMI	2	MASA	15	LYMI	1
			TH	18	JUBUb	2	LYMI	2	MAGR	3	RUAC	3	MAGR	4
					LYHY	4	MAGR	3	RUAC	4	TRIX	3	MASA	15
					LYMI	2	RUAC	2	TRIX	1	BG	2	MIPA	1
					MASA	4	ZEDA	1	BG	4	TH	18	RUAC	6
					PLCO	1	BG	7	TH	10			SIBE	2
					RUAC	1	TH	10					BG	30
					ZEDA	1							TH	8
					BG	9								
					TH	4								
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**104**	**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	12%	BRMA	3	BRMA	6	BRMA	5	BRMA	7	BRMA	6	BAPI	1
			BRMI	2	BRTEt	2	BRTEt	1	DACA	6	ERAR12	5	BRMA	8
			BRTEt	1	JUBUb	1	ERAR12	5	ERAR12	8	GEDI	1	BRMI	1
			JUPH	48	JUPH	70	JUPH	72	JUPH	45	JUPH	70	CAAMa3	1
			LYHY	6	BG	2	LYMI	1	LYMI	1	MASA	2	DACA	6
			BG	15	TH	19	BG	2	BG	3	BG	1	ERAR12	3
			TH	25			TH	14	TH	30	TH	15	JUBUb	1
													JUPH	30
													LYHY	4
													LYMI	2
													PLCHh	1
													BG	14
													TH	28
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 997 2020 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Acaena pinnatifida var. *californica*	California acaena	ACPIC	*Isolepis cernua*	low bulrush	ISCE
Achillea millefolium	common yarrow	ACMI	*Juncus bufonius* var. *bufonius*	common toad rush	JUBUB
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Juncus bufonius* var. *occidentalis*	round-fruited toad rush	JUBUO
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV	*Juncus phaeocephalus*	brown-headed rush	JUPH
Aira caryophyllea	silvery hair-grass	AICA	*Lasthenia conjugens*	Contra Costa goldfields	LACO
Avena barbata	slender wild oat	AVBA	*Logfia gallica*	narrowleaf cottonrose	LOGA
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 gracilis*	gumweed	MAGR
Bromus diandrus	ripgut grass	BRDI	*Madia sativa*	coast tarweed	MASA
Bromus hordeaceus	soft chess	BRHO	*Microseris paludosa*	marsh microseris	MIPA
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Chlorogalum pomeridianum	wavyleaf soap plant	CHPO	*Plantago coronopus*	cut-leaved plantain	PLCO
Cirsium quercetorum	brownie thistle	CIQU2	*Plantago lanceolata*	English plantain	PLLA
Clarkia purpurea ssp. *quadrivulnera*	winecup clarkia	CLPUQ	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Corethrogyne filaginifolia	common sandaster	COFI	*Pseudognaphalium californicum*	California everlasting	PSCA
Cotula coronopifolia	brass buttons	COCO	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Pseudognaphalium ramosissimum*	pink everlasting	PSRA
Danthonia californica	California oat grass	DACA	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Deinandra corymbosa	coastal tarweed	DECO	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Diplacus aurantiacus	sticky monkey flower	DIAU	*Quercus agrifolia*	coast live oak	QUAG
Elatine californica	California waterwort	ELCA	*Ranunculus californicus*	California buttercup	RACA
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Rumex acetosella*	sheep sorrel	RUAC
Eleocharis macrostachya	pale spikerush	ELMA	*Salvia mellifera*	black sage	SAME
Elymus glaucus	blue wild-rye	ELGL	*Senecio glomeratus*	cutleaf burnweed	SEGL
Elymus triticoides	beardless wild rye	ELTR3	*Sidalcea malviflora* ssp. *malviflora*	checkerbloom	SIMAM
Erigeron canadensis	horseweed	ERCA	*Silene gallica*	small-flower catchfly	SIGA
Erodium botrys	long-beaked filaree	ERBO	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Eryngium armatum	coyote thistle	ERAR12	*Sonchus asper*	prickly sow thistle	SOAS
Festuca bromoides	brome fescue	FEBR	*Sonchus oleraceus*	common sow thistle	SOOL
Festuca myuros	rattail sixweeks grass	FEMY	*Spiranthes romanzoffiana*	hooded lady's tresses	SPRO
Festuca perennis	Italian rye grass	FEPE	*Stachys ajugoides*	bugle hedge nettle	STAJ
Frangula californica	California coffeeberry	FRCA12	*Stipa pulchra*	purple needle grass	STPU
Galium aparine	goose grass	GAAP	*Taraxia ovata*	sun cups	TAOV
Galium porrigens	climbing bedstraw	GAPO	*Toxicodendron diversilobum*	poison oak	TODI
Gamochaeta ustulata	purple cudweed	GAUS	*Trifolium barbigerum*	bearded clover	TRBA
Geranium dissectum	cut-leaved geranium	GEDI	*Triteleia ixioides*	coast pretty face	TRIX
Horkelia cuneata var. *cuneata*	wedge-leaved horkelia	HOCUC	*Zeltnera davyi*	Davy's centuary	ZEDA
Hypochaeris glabra	smooth cat's-ear	HYGL	**Groundcover Codes**		
Hypochaeris radicata	rough cat's-ear	HYRA	BG	Bare Ground	
Isoetes howellii	Howell's quillwort	ISHO	TH	Thatch/Duff	
Isolepis carinata	keeled bulrush	ISCA	AL	Algae	

Table A-4. Pond 101 East (West) (Year 2 Post-Mastication) Wetland Vegetation Transect Data by Stratum

POND 101 East (West)			
Date	6/8/2020, 6/26/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 6/8/2020. Strata 1, 2, 4, and 5 were repeated from 2016, 2017, 2018, and 2019. Stratum 6 was repeated from 2017, 2018, and 2019. Stratum 8 was repeated from 2019. Transects 1 and 5 were relocated to a more representative vegetative composition. Transects 2, 4, and 6 were relocated because the previous locations were no longer within the correct strata. Transect 8 was repeated from 2019.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
1	10 m	3%	ELMA	15	ALSA	1	ALSA	2	ALSA	2	ALSA	1	ALSA	1
			HECUo	6	ELMA	20	ELMA	13	ELMA	12	ELMA	18	ELMA	24
			MALE	17	MALE	4	GNPA	1	GNPA	5	GNPA	2	MALE	15
			POMO	1	POMO	10	HECUo	1	HECUo	4	LYHY	1	POMO	2
			BG	5	TH	65	LYHY	1	MALE	10	MALE	12	ROCU	1
			TH	56			MALE	11	PEMA	1	POMO	2	VEBR	1
							POMO	1	POMO	2	VEBR	1	BG	2
							ROCU	2	ROCU	1	BG	2	TH	54
							VEBR	3	VEBR	3	TH	61		
							BG	5	BG	2				
							TH	60	TH	58				
			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	10%	ELMA	35	ELMA	40	ELMA	35	ELMA	40	ELMA	45	ELMA	60
			MALE	1	TH	60	LAGL3	1	MALE	1	MALE	1	MALE	1
			TH	64			MALE	1	PHLE	2	PHLE	3	PHLE	1
							BG	5	BG	1	BG	5	TH	38
							TH	58	TH	56	TH	46		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
4	5 m	4%	BRMI	1	BRMI	1	ACAMa	2
			ELMA	5	ELMA	6	BRMI	2
			FEPE	1	GEDI	8	ELMA	3
			GEDI	2	JUPH	6	GEDI	3
			JUPH	1	MAGR	25	HECUo	6
			MAGR	13	MASA	7	JUPH	5
			MASA	40	PSLU	1	LYAR	3
			RUAC	2	PSST	2	MAGR	10
			VISAs	1	RUAC	5	MASA	45
			BG	2	RUCR	1	PSST	2
			TH	32	VISAs	1	RUCR	1
					BG	2	BG	2
					TH	35	TH	16
			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	44%	FEPE	60	BRMI	1	BRMI	1	ELMA	20	ELMA	16	DISP	2
			FEBR	5	ELMA	1	ELMA	5	FEBR	5	BRDI	1	ELMA	5
			BG	5	FEBR	12	FEBR	5	FEPE	25	FEBR	20	ERAR12	2
			TH	30	FEPE	44	FEPE	31	MALE	3	FEPE	35	FEBR	5
					GEDI	3	GEDI	2	BG	2	GEDI	1	FEPE	55
					HYGL	2	MALE	25	TH	45	MALE	4	MALE	5
					MALE	8	BG	6			BG	3	RUCR	4
					BG	5	TH	25			TH	20	BG	2
					TH	24							TH	20
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
6	5 m	12%	ACAMa	1	ACAMa	1	AGAV	1
			AGAV	6	AGAV	4	BRMI	1
			GEDI	3	BAPI	1	JUBA	5
			HYGL	1	BRMI	1	JUPH	30
			JUBA	2	FEMY	1	POMO	2
			JUPH	39	FEPE	1	BG	4
			MASA	7	GEDI	4	TH	57
			POMO	1	JUBA	2		
			RUAC	4	JUPH	16		
			RUCR	1	PSST	2		
			VISAn	3	RUCR	2		
			BG	4	SEGL	1		
			TH	28	SOAS	1		
					SOOL	5		
					BG	4		
					TH	54		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
8	5 m	4%	BRMI	1	EUOC	28	EUOC	20
			ELACa	2	FEPE	1	FEPE	1
			EUOC	30	GEDI	2	GEDI	2
			FEPE	1	JUPH	1	JUPH	4
			GEDI	2	POMO	6	MALE	1
			JUPH	2	RUAC	1	POMO	12
			MALE	1	BG	12	RUAC	1
			PLCHh	1	TH	49	BG	5
			POMO	10			TH	54
			PSST	2				
			RUAC	1				
			SOOL	1				
			BG	8				
			TH	38				
			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
9	10 m	25%	AGAV	40	AGAV	28	AGAV	15	AGAV	55	AGAV	7	AGAV	30
			BRMI	1	BRMI	2	BRMI	2	BRMI	1	ELMA	30	ELMA	5
			FEPE	3	FEBR	1	FEBR	1	ELMA	3	HECUo	10	HECUo	24
			GEDI	6	GEDI	3	FEPE	2	GEDI	2	RUCR	20	POMO	3
			HECUo	1	HECUo	3	GEDI	15	HECUo	7	BG	2	RUCR	12
			JUBA	1	HYGL	1	POMO	18	POMO	5	TH	31	BG	1
			POMO	8	JUBA	1	RUCR	6	RUCR	7			TH	25
			RUCR	2	POMO	8	SOOL	4	VISAs	1				
			BG	3	RUCR	3	VISAs	2	BG	2				
			TH	35	BG	2	BG	3	TH	17				
					TH	48	TH	32						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 101 East (West) 2020 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Lythrum hyssopifolia*	grass poly	LYHY
Agrostis avenacea	Pacific bent grass	AGAV	*Madia gracilis*	gumweed	MAGR
Aira caryophyllea	silvery hair-grass	AICA	*Madia sativa*	coast tarweed	MASA
Alopecurus saccatus	Pacific foxtail	ALSA	*Malvella leprosa*	alkali mallow	MALE
Avena barbata	slender wild oat	AVBA	*Microseris paludosa*	marsh microseris	MIPA
Baccharis pilularis	coyote brush	BAPI	*Oxalis micrantha*	dwarf woodsorrel	OXMI
Briza maxima	rattlesnake grass	BRMA	*Persicaria maculosa*	lady's thumb	PEMA
Briza minor	annual quaking grass	BRMI	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
Bromus carinatus	California brome	BRCA	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Bromus diandrus	ripgut grass	BRDI	*Plantago coronopus*	cut-leaved plantain	PLCO
Bromus hordeaceus	soft chess	BRHO	*Plantago lanceolata*	English plantain	PLLA
Carex praegracilis	clustered field sedge	CAPR	*Polygonum aviculare* ssp. *depressum*	prostrate knotweed	POAVD
Cotula coronopifolia	brass buttons	COCO	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Cyperus eragrostis	tall cyperus	CYER	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Danthonia californica	California oat grass	DACA	*Pseudognaphalium ramosissimum*	pink everlasting	PSRA
Deschampsia danthonioides	annual hair grass	DEDA	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Distichlis spicata	salt grass	DISP	*Rorippa curvisiliqua*	western yellowcress	ROCU
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Rumex acetosella*	sheep sorrel	RUAC
Eleocharis macrostachya	pale spikerush	ELMA	*Rumex crispus*	curly dock	RUCR
Erigeron canadensis	horseweed	ERCA	*Rumex salicifolius*	willow dock	RUSA
Erodium botrys	long-beaked filaree	ERBO	*Senecio glomeratus*	cutleaf burnweed	SEGL
Eryngium armatum	coyote thistle	ERAR12	*Sonchus asper*	prickly sow thistle	SOAS
Euthamia occidentalis	western goldenrod	EUOC	*Sonchus oleraceus*	common sow thistle	SOOL
Festuca myuros	rattail sixweeks grass	FEMY	*Stachys ajugoides*	bugle hedge nettle	STAJ
Festuca perennis	Italian rye grass	FEPE	*Toxicodendron diversilobum*	poison oak	TODI
Gamochaeta ustulata	purple cudweed	GAUS	*Trifolium angustifolium*	narrow-leaved clover	TRAN
Geranium dissectum	cut-leaved geranium	GEDI	*Trifolium barbigerum*	bearded clover	TRBA
Gnaphalium palustre	lowland cudweed	GNPA	*Trifolium dubium*	little hop clover	TRDU
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO	*Trifolium microcephalum*	small head clover	TRMI
Hordeum brachyantherum ssp. *brachyantherum*	meadow barley	HOBRB	*Trifolium willdenovii*	tomcat clover	TRWI
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	HOMAG	*Verbena bracteata*	bracted verbena	VEBR
Hypochaeris glabra	smooth cat's-ear	HYGL	*Verbena lasiostachys* var. *lasiostachys*	western vervain	VELAL
Hypochaeris radicata	rough cat's-ear	HYRA	*Vicia sativa* ssp. *nigra*	common vetch	VISAN
Isoetes howellii	Howell's quillwort	ISHO	*Vicia sativa* ssp. *sativa*	spring vetch	VISAS
Juncus balticus	Baltic rush	JUBA	*Vicia villosa* ssp. *villosa*	hairy vetch	VIVIV
Juncus effusus	common rush	JUEF	**Groundcover Codes**		
Juncus phaeocephalus	brown-headed rush	JUPH	BG	Bare Ground	
Lasthenia glaberrima	smooth goldfields	LAGL3	TH	Thatch/Duff	
Lupinus nanus	sky lupine	LUNA	AL	Algae	
Lysimachia arvensis	scarlet pimpernel	LYAR			

Table A-5. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 41			
Date	6/1/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 6/1/2020. Strata 1, 2, and 3 were repeated from 2016 and 2019. Stratum 4 was repeated from 2019. Transects 1 and 2 were repeated from 2016 and 2019, whereas Transect 4 was repeated from 2019. Transect 3 was relocated because the previous location was no longer within the stratum. 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	14%	ELACa	3	ELACa	2	ELACa	12	DEDA	2	DEDA	1	DEDA	4
			ELMA	14	ELMA	62	ELMA	48	ELACa	1	ELACa	3	ELACa	1
			LAGL3	1	PHLE	6	LAGL3	3	ELMA	59	ELMA	54	ELMA	30
			MALE	1	POMO	18	PHLE	7	POMO	1	LAGL3	3	LAGL3	3
			PHLE	6	BG	1	POMO	10	BG	2	PLCHh	1	PHLE	3
			POMO	3	TH	11	BG	2	TH	35	POMO	15	POMO	9
			BG	2			TH	18			STAJ	12	BG	2
			TH	70							BG	1	TH	48
											TH	10		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	10 m	59%	ELACa	11	DEDA	6	DEDA	9	DEDA	2	ELACa	4	ELACa	12
			GEDI	7	ELACa	14	ELACa	12	ELACa	1	ELMA	8	ELMA	5
			JUPH	10	GEDI	18	ELMA	4	ELMA	8	GEDI	22	GEDI	9
			PHLE	4	JUPH	8	GEDI	20	GEDI	18	LAGL3	1	LAGL3	2
			PLCHh	2	LAGL3	2	MALE	7	MALE	3	PHLE	1	MALE	2
			POMO	40	MALE	2	PHLE	1	PHLE	2	PLCHh	1	PHLE	2
			RUCR	5	PHLE	4	PLCHh	1	PLCHh	1	POMO	34	PLCHh	2
			STAJ	2	PLCHh	1	POMO	25	POMO	30	RUCR	3	POMO	44
			TH	19	POMO	9	STAJ	7	STAJ	12	STAJ	2	STAJ	4
					STAJ	3	TH	14	TH	23	TH	24	TH	18
					TH	33								
			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	21%	BRHO	1	BRHO	1	ELACa	10	BRMI	1	DEDA	1	GEDI	2
			BRMI	1	BRMI	3	JUPH	75	ELACa	2	ELACa	1	JUPH	70
			ERBO	2	ERCA	1	POMO	3	JUBA	3	ERCA	1	MALE	1
			FEBR	1	FEBR	2	TH	10	JUPH	55	GEDI	2	RUCR	2
			GAUS	3	GEDI	6	BG	2	POMO	3	JUPH	55	TH	23
			GEDI	2	JUPH	55			RUCR	2	MALE	1	BG	2
			HYGL	2	MASA	4			TH	30	POMO	3		
			JUBA	1	POMO	5			BG	4	RUCR	1		
			JUPH	35	SOOL	5					SOOL	3		
			LYAR	4	TH	18					TH	30		
			MAGR	4	BG	1					BG	2		
			MASA	12										
			POMO	3										
			RUAC	2										
			SOOL	3										
			TH	20										
			BG	4										
			TOTAL	**100**	**TOTAL**	**101**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transec t #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
4	10 m	6%	AICA	2	AICA	1	BRMI	2	AICA	1	AICA	1	AICA	2
			BRHO	1	BRHO	1	DACA	32	BRMI	1	BAPI	9	BRMI	2
			BRMI	1	BRMI	1	FEMY	1	BRTEt	1	BRMI	3	BRTEt	1
			DACA	40	BRTEt	1	GEDI	3	CAAMa3	1	BRTEt	1	DACA	15
			ERAR12	3	DACA	28	HYGL	3	DACA	22	CAAMa3	4	FEMY	1
			FEBR	1	FEMY	1	LYMI	1	FEBR	1	DACA	11	GEDI	3
			GAUS	1	GAUS	1	MAGR	4	GEDI	2	ERAR12	4	HYGL	5
			GEDI	3	GEDI	2	MASA	1	HYGL	2	FEMY	3	LUCO6	2
			MAGR	8	HYGL	2	STAJ	4	JUPH	1	GAUS	1	LYAR	1
			TH	32	LYAR	1	BG	9	MAGR	28	GEDI	4	MAGR	12
			BG	8	MAGR	10	TH	40	POMO	1	HYGL	6	BG	35
					PLCO	5			BG	6	MAGR	12	TH	21
					BG	15			TH	33	POMO	2		
					TH	31					BG	9		
											TH	30		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 41 2020 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI	*Juncus occidentalis*	western rush	JUOC
Agrostis exarata	spike bent grass	AGEX	*Juncus phaeocephalus*	brown-headed rush	JUPH
Aira caryophyllea	silvery hair-grass	AICA	*Lasthenia glaberrima*	smooth goldfields	LAGL3
Alopecurus saccatus	Pacific foxtail	ALSA	*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 gracilis*	gumweed	MAGR
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Madia sativa*	coast tarweed	MASA
Bromus hordeaceus	soft chess	BRHO	*Malvella leprosa*	alkali mallow	MALE
Carduus pycnocephalus	Italian thistle	CAPY	*Microseris paludosa*	marsh microseris	MIPA
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3	*Oxalis corniculata*	creeping woodsorrel	OXCO
Danthonia californica	California oat grass	DACA	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
Deschampsia danthonioides	annual hair grass	DEDA	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Drymocallis glandulosa var. *wrangelliana*	sticky cinquefoil	DRGLW	*Plantago coronopus*	cut-leaved plantain	PLCO
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Eleocharis macrostachya	pale spikerush	ELMA	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Elymus glaucus	blue wild-rye	ELGL	*Pseudognaphalium ramosissimum*	pink everlasting	PSRA
Elymus triticoides	beardless wild rye	ELTR3	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Erigeron canadensis	horseweed	ERCA	*Rumex acetosella*	sheep sorrel	RUAC
Erodium botrys	long-beaked filaree	ERBO	*Rumex crispus*	curly dock	RUCR
Eryngium armatum	coyote thistle	ERAR12	*Rumex salicifolius*	willow dock	RUSA
Festuca bromoides	brome fescue	FEBR	*Senecio glomeratus*	cutleaf burnweed	SEGL
Festuca myuros	rattail sixweeks grass	FEMY	*Sonchus oleraceus*	common sow thistle	SOOL
Gamochaeta ustulata	purple cudweed	GAUS	*Stachys ajugoides*	bugle hedge nettle	STAJ
Geranium dissectum	cut-leaved geranium	GEDI	*Trifolium microcephalum*	small head clover	TRMI
Gnaphalium palustre	lowland cudweed	GNPA	*Verbena lasiostachys* var. *lasiostachys*	western vervain	VELAL
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO	*Zeltnera davyi*	Davy's centuary	ZEDA
Hordeum brachyantherum	meadow barley	HOBR	**Groundcover Codes**		
Hypochaeris glabra	smooth cat's-ear	HYGL	BG	Bare Ground	
Hypochaeris radicata	rough cat's-ear	HYRA	TH	Thatch/Duff	
Juncus balticus	Baltic rush	JUBA	AL	Algae	

Table A-6. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 3 North			
Date	6/5/2020, 6/18/2020, 6/25/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 6/25/2020. Stratum 1 was repeated from 2015 and 2018. Strata 2, 3, and 4 were repeated from 2015, 2018, and 2019. Transect 1 was repeated from 2015 and 2018. Transect 2 was relocated because the previous location was no longer within the stratum. Transect 3 was repeated from 2018. Stratum 4 consisted of CCG and no transects were placed in this stratum.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
1	10 m	11%	ELMA	70	ELMA	50	ELMA	30	ELMA	70	ELACa	1	ELACa	4
			BG	7	BG	5	ELACa	1	ELACa	1	ELMA	65	ELMA	85
			TH	23	TH	45	BG	40	BG	20	POMO	1	LAGL3	1
							TH	29	TH	9	BG	12	POMO	2
											TH	21	BG	6
													TH	2
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	10 m	14%	ELMA	18	ELMA	20	ELMA	15	ELMA	12	COCO	1	DEDA	1
			ERAR12	6	ERAR12	18	HOMAg	10	HOMAg	6	ELMA	10	ELACa	3
			FEPE	1	POMO	10	JUBUb	1	LACO	1	ERAR12	6	ELMA	5
			HOMAg	2	PLCO	6	LACO	1	LYHY	5	HOMAg	5	ERAR12	13
			LYHY	3	PSCH	4	LYHY	8	LYMI	1	LYHY	4	HOMAg	10
			LYMI	1	HOMAg	3	LYMI	1	PLCHh	2	LYMI	1	JUBUb	1
			PLCHh	2	PLCHh	2	POMO	4	POMO	8	PLCHh	1	LYHY	2
			PLCO	7	LYHY	2	POZI	3	POZI	1	PLCO	3	PLCHh	1
			POMO	16	POZI	1	PSCH	2	PSCH	2	POMO	4	PLCO	3
			PSCH	1	JUBUb	1	ZEDA	1	ZEDA	1	PSCH	2	POMO	8
			BG	16	ZEDA	1	BG	25	BG	36	ZEDA	1	PSCH	1
			TH	27	LYMI	1	TH	29	TH	25	BG	30	ZEDA	1
					BG	2					TH	32	BG	27
					TH	29							TH	24
			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**	**37%**	AICA	1	AICA	1	ACPA	2	ACPA	2	AICA	1	BRMI	1
			BAPI	5	BRHO	3	AICA	1	AICA	1	BRHO	1	DACA	20
			BRHO	1	BRMI	1	BRHO	3	BRHO	1	BRMI	1	ERAR12	7
			BRMI	1	CAAM	5	BRMI	1	CAAM	2	CAAM	3	FEMY	1
			CAAM	4	DACA	40	DACA	12	CAUN	1	DACA	5	FEPE	26
			CAUN	1	DECO	1	ERAR12	3	DACA	15	ERAR12	6	HYGL	1
			DACA	2	ERCA	1	FEPE	31	ERAR12	5	ERCA	1	JUBUb	1
			ERAR12	30	FEMY	1	LOGA	1	FEMY	1	FEPE	15	JUPH	1
			FEMY	1	LYAR	2	LYAR	2	FEPE	25	LYAR	3	LYHY	6
			JUPH	2	MIPA	3	MAGR	1	LYAR	3	LYHY	2	MIPA	1
			LYAR	5	PLCO	3	MIPA	3	MIPA	2	MA sp.	2	PLCO	2
			LYMI	1	TRAN	1	TRAN	3	PLCO	2	MIPA	3	POMO	1
			MIPA	1	TRDU	1	BG	6	TRDU	2	PLCO	6	SOOL	1
			ZEDA	1	ZEDA	1	TH	31	BG	12	PLER	1	BG	6
			BG	32	BG	12			TH	26	BG	45	TH	25
			TH	12	TH	24					TH	5		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 3 North 2020 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
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV
Aira caryophyllea	silvery hair-grass	AICA
Allium hickmanii	Hickman's onion	ALHI
Avena barbata	slender wild oat	AVBA
Baccharis pilularis	coyote brush	BAPI
Briza minor	annual quaking grass	BRMI
Brodiaea terrestris ssp. terrestris	dwarf brodiaea	BRTET
Bromus diandrus	ripgut grass	BRDI
Bromus hordeaceus	soft chess	BRHO
Callitriche heterophylla var. bolanderi	Bolander's water starwort	CAHEB
Calochortus uniflorus	pink star-tulip	CAUN
Castilleja ambigua ssp. ambigua	Johnny-Nip	CAAMA3
Cotula coronopifolia	brass buttons	COCO
Crassula aquatica	aquatic pygmy-weed	CRAQ
Danthonia californica	California oat grass	DACA
Deinandra corymbosa	coastal tarweed	DECO
Deschampsia danthonioides	annual hair grass	DEDA
Eleocharis acicularis var. acicularis	needle spikerush	ELACa
Eleocharis macrostachya	pale spikerush	ELMA
Erigeron canadensis	horseweed	ERCA
Erodium botrys	long-beaked filaree	ERBO
Eryngium armatum	coyote thistle	ERAR12
Festuca bromoides	brome fescue	FEBR
Festuca myuros	rattail sixweeks grass	FEMY
Festuca perennis	Italian rye grass	FEPE
Gamochaeta ustulata	purple cudweed	GAUS
Geranium dissectum	cut-leaved geranium	GEDI
Hordeum brachyantherum	meadow barley	HOBR
Hordeum marinum ssp. gussoneanum	Mediterranean barley	HOMAG
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
Isolepis cernua	low bulrush	ISCE
Hordeum brachyantherum	meadow barley	HOBR
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
Leptosiphon parviflorus	variable linanthus	LEPA
Logfia gallica	narrowleaf cottonrose	LOGA
Luzula comosa	Pacific woodrush	LUCO6
Lysimachia arvensis	scarlet pimpernel	LYAR
Lysimachia minima	chaffweed	LYMI
Lythrum hyssopifolia	grass poly	LYHY
Madia exigua	small tarweed	MAEX
Madia gracilis	gumweed	MAGR
Madia sativa	coast tarweed	MASA
Microseris paludosa	marsh microseris	MIPA
Plagiobothrys chorisianus var. hickmanii	Hickman's popcornflower	PLCHH
Plantago coronopus	cut-leaved plantain	PLCO
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
Senecio glomeratus	cutleaf burnweed	SEGL
Sidalcea malviflora ssp. malviflora	checkerbloom	SIMAM
Sonchus oleraceus	common sow thistle	SOOL
Stipa pulchra	purple needle grass	STPU
Taraxia ovata	sun cups	TAOV
Toxicodendron diversilobum	poison oak	TODI
Trifolium angustifolium	narrow-leaved clover	TRAN
Trifolium campestre	hop clover	TRCA5
Trifolium dubium	little hop clover	TRDU
Trifolium microcephalum	small head clover	TRMI
Trifolium variegatum	variegated clover	TRVA
Triglochin scilloides	flowering quillwort	TRSC
Triteleia hyacinthina	white brodiaea	TRHY3
Vicia sativa ssp. nigra	common vetch	VISAN
Vicia sativa ssp. sativa	spring vetch	VISAS
Zeltnera davyi	Davy's centuary	ZEDA

Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

Table A-7. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 3 South			
Date	5/26/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 5/26/2020. Strata 1 through 4 were repeated from 2016, 2018, and 2019. Transect 1 was repeated from 2016, 2018, and 2019, whereas Transects 2 through 4 were repeated from 2019. Stratum 5 consisted of CCG and no transects were placed in this stratum. 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		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
1	10 m	17%	CRAQ	1	COCO	1	DEDA	1	COCO	1	COCO	2	ELACa	4
			ELACa	10	CRAQ	1	ELACa	6	DEDA	1	ELMA	40	ELMA	55
			ELMA	15	ELACa	3	ELMA	55	ELACa	2	JUPH	1	JUPH	1
			ERAR12	12	ELMA	25	ERAR12	6	ELMA	60	LAGL3	1	LAGL3	2
			LYHY	1	ERAR12	20	JUPH	2	ERAR12	6	LYHY	1	MALE	1
			PLCHh	3	LYHY	1	LAGL3	2	JUPH	2	MALE	1	PLCHh	1
			POMO	1	PLCHh	3	LYHY	1	LAGL3	2	PLCHh	1	BG	6
			BG	2	PLCO	15	MALE	1	MALE	2	POMO	2	TH	30
			TH	55	POMO	1	PLCHh	3	PLCHh	2	BG	16		
					BG	20	POMO	3	POMO	3	TH	35		
					TH	10	BG	5	BG	10				
							TH	15	TH	11				
			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	22%	BRMI	2	BRMI	1	BRTEt	1	BRMI	1	BRMI	1	AICA	1
			BRTEt	1	BRTEt	6	FEBR	1	BRTEt	1	BRTEt	2	BRMI	1
			CAAMa3	2	ELACa	2	FEPE	2	CAAMa3	1	ELACa	3	CAAMa3	1
			DACA	2	ERAR12	1	GEDI	1	DEDA	1	ERAR12	2	DEDA	1
			DEDA	1	FEMY	1	JUPH	70	ELACa	2	FEBR	1	ELACa	1
			ELACa	5	FEPE	4	MIPA	1	FEBR	1	GEDI	1	GEDI	1
			ERAR12	4	GEDI	2	PLCO	2	FEPE	3	JUBUb	1	ISCA	1
			FEPE	5	JUPH	64	POMO	1	ISCE	1	JUPH	35	JUBUo	1
			GEDI	4	LYAR	1	BG	6	JUBUb	1	LYHY	1	JUPH	40
			ISCE	1	LYHY	1	TH	15	JUPH	50	MIPA	1	LYHY	6
			JUBUo	1	MALE	2			LOGA	1	PLCO	15	LYMI	1
			JUPH	40	MIPA	3			LYHY	5	POMO	2	MIPA	2
			LYHY	5	POMO	2			PLCO	7	TRVA	1	POMO	6
			LYMI	1	BG	1			POMO	3	BG	10	PSCH	1
			MIPA	1	TH	10			ZEDA	1	TH	24	SIGA	1
			POMO	6					BG	10			ZEDA	1
			RACA	1					TH	11			BG	14
			BG	3									TH	20
			TH	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		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
3	10 m	47%	AICA	1	AICA	1	AICA	2	ACMI	2	ACMI	10	ACMI	1
			BRMI	2	BRMI	1	BRMI	1	AICA	1	AICA	2	AICA	1
			BRTEt	2	BRTEt	2	BRTEt	3	BRMI	3	BRMI	2	BRMI	1
			CAUN	1	DACA	12	CAAMa3	3	BRTEt	2	BRTEt	1	BRTEt	1
			ERAR12	3	ERAR12	3	DACA	12	CAAMa3	3	DACA	40	DACA	25
			ERCA	1	FEBR	1	FEBR	1	DACA	20	ERBO	1	ERBO	3
			FEBR	1	GEDI	1	HYGL	2	FEBR	1	FEBR	1	ERCA	1
			GEDI	2	HYGL	1	JUPH	2	GAPH	1	FEPE	1	FEBR	1
			HYGL	1	JUPH	1	LOGA	1	GEDI	5	GEDI	3	FEPE	2
			HYRA	2	LOGA	1	LYAR	1	HYGL	2	HYGL	1	GEDI	1
			JUPH	1	LYAR	1	LYHY	26	HYRA	2	JUPH	1	HYGL	2
			LOGA	1	LYHY	3	LYMI	2	JUPH	1	LOGA	1	LOGA	1
			LYAR	1	LYMI	1	PLER	2	LOGA	1	LYAR	2	LYAR	2
			LYHY	12	MIPA	1	POMO	1	LYAR	1	LYHY	6	LYHY	10
			LYMI	1	POMO	1	SIMAm	2	LYHY	12	MASA	1	MAGR	1
			MASA	1	SIMAm	3	SOOL	1	LYMI	1	SIMAm	4	MASA	1
			MIPA	1	SOOL	1	TRBA	1	MAGR	1	BG	8	PLER	1
			PLCO	3	ZEDA	2	ZEDA	1	MASA	1	TH	15	POMO	1
			PLER	1	BG	23	BG	20	SOOL	1			SOOL	1
			POMO	1	TH	40	TH	16	ZEDA	1			TAOV	1
			SOOL	1					BG	18			BG	35
			ZEDA	1					TH	20			TH	7
			BG	30										
			TH	30										
			TOTAL	**101**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
4	10 m	10%	BRMI	5	BRHO	1	BRHO	1	BRDI	1	BRDI	1	BRHO	3
			BRTEt	2	BRMI	1	BRMI	5	BRHO	2	BRHO	5	BRMI	2
			ELMA	4	BRTEt	1	BRTEt	1	BRMI	1	BRMI	3	BRTEt	1
			FEPE	57	ELMA	4	ELMA	3	BRTEt	6	ELMA	17	CAUN	1
			GEDI	1	FEPE	52	ERCA	1	ELMA	20	FEPE	30	ELMA	5
			HYGL	1	GEDI	2	FEPE	43	ERCA	5	GAUS	2	FEPE	34
			JUPH	2	JUPH	1	GEDI	3	FEPE	31	GEDI	8	GEDI	7
			LYAR	1	LYHY	1	HYGL	1	GAUS	2	HYGL	2	HYGL	1
			LYHY	3	MALE	5	JUPH	2	GEDI	4	JUPH	3	JUPH	4
			MALE	4	PSST	1	LYHY	2	HYGL	1	LYHY	1	MALE	7
			RACA	1	SIGA	1	MALE	6	JUPH	2	MALE	2	MIPA	1
			SIGA	1	TRDU	15	MIPA	2	MALE	2	RACA	2	RACA	2
			SOOL	1	TH	15	RACA	1	MIPA	3	SIGA	1	SOOL	5
			BG	2			SIGA	2	SOOL	2	SOOL	7	TRBA	1
			TH	15			TRDU	6	BG	2	BG	1	BG	6
							ZEDA	1	TH	16	TH	22	TH	20
							BG	6						
							TH	14						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**107**	**TOTAL**	**100**

Pond 3 South 2020 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Lysimachia minima*	chaffweed	LYMI
Adenostoma fasciculatum	chamise	ADFA	*Lythrum hyssopifolia*	grass poly	LYHY
Agoseris grandiflora	large-flowered agoseris	AGGR	*Madia exigua*	small tarweed	MAEX
Aira caryophyllea	silvery hair-grass	AICA	*Madia gracilis*	gumweed	MAGR
Allium hickmanii	Hickman's onion	ALHI	*Madia sativa*	coast tarweed	MASA
Arctostaphylos hookeri	Hooker's manzanita	ARHO	*Malvella leprosa*	alkali mallow	MALE
Avena barbata	slender wild oat	AVBA	*Microseris paludosa*	marsh microseris	MIPA
Baccharis pilularis	coyote brush	BAPI	*Navarretia hamata* ssp. *parviloba*	hooked navarretia	NAHAP
Briza maxima	rattlesnake grass	BRMA	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
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 diandrus	ripgut grass	BRDI	*Plantago erecta*	California plantain	PLER
Bromus hordeaceus	soft chess	BRHO	*Plantago lanceolata*	English plantain	PLLA
Calochortus uniflorus	pink star-tulip	CAUN	*Pogogyne zizyphoroides*	Sacramento mesa mint	POZI
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Cirsium brevistylum	Indian thistle	CIBR	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Clarkia purpurea ssp. *quadrivulnera*	winecup clarkia	CLPUQ	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Cotula coronopifolia	brass buttons	COCO	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Ranunculus californicus*	California buttercup	RACA
Danthonia californica	California oat grass	DACA	*Rubus ursinus*	California blackberry	RUUR
Deinandra corymbosa	coastal tarweed	DECO	*Rumex acetosella*	sheep sorrel	RUAC
Deschampsia danthonioides	annual hair grass	DEDA	*Rumex crispus*	curly dock	RUCR
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Senecio glomeratus*	cutleaf burnweed	SEGL
Eleocharis macrostachya	pale spikerush	ELMA	*Sidalcea malviflora* ssp. *malviflora*	checkerbloom	SIMAM
Elymus glaucus	blue wild-rye	ELGL	*Silene gallica*	small-flower catchfly	SIGA
Erigeron canadensis	horseweed	ERCA	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Erodium botrys	long-beaked filaree	ERBO	*Sonchus oleraceus*	common sow thistle	SOOL
Eryngium armatum	coyote thistle	ERAR12	*Spergularia villosa*	hairy sand-spurrey	SPVI
Festuca bromoides	brome fescue	FEBR	*Stipa pulchra*	purple needle grass	STPU
Festuca perennis	Italian rye grass	FEPE	*Taraxia ovata*	sun cups	TAOV
Gamochaeta ustulata	purple cudweed	GAUS	*Tribolium obliterum*	Capetown grass	TROB
Geranium dissectum	cut-leaved geranium	GEDI	*Trifolium angustifolium*	narrow-leaved clover	TRAN
Hordeum brachyantherum ssp. *brachyantherum*	meadow barley	HOBRB	*Trifolium barbigerum*	bearded clover	TRBA
Horkelia cuneata	wedge-leaved horkelia	HOCU	*Trifolium campestre*	hop clover	TRCA5
Hypochaeris glabra	smooth cat's-ear	HYGL	*Trifolium depauperatum*	sack clover	TRDE
Hypochaeris radicata	rough cat's-ear	HYRA	*Trifolium dubium*	little hop clover	TRDU
Isolepis cernua	low bulrush	ISCE	*Trifolium microcephalum*	small head clover	TRMI
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	*Trifolium variegatum*	variegated clover	TRVA
Juncus bufonius var. *occidentalis*	round-fruited toad rush	JUBUO	*Triteleia hyacinthina*	white brodiaea	TRHY3
Juncus falcatus	falcate rush	JUFA	*Triteleia ixioides*	coast pretty face	TRIX
Juncus occidentalis	western rush	JUOC	*Vicia hirsuta*	hairy vetch	VIHI
Juncus patens	spreading rush	JUPA	*Vicia sativa* ssp. *sativa*	spring vetch	VISAS
Juncus phaeocephalus	brown-headed rush	JUPH	*Zeltnera davyi*	Davy's centuary	ZEDA
Lasthenia conjugens	Contra Costa goldfields	LACO	**Groundcover Codes**		
Lasthenia glaberrima	smooth goldfields	LAGL3	BG	Bare Ground	
Leptosiphon parviflorus	variable linanthus	LEPA	TH	Thatch/Duff	
Logfia gallica	narrowleaf cottonrose	LOGA	AL	Algae	

Table A-8. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 39			
Date	5/22/2020, 6/3/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 6/3/2020. Strata 1 and 3 were repeated from 2016, 2018, and 2019. Stratum 4 was repeated from 2018 and 2019. Transect 1 was repeated from 2016 and 2018. Transect 3 was repeated from 2018 and 2019. Transect 4 was repeated from 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	9%	ELACa	1	ELACa	2	ELACa	2
			ELMA	77	ELMA	70	ELMA	72
			BG	7	BG	4	BG	5
			TH	15	TH	24	TH	21
			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	38%	AICA	1	BRHO	1	BRDI	1	BRDI	1	BRDI	2	AVBA	2
			BRHO	1	BRMI	1	DISP	15	DISP	6	BRHO	1	BRDI	3
			DACA	45	BRTEt	1	FEMY	20	FEMY	2	ERBO	3	BRHO	1
			FEMY	1	DACA	30	FEPE	52	FEPE	49	FEMY	2	ERBO	3
			GEDI	2	FEMY	1	GEDI	5	GEDI	6	FEPE	71	FEMY	2
			JUOC	15	GEDI	1	BG	2	BG	1	GEDI	3	FEPE	55
			MAGR	3	JUOC	33	TH	5	TH	35	BG	3	GEDI	2
			PLCO	8	MAGR	2					TH	15	BG	2
			TRDU	2	PLCO	15							TH	30
			VISAn	1	TRDU	2								
			BG	2	ZEDA	1								
			TH	19	BG	2								
					TH	10								
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
4	10 m	44%	ACAMa	1	ACAMa	8	AICA	1	ACPA	1	ACPA	2	AICA	1
			AICA	1	AICA	1	AVBA	1	AICA	3	AICA	2	BRDI	1
			BRHO	1	BRHO	1	BRHO	4	AVBA	1	BRHO	1	BRHO	1
			BRMI	1	BRMI	1	BRMI	1	BRDI	1	BRMI	1	BRMI	1
			ERBO	5	DACA	5	DACA	40	BRHO	2	DACA	45	DACA	45
			FEBR	2	FEMY	15	FEBR	3	BRMI	2	ERBO	2	ERBO	3
			FEMY	1	GEDI	2	FEMY	8	CADE	1	FEMY	1	FEMY	4
			GEDI	2	HYGL	1	GEDI	2	DACA	25	HYGL	2	HYGL	1
			PLCO	15	MAGR	15	HYGL	1	FEMY	1	HYRA	1	PLCO	18
			TRAN	21	PLCO	6	MAGR	2	GEDI	1	LYAR	1	TRAN	2
			BG	10	PLLA	4	PLCO	4	HYGL	4	PLCO	7	VISAs	1
			TH	40	TRAN	1	TAOV	3	HYRA	2	TRAN	1	BG	4
					BG	5	TRDU	2	JUOC	1	TRDU	1	TH	18
					TH	35	VIHI	1	MAGR	2	BG	20		
							BG	2	PLCO	25	TH	13		
							TH	25	TAOV	1				
									TRDU	1				
									VISAn	1				
									BG	5				
									TH	20				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 39 2020 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
Agrostis avenacea	Pacific bent grass	AGAV
Agrostis exarata	spike bent grass	AGEX
Aira caryophyllea	silvery hair-grass	AICA
Arctostaphylos hookeri	Hooker's manzanita	ARHO
Avena barbata	slender wild oat	AVBA
Baccharis pilularis	coyote brush	BAPI
Briza maxima	rattlesnake grass	BRMA
Briza minor	annual quaking grass	BRMI
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET
Bromus diandrus	ripgut grass	BRDI
Bromus hordeaceus	soft chess	BRHO
Calochortus uniflorus	pink star-tulip	CAUN
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3
Castilleja densiflora ssp. *densiflora*	dense flower owl's clover	CADED
Clarkia purpurea ssp. *quadrivulnera*	winecup clarkia	CLPUQ
Cotula coronopifolia	brass buttons	COCO
Cynosurus echinatus	bristly dogtail grass	CYEC
Danthonia californica	California oat grass	DACA
Deinandra corymbosa	coastal tarweed	DECO
Deschampsia danthonioides	annual hair grass	DEDA
Distichlis spicata	salt grass	DISP
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa
Eleocharis macrostachya	pale spikerush	ELMA
Elymus glaucus	blue wild-rye	ELGL
Erodium botrys	long-beaked filaree	ERBO
Eryngium armatum	coyote thistle	ERAR12
Festuca bromoides	brome fescue	FEBR
Festuca myuros	rattail sixweeks grass	FEMY
Festuca perennis	Italian rye grass	FEPE
Galium porrigens	climbing bedstraw	GAPO
Gamochaeta ustulata	purple cudweed	GAUS
Geranium dissectum	cut-leaved geranium	GEDI
Heteromeles arbutifolia	toyon	HEAR
Hordeum brachyantherum	meadow barley	HOBR
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	HOMAG
Horkelia cuneata	wedge-leaved horkelia	HOCU
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
Juncus bufonius var. *bufonius*	common toad rush	JUBUB
Juncus bufonius var. *occidentalis*	round-fruited toad rush	JUBUO
Juncus occidentalis	western rush	JUOC
Juncus patens	spreading rush	JUPA
Juncus phaeocephalus	brown-headed rush	JUPH
Lasthenia glaberrima	smooth goldfields	LAGL3
Lupinus bicolor	miniature lupine	LUBI
Lupinus nanus	sky lupine	LUNA
Luzula comosa	Pacific woodrush	LUCO6
Lysimachia arvensis	scarlet pimpernel	LYAR
Lythrum hyssopifolia	grass poly	LYHY
Madia gracilis	gumweed	MAGR
Madia sativa	coast tarweed	MASA
Microseris paludosa	marsh microseris	MIPA
Oxalis corniculata	creeping woodsorrel	OXCO
Plagiobothrys chorisianus var. *hickmanii*	Hickman's popcornflower	PLCHH
Plantago coronopus	cut-leaved plantain	PLCO
Plantago lanceolata	English plantain	PLLA
Polypogon monspeliensis	rabbitfoot grass	POMO
Pseudognaphalium stramineum	cottonbatting plant	PSST
Psilocarphus chilensis	round woolly-marbles	PSCH
Quercus agrifolia	coast live oak	QUAG
Ranunculus californicus	California buttercup	RACA
Rumex acetosella	sheep sorrel	RUAC
Rumex crispus	curly dock	RUCR
Rumex salicifolius	willow dock	RUSA
Sidalcea malviflora ssp. *malviflora*	checkerbloom	SIMAM
Silene gallica	small-flower catchfly	SIGA
Sisyrinchium bellum	western blue-eyed grass	SIBE
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Stachys ajugoides	bugle hedge nettle	STAJ
Stachys bullata	California hedge nettle	STBU
Stipa pulchra	purple needle grass	STPU
Taraxia ovata	sun cups	TAOV
Toxicodendron diversilobum	poison oak	TODI
Trifolium angustifolium	narrow-leaved clover	TRAN
Trifolium dubium	little hop clover	TRDU
Triteleia hyacinthina	white brodiaea	TRHY3
Triteleia ixioides	coast pretty face	TRIX
Vicia hirsuta	hairy vetch	VIHI
Vicia sativa ssp. *nigra*	common vetch	VISAN
Vicia sativa ssp. *sativa*	spring vetch	VISAS
Zeltnera davyi	Davy's centuary	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

Table A-9. Pond 40 North (Year 3 Post-Burn) Wetland Vegetation Transect Data by Stratum

POND 40 North			
Date	6/16/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 6/16/2020. Stratum 2 was repeated from 2015, 2018, and 2019, whereas stratum 3 was repeated from 2015 and 2019. Stratum 4 was repeated from 2018 and 2019. Transect 2 was repeated from 2015, 2018, and 2019. Transect 3 was relocated because the previous location was no longer within the correct stratum. Transect 4 was repeated from 2019.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
2	**5 m**	**33%**	ELMA	37	ELMA	69	ELMA	54
			GAUS	1	LYMI	1	GAUS	2
			BG	32	BG	18	BG	9
			TH	30	TH	12	TH	35
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
3	**5 m**	**41%**	ELMA	33	ELMA	5	ERAR12	9
			ERAR12	25	ERAR12	33	FEPE	1
			JUPH	7	FEPE	1	JUPH	12
			PLCO	4	JUPH	9	PLCO	20
			POMO	2	PLCO	2	POMO	2
			RUCR	3	POMO	2	BG	25
			BG	5	BG	10	TH	31
			TH	21	TH	38		
			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**	**26%**	BRMI	1	BRMI	1	BRMI	2
			DECO	2	GEDI	2	ERAR12	3
			GEDI	7	JUPH	20	JUPH	30
			JUPH	50	LYHY	1	LYHY	1
			MAGR	1	PLCO	25	PLCO	18
			PLCO	2	POMO	1	POMO	2
			BG	4	BG	5	RUCR	1
			TH	33	TH	45	SIGA	1
							BG	12
							TH	30
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 40 North 2020 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Lythrum hyssopifolia*	grass poly	LYHY
Adenostoma fasciculatum	chamise	ADFA	*Madia gracilis*	gumweed	MAGR
Aira caryophyllea	silvery hair-grass	AICA	*Madia sativa*	coast tarweed	MASA
Avena barbata	slender wild oat	AVBA	*Medicago polymorpha*	California burclover	MEPO
Baccharis pilularis	coyote brush	BAPI	*Microseris paludosa*	marsh microseris	MIPA
Briza minor	annual quaking grass	BRMI	*Plantago coronopus*	cut-leaved plantain	PLCO
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Plantago lanceolata*	English plantain	PLLA
Bromus hordeaceus	soft chess	BRHO	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Clarkia purpurea ssp. *quadrivulnera*	winecup clarkia	CLPUQ	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Cotula coronopifolia	brass buttons	COCO	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Cynosurus echinatus	bristly dogtail grass	CYEC	*Quercus agrifolia*	coast live oak	QUAG
Danthonia californica	California oat grass	DACA	*Ranunculus californicus*	California buttercup	RACA
Deinandra corymbosa	coastal tarweed	DECO	*Rumex crispus*	curly dock	RUCR
Drymocallis glandulosa var. *wrangelliana*	sticky cinquefoil	DRGLW	*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	*Sonchus asper*	prickly sow thistle	SOAS
Erigeron canadensis	horseweed	ERCA	*Sonchus oleraceus*	common sow thistle	SOOL
Erodium botrys	long-beaked filaree	ERBO	*Stachys bullata*	California hedge nettle	STBU
Eryngium armatum	coyote thistle	ERAR12	*Taraxia ovata*	sun cups	TAOV
Festuca myuros	rattail sixweeks grass	FEMY	*Toxicodendron diversilobum*	poison oak	TODI
Festuca perennis	Italian rye grass	FEPE	*Trifolium angustifolium*	narrow-leaved clover	TRAN
Galium porrigens	climbing bedstraw	GAPO	*Trifolium dubium*	little hop clover	TRDU
Gamochaeta ustulata	purple cudweed	GAUS	*Vicia hirsuta*	hairy vetch	VIHI
Geranium dissectum	cut-leaved geranium	GEDI	*Vicia sativa* ssp. *sativa*	spring vetch	VISAS
Heterotheca grandiflora	telegraph weed	HEGR	*Zeltnera davyi*	Davy's centuary	ZEDA
Hypochaeris glabra	smooth cat's-ear	HYGL	**Groundcover Codes**		
Hypochaeris radicata	rough cat's-ear	HYRA	BG	Bare Ground	
Juncus occidentalis	western rush	JUOC	TH	Thatch/Duff	
Juncus phaeocephalus	brown-headed rush	JUPH	AL	Algae	
Luzula comosa	Pacific woodrush	LUCO6			

Table A-10. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 40 South			
Date	5/27/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 5/27/2020. Strata 1 through 3 were repeated from 2016, 2018, and 2019. Transects 1 and 2 were repeated from 2016, 2018, and 2019. Transect 3 was repeated from 2016.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
1	5 m	6%	ELMA	8	ELACa	5	ELACa	20
			FEPE	2	ELMA	2	ELMA	3
			JUPH	1	FEPE	1	FEPE	1
			LYHY	1	JUPH	1	LYHY	1
			PLCHh	50	LYHY	1	PLCHh	40
			PLCO	4	PHLE	1	PLCO	8
			POMO	1	PLCHh	60	RUCR	2
			RUCR	3	PLCO	4	BG	3
			BG	5	POMO	2	TH	22
			TH	25	RUCR	5		
					BG	6		
					TH	12		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
2	5 m	12%	AICA	3	AICA	5	AICA	10
			BRHO	2	BRHO	2	BRHO	1
			BRMI	2	BRMI	7	BRMI	2
			ERBO	1	ERBO	3	ERBO	1
			FEBR	2	HYGL	12	HYGL	4
			HYGL	10	JUPH	9	JUPH	8
			JUPH	4	PLCO	7	PLCO	18
			PLCO	7	RUAC	2	RUAC	2
			RUAC	2	SIGA	5	SIGA	1
			SIGA	2	TRAN	13	TRDU	1
			TRAN	5	BG	16	BG	26
			BG	16	TH	19	TH	26
			TH	44				
			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**	**82%**	BRHO	1	BRDI	2	BRDI	2	BRDI	1	FEBR	2	FEBR	3
			BRMI	1	BRHO	1	BRHO	1	BRHO	1	FEPE	55	FEPE	18
			ERBO	2	FEBR	2	FEBR	1	DACA	40	GEDI	10	GEDI	3
			FEBR	10	FEPE	60	FEMY	1	FEBR	1	MASA	2	HYGL	1
			FEPE	55	GEDI	6	FEPE	20	FEPE	2	BG	12	MAGR	2
			RUAC	8	RUAC	5	GEDI	3	GEDI	2	TH	19	BG	3
			BG	2	BG	2	JUPH	1	JUPH	2			TH	70
			TH	21	TH	22	MAGR	2	BG	4				
							MASA	25	TH	47				
							BG	2						
							TH	42						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 40 South 2020 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI	*Lythrum hyssopifolia*	grass poly	LYHY
Aira caryophyllea	silvery hair-grass	AICA	*Madia exigua*	small tarweed	MAEX
Avena barbata	slender wild oat	AVBA	*Madia gracilis*	gumweed	MAGR
Baccharis pilularis	coyote brush	BAPI	*Madia sativa*	coast tarweed	MASA
Briza minor	annual quaking grass	BRMI	*Medicago polymorpha*	California burclover	MEPO
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
Calochortus uniflorus	pink star-tulip	CAUN	*Plantago coronopus*	cut-leaved plantain	PLCO
Castilleja densiflora ssp. *densiflora*	dense flower owl's clover	CADED	*Plantago lanceolata*	English plantain	PLLA
Cotula coronopifolia	brass buttons	COCO	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Danthonia californica	California oat grass	DACA	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Deinandra corymbosa	coastal tarweed	DECO	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Ranunculus californicus*	California buttercup	RACA
Eleocharis macrostachya	pale spikerush	ELMA	*Rumex acetosella*	sheep sorrel	RUAC
Elymus glaucus	blue wild-rye	ELGL	*Rumex crispus*	curly dock	RUCR
Erigeron canadensis	horseweed	ERCA	*Rumex salicifolius*	willow dock	RUSA
Erodium botrys	long-beaked filaree	ERBO	*Sidalcea malviflora* ssp. *malviflora*	checkerbloom	SIMAM
Eryngium armatum	coyote thistle	ERAR12	*Silene gallica*	small-flower catchfly	SIGA
Festuca bromoides	brome fescue	FEBR	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Festuca myuros	rattail sixweeks grass	FEMY	*Sonchus asper*	prickly sow thistle	SOAS
Festuca perennis	Italian rye grass	FEPE	*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
Hordeum brachyantherum	meadow barley	HOBR	*Trifolium angustifolium*	narrow-leaved clover	TRAN
Hypochaeris glabra	smooth cat's-ear	HYGL	*Trifolium campestre*	hop clover	TRCA5
Hypochaeris radicata	rough cat's-ear	HYRA	*Trifolium dubium*	little hop clover	TRDU
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	*Trifolium microcephalum*	small head clover	TRMI
Juncus bufonius var. *occidentalis*	round-fruited toad rush	JUBUO	*Triteleia ixioides*	coast pretty face	TRIX
Juncus capitatus	dwarf rush	JUCA	*Vicia sativa* ssp. *sativa*	spring vetch	VISAS
Juncus falcatus	falcate rush	JUFA	*Zeltnera davyi*	Davy's centuary	ZEDA
Juncus occidentalis	western rush	JUOC	**Groundcover Codes**		
Juncus phaeocephalus	brown-headed rush	JUPH	BG	Bare Ground	
Lupinus nanus	sky lupine	LUNA	TH	Thatch/Duff	
Lysimachia arvensis	scarlet pimpernel	LYAR	AL	Algae	

Table A-11. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 43			
Date	5/28/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Rachel Spellenberg		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 5/28/2020. All three strata were repeated from 2016, 2018, and 2019. Transects 1 and 3 were repeated from 2016, 2018, and 2019. Transect 2 was relocated because the previous location was no longer within the correct stratum.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
1	10 m	46%	DEDA	1	CRAQ	1	ELACa	3	CRAQ	1	CRAQ	1	CRAQ	1
			ELACa	1	ELACa	8	ELMA	8	DEDA	1	ELACa	5	ELACa	5
			ELMA	2	ELMA	1	ERAR12	4	ELACa	6	ELMA	1	ELMA	32
			ERAR12	5	ERAR12	5	ISCE	1	ELMA	5	ERAR12	30	ERAR12	16
			JUPH	1	ISCE	2	JUPH	2	ERAR12	4	JUPH	1	ISCE	1
			LAGL3	45	JUPH	3	LYHY	1	JUPH	1	LYMI	3	JUPH	1
			LYHY	1	LAGL3	1	LYMI	1	LYHY	2	PLCHh	2	LYHY	1
			LYMI	1	LYHY	2	PLCHh	2	LYMI	2	POMO	3	LYMI	3
			PLCHh	4	LYMI	1	POZI	12	PLCHh	19	POZI	3	PLCHh	2
			POMO	1	PLCHh	25	PSCH	1	POMO	3	PSCH	1	POMO	3
			POZI	1	POMO	1	BG	10	POZI	17	BG	10	POZI	5
			PSCH	1	POZI	1	TH	55	BG	18	TH	40	PSCH	8
			BG	12	TRSC	2			TH	21			BG	2
			TH	24	BG	20							TH	20
					TH	27								
			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	37%	AICA	1	BRMI	1	ERAR12	1
			BAPI	1	DEDA	10	JUPH	39
			BRHO	1	GEDI	1	LYHY	6
			BRMI	2	JUPH	61	LYMI	2
			DECO	7	LYHY	2	PLCHh	2
			FEBR	1	LYMI	1	POMO	1
			GAUS	1	PLCHh	1	POZI	1
			GEDI	3	POMO	2	PSCH	3
			HYGL	2	POZI	1	BG	35
			JUBUb	1	PSCH	1	TH	10
			JUCA	2	PSLU	1		
			JUOC	3	SOOL	2		
			JUPH	27	BG	6		
			LYHY	3	TH	10		
			LYMI	2				
			MAGR	4				
			MASA	2				
			POMO	1				
			SIBE	3				
			SOOL	1				
			BG	22				
			TH	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
3	5 m	15%	ACAMa	5	ACAMa	5	ACAMa	8
			AICA	1	AICA	1	AICA	1
			BRHO	1	BRHO	1	BRHO	1
			BRMI	1	BRMI	2	BRMI	1
			DACA	55	DACA	35	CIQU	1
			DECO	3	DECO	2	DACA	44
			ERAR12	1	ERAR12	2	DECO	2
			FEBR	1	FEBR	1	ERAR12	7
			GAUS	2	GEDI	1	FEBR	1
			HYGL	1	HYGL	1	GEDI	1
			MAEX	2	JUBUb	1	JUOC	1
			MAGR	5	LYHY	2	JUPH	1
			PLCO	5	MAEX	1	LYAR	1
			TRDU	2	MAGR	3	LYMI	1
			BG	6	PLCO	5	MAEX	1
			TH	9	POMO	1	MAGR	4
					TRDU	12	PLCO	5
					BG	20	PSCH	1
					TH	4	SIBE	1
							TRDU	1
							TROB	1
							ZEDA	1
							BG	6
							TH	8
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 43 2020 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
Acmispon strigosus	strigose lotus	ACST	*Lasthenia glaberrima*	smooth goldfields	LAGL3
Adenostoma fasciculatum	chamise	ADFA	*Lepechinia calycina*	pitcher sage	LECA
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV	*Logfia filaginoides*	California cottonrose	LOFI
Aira caryophyllea	silvery hair-grass	AICA	*Logfia gallica*	narrowleaf cottonrose	LOGA
Arctostaphylos hookeri	Hooker's manzanita	ARHO	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Arctostaphylos tomentosa	woolly leaf manzanita	ARTO	*Lysimachia minima*	chaffweed	LYMI
Baccharis pilularis	coyote brush	BAPI	*Lythrum hyssopifolia*	grass poly	LYHY
Briza maxima	rattlesnake grass	BRMA	*Madia exigua*	small tarweed	MAEX
Briza minor	annual quaking grass	BRMI	*Madia gracilis*	gumweed	MAGR
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Madia sativa*	coast tarweed	MASA
Bromus hordeaceus	soft chess	BRHO	*Microseris paludosa*	marsh microseris	MIPA
Castilleja densiflora ssp. *densiflora*	dense flower owl's clover	CADED	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Ceanothus dentatus	dwarf ceanothus	CEDE	*Plantago coronopus*	cut-leaved plantain	PLCO
Ceanothus rigidus	Monterey ceanothus	CERI	*Plantago erecta*	California plantain	PLER
Cicendia quadrangularis	timwort	CIQU	*Pogogyne zizyphoroides*	Sacramento mesa mint	POZI
Cirsium brevistylum	Indian thistle	CIBR	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Crocanthemum scoparium	peak rush-rose	CRSC	*Pseudognaphalium ramosissimum*	pink everlasting	PSRA
Danthonia californica	California oat grass	DACA	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Deinandra corymbosa	coastal tarweed	DECO	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Deschampsia danthonioides	annual hair grass	DEDA	*Quercus agrifolia*	coast live oak	QUAG
Diplacus aurantiacus	sticky monkey flower	DIAU	*Ribes malvaceum*	chaparral currant	RIMA
Elatine californica	California waterwort	ELCA	*Salix* sp.		
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Senecio glomeratus*	cutleaf burnweed	SEGL
Elymus glaucus	blue wild-rye	ELGL	*Silene gallica*	small-flower catchfly	SIGA
Epilobium ciliatum	fringed willowherb	EPCI	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Erigeron canadensis	horseweed	ERCA	*Sonchus asper*	prickly sow thistle	SOAS
Eriophyllum confertiflorum	golden yarrow	ERCO	*Sonchus oleraceus*	common sow thistle	SOOL
Eryngium armatum	coyote thistle	ERAR12	*Toxicodendron diversilobum*	poison oak	TODI
Festuca bromoides	brome fescue	FEBR	*Tribolium obliterum*	Capetown grass	TROB
Festuca myuros	rattail sixweeks grass	FEMY	*Trifolium barbigerum*	bearded clover	TRBA
Gamochaeta ustulata	purple cudweed	GAUS	*Trifolium campestre*	hop clover	TRCA5
Garrya elliptica	coast silk tassel	GAEL	*Trifolium dubium*	little hop clover	TRDU
Geranium dissectum	cut-leaved geranium	GEDI	*Trifolium gracilentum*	pin point clover	TRGR
Horkelia cuneata	wedge-leaved horkelia	HOCU	*Trifolium microcephalum*	small head clover	TRMI
Hypochaeris glabra	smooth cat's-ear	HYGL	*Trifolium variegatum*	variegated clover	TRVA
Hypochaeris radicata	rough cat's-ear	HYRA	*Trifolium willdenovii*	tomcat clover	TRWI
Isolepis carinata	keeled bulrush	ISCA	*Triglochin scilloides*	flowering quillwort	TRSC
Isolepis cernua	low bulrush	ISCE	*Triteleia ixioides*	coast pretty face	TRIX
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	*Zeltnera davyi*	Davy's centuary	ZEDA
Juncus bufonius var. *congestus*	clustered toad rush	JUBUC2	**Groundcover Codes**		
Juncus bufonius var. *occidentalis*	round-fruited toad rush	JUBUO	BG	Bare Ground	
Juncus capitatus	dwarf rush	JUCA	TH	Thatch/Duff	
Juncus occidentalis	western rush	JUOC	AL	Algae	

Table A-12. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 35			
Date	5/21/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 5/21/2020. Strata 1 and 2 were repeated from 2016, 2018, and 2019. Stratum 4 was repeated from 2018 and 2019. Transects 1 and 2 were repeated from 2016, 2018, and 2019. Transect 4 was relocated because the previous location was no longer within the correct stratum.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
			COCO	1	COCO	1	COCO	1	COCO	1	ELMA	3	ELMA	4
			ELMA	1	ELMA	1	LAGL3	1	LAGL3	1	LYHY	8	LYHY	25
			FEPE	1	LAGL3	2	LYHY	1	LYHY	8	PLCHh	25	PLCHh	30
			LAGL3	1	LYHY	8	PLCHh	40	PLCHh	24	PLCO	25	PLCO	20
			LYHY	4	PLCHh	22	PLCO	35	PLCO	32	PSCH	1	PSCH	1
1	10 m	20%	PLCHh	12	PLCO	45	PSCH	2	PSCH	1	TRSC	1	BG	12
			PLCO	50	PSCH	6	TRSC	2	TRSC	1	BG	25	TH	8
			PSCH	3	TRSC	1	BG	11	BG	7	TH	12		
			TRSC	5	BG	8	TH	7	TH	25				
			BG	11	TH	6								
			TH	11										
			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
			DEDA	1	FEPE	1	PLCO	30	FEPE	1	PLCO	20	PLCO	50
			NAAT	1	HYGL	1	PSCH	3	PLCO	40	TRAN	26	TRAN	2
			PLCO	35	LYHY	1	TRAN	1	PSCH	1	BG	32	BG	24
2	10 m	36%	PSCH	3	PLCO	45	BG	25	TRAN	1	TH	22	TH	24
			TRAN	2	PSCH	2	TH	41	BG	26				
			BG	40	BG	20			TH	31				
			TH	18	TH	30								
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
4	**10 m**	**44%**	AICA	3	AICA	4	BRDI	2	BRMI	1	BRHO	2	BRDI	1
			AVBA	1	AVBA	1	BRMI	1	DACA	5	BRTEt	1	BRTEt	1
			BRHO	2	BRHO	2	DACA	40	FEMY	1	ERBO	1	ERBO	3
			DACA	65	DACA	60	FEBR	3	FEPE	25	FEPE	65	FEPE	65
			FEMY	2	FEBR	6	FEPE	10	GEDI	2	GEDI	2	HOBR	1
			FEPE	1	FEPE	2	GEDI	2	PLCO	12	TRAN	1	TRAN	12
			GEDI	2	GEDI	2	HYGL	2	TRAN	30	BG	5	BG	3
			TRAN	15	HYGL	1	TRAN	8	TRDU	1	TH	23	TH	15
			BG	1	TRAN	1	BG	4	BG	3				
			TH	8	BG	1	TH	28	TH	20				
					TH	20								
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**101**

Pond 35 2020 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Acmispon parviflorus	hill lotus	ACPA	*Isoetes howellii*	Howell's quillwort	ISHO
Aira caryophyllea	silvery hair-grass	AICA	*Juncus occidentalis*	western rush	JUOC
Avena barbata	slender wild oat	AVBA	*Lasthenia glaberrima*	smooth goldfields	LAGL3
Baccharis pilularis	coyote brush	BAPI	*Lupinus bicolor*	miniature lupine	LUBI
Briza minor	annual quaking grass	BRMI	*Lythrum hyssopifolia*	grass poly	LYHY
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Madia gracilis*	gumweed	MAGR
Bromus diandrus	ripgut grass	BRDI	*Madia sativa*	coast tarweed	MASA
Bromus hordeaceus	soft chess	BRHO	*Navarretia atractyloides*	holly leaf navarretia	NAAT
Cardionema ramosissimum	sand mat	CARA	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Castilleja densiflora ssp. *densiflora*	dense flower owl's clover	CADED	*Plantago coronopus*	cut-leaved plantain	PLCO
Clarkia purpurea ssp. *quadrivulnera*	winecup clarkia	CLPUQ	*Plantago lanceolata*	English plantain	PLLA
Cotula coronopifolia	brass buttons	COCO	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Cynosurus echinatus	bristly dogtail grass	CYEC	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Cyperus eragrostis	tall cyperus	CYER	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Danthonia californica	California oat grass	DACA	*Quercus agrifolia*	coast live oak	QUAG
Deschampsia danthonioides	annual hair grass	DEDA	*Rumex acetosella*	sheep sorrel	RUAC
Eleocharis macrostachya	pale spikerush	ELMA	*Rumex crispus*	curly dock	RUCR
Erodium botrys	long-beaked filaree	ERBO	*Silene gallica*	small-flower catchfly	SIGA
Erodium cicutarium	redstem filaree	ERCI	*Sonchus oleraceus*	common sow thistle	SOOL
Eryngium armatum	coyote thistle	ERAR12	*Spergularia villosa*	hairy sand-spurrey	SPVI
Eschscholzia californica	California poppy	ESCA	*Stipa pulchra*	purple needle grass	STPU
Festuca bromoides	brome fescue	FEBR	*Taraxia ovata*	sun cups	TAOV
Festuca myuros	rattail sixweeks grass	FEMY	*Trifolium angustifolium*	narrow-leaved clover	TRAN
Festuca perennis	Italian rye grass	FEPE	*Trifolium dubium*	little hop clover	TRDU
Gamochaeta ustulata	purple cudweed	GAUS	*Trifolium hirtum*	rose clover	TRHI
Gastridium phleoides	nit grass	GAPH	*Triglochin scilloides*	flowering quillwort	TRSC
Geranium dissectum	cut-leaved geranium	GEDI	*Vicia sativa* ssp. *nigra*	common vetch	VISAN
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO	*Vicia sativa* ssp. *sativa*	spring vetch	VISAS
Heterotheca grandiflora	telegraph weed	HEGR	**Groundcover Codes**		
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	HOMAG	BG	Bare Ground	
Hypochaeris glabra	smooth cat's-ear	HYGL	TH	Thatch/Duff	
Hypochaeris radicata	rough cat's-ear	HYRA	AL	Algae	

Table A-13. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 42			
Date	6/16/2020, 6/26/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 6/26/2020. Strata 1 through 4 were repeated from 2017, 2018, and 2019. Stratum 5 was repeated from 2019. Transect 1 was relocated to an area with more representative vegetative composition. Transect 2 was repeated from 2018 and 2019. Transects 3 and 5 were relocated because the previous locations were no longer within the correct strata. Transect 4 was repeated from 2017, 2018, and 2019. An upland stratum was mapped and occupied 17% 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	11%	ELACa	35	ELACa	32	ELACa	45
			JUPH	15	ELMA	9	ERAR12	2
			LYHY	1	ERAR12	10	JUPH	18
			PLCHh	1	LAGL3	2	LYHY	2
			BG	12	LYHY	1	POMO	1
			TH	36	PLCHh	3	BG	18
					POMO	1	TH	14
					BG	7		
					TH	36		
			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
2	5 m	10%	ELACa	3	ELACa	1	ELACa	1
			ELMA	45	ELMA	40	ELMA	42
			LAGL3	1	ERAR12	1	ISHO	1
			LYHY	2	PLCHh	1	POMO	6
			PLCHh	1	POMO	5	TH	50
			POMO	2	PS sp	1		
			TH	46	TH	51		
			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	41%	AGLAV	1	AGLAV	1	AGLAV	1	BRTEt	1	COCO	2	ELACa	5
			BRTEt	1	BG	2	BG	8	CIQU	1	ELACa	7	ERAR12	6
			DEDA	1	BRTEt	1	BRTEt	1	DEDA	1	JUPH	65	JUPH	76
			ELACa	34	COCO	1	DEDA	1	ELACa	13	LAGL3	1	LAGL3	2
			ERAR12	18	ELACa	30	ELACa	10	ERAR12	21	LYAR	1	POMO	2
			JUPH	15	ERAR12	30	ERAR12	14	JUPH	25	LYHY	1	BG	1
			LYHY	1	JUPH	16	HERA	1	LYHY	1	PLCHh	2	TH	8
			LYMI	1	LYMI	1	HYGL	1	LYMI	1	POMO	6		
			PLCHh	1	PLCHh	1	JUPH	13	POMO	2	BG	3		
			POMO	8	POMO	2	LYHY	2	PSCH	1	TH	12		
			PSCH	1	TH	15	LYMI	1	SEGL	1				
			BG	2			PLCHh	1	SOOL	1				
			TH	16			POMO	15	BG	8				
							SEGL	1	TH	23				
							TH	30						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
4	5 m	14%	AICA	1	AICA	1	AICA	1
			AVBA	1	BRMI	1	BRMI	1
			BRMI	1	DACA	24	BRTEt	1
			DACA	23	DECO	20	DACA	10
			DECO	18	FEBR	1	DECO	42
			FEBR	1	GAPH	2	ERAR12	1
			GAPH	3	HYGL	1	FEBR	1
			GAUS	2	LYAR	2	GAPH	2
			LYAR	2	BG	28	GAUS	2
			PLER	1	TH	20	HYGL	1
			POMO	1			LYAR	2
			ZEDA	1			POMO	1
			BG	23			ZEDA	1
			TH	22			BG	20
							TH	14
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
5	5 m	6%	COCO	55	COCO	70	COCO	65
			ERCA	1	POMO	5	POMO	7
			POMO	2	BG	1	BG	3
			PS sp	1	TH	24	TH	25
			BG	1				
			TH	40				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 42 2020 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 parviflorus	hill lotus	ACPA	*Lasthenia glaberrima*	smooth goldfields	LAGL3
Agrostis avenacea	Pacific bent grass	AGAV	*Logfia gallica*	narrowleaf cottonrose	LOGA
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV	*Luzula comosa*	Pacific woodrush	LUCO6
Agrostis pallens	seashore bent grass	AGPA	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Aira caryophyllea	silvery hair-grass	AICA	*Lysimachia minima*	chaffweed	LYMI
Arctostaphylos hookeri	Hooker's manzanita	ARHO	*Lythrum hyssopifolia*	grass poly	LYHY
Avena barbata	slender wild oat	AVBA	*Madia gracilis*	gumweed	MAGR
Baccharis pilularis	coyote brush	BAPI	*Madia sativa*	coast tarweed	MASA
Briza maxima	rattlesnake grass	BRMA	*Microseris paludosa*	marsh microseris	MIPA
Briza minor	annual quaking grass	BRMI	*Nuttallanthus texanus*	blue toadflax	NUTE
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Perideridia gairdneri*	Gairdner's yampah	PEGA
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
Callitriche longipedunculata	longstock water starwort	CALO2	*Plantago coronopus*	cut-leaved plantain	PLCO
Carpobrotus edulis	ice plant	CAED	*Plantago erecta*	California plantain	PLER
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Centaurea melitensis	Maltese star-thistle	CEME	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Cirsium brevistylum	Indian thistle	CIBR	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Cotula coronopifolia	brass buttons	COCO	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Quercus agrifolia*	coast live oak	QUAG
Danthonia californica	California oat grass	DACA	*Rubus ursinus*	California blackberry	RUUR
Daucus pusillus	rattlesnake weed	DAPU	*Rumex acetosella*	sheep sorrel	RUAC
Deinandra corymbosa	coastal tarweed	DECO	*Rumex salicifolius*	willow dock	RUSA
Deschampsia danthonioides	annual hair grass	DEDA	*Salix* sp.		
Elatine californica	California waterwort	ELCA	*Senecio glomeratus*	cutleaf burnweed	SEGL
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Silene gallica*	small-flower catchfly	SIGA
Eleocharis macrostachya	pale spikerush	ELMA	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Elymus glaucus	blue wild-rye	ELGL	*Sonchus asper*	prickly sow thistle	SOAS
Epilobium ciliatum	fringed willowherb	EPCI	*Sonchus oleraceus*	common sow thistle	SOOL
Epilobium densiflorum	denseflower willowherb	EPDE4	*Spiranthes romanzoffiana*	hooded lady's tresses	SPRO
Erigeron canadensis	horseweed	ERCA	*Stachys bullata*	California hedge nettle	STBU
Eriodictyon californicum	yerba santa	ERCA6	*Stipa pulchra*	purple needle grass	STPU
Erodium botrys	long-beaked filaree	ERBO	*Toxicodendron diversilobum*	poison oak	TODI
Eryngium armatum	coyote thistle	ERAR12	*Tribolium obliterum*	Capetown grass	TROB
Festuca bromoides	brome fescue	FEBR	*Trifolium barbigerum*	bearded clover	TRBA
Festuca myuros	rattail sixweeks grass	FEMY	*Trifolium campestre*	hop clover	TRCA5
Galium porrigens	climbing bedstraw	GAPO	*Trifolium dubium*	little hop clover	TRDU
Gamochaeta ustulata	purple cudweed	GAUS	*Trifolium variegatum*	variegated clover	TRVA
Gastridium phleoides	nit grass	GAPH	*Triglochin scilloides*	flowering quillwort	TRSC
Geranium dissectum	cut-leaved geranium	GEDI	*Triteleia ixioides*	coast pretty face	TRIX
Heterocodon rariflorum	western pearlflower	HERA	*Typha* sp.		
Hypochaeris glabra	smooth cat's-ear	HYGL	*Vicia hirsuta*	hairy vetch	VIHI
Hypochaeris radicata	rough cat's-ear	HYRA	*Zeltnera davyi*	Davy's centuary	ZEDA
Isoetes howellii	Howell's quillwort	ISHO	**Groundcover Codes**		
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	BG	Bare Ground	
Juncus capitatus	dwarf rush	JUCA	TH	Thatch/Duff	
Juncus occidentalis	western rush	JUOC	AL	Algae	

Table A-14. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 44			
Date	5/28/2020, 6/1/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Rachel Spellenberg		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 5/28/2020. Strata 1 and 3 were repeated from 2016, 2018, and 2019, whereas stratum 4 was repeated from 2018 and 2019. Strata 2 was repeated from 2016. Transect 1 was repeated from 2018 and 2019. Transect 2 was relocated because the previous location was no longer within the correct stratum. Transect 3 was repeated from 2016, 2018 and 2019, whereas Transect 4 was relocated to an area with more representative vegetative composition. 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	59%	AGLAv	1	AGLAv	2	BRMI	2
			ELACa	11	ERAR12	9	ERAR12	12
			ERAR12	15	JUBUb	7	ERBO	1
			JUBUb	4	LYHY	5	FEBR	1
			JUPH	3	LYMI	3	HYGL	1
			LAGL3	1	PLCHh	11	JUBUb	10
			LYHY	10	POMO	13	LYHY	2
			LYMI	1	PSCH	24	PLCO	2
			PLCHh	6	TRDU	1	POMO	4
			POMO	15	BG	11	POZI	1
			POZI	1	TH	14	PSCH	2
			PSCH	4			TRDU	5
			BG	14			BG	35
			TH	14			TH	22
			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	9%	AGLAv	3	AGLAv	3	AGLAv	1
			BRMI	1	BRMI	1	BRTEt	1
			CRAQ	1	BRTEt	3	DEDA	2
			DEDA	1	ELACa	2	ELACa	1
			ELMA	1	ERAR12	4	ERAR12	6
			ERAR12	6	JUBUb	28	JUBUb	20
			JUBUb	7	JUPH	1	JUCA	1
			JUPH	5	LYHY	18	LYHY	12
			LYHY	7	PLCHh	6	LYMI	1
			LYMI	2	PLCO	2	PLCHh	2
			PLCHh	12	POMO	2	PLCO	1
			POMO	6	PSCH	3	POMO	18
			PSCH	2	BG	23	PSCH	1
			BG	30	TH	4	BG	29
			TH	16			TH	4
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
3	5 m	18%	ACPA	1	ACPA	2	ACPA	1
			AICA	1	AICA	1	AICA	1
			BRTEt	2	AVBA	1	BRMI	1
			CAAT	1	BRMA	2	CIQU	1
			DACA	30	DACA	55	DACA	47
			ELACa	1	ERAR12	6	DECO	1
			ERAR12	1	GAPH	1	ERBO	1
			FEMY	1	HYGL	2	FEMY	1
			GEDI	1	JUBUb	1	JUBUb	1
			HYGL	1	JUPH	1	LYAR	2
			JUBUb	1	LYAR	3	MAGR	2
			JUPH	2	LYMI	1	PLCO	7
			LYAR	2	MAGR	2	TRDU	2
			LYMI	2	PLCO	12	TRPU	2
			MAGR	32	POMO	1	BG	25
			PLCO	10	TRDU	2	TH	5
			POMO	1	TRPU	1		
			TAOV	1	BG	5		
			TRCA5	1	TH	1		
			TRDU	4				
			ZEDA	1				
			BG	1				
			TH	2				
			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	4%	BRMI	1	AGLAv	1	BRMI	1
			BRTEt	1	BRTEt	1	BRTEt	2
			ELACa	2	DEDA	2	DEDA	1
			ERAR12	4	ELACa	10	ELACa	12
			HYGL	1	ERAR12	10	ERAR12	18
			JUBUb	1	JUBUb	1	GEDI	1
			JUPH	45	JUCA	1	JUBUb	1
			LYHY	6	JUPH	40	JUPH	24
			LYMI	2	LAGL3	2	LAGL3	2
			PLCHh	1	LYHY	6	LYHY	3
			PLCO	1	LYMI	2	PLCO	1
			POMO	2	PLCHh	1	POMO	1
			PSCH	1	POMO	1	POZI	1
			TRDU	1	PSCH	3	PSCH	2
			TRVA	2	BG	7	TRDU	2
			BG	11	TH	12	BG	15
			TH	20			TH	13
			TOTAL	**102**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 44 2020 Species List

Species Name	Common Name	Species Code
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA
Acmispon parviflorus	hill lotus	ACPA
Adenostoma fasciculatum	chamise	ADFA
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV
Aira caryophyllea	silvery hair-grass	AICA
Arctostaphylos hookeri	Hooker's manzanita	ARHO
Avena barbata	slender wild oat	AVBA
Baccharis pilularis	coyote brush	BAPI
Briza maxima	rattlesnake grass	BRMA
Briza minor	annual quaking grass	BRMI
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET
Bromus hordeaceus	soft chess	BRHO
Castilleja attenuata	valley tassels	CAAT
Cicendia quadrangularis	timwort	CIQU
Crocanthemum scoparium	peak rush-rose	CRSC
Danthonia californica	California oat grass	DACA
Deinandra corymbosa	coastal tarweed	DECO
Deschampsia danthonioides	annual hair grass	DEDA
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa
Erodium botrys	long-beaked filaree	ERBO
Eryngium armatum	coyote thistle	ERAR12
Festuca bromoides	brome fescue	FEBR
Festuca myuros	rattail sixweeks grass	FEMY
Gamochaeta ustulata	purple cudweed	GAUS
Gastridium phleoides	nit grass	GAPH
Geranium dissectum	cut-leaved geranium	GEDI
Horkelia cuneata	wedge-leaved horkelia	HOCU
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
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
Luzula comosa	Pacific woodrush	LUCO6
Lysimachia arvensis	scarlet pimpernel	LYAR

Species Name	Common Name	Species Code
Lysimachia minima	chaffweed	LYMI
Lythrum hyssopifolia	grass poly	LYHY
Madia exigua	small tarweed	MAEX
Madia gracilis	gumweed	MAGR
Madia sativa	coast tarweed	MASA
Microseris paludosa	marsh microseris	MIPA
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 monspeliensis	rabbitfoot grass	POMO
Pseudognaphalium luteoalbum	weedy cudweed	PSLU
Psilocarphus chilensis	round woolly-marbles	PSCH
Quercus agrifolia	coast live oak	QUAG
Rumex acetosella	sheep sorrel	RUAC
Silene gallica	small-flower catchfly	SIGA
Sisyrinchium bellum	western blue-eyed grass	SIBE
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Taraxia ovata	sun cups	TAOV
Toxicodendron diversilobum	poison oak	TODI
Trifolium angustifolium	narrow-leaved clover	TRAN
Trifolium campestre	hop clover	TRCA5
Trifolium dubium	little hop clover	TRDU
Trifolium microcephalum	small head clover	TRMI
Trifolium variegatum	variegated clover	TRVA
Trifolium willdenovii	tomcat clover	TRWI
Triphysaria pusilla	little owl's clover	TRPU
Triteleia ixioides	coast pretty face	TRIX
Vicia sativa ssp. *nigra*	common vetch	VISAN
Zeltnera davyi	Davy's centuary	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

Table A-15. Pond 56 (Year 3 Post-Mastication) Wetland Vegetation Transect Data by Stratum

POND 56			
Date	6/16/2020, 7/14/2020, 8/11/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 8/11/2020. Stratum 1 was repeated from 2016 and 2019. Strata 2 through 4 were repeated from 2015, 2016, and 2019 whereas stratum 5 was repeated from 2015 and 2016.Transect 1 was repeated from 2016. Transects 2 and 5 were relocated to areas with more representative vegetative composition. Transects 3 and 4 were repeated from 2016. 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		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
1	**10 m**	**6%**	ELMA	60	ELMA	45	ELMA	45	ELMA	24	ELMA	48	ELMA	55
			MALE	4	MALE	3	MALE	5	MALE	5	MALE	3	MALE	3
			TH	36	TH	52	TH	50	BG	10	BG	1	TH	42
									TH	61	TH	48		
			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**	**5%**	DISP	25	DISP	22	DISP	16	DISP	30	DISP	40	DISP	18
			ELACa	2	ELACa	2	ELACa	4	ELACa	1	ELACa	1	ELACa	6
			ELMA	9	ELMA	7	ELMA	6	ELMA	9	ELMA	10	ELMA	9
			JUPH	1	JUPH	3	JUPH	4	JUPH	1	BG	4	JUPH	1
			BG	10	BG	11	BG	9	BG	7	TH	45	BG	9
			TH	53	TH	55	TH	61	TH	52			TH	57
			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	**10m**	**16%**	DISP	18	DISP	8	DISP	7	DISP	10	DISP	9	DISP	18
			ELMA	28	ELMA	20	ELMA	20	ELMA	22	ELMA	16	ELMA	10
			JUPH	10	JUPH	8	JUPH	9	JUPH	8	JUPH	18	JUPH	14
			TH	44	BG	8	BG	3	BG	4	BG	2	TH	58
					TH	56	TH	61	TH	56	TH	55		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
4	**10 m**	**24%**	DISP	7	DISP	5	DISP	5	DISP	4	DISP	4	DISP	4
			JUPH	16	JUPH	18	JUPH	20	JUPH	9	JUPH	10	JUPH	12
			PLCHh	1	TH	77	STAJ	5	LYHY	1	LYHY	2	LYHY	1
			POMO	6			TH	70	PHLE	2	PHLE	1	POMO	1
			BG	4					STAJ	1	POMO	1	TRSC	2
			TH	66					TRSC	1	TRSC	4	BG	1
									BG	2	BG	4	TH	79
									TH	80	TH	74		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
5	**10 m**	**46%**	AGAV	1	AGAV	1	BRTEt	1	AGAV	1	AGAV	1	AGAV	1
			BRTEt	1	BRTEt	1	DECO	1	DEDA	1	DEDA	1	BRMI	1
			ELACa	2	DEDA	1	DISP	2	DISP	4	DISP	5	DECO	1
			ERAR12	12	DISP	1	ELACa	2	ERAR12	7	ERAR12	15	DEDA	5
			JUPH	12	ELACa	2	ERAR12	32	ERBO	1	JUPH	35	ERAR12	7
			MALE	11	ERAR12	18	JUPH	15	JUPH	19	MALE	2	ERBO	1
			POMO	1	JUPH	30	LYHY	1	MALE	6	BG	1	JUPH	25
			BG	1	MALE	6	MALE	3	POMO	1	TH	40	LYHY	2
			TH	59	POMO	1	POMO	1	BG	5			MALE	5
					TH	39	BG	3	TH	55			POMO	3
							TH	39					BG	3
													TH	46
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 56 2020 Species List

Species Name	Common Name	Species Code
Agoseris grandiflora	large-flowered agoseris	AGGR
Agrostis avenacea	Pacific bent grass	AGAV
Agrostis pallens	seashore bent grass	AGPA
Aira caryophyllea	silvery hair-grass	AICA
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
Castilleja ambigua	Johnny-Nip	CAAM
Cotula coronopifolia	brass buttons	COCO
Danthonia californica	California oat grass	DACA
Deinandra corymbosa	coastal tarweed	DECO
Diplacus aurantiacus	sticky monkey flower	DIAU
Distichlis spicata	salt grass	DISP
Drymocallis glandulosa	sticky cinquefoil	DRGL
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa
Eleocharis macrostachya	pale spikerush	ELMA
Elymus triticoides	beardless wild rye	ELTR3
Erigeron canadensis	horseweed	ERCA
Erodium botrys	long-beaked filaree	ERBO
Eryngium armatum	coyote thistle	ERAR12
Euthamia occidentalis	western goldenrod	EUOC
Festuca perennis	Italian rye grass	FEPE
Galium aparine	goose grass	GAAP
Gamochaeta ustulata	purple cudweed	GAUS
Geranium dissectum	cut-leaved geranium	GEDI
Heterocodon rariflorum	western pearlflower	HERA
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
Juncus phaeocephalus	brown-headed rush	JUPH
Lasthenia glaberrima	smooth goldfields	LAGL3
Leptosiphon parviflorus	variable linanthus	LEPA
Logfia gallica	narrowleaf cottonrose	LOGA
Luzula comosa	Pacific woodrush	LUCO6
Lysimachia arvensis	scarlet pimpernel	LYAR
Lysimachia minima	chaffweed	LYMI
Lythrum hyssopifolia	grass poly	LYHY
Madia gracilis	gumweed	MAGR
Madia sativa	coast tarweed	MASA
Malvella leprosa	alkali mallow	MALE
Microseris paludosa	marsh microseris	MIPA
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
Rumex acetosella	sheep sorrel	RUAC
Rumex crispus	curly dock	RUCR
Senecio glomeratus	cutleaf burnweed	SEGL
Sidalcea malviflora ssp. *malviflora*	checkerbloom	SIMAM
Silene gallica	small-flower catchfly	SIGA
Solanum americanum	small-flowered nightshade	SOAM
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Spiranthes romanzoffiana	hooded lady's tresses	SPRO
Stachys ajugoides	bugle hedge nettle	STAJ
Taraxia ovata	sun cups	TAOV
Toxicodendron diversilobum	poison oak	TODI
Triglochin scilloides	flowering quillwort	TRSC
Zeltnera davyi	Davy's centuary	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

Table A-16. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 60			
Date	6/17/2020, 8/11/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 8/11/2020. Strata 1 through 4 were repeated from 2015, 2018, and 2019. Transect 1 was relocated to an area with more representative vegetative composition. Transect 2 was repeated from 2018 and 2019, while Transect 3 was repeated from 2018. Transect 4 was repeated from 2015.			

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	50	ELMA	52	ELMA	60	ELMA	35	ELMA	65	ELMA	46
			MALE	6	MALE	8	MALE	1	TH	65	TH	35	BG	4
			TH	44	TH	40	BG	1					TH	50
							TH	38						
			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	39%	ELMA	32	DISP	8	DISP	5	DISP	5	DISP	15	DISP	6
			COCO	2	ELMA	30	ELMA	50	ELMA	42	ELMA	52	ELMA	60
			DISP	4	JUPH	1	BG	2	JUPH	1	JUPH	1	JUPH	10
			JUPH	2	TH	58	TH	43	BG	3	BG	2	BG	1
			BG	20	BG	3			TH	49	TH	30	TH	23
			TH	40										
			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	13%	DISP	2	DISP	1	DISP	DISP	2	DISP	1	DISP	DISP	2
			ELMA	20	ELMA	2	ELMA	ELMA	20	ELMA	2	ELMA	ELMA	20
			JUPH	55	JUPH	76	JUPH	JUPH	55	JUPH	76	JUPH	JUPH	55
			BG	1	BG	1	BG	BG	1	BG	1	BG	BG	1
			TH	22	TH	20	TH	TH	22	TH	20	TH	TH	22
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
4	10 m	41%	AICA	1	BRMI	1	BRMI	1	BRMI	1	BRMI	2	BRMI	1
			BRMI	1	DISP	16	DISP	6	DISP	6	DISP	9	DISP	4
			COCO	1	ELACa	4	ELACa	2	ELACa	3	ELACa	3	ELACa	1
			DISP	10	ELMA	8	ELMA	7	ELMA	3	ELMA	3	ELMA	1
			ELACa	16	PHLE	3	JUPH	1	JUPH	1	ERCA	1	JUPH	3
			ELMA	6	POMO	12	LYHY	2	LYHY	1	PHLE	1	PHLE	1
			ERCA	4	STAJ	2	PHLE	1	PHLE	1	POMO	10	POMO	5
			ISHO	1	TH	54	POMO	11	POMO	20	PSLU	1	STAJ	33
			JUPH	1			PSLU	1	SOOL	1	PSST	2	BG	9
			LYHY	1			RUCR	1	STAJ	19	RUCR	1	TH	42
			PHLE	2			STAJ	13	BG	7	STAJ	5		
			POMO	10			BG	2	TH	37	BG	6		
			BG	3			TH	52			TH	56		
			TH	43										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 60 2020 Species List

Species Name	Common Name	Species Code
Agrostis avenacea	Pacific bent grass	AGAV
Aira caryophyllea	silvery hair-grass	AICA
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
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3
Clarkia purpurea ssp. *quadrivulnera*	winecup clarkia	CLPUQ
Cotula coronopifolia	brass buttons	COCO
Danthonia californica	California oat grass	DACA
Daucus pusillus	rattlesnake weed	DAPU
Deinandra corymbosa	coastal tarweed	DECO
Distichlis spicata	salt grass	DISP
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa
Eleocharis macrostachya	pale spikerush	ELMA
Elymus triticoides	beardless wild rye	ELTR3
Erigeron canadensis	horseweed	ERCA
Erodium botrys	long-beaked filaree	ERBO
Eryngium armatum	coyote thistle	ERAR12
Euthamia occidentalis	western goldenrod	EUOC
Festuca bromoides	brome fescue	FEBR
Festuca perennis	Italian rye grass	FEPE
Galium aparine	goose grass	GAAP
Gamochaeta ustulata	purple cudweed	GAUS
Geranium dissectum	cut-leaved geranium	GEDI
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
Isoetes howellii	Howell's quillwort	ISHO
Juncus bufonius var. *occidentalis*	round-fruited toad rush	JUBUO
Juncus phaeocephalus	brown-headed rush	JUPH
Logfia gallica	narrowleaf cottonrose	LOGA
Lysimachia arvensis	scarlet pimpernel	LYAR
Lythrum hyssopifolia	grass poly	LYHY
Madia gracilis	gumweed	MAGR
Madia sativa	coast tarweed	MASA
Malvella leprosa	alkali mallow	MALE
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
Polypogon monspeliensis	rabbitfoot grass	POMO
Pseudognaphalium luteoalbum	weedy cudweed	PSLU
Pseudognaphalium ramosissimum	pink everlasting	PSRA
Pseudognaphalium stramineum	cottonbatting plant	PSST
Rumex acetosella	sheep sorrel	RUAC
Rumex crispus	curly dock	RUCR
Senecio glomeratus	cutleaf burnweed	SEGL
Sisyrinchium bellum	western blue-eyed grass	SIBE
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Stachys ajugoides	bugle hedge nettle	STAJ
Triglochin scilloides	flowering quillwort	TRSC
Zeltnera davyi	Davy's centuary	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

Table A-17. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 61			
Date	5/19/2020, 5/20/2020, 6/3/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond was dry by 6/3/2020. Strata 1 through 4 were repeated from 2017, 2018, and 2019. Transect 1 was repeated from 2017, whereas Transect 3 was repeated from 2017, 2018, and 2019. Transect 4 was repeated from 2019. Stratum 2 consisted of CCG and no transect was placed in this stratum. An upland stratum was mapped and occupied 32% 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	1%	BRTEt	4	BRTEt	3	ELMA	15	ELACa	2	BRTEt	1	CRAQ	1
			ELACa	6	ELACa	2	ISHO	8	ELMA	3	CRAQ	1	ELMA	10
			ELMA	40	ELMA	40	LAGL3	1	ISHO	3	ELACa	5	ISHO	8
			LAGL3	2	ISHO	8	PLCHh	1	LACO	6	ELMA	20	LACO	2
			LYHY	3	LAGL3	5	TRSC	12	LAGL3	5	ISHO	2	LAGL3	1
			LYMI	1	PLCHh	1	BG	45	PLCHh	3	LACO	3	LYMI	1
			PLCHh	2	POMO	1	TH	18	BG	20	LAGL3	3	PLCHh	3
			POMO	1	BG	12			TH	58	PLCHh	2	TRSC	3
			POZI	1	TH	28					TRSC	3	BG	66
			PSCH	2							BG	48	TH	5
			BG	12							TH	12		
			TH	26										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
3	**10 m**	**4%**	AGLAv	1	BRTEt	3	BRTEt	18	BRTEt	10	BRTEt	3	BRTEt	5
			BRMA	1	CIQU	1	ELACa	3	ELACa	4	ELACa	5	ELACa	11
			BRMI	3	DEDA	1	ERAR12	12	ERAR12	14	ERAR12	33	ERAR12	22
			BRTEt	1	ELACa	12	LAGL3	13	ISHO	2	ISHO	2	ISHO	10
			DACA	1	ERAR12	10	LYHY	2	JUPH	2	JUPH	1	JUPH	1
			ELACa	25	ISHO	1	LYMI	1	LAGL3	12	LAGL3	8	LAGL3	3
			ERAR12	8	JUPH	1	PLCHh	16	LYHY	3	LYHY	3	LYHY	3
			FEMY	1	LAGL3	3	POMO	1	LYMI	1	LYMI	4	LYMI	2
			GEDI	3	LYHY	14	POZI	12	PLCHh	15	PLCHh	20	PLCHh	30
			HYGL	1	LYMI	1	BG	3	PSCH	1	BG	5	POZI	1
			JUPH	2	PLCHh	16	TH	20	BG	18	TH	16	BG	2
			LYHY	15	PSCH	1			TH	18			TH	10
			LYMI	2	UNK1	1								
			MAGR	1	BG	20								
			MIPA	1	TH	15								
			PLCHh	5										
			PSCH	4										
			SOOL	4										
			TRVA	1										
			BG	10										
			TH	10										
			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
4	**10 m**	**59%**	BRMA	3	ACAMa	1	BRMA	2	BRMA	8	ACMI	1	ACMI	6
			BRTEt	1	BRMA	1	BRMI	1	BRMI	1	BRHO	1	AICA	1
			DACA	40	BRTEt	2	DACA	15	BRTEt	1	BRMA	5	BRHO	1
			GEDI	3	DACA	8	ELACa	3	DACA	20	DACA	60	BRMA	5
			HYGL	3	ERAR12	18	ERAR12	3	ELACa	3	ELACa	2	BRTEt	1
			JUPH	30	GEDI	4	HYGL	6	ERAR12	2	GEDI	6	DACA	30
			LYMI	2	HYGL	4	JUPH	30	FEMY	1	JUPH	10	ERAR12	4
			MAGR	2	HYRA	2	LYMI	3	GEDI	12	MAGR	3	GEDI	2
			MIPA	2	JUPH	40	MAGR	8	JUPH	3	MIPA	3	HYGL	1
			BG	2	LYAR	2	MIPA	1	MAGR	15	BG	2	MAGR	25
			TH	12	LYMI	1	BG	10	MASA	5	TH	8	MIPA	2
					MAGR	3	TH	18	BG	9			BG	6
					MIPA	2			TH	20			TH	16
					BG	2								
					TH	10								
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**101**	**TOTAL**	**100**

Pond 61 2020 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Acaena pinnatifida var. *californica*	California acaena	ACPIC	*Juncus bufonius* var. *bufonius*	common toad rush	JUBUB
Achillea millefolium	common yarrow	ACMI	*Juncus capitatus*	dwarf rush	JUCA
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Juncus occidentalis*	western rush	JUOC
Acmispon glaber	deerweed	ACGL	*Juncus phaeocephalus*	brown-headed rush	JUPH
Acmispon parviflorus	hill lotus	ACPA	*Koeleria macrantha*	June grass	KOMA
Adenostoma fasciculatum	chamise	ADFA	*Lasthenia glaberrima*	smooth goldfields	LAGL3
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV	*Leptosiphon parviflorus*	variable linanthus	LEPA
Aira caryophyllea	silvery hair-grass	AICA	*Linum bienne*	pale flax	LIBI5
Allium hickmanii	Hickman's onion	ALHI	*Lupinus nanus*	sky lupine	LUNA
Arctostaphylos tomentosa	woolly leaf manzanita	ARTO	*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	*Madia gracilis*	gumweed	MAGR
Briza minor	annual quaking grass	BRMI	*Madia sativa*	coast tarweed	MASA
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Microseris paludosa*	marsh microseris	MIPA
Bromus carinatus	California brome	BRCA	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Bromus diandrus	ripgut grass	BRDI	*Plantago coronopus*	cut-leaved plantain	PLCO
Bromus hordeaceus	soft chess	BRHO	*Plantago erecta*	California plantain	PLER
Calandrinia ciliata	red maids	CACI	*Pogogyne zizyphoroides*	Sacramento mesa mint	POZI
Callitriche marginata	California water-starwort	CAMA	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Calochortus uniflorus	pink star-tulip	CAUN	*Pseudognaphalium californicum*	California everlasting	PSCA
Calystegia subacaulis ssp. *subacaulis*	hill morning glory	CASUS	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Carduus pycnocephalus	Italian thistle	CAPY	*Pseudognaphalium ramosissimum*	pink everlasting	PSRA
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Castilleja densiflora	dense flower owl's clover	CADE	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Centaurea melitensis	Maltese star-thistle	CEME	*Quercus agrifolia*	coast live oak	QUAG
Chlorogalum pomeridianum	wavyleaf soap plant	CHPO	*Ranunculus californicus*	California buttercup	RACA
Cicendia quadrangularis	timwort	CIQU	*Rumex acetosella*	sheep sorrel	RUAC
Cirsium quercetorum	brownie thistle	CIQU2	*Senecio glomeratus*	cutleaf burnweed	SEGL
Clarkia purpurea ssp. *quadrivulnera*	winecup clarkia	CLPUQ	*Sidalcea malviflora* ssp. *malviflora*	checkerbloom	SIMAM
Corethrogyne filaginifolia	common sandaster	COFI	*Silene gallica*	small-flower catchfly	SIGA
Danthonia californica	California oat grass	DACA	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Deinandra corymbosa	coastal tarweed	DECO	*Sonchus asper*	prickly sow thistle	SOAS
Deschampsia danthonioides	annual hair grass	DEDA	*Sonchus oleraceus*	common sow thistle	SOOL
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Stachys ajugoides*	bugle hedge nettle	STAJ
Eleocharis macrostachya	pale spikerush	ELMA	*Stipa cernua*	nodding needle grass	STCE
Elymus glaucus	blue wild-rye	ELGL	*Taraxia ovata*	sun cups	TAOV
Erodium botrys	long-beaked filaree	ERBO	*Tribolium obliterum*	Capetown grass	TROB
Eryngium armatum	coyote thistle	ERAR12	*Trifolium polyodon*	Pacific Grove clover	TRPO3
Festuca bromoides	brome fescue	FEBR	*Trifolium variegatum*	variegated clover	TRVA
Festuca myuros	rattail sixweeks grass	FEMY	*Triglochin scilloides*	flowering quillwort	TRSC
Festuca perennis	Italian rye grass	FEPE	*Triteleia hyacinthina*	white brodiaea	TRHY3
Galium porrigens	climbing bedstraw	GAPO	*Triteleia ixioides*	coast pretty face	TRIX
Gamochaeta ustulata	purple cudweed	GAUS	*Unknown 1*		
Geranium dissectum	cut-leaved geranium	GEDI	*Vicia benghalensis*	purple vetch	VIBE
Gnaphalium palustre	lowland cudweed	GNPA	*Vicia sativa* ssp. *sativa*	spring vetch	VISAS
Heteromeles arbutifolia	toyon	HEAR	*Zeltnera davyi*	Davy's centaury	ZEDA
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	HOMAG	**Groundcover Codes**		
Hypochaeris glabra	smooth cat's-ear	HYGL	BG	Bare Ground	
Isoetes howellii	Howell's quillwort	ISHO	TH	Thatch/Duff	
Isolepis carinata	keeled bulrush	ISCA	AL	Algae	

Table A-18. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 73			
Date	6/3/2020, 6/4/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			

Notes

Pond was dry by 6/4/2020. Strata 1 and 2 were repeated from 2017, 2018, and 2019, whereas stratum 4 was repeated from 2018 and 2019. Transect 1 was repeated from 2018 and 2019. Transect 2 was relocated to an area with more representative vegetative composition. Transect 4 was repeated from 2018. An upland stratum was mapped and occupied 32% 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	11%	ELMA	57	ELMA	64	ELMA	70
			POMO	2	JUPH	1	BG	1
			BG	6	BG	2	TH	29
			TH	35	TH	33		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	10 m	46%	DEDA	1	DEDA	1	ERAR12	2	ELACa	1	DEDA	1	ELACa	6
			ERAR12	1	ERAR12	1	JUPH	75	ERAR12	4	ELACa	3	ERAR12	12
			GEDI	1	JUPH	75	LAGL3	1	JUPH	75	ERAR12	25	JUPH	65
			JUPH	80	LAGL3	1	POMO	1	LAGL3	1	JUPH	35	LAGL3	1
			LAGL3	1	POMO	1	TH	21	POMO	1	LAGL3	1	POMO	3
			PLCHh	1	TH	21			TH	18	POMO	8	TH	13
			POMO	4							TH	27		
			TH	12										
			TOTAL	**101**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
4	**10 m**	**41%**	BRMI	1	BRMI	1	BRMI	1	AGLAv	1	BRMI	1	BRMI	1
			DECO	1	DECO	1	CAAMa3	2	BRMI	1	CAAMa3	5	CAAMa3	2
			DEDA	1	DEDA	7	DECO	1	CAAMa3	3	DECO	2	DECO	3
			ELACa	6	ERAR12	18	DEDA	1	DECO	5	DEDA	1	DEDA	2
			ERAR12	40	HYGL	2	ERAR12	18	DEDA	1	ERAR12	45	ERAR12	24
			GEDI	1	JUCA	1	HYGL	2	ELACa	2	HYGL	2	HYGL	1
			JUPH	12	JUPH	8	JUBUb	1	ERAR12	40	JUPH	15	HYRA	1
			LYHY	8	LYMI	1	JUPH	8	HYGL	1	LYMI	1	JUBUb	1
			LYMI	1	POMO	45	LOGA	1	JUPH	20	POMO	12	JUCA	2
			PLCHh	1	PSCH	1	LYHY	2	LYHY	1	SOOL	1	JUPH	12
			POMO	12	ZEDA	1	LYMI	1	LYMI	1	BG	9	LYHY	1
			PSCH	1	BG	7	PLCHh	1	POMO	5	TH	6	LYMI	1
			BG	8	TH	7	POMO	45	SOOL	1			POMO	20
			TH	7			PSCH	1	ZEDA	1			PSCH	1
							SOOL	1	BG	10			SOOL	1
							ZEDA	1	TH	7			ZEDA	1
							BG	6					BG	11
							TH	7					TH	15
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 73 2020 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI	*Juncus bufonius* var. *bufonius*	common toad rush	JUBUB
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Juncus bufonius* var. *congestus*	clustered toad rush	JUBUC2
Acmispon parviflorus	hill lotus	ACPA	*Juncus capitatus*	dwarf rush	JUCA
Agrostis avenacea	Pacific bent grass	AGAV	*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	*Logfia gallica*	narrowleaf cottonrose	LOGA
Aira caryophyllea	silvery hair-grass	AICA	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Avena barbata	slender wild oat	AVBA	*Lysimachia minima*	chaffweed	LYMI
Baccharis pilularis	coyote brush	BAPI	*Lythrum hyssopifolia*	grass poly	LYHY
Briza maxima	rattlesnake grass	BRMA	*Madia exigua*	small tarweed	MAEX
Briza minor	annual quaking grass	BRMI	*Madia gracilis*	gumweed	MAGR
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Madia sativa*	coast tarweed	MASA
Bromus diandrus	ripgut grass	BRDI	*Microseris paludosa*	marsh microseris	MIPA
Bromus hordeaceus	soft chess	BRHO	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3	*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	*Pogogyne zizyphoroides*	Sacramento mesa mint	POZI
Danthonia californica	California oat grass	DACA	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Deinandra corymbosa	coastal tarweed	DECO	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Deschampsia cespitosa ssp. *cespitosa*	tufted hair grass	DECEC2	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Deschampsia danthonioides	annual hair grass	DEDA	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa	*Rumex acetosella*	sheep sorrel	RUAC
Eleocharis macrostachya	pale spikerush	ELMA	*Rumex crispus*	curly dock	RUCR
Elymus triticoides	beardless wild rye	ELTR3	*Senecio glomeratus*	cutleaf burnweed	SEGL
Epilobium ciliatum ssp. *watsonii*	willow herb	EPCIW	*Silene gallica*	small-flower catchfly	SIGA
Erodium botrys	long-beaked filaree	ERBO	*Sonchus oleraceus*	common sow thistle	SOOL
Eryngium armatum	coyote thistle	ERAR12	*Spiranthes romanzoffiana*	hooded lady's tresses	SPRO
Festuca myuros	rattail sixweeks grass	FEMY	*Taraxia ovata*	sun cups	TAOV
Galium aparine	goose grass	GAAP	*Toxicodendron diversilobum*	poison oak	TODI
Galium porrigens	climbing bedstraw	GAPO	*Triglochin scilloides*	flowering quillwort	TRSC
Gamochaeta ustulata	purple cudweed	GAUS	*Triteleia ixioides*	coast pretty face	TRIX
Geranium dissectum	cut-leaved geranium	GEDI	*Zeltnera davyi*	Davy's centuary	ZEDA
Heterocodon rariflorum	western pearlflower	HERA	**Groundcover Codes**		
Hypochaeris glabra	smooth cat's-ear	HYGL	BG	Bare Ground	
Hypochaeris radicata	rough cat's-ear	HYRA	TH	Thatch/Duff	
Isoetes howellii	Howell's quillwort	ISHO	AL	Algae	

Table A-19. Machine Gun Flats (Year 3 Post-Mastication) Wetland Vegetation Transect Data by Stratum

Machine Gun Flats			
Date	5/29/2020, 6/4/2020, 6/5/2020, 6/25/2020		
Surveying Personnel	Kayti Christianson, Emily Poor, and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation	21	ELMA, PEAM	15% ELMA, 6% PEAM
Floating Vegetation	50	PONO	
Submerged Vegetation			
Open Water	29		
Notes			
Machine Gun Flats was inundated 85 cm on 6/25/2020. Inundated area was 0.3% of the basin boundary. Strata 1 through 9 were repeated from 2019. Transects 3 and 5 were relocated to an area with more representative vegetative composition. All other transects were repeated from 2019.			

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
2	10 m	53%	AGAV	1	AGAV	1	AGAV	3	DISP	2	DISP	1	ELMA	12
			DISP	2	DISP	2	DISP	1	ELACa	1	ELACa	1	POMO	10
			ELMA	12	ELMA	13	ELMA	9	ELMA	28	ELMA	14	PONO	3
			POMO	2	JUPH	1	JUPH	4	JUBA	1	JUPH	1	BG	1
			PONO	1	LYHY	1	LYHY	1	MALE	1	MALE	1	TH	74
			BG	6	POMO	11	POMO	3	POMO	1	POMO	5		
			TH	76	PONO	2	PONO	4	PONO	3	BG	3		
					TH	69	TH	75	TH	63	TH	74		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
3	5 m	1%	AGAV	3	AGAV	4	BRMI	1
			BRMI	2	BRMI	3	CAPY	1
			DECO	1	DECO	3	DECO	4
			ERCA	4	DISP	5	DISP	6
			GEDI	3	ELTR3	1	ERBO	3
			HYRA	2	ERCA	1	GEDI	4
			JUBA	15	GEDI	4	HYGL	4
			LYHY	1	HYGL	2	JUBA	2
			MALE	2	JUBA	1	PLCO	6
			POMO	20	LYHY	4	POMO	12
			PSLU	2	MALE	1	PSLU	2
			PSST	1	POMO	10	SIGA	1
			SEGL	5	PSLU	3	SOAS	1
			SIGA	1	SEGL	6	SOOL	1
			SOAS	2	STAJ	4	STAJ	1
			SOOL	2	BG	17	BG	8
			BG	3	TH	31	TH	43
			TH	31				
			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	9%	BRHO	1	BRHO	1	DISP	30	BRMI	4	AICA	1	AICA	1
			BRMI	1	BRMI	1	ERAR12	12	DECO	15	BRMI	1	BRMI	1
			DISP	6	DISP	20	GEDI	8	DISP	1	DECO	30	DECO	2
			ERAR12	24	ERAR12	40	HYGL	3	ERBO	1	DISP	3	DISP	2
			ERBO	1	GEDI	3	PLCO	1	GEDI	5	ERAR12	5	ERAR12	35
			GEDI	5	HYGL	1	STAJ	3	HYGL	11	GEDI	2	FEPE	1
			HYGL	1	SOOL	3	BG	1	JUPH	2	HYGL	4	GEDI	2
			SOOL	1	STAJ	3	TH	45	MALE	2	LIBI5	1	LIBI5	5
			STAJ	13	BG	1			STAJ	3	MALE	6	LYHY	1
			ZEDA	1	TH	27			BG	2	SOOL	1	MALE	1
			BG	2					TH	54	BG	3	SOOL	1
			TH	44							TH	43	STAJ	2
													BG	3
													TH	43
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**103**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
5	5 m	5%	DISP	1	ELACa	2	AGAV	1
			ELACa	3	GEDI	1	JUBA	29
			GEDI	3	JUBA	30	BG	30
			JUBA	25	PSST	2	TH	40
			JUPH	2	BG	25		
			BG	15	TH	40		
			TH	51				
			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	3%	ELACa	2	ELACa	3	EUOC	20
			EUOC	25	EUOC	28	JUBA	18
			JUBA	15	GEDI	1	LYAR	1
			LYAR	1	JUBA	16	PS sp.	1
			PS sp.	1	LYAR	1	SOOL	2
			VELAI	1	PS sp.	1	VELAI	1
			BG	28	BG	20	BG	35
			TH	25	TH	30	TH	22
			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
7	10 m	6%	AICA	5	AICA	6	AICA	2	AGLAv	1	AGLAv	2	AGLAv	2
			BRMI	1	BRMI	1	BRMI	1	AICA	1	AICA	1	AICA	2
			BRTEt	2	BRTEt	1	BRTEt	3	BRMI	1	BRMI	1	BRMI	1
			CAAMa3	3	CAAMa3	3	CAAMa3	8	CAAMa3	8	BRTEt	1	CAAMa3	2
			DACA	2	DACA	2	CAAT	1	DACA	1	CAAMa3	3	ERAR12	10
			ERAR12	20	ERAR12	32	DACA	2	ERAR12	15	ERAR12	6	ERBO	1
			ERBO	3	ERBO	2	DECO	2	ERBO	2	ERBO	1	JUPH	2
			FEBR	2	FEBR	2	ERAR12	25	FEBR	1	FEBR	1	LYMI	2
			HYGL	2	HYGL	2	ERBO	3	GEDI	1	FEMY	1	PLCO	8
			JUBUb	2	JUBUb	1	FEBR	1	HYGL	1	JUBUb	1	PSCH	2
			JUCA	1	JUPH	1	JUPH	1	JUBUb	1	JUPH	2	ZEDA	3
			JUPH	1	LYHY	1	LYHY	1	JUPH	2	LYMI	1	BG	50
			LYAR	1	LYMI	1	MA sp.	2	LYMI	1	PLCO	8	TH	15
			MA sp.	1	MA sp.	2	PLCO	15	PLCO	7	PSCH	1		
			MAGR	1	MAGR	1	TR sp.	1	ZEDA	3	ZEDA	2		
			SOOL	1	PLCO	1	TRDE	3	BG	39	BG	34		
			ZEDA	1	ZEDA	3	TRVA	1	TH	15	TH	34		
			BG	20	BG	23	BG	3						
			TH	30	TH	15	TH	25						
			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
8	10 m	21%	DACA	25	BRTEt	1	BRMI	1	BRMI	1	FEBR	38	DACA	10
			ERBO	15	DACA	40	BRTEt	1	BRTEt	6	HYGL	1	ERBO	2
			FEBR	10	FEBR	15	DACA	45	DACA	10	MAGR	1	FEBR	60
			FEPE	8	FEPE	5	ERBO	2	ERBO	3	BG	1	FEPE	4
			HYGL	12	GEDI	2	FEBR	5	FEBR	25	TH	59	HYGL	1
			LIBI5	3	LIBI5	3	FEPE	1	FEPE	5			MAGR	2
			LYHY	3	BG	10	GEDI	2	HYGL	1			BG	3
			BG	4	TH	24	HYGL	2	LIBI5	3			TH	18
			TH	20			LIBI5	2	BG	12				
							MAGR	2	TH	33				
							BG	10						
							TH	27						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**99**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3	
			Species	% Cover	Species	% Cover	Species	% Cover
9	5 m	2%	ELTR3	30	AVBA	1	BRMI	4
			ERCA	3	ELTR3	57	ELACa	5
			GEDI	2	ERCA	4	ELTR3	30
			HYGL	2	HYGL	3	ERCA	5
			LYAR	1	LYHY	1	GEDI	1
			LYHY	1	PLCO	1	HYGL	5
			PS?	1	PSLU	1	LYAR	1
			RUAC	6	SEGL	10	POMO	1
			SEGL	2	SOAS	1	SEGL	6
			SOOL	1	SOOL	1	SOAS	1
			BG	12	BG	5	BG	2
			TH	39	TH	15	TH	39
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Machine Gun Flats 2020 Species List

Species Name	Common Name	Species Code
Acaena pinnatifida var. *californica*	California acaena	ACPIC
Achillea millefolium	common yarrow	ACMI
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA
Acmispon wrangelianus	Chilean trefoil	ACWR
Agrostis avenacea	Pacific bent grass	AGAV
Agrostis lacuna-vernalis	vernal pool bent grass	AGLAV
Aira caryophyllea	silvery hair-grass	AICA
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 carinatus	California brome	BRCA
Bromus diandrus	ripgut grass	BRDI
Bromus hordeaceus	soft chess	BRHO
Calochortus uniflorus	pink star-tulip	CAUN
Carduus pycnocephalus	Italian thistle	CAPY
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3
Castilleja densiflora ssp. *densiflora*	dense flower owl's clover	CADED
Castilleja exserta	purple owl's-clover	CAEX
Cirsium brevistylum	Indian thistle	CIBR
Cirsium quercetorum	brownie thistle	CIQU2
Cirsium vulgare	bull thistle	CIVU
Clarkia purpurea ssp. *quadrivulnera*	winecup clarkia	CLPUQ
Conium maculatum	poison hemlock	COMA
Cotula coronopifolia	brass buttons	COCO
Cynosurus echinatus	bristly dogtail grass	CYEC
Cyperus eragrostis	tall cyperus	CYER
Danthonia californica	California oat grass	DACA
Deinandra corymbosa	coastal tarweed	DECO
Deschampsia danthonioides	annual hair grass	DEDA
Diplacus aurantiacus	sticky monkey flower	DIAU
Distichlis spicata	salt grass	DISP
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACa
Eleocharis macrostachya	pale spikerush	ELMA
Elymus glaucus	blue wild-rye	ELGL
Elymus triticoides	beardless wild rye	ELTR3
Erigeron bonariensis	flax-leaved horseweed	ERBO4
Erigeron canadensis	horseweed	ERCA
Erodium botrys	long-beaked filaree	ERBO
Erodium cicutarium	redstem filaree	ERCI
Eryngium armatum	coyote thistle	ERAR12
Eschscholzia californica	California poppy	ESCA
Euthamia occidentalis	western goldenrod	EUOC
Festuca bromoides	brome fescue	FEBR
Festuca myuros	rattail sixweeks grass	FEMY
Festuca perennis	Italian rye grass	FEPE
Galium aparine	goose grass	GAAP
Gamochaeta ustulata	purple cudweed	GAUS
Geranium dissectum	cut-leaved geranium	GEDI
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO
Hordeum brachyantherum ssp. *brachyantherum*	meadow barley	HOBRB
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	HOMAG
Horkelia cuneata	wedge-leaved horkelia	HOCU
Hypericum perforatum ssp. *perforatum*	Klamathweed	HYPEP
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
Juncus balticus	Baltic rush	JUBA
Juncus bufonius var. *bufonius*	common toad rush	JUBUB
Juncus bufonius var. *occidentalis*	round-fruited toad rush	JUBUO
Juncus capitatus	dwarf rush	JUCA
Juncus occidentalis	western rush	JUOC
Juncus phaeocephalus	brown-headed rush	JUPH
Lactuca serriola	prickly lettuce	LASE
Leptosiphon parviflorus	variable linanthus	LEPA
Linum bienne	pale flax	LIBI5
Logfia gallica	narrowleaf cottonrose	LOGA
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
Madia sp.		
Malvella leprosa	alkali mallow	MALE
Microseris paludosa	marsh microseris	MIPA
Oxalis corniculata	creeping woodsorrel	OXCO
Persicaria amphibia	water smartweed	PEAM
Phalaris lemmonii	Lemmon's canary grass	PHLE
Plagiobothrys chorisianus var. *hickmanii*	Hickman's popcornflower	PLCHH
Plantago coronopus	cut-leaved plantain	PLCO
Plantago erecta	California plantain	PLER
Plantago lanceolata	English plantain	PLLA
Polypogon monspeliensis	rabbitfoot grass	POMO
Potamogeton nodosus	longleaf pondweed	PONO
Pseudognaphalium californicum	California everlasting	PSCA
Pseudognaphalium luteoalbum	weedy cudweed	PSLU
Pseudognaphalium ramosissimum	pink everlasting	PSRA
Pseudognaphalium stramineum	cottonbatting plant	PSST
Psilocarphus chilensis	round woolly-marbles	PSCH
Quercus agrifolia	coast live oak	QUAG
Ranunculus californicus	California buttercup	RACA
Rorippa curvisiliqua	western yellowcress	ROCU
Rubus ursinus	California blackberry	RUUR
Rumex acetosella	sheep sorrel	RUAC
Rumex crispus	curly dock	RUCR
Senecio glomeratus	cutleaf burnweed	SEGL
Sidalcea malviflora ssp. *malviflora*	checkerbloom	SIMAM
Silene gallica	small-flower catchfly	SIGA
Sisyrinchium bellum	western blue-eyed grass	SIBE
Solanum americanum	small-flowered nightshade	SOAM
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Spiranthes romanzoffiana	hooded lady's tresses	SPRO
Stachys ajugoides	bugle hedge nettle	STAJ
Stipa pulchra	purple needle grass	STPU
Stylocline gnaphaloides	everlasting stylocline	STGN
Taraxia ovata	sun cups	TAOV
Torilis arvensis	tall sock destroyer	TOAR
Toxicodendron diversilobum	poison oak	TODI
Trifolium angustifolium	narrow-leaved clover	TRAN
Trifolium barbigerum	bearded clover	TRBA
Trifolium depauperatum	sack clover	TRDE
Trifolium dubium	little hop clover	TRDU
Trifolium microcephalum	small head clover	TRMI
Trifolium variegatum	variegated clover	TRVA
Triglochin scilloides	flowering quillwort	TRSC
Triteleia ixioides	coast pretty face	TRIX
Verbena lasiostachys var. *lasiostachys*	western vervain	VELAL
Vicia villosa ssp. *varia*	winter vetch	VIVIV8
Zeltnera davyi	Davy's centuary	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

**Table A-20. Pond 16 (Year 2 Post-Subsurface Munitions Remediation)
Wetland Vegetation Transect Data by Stratum**

POND 16			
Date	6/15/2020, 8/11/2020		
Surveying Personnel	Kayti Christianson, Emily Poor and Lizzy Eichorn		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			

Notes

Pond was dry by 8/11/2020. Strata 3 and 5 were repeated from 2015, 2017, and 2019. Strata 1, 4, and 6 were repeated from 2017 and 2019. Transects 3 and 5 were repeated from 2015, 2017, and 2019. Transect 4 was repeated from 2019, whereas Transect 6 was repeated from 2017 and 2019. No transect was placed in strata 1 due to the height and density of the vegetation; instead, a visual cover estimate was conducted to access vegetative cover.

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
3	**10 m**	**34%**	ELMA	65	ELMA	75	CRSC2	4	CRSC2	9	CRSC2	9	CRSC2	5
			MALE	2	MALE	2	ELMA	63	ECCR	1	ELMA	50	ECCR	1
			BG	3	BG	7	GNPA	9	ELMA	37	GNPA	7	ELMA	31
			TH	30	TH	16	BG	4	GNPA	22	BG	6	GNPA	21
							TH	20	BG	16	TH	28	BG	12
									TH	15			TH	30
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative % Cover of Wetland	Quadrat #1		Quadrat #2		Quadrat #3		Quadrat #4		Quadrat #5		Quadrat #6	
			Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover	Species	% Cover
4	**10 m**	**25%**	AGPA	1	CAPR	64	BRMI	1	CAPR	69	RUUR	20	CAPR	1
			CAPR	60	JUPH	2	CAPR	70	CIVU	5	CAPR	57	JUBA	75
			JUBA	1	RUUR	8	CIVU	3	ELTR3	1	JUBA	2	RUUR	15
			JUPH	2	TH	25	JUBA	1	JUBA	1	TH	20	TH	8
			TH	33	BG	1	RUUR	4	JUPH	1	BG	1	BG	1
			BG	2			TH	20	RUUR	7				
							BG	1	TH	15				
									BG	1				
			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**	**33%**	CABA	30	CABA	33	CABA	38	CABA	30	CABA	60	CABA	45
			RUUR	18	RUUR	20	RUUR	35	RUUR	18	RUUR	11	RUUR	16
			SOEL	15	SOEL	14	SOEL	1	SOEL	18	SOEL	1	SOEL	10
			TH	29	TH	15	TH	19	TH	25	TH	22	TH	15
			BG	8	BG	18	BG	7	BG	9	BG	6	BG	14
			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%**	JUBA	85	JUBA	65	JUBA	65
			TH	10	PSLU	1	TH	32
			BG	5	RUCR	2	BG	3
					TH	28		
					BG	4		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 16 2020 Species List

Species Name	Common Name	Species Code
Achillea millefolium	common yarrow	ACMI
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA
Agrostis exarata	spike bent grass	AGEX
Agrostis pallens	seashore bent grass	AGPA
Aira caryophyllea	silvery hair-grass	AICA
Arctostaphylos tomentosa ssp. *tomentosa*	woolly leaf manzanita	ARTOT
Artemisia douglasiana	mugwort	ARDO
Asparagus officinalis	garden asparagus	ASOF
Avena barbata	slender wild oat	AVBA
Baccharis pilularis	coyote brush	BAPI
Briza maxima	rattlesnake grass	BRMA
Briza minor	annual quaking grass	BRMI
Bromus hordeaceus	soft chess	BRHO
Carduus pycnocephalus	Italian thistle	CAPY
Carex barbarae	whiteroot	CABA
Carex harfordii	Harford's sedge	CAHA4
Carex praegracilis	clustered field sedge	CAPR
Carpobrotus edulis	ice plant	CAED
Cirsium brevistylum	Indian thistle	CIBR
Cirsium vulgare	bull thistle	CIVU
Conium maculatum	poison hemlock	COMA
Crypsis schoenoides	swamp pricklegrass	CRSC2
Cyperus eragrostis	tall cyperus	CYER
Drymocallis glandulosa var. *wrangelliana*	sticky cinquefoil	DRGLW
Echinochloa crus-galli	barnyard grass	ECCR
Elatine californica	California waterwort	ELCA
Eleocharis macrostachya	pale spikerush	ELMA
Elymus glaucus	blue wild-rye	ELGL
Elymus triticoides	beardless wild rye	ELTR3
Epilobium ciliatum	fringed willowherb	EPCI
Erigeron canadensis	horseweed	ERCA
Festuca myuros	rattail sixweeks grass	FEMY
Festuca perennis	Italian rye grass	FEPE
Galium porrigens	climbing bedstraw	GAPO
Geranium dissectum	cut-leaved geranium	GEDI
Gnaphalium palustre	lowland cudweed	GNPA
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO
Helminthotheca echioides	bristly oxtongue	HEEC
Heteromeles arbutifolia	toyon	HEAR
Heterotheca grandiflora	telegraph weed	HEGR
Horkelia cuneata var. *cuneata*	wedge-leaved horkelia	HOCUC
Hypericum anagalloides	creeping St. John's wort	HYAN
Hypochaeris glabra	smooth cat's-ear	HYGL
Hypochaeris radicata	rough cat's-ear	HYRA
Iris douglasiana	Douglas iris	IRDO
Juncus balticus	Baltic rush	JUBA
Juncus effusus	common rush	JUEF
Juncus falcatus	falcate rush	JUFA
Juncus occidentalis	western rush	JUOC
Juncus phaeocephalus	brown-headed rush	JUPH
Lupinus arboreus	yellow bush lupine	LUAR
Luzula comosa	Pacific woodrush	LUCO6
Lysimachia arvensis	scarlet pimpernel	LYAR
Lythrum hyssopifolia	grass poly	LYHY
Madia sativa	coast tarweed	MASA
Navarretia hamata ssp. *parviloba*	hooked navarretia	NAHAP
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
Pteridium aquilinum var. *pubescens*	western bracken fern	PTAQP
Quercus agrifolia	coast live oak	QUAG
Rosa californica	California wild rose	ROCA
Rubus ursinus	California blackberry	RUUR
Rumex acetosella	sheep sorrel	RUAC
Rumex crispus	curly dock	RUCR
Rumex salicifolius	willow dock	RUSA
Salix lasiandra var. lasiandra	shining willow	SALAL
Schoenoplectus californicus	California bulrush	SCCA
Senecio glomeratus	cutleaf burnweed	SEGL
Silybum marianum	milk thistle	SIMA
Solanum americanum	small-flowered nightshade	SOAM
Solidago elongata	West Coast Canada goldenrod	SOEL
Solidago velutina ssp. *californica*	California goldenrod	SOVEC
Sonchus asper	prickly sow thistle	SOAS
Sonchus oleraceus	common sow thistle	SOOL
Stachys ajugoides	bugle hedge nettle	STAJ
Stachys bullata	California hedge nettle	STBU
Toxicodendron diversilobum	poison oak	TODI
Zeltnera davyi	Davy's centuary	ZEDA
Groundcover Codes		
BG	Bare Ground	
TH	Thatch/Duff	
AL	Algae	

APPENDIX B

Stratum Cover by Vernal Pool

This page intentionally left blank

Table B-1. Pond 5 (Reference) Wetland Vegetation Cover by Stratum

POND 5			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**35%**	AGAV	0.2
		ELMA	50.5
		MALE	0.5
		POMO	1.0
		TH	46.2
		BG	1.7
		TOTAL	**100.0**
2	**32%**	DISP	2.3
		ELMA	35.0
		MALE	0.2
		POMO	3.7
		TH	58.8
		TOTAL	**100.0**

POND 5			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**12%**	AGGR	0.2
		BRMI	0.3
		CRTR	1.7
		DISP	3.8
		ELMA	4.0
		ERCA	0.3
		GEDI	1.5
		HYGL	0.8
		HYRA	0.3
		JUPH	0.5
		LYHY	0.2
		PHLE	2.2
		PLCHh	0.3
		POMO	1.2
		PSLU	0.2
		RUCR	0.5
		SOOL	0.2
		STAJ	34.3
		TH	46.0
		BG	1.5
		TOTAL	**100.0**

Table B-1 (continued). Pond 5 (Reference) Wetland Vegetation Cover by Stratum

POND 5			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
6	**14%**	CRTR	0.3
		DISP	2.8
		ELMA	10.3
		JUPH	2.8
		PHLE	2.5
		POMO	5.7
		RUCR	2.3
		TH	73.2
		TOTAL	**100.0**
7	**7%**	AGAV	0.2
		ERCA	1.5
		HYGL	1.0
		JUBA	59.7
		POMO	0.5
		PSST	1.7
		SEGL	0.8
		SOOL	0.2
		TH	33.3
		BG	1.2
		TOTAL	**100.0**

Table B-2. Pond 101 East (East) (Reference) Wetland Vegetation Cover by Stratum

POND 101 East (East)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**0.4%**	ELMA	6.7
		LYHY	0.3
		MALE	47.7
		POMO	0.3
		ROCU	0.3
		RUAC	0.3
		RUCR	0.7
		TRSC	0.7
		TH	36.0
		BG	7.0
		TOTAL	**100.0**
2	**38%**	AGAV	0.7
		ELMA	55.7
		MALE	1.5
		POMO	0.8
		RUCR	6.2
		TH	33.3
		BG	1.8
		TOTAL	**100.0**
4	**25%**	EPBR	0.2
		ERCA	1.8
		FEMY	0.2
		GEDI	2.8
		JUBA	48.8
		POMO	0.5
		RUAC	6.2
		RUSA	3.8
		VELAl	2.2
		VISAs	0.3
		TH	31.7
		BG	1.5
		TOTAL	**100.0**

POND 101 East (East)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
5	**3%**	ACAMa	11.8
		AGAV	0.5
		AVBA	0.2
		BAPI	0.3
		BRMI	2.5
		ERBO	1.3
		ERCA	1.3
		FEBR	1.2
		FEMY	0.7
		HECUo	2.2
		HYGL	12.0
		JUBA	0.8
		LYAR	0.2
		MAGR	1.7
		POMO	0.2
		PSLU	1.0
		PSST	4.2
		RUAC	8.0
		SOOL	0.5
		STAJ	6.3
		TRGR	0.5
		TRMI	0.8
		VISAn	1.8
		VISAs	1.0
		TH	18.2
		BG	20.8
		TOTAL	**100.0**

Table B-2 (continued). Pond 101 East (East) (Reference) Wetland Vegetation Cover by Stratum

POND 101 East (East)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
6	1%	BRDI	0.3
		CAPR	41.7
		CIVU	0.3
		ERCA	0.3
		FEMY	0.7
		GEDI	0.3
		JUBA	0.3
		PSST	0.3
		RUAC	3.7
		SOOL	0.7
		VISAn	0.3
		VISAs	0.3
		TH	25.0
		BG	25.7
		TOTAL	**100.0**

POND 101 East (East)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
8	34%	AGAV	15.5
		ACAMa	0.5
		AGGR	0.3
		BRMI	0.2
		EPBR	0.5
		ERBO	0.2
		ERCA	0.8
		FEMY	0.2
		GEDI	5.5
		HECUo	0.2
		HYGL	0.5
		JUPH	15.8
		MALE	0.5
		MASA	3.8
		PHLE	0.2
		POMO	5.2
		RUCR	1.8
		SOOL	0.2
		STAJ	10.7
		TRBA	0.2
		TRGR	0.5
		TRMI	0.3
		TRVA	1.7
		VISAn	2.2
		VISAs	3.8
		TH	25.2
		BG	3.8
		TOTAL	**100.2**

Table B-3. Pond 997 (Reference) Wetland Vegetation Cover by Stratum

POND 997			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**6%**	BRMI	0.2
		CRAQ	0.2
		ELACa	1.5
		ELCA	0.3
		ELMA	1.3
		ERAR12	29.2
		HYGL	0.3
		ISHO	0.3
		JUBUb	0.7
		JUBUo	0.2
		JUPH	0.3
		LACO	0.3
		LYHY	4.7
		LYMI	0.7
		PLCHh	1.5
		PLCO	1.0
		POMO	8.3
		PSCH	10.2
		TH	24.5
		BG	14.3
		TOTAL	**100.0**
2 (CCG)	**4%**	-	-

POND 997			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**78%**	ACPA	1.2
		AICA	2.3
		BRMA	6.3
		BRMI	3.0
		BRTEt	0.3
		CAAMa3	4.5
		DACA	23.5
		DECO	1.7
		ERAR12	5.8
		ERBO	0.8
		FEBR	1.5
		FEMY	0.8
		GEDI	1.0
		GRASS1	0.2
		HYGL	3.5
		HYRA	0.2
		ISCA	0.2
		ISCE	0.7
		JUBUb	1.2
		JUPH	0.2
		LYAR	0.5
		LYHY	1.5
		LYMI	1.7
		MAGR	2.8
		MASA	5.7
		MIPA	0.2
		PLCO	3.2
		POMO	0.2
		RUAC	2.7
		SIBE	0.3
		TRIX	0.7
		ZEDA	0.3
		TH	11.3
		BG	11.3
		TOTAL	**101.2**

Table B-3 (continued). Pond 997 (Reference) Wetland Vegetation Cover by Stratum

POND 997			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
5	12%	BAPI	0.2
		BRMA	5.8
		BRMI	0.5
		BRTEt	0.7
		CAAMa3	0.2
		DACA	2.0
		ERAR12	3.5
		GEDI	0.2
		JUBUb	0.3
		JUPH	55.8
		LYHY	1.7
		LYMI	0.7
		MASA	0.3
		PLCHh	0.2
		TH	21.8
		BG	6.2
		TOTAL	**100.0**

Table B-4. Pond 101 East (West) (Year 2 Post-Mastication) Wetland Vegetation Cover by Stratum

POND 101 East (West)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**3%**	ALSA	1.2
		ELMA	17.0
		GNPA	1.3
		HECUo	1.8
		LYHY	0.3
		MALE	11.5
		PEMA	0.2
		POMO	3.0
		ROCU	0.7
		VEBR	1.3
		TH	59.0
		BG	2.7
		TOTAL	**100.0**
2	**10%**	ELMA	42.5
		LAGL3	0.2
		MALE	0.8
		PHLE	1.0
		TH	53.7
		BG	1.8
		TOTAL	**100.0**
4	**4%**	ACAMa	0.7
		BRMI	1.3
		ELMA	4.7
		FEPE	0.3
		GEDI	4.3
		HECUo	2.0
		JUPH	4.0
		LYAR	1.0
		MAGR	16.0
		MASA	30.7
		PSST	1.3
		RUAC	2.3
		RUCR	0.7
		VISAs	0.7
		TH	27.7
		BG	2.0
		TOTAL	**100.0**

POND 101 East (West)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
5	**44%**	BRDI	0.3
		BRMI	0.3
		DISP	0.3
		ELMA	7.2
		ERAR12	0.3
		FEBR	11.2
		FEPE	43.3
		GEDI	1.2
		HYGL	0.3
		MALE	7.7
		RUCR	0.7
		TH	23.2
		BG	4.0
		TOTAL	**100.0**
6	**12%**	ACAMa	0.7
		AGAV	3.7
		BAPI	0.3
		BRMI	0.7
		FEMY	0.3
		FEPE	0.3
		GEDI	2.3
		HYGL	0.3
		JUBA	3.0
		JUPH	28.3
		MASA	2.3
		POMO	1.0
		PSST	0.7
		RUAC	1.3
		RUCR	1.0
		SEGL	0.3
		SOAS	0.3
		SOOL	1.7
		VISAn	1.0
		BG	4.0
		TH	46.3
		TOTAL	**100.0**

Table B-4 (continued). Pond 101 East (West) (Year 2 Post-Mastication) Wetland Vegetation Cover by Stratum

POND 101 East (West)			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
8	**4%**	BRMI	0.3
		ELACa	0.7
		EUOC	26.0
		FEPE	1.0
		GEDI	2.0
		JUPH	2.3
		MALE	0.7
		PLCHh	0.3
		POMO	9.3
		PSST	0.7
		RUAC	1.0
		SOOL	0.3
		TH	47.0
		BG	8.3
		TOTAL	**100.0**
9	**25%**	AGAV	29.2
		BRMI	1.0
		ELMA	6.3
		FEBR	0.3
		FEPE	0.8
		GEDI	4.3
		HECUo	7.5
		HYGL	0.2
		JUBA	0.3
		POMO	7.0
		RUCR	8.3
		SOOL	0.7
		VISAs	0.5
		TH	31.3
		BG	2.2
		TOTAL	**100.0**

Table B-5. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 41			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**14%**	DEDA	1.2
		ELACa	3.7
		ELMA	44.5
		LAGL3	1.7
		MALE	0.2
		PHLE	3.7
		PLCHh	0.2
		POMO	9.3
		STAJ	2.0
		TH	32.0
		BG	1.7
		TOTAL	**100.0**
2	**59%**	DEDA	2.8
		ELACa	9.0
		ELMA	4.2
		GEDI	15.7
		JUPH	3.0
		LAGL3	0.8
		MALE	2.3
		PHLE	2.3
		PLCHh	1.3
		POMO	30.3
		RUCR	1.3
		STAJ	5.0
		TH	21.8
		TOTAL	**100.0**

POND 41			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**21%**	BRHO	0.3
		BRMI	0.8
		DEDA	0.2
		ELACa	2.2
		ERBO	0.3
		ERCA	0.3
		FEBR	0.5
		GAUS	0.5
		GEDI	2.0
		HYGL	0.3
		JUBA	0.7
		JUPH	57.5
		LYAR	0.7
		MASA	2.7
		MAGR	0.7
		MALE	0.3
		POMO	2.8
		RUAC	0.3
		RUCR	0.8
		SOOL	1.8
		TH	21.8
		BG	2.5
		TOTAL	**100.2**

Table B-5 (continued). Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 41			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**6%**	AICA	1.2
		BAPI	1.5
		BRHO	0.3
		BRMI	1.7
		BRTEt	0.7
		CAAMa3	0.8
		DACA	24.7
		ERAR12	1.2
		FEBR	0.3
		FEMY	1.0
		GAUS	0.5
		GEDI	2.8
		HYGL	3.0
		JUPH	0.2
		LUCO6	0.3
		LYAR	0.3
		LYMI	0.2
		MASA	0.2
		MAGR	12.3
		PLCO	0.8
		POMO	0.5
		STAJ	0.7
		TH	31.2
		BG	13.7
		TOTAL	**100.0**
Upland	**1%**	**-**	**-**

Table B-6. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 3 North			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	11%	ELMA	61.7
		ELACa	1.2
		LAGL3	0.2
		POMO	0.5
		TH	21.5
		BG	15.0
		TOTAL	**100.0**
2	14%	COCO	0.2
		DEDA	0.2
		ELACa	0.5
		ELMA	13.3
		ERAR12	7.2
		FEPE	0.2
		HOMAg	6.0
		JUBUb	0.5
		LACO	0.3
		LYHY	4.0
		LYMI	0.8
		PLCHh	1.3
		PLCO	3.2
		POMO	8.3
		POZI	0.8
		PSCH	2.0
		ZEDA	0.8
		TH	27.7
		BG	22.7
		TOTAL	**100.0**

POND 3 North			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	37%	ACPA	0.7
		AICA	0.8
		BAPI	0.8
		BRHO	1.5
		BRMI	0.8
		CAAM	2.3
		CAUN	0.3
		DACA	15.7
		DECO	0.2
		ERAR12	8.5
		ERCA	0.3
		FEMY	0.7
		FEPE	16.2
		HYGL	0.2
		JUBUb	0.2
		JUPH	0.5
		LOGA	0.2
		LYAR	2.5
		LYHY	1.3
		LYMI	0.2
		MA sp.	0.3
		MAGR	0.2
		MIPA	2.2
		PLCO	2.2
		PLER	0.2
		POMO	0.2
		SOOL	0.2
		TRAN	0.7
		TRDU	0.5
		ZEDA	0.3
		TH	20.5
		BG	18.8
		TOTAL	**100.0**
4 (CCG)	**38%**	-	-

Table B-7. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 3 South			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	17%	COCO	0.7
		CRAQ	0.3
		DEDA	0.3
		ELACa	4.2
		ELMA	41.7
		ERAR12	7.3
		JUPH	1.0
		LAGL3	1.2
		LYHY	0.7
		MALE	0.8
		PLCHh	2.2
		PLCO	2.5
		POMO	1.7
		TH	26.0
		BG	9.8
		TOTAL	**100.3**

POND 3 South			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
2	22%	AICA	0.2
		BRMI	1.0
		BRTEt	1.8
		CAAMa3	0.7
		DACA	0.3
		DEDA	0.5
		ELACa	2.2
		ERAR12	1.2
		FEBR	0.5
		FEMY	0.2
		FEPE	2.3
		GEDI	1.5
		ISCA	0.2
		ISCE	0.3
		JUBUb	0.3
		JUBUo	0.3
		JUPH	49.8
		LOGA	0.2
		LYAR	0.2
		LYHY	3.0
		LYMI	0.3
		MALE	0.3
		MIPA	1.3
		PLCO	4.0
		POMO	3.3
		PSCH	0.2
		RACA	0.2
		SIGA	0.2
		TRVA	0.2
		ZEDA	0.3
		TH	15.8
		BG	7.3
		TOTAL	**100.2**

Table B-7 (continued). Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 3 South			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	47%	ACMI	2.2
		AICA	1.3
		BRMI	1.7
		BRTEt	1.8
		CAAMa3	1.0
		CAUN	0.2
		DACA	18.2
		ERAR12	1.0
		ERBO	0.7
		ERCA	0.3
		FEBR	1.0
		FEPE	0.5
		GAPH	0.2
		GEDI	2.0
		HYGL	1.5
		HYRA	0.7
		JUPH	1.0
		LOGA	1.0
		LYAR	1.3
		LYHY	11.5
		LYMI	0.8
		MAGR	0.3
		MASA	0.7
		MIPA	0.3
		PLCO	0.5
		PLER	0.7
		POMO	0.7
		SIMAm	1.5
		SOOL	0.8
		TAOV	0.2
		TRBA	0.2
		ZEDA	0.8
		TH	21.3
		BG	22.3
		TOTAL	**100.2**

POND 3 South			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	10%	BRDI	0.3
		BRHO	2.0
		BRMI	2.8
		BRTEt	1.8
		CAUN	0.2
		ELMA	8.8
		ERCA	1.0
		FEPE	41.2
		GAUS	0.7
		GEDI	4.2
		HYGL	1.0
		JUPH	2.3
		LYAR	0.2
		LYHY	1.2
		MALE	4.3
		MIPA	1.0
		PSST	0.2
		RACA	1.0
		SIGA	0.8
		SOOL	2.5
		TRBA	0.2
		TRDU	3.5
		ZEDA	0.2
		TH	17.0
		BG	2.8
		TOTAL	**101.2**
5 (CCG)	**0.1%**	-	-
Upland	**3%**	-	-

Table B-8. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 39			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**9%**	ELMA	73.0
		ELACa	1.7
		BG	5.3
		TH	20.0
		TOTAL	**100.0**
3	**38%**	AICA	0.2
		AVBA	0.3
		BRDI	1.2
		BRHO	0.7
		BRMI	0.2
		BRTEt	0.2
		DACA	12.5
		DISP	3.5
		ERBO	1.0
		FEMY	4.7
		FEPE	37.8
		GEDI	3.2
		JUOC	8.0
		MAGR	0.8
		PLCO	3.8
		TRDU	0.7
		VISAn	0.2
		ZEDA	0.2
		TH	19.0
		BG	2.0
		TOTAL	**100.0**

POND 39			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**44%**	ACAMa	1.5
		ACPA	0.5
		AICA	1.5
		AVBA	0.3
		BRDI	0.3
		BRHO	1.7
		BRMI	1.2
		CADE	0.2
		DACA	26.7
		ERBO	1.7
		FEBR	0.8
		FEMY	5.0
		GEDI	1.2
		HYGL	1.5
		HYRA	0.5
		JUOC	0.2
		LYAR	0.2
		MAGR	3.2
		PLCO	12.5
		PLLA	0.7
		TAOV	0.7
		TRAN	4.2
		TRDU	0.7
		VIHI	0.2
		VISAn	0.2
		VISAs	0.2
		TH	25.2
		BG	7.7
		TOTAL	**100.0**
Upland	**9%**	-	-

Table B-9. Pond 40 North (Year 3 Post-Burn) Wetland Vegetation Cover by Stratum

POND 40 North			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
2	**33%**	ELMA	53.3
		GAUS	1.0
		LYMI	0.3
		TH	25.7
		BG	19.7
		TOTAL	**100.0**
3	**41%**	ELMA	12.7
		ERAR12	22.3
		FEPE	0.7
		JUPH	9.3
		PLCO	8.7
		POMO	2.0
		RUCR	1.0
		TH	30.0
		BG	13.3
		TOTAL	**100.0**

POND 40 North			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**26%**	BRMI	1.3
		DECO	0.7
		ERAR12	1.0
		GEDI	3.0
		JUPH	33.3
		LYHY	0.7
		MAGR	0.3
		PLCO	15.0
		POMO	1.0
		RUCR	0.3
		SIGA	0.3
		TH	36.0
		BG	7.0
		TOTAL	**100.0**

Table B-10. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 40 South			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**6%**	ELACa	8.3
		ELMA	4.3
		FEPE	1.3
		JUPH	0.7
		LYHY	1.0
		PHLE	0.3
		PLCHh	50.0
		PLCO	5.3
		POMO	1.0
		RUCR	3.3
		TH	19.7
		BG	4.7
		TOTAL	**100.0**
2	**12%**	AICA	6.0
		BRHO	1.7
		BRMI	3.7
		ERBO	1.7
		FEBR	0.7
		HYGL	8.7
		JUPH	7.0
		PLCO	10.7
		RUAC	2.0
		SIGA	2.7
		TRAN	6.0
		TRDU	0.3
		TH	29.7
		BG	19.3
		TOTAL	**100.0**

POND 40 South			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**82%**	BRDI	0.8
		BRHO	0.7
		BRMI	0.2
		DACA	6.7
		ERBO	0.3
		FEBR	3.2
		FEMY	0.2
		FEPE	35.0
		GEDI	4.0
		HYGL	0.2
		JUPH	0.5
		MASA	4.5
		MAGR	0.7
		RUAC	2.2
		TH	36.8
		BG	4.2
		TOTAL	**100.0**

Table B-11. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 43			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**46%**	CRAQ	0.7
		DEDA	0.3
		ELACa	4.7
		ELMA	8.2
		ERAR12	10.7
		ISCE	0.7
		JUPH	1.5
		LAGL3	7.7
		LYHY	1.2
		LYMI	1.8
		PLCHh	9.0
		POMO	1.8
		POZI	6.5
		PSCH	1.8
		TRSC	0.3
		TH	31.2
		BG	12.0
		TOTAL	**100.0**

POND 43			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
2	**37%**	AICA	0.3
		BAPI	0.3
		BRHO	0.3
		BRMI	1.0
		DECO	2.3
		DEDA	3.3
		ERAR12	0.3
		FEBR	0.3
		GAUS	0.3
		GEDI	1.3
		HYGL	0.7
		JUBUb	0.3
		JUCA	0.7
		JUOC	1.0
		JUPH	42.3
		LYHY	3.7
		LYMI	1.7
		MAGR	1.3
		MASA	0.7
		PLCHh	1.0
		POMO	1.3
		POZI	0.7
		PSCH	1.3
		PSLU	0.3
		SIBE	1.0
		SOOL	1.0
		TH	10.0
		BG	21.0
		TOTAL	**100.0**

Table B-11 (continued). Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 43			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	15%	ACAMa	6.0
		AICA	1.0
		BRHO	1.0
		BRMI	1.3
		CIQU	0.3
		DACA	44.7
		DECO	2.3
		ERAR12	3.3
		FEBR	1.0
		GAUS	0.7
		GEDI	0.7
		HYGL	0.7
		JUBUb	0.3
		JUOC	0.3
		JUPH	0.3
		LYAR	0.3
		LYHY	0.7
		LYMI	0.3
		MAEX	1.3
		MAGR	4.0
		PLCO	5.0
		POMO	0.3
		PSCH	0.3
		SIBE	0.3
		TRDU	5.0
		TROB	0.3
		ZEDA	0.3
		TH	7.0
		BG	10.7
		TOTAL	**100.0**
Upland	**1%**	-	-

Table B-12. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 35			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**20%**	COCO	0.7
		ELMA	1.5
		FEPE	0.2
		LAGL3	0.8
		LYHY	9.0
		PLCHh	25.5
		PLCO	34.5
		PSCH	2.3
		TRSC	1.7
		TH	11.5
		BG	12.3
		TOTAL	**100.0**
2	**36%**	DEDA	0.2
		FEPE	0.3
		HYGL	0.2
		LYHY	0.2
		NAAT	0.2
		PLCO	36.7
		PSCH	1.5
		TRAN	5.3
		TH	27.7
		BG	27.8
		TOTAL	**100.0**

POND 35			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**44%**	AICA	1.2
		AVBA	0.3
		BRDI	0.5
		BRHO	1.0
		BRMI	0.3
		BRTEt	0.3
		DACA	28.3
		ERBO	0.7
		FEBR	1.5
		FEMY	0.5
		FEPE	28.0
		GEDI	1.7
		HOBR	0.2
		HYGL	0.5
		PLCO	2.0
		TRAN	11.2
		TRDU	0.2
		TH	19.0
		BG	2.8
		TOTAL	**100.2**

Table B-13. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 42			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**11%**	ELACa	37.3
		ELMA	3.0
		ERAR12	4.0
		JUPH	11.0
		LAGL3	0.7
		LYHY	1.3
		PLCHh	1.3
		POMO	0.7
		TH	28.7
		BG	12.3
		TOTAL	**100.3**
2	**10%**	ELACa	1.7
		ELMA	42.3
		ERAR12	0.3
		ISHO	0.3
		LAGL3	0.3
		LYHY	0.7
		PLCHh	0.7
		POMO	4.3
		PS sp	0.3
		TH	49.0
		TOTAL	**100.0**

POND 42			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**41%**	AGLAV	0.5
		BRTEt	0.7
		CIQU	0.2
		COCO	0.5
		DEDA	0.5
		ELACa	16.5
		ERAR12	14.8
		HERA	0.2
		HYGL	0.2
		JUPH	35.0
		LAGL3	0.5
		LYAR	0.2
		LYHY	0.8
		LYMI	0.7
		PLCHh	0.8
		POMO	5.8
		PS sp	0.0
		PSCH	0.3
		SEGL	0.3
		SOOL	0.2
		TH	17.3
		BG	4.0
		TOTAL	**100.0**

Table B-13 (continued). Pond 42 (Year 3 Post-Mastication and Post Burn, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 42			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	14%	AICA	1.0
		AVBA	0.3
		BRMI	1.0
		BRTEt	0.3
		DACA	19.0
		DECO	26.7
		ERAR12	0.3
		FEBR	1.0
		GAPH	2.3
		GAUS	1.3
		HYGL	0.7
		LYAR	2.0
		PLER	0.3
		POMO	0.7
		ZEDA	0.7
		TH	18.7
		BG	23.7
		TOTAL	**100.0**
5	6%	COCO	63.3
		POMO	4.7
		ERCA	0.3
		PS sp	0.3
		TH	29.7
		BG	1.7
		TOTAL	**100.0**
Upland	**17%**	**-**	**-**

Table B-14. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 44			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	59%	AGLAv	1.0
		BRMI	0.7
		ELACa	3.7
		ERAR12	12.0
		ERBO	0.3
		FEBR	0.3
		HYGL	0.3
		JUBUb	7.0
		JUPH	1.0
		LAGL3	0.3
		LYHY	5.7
		LYMI	1.3
		PLCHh	5.7
		PLCO	0.7
		POMO	10.7
		POZI	0.7
		PSCH	10.0
		TRDU	2.0
		TH	16.7
		BG	20.0
		TOTAL	**100.0**

POND 44			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
2	9%	AGLAv	2.3
		BRMI	0.7
		BRTEt	1.3
		CRAQ	0.3
		DEDA	1.0
		ELACa	1.0
		ELMA	0.3
		ERAR12	5.3
		JUBUb	18.3
		JUCA	0.3
		JUPH	2.0
		LYHY	12.3
		LYMI	1.0
		PLCHh	6.7
		PLCO	1.0
		POMO	8.7
		PSCH	2.0
		TH	8.0
		BG	27.3
		TOTAL	**100.0**

Table B-15 (Continued). Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 44			
Stratum	Relative % Cover of Wetland	Species	% Cover
3	18%	ACPA	1.7
		AICA	1.0
		AVBA	0.7
		BRMA	1.3
		BRTEt	0.7
		CAAT	0.3
		DACA	46.7
		ELACa	0.3
		ERAR12	4.3
		FEMY	0.3
		GAPH	0.7
		GEDI	0.3
		HYGL	1.7
		JUBUb	1.0
		JUPH	1.3
		LYAR	2.7
		LYMI	1.3
		MAGR	12.0
		PLCO	11.3
		POMO	1.0
		TAOV	0.3
		TRCA5	0.3
		TRDU	2.7
		TRPU	0.7
		ZEDA	0.3
		TH	1.3
		BG	3.7
		TOTAL	**100.0**

POND 44			
Stratum	Relative % Cover of Wetland	Species	% Cover
4	4%	AGLAv	0.3
		BRMI	0.7
		BRTEt	1.3
		DEDA	1.0
		ELACa	8.0
		ERAR12	10.7
		GEDI	0.3
		HYGL	0.3
		JUBUb	1.0
		JUCA	0.3
		JUPH	36.3
		LAGL3	1.3
		LYHY	5.0
		LYMI	1.3
		PLCHh	0.7
		PLCO	0.7
		POMO	1.3
		POZI	0.3
		PSCH	2.0
		TRDU	1.0
		TRVA	0.7
		TH	15.0
		BG	11.0
		TOTAL	**100.7**
Upland	**11%**	-	-

Table B-16. Pond 56 (Year 3 Post-Mastication) Wetland Vegetation Cover by Stratum

POND 56			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**6%**	ELMA	46.2
		MALE	3.8
		TH	48.2
		BG	1.8
		TOTAL	**100.0**
2	**5%**	DISP	25.2
		ELACa	2.7
		ELMA	8.3
		JUPH	1.7
		TH	53.8
		BG	8.3
		TOTAL	**100.0**
3	**16%**	ELMA	19.3
		DISP	11.7
		JUPH	11.2
		TH	55.0
		BG	2.8
		TOTAL	**100.0**
4	**24%**	DISP	4.8
		JUPH	14.2
		LYHY	0.7
		PHLE	0.5
		PLCHh	0.2
		POMO	1.3
		STAJ	1.0
		TRSC	1.2
		TH	74.3
		BG	1.8
		TOTAL	**100.0**

POND 56			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
5	**46%**	AGAV	0.8
		BRMI	0.2
		BRTEt	0.5
		DECO	0.3
		DEDA	1.3
		DISP	2.0
		ELACa	1.0
		ERAR12	15.2
		ERBO	0.3
		JUPH	22.7
		LYHY	0.5
		MALE	5.5
		POMO	1.2
		TH	46.3
		BG	2.2
		TOTAL	**100.0**
Upland	**3%**	-	-

Table B-17. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 60			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**7%**	ELMA	51.3
		MALE	2.5
		TH	45.3
		BG	0.8
		TOTAL	**100.0**
2	**39%**	COCO	0.3
		DISP	7.2
		ELMA	44.3
		JUPH	2.5
		TH	40.5
		BG	5.2
		TOTAL	**100.0**
3	**13%**	DISP	3.5
		ELMA	20.3
		JUPH	37.8
		TH	36.8
		BG	1.5
		TOTAL	**100.0**

POND 60			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**41%**	AICA	0.2
		BRMI	1.2
		COCO	0.2
		DISP	8.5
		ELACa	4.8
		ELMA	4.7
		ERCA	0.8
		ISHO	0.2
		JUPH	1.0
		LYHY	0.7
		PHLE	1.5
		POMO	11.3
		PSLU	0.3
		PSST	0.3
		RUCR	0.3
		SOOL	0.2
		STAJ	12.0
		TH	47.3
		BG	4.5
		TOTAL	**100.0**

Table B-18. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 61			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**1%**	BRTEt	1.3
		CRAQ	0.3
		ELACa	2.5
		ELMA	21.3
		ISHO	4.8
		LACO	1.8
		LAGL3	2.8
		LYHY	0.5
		LYMI	0.3
		PLCHh	2.0
		POMO	0.3
		POZI	0.2
		PSCH	0.3
		TRSC	3.0
		TH	24.5
		BG	33.8
		TOTAL	**100.0**
2 (CCG)	**6%**		

POND 61			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**4%**	AGLAv	0.2
		BRMA	0.2
		BRMI	0.5
		BRTEt	6.7
		CIQU	0.2
		DACA	0.2
		DEDA	0.2
		ELACa	10.0
		ERAR12	16.5
		FEMY	0.2
		GEDI	0.5
		HYGL	0.2
		ISHO	2.5
		JUPH	1.2
		LAGL3	6.5
		LYHY	6.7
		LYMI	1.8
		MAGR	0.2
		MIPA	0.2
		PLCHh	17.0
		POMO	0.2
		POZI	2.2
		PSCH	1.0
		SOOL	0.7
		TRVA	0.2
		UNK1	0.2
		TH	14.8
		BG	9.7
		TOTAL	**100.2**

Table B-17 (continued). Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation)
Wetland Vegetation Cover by Stratum

POND 61			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**59%**	ACAMa	0.2
		ACMI	1.2
		AICA	0.2
		BRHO	0.3
		BRMA	4.0
		BRMI	0.3
		BRTEt	0.8
		DACA	28.8
		ELACa	1.3
		ERAR12	4.5
		FEMY	0.2
		GEDI	4.5
		HYGL	2.3
		HYRA	0.3
		JUPH	18.8
		LYAR	0.3
		LYMI	1.0
		MAGR	9.3
		MASA	0.8
		MIPA	1.7
		TH	14.0
		BG	5.2
		TOTAL	**100.2**
Upland	**32%**	-	**-**

Table B-19. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 73			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**11%**	ELMA	63.7
		JUPH	0.3
		POMO	0.7
		TH	32.3
		BG	3.0
		TOTAL	**100.0**
2	**46%**	DEDA	0.5
		ELACa	1.7
		ERAR12	7.5
		GEDI	0.2
		JUPH	67.5
		LAGL3	1.0
		PLCHh	0.2
		POMO	3.0
		TH	18.7
		TOTAL	**100.2**

POND 73			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**41%**	AGLAv	0.2
		BRMI	1.0
		CAAMa3	2.0
		DECO	2.2
		DEDA	2.2
		ELACa	1.3
		ERAR12	30.8
		GEDI	0.2
		HYGL	1.3
		HYRA	0.2
		JUBUb	0.3
		JUCA	0.5
		JUPH	12.5
		LOGA	0.2
		LYHY	2.0
		LYMI	1.0
		PLCHh	0.3
		POMO	23.2
		PSCH	0.7
		SOOL	0.7
		ZEDA	0.7
		TH	8.2
		BG	8.5
		TOTAL	**100.0**
Upland	**2%**	-	-

Table B-20. Machine Gun Flats (Year 3 Post-Mastication) Wetland Vegetation Cover by Stratum

Machine Gun Flats			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**0.3%**	ELMA	15.0
		PEAM	6.0
		PONO	50.0
2	**53%**	AGAV	0.8
		DISP	1.3
		ELACa	0.3
		ELMA	14.7
		JUBA	0.2
		JUPH	1.0
		LYHY	0.3
		MALE	0.3
		POMO	5.3
		PONO	2.2
		TH	71.8
		BG	1.7
		TOTAL	**100.0**

Machine Gun Flats			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
3	**1%**	AGAV	2.3
		BRMI	2.0
		CAPY	0.3
		DECO	2.7
		DISP	3.7
		ELTR3	0.3
		ERBO	1.0
		ERCA	1.7
		GEDI	3.7
		HYGL	2.0
		HYRA	0.7
		JUBA	6.0
		LYHY	1.7
		MALE	1.0
		PLCO	2.0
		POMO	14.0
		PSLU	2.3
		PSST	0.3
		SEGL	3.7
		SIGA	0.7
		SOAS	1.0
		SOOL	1.0
		STAJ	1.7
		TH	35.0
		BG	9.3
		TOTAL	**100.0**

Table B-21 (Continued). Machine Gun Flats (Year 3 Post-Mastication) Wetland Vegetation Cover by Stratum

Machine Gun Flats			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
4	**9%**	AICA	0.3
		BRHO	0.3
		BRMI	1.3
		DECO	7.8
		DISP	10.3
		ERAR12	19.3
		ERBO	0.3
		FEPE	0.2
		GEDI	4.2
		HYGL	3.3
		JUPH	0.3
		LIBI5	1.0
		LYHY	0.2
		MALE	1.5
		PLCO	0.2
		SOOL	1.0
		STAJ	4.0
		ZEDA	0.2
		TH	42.7
		BG	2.0
		TOTAL	**100.5**
5	**5%**	AGAV	0.3
		DISP	0.3
		ELACa	1.7
		GEDI	1.3
		JUBA	28.0
		JUPH	0.7
		PSST	0.7
		TH	43.7
		BG	23.3
		TOTAL	**100.0**

Machine Gun Flats			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
6	**3%**	ELACa	1.7
		EUOC	24.3
		GEDI	0.3
		JUBA	16.3
		LYAR	1.0
		PS sp.	1.0
		SOOL	0.7
		VELAl	0.7
		TH	25.7
		BG	27.7
		TOTAL	**99.3**

Table B-22 (Continued). Machine Gun Flats (Year 3 Post-Mastication) Wetland Vegetation Cover by Stratum

Machine Gun Flats			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
7	**6%**	AGLAv	0.8
		AICA	2.8
		BRMI	1.0
		BRTEt	1.2
		CAAMa3	4.5
		CAAT	0.2
		DACA	1.2
		DECO	0.3
		ERAR12	18.0
		ERBO	2.0
		FEBR	1.2
		FEMY	0.2
		GEDI	0.2
		HYGL	0.8
		JUBUb	0.8
		JUCA	0.2
		JUPH	1.5
		LYAR	0.2
		LYHY	0.3
		LYMI	0.8
		MA sp.	0.8
		MAGR	0.3
		PLCO	6.5
		PSCH	0.5
		SOOL	0.2
		TR sp.	0.2
		TRDE	0.5
		TRVA	0.2
		ZEDA	2.0
		TH	22.3
		BG	28.2
		TOTAL	**99.8**

Machine Gun Flats			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
8	**21%**	BRMI	0.3
		BRTEt	1.3
		DACA	21.7
		ERBO	3.7
		FEBR	25.5
		FEPE	3.8
		GEDI	0.7
		HYGL	2.8
		LIBI5	1.8
		LYHY	0.5
		MAGR	0.8
		TH	30.2
		BG	6.7
		TOTAL	**99.8**
9	**2%**	AVBA	0.3
		BRMI	1.3
		ELACa	1.7
		ELTR3	39.0
		ERCA	4.0
		GEDI	1.0
		HYGL	3.3
		LYAR	0.7
		LYHY	0.7
		PLCO	0.3
		POMO	0.3
		PS sp.	0.3
		PSLU	0.3
		RUAC	2.0
		SEGL	6.0
		SOAS	0.7
		SOOL	0.7
		TH	31.0
		BG	6.3
		TOTAL	**100.0**

Table C-23. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 16			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
1	**4%**	CIVU	1.0
		GNPA	1.0
		HECUo	2.0
		MALE	1.0
		SCCA	65.0
		TH	5.0
		BG	25.0
		TOTAL	**100.0**
3	**34%**	CRSC2	4.5
		ECCR	0.3
		ELMA	53.5
		GNPA	9.8
		MALE	0.7
		TH	23.2
		BG	8.0
		TOTAL	**100.0**
4	**25%**	AGPA	0.2
		BRMI	0.2
		CAPR	53.5
		CIVU	1.3
		ELTR3	0.2
		JUBA	13.3
		JUPH	0.8
		RUUR	9.0
		TH	20.2
		BG	1.2
		TOTAL	**99.8**

POND 16			
Stratum	**Relative % Cover of Wetland**	**Species**	**% Cover**
5	**33%**	CABA	39.3
		RUUR	19.7
		SOEL	9.8
		TH	20.8
		BG	10.3
		TOTAL	**100.0**
6	**4%**	JUBA	71.7
		PSLU	0.3
		RUCR	0.7
		TH	23.3
		BG	4.0
		TOTAL	**100.0**

APPENDIX C

CTS and Aquatic Invertebrate Data from Aquatic Surveys at Vernal Pools Monitored in 2020

This page intentionally left blank

Table C-1. CTS Aquatic Survey Results for Vernal Pools Monitored in 2020 at Former Fort Ord

Vernal Pool	Sampling Date	# of Larvae Observed	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
5	3/17/2020	0	-	-	-	-	-	-	-	30 mins
	4/15/2020	0	-	-	-	-	-	-	-	4 hrs 30 mins
	5/18/2020	0	-	-	-	-	-	-	-	1 hr
101 East (East)	4/17/2020	0	-	-	-	-	-	-	-	3 hrs
101 East (West)	4/17/2020	0	-	-	-	-	-	-	-	3 hrs
	5/19/2020	0	-	-	-	-	-	-	-	18 mins
41	4/16/2020	0	-	-	-	-	-	-	-	2 hrs 15 mins
3 North	3/17/2020	0	-	-	-	-	-	-	-	11 mins
	4/16/2020	0	-	-	-	-	-	-	-	30 mins
	5/20/2020	0	-	-	-	-	-	-	-	8 mins
3 South	4/16/2020	0	-	-	-	-	-	-	-	45 mins
39	3/17/2020	0	-	-	-	-	-	-	-	5 mins
	4/16/2020	0	-	-	-	-	-	-	-	17 mins
40 North	4/16/2020	0	-	-	-	-	-	-	-	18 mins
	5/20/2020	0	-	-	-	-	-	-	-	10 mins
40 South	4/16/2020	0	-	-	-	-	-	-	-	4 mins
43	4/15/2020	0	-	-	-	-	-	-	-	15 mins
35	4/16/2020	0	-	-	-	-	-	-	-	21 mins
42	4/15/2020	0	-	-	-	-	-	-	-	1 hr 30 mins
	5/19/2020	0	-	-	-	-	-	-	-	26 mins
44	4/15/2020	0	-	-	-	-	-	-	-	21 mins

Table C-1. CTS Aquatic Survey Results for Vernal Pools Monitored in 2020 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	
56	3/16/2020	0	-	-	-	-	-	-	-	1 hr 36 mins
	4/13/2020	0	-	-	-	-	-	-	-	3 hrs 20 mins
	5/19/2020	0	-	-	-	-	-	-	-	30 mins
60	3/16/2020	1	1	16	16	16	7	7	7	1 hr
	4/14/2020	5	5	34	26-38	38	17	15-19	18	2 hrs 40 mins
	5/18/2020	7	7	88	70-101	N/A	49	41-55	52	1 hr
61	4/14/2020	0	-	-	-	-	-	-	-	21 mins
73	4/20/2020	0	-	-	-	-	-	-	-	1 hr
Machine Gun Flats	3/16/2020	5	5	25	23-29	N/A	12	9-15	N/A	2 hrs 4 mins
	4/14/2020	3	3	36	26-51	N/A	23	19-29	N/A	8 hrs 12 mins
	5/18/2020	0	-	-	-	-	-	-	-	4 hrs 50 mins
16	4/20/2020	0	-	-	-	-	-	-	-	2 hrs
	5/19/2020	0	-	-	-	-	-	-	-	1 hr 10 mins

*The mean was rounded to the nearest whole number

Table C-2. Aquatic Invertebrates Observed During Aquatic Surveys at Vernal Pools Monitored in 2020

Vernal Pool	Aquatic Invertebrate																	
	CA Fairy Shrimp	Clam Shrimp (Order Conchostraca)	Water Flea (Order Cladocera)	Seed Shrimp (Order Ostracoda)	Copepods (Order Eucopepoda)	Scuds	Mayfly Larvae (Order Ephemeroptera)	Dragonfly Larvae (Order Anisoptera)	Damselfly Larvae (Order Zygoptera)	Backswimmer (Family Corixidae)	Waterboatmen (Family Corixidae)	Predaceous Diving Beetle (Family Dytiscidae)	Giant Water Bug (Family Belostomatidae)	Water Scorpion (Family Nepidae)	Mosquito (Family Culicidae)	Water Scavenger Beetle (Family Hydrophilidae)	Dipteran Larvae (Order Diptera)	Snail
5	-	●	●	●	●	-	●	-	●	●	●	●	-	-	●	●	●	●
101 East (East)	●	-	●	●	●	-	●	-	●	●	●	●	-	-	●	●	●	●
101 East (West)	-	-	●	●	●	-	●	●	●	●	●	●	-	-	●	●	●	-
41	●	-	●	●	●	-	-	-	●	●	●	●	-	-	●	●	●	-
3 North	●	-	●	●	●	●	●	●	●	●	●	●	-	-	●	●	●	●
3 South	●	-	●	●	●	-	●	-	●	●	●	●	-	-	●	●	●	-
39	●	-	●	●	●	-	●	-	●	-	●	●	-	-	●	●	●	●
40 North	●	●	●	●	●	-	●	-	●	●	-	●	-	-	●	●	●	-
40 South	●	-	●	●	●	-	-	-	-	-	-	-	-	-	●	-	●	-
43	●	-	-	●	●	-	●	-	-	●	-	●	-	-	●	-	●	-
35	●	●	●	●	●	-	●	-	-	●	●	-	-	-	●	-	-	-
42	●	-	●	●	●	-	●	●	●	●	●	●	-	-	●	●	●	-
44	●	-	-	●	●	-	●	-	●	●	●	●	-	-	●	-	●	-
56	-	●	●	●	●	-	●	●	●	●	●	●	●	-	●	●	●	●

Table C-2. Aquatic Invertebrates Observed During Aquatic Surveys at Vernal Pools Monitored in 2020

Vernal Pool	Aquatic Invertebrate																	
	CA Fairy Shrimp	Clam Shrimp (Order Conchostraca)	Water Flea (Order Cladocera)	Seed Shrimp (Order Ostracoda)	Copepods (Order Eucopepoda)	Scuds	Mayfly Larvae (Order Ephemeroptera)	Dragonfly Larvae (Order Anisoptera)	Damselfly Larvae (Order Zygoptera)	Backswimmer (Family Corixidae)	Waterboatmen (Family Corixidae)	Predaceous Diving Beetle (Family Dytiscidae)	Giant Water Bug (Family Belostomatidae)	Water Scorpion (Family Nepidae)	Mosquito (Family Culicidae)	Water Scavenger Beetle (Family Hydrophilidae)	Dipteran Larvae (Order Diptera)	Snail
60	-	●	●	●	●	-	●	●	●	●	●	●	-	-	●	●	●	●
61	●	-	●	-	●	-	-	-	●	●	●	●	-	-	●	●	●	-
73	●	-	●	●	●	-	-	-	●	●	●	●	-	-	●	●	●	-
Machine Gun Flats	●	●	●	●	●	●	●	●	●	●	●	●	●	-	●	●	●	●
16	●	●	●	●	●	-	●	●	●	●	●	●	●	-	●	●	●	●

Table C-3. Fairy Shrimp Aquatic Survey Results for Vernal Pools Monitored in 2020 at Former Fort Ord

Vernal Pool	Sampling Date	Abundance (# of Individuals)
5	3/17/2020	Not detected
	4/15/2020	Not detected
	5/18/2020	Not detected
101 East (East)	4/17/2020	Moderate (15)
101 East (West)	4/17/2020	Not detected
	5/19/2020	Not detected
41	4/16/2020	Moderate (15)
3 North	3/17/2020	Not detected
	4/16/2020	Low (6)
	5/20/2020	Not detected
3 South	4/16/2020	Moderate (13)
39	3/17/2020	Not detected
	4/16/2020	Low (5)
40 North	4/16/2020	Moderate (36)
	5/20/2020	Not detected
40 South	4/16/2020	Low (1)
43	4/15/2020	Moderate (40)

Table C-3. Fairy Shrimp Aquatic Survey Results for Vernal Pools Monitored in 2020 at Former Fort Ord

Vernal Pool	Sampling Date	Abundance (# of Individuals)
35	4/16/2020	High (186)
42	4/15/2020	High (125)
	5/19/2020	Not detected
44	4/15/2020	High (258)
56	3/16/2020	Not detected
	4/13/2020	Not detected
	5/19/2020	Not detected
60	3/16/2020	Not detected
	4/14/2020	Not detected
	5/18/2020	Not detected
61	4/14/2020	High (172)
73	4/20/2020	Low (1)
Machine Gun Flats	3/16/2020	Not detected
	4/14/2020	Low (1)
	5/18/2020	Not detected
16	4/20/2020	High (267)
	5/19/2020	Not detected

APPENDIX D

Site Photos

This page intentionally left blank

Figure D-1. Pond 5 (Reference): Vegetation Photo Point 1 on 6/10/2020

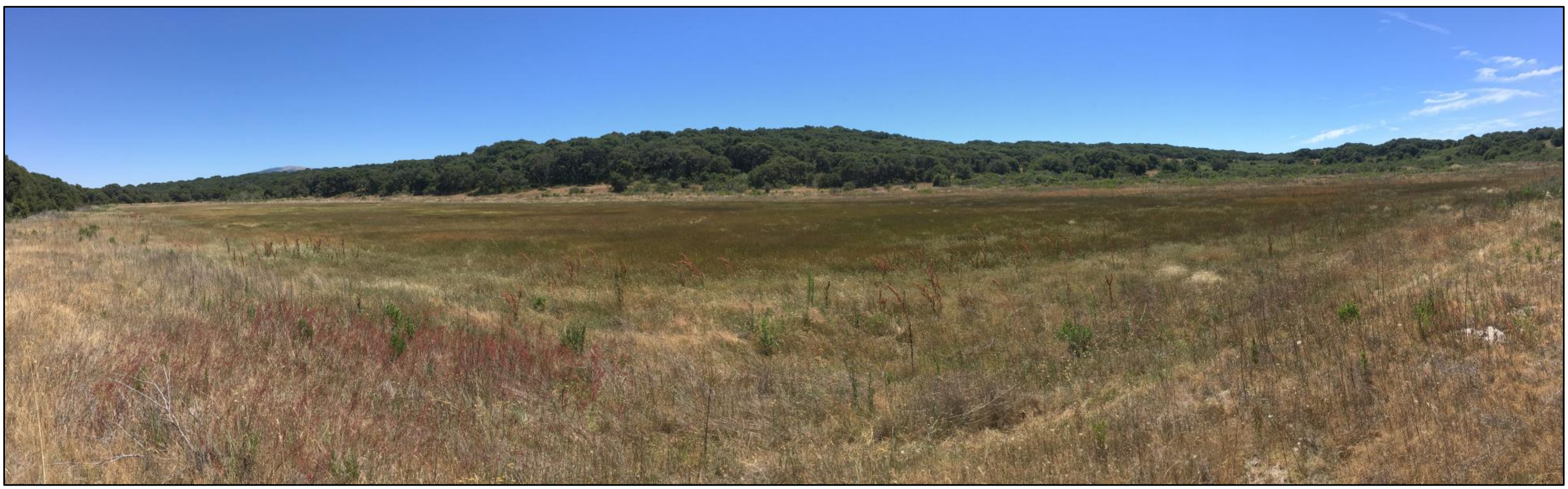


Figure D- 2. Pond 5 (Reference): Vegetation Photo Point 2 on 6/10/2020

Figure D- 3. Pond 101 East (East) (Reference): Vegetation Photo Point on 6/09/2020

Figure D- 4. Pond 997 (Reference): Vegetation Photo Point on 6/2/2020

Figure D- 5. Pond 101 East (West) (Year 2 Post-Mastication): Vegetation Photo Point on 6/8/2020

Figure D- 6. Pond 41 (Year 2 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 6/1/2020

Figure D- 7. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 6/5/2020

Figure D- 8. Contra Costa goldfields (*Lasthenia conjugens*) at Pond 3 North on 5/13/2020.

Figure D- 9. Close-up of Contra Costa goldfields (*Lasthenia conjugens*) At Pond 3 North on 5/22/2020.

Figure D- 10. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation): Vegetation Photo Point 1 on 6/8/2020

Figure D- 11. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 5/22/2020

Figure D- 12. Pond 40 North (Year 3 Post-Burn): Vegetation Photo Point on 6/16/2020

Figure D- 13. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation): Vegetation Photo Point 1 on 5/27/2020

Figure D- 14. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation): Vegetation Photo Point 2 on 5/27/2020

Figure D- 15. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Photo Point on 5/28/2020

Figure D- 16. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 5/21/2020

Figure D- 17. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 6/16/2020

Figure D- 18. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 6/1/2020

Figure D- 19. Pond 56 (Year 3 Post-Mastication): Vegetation Photo Point on 6/17/2020

Figure D- 20. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 6/17/2020

Figure D- 21. California tiger salamander (*Ambystoma californiense*) at Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) on 5/18/2020.

Figure D- 22. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation): Vegetation Photo Point 1 on 5/20/2020

Figure D- 23. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation): Vegetation Photo Point 2 on 5/20/2020

Figure D- 24. Contra Costa goldfields (*Lasthenia conjugens)* at Pond 61 Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) on 5/19/2020

Figure D- 25. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 6/3/2020

Figure D- 26. Machine Gun Flats (Year 3 Post-Mastication): Vegetation Photo Point 1 on 6/4/2020

Figure D- 27. Machine Gun Flats (Year 3 Post-Mastication): Vegetation Photo Point 2 on 6/4/2020

Figure D- 28. California tiger salamander (*Ambystoma californiense)* at Machine Gun Flats (Year 3 Post-Mastication) on 5/7/2020

Figure D- 29. Pond 16 (Year 2 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 8/11/2020

APPENDIX E

Vegetation Species Richness of Native and Non-Native Species and Wetland Indicator Category by Vernal Pool

This page intentionally left blank

Table E-1. Pond 5 (Reference) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 5			
Stratum	Native	Non-Native	Unidentified
1	2	2	0
2	3	1	0
3	9	9	0
6	5	2	0
7	3	5	0
Basin Total	**39**	**30**	**0**

Table E-2. Pond 101 East (East) (Reference) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 101 East (East)			
Stratum	Native	Non-Native	Unidentified
1	4	4	0
2	2	3	0
4	5	5	0
5	10	14	0
6	4	8	0
8	14	11	0
Basin Total	**51**	**35**	**0**

Table E-3. Pond 997 (Reference) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 997			
Stratum	Native	Non-Native	Unidentified
1	13	5	0
3	17	14	1
5	10	4	0
Basin Total	**56**	**26**	**0**

Table E-4. Pond 101 East (West) (Year 2 Post-Mastication) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 101 East (West)			
Stratum	Native	Non-Native	Unidentified
1	7	3	0
2	4	0	0
4	7	8	0
5	4	7	0
6	6	13	0
8	6	6	0
Basin Total	**41**	**34**	**0**

Table E-5. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 41			
Stratum	Native	Non-Native	Unidentified
1	8	1	0
2	9	3	0
3	9	11	0
4	12	10	0
Basin Total	**39**	**21**	**0**

Table E-6. Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 3 North			
Stratum	Native	Non-Native	Unidentified
1	3	1	0
2	11	6	0
3	15	14	1
Basin Total	**46**	**28**	**0**

Table E-7. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 3 South			
Stratum	**Native**	**Non-Native**	**Unidentified**
1	9	4	0
2	18	12	0
3	17	15	0
4	13	10	0
Basin Total	**60**	**32**	**0**

Table E-8. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 39			
Stratum	**Native**	**Non-Native**	**Unidentified**
1	2	0	0
3	6	12	0
4	7	19	0
Basin Total	**53**	**32**	**0**

Table E-9. Pond 40 North (Year 3 Post-Burn) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 40 North			
Stratum	**Native**	**Non-Native**	**Unidentified**
2	3	0	0
3	3	4	0
4	5	6	0
Basin Total	**31**	**28**	**0**

Table E-10. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 40 South			
Stratum	**Native**	**Non-Native**	**Unidentified**
1	5	5	0
2	1	11	0
3	4	10	0
Basin Total	**36**	**30**	**0**

Table E-11. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 43			
Stratum	**Native**	**Non-Native**	**Unidentified**
1	13	2	0
2	15	11	0
3	15	12	0
Basin Total	**62**	**23**	**1**

Table E-12. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 35			
Stratum	**Native**	**Non-Native**	**Unidentified**
1	5	4	0
2	3	5	0
4	3	14	0
Basin Total	**29**	**31**	**0**

Table E-13. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 42			
Stratum	Native	Non-Native	Unidentified
1	6	2	0
2	6	2	1
3	12	7	1
4	7	8	0
5	1	2	1
Basin Total	**57**	**33**	**3**

Table E-14. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 44			
Stratum	Native	Non-Native	Unidentified
1	10	8	0
2	12	5	0
3	13	12	0
4	13	8	0
Basin Total	**41**	**26**	**0**

Table E-15. Pond 56 (Year 3 Post-Mastication) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 56			
Stratum	Native	Non-Native	Unidentified
1	2	0	0
2	4	0	0
3	3	0	0
4	6	2	0
5	8	5	0
Basin Total	**42**	**25**	**0**

Table E-16. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 60			
Stratum	Native	Non-Native	Unidentified
1	2	0	0
2	3	1	0
3	3	0	0
4	9	8	0
Basin Total	**32**	**25**	**0**

Table E-17. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 61			
Stratum	Native	Non-Native	Unidentified
1	12	2	0
3	17	8	1
4	11	9	0
Basin Total	**68**	**29**	**1**

Table E-18. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 73			
Stratum	Native	Non-Native	Unidentified
1	2	1	0
2	6	2	0
4	12	9	0
Basin Total	**43**	**25**	**1**

Table E-19. Machine Gun Flats (Year 4 Post-Mastication) Vegetation Species Richness of Native and Non-Native Species by Stratum

Machine Gun Flats			
Stratum	Native	Non-Native	Unidentified
2	7	3	0
3	8	15	0
4	7	11	0
5	5	2	0
6	4	3	1
7	15	12	2
8	3	8	0
9	3	13	1
Basin Total	**77**	**43**	**3**

Table E-20. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 16			
Stratum	Native	Non-Native	Unidentified
3	3	2	0
4	6	2	0
5	3	0	0
6	1	2	0
Basin Total	**52**	**29**	**0**

Table E-21. Vegetation Species Richness of Native and Non-Native Species within Entire Vernal Pool Basin at Vernal Pools Monitored in 2020

Vernal Pool	Native	Non-Native	Unidentified	Total
5	39	30	0	69
101 East (East)	51	35	0	86
997	56	26	0	82
101 East (West)	41	34	0	75
41	39	21	0	60
3 North	46	28	0	74
3 South	60	32	0	92
39	53	32	0	85
40 North	31	28	0	59
40 South	36	30	0	66
43	62	23	1	86
35	29	31	0	60
42	57	33	3	93
44	41	26	0	67
56	42	25	0	67
60	32	25	0	57
61	68	29	1	98
73	43	25	1	69
Machine Gun Flats	77	43	3	123
16	52	29	0	81

Table E-22. 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	1
2	1	2	0	1	0	0
3	4	6	2	2	1	3
6	1	5	1	0	0	0
7	0	2	1	1	1	3
Basin Total	**8**	**12**	**9**	**16**	**1**	**23**

Table E-23. 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	4	1	1	2	0	0
2	1	1	1	1	0	1
4	0	3	1	3	1	2
5	1	3	4	4	3	9
6	0	2	1	4	3	2
8	1	4	4	4	3	9
Basin Total	**5**	**17**	**15**	**15**	**4**	**30**

Table E-24. Pond 997 (Reference) Number of Wetland Plants by Indicator Category by Stratum

Pond 997						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	7	8	2	0	0	1
3	3	7	5	5	0	12
5	2	5	2	0	0	5
Basin Total	**11**	**15**	**10**	**13**	**1**	**32**

Table E-25. Pond 101 East (West) (Year 2 Post-Mastication) Number of Wetland Plants by Indicator Category by Stratum

Pond 101 East (West)						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	3	4	1	1	0	1
2	2	1	0	1	0	0
4	1	2	5	1	1	5
5	1	2	3	1	0	4
6	0	3	4	3	2	7
8	2	3	3	2	1	1
Basin Total	**9**	**18**	**13**	**12**	**3**	**20**

Table E-26. Pond 41 (Year 2 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 41						
Stratum	OBL	FACW	FAC	FACU	UPL	NL
1	5	3	0	1	0	0
2	5	4	1	1	0	1
3	1	4	3	5	1	6
4	1	5	5	3	0	8
Basin Total	**6**	**15**	**11**	**11**	**1**	**16**

Table E-27 Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 3 North						
Stratum	OBL	FACW	FAC	FACU	UPL	NL
1	3	1	0	0	0	0
2	6	7	3	0	0	1
3	1	7	5	5	1	11
Basin Total	**11**	**15**	**12**	**10**	**3**	**23**

Table E-28. Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 3 South						
Stratum	OBL	FACW	FAC	FACU	UPL	NL
1	7	4	1	1	0	0
2	4	9	7	3	0	7
3	1	8	5	6	1	11
4	2	3	4	4	1	9
Basin Total	**9**	**20**	**13**	**13**	**2**	**35**

Table E-29. Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 39						
Stratum	OBL	FACW	FAC	FACU	UPL	NL
1	2	0	0	0	0	0
3	0	2	4	5	1	6
4	0	1	4	7	2	12
Basin Total	**7**	**17**	**13**	**12**	**3**	**33**

Table E-30. Pond 40 North (Year 3 Post-Burn) Number of Wetland Plants by Indicator Category by Stratum

Pond 40 North						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
2	1	1	0	0	0	1
3	1	3	3	0	0	0
4	1	3	2	0	0	5
Basin Total	**4**	**7**	**10**	**12**	**2**	**24**

Table E-31. Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 40 South						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	4	3	3	0	0	0
2	0	1	2	5	0	4
3	0	1	3	4	0	6
Basin Total	**5**	**14**	**10**	**14**	**2**	**21**

Table E-32. Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 43						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	8	6	0	0	0	1
2	3	10	1	3	1	8
3	1	8	4	3	0	11
Basin Total	**10**	**16**	**9**	**11**	**1**	**39**

Table E-33. Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 35						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	6	1	2	0	0	0
2	1	2	2	0	0	3
4	0	1	4	5	0	7
Basin Total	**7**	**6**	**7**	**9**	**3**	**28**

Table E-34. Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 42						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	5	3	0	0	0	0
2	6	2	0	0	0	1
3	5	8	2	0	1	4
4	0	2	3	2	0	8
5	1	1	0	1	0	1
Basin Total	**11**	**18**	**11**	**14**	**2**	**37**

Table E-35. Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 44						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	5	7	2	2	0	2
2	5	8	2	1	0	1
3	1	5	3	4	0	12
4	5	8	3	2	0	3
Basin Total	**5**	**12**	**9**	**11**	**2**	**28**

Table E-36. Pond 56 (Year 3 Post-Mastication) Number of Wetland Plants by Indicator Category by Stratum

Pond 56						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	1	0	0	1	0	0
2	2	2	0	0	0	0
3	1	2	0	0	0	0
4	4	4	0	0	0	0
5	2	5	1	2	0	3
Basin Total	**8**	**11**	**12**	**12**	**2**	**22**

Table E-37. Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 60						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	1	0	0	1	0	0
2	2	2	0	0	0	0
3	1	2	0	0	0	0
4	6	5	3	2	1	0
Basin Total	**8**	**10**	**8**	**9**	**1**	**21**

Table E-38. Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 61						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	9	4	0	0	0	1
3	6	8	3	1	1	7
4	1	3	3	5	0	8
Basin Total	**10**	**17**	**12**	**11**	**2**	**46**

Table E-39. Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 73						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	1	2	0	0	0	0
2	3	4	0	0	0	1
4	3	9	1	2	1	5
Basin Total	**9**	**15**	**10**	**9**	**1**	**25**

Table E-40. Machine Gun Flats (Year 3 Post-Mastication) Number of Wetland Plants by Indicator Category by Stratum

Machine Gun Flats						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
2	4	4	0	1	0	1
3	2	4	4	5	1	7
4	2	3	3	4	1	5
5	1	3	1	0	0	2
6	1	2	2	0	1	2
7	1	7	6	4	1	10
8	1	0	3	1	0	6
9	2	2	4	3	1	5
Basin Total	**9**	**23**	**18**	**23**	**1**	**49**

Table E-41. Pond 16 (Year 2 Post-Subsurface Munitions Remediation) Number of Wetland Plants by Indicator Category by Stratum

Pond 16						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
3	2	1	1	1	0	0
4	0	3	3	1	1	0
5	0	0	2	1	0	0
6	0	2	1	0	0	0
Basin Total	**8**	**15**	**15**	**14**	**2**	**27**

Table E-42. Wetland Plants by Indicator Category within Entire Vernal Pool Basin at Vernal Pools Monitored in 2020

Number of Wetland Plants Observed at Vernal Pools Monitored in 2020							
Vernal Pool	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**	**Total**
5	8	12	9	16	1	23	69
101 East (East)	5	17	15	15	4	30	86
997	11	15	10	13	1	32	82
101 East (West)	9	18	13	12	3	20	75
41	6	15	11	11	1	16	60
3 North	11	15	12	10	3	23	74
3 South	2	3	4	4	1	9	23
39	7	17	13	12	3	33	85
40 North	4	7	10	12	2	24	59
40 South	5	14	10	14	2	21	66
43	10	16	9	11	1	39	86
35	7	6	7	9	3	28	60
42	11	18	11	14	2	37	93
44	5	12	9	11	2	28	67
56	5	12	9	11	2	28	67
60	8	10	8	9	1	21	57
61	10	17	12	11	2	46	98
73	9	15	10	9	1	25	69
Machine Gun Flats	9	23	18	23	1	49	123
16	8	15	15	14	2	27	81

This page intentionally left blank

APPENDIX F

Species Composition of Follow-Up Wetland Vegetation Monitoring by Vernal Pool

This page intentionally left blank

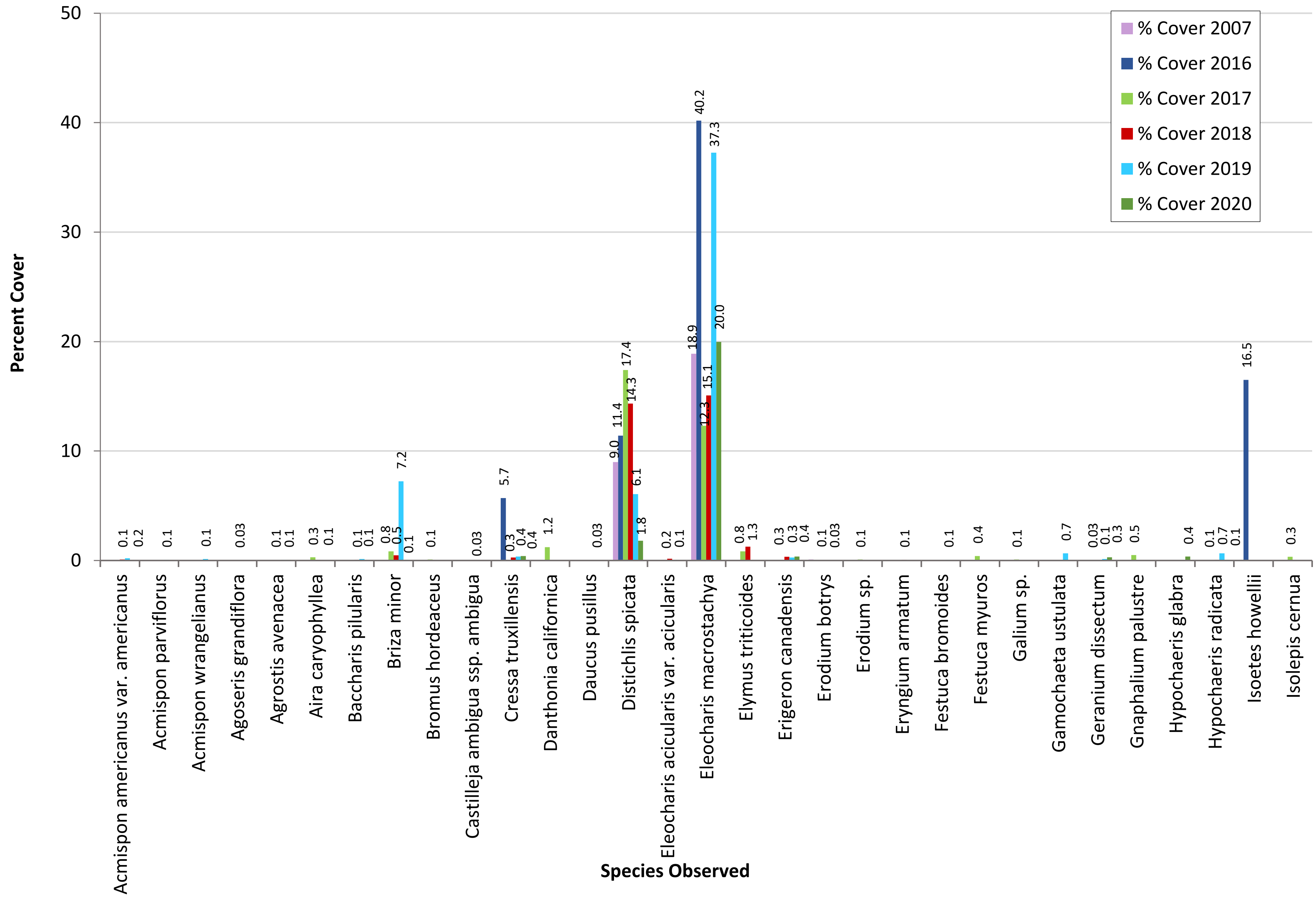


Figure F-1. Comparison Graph of Percent Cover by Wetland Plant Species for 2007, 2016, 2017, 2018, 2019, and 2020 at Pond 5 (Reference)

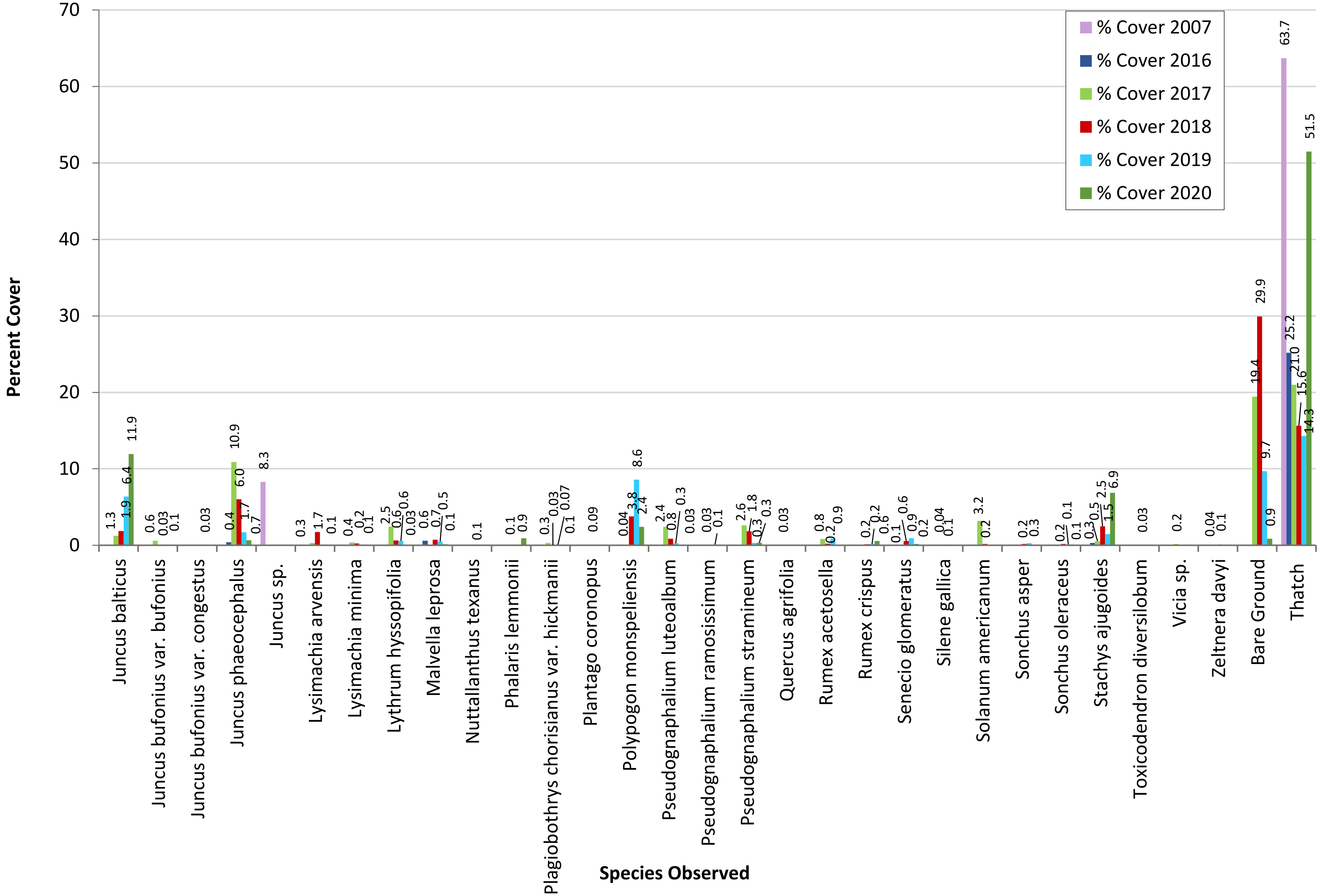


Figure F-1 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 2007, 2016, 2017, 2018, 2019, and 2020 at Pond 5 (Reference)

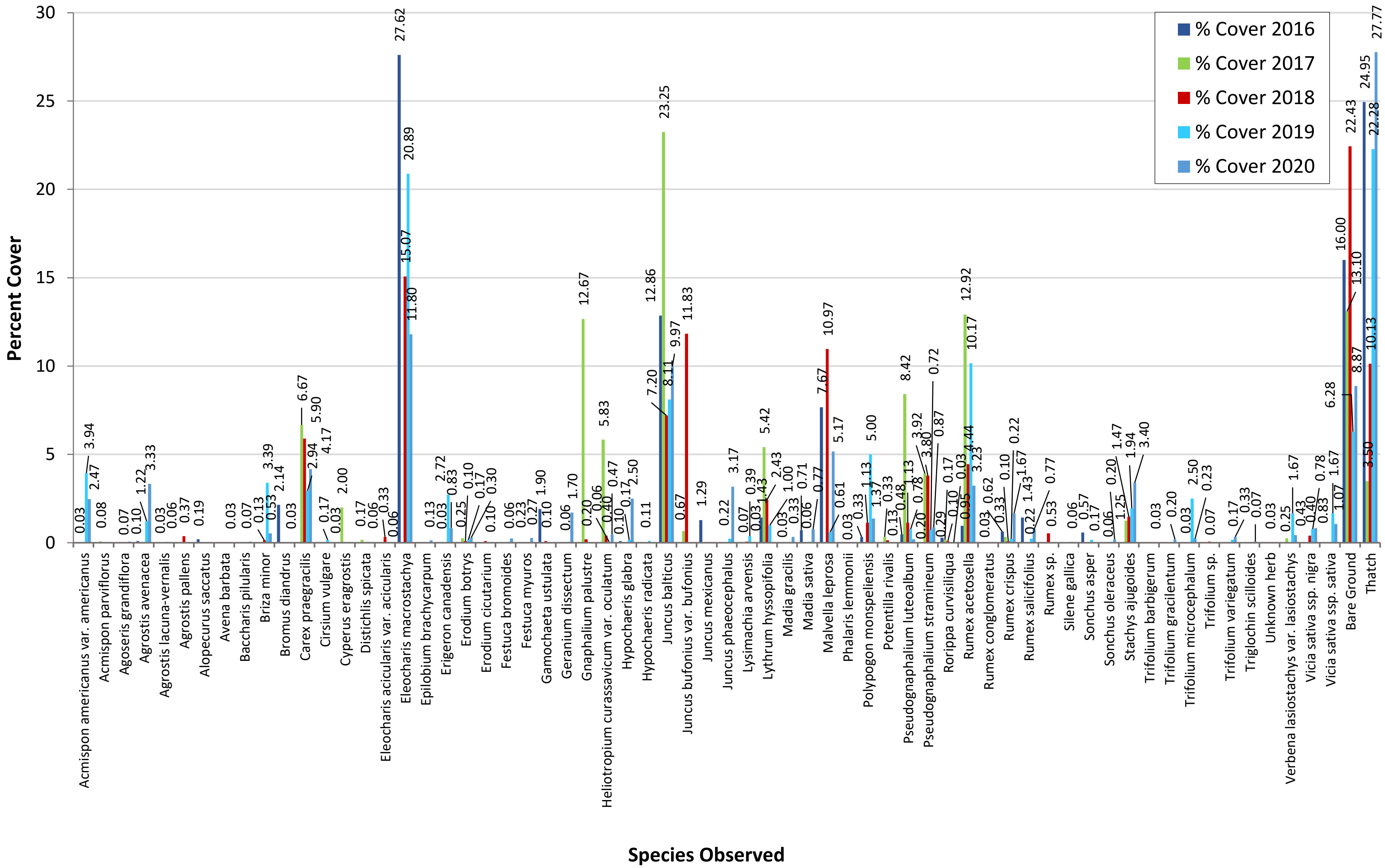


Figure F-2. Comparison Graph of Percent Cover by Wetland Plant Species for 2016, 2017, 2018, 2019, and 2020 at Pond 101 East (East)(Reference)

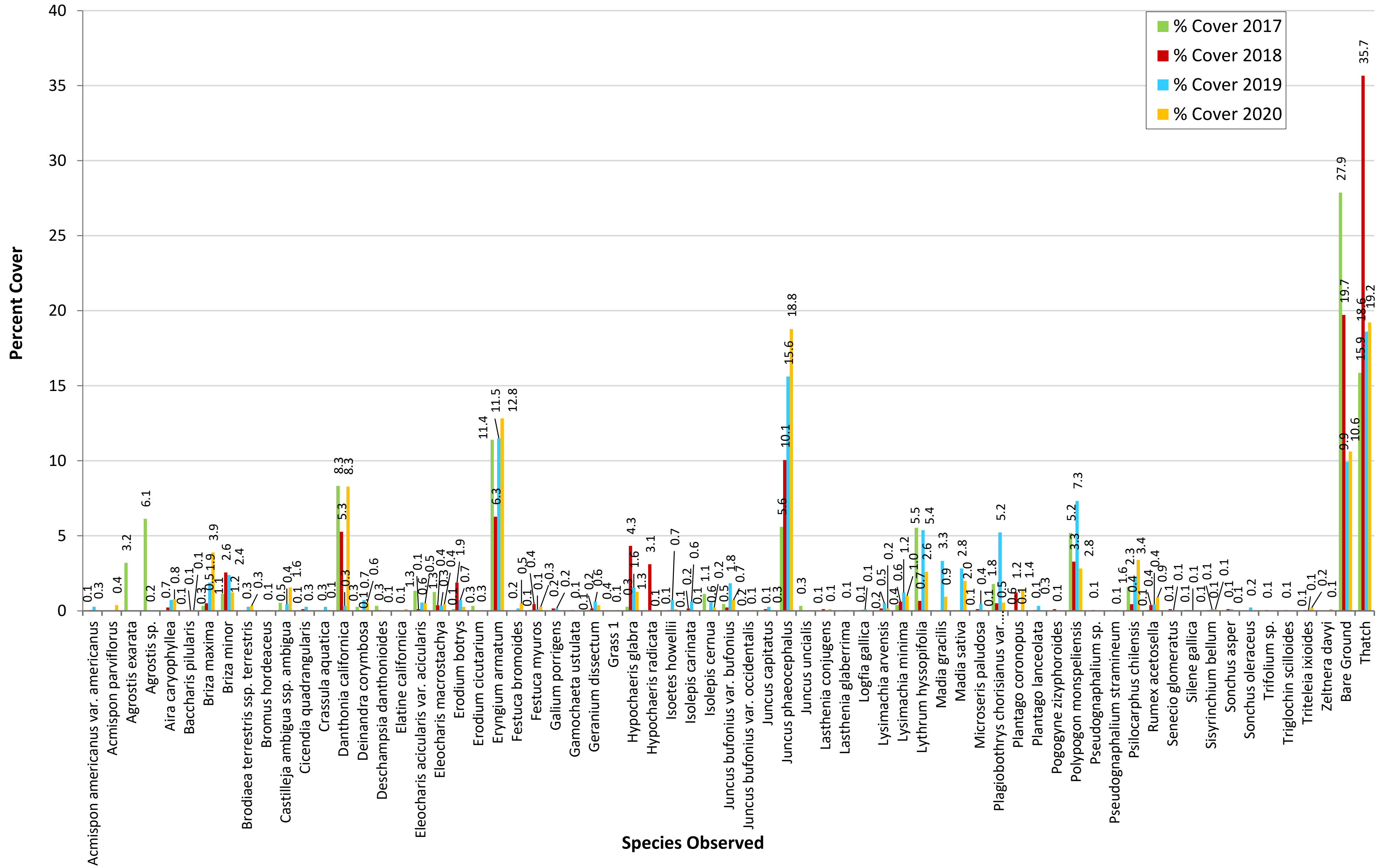


Figure F-3. Comparison Graph of Percent Cover by Wetland Plant Species for 2017, 2018, 2019, and 2020 at Pond 997 (Reference)

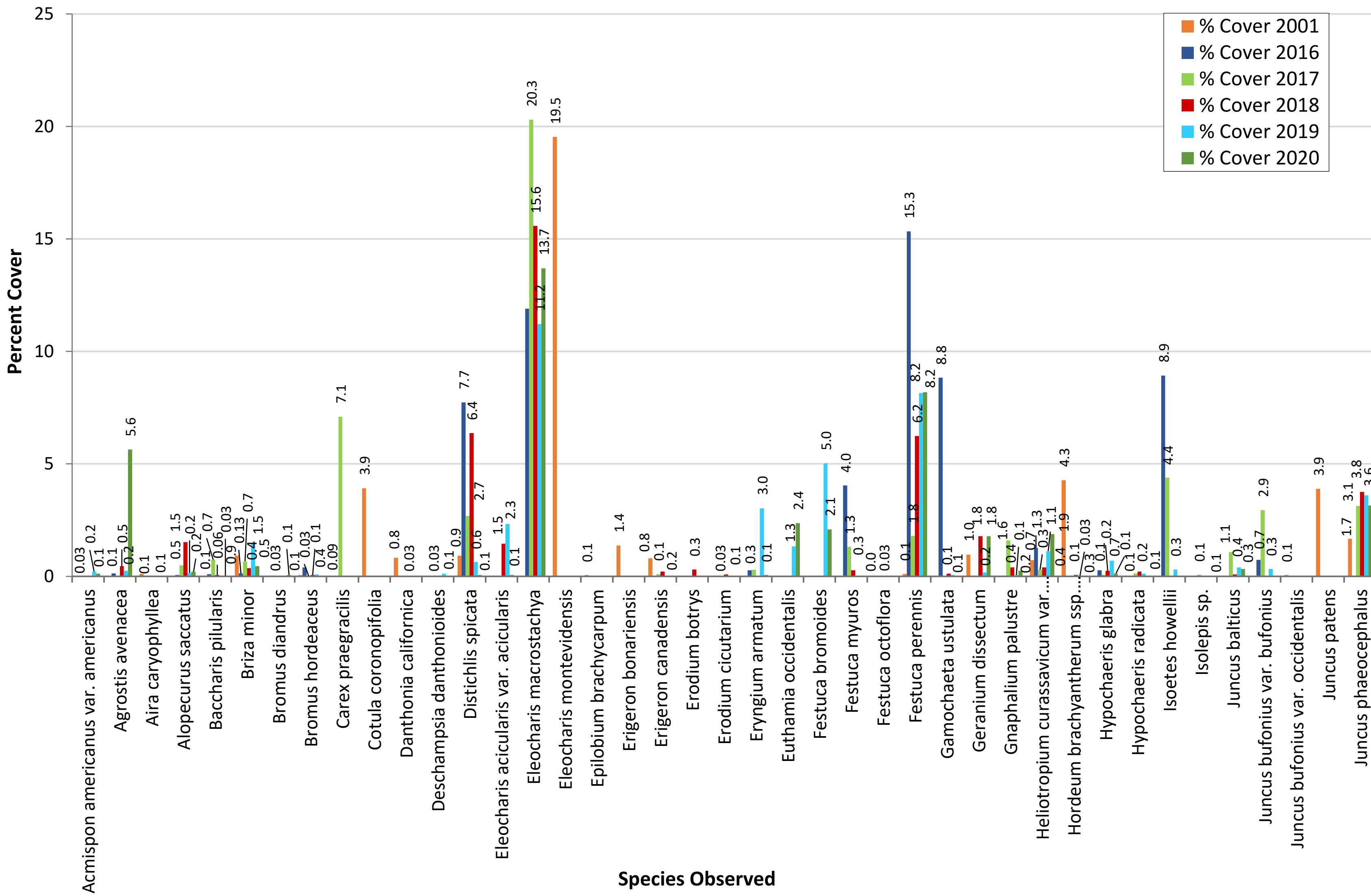


Figure F-4. Comparison Graph of Percent Cover by Wetland Plant Species for 2001, 2016, 2017, 2018, 2019, and 2020 at Pond 101 East (West) (Year 2 Post-Mastication)

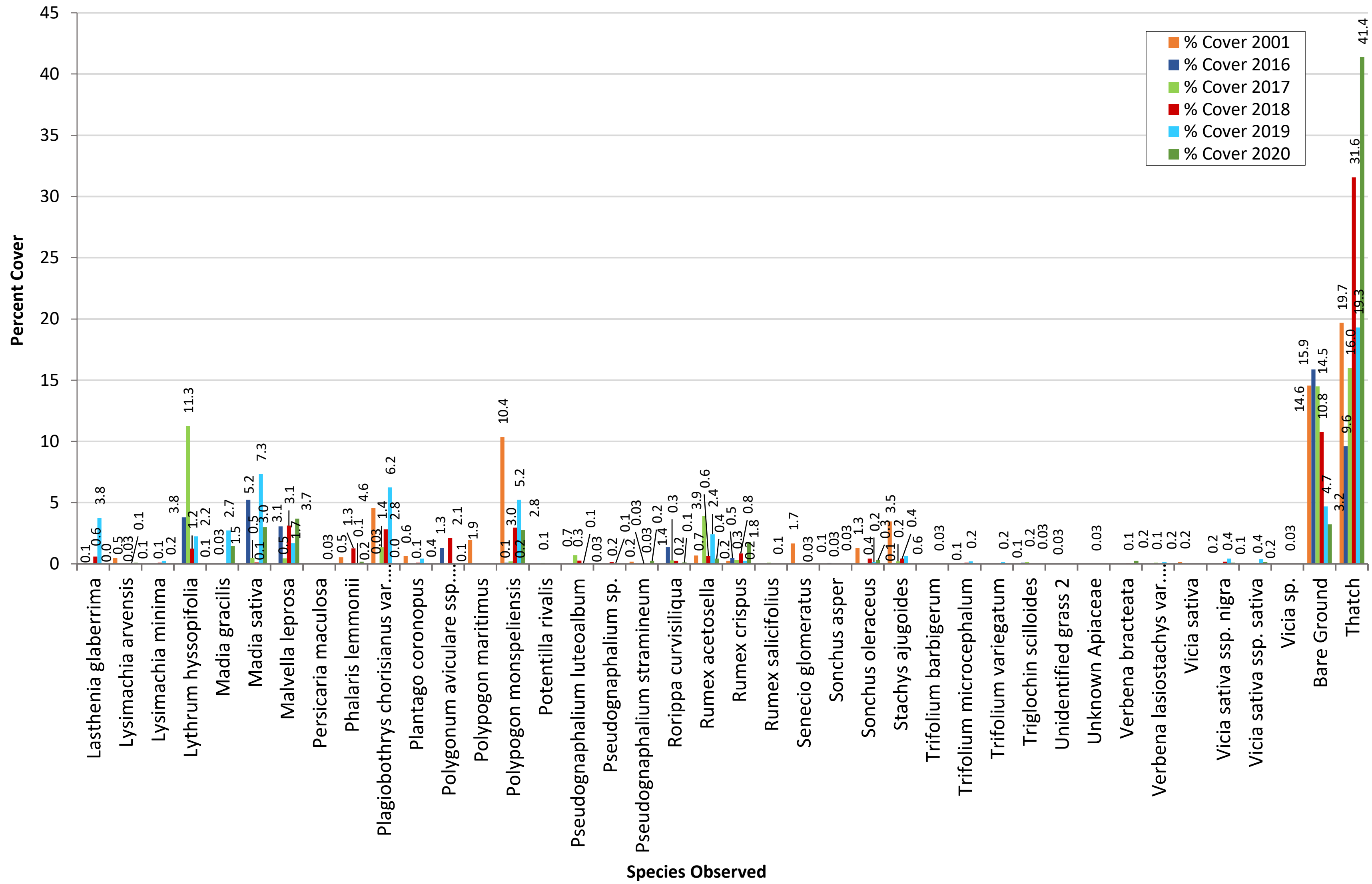


Figure F-4 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 2001, 2016, 2017, 2018, 2019, and 2020 at Pond 101 East (West) (Year 2 Post-Mastication)

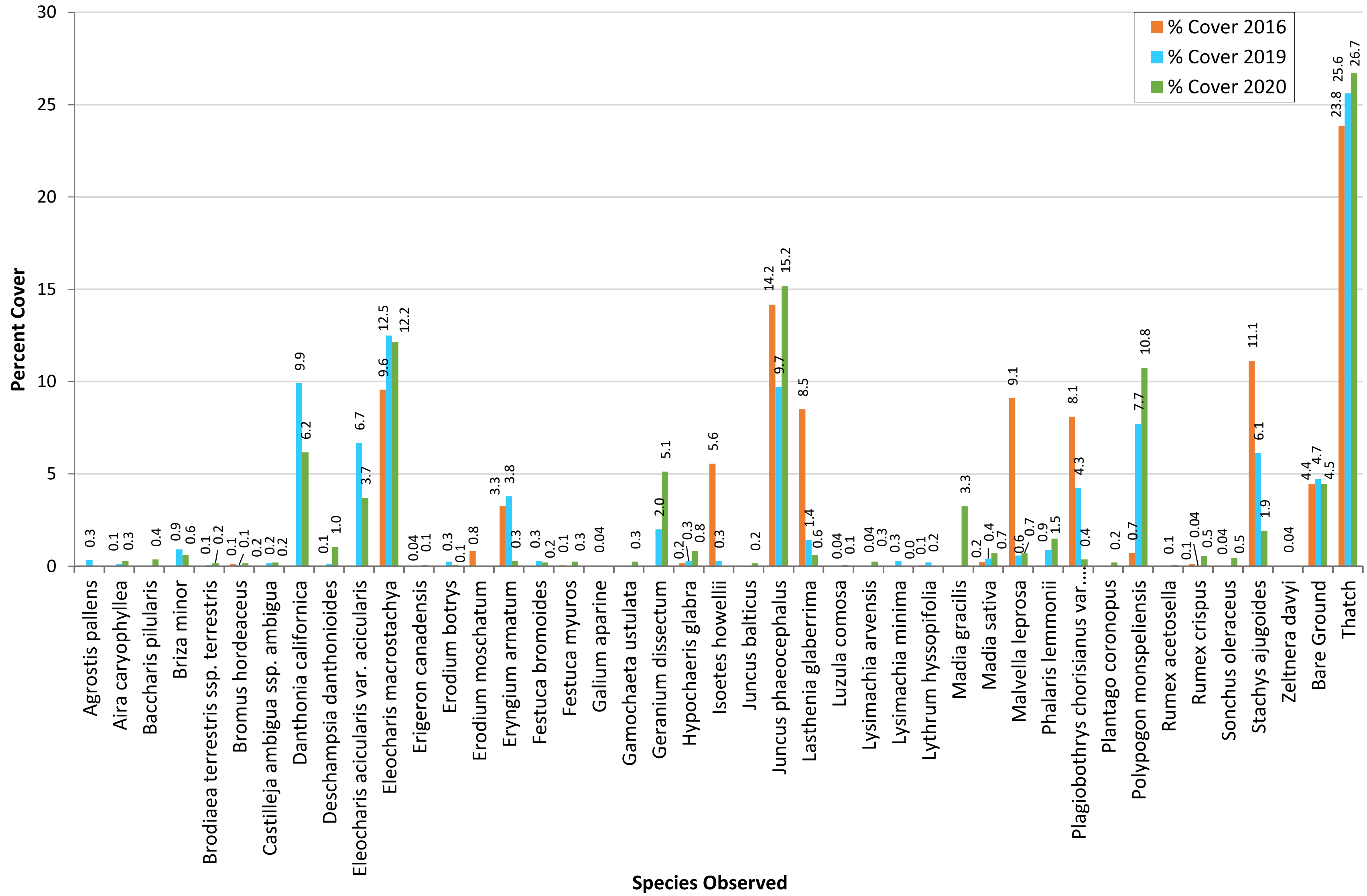


Figure F-5. Comparison Graph of Percent Cover by Wetland Plant Species for 2016, 2019 and 2020 at Pond 41 (Year 2 Post-Subsurface Munitions Remediation)

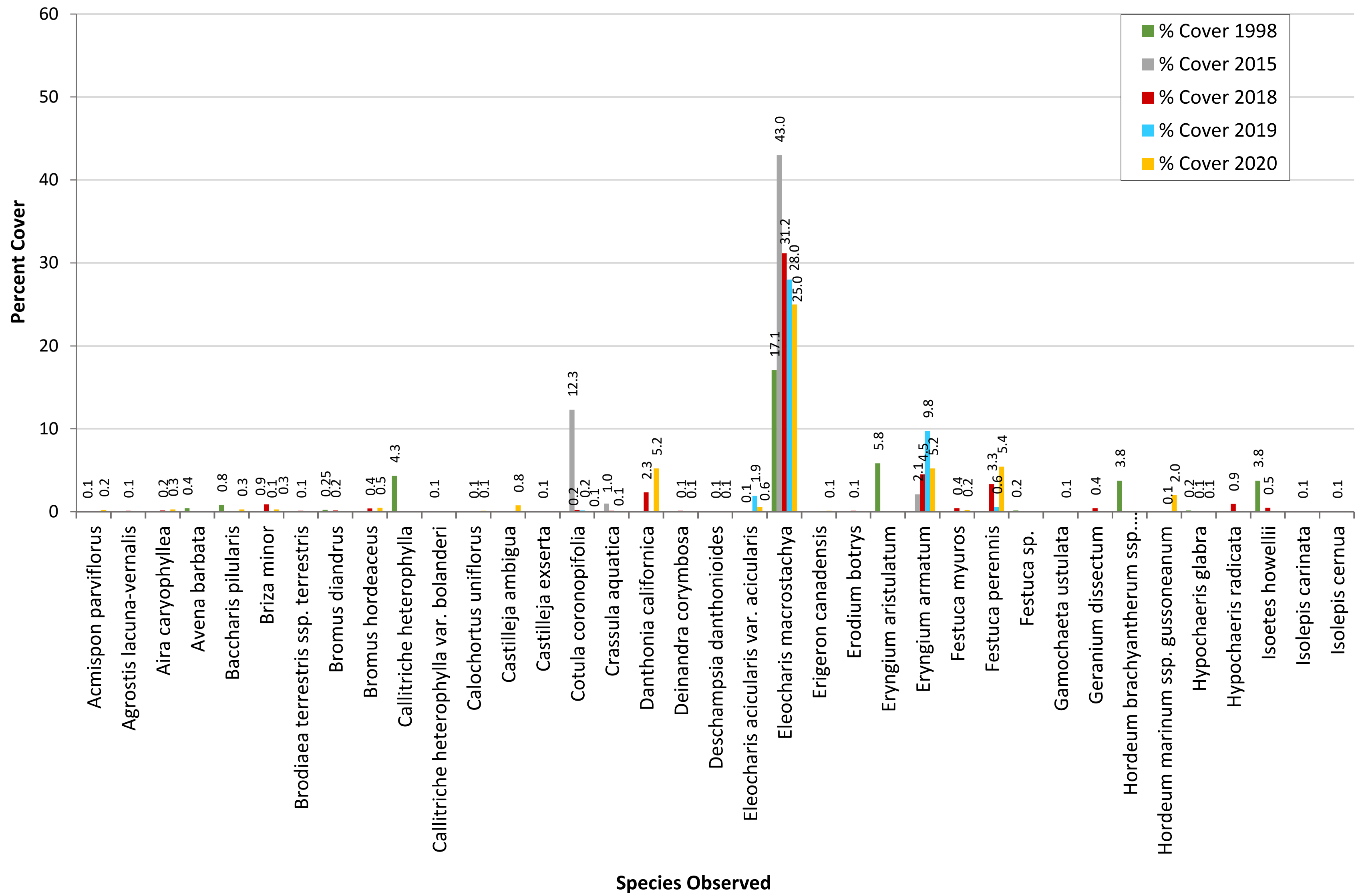


Figure F-6. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2015, 2018, 2019, and 2020 at Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

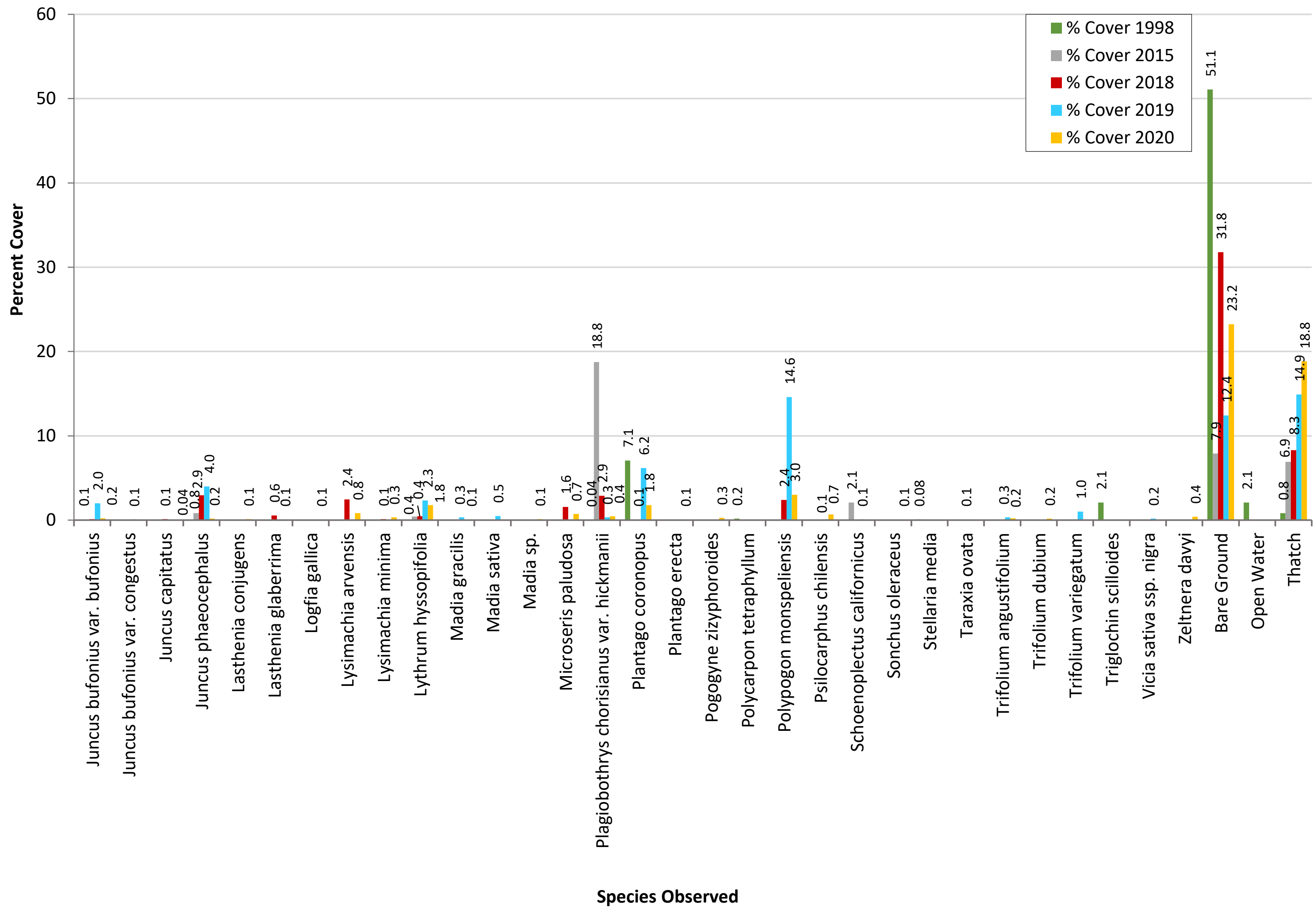


Figure F-6 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2015, 2018, 2019, and 2020 at Pond 3 North (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

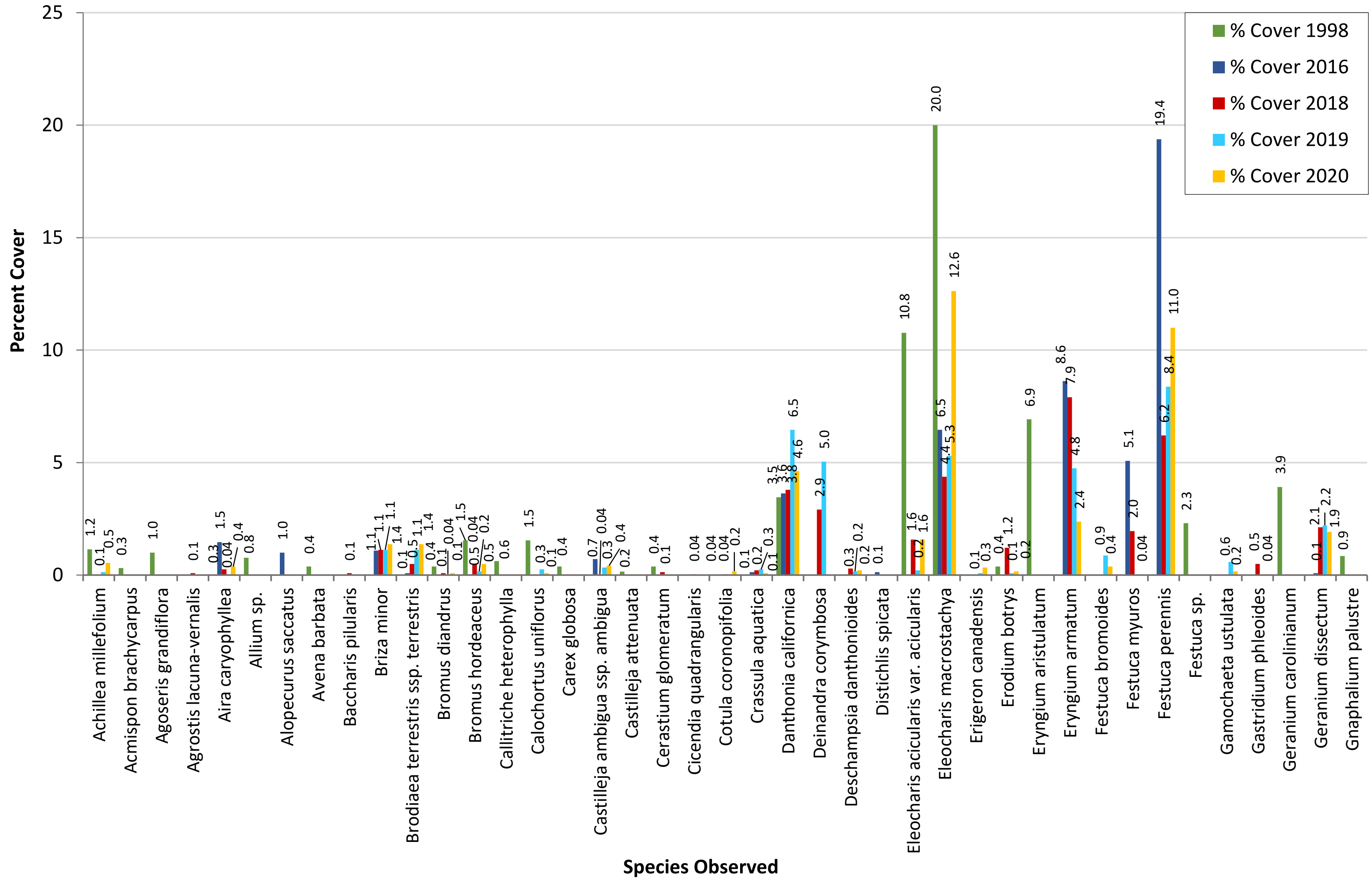


Figure F-7. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, 2019, and 2020 at Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

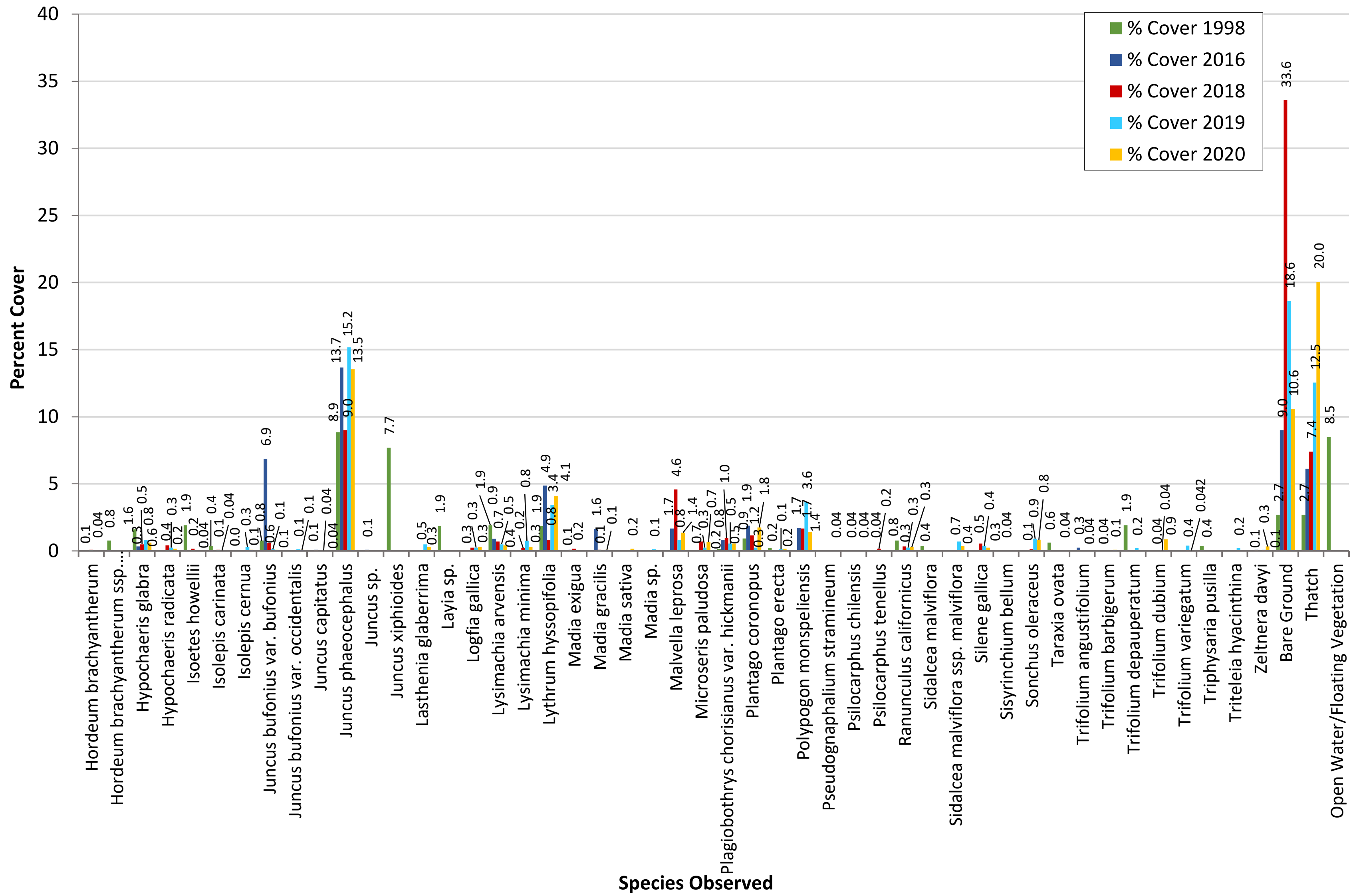


Figure F-7 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, 2019, and 2020 at Pond 3 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

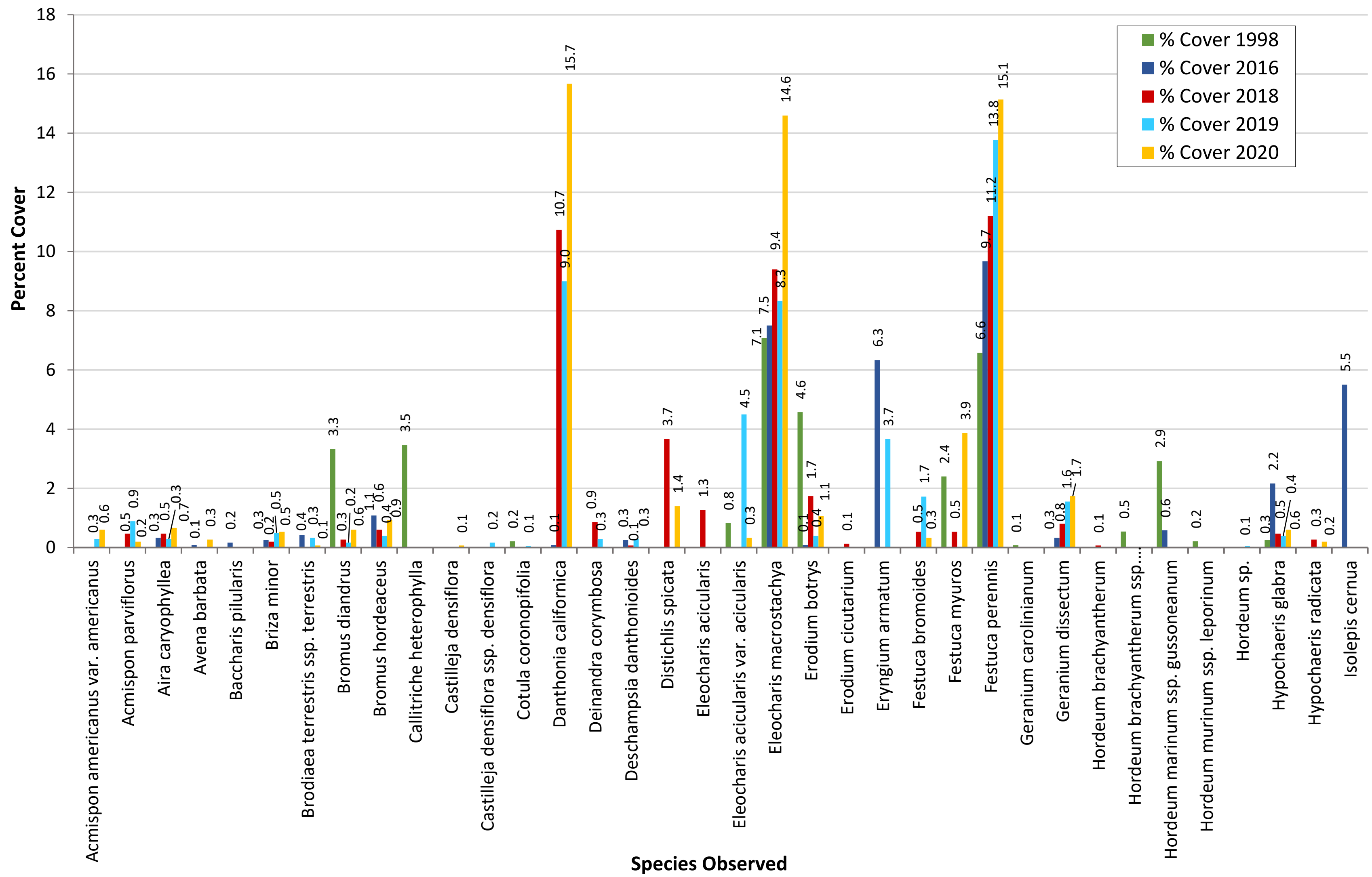


Figure F-8. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, 2019, and 2020 at Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

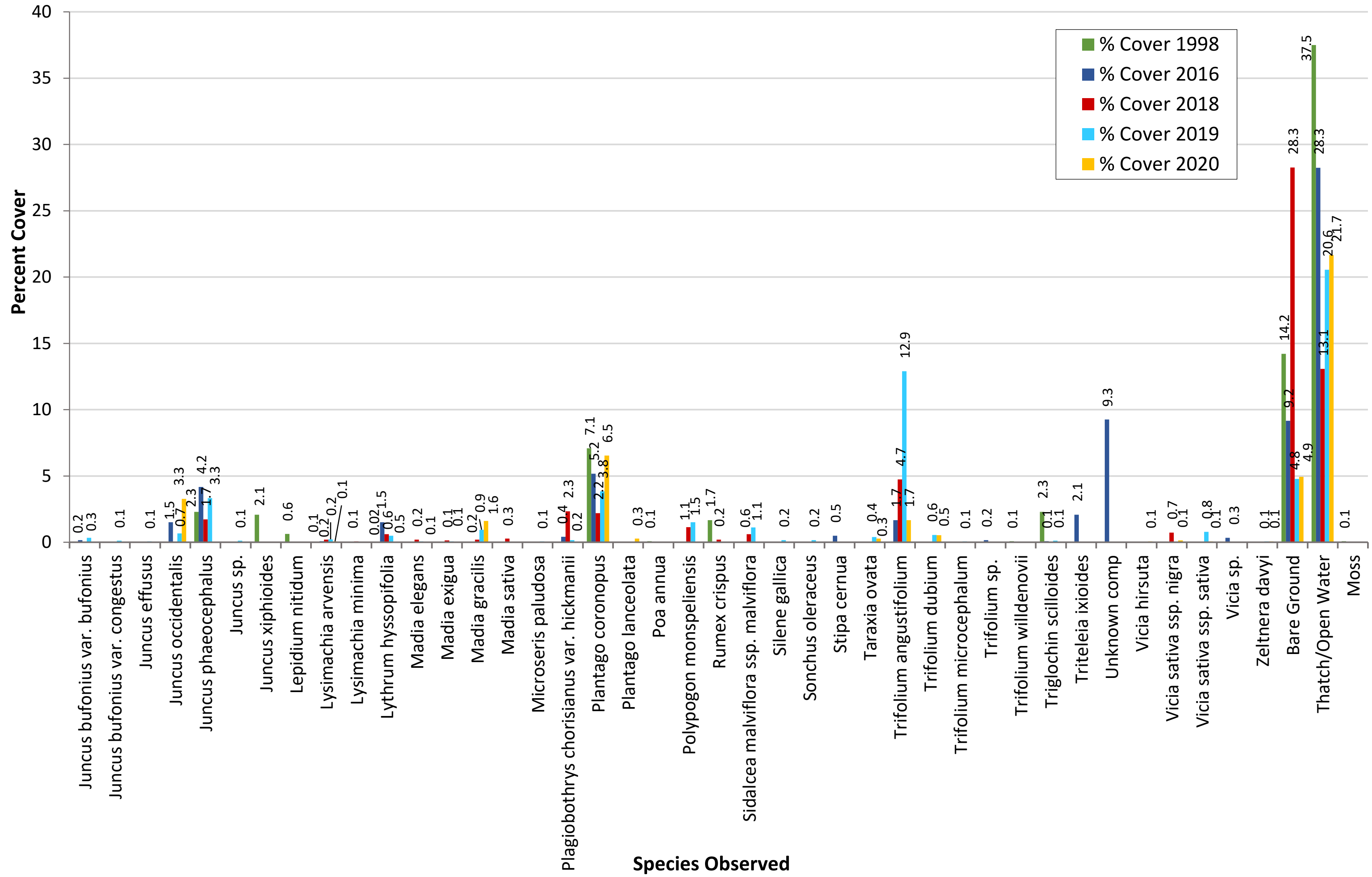


Figure F-8 (Continued). Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, 2019, and 2020 at Pond 39 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

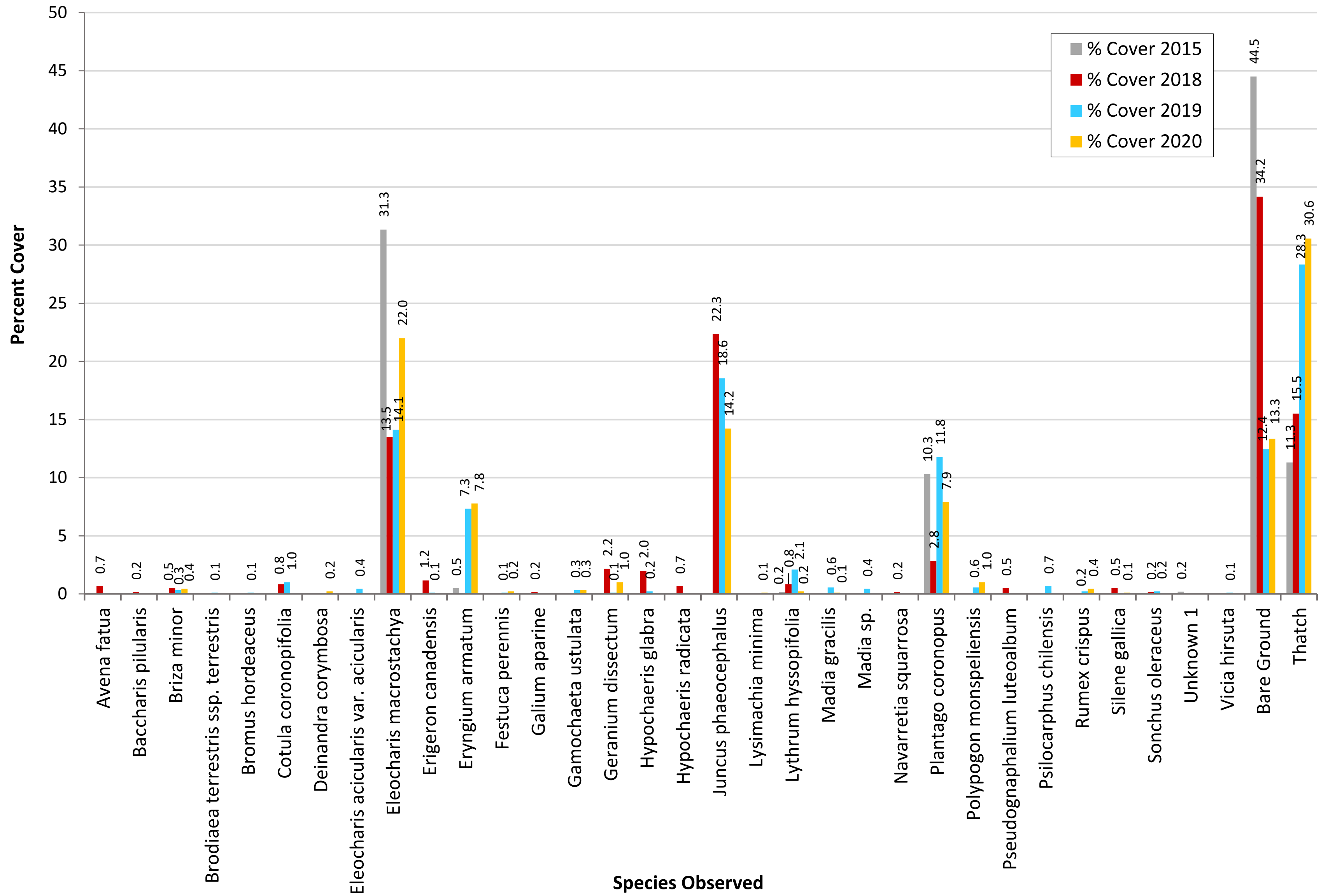


Figure F-9. Comparison Graph of Percent Cover by Wetland Plant Species for 2015, 2018, 2019, and 2020 at Pond 40 North (Year 3 Post-Burn)

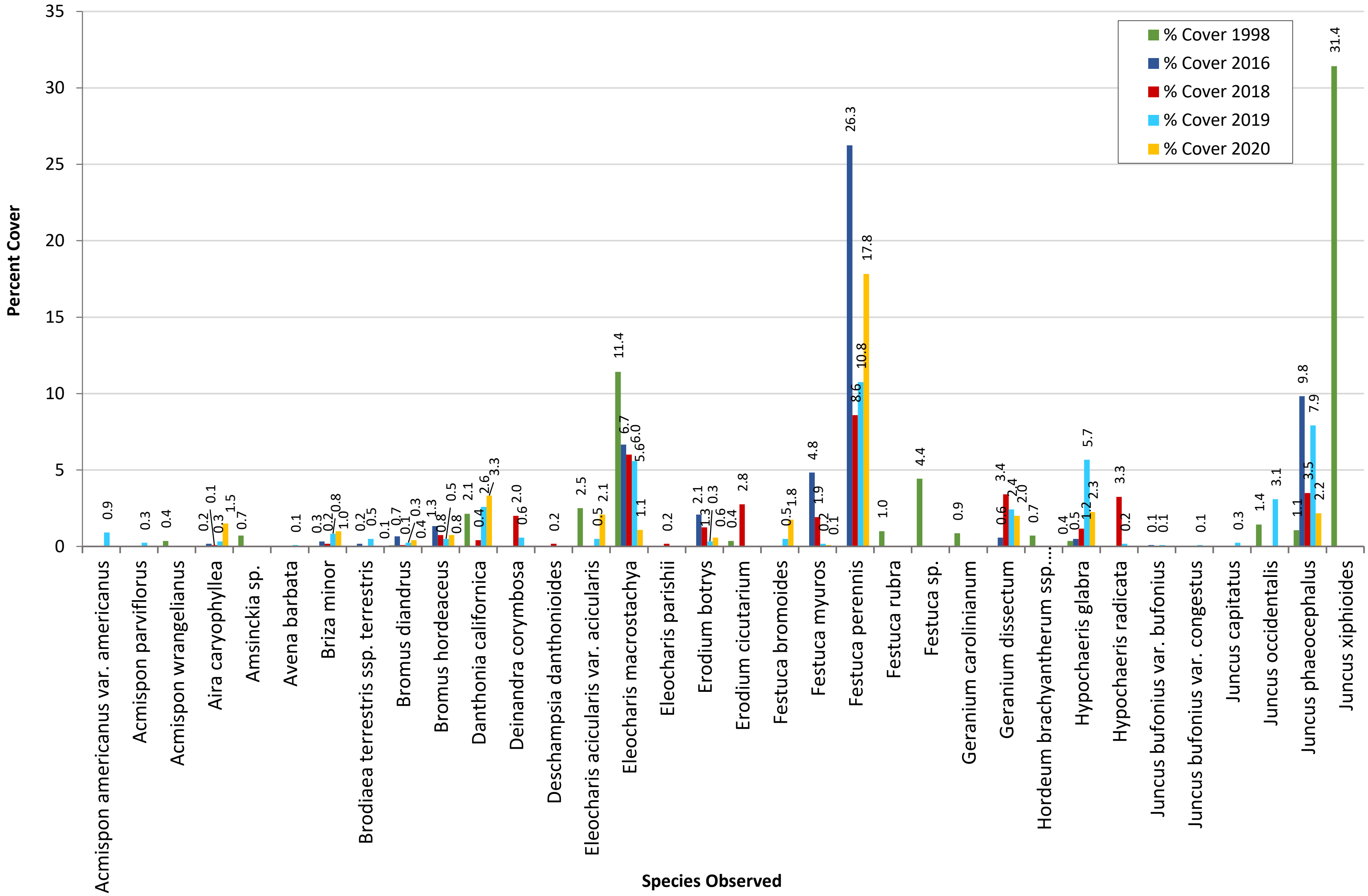


Figure F-10. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, 2019, and 2020 at Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

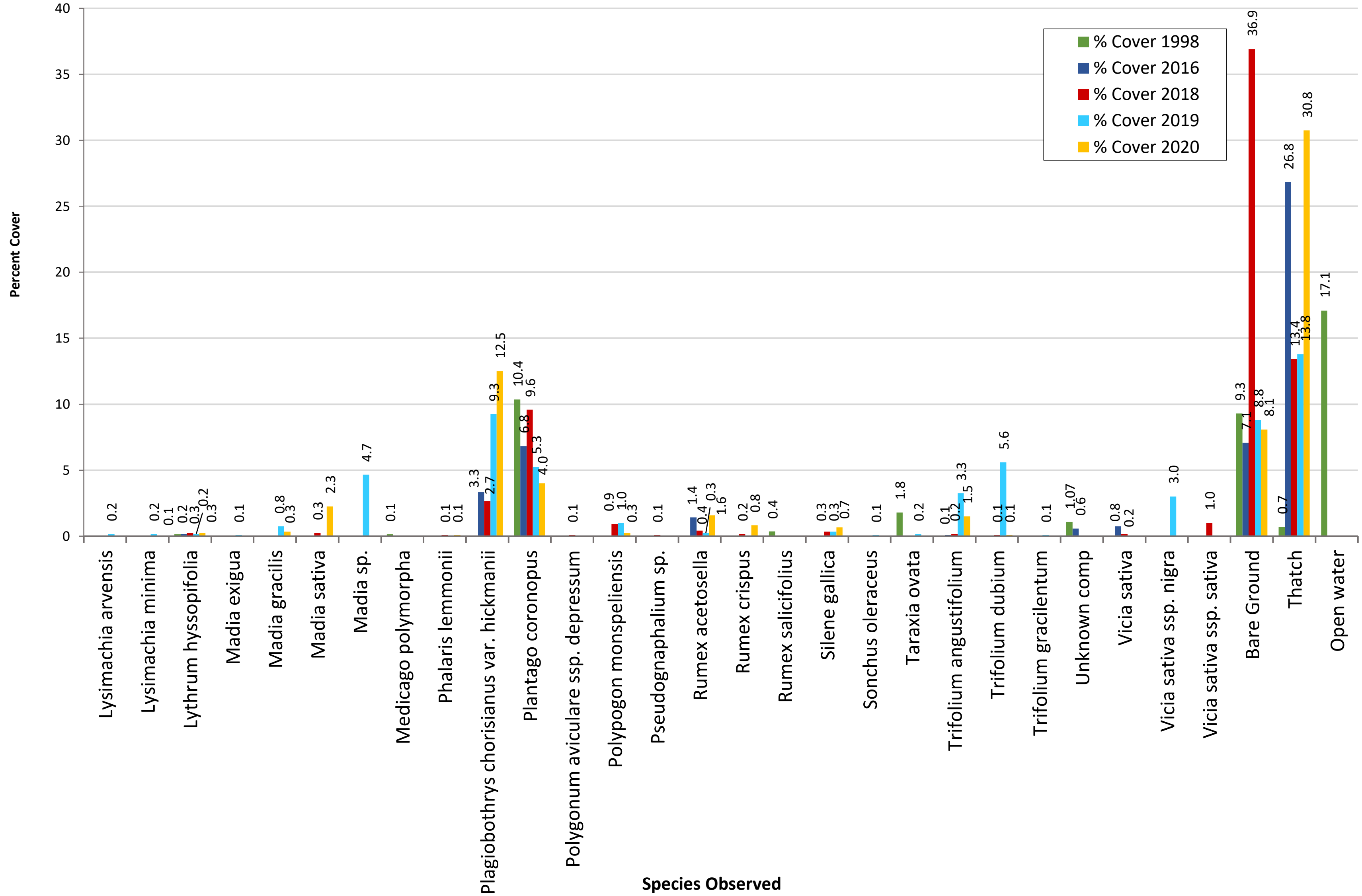


Figure F-10 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, 2019, and 2020 at Pond 40 South (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

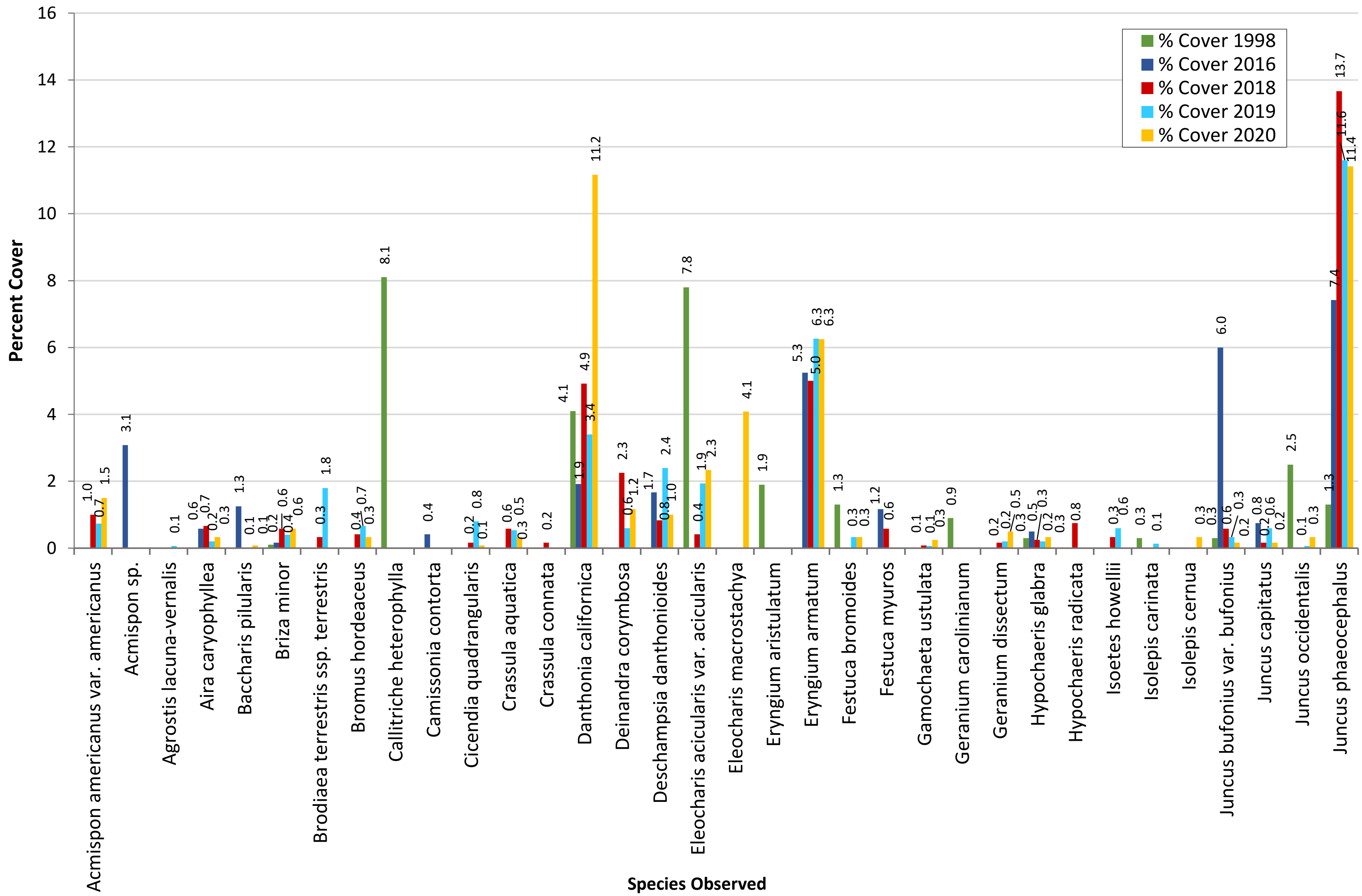


Figure F-11. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, 2019, and 2020 at Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

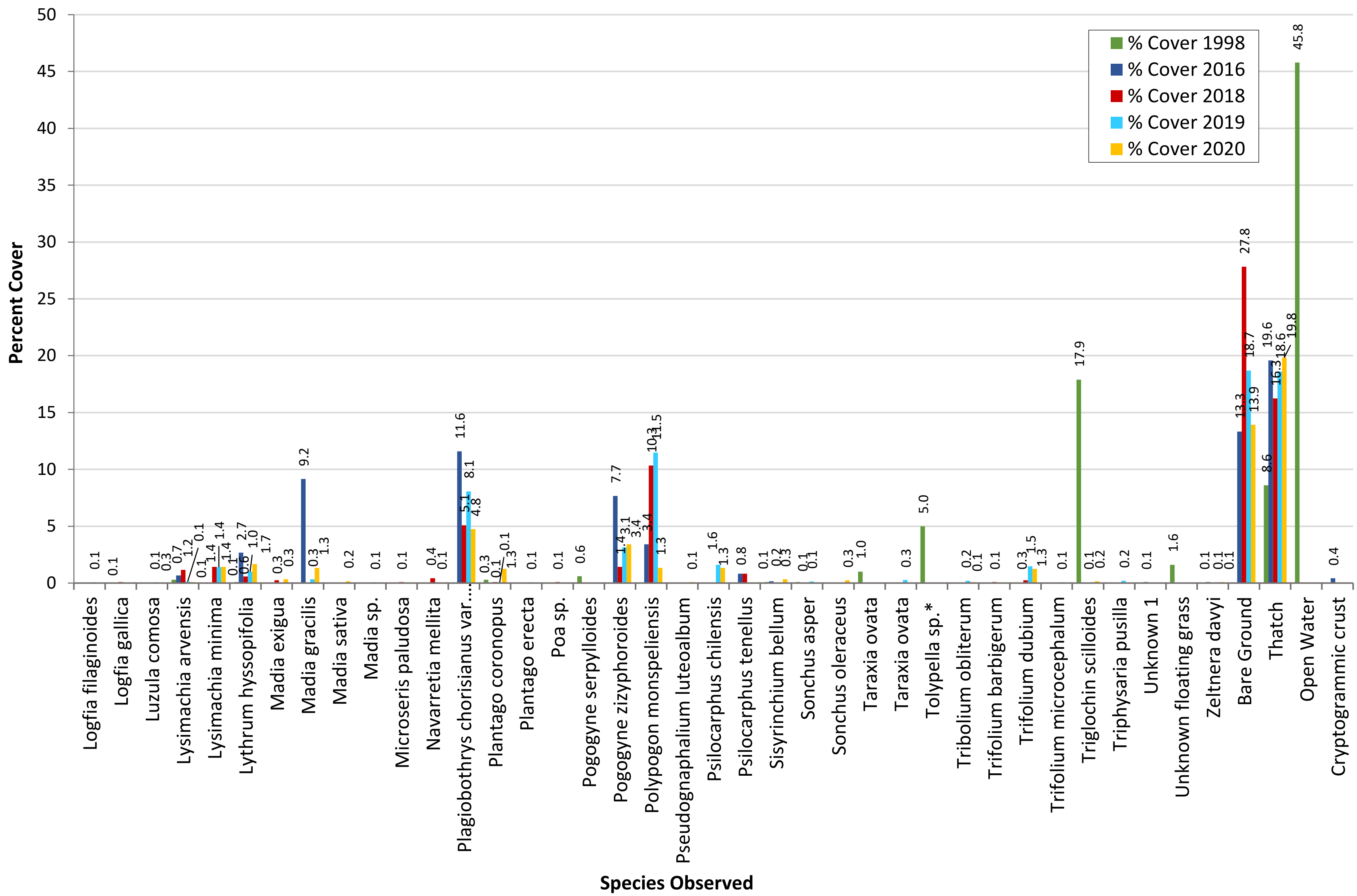


Figure F-11 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, 2019, and 2020 at Pond 43 (Year 3 Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

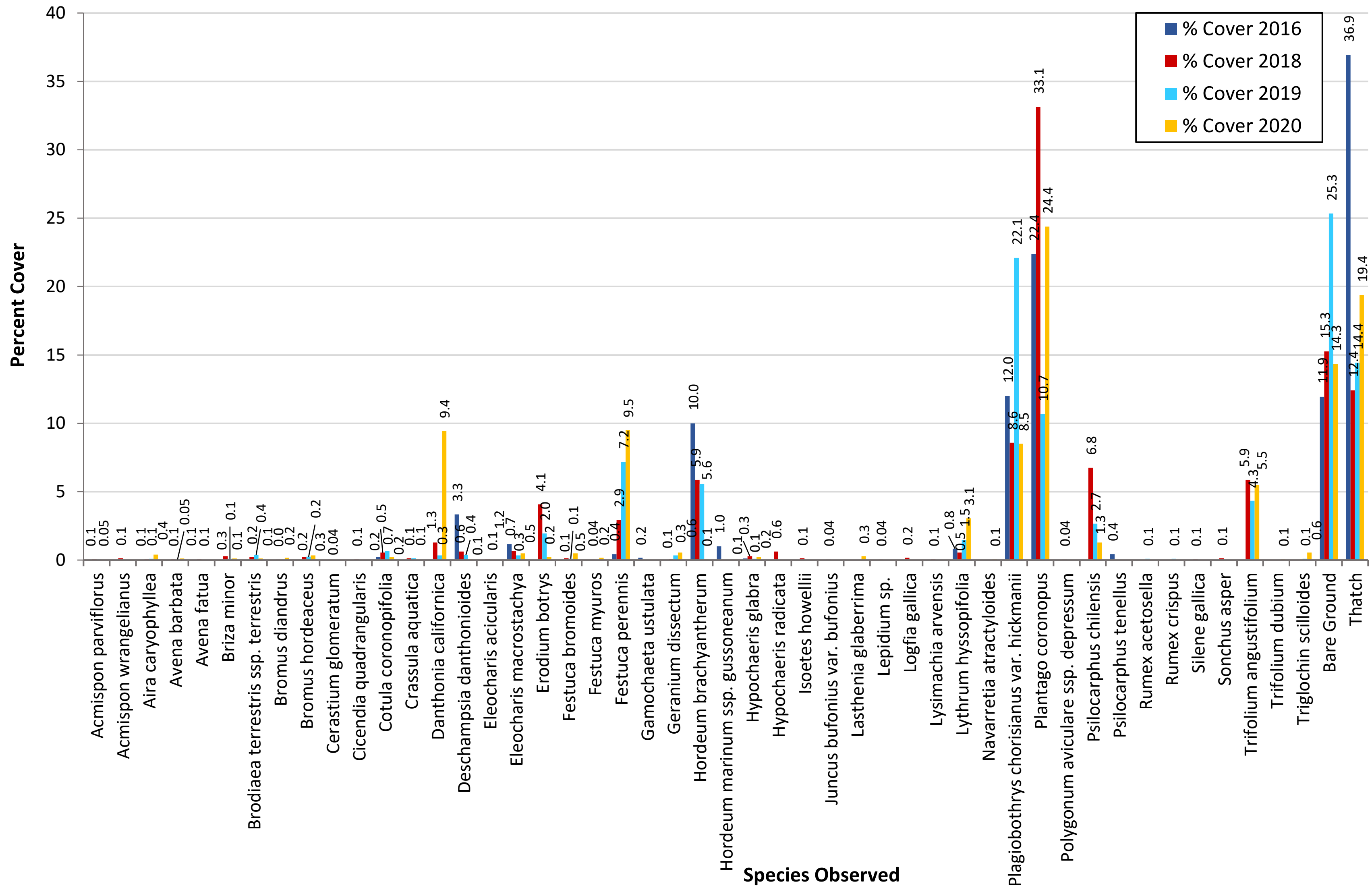


Figure F-12. Comparison Graph of Percent Cover by Wetland Plant Species for 2016, 2018, 2019, and 2020 at Pond 35 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation)

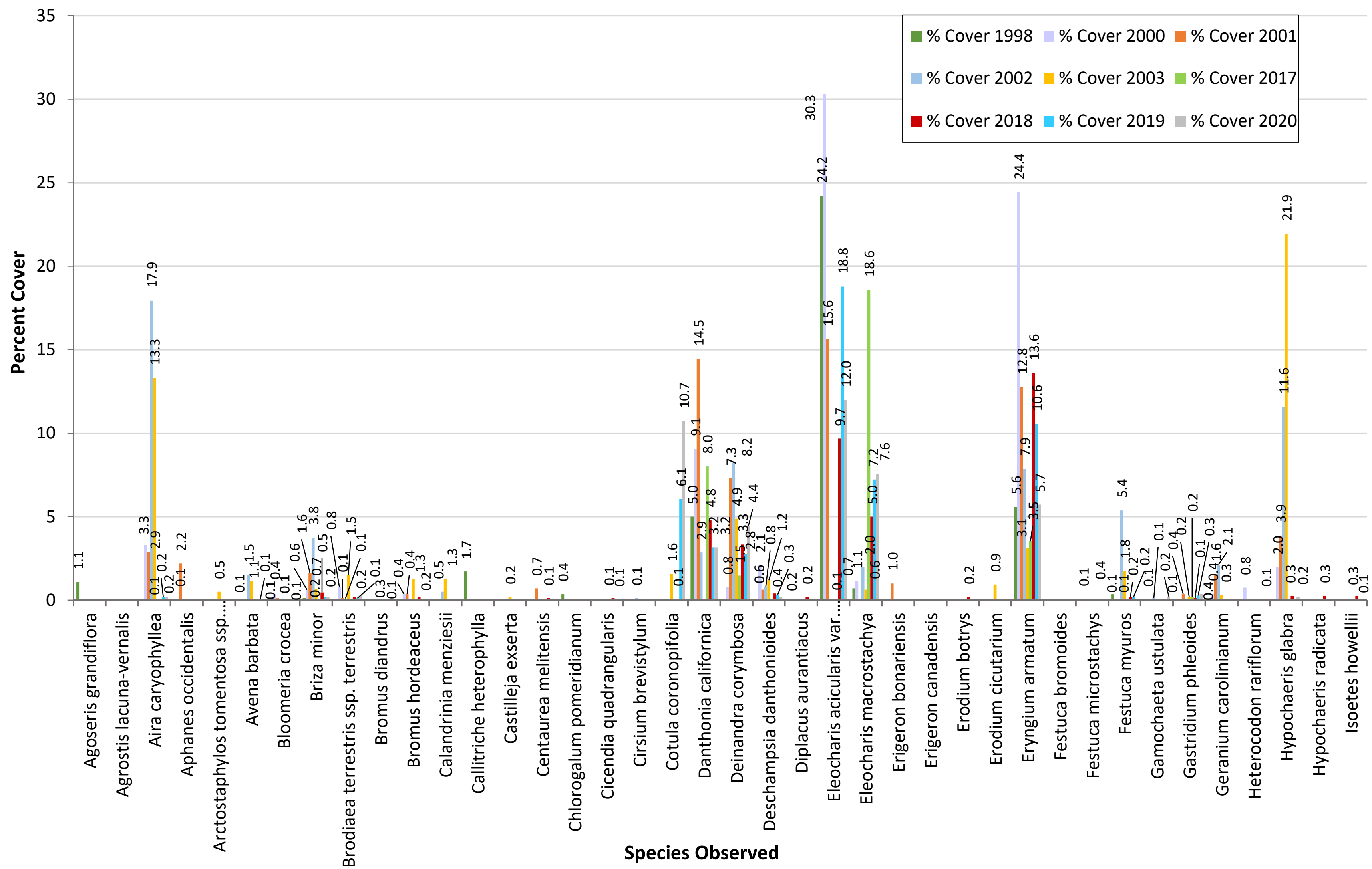


Figure F-13. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2000, 2001, 2002, 2003, 2017, 2018, 2019, and 2020 at Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

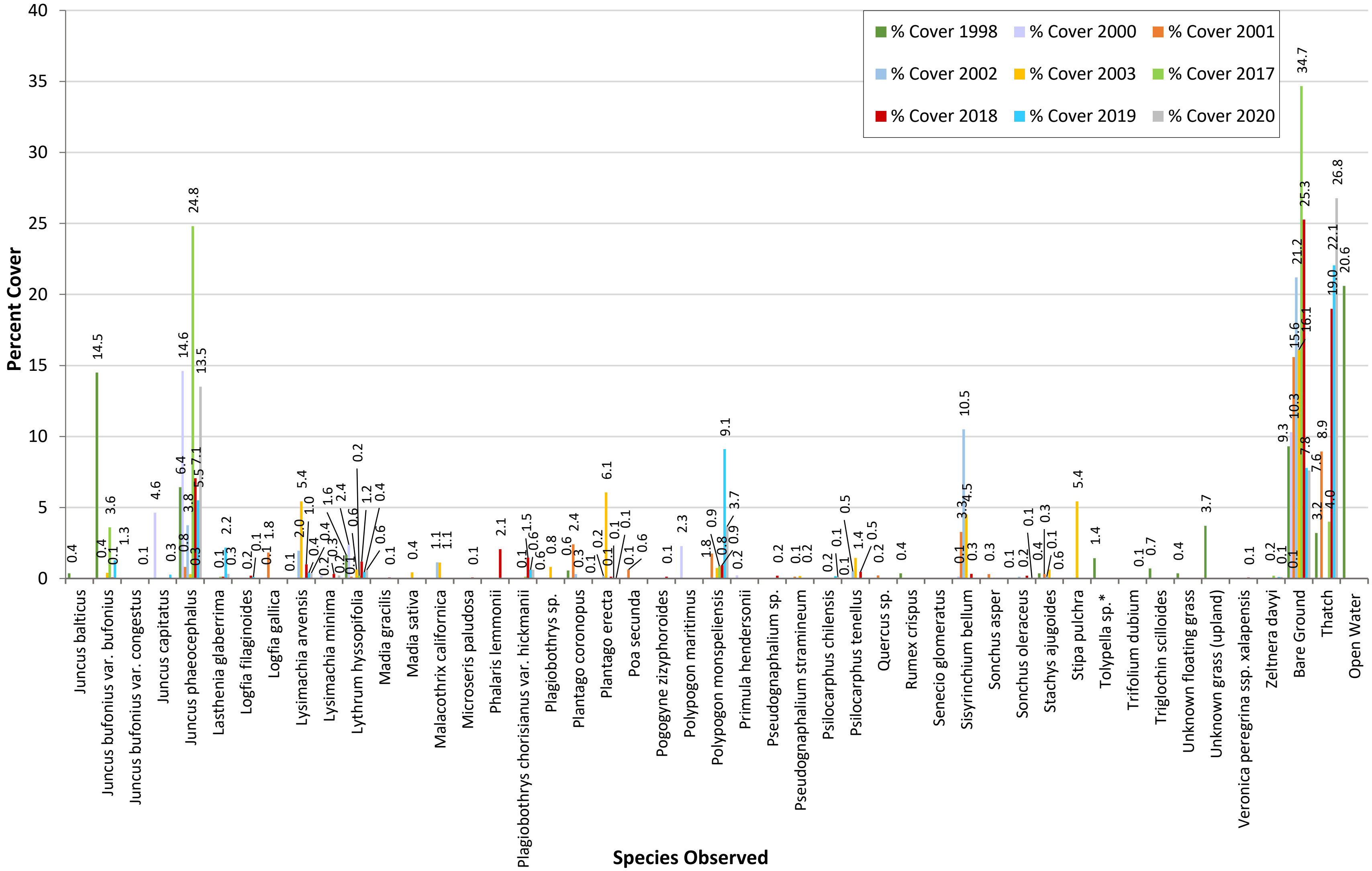


Figure F-13 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2000, 2001, 2002, 2003, 2017, 2018, 2019, and 2020 at Pond 42 (Year 3 Post-Mastication and Post-Burn, Year 2 Post-Subsurface Munitions Remediation)

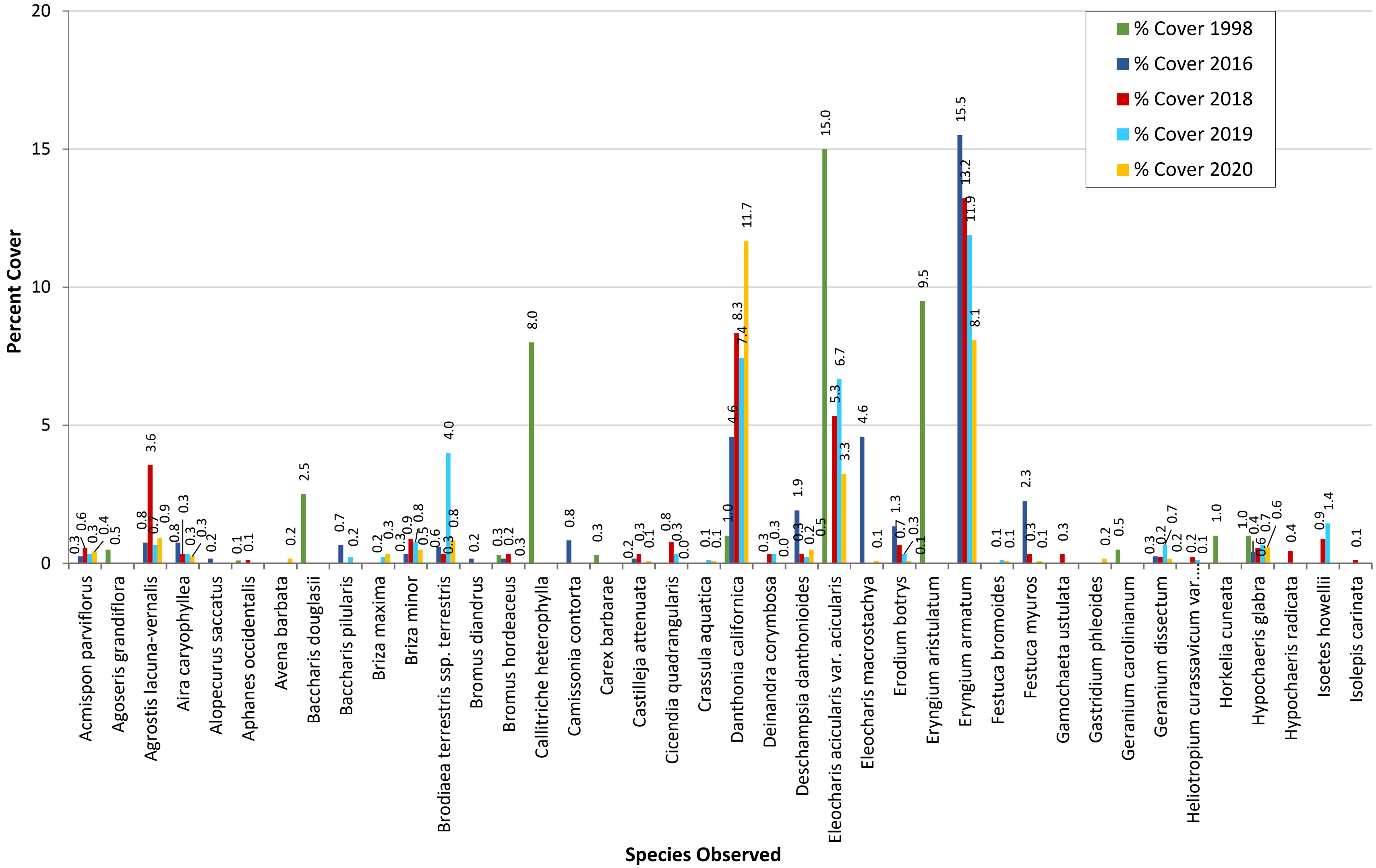


Figure F-14. Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, 2019, and 2020 at Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation)

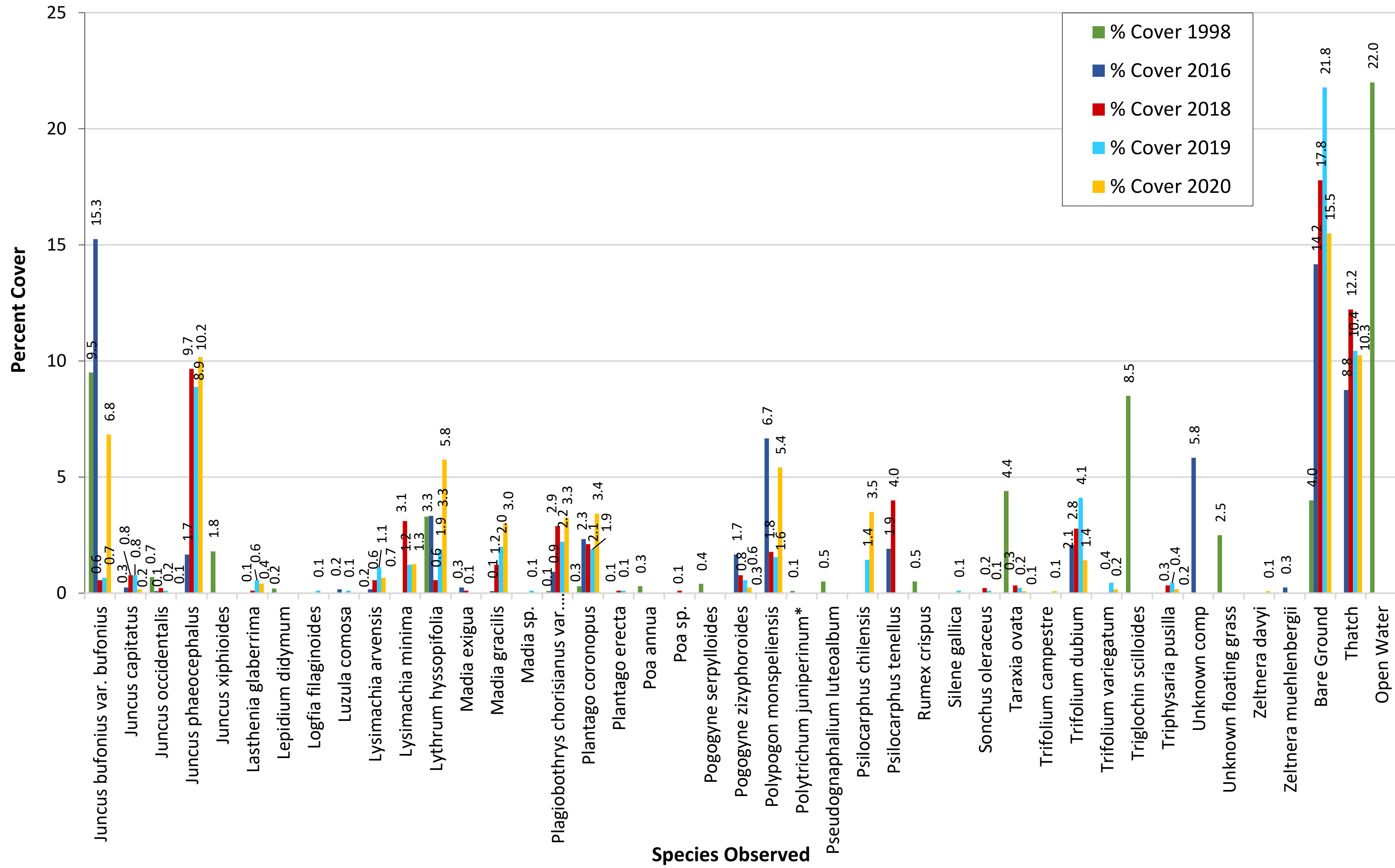


Figure F-14 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 1998, 2016, 2018, 2019, and 2020 at Pond 44 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation)

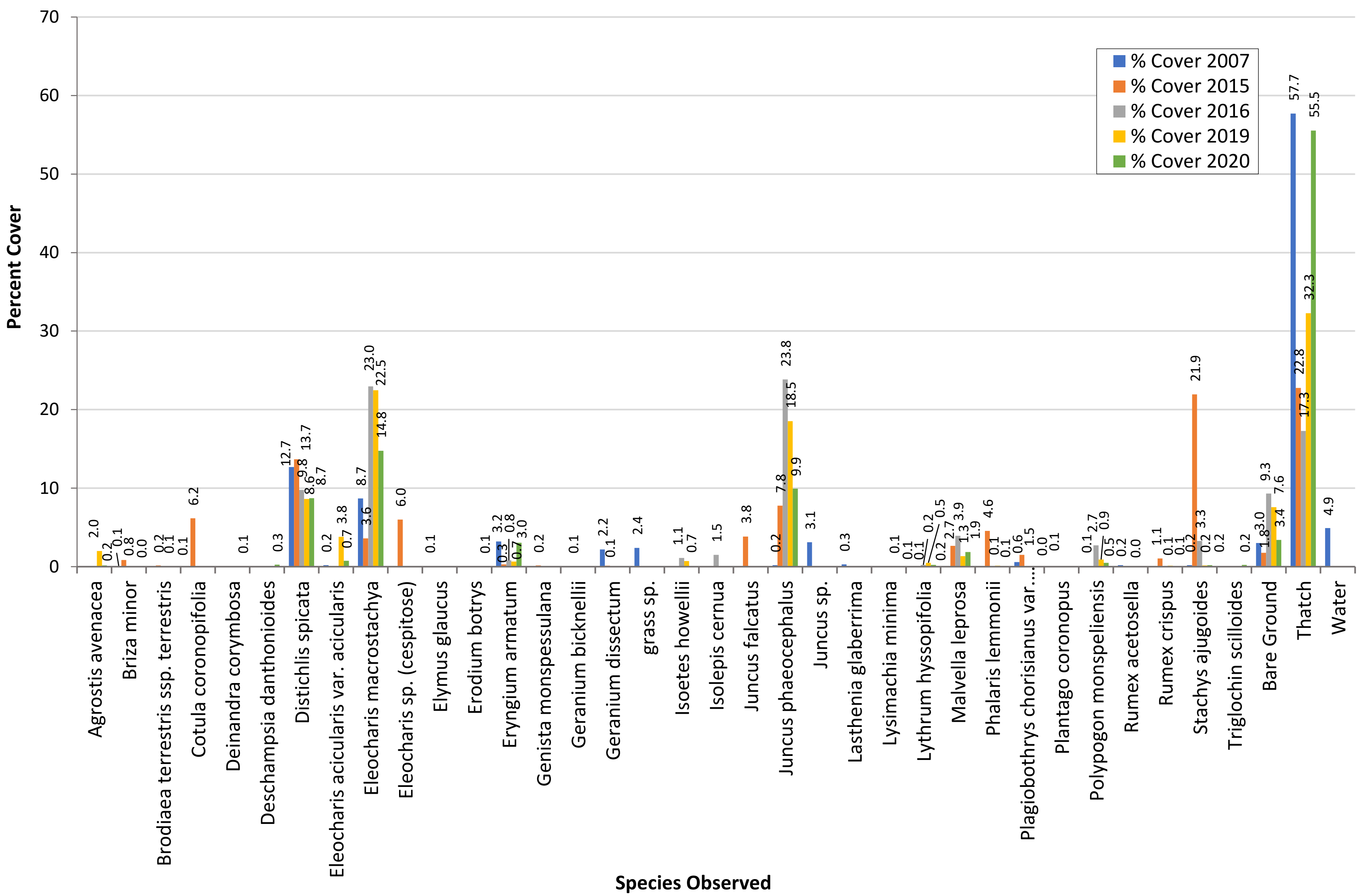


Figure F-15. Comparison Graph of Percent Cover by Wetland Plant Species for 2007, 2015, 2016, 2019, and 2020 at Pond 56 (Year 3 Post-Mastication)

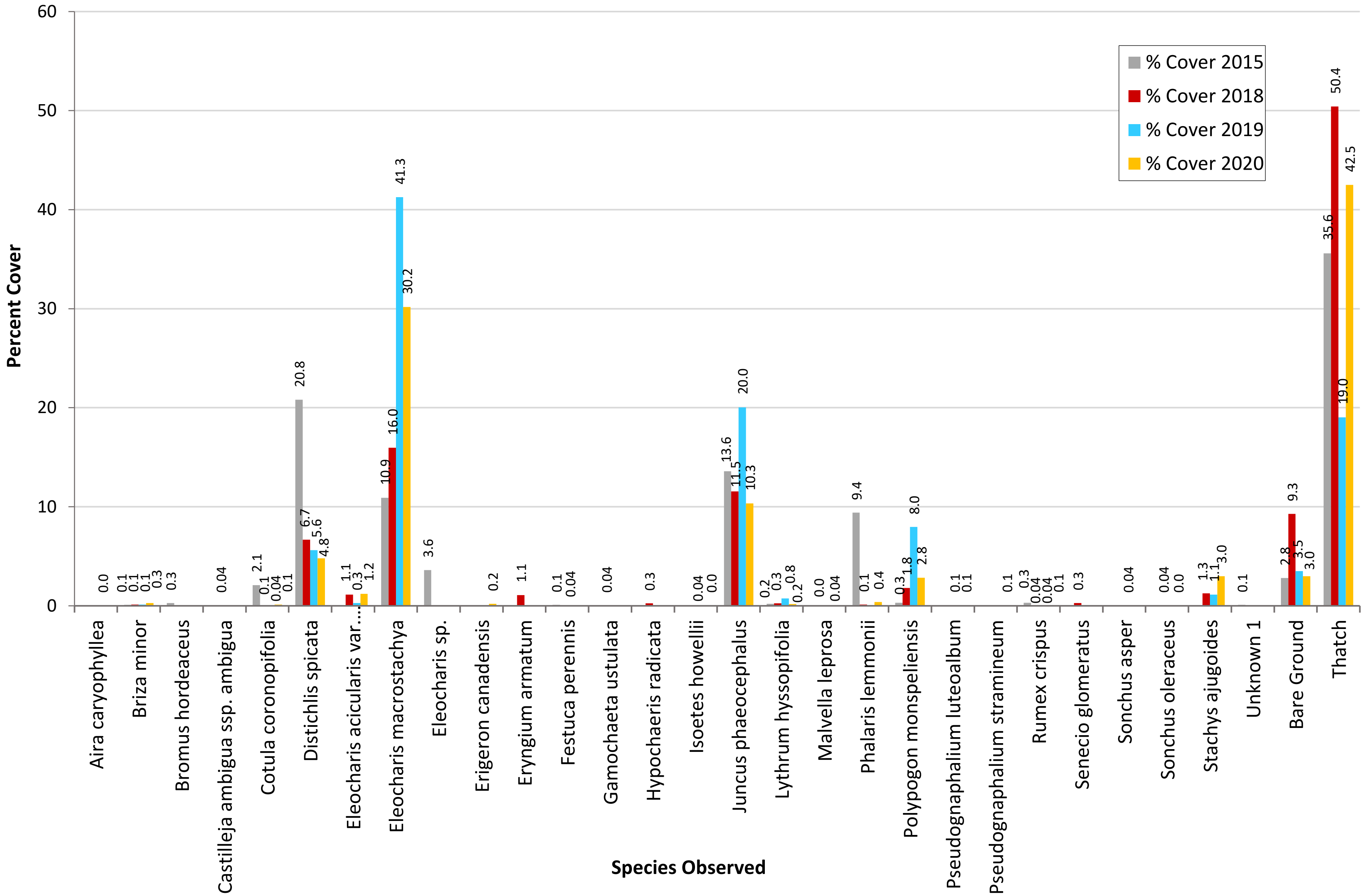


Figure F-16. Comparison Graph of Percent Cover by Wetland Plant Species for 2015, 2018, 2019, and 2020 at Pond 60 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation)

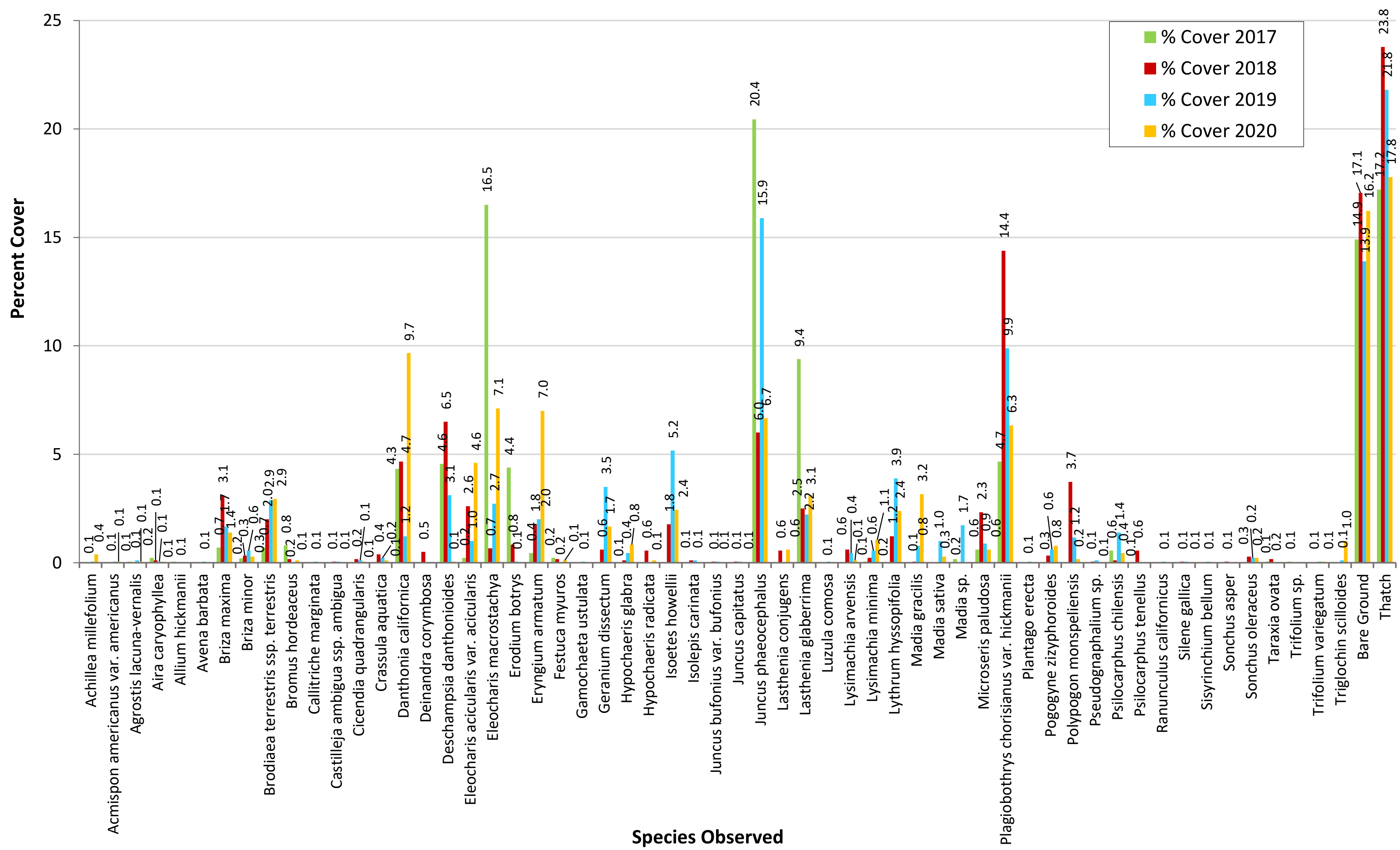


Figure F-17. Comparison Graph of Percent Cover by Wetland Plant Species for 2017, 2018, 2019, and 2020 at Pond 61 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation)

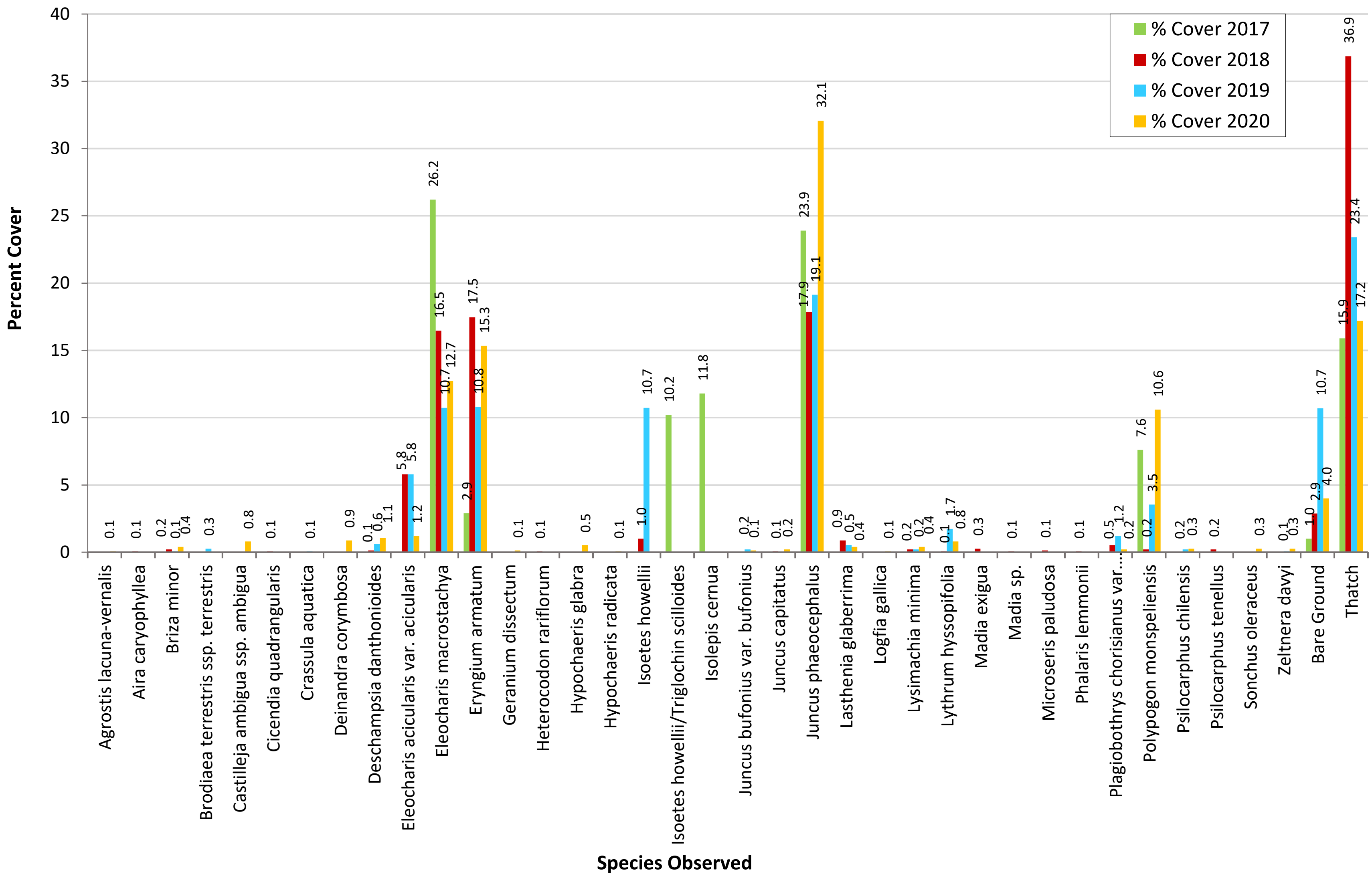


Figure F-18. Comparison Graph of Percent Cover by Wetland Plant Species for 2017, 2018, 2019, and 2020 at Pond 73 (Year 3 Post-Mastication, Year 2 Post-Subsurface Munitions Remediation)

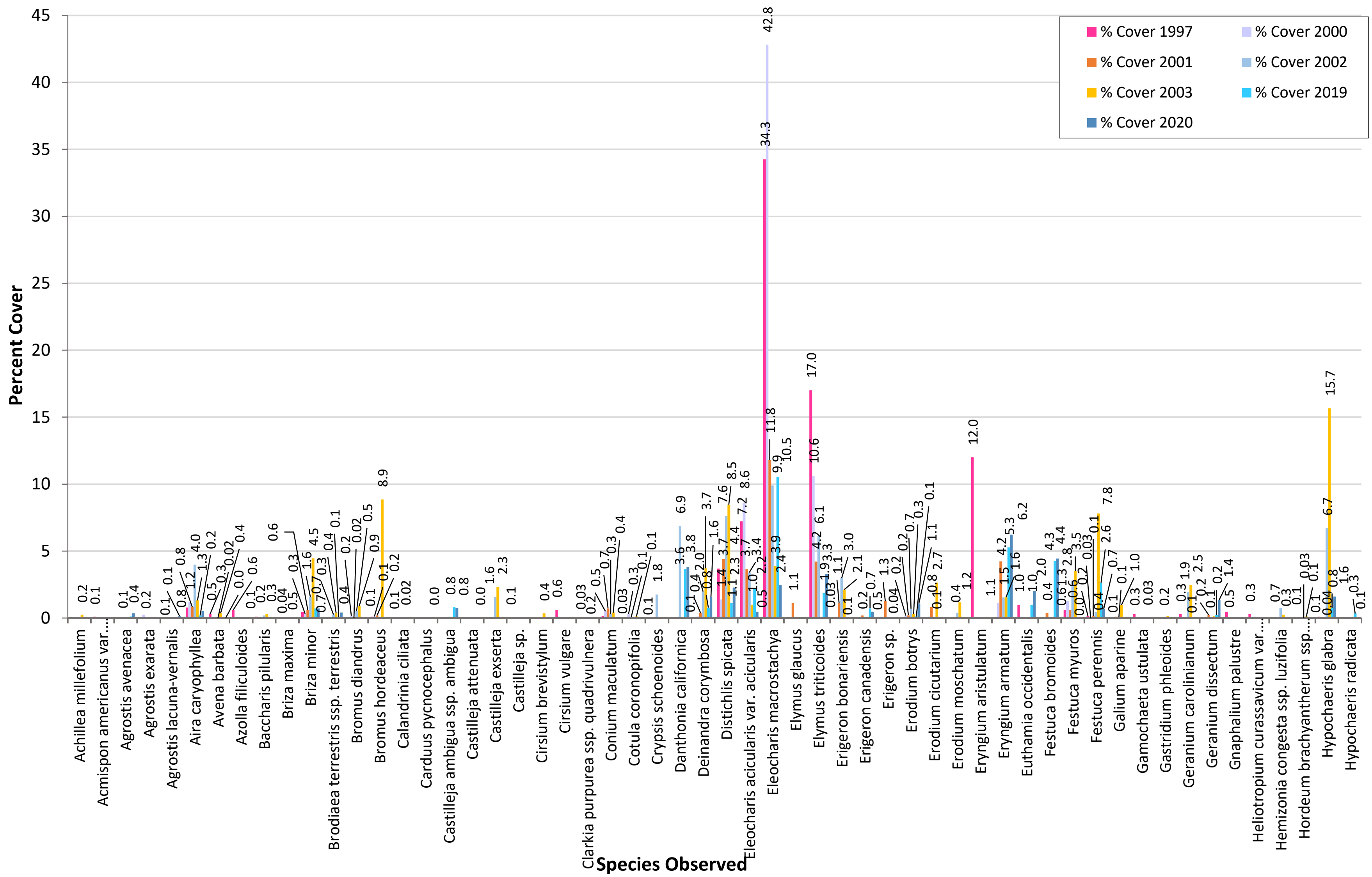


Figure F-19. Comparison Graph of Percent Cover by Wetland Plant Species for 1997, 2000, 2001, 2002, 2003, 2019, and 2020 at Machine Gun Flats (Year 3 Post-Mastication)

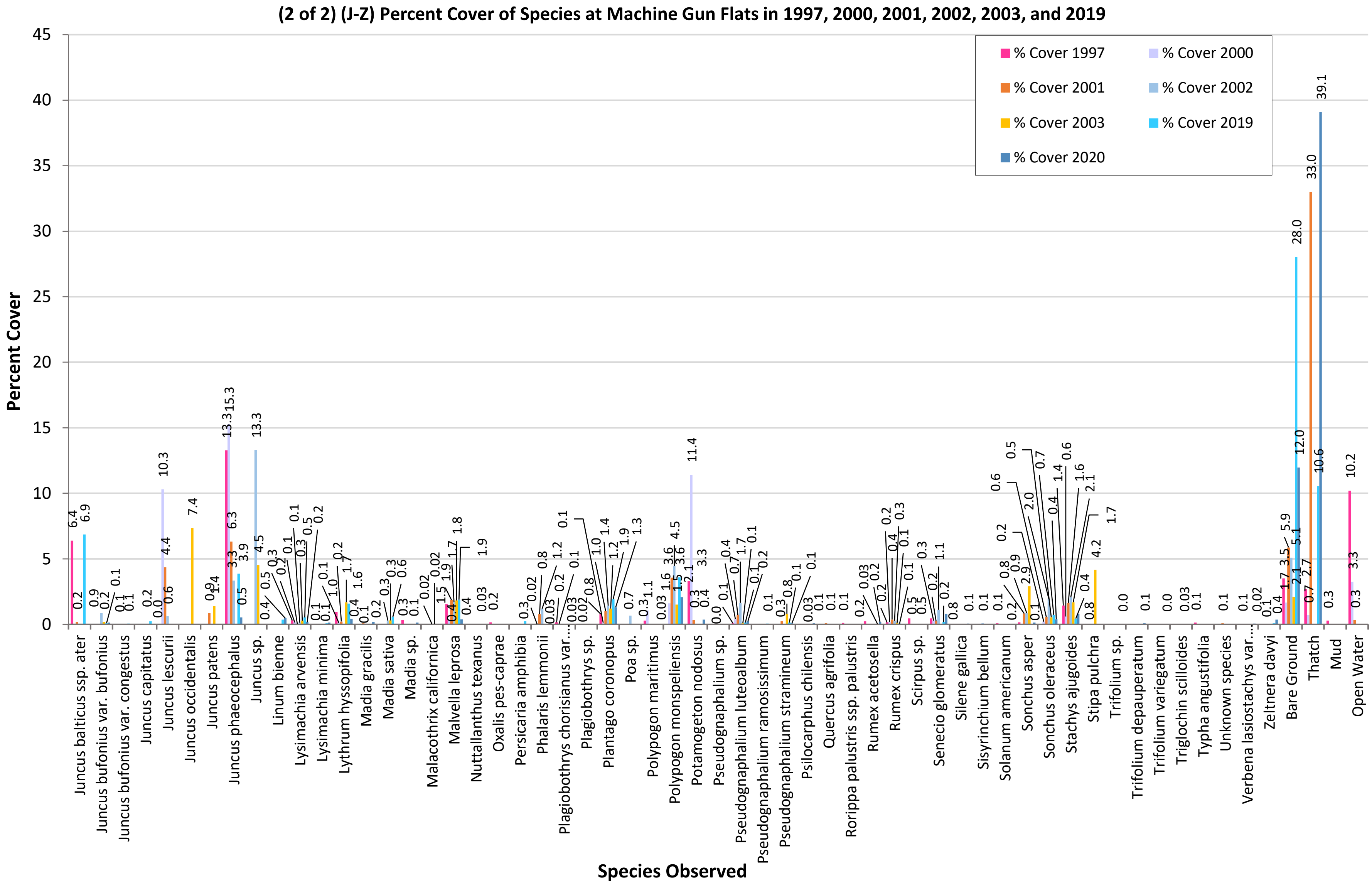


Figure F-19 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 1997, 2000, 2001, 2002, 2003, 2019, and 2020 at Machine Gun Flats (Year 3 Post-Mastication)

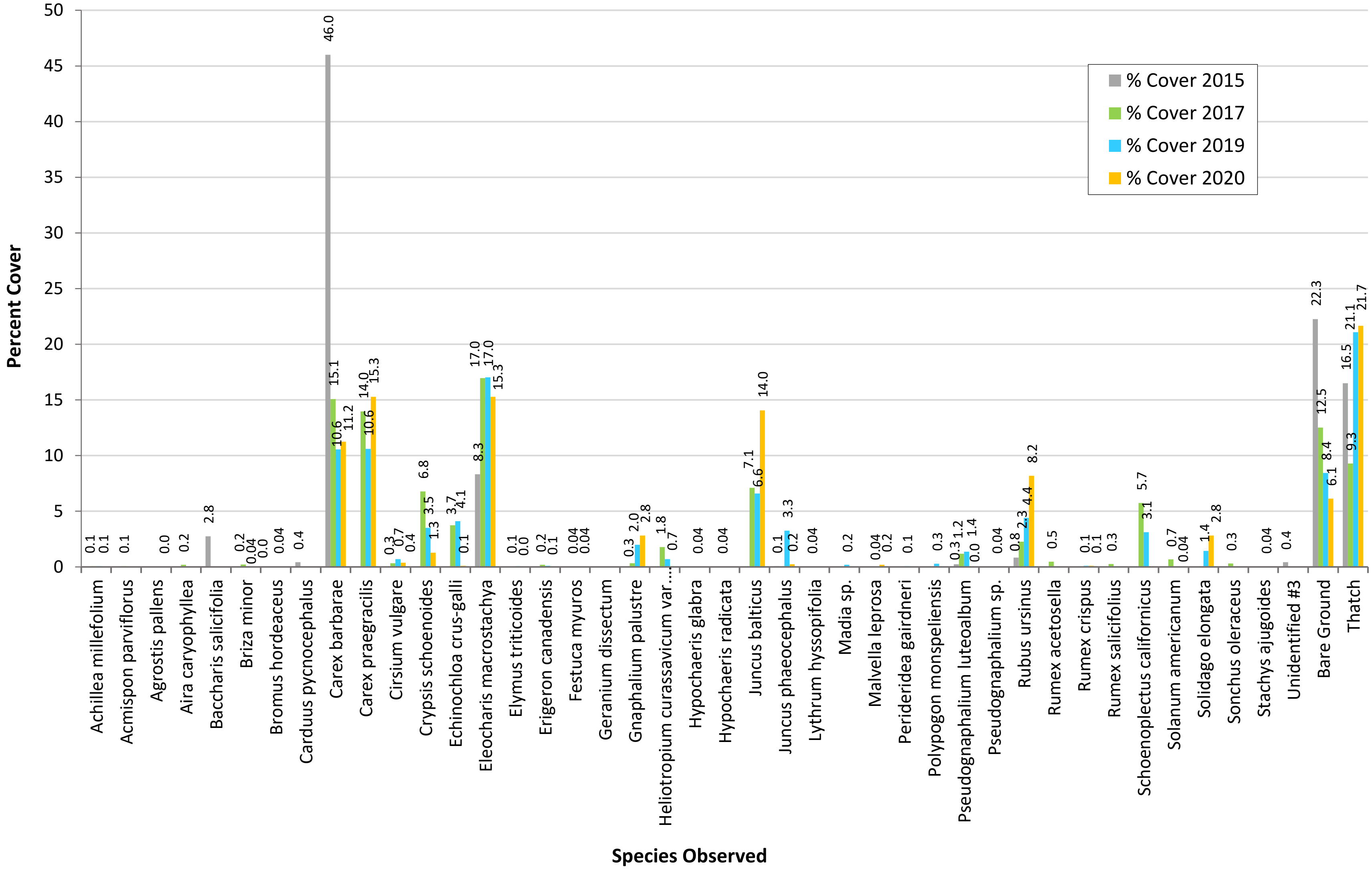


Figure F-20. Comparison Graph of Percent Cover by Wetland Plant Species for 2015, 2017, 2019, and 2020 at Pond 16 (Year 2 Post-Subsurface Munitions Remediation)