BW-2961
AR

2024 ANNUAL REPORT WETLAND VEGETATION AND WILDLIFE MONITORING

Contract No. W9123823D0009
Task Order W9123824F0014

FORMER FORT ORD
Monterey County, California

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

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March 2024

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DRAFT 2024 ANNUAL REPORT
WETLAND VEGETATION AND WILDLIFE MONITORING

SUBMITTED TO:

UNITED STATES ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
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CONTENTS

Section **Page**

1 INTRODUCTION 1
2 METHODS 7
2.1 Hydrologic Monitoring 7
2.2 Vegetation Monitoring 8
2.3 Wildlife Monitoring 9
2.3.1 California Tiger Salamander 9
2.3.2 California Fairy Shrimp 10
2.4 Evaluation for Data Quality Objectives and Success Criteria 10
3 RESULTS 13
3.1 Pond 5 15
3.1.1 Hydrologic Monitoring 15
3.1.2 Vegetation Monitoring 16
3.1.3 Wildlife Monitoring 18
3.2 Pond 101 East (East) 19
3.2.1 Hydrologic Monitoring 19
3.2.2 Vegetation Monitoring 20
3.2.3 Wildlife Monitoring 22
3.3 Pond 997 23
3.3.1 Hydrologic Monitoring 23
3.3.2 Vegetation Monitoring 24
3.3.3 Wildlife Monitoring 26
3.4 Pond 21 27
3.4.1 Hydrologic Monitoring 27
3.4.2 Vegetation Monitoring 28
3.4.3 Wildlife Monitoring 29
3.5 Pond 76 30
3.5.1 Hydrologic Monitoring 30
3.5.2 Vegetation Monitoring 31
3.5.3 Wildlife Monitoring 32
4 DISCUSSION 33
4.1 Historical Data 33

4.2 Pond 5 – Reference 39
4.2.1 Hydrologic Monitoring 39
4.2.2 Vegetation Monitoring 43
4.2.3 Wildlife Monitoring 51
4.2.4 Conclusion 52
4.3 Pond 101 East (East) – Reference 53
4.3.1 Hydrologic Monitoring 53
4.3.2 Vegetation Monitoring 57
4.3.3 Wildlife Monitoring 64
4.3.4 Conclusion 65
4.4 Pond 997 – Reference 66
4.4.1 Hydrologic Monitoring 66
4.4.2 Vegetation Monitoring 69
4.4.3 Wildlife Monitoring 78
4.4.4 Conclusion 79
4.5 Pond 21—Year 2 80
4.5.1 Hydrologic Monitoring 81
4.5.2 Vegetation Monitoring 84
4.5.3 Wildlife Monitoring 92
4.5.4 Conclusion 93
4.6 Pond 76 –Year 2 and Year 1 94
4.6.1 Hydrologic Monitoring 94
4.6.2 Vegetation Monitoring 98
4.6.3 Wildlife Monitoring 105
4.6.4 Conclusion 106
5 CONCLUSION 107
6 REFERENCES 109

FIGURES

Figure 1-1. Location map of vernal pools on former Fort Ord monitored in 2024. 2
Figure 1-2. Location map of Reference Ponds 5, 101 East (East), and 997. 3
Figure 1-3. Location map of monitored Ponds 21 and 76. 4
Figure 1-4. Cumulative monthly precipitation for the 2023-2024 water year compared to the 30-Year 5
Figure 1-5. Monthly precipitation, maximum and minimum temperatures for the 2023-2024 water 5
Figure 3-1. Pond 5 (Reference) depth and precipitation on former Fort Ord, 2024. 15
Figure 3-2. Pond 5 (Reference) vegetation strata and transects on former Fort Ord, 2024. 17
Figure 3-3. Pond 101 East (East) (Reference) depth and precipitation on former Fort Ord, 2024. 19

Figure 3-4. Pond 101 East (East) (Reference) vegetation strata and transects on former Fort Ord 21
Figure 3-5. Pond 997 (Reference) depth and precipitation on former Fort Ord, 2024. 23
Figure 3-6. Pond 997 (Reference) vegetation strata and transects on former Fort Ord, 2024. 24
Figure 3-7. Contra Costa Goldfields Populations at Pond 997 (Reference), 2024. 26
Figure 3-8. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) depth. 27
Figure 3-9. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) veg. 28
Figure 3-10. Pond 76 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) depth. 30
Figure 3-11. Pond 76 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) veg. 31
Figure 4-1. Plot of historical depth vs inundation area data going back to the 2000-2001 33
Figure 4-2. Plot of historical pH values going back to the 2000-2001. 35
Figure 4-3. Plot of historical temperature values going back to the 2015-2016 36
Figure 4-4. Plot of historical turbidity values going back to the 2015-2016 37
Figure 4-5. Plot of historical dissolved oxygen values going back to the 2015-2016. 38
Figure 4-6. Cumulative monthly precipitation for years that hydrology monitoring occurred at Pond 5 . 39
Figure 4-7. Cumulative monthly precipitation for years that hydrology monitoring occurred at Pond 5 . 40
Figure 4-8. Pond 5 (Reference) Plot of Depth vs Inundation Area since 2015-2016 Water Year 41
Figure 4-9. Pond 5 (Reference) historical and 2024 water quality measurements 41
Figure 4-10. Pond 5 (Reference) inundation areas in 2020 and 2024 42
Figure 4-11. Pond 5 (Reference) vegetation strata and transects for 2016 and 2024. 44
Figure 4-12. Rank abundance curves at Pond 5 (Reference) in 2016-2019 46
Figure 4-13. Rank abundance curves at Pond 5 (Reference) in 2020-2024 47
Figure 4-14. Rank abundance curves at Pond 5 (Reference) in 2016-2024 48
Figure 4-15. Percent cover of dominant species at Pond 5 (Reference). 49
Figure 4-16. Cumulative monthly precipitation for years that hydrology monitoring occurred at Pond. . 53
Figure 4-17. Cumulative monthly precipitation for years that hydrology monitoring occurred at Pond. . 54
Figure 4-18. Pond 101 East (East) (Reference) plot of depth vs inundation area since 2001. 55
Figure 4-19. Pond 101 East (East) (Reference) historical and 2024 water quality measurements 55
Figure 4-20. Pond 101 East (East) (Reference) inundation areas in 2020 and 2024. 56
Figure 4-21. Pond 101 East (East) (Reference) vegetation strata and transects for 2016 and 2024. 57
Figure 4-22. Rank abundance curves at Pond 101 East (East) (Reference) in 2016-2019. 59
Figure 4-23. Rank abundance curves at Pond 101 East (East) (Reference) in 2020-2024. 60
Figure 4-24. Rank abundance curves at Pond 101 East (East) (Reference) in 2016-2024. 61
Figure 4-25. Percent cover of dominant species at Pond 101 East (East) (Reference). 62
Figure 4-26. Cumulative monthly precipitation for years that hydrology monitoring occurred at Pond. . 66
Figure 4-27. Cumulative monthly precipitation for years that hydrology monitoring occurred at Pond. . 67
Figure 4-28. Pond 997 (Reference) plot of depth vs inundation area since the 2016-2017 67
Figure 4-29. Pond 997 (Reference) inundation areas in 2020 and 2024 68
Figure 4-30. Pond 997 (Reference) historical and 2024 water quality measurements 69
Figure 4-31. Pond 997 (Reference) vegetation strata and transects for 2017 and 2024. 70
Figure 4-32. Rank abundance curves at Pond 997 (Reference) in 2017-2020 72
Figure 4-33. Rank abundance curves at Pond 997 (Reference) from 2021-2024 73
Figure 4-34. Rank abundance curves at Pond 997 (Reference) in 2017-2024 74
Figure 4-35. Percent cover of dominant species at Pond 997 (Reference). 75
Figure 4-36. Contra Costa goldfields populations at Pond 997 (Reference) in 2017 and 2024. 78
Figure 4-37. Cumulative monthly precipitation for years that hydrology monitoring occurred at Pond. . 80
Figure 4-38. Cumulative monthly precipitation for years that hydrology monitoring occurred at Pond. . 81
Figure 4-39. Pond 21 plot of depth vs inundation area since 2019. 82
Figure 4-40. Pond 21 historical and 2024 water quality measurements. 82

Figure 4-41. Pond 21 inundation areas in 2019 (baseline) and 2024. 83
Figure 4-42. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) 85
Figure 4-43. Rank abundance curves at Pond 21 (Year 2 Post-Mastication and Post-Subsurface 87
Figure 4-44. Rank abundance curves at Pond 21 (Year 2 Post-Mastication and Post-Subsurface 88
Figure 4-45. Percent cover of dominant species at Pond 21 (Year 2 Post-Mastication and Post- 89
Figure 4-46. Cumulative monthly precipitation for years that hydrology monitoring occurred at 94
Figure 4-47. Cumulative monthly precipitation for years that hydrology monitoring occurred at 95
Figure 4-48. Pond 76 plot of depth vs. inundation area since the 2022-2023 water year. 95
Figure 4-49. Pond 76 historical and 2024 water quality measurements. 96
Figure 4-50. Pond 76 inundation areas in 2023 and 2024. 97
Figure 4-51. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) 98
Figure 4-52. Rank abundance curves at Pond 76 (Year 2 Post-Mastication and Year 1 Post- 100
Figure 4-53. Rank abundance curves at Pond 76 (Year 2 Post-Mastication and Year 1 Post- 101
Figure 4-54. Percent cover of dominant species at Pond 76 (Year 2 Post-Mastication and 102

TABLES

Table 1-1. 2024 Monitoring Status of Vernal Pools on Former Fort Ord 6
Table 3-1. Vegetation Species Richness of Native and Non-Native Species Observed on Transects at 13
Table 3-2. Vegetation Species Richness of Obligate and Facultative Wetland Species Observed on 14
Table 3-3. California Tiger Salamander and Fairy Shrimp Detections at Vernal Pools in 2024. 14
Table 3-4. Pond 5 (Reference) Hydrology Monitoring Results. 16
Table 3-5. Pond 5 (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary. 16
Table 3-6. Pond 5 (Reference) Dominant Species by Stratum Results. 18
Table 3-7. Pond 5 (Reference) CTS Monitoring Results. 18
Table 3-8. Pond 5 (Reference) Fairy Shrimp Monitoring Results. 18
Table 3-9. Pond 101 East (East) (Reference) Hydrology Monitoring Results. 20
Table 3-10. Pond 101 East (East) (Reference) Vegetative Strata Percentage within the Vernal Pool 20
Table 3-11. Pond 101 East (East) (Reference) Dominant Species by Stratum Results. 22
Table 3-12. Pond 101 East (East) (Reference) CTS Monitoring Results. 22
Table 3-13. Pond 101 East (East) (Reference) Fairy Shrimp Monitoring Results. 22
Table 3-14. Pond 997 (Reference) Hydrology Monitoring Results. 23
Table 3-15. Pond 997 (Reference) Vegetative Strata Percentage within the Vernal Pool Basin 24
Table 3-16. Pond 997 (Reference) Dominant Species by Stratum Results. 25
Table 3-17. Pond 997 CTS Monitoring Results. 26
Table 3-18. Pond 997 Fairy Shrimp Monitoring Results. 26
Table 3-19. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) 27
Table 3-20. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) 28
Table 3-21. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) Dominant 29
Table 3-22. Pond 21 CTS Monitoring Results. 29
Table 3-23. Pond 21 Fairy Shrimp Monitoring Results. 29
Table 3-24. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) 30
Table 3-25. Pond 76 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) 31
Table 3-26. Pond 76 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) 32
Table 3-27. Pond 76 CTS Monitoring Results. 32
Table 3-28. Pond 76 Fairy Shrimp Monitoring Results. 32
Table 4-1. Pond 5 (Reference) Summary of Historical Surveys for Hydrology, Vegetation, and Wildlife. 39
Table 4-2. Pond 5 (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary. 43

Table 4-3. Pond 5 (Reference) Absolute Percent Cover. 44
Table 4-4. Pond 5 (Reference) Native and Non-Native Species Richness. 49
Table 4-5. Pond 5 (Reference) Relative Percent Cover of Native and Non-Native Plants. 50
Table 4-6. Pond 5 (Reference) Wetland and Non-Wetland Species Richness. 50
Table 4-7. Pond 5 (Reference) Relative Percent Cover of Wetland and Non-Wetland Species. 51
Table 4-8. Pond 5 (Reference) Historical Wildlife Monitoring Results. 51
Table 4-9. Success at Pond 5 (Reference) Based on Performance Standards and Applicable Data 52
Table 4-10. Pond 101 East (East) (Reference) Summary of Historical Surveys for Hydrology, Veg. 53
Table 4-11. Pond 101 East (East) (Reference) Vegetative Strata Percentage within the Vernal Pool 57
Table 4-12. Pond 101 East (East) (Reference) Absolute Percent Cover. 58
Table 4-13. Pond 101 East (East) (Reference) Native and Non-Native Species Richness. 62
Table 4-14. Pond 101 East (East) (Reference) Relative Percent Cover of Native and Non-Native Plants. 63
Table 4-15. Pond 101 East (East) (Reference) Wetland and Non-Wetland Species Richness. 63
Table 4-16. Pond 101 East (East) (Reference) Relative Percent Cover of Wetland and Non-Wetland 64
Table 4-17. Pond 101 East (East) (Reference) Historical Wildlife Monitoring Results. 64
Table 4-18. Success at Pond 101 East (East) (Reference) Based on Performance Standards and 65
Table 4-19. Pond 997 (Reference) Summary of Historical Surveys for Hydrology, Vegetation, and 66
Table 4-20. Pond 997 (Reference) Vegetative Strata Percentage within the Vernal Pool Basin 70
Table 4-21. Pond 997 (Reference) Absolute Percent Cover. 71
Table 4-22. Pond 997 (Reference) Native and Non-Native Species Richness. 75
Table 4-23. Pond 997 (Reference) Relative Percent Cover of Native and Non-Native Plants. 76
Table 4-24. Pond 997 (Reference) Wetland and Non-Wetland Species Richness. 76
Table 4-25. Pond 997 (Reference) Relative Percent Cover of Wetland and Non-Wetland Species 76
Table 4-26. Pond 997 (Reference) Contra Costa Goldfields Estimated Cover. 77
Table 4-27. Pond 997 (Reference) Historical Wildlife Monitoring Results. 79
Table 4-28. Success at Pond 997 (Reference) Based on Performance Standards and Applicable 79
Table 4-29. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) Summary 80
Table 4-30. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) 84
Table 4-31. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) 85
Table 4-32. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) 86
Table 4-33. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) 89
Table 4-34. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) 90
Table 4-35. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) 90
Table 4-36. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) 90
Table 4-37. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) 90
Table 4-38. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) 91
Table 4-39. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) 91
Table 4-40. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) 91
Table 4-41. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) 92
Table 4-42. Success at Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) 93
Table 4-43. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation). 94
Table 4-44. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation). 98
Table 4-45. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) 99
Table 4-46. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) 99
Table 4-47. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) 102
Table 4-48. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) 103
Table 4-49. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) 103
Table 4-50. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) 103

Table 4-51. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) 103
Table 4-52. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) 104
Table 4-53. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) 104
Table 4-54. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) 104
Table 4-55. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) 105
Table 4-56. Success at Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions.......... 106
Table 5-1. 2024 Remediated Vernal Pools and Performance Standards Status. 108

APPENDICES

A WATER QUALITY RESULTS AND INUNDTION AREA FOR VERNAL POOLS BY MONTH
B VEGETATION TRANSECT DATA
C STRATUM COVER BY VERNAL POOL
D CTS AND AQUATIC INVERTEBRATE DATA
E SITE PHOTOS
F HISTORICAL HYDROLOGY MONITORING RESULTS
G VEGETATION SPECIES RICHNESS OF NATIVE AND NON-NATIVE SPECIES AND WETLAND INDICATOR CATEGORY BY VERNAL POOL
H SPECIES COMPOSITION OF FOLLOW-UP VEGETATION MONITORING BY VERNAL POOL
I RANK ABUNDANCE VURVES

ACRONYMS AND ABBREVIATIONS

C	Celsius
CCG	Contra Costa goldfields
cm	centimeter(s)
CTS	California tiger salamander
DQO	Data Quality Objective
FAC	Facultative Plant
FACU	Facultative Upland Plant
FACW	Facultative Wetland Plant
fairy shrimp	California fairy shrimp
FNU	Formazin Nephelometric Units
ft^2	square feet
Harris	Harris Environmental Group Inc.
Harris-Terracon	Harris Environmental Group Inc. and Terracon Consultants Inc. Team
HLA	Harding Lawson and Associates
HMP	Habitat Management Plan
m	meter(s)
MEC	Munitions and Explosives of Concern
mg/L	milligram per liter
NCEI	National Centers for Environmental Information
NL	Not Listed
NOAA	National Oceanic and Atmospheric Administration

NS	Not surveyed
NWSFO	National Weather Service Forecast Office
OBL	Obligate Wetland Plant
PBO	Programmatic Biological Opinion
RACs	rank abundance curves
RTK	real-time kinematic
SVL	snout-vent length
sp.	species
Terracon	Terracon Consultants Inc. (formerly Burleson Consulting Inc.)
UPL	Obligate Upland Plant
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
UXO	Unexploded Ordnance
Wetland Plan	Wetland Monitoring and Restoration Plan for Munitions and Contaminated Soil Remediation
%	percent

1 INTRODUCTION

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

The Harris-Terracon team monitored hydrologic and water quality conditions, wetland wildlife, and wetland vegetation. Hydrologic monitoring parameters include area of inundation, pH, turbidity, temperature, dissolved oxygen and photo point documentation. Wetland wildlife monitoring includes aquatic invertebrates and protocol-level California tiger salamander (*Ambystoma californiense*; CTS) surveys. Wetland vegetation surveys include species identification, vegetative stratum evaluation, vegetative strata mapping, transect sampling and documentation of Contra Costa goldfields (*Lasthenia conjugens*; CCG). These monitoring requirements are 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* (PBO); 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 2024 monitoring within reference vernal pools 5, 101 East (East), and 997; and remediated vernal pools 21 and 76 (see Figure 1-2 and Figure 1-3). Populations of CCG were mapped and evaluated at Pond 997. Invertebrate and protocol-level CTS wetland sampling surveys were completed for Ponds 5, 101 East (East), 997, 21, and 76 during the 2023-2024 water year.

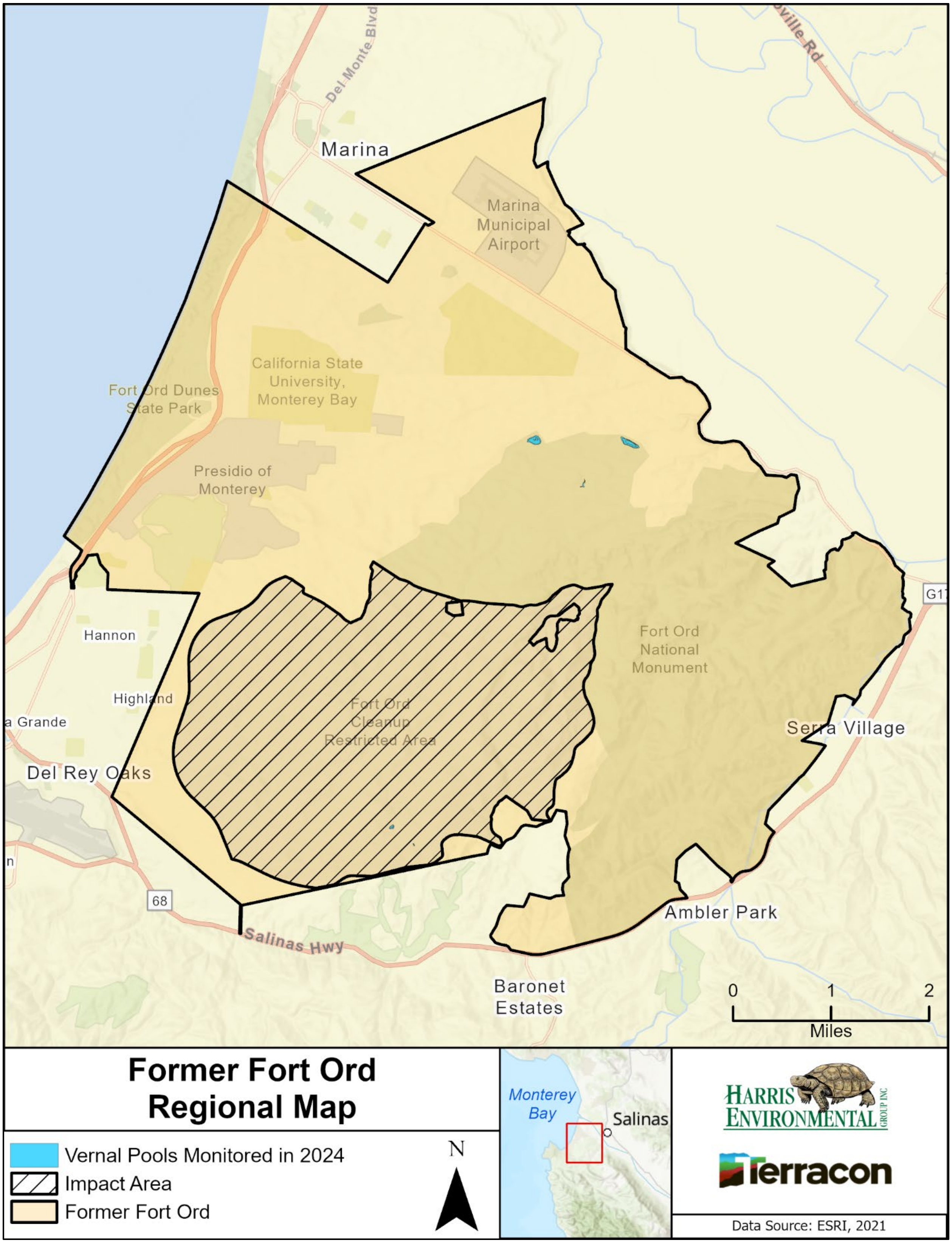


Figure 1-1. Location map of vernal pools on former Fort Ord monitored in 2024.

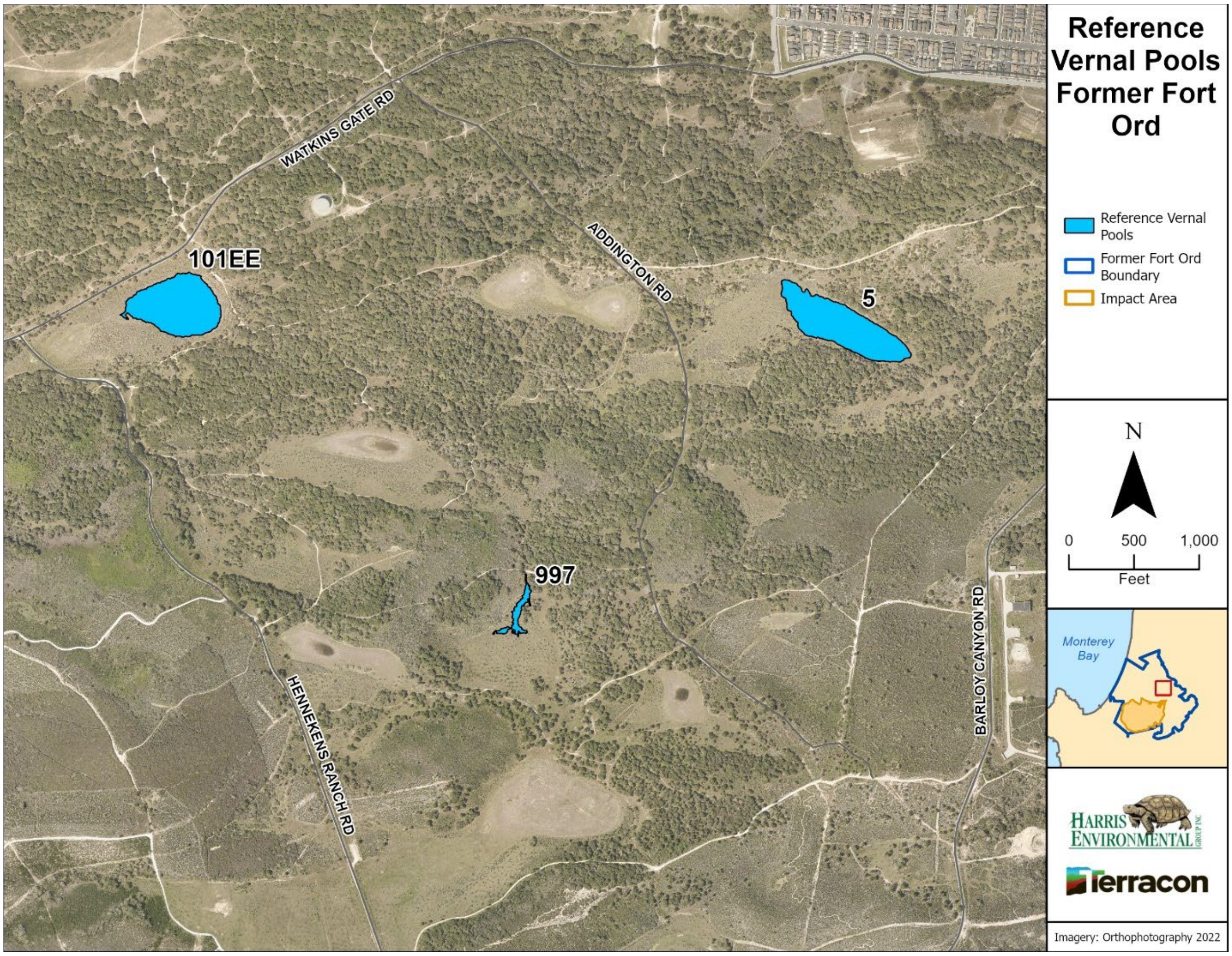


Figure 1-2. Location map of Reference Ponds 5, 101 East (East), and 997.

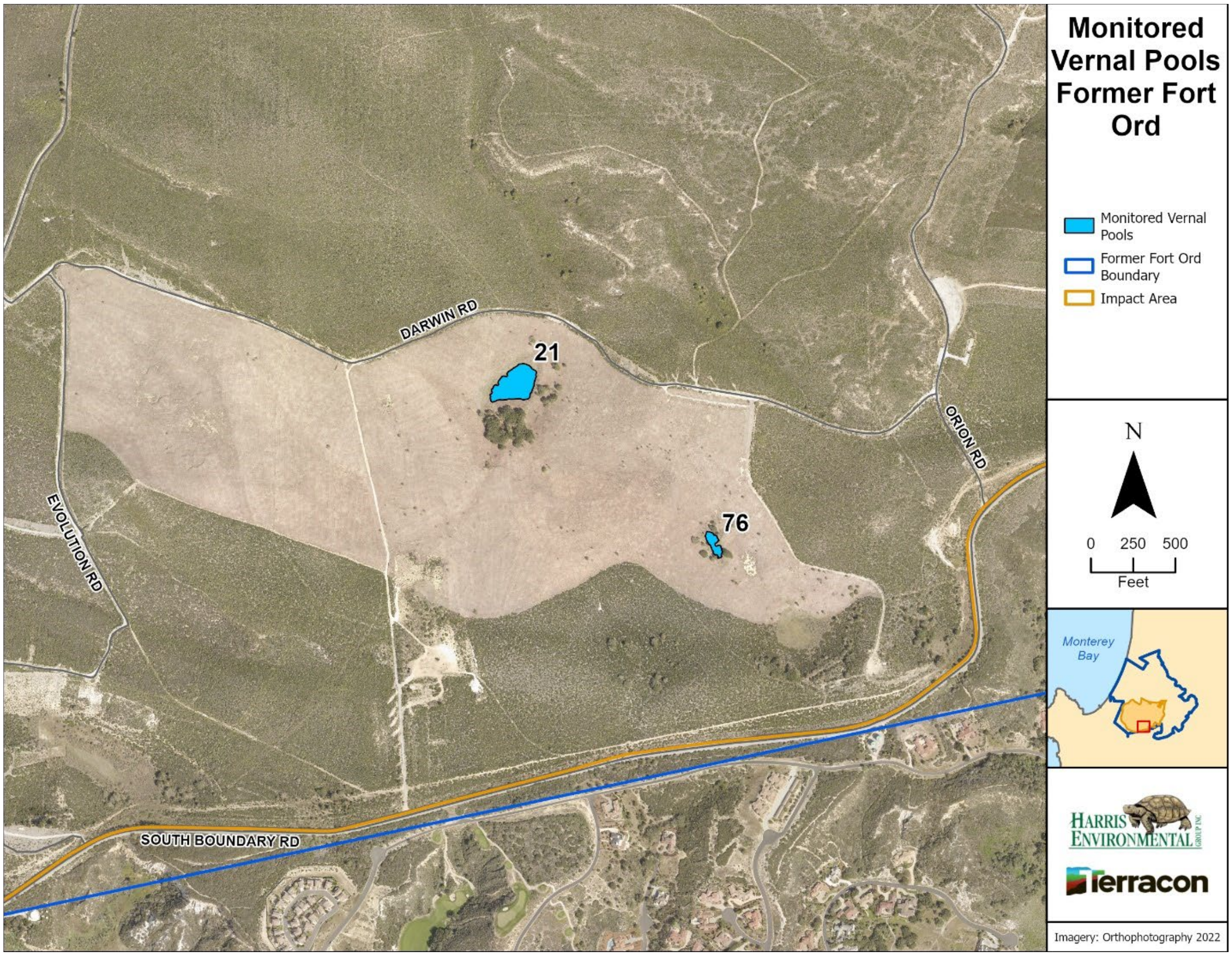


Figure 1-3. Location map of monitored Ponds 21 and 76.

During the 2023-2024 water year, the National Weather Service Forecast Office (NWSFO) meteorological tower located at the Monterey Peninsula Regional Airport recorded cumulative precipitation within one centimeter (cm) of the 30-year normal (NOAA, 2023-2024; see Figure 1-4). After a dry October and November, heavy rainfall in December led to a spike in precipitation. This was followed by a decrease in January, but overall, precipitation remained about 1 cm above normal for the rest of the year (see Figure 1-5). Total cumulative precipitation was within 5% of normal in 2023-2024.

The NWSFO tower is located approximately two miles southeast of Site 39 on former Fort Ord. All 2023-2024 values in this report are from the NWSFO tower.

The NWSFO determines normal rainfall based on a 30-year average that at the end of each decade is moved forward another 10 years. Prior to 2021, the dataset was from 1981-2010. Since the 2021 annual report, normal rainfall was updated resulting in some water years being recategorized based on their relationship to normal. The normal dataset used for comparison in this report is from the NWSFO tower and is defined as the mean precipitation from years 1991-2020. Water years are categorized as normal if cumulative precipitation was within one inch of the NWSFO normal. The two water years that were recategorized were 1998-1999 and 1999-2000, which changed from below normal to normal.

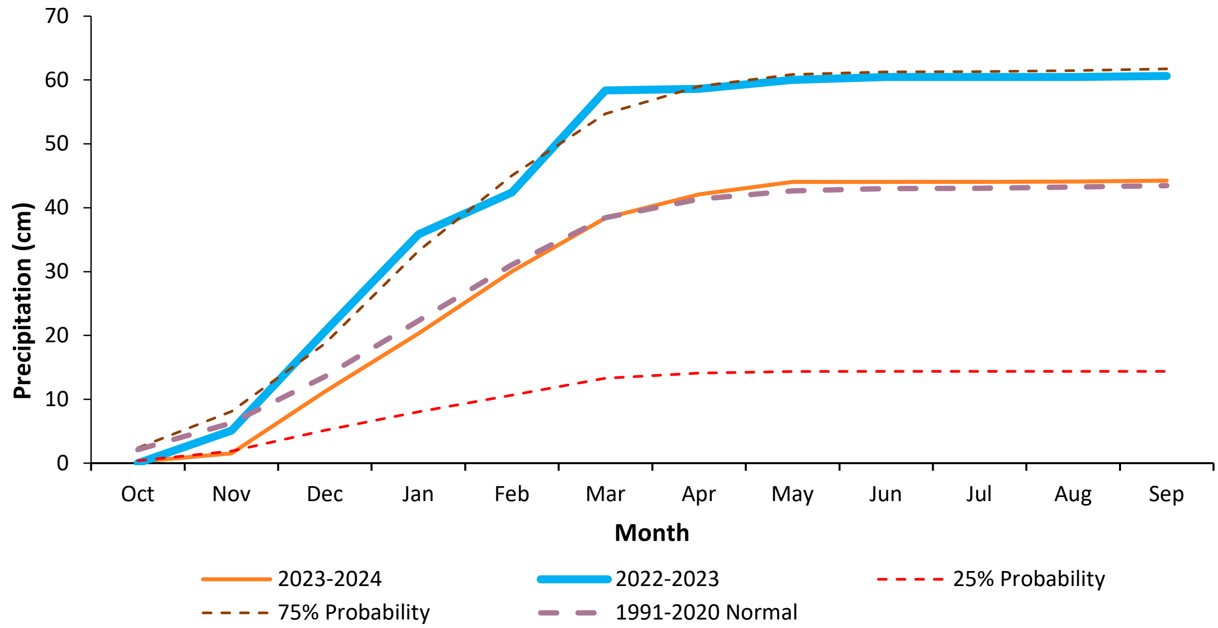


Figure 1-4. Cumulative monthly precipitation for the 2023-2024 water year compared to the 30-Year normal (mean 1991-2020), the 2022-2023 water year, and the 25% and 75% probabilities (NOAA, 2023-2024).

[1] The 25% probability indicates that there is a 25% chance that the actual precipitation will fall below that amount; and the 75% probability indicates that there is a 75% chance that the actual precipitation will fall below that amount.

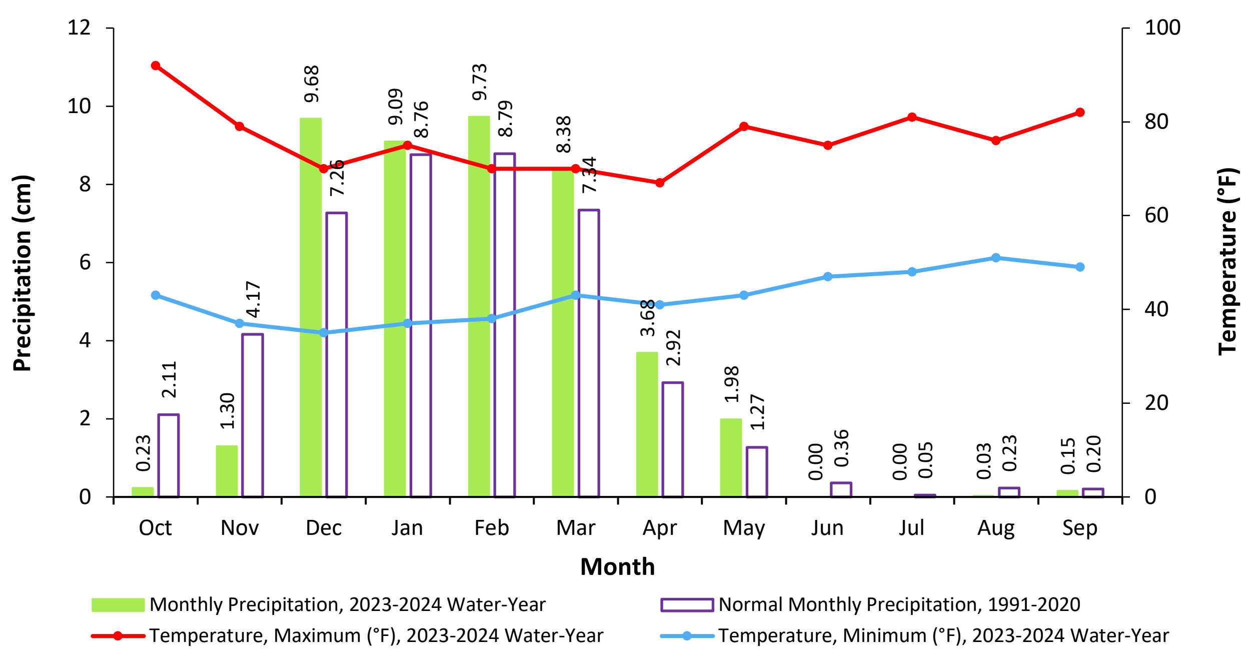


Figure 1-5. Monthly precipitation, maximum and minimum temperatures for the 2023-2024 water year and normal monthly precipitation (NOAA, 2023-2024).

The goal of hydrologic, 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 California fairy shrimp (*Linderiella occidentalis*; 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 2024 at former Fort Ord.

Table 1-1. 2024 Monitoring Status of Vernal Pools on Former Fort Ord.

Vernal Pool	Monitoring Status
Pond 21	Year 2 Post-Mastication and Post-Subsurface Munitions Remediation
Pond 76	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation
Pond 5	Reference
Pond 101 East (East)	Reference
Pond 997	Reference

2 METHODS

Sampling methods for wetland vegetation monitoring and wetland wildlife 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. As described in the PBO, the Army will conduct two years of pre-activity larval CTS sampling, to the extent possible, in the vernal pools where more than 50% of the watershed is affected by prescribed burns; thus, vernal pools may be monitored multiple years for baseline (USFWS, 2017).

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% 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% 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 the first, third, and fifth years, following mastication (Burleson, 2006). Vernal pools where subsurface munitions remediation activities disturbed less than 10 ft^2 and were shallower than four feet deep are monitored in the 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.

Ponds 21 and 76 were investigated for geophysical anomalies that potentially represented munitions and explosives of concern (MEC) items in 2022 and 2023, respectively. They had subsurface munitions remediation less than the 10 ft^2 threshold (KEMRON, 2023). Ponds 5, 101 East (East), and 997 were monitored as reference vernal pools.

2.1 Hydrologic Monitoring

Biologists measured pH, turbidity, temperature, dissolved oxygen, vernal pool depth and inundated area. Water quality data were collected using a Hanna Instrument 9829 Multi-parameter Meter. The meter was calibrated prior to each data collection event (see Appendix A). Data were collected monthly between January and June. Data collection for water quality ceased at the end of June or when vernal pools became completely dry, whichever came first. Unfortunately, the dissolved oxygen probe was improperly deployed throughout the 2024 season, causing all dissolved oxygen readings to be artificially low. Water quality parameters were not surveyed (NS) when depth was insufficient. Depth and perimeter were measured until ponds were dry. These sampling methods are consistent with the PBO and Wetland Plan (Burleson, 2006). Recommendations were to collect data at mid-pool and mid-depth in all vernal pools. The staff gauge is located at the deepest point of the vernal pool, and mid-pool was therefore considered the location of the staff gauge, regardless of the variable vernal pool perimeter. Mid-depth was dependent on the depth of the vernal pool during the time of monitoring.

The inundated surface area was mapped with a Juniper Systems Geode GNS3S Receiver with submeter accuracy using RTK (real-time kinematic) corrections. The perimeters of the vernal pools were mapped in their entirety, unless physically impossible due to safety risks. The perimeter only included ponded areas that had surface hydrologic connectivity to the ponded area at the staff gauge. Peripheral ponding was observed and documented but was not mapped. Areas were calculated from the resultant shape files using ArcGIS Pro (Esri, 2024b). Vernal pool depths were recorded from staff gauges placed in the deepest point of each pool. Photographs of each vernal pool were taken at established photo points.

2.2 Vegetation Monitoring

Wetland vegetation surveys involve a variety of activities, including plant species identification, vegetative stratum evaluation, vegetative strata mapping, and transect sampling. 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 14 and August 13, 2024. Data were collected as the vernal pools dried and the vegetation was sufficiently identifiable (see Appendices B, C, G, H, and I). Biologists visually assessed the historical vernal pool basins 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 those strata. Otherwise, biologists placed a new transect in the most homogenous representative area for each accessible stratum. These were mapped using ArcGIS® Field Maps® (Esri, 2024a). Transects were 5-meters (m) or 10-m in length depending on stratum size. Biologists used a random number table to determine placement of a 0.25 m^2 quadrat along each transect. The quadrat was placed a minimum of three times for every 5 m of transect. Biologists recorded the absolute percent cover by plant species, thatch, and bare ground (see Appendix B). Species percent cover was averaged for each stratum of the sampled vernal pools (see Appendix C). Biologists mapped strata the same day as quadrat sampling using ArcGIS® Field Maps® and calculated absolute percent cover of the strata using ArcGIS Pro® (Esri, 2024b). In addition, photo points were taken to show the extent of each vernal pool for comparison with previous years (See Appendix E).

In addition to species identification on transects, a species list was recorded for each vernal pool basin. Most species were identified in the field using *The Plants of Monterey County, an Illustrated Field Key; Second Edition* (Matthews and Mitchell, 2015) and *The Jepson Manual: Vascular Plants of California, Second Edition* (Baldwin *et al.*, 2012). Plants were categorized as native, non-native, or unidentified (see Appendix G Tables G-1 – G-6. Additional categorization of the plants occurred to identify them as one of the following: obligate wetland (OBL), facultative wetland (FACW), facultative (FAC), facultative upland (FACU), obligate upland (UPL), or not listed (NL) (see Appendix G Tables G-7 – G-12) (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 were mapped by creating polygons using ArcGIS® Field Maps® (Esri, 2024b). Absolute cover for CCG was visually estimated, as a percentage.

2.3 Wildlife Monitoring

Following the HMP, PBO, and Wetland Plan, biologists conduct wetland wildlife surveys for CTS and fairy shrimp to assess impacts from remediation activities (USACE, 1997; USFWS, 2017; Burleson, 2006). Wildlife surveys are scheduled 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 through May. 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). The criterion for CTS was met at ponds 5 and 101 East (East). The criterion for fairy shrimp was met at all ponds. Surveys began for fairy shrimp and CTS in March and were conducted concurrently through May.

Nets, boots, and other equipment were scrubbed with 10% diluted bleach solution and completely dried between monitoring different vernal pools and at the end of each day to reduce the possibility of spreading disease. Cleaning was conducted away from wetland wildlife resources, on disturbed or developed roads to reduce contamination.

2.3.1 California Tiger Salamander

Survey methods for CTS followed the *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (USFWS and California Department of Fish and Game, 2003) with modifications to maintain consistency of the data as described in the Wetland Plan. Some exceptions were made as needed: wetland wildlife sampling continued after initial detection and dip nets were used exclusively. Additional wetland wildlife sampling may be completed to provide additional insight into vernal pool function.

CTS larvae are collected using long-handled, fine-meshed (1/8th inch (3.2mm)), D-shaped dipnets to allow biologists to record individual metrics and derive an approximate CTS count for each vernal pool.

All sites are sampled using dipnets to minimize wetland habitat disturbance as well as to maintain safety due to potential presence of unexploded ordnance (UXO). This methodology was chosen to allow direct comparison to past results. Depending on the extent of wetland habitat, two to six biologists sample each site. Biologists collected samples from each vernal pool until the habitat was adequately represented.

Biologists measured and recorded the total length and snout-vent length (SVL) of a subset of 30 individual CTS larvae collected. When the total number of CTS collected was less than 30, all individuals were measured. In instances where CTS are too small to determine SVL only, total length is recorded. California tiger salamander and other amphibian species encountered were identified and the total numbers recorded (see Appendix D Table D-1).

2.3.2 California Fairy Shrimp

Wetland wildlife sampling for fairy shrimp and other aquatic invertebrates was conducted using a fine-meshed dip net (1/16 inch (.16 cm)) 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 after 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 D Tables D-2 – D-3):

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

2.4 Evaluation for Data Quality Objectives and Success Criteria

Data quality objectives (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 follows:

- 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; and
- DQO 5: wildlife – consistent with baseline and similar to reference control wetland trends.

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

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

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

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

In addition to the Wetland Plan, the 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. 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.

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

Rank-abundance curves (RACs) were generated to illustrate species composition and relative species abundance at the vernal pools. The species rank was plotted on the x-axis and the proportional abundance on the y-axis, with species identified using their species code. The RACs show the distribution of the species, relative abundance, species evenness, and species richness. They can characterize the species composition further than the community metrics such as the Shannon-Wiener diversity index or the species evenness index (Calow, 1999). We created rank abundance curves using the rank abundance function in the BiodiversityR package (Kindt, 2019). For RACs with species codes and individual years, the y-axis was put into log-10 scale and for the RACs with all years on one plot, the x-axis and y-axis were both in log-10 scale (see Appendix I).

3 RESULTS

Hydrologic surveys were conducted once per month from December 2023 through August 2024 at reference ponds 5, 101 East (East), 997, and remediation ponds 21 and 76. Measurable ponding was observed in all vernal pools monitored in the 2023-2024 water year.

Vernal pool hydrologic conditions were characteristic of a normal precipitation year with normal rain events. Gradual filling occurred following a series of winter rain events with the majority of the precipitation and consequent inundation occurring January through March (NOAA, 2023-2024). Drying began in March and April. Of the five vernal pools that held water in 2024, three dried by May (Ponds 21, 76, and 997), one dried by July (Pond 101 East (East)), and one dried by August (Pond 5).

The minimum depth requirement for wildlife surveys was 10 cm and was based on the success criterion for fairy shrimp outlined in the Wetland Plan (Burleson, 2006). Hydrologic survey results for March indicated that CTS and fairy shrimp wildlife monitoring minimum depth requirements were met at all pools monitored in 2024.

Vegetation monitoring was conducted at Ponds 5, 101 East (East), 997, 21, and 76. Across all monitored vernal pools, the mean number of native plant species was 18 and non-native species was nine (see Table 3-1). Of these species, a mean of 17 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, the population of CCG was surveyed at Pond 997.

Table 3-1. Vegetation Species Richness of Native and Non-Native Species Observed on Transects at Vernal Pools Monitored in 2024.

Vernal Pool	Monitoring Status	Native	Non-Native
Pond 5	Reference	18	5
Pond 101 East (East)	Reference	17	11
Pond 997	Reference	24	13
Mean (Reference)	-	**20**	**10**
21	Year 2 Post-Mastication and Post-Subsurface Munitions Remediation	22	10
76	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	10	6
Mean (Remediated)	-	**16**	**8**
Mean (All)	-	**18**	**9**

Table 3-2. Vegetation Species Richness of Obligate and Facultative Wetland Species Observed on Transects at Vernal Pools Monitored in 2024.

Vernal Pool	Monitoring Status	OBL	FACW	FAC	Wetland Species
Pond 5	Reference	4	9	3	16
Pond 101 East (East)	Reference	7	10	2	19
Pond 997	Reference	9	8	5	22
Mean (Reference)	-	**7**	**9**	**3**	**19**
21	Year 2 Post-Mastication and Post-Subsurface Munitions Remediation	6	9	5	20
76	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	3	5	1	9
Mean (Remediated)	-	**5**	**7**	**3**	**15**
Mean (All)	-	**6**	**8**	**3**	**17**

Wetland wildlife monitoring was conducted at Ponds 5, 101 East (East), 997, 21, and 76 (see Appendix D Tables D-1 – D-3). No early fairy shrimp surveys took place because the criteria of average depth 10 cm of water for at least 18 consecutive days was not met for any pool until March. Fairy shrimp surveys were therefore conducted in conjunction with CTS surveys for all vernal pools monitored in 2024. Overall, fairy shrimp were present in one of the five vernal pools monitored in 2024 (see Table 3-3).

For CTS surveys, vernal pools were sampled up to three times in March, April, and May. Ponds 997, 21, and 76 dried completely during the sampling period and were not sampled during all events. California tiger salamanders were present in Ponds 5 and 101 East (East). Three hundred and ninety-seven larvae were observed during sampling in 2024. Overall, CTS were present in two of the five vernal pools monitored.

Table 3-3. California Tiger Salamander and Fairy Shrimp Detections at Vernal Pools in 2024.

Vernal Pool	Monitoring Status	CTS Detected	Fairy Shrimp Detected
Pond 5	Reference	Yes	No
Pond 101 East (East)	Reference	Yes	No
Pond 997	Reference	No	No
Pond 21	Year 2 Post-Mastication and Post-Subsurface Munitions Remediation	No	No
Pond 76	Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation	No	Yes

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 2024, Pond 5 was monitored for hydrology, vegetation and wildlife.

3.1.1 Hydrologic Monitoring

Pond 5 was monitored for hydrology seven times and depth alone was checked three times. Monitoring was initiated in December after a major winter rain event to evaluate the effects of the precipitation on pond depth. Subsequent monitoring events included measurements for depth and the full suite of hydrologic parameters. Due to improper deployment of the dissolved oxygen probe—specifically, the absence of required flow over the membrane—all dissolved oxygen measurements recorded as 0.0 mg/L were omitted from the dataset. Non-zero dissolved oxygen values were retained as they fell within expected and historical ranges; however, they may be artificially low due to insufficient probe movement during measurement. The two final monitoring events in July and August only included depth surveys in order to capture the end of the hydroperiod. The pond was dry by August (see Figure 3-1 and Table 3-4).

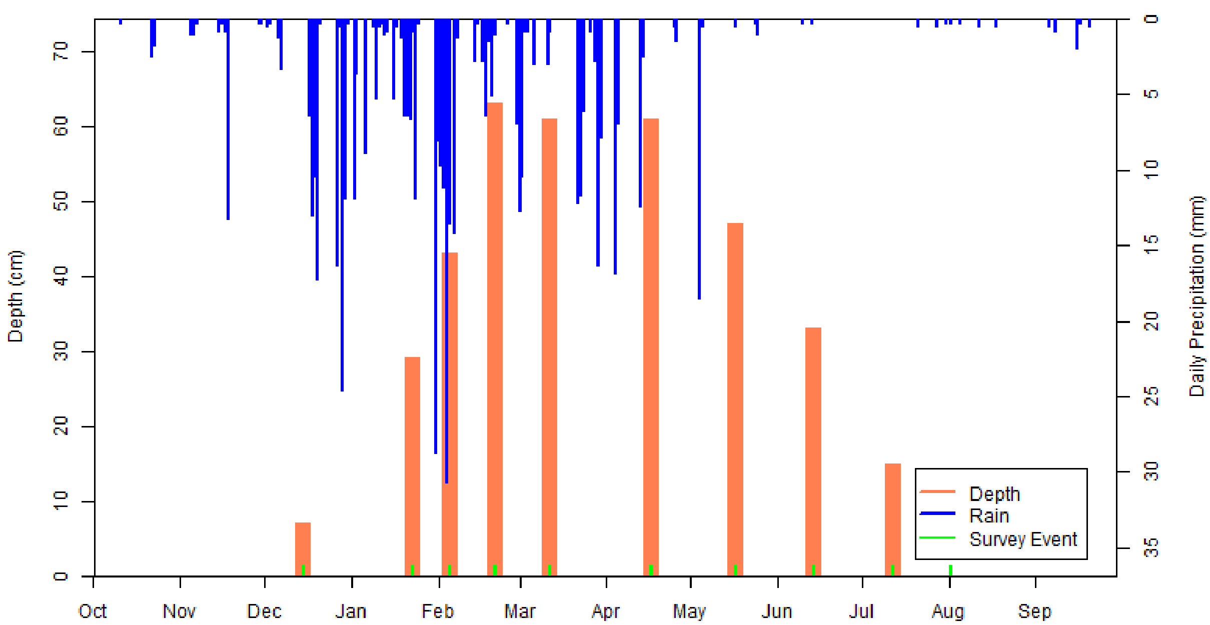


Figure 3-1. Pond 5 (Reference) depth and precipitation on former Fort Ord, 2024.

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

Date	Inundated Surface Area (acres)	Max Depth (cm)	Dissolved Oxygen (mg/L)	Temperature (C)	Turbidity (FNU)	pH
2023-12-15^	0.3229	6	NS	NS	NS	NS
2024-01-23	3.2522	28	Omitted	13.88	6.7	6.64
2024-02-05	NS	42	NS	NS	NS	NS
2024-02-21^	4.8078	62	Omitted	13.06	19.1	7.63
2024-03-12	4.7666	60	Omitted	14.88	25.4	6.8
2024-04-17	4.7398	60	Omitted	16.26	73.7	6.7
2024-05-17	4.2191	46	Omitted	18.39	23.2	6.75
2024-06-14	3.2776	32	Omitted	17.33	7.5	6.65
2024-07-12	0.9407	14	NS	NS	NS	NS
2024-08-02	0	0	NS	NS	NS	NS

NS = Not Surveyed
^Peripheral inundation present
Omitted: Dissolved oxygen readings of 0.0 mg/L were omitted due to improper probe deployment

3.1.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 5 on August 13, 2024. These monitoring data represent reference conditions. Pond 5 held water from December 2023 through July 2024. Biologists identified five vegetative strata at the vernal pool (see Table 3-5 and Figure 3-2). Stratum 1 was repeated from 2016 and 2018-2023. Stratum 3 was repeated from 2016-2023. Stratum 6 was repeated from 2018-2020. Stratum 7 was repeated from 2019-2021. Stratum 10 and its associated transect were newly established in 2024. Transect 1 was repeated from 2016 and 2018-2022, whereas Transects 3, 6, and 7 were relocated to more representative locations.

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

Stratum	Percentage
1	29.7%
3	23.7%
6	40.6%
7	4.9%
10	1.1%

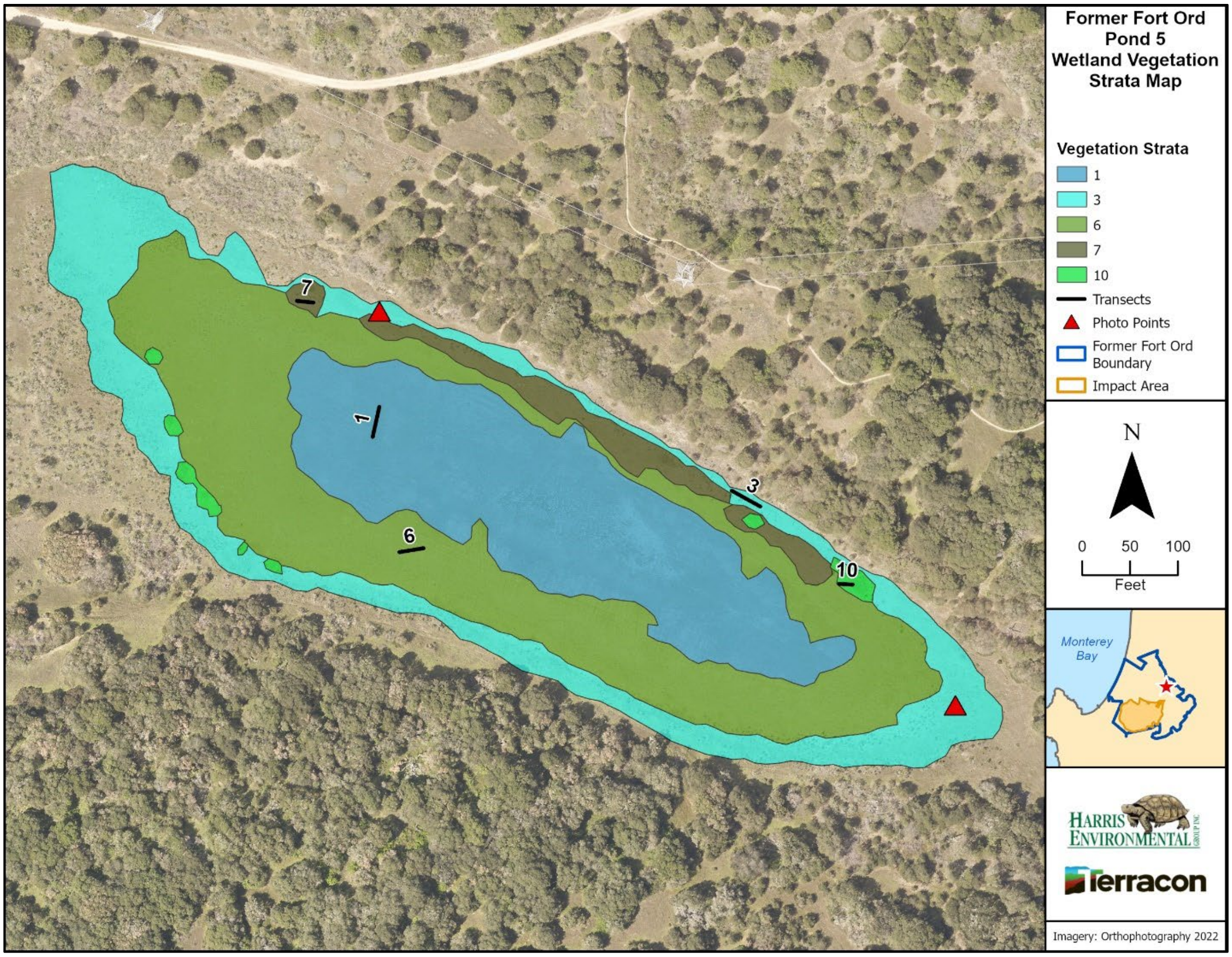


Figure 3-2. Pond 5 (Reference) vegetation strata and transects on former Fort Ord, 2024.

Sixty plant species were observed within the vernal pool basin boundary. Of these species, 42 were native, 17 were non-native, and one was unidentified. Thirteen species were OBL wetland plants, 23 were FACW or FAC, nine were FACU or UPL, and 15 were not listed. Appendix C provides the species cover results for each stratum. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum. Table 3-6 provides a summary of the dominant species cover results for each stratum.

Table 3-6. Pond 5 (Reference) Dominant Species by Stratum Results.

Stratum	Transect Length (m)	Dominant Species	
		Common Name	Absolute Cover on Transect (%)
1	10	pale spikerush	88.8
3	10	pale spikerush brown-headed rush	38.3 11.3
6	10	pale spikerush salt grass	64.3 12.8
7	5	Baltic rush pale spikerush	79.7 5.3
10	5	western goldenrod pale spikerush	61.7 8.0

3.1.3 Wildlife Monitoring

Pond 5 was surveyed for CTS and fairy shrimp on March 12, April 17, and May 15, 2024. California tiger salamanders were present at all three monitoring events while no fairy shrimp were present at any survey event. Table 3-7 and Table 3-8 provide results of the CTS and fairy shrimp surveys in 2024. Invertebrate results for 2024 are provided in Appendix D (see Table D-2).

Table 3-7. Pond 5 (Reference) CTS 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	3/12/2024†	6	6	24	15-26	25	-	-	-	10 hrs 40 min
	4/17/2024	33	30	46	29-66	54	28	15-40	31	8 hrs 32 min
	5/15/2024	3	3	61	56-71	56	34	31-38	-	8 hrs 45 min

*The mean was rounded to the nearest whole number
†CTS too small to determine SVL during March survey

Table 3-8. Pond 5 (Reference) Fairy Shrimp Monitoring Results.

Sampling Date	Abundance (# Individuals)
3/12/2024	Not detected
4/17/2024	Not detected
5/15/2024	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 2024, Pond 101 East (East) was monitored for hydrology, vegetation and wildlife.

3.2.1 Hydrologic Monitoring

Pond 101 East (East) was monitored for hydrology six times and depth alone was checked three times. Monitoring was initiated in December after a major winter rain event to evaluate the effects of the precipitation on pond depth. Due to improper deployment of the dissolved oxygen probe—specifically, the absence of required flow over the membrane—all dissolved oxygen measurements recorded as 0.0 mg/L were omitted from the dataset. Non-zero dissolved oxygen values were retained as they fell within expected and historical ranges; however, they may be artificially low due to insufficient probe movement during measurement. The pond dried by July (see Table 3-B and Figure 3-B).

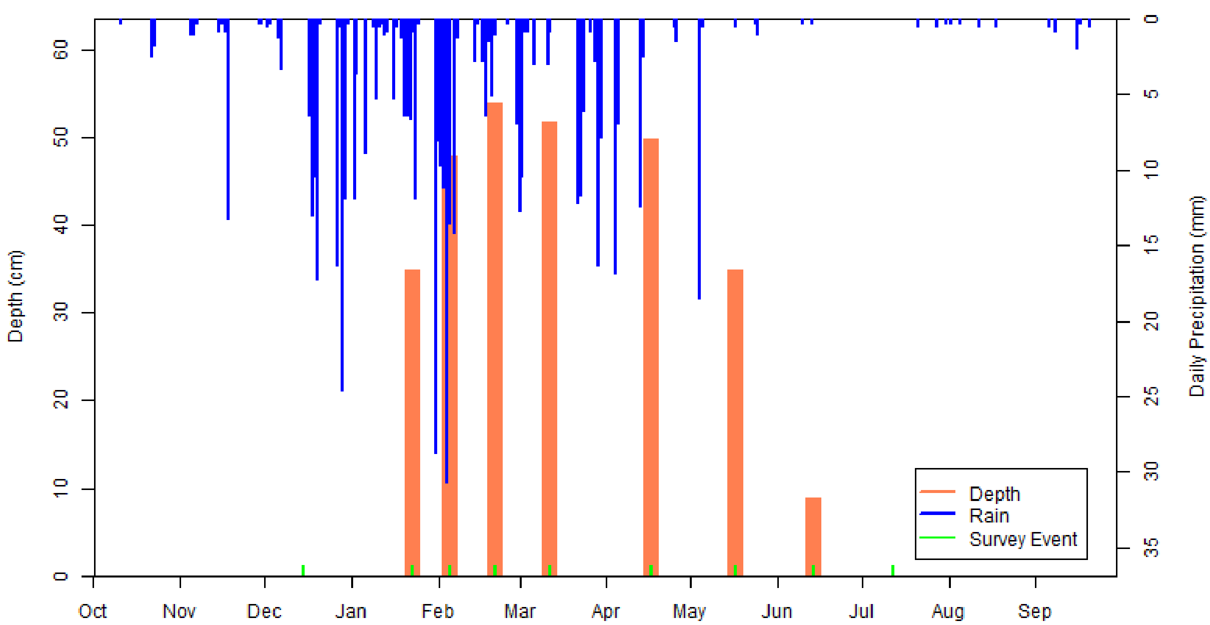


Figure 3-3. Pond 101 East (East) (Reference) depth and precipitation on former Fort Ord, 2024.

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

Date	Inundated Surface Area (acres)	Max Depth (cm)	Dissolved Oxygen (mg/L)	Temperature (C)	Turbidity (FNU)	pH
2023-12-15	0	0	NS	NS	NS	NS
2024-01-23	1.4594	34	4.75*	15.9	62.1	7.14
2024-02-05	NS	47	NS	NS	NS	NS
2024-02-21^	2.7432	53	2.89*	12.53	52.1	7.89
2024-03-12^	2.6543	51	0.25*	14.84	39.6	7.16
2024-04-17	2.571	49	Omitted	14.91	34.7	6.84
2024-05-17^	1.341	34	Omitted	17.37	33.2	6.28
2024-06-14	0.0102	8	Omitted	21.15	312	6.54
2024-07-12	0	0	NS	NS	NS	NS

NS = Not Surveyed
^Peripheral inundation present
Omitted: Dissolved oxygen readings of 0.0 mg/L were omitted due to improper probe deployment
*All non-zero dissolved oxygen readings are likely artificially low due to improper probe deployment

3.2.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 101 East (East) on June 27, 2024. These monitoring data represent reference conditions. Pond 101 East (East) held water from January until the June vegetation monitoring event. Biologists identified four strata at the vernal pool (see Table 3-10 and Figure 3-4). Stratum 2 was repeated from 2016, 2018-2020, and 2023. Stratum 3 was repeated from 2016, 2021, and 2022. Stratum 4 was repeated from 2016, 2022, and 2023. Stratum 9 was repeated from 2022. Transects 2 and 3 were relocated because the transect no longer fell within the respective strata. Transect 4 was repeated from the 2021 location. Transect 9 was relocated to a more representative location.

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

Stratum	Percentage
2	5%
3	61%
4	31%
9	3%

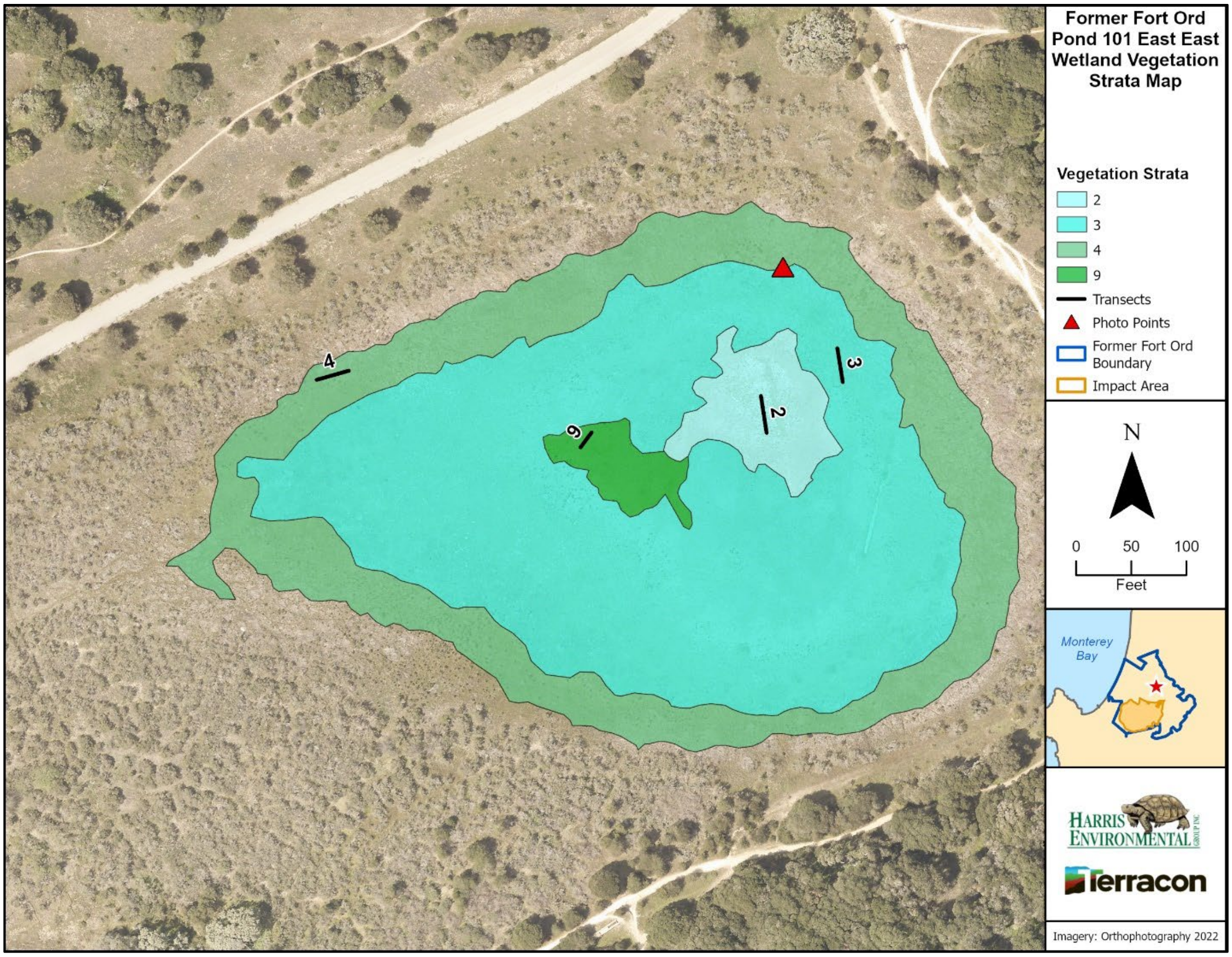


Figure 3-4. Pond 101 East (East) (Reference) vegetation strata and transects on former Fort Ord, 2024.

Sixty-five plant species were observed within the vernal pool basin boundary. Of these species, 40 were native and 25 were non-native. Nine species were OBL wetland plants, 30 were FACW or FAC, 12 were FACU or UPL, and 14 were not listed. Appendix C provides the species cover results for each stratum. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum. Table 3-11 provides a summary of the dominant species cover results for each stratum.

Table 3-11. Pond 101 East (East) (Reference) Dominant Species by Stratum Results.

Stratum	Transect Length (m)	Dominant Species	
		Common Name	Absolute Cover on Transect (%)
2	10	pale spikerush flowering quillwort	80.2 2.0
3	10	rabbitfoot grass Pacific bent grass grass poly	31.5 25.2 10.0
4	10	Baltic rush sheep sorrel Pacific bent grass	34.8 24.3 8.7
9	5	smooth goldfields Pacific foxtail alkali mallow rabbitfoot grass	19.0 18.3 16.0 10.0

3.2.3 Wildlife Monitoring

Pond 101 East (East) was surveyed for CTS and fairy shrimp on March 12, April 17, and May 15, 2024. California tiger salamanders were present at all three survey events while no fairy shrimp were present at any survey event. Table 3-12 and Table 3-13 provide results of the CTS and fairy shrimp surveys in 2024. Invertebrate results for 2024 are provided in Appendix D (see Table D-2).

Table 3-12. Pond 101 East (East) (Reference) CTS Monitoring Results.

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
101 East (East)	3/12/2024	180	30	30	12-47	45	16	5-30	21	5 hrs
	4/17/2024	82	30	46	29-66	54	34	12-56	25	5 hrs
	5/15/2024	93	30	90	56-135	66	50	28-75	40	3 hrs 42 min

*The mean was rounded to the nearest whole number

Table 3-13. Pond 101 East (East) (Reference) Fairy Shrimp Monitoring Results.

Sampling Date	Abundance (# Individuals)
3/12/2024	Not detected
4/17/2024	Not detected
5/15/2024	Not detected

3.3 Pond 997

Pond 997 is a reference vernal pool that was monitored as a control for comparison to the remediated vernal pools. In 2024, Pond 997 was monitored for hydrology, vegetation and wildlife.

3.3.1 Hydrologic Monitoring

Pond 997 was monitored for hydrology two times and depth alone was checked six times. Monitoring was initiated in December after a major winter rain event to evaluate the effects of the precipitation on pond depth. The pond dried by May (see Figure 3-5 and Table 3-14).

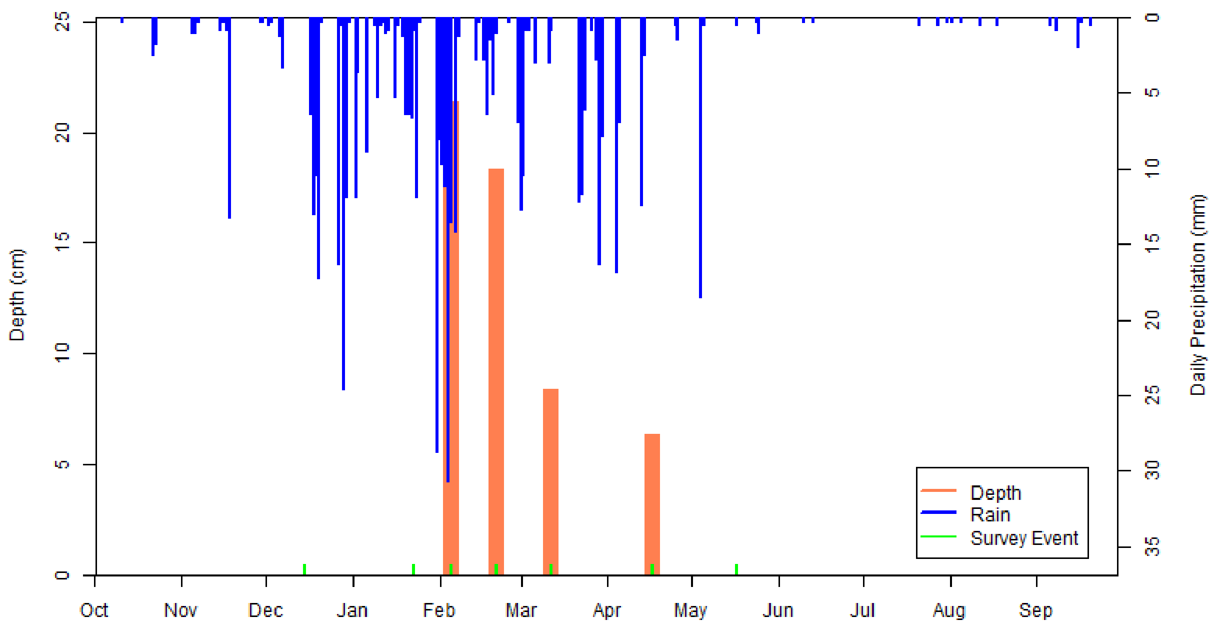


Figure 3-5. Pond 997 (Reference) depth and precipitation on former Fort Ord, 2024.

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

Date	Inundated Surface Area (acres)	Max Depth (cm)	Dissolved Oxygen (mg/L)	Temperature (C)	Turbidity (FNU)	pH
2023-12-15	0	0	NS	NS	NS	NS
2024-01-23	0	0	NS	NS	NS	NS
2024-02-05	NS	21	NS	NS	NS	NS
2024-02-21^	0.3235	18	6.33*	19.5	15.1	8.23
2024-03-12^	0.0706	8	4.77*	15.05	22.2	6.81
2024-04-17	0.0159	6	NS	NS	NS	NS
2024-05-17	0	0	NS	NS	NS	NS

NS = Not Surveyed
^Peripheral inundation present
*All non-zero dissolved oxygen readings are likely artificially low due to improper probe deployment

3.3.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 997 on June 6, 2024. These monitoring data represent reference conditions. Pond 997 held water from February through March, 2024. Biologists identified four wetland strata at the vernal pool (see Table 3-15 and Figure 3-6). Strata 1, 2, and 3 were repeated from 2017-2023, whereas Stratum 5 was repeated from 2018-2020 and 2023. Transect 1 was relocated to avoid the CCG population growing there. Transect 3 was repeated from 2023. Transect 5 was relocated to a more representative area. No transect was placed in Stratum 2 in order to not disturb the CCG population. Figure 3-7 illustrates the extent and density of the CCG population at Pond 997.

Table 3-15. Pond 997 (Reference) Vegetative Strata Percentage within the Vernal Pool Basin Boundary.

Stratum	Percentage
1	7.3%
2 (CCG)	3.1%
3	11.3%
5	76.4%
Upland	1.9%

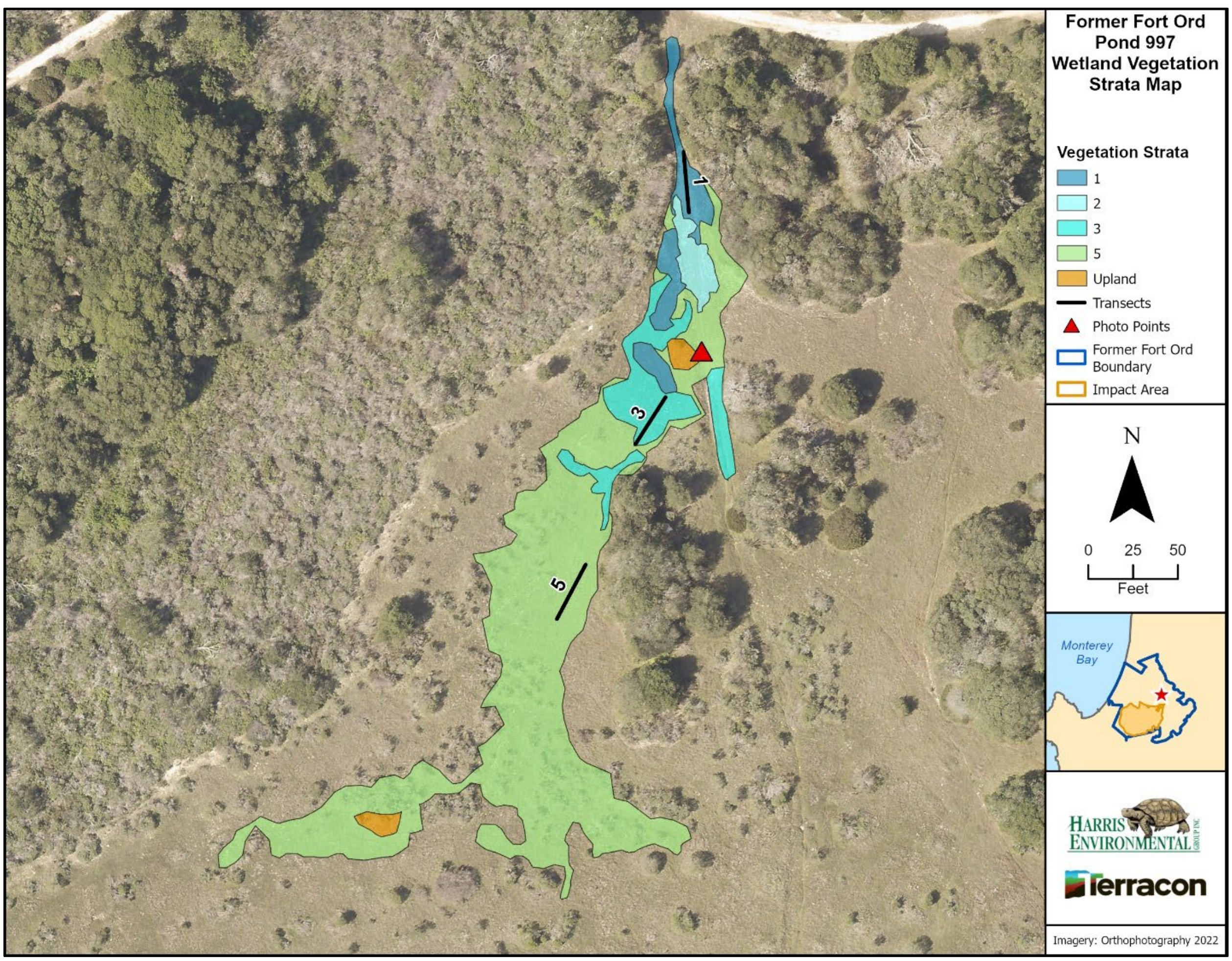


Figure 3-6. Pond 997 (Reference) vegetation strata and transects on former Fort Ord, 2024.

Sixty-six plant species were observed within the vernal pool basin boundary. Of these species, 43 were native, 22 were non-native, and one was unidentified. Thirteen species were OBL wetland plants, 24 were FACW or FAC, nine were FACU or UPL, and 20 were not listed. Appendix C provides the species cover results for each stratum. Appendix G identifies the number of native, non-native, and unidentified species within each stratum as well as the number of species within each wetland indicator category for each stratum. Table 3-16 provides a summary of the dominant species cover results for each stratum.

Table 3-16. Pond 997 (Reference) Dominant Species by Stratum Results.

Stratum	Transect Length (m)	Dominant Species	
		Common Name	Absolute Cover on Transect (%)
1	10	Hickman's popcornflower rabbitfoot grass coyote thistle	24.0 16.5 15.0
2	N/A	Contra Costa goldfields	N/A
3	10	California oat grass brown-headed rush	24.5 7.3
5	10	brown-headed rush rattlesnake grass	25.7 7.5

3.3.2.1 *Contra Costa Goldfields*

Contra Costa goldfields at Pond 997 were mapped on March 14, 2024; they occupied 0.017 acre, with a density of 30% cover. No transects were placed in Stratum 2 to avoid disturbing the population. Figure 3-7 illustrates the extent of the CCG population at Pond 997.

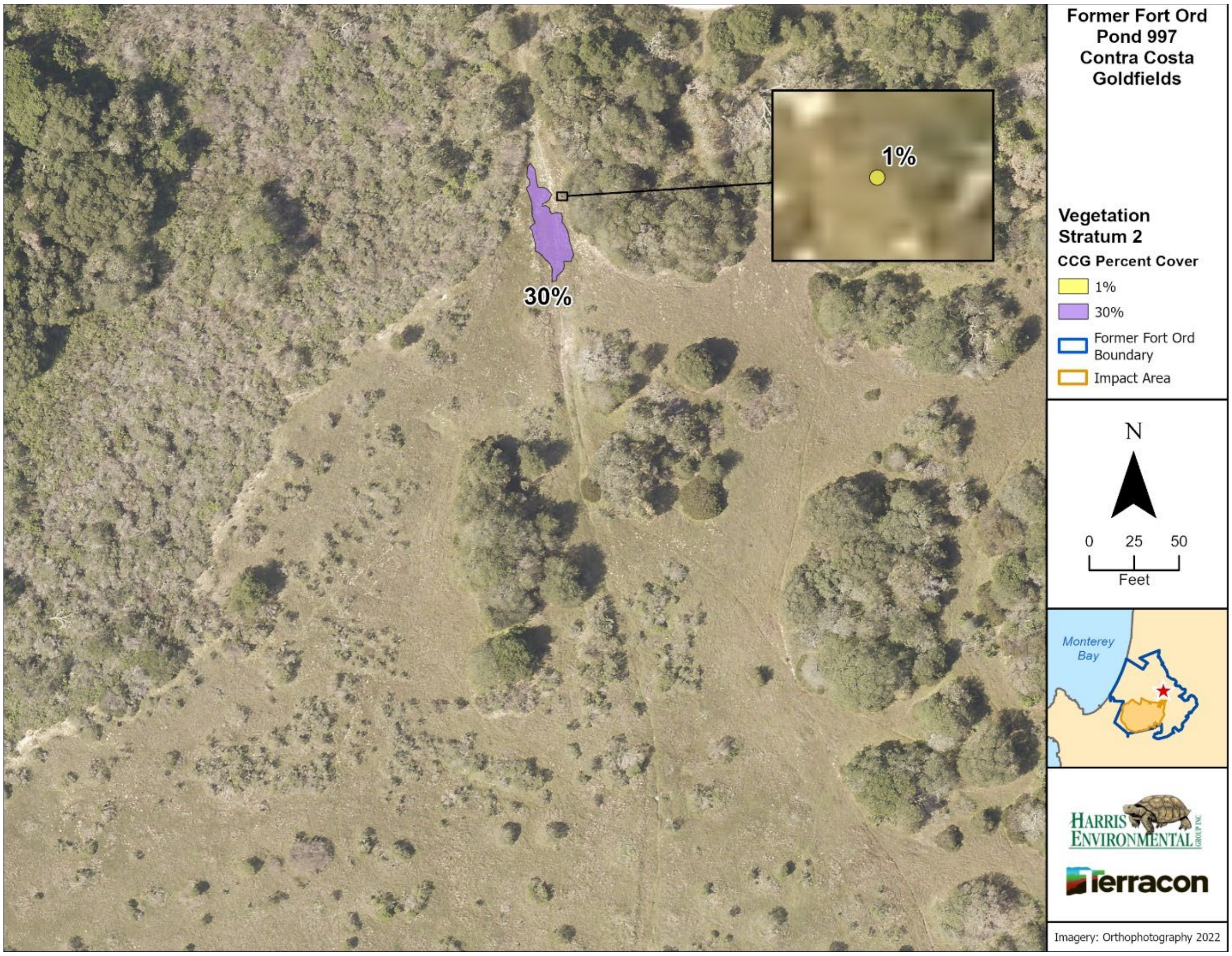


Figure 3-7. Contra Costa Goldfields Populations at Pond 997 (Reference), 2024.

3.3.3 Wildlife Monitoring

Pond 997 was surveyed for CTS and fairy shrimp on March 13, 2024 (see Table 3-17). No California tiger salamanders or fairy shrimp were present at the March survey. No surveys were conducted in April or May due to insufficient vernal pool depth. Table 3-17 and Table 3-18 provide results of the CTS and fairy shrimp surveys in 2024. Invertebrate results for 2024 are provided in Appendix D (see Table D-2).

Table 3-17. Pond 997 CTS 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	3/13/2024	0	-	-	-	-	-	-	-	4 min

*The mean was rounded to the nearest whole number

Table 3-18. Pond 997 Fairy Shrimp Monitoring Results.

Sampling Date	Abundance (# Individuals)
3/13/2024	Not detected

3.4 Pond 21

Pond 21 was in Year 2 of monitoring for post-mastication and post-subsurface munitions remediation in 2024. Pond 21 was monitored for hydrology, vegetation, and wildlife.

3.4.1 Hydrologic Monitoring

Pond 21 was monitored for hydrology three times and depth alone was checked four times. Monitoring was initiated in December after a major winter rain event to evaluate the effects of the precipitation on pond depth. The pond dried by May (see Figure 3-8 and Table 3-19).

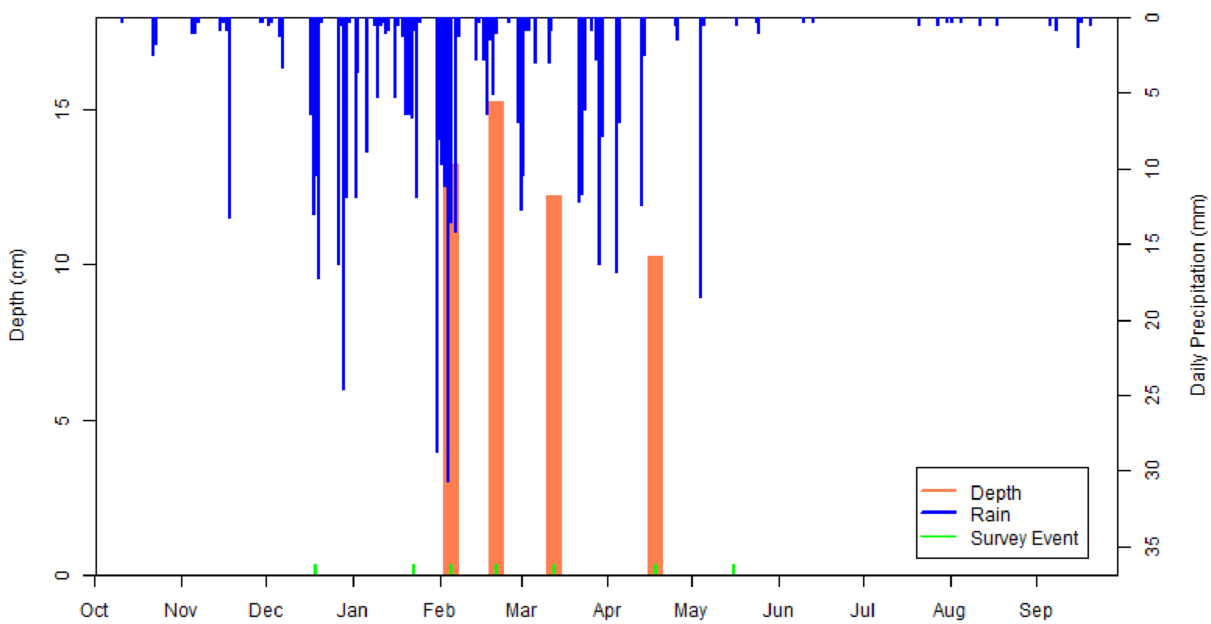


Figure 3-8. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) depth and precipitation on former Fort Ord, 2024.

Table 3-19. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) Hydrologic Monitoring Results.

Date	Inundated Surface Area (acres)	Max Depth (cm)	Dissolved Oxygen (mg/L)	Temperature (C)	Turbidity (FNU)	pH
2023-12-19	0	0	NS	NS	NS	NS
2024-01-23	0	0	NS	NS	NS	NS
2024-02-05	NS	13	NS	NS	NS	NS
2024-02-21^	0.806	15	4.21*	12.89	8.4	7.37
2024-03-13	0.795	12	3.77*	11.47	1.6	6.48
2024-04-18	0.7502	10	7.53*	19.02	86.9	6.81
2024-05-16	0	0	NS	NS	NS	NS

NS = Not Surveyed
^Peripheral inundation present
*All non-zero dissolved oxygen readings are likely artificially low due to improper probe deployment

3.4.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 21 on May 30, 2024. These monitoring data represent Year 2 post-mastication and post-subsurface munitions remediation conditions. Pond 21 held water from February through May, 2024. Biologists identified four strata at the vernal pool (see Table 3-20 and Figure 3-9). Strata 1 and 2 were repeated from 2019 and 2023, and Stratum 3 was repeated from 2023. Stratum 4 and its associated transect were identified and established in 2024. Transects 1 and 2 were relocated to more representative locations; additionally Transect 1 was increased from 5 m to 10 m. Transect 3 was repeated from 2023.

Table 3-20. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary.

Stratum	Percentage
1	63%
2	29%
3	3%
4	2%
Upland	3%

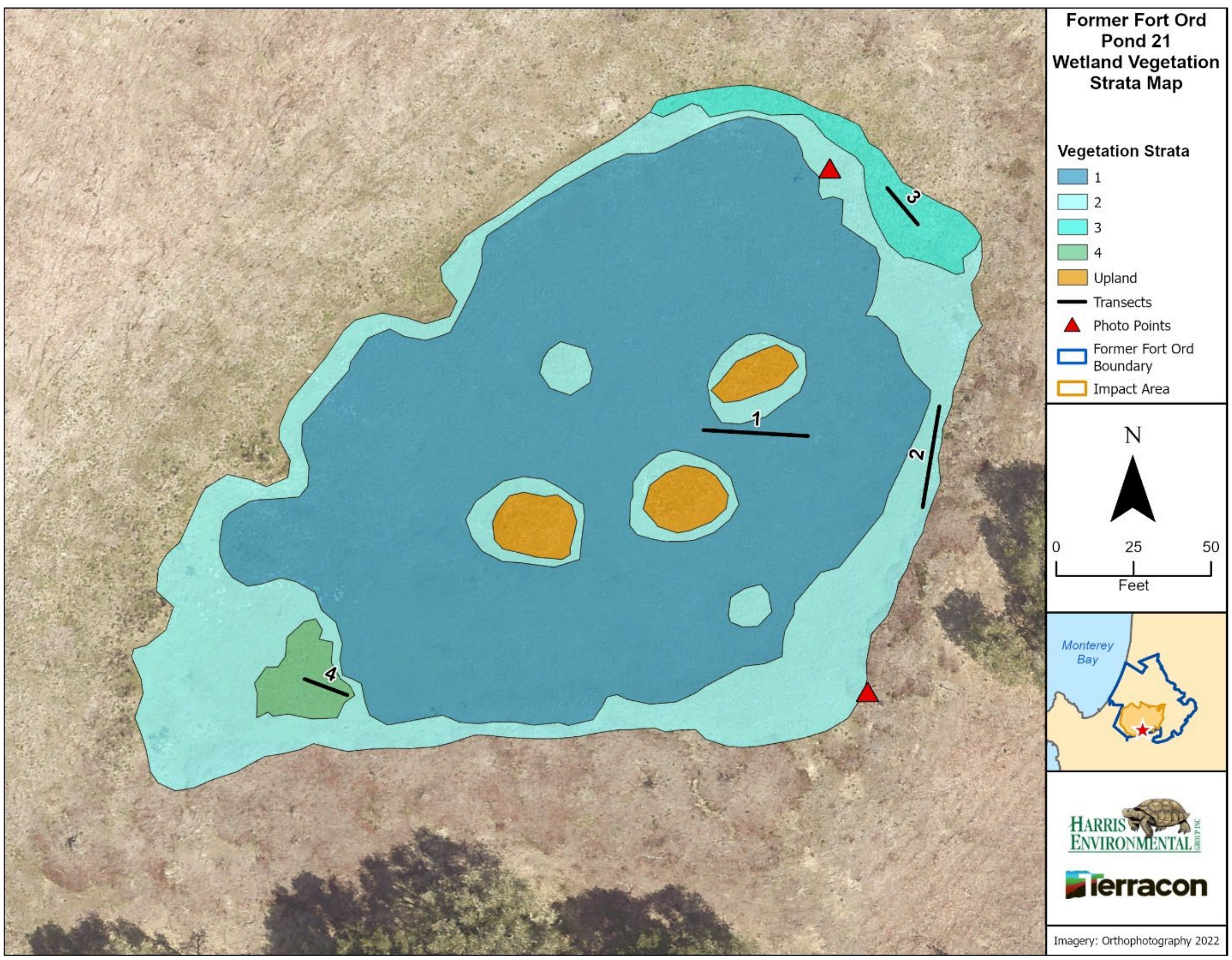


Figure 3-9. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) vegetation strata and transects on former Fort Ord, 2024.

Seventy-five species were observed within the vernal pool basin boundary. Of these species, 54 were native and 21 were non-native. Six species were OBL wetland plants, 34 were FACW or FAC, 10 were FACU or UPL, and 25 were not listed. Appendix C provides the species cover results for each stratum. Appendix G identifies the number of native, non-native, and unidentified species within each stratum, as well as the number of species within each wetland indicator category for each stratum. Table 3-21 provides a summary of the dominant species cover results for each stratum.

Table 3-21. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) Dominant Species by Stratum Results.

Stratum	Transect Length (m)	Dominant Species	
		Common Name	Absolute Cover on Transect (%)
1	10	coyote thistle pale spikerush	48.3 8.0
2	10	coyote thistle rabbitfoot grass brown-headed rush	56.2 10.2 5.7
3	5	whiteroot rabbitfoot grass	48.3 8.3
4	5	brown-headed rush	48.0

3.4.3 Wildlife Monitoring

Pond 21 was surveyed for CTS and fairy shrimp on March 13 and April 18, 2024. No CTS or fairy shrimp were detected in the March or April surveys. No surveys were conducted in May due to insufficient vernal pool depth. Table 3-22 and Table 3-23 provide results of the CTS and fairy shrimp surveys conducted in 2024. Invertebrate results for 2024 are provided in Appendix D (see Table D-2).

Table 3-22. Pond 21 CTS Monitoring Results.

Vernal Pool	Sampling Date	# of Larvae Obs.	# of Larvae Measured	Total Length of Larvae (mm)			Snout-Vent Length of Larvae (mm)			Survey Hours
				Mean*	Range	Mode	Mean*	Range	Mode	
21	3/13/2024	0	-	-	-	-	-	-	-	2 hrs 15 min
	4/18/2024	0	-	-	-	-	-	-	-	1 hr 50 min

*The mean was rounded to the nearest whole number

Table 3-23. Pond 21 Fairy Shrimp Monitoring Results.

Sampling Date	Abundance (# Individuals)
3/13/2024	Not detected
4/18/2024	Not detected

3.5 Pond 76

Pond 76 was monitored for year 2 post-mastication and Year 1 post-subsurface munitions remediation in 2024. Pond 76 was monitored for hydrology, vegetation and wildlife.

3.5.1 Hydrologic Monitoring

Pond 76 was monitored for hydrology three times and depth alone was checked four times. Monitoring was initiated in December after a major winter rain event to evaluate the effects of the precipitation on pond depth. The pond dried by May (see Figure 3-10 and Table 3-24).

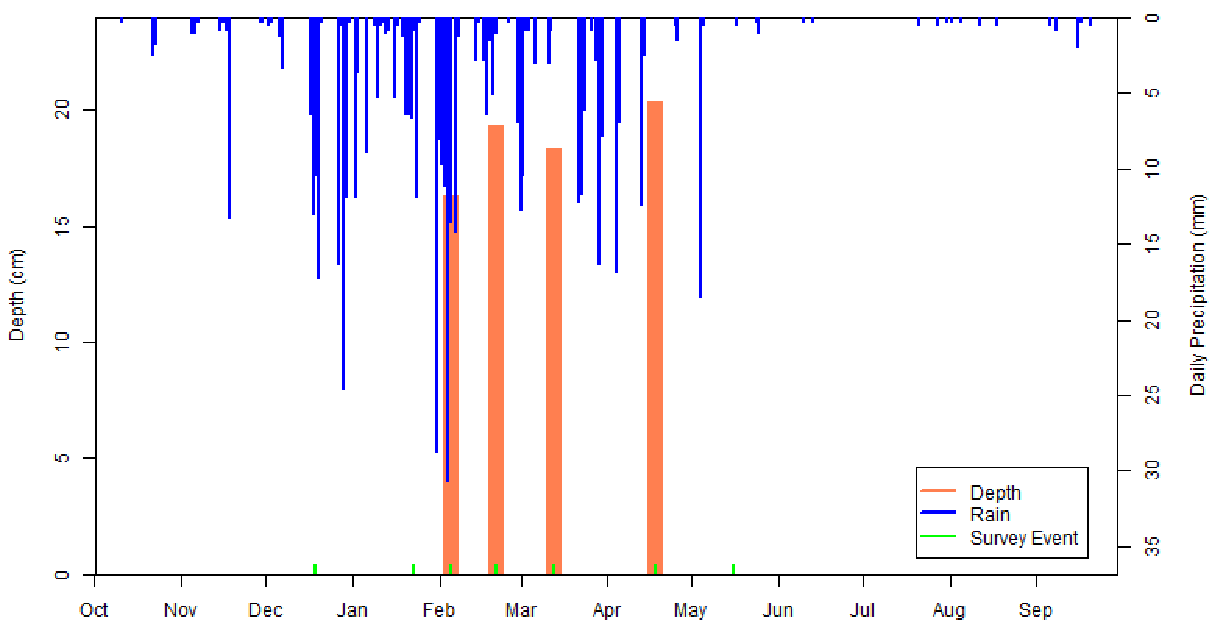


Figure 3-10. Pond 76 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) depth and precipitation on former Fort Ord, 2024.

Table 3-24. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) Hydrologic Monitoring Results.

Date	Inundated Surface Area (acres)	Max Depth (cm)	Dissolved Oxygen (mg/L)	Temperature (C)	Turbidity (FNU)	pH
2023-12-19	0	0	NS	NS	NS	NS
2024-01-23	0	0	NS	NS	NS	NS
2024-02-05	NS	16	NS	NS	NS	NS
2024-02-21	0.1322	19	5.63*	11.24	89.3	7.63
2024-03-13	0.129	18	5.03*	10.48	59	7.4
2024-04-18	0.128	20	4.38*	15.96	65.5	6.95
2024-05-16	0	0	NS	NS	NS	NS

NS = Not Surveyed
*All non-zero dissolved oxygen readings are likely artificially low due to improper probe deployment

3.5.2 Vegetation Monitoring

Vegetation monitoring was completed at Pond 76 on May 22, 2024. These monitoring data represent year 2 post-mastication and Year 1 post-excavation conditions. Pond 76 held water from February to March, 2024. Biologists identified three strata at the vernal pool (see Table 3-25 and Figure 3-11). Strata 1, 2, and 3 were repeated from 2023. Transects 1, 2, and 3 were all relocated because they no longer fell within the strata.

Table 3-25. Pond 76 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary.

Stratum	Percentage
1	39%
2	26%
3	35%

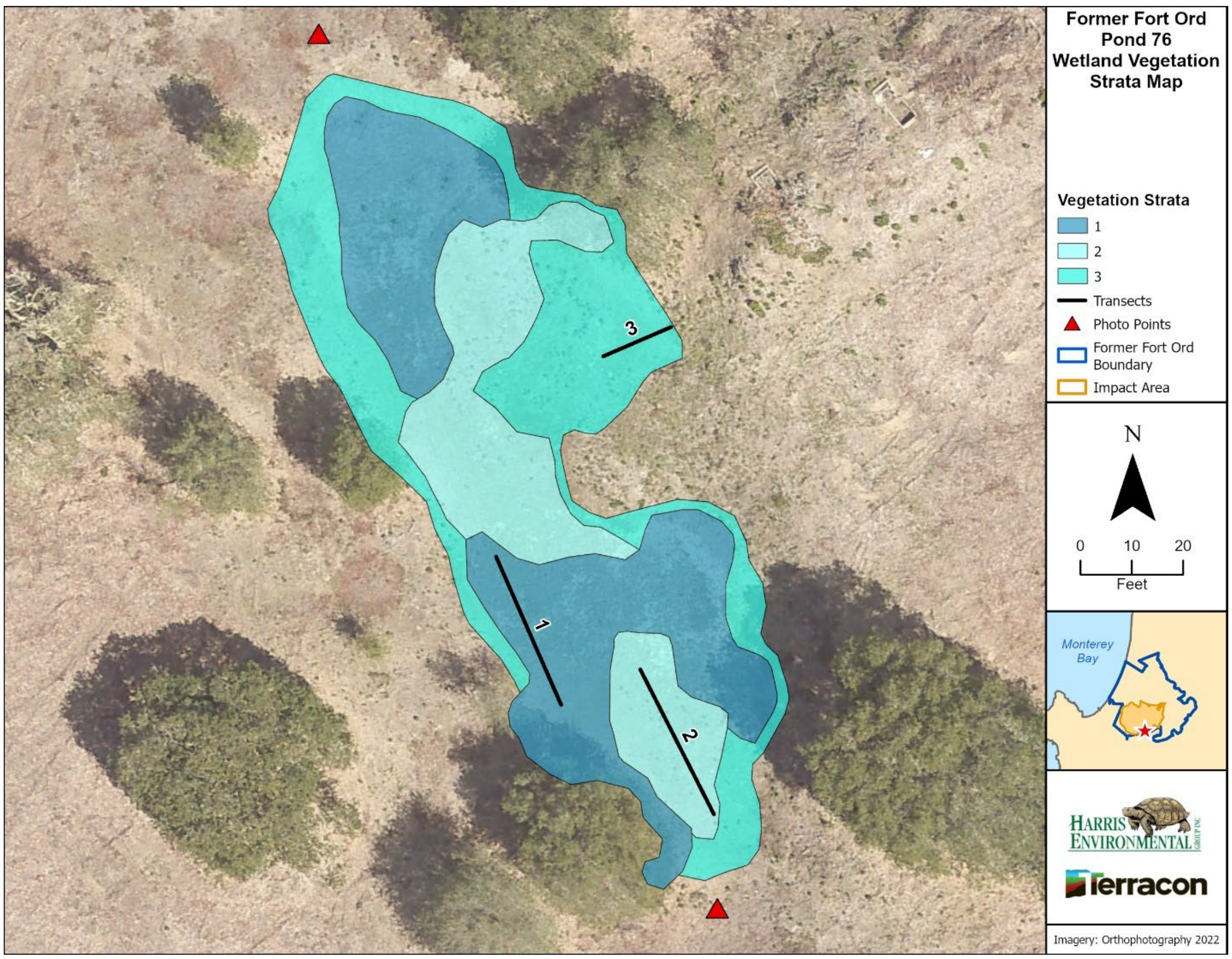


Figure 3-11. Pond 76 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) vegetation strata and transects on former Fort Ord, 2024.

Forty-one species were observed within the vernal pool basin boundary. Of these species, 27 were native and 14 were non-native. Six species were OBL wetland plants, 17 were FACW or FAC, six were

FACU or UPL, and 12 were not listed. Appendix C provides the species cover results for each stratum. Appendix G identifies the number of native, non-native, and unidentified species within each stratum, as well as the number of species within each wetland indicator category for each stratum. Table 3-26 provides a summary of the dominant species cover results for each stratum.

Table 3-26. Pond 76 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation) Dominant Species by Stratum Results.

Stratum	Transect Length (m)	Dominant Species	
		Common Name	Absolute Cover on Transect (%)
1	10	coyote thistle needle spikerush Hickman's popcornflower rabbitfoot grass	42.2 12.5 10.5 10.2
2	10	brown-headed rush coyote thistle	25.7 23.8
3	5	rabbitfoot grass Sacramento mesa mint needle spikerush	50.7 9.7 8.7

3.5.3 Wildlife Monitoring

Pond 76 was surveyed for CTS and fairy shrimp on March 13 and April 18, 2024. No CTS were detected in either survey, while fairy shrimp were detected in the March survey. No surveys were conducted in May due to insufficient vernal pool depth. Table 3-27 and Table 3-28 provide results of the CTS and fairy shrimp surveys conducted in 2024. Invertebrate results for 2024 are provided in Appendix D (see Table D-2).

Table 3-27. Pond 76 CTS 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	
76	3/13/2024	0	-	-	-	-	-	-	-	28 min
	4/18/2024	0	-	-	-	-	-	-	-	24 min

*The mean was rounded to the nearest whole number

Table 3-28. Pond 76 Fairy Shrimp Monitoring Results.

Sampling Date	Abundance (# Individuals)
3/13/2024	13
4/18/2024	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 activities (Burleson, 2006). Evaluation for the DQOs was included in the Methods Section 2.4. DQOs for wetland function are summarized below:

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

4.1 Historical Data

Depth of vernal pools, the area, and the temporal length of inundation largely depend on the amount and frequency of precipitation, and the geomorphic features such as slope, extent of the vernal pool basin, size of its watershed, the underlying soil types and their geologic sources. The vernal pools on former Fort Ord vary greatly based on the vernal pool basin size and shape. Figure 4-1 compares the historical depth vs inundation area across all vernal pools monitored in the 2023-2024 water year.

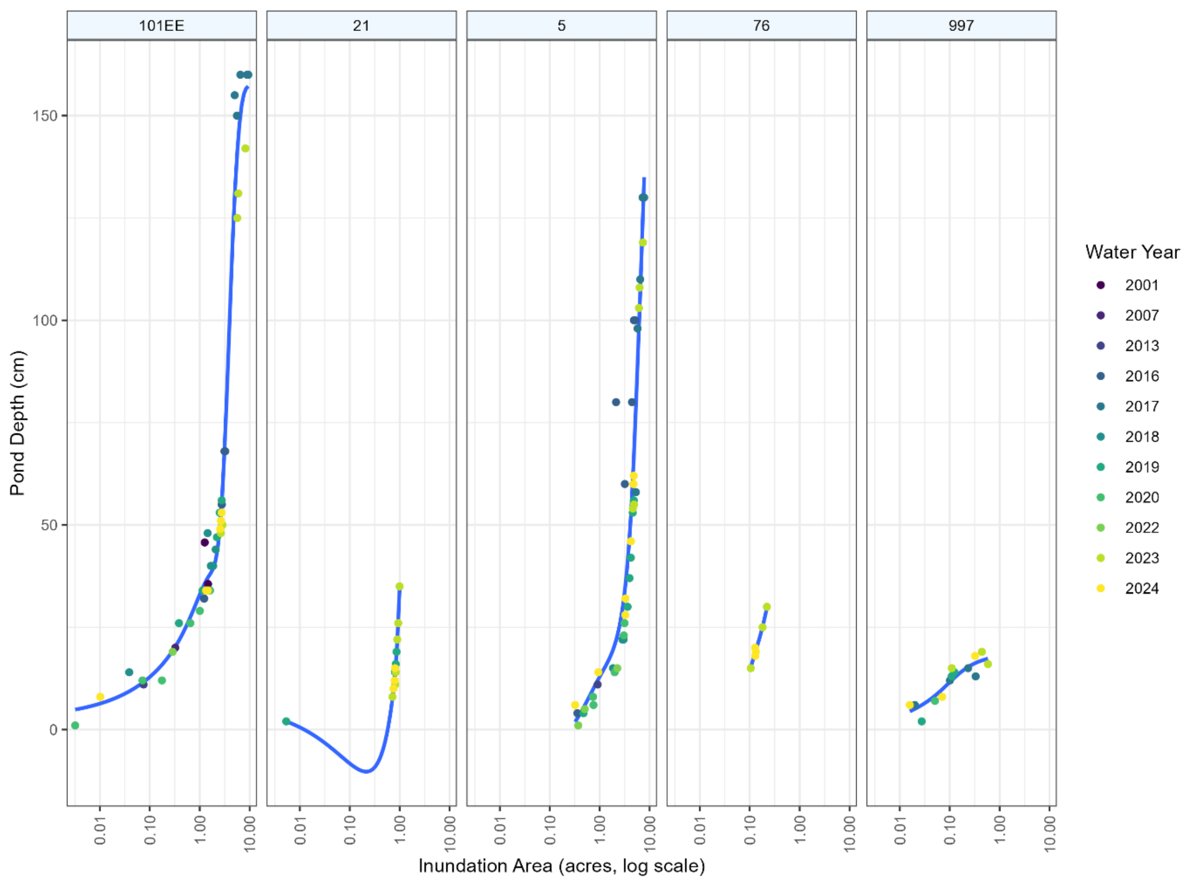


Figure 4-1. Plot of historical depth vs inundation area data going back to the 2000-2001 (2001) water year for all ponds surveyed in 2023-2024 (2024).

Following initial inundation, vernal pools with large and shallow basins tend to increase rapidly in inundation area with relatively small corresponding increases in depth. Once the inundation area in these vernal pools reaches the edge of the basin, there is a steep increase in depth with only modest increases in inundation area. Ponds 5 and 101 East (East) are good examples of large and shallow vernal pools. On the opposite end of the spectrum there are vernal pools that have small and steep basins. These vernal pools increase rapidly in depth following initial inundation as is demonstrated by Pond 997 (see Figure 4-1). Thus, assessments of wetland DQOs must be made in the context of combinations of basin extent (large vs small) and basin slope (shallow vs steep) as the main drivers of vernal pool hydroperiods in any given precipitation pattern.

Since water quality parameters can be variable, their assessment was conducted for each vernal pool by comparing them to their historic values, reference vernal pools, and other vernal pools with an objective of spotting any anomalous trends. Single measurements of water quality parameters that were out of range were noted, but occasional discrepancies are to be expected due to a variety of variables noted above. Due to improper deployment of the dissolved oxygen probe—specifically, the absence of required flow over the membrane—all dissolved oxygen measurements recorded as 0.0 mg/L were omitted from the dataset. Non-zero dissolved oxygen values were retained as they fell within expected and historical ranges; however, they may be artificially low due to insufficient probe movement during measurement.

During the 2024 water year, measured pH values remained within historical ranges, except for a single alkaline outlier in each pond on February 21, 2024, following the year's largest rain event. Aside from these outliers, no significant trends in pH values were observed across the vernal pools in 2024 (Figure 4-2). Water temperature measurements were within historical ranges (Figure 4-3). Turbidity values were mostly within historical ranges (Figure 4-4). Pond 21 had one below average turbidity measurement, while Pond 76 had a higher average turbidity than its first year of measurement. Other than the omitted data, dissolved oxygen was within historical ranges for all ponds except Pond 997, at which it was lower than historical values (Figure 4-5).

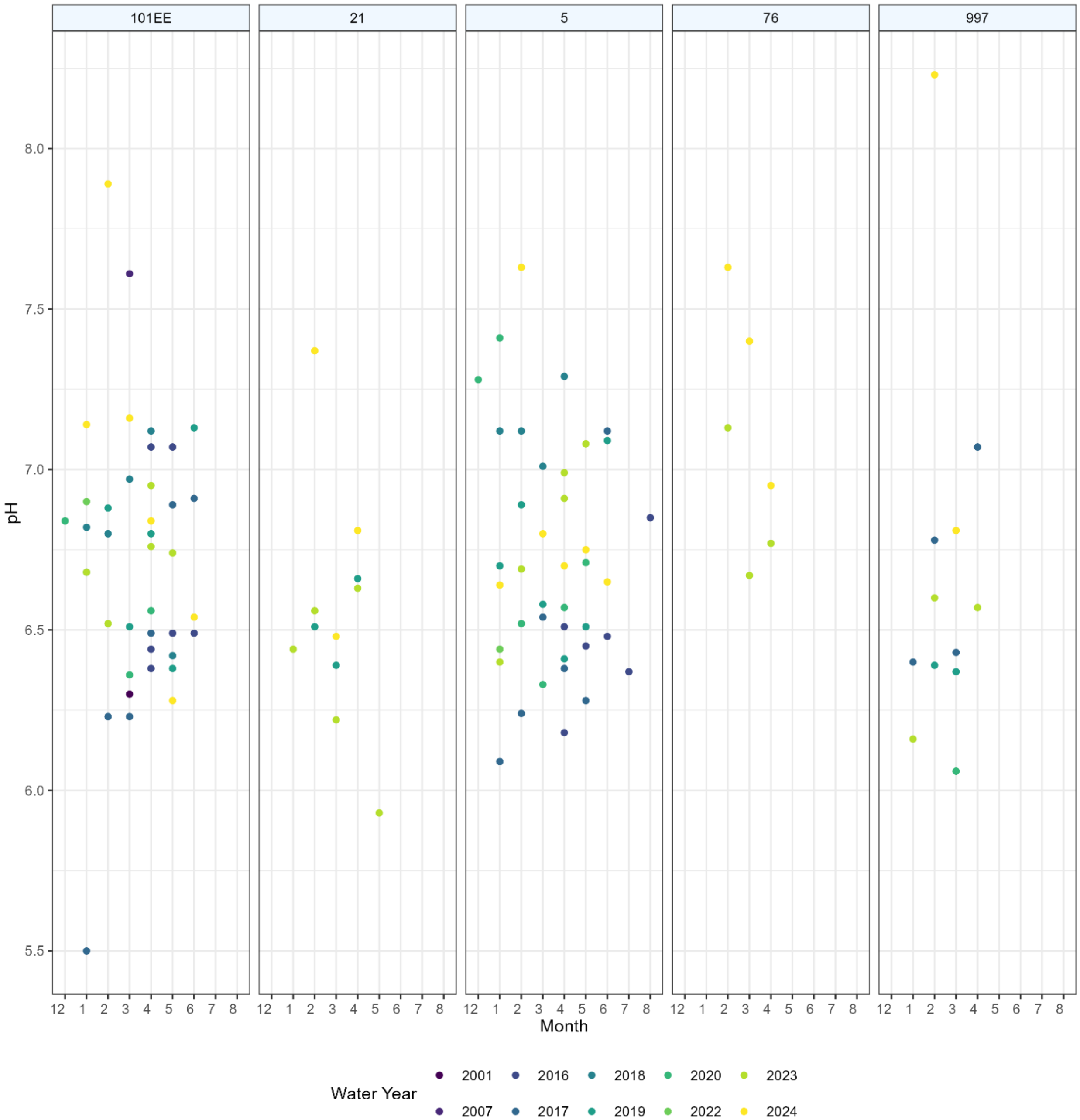


Figure 4-2. Plot of historical pH values going back to the 2000-2001 (2001) for reference and remediated ponds surveyed in 2023-2024 (2024).

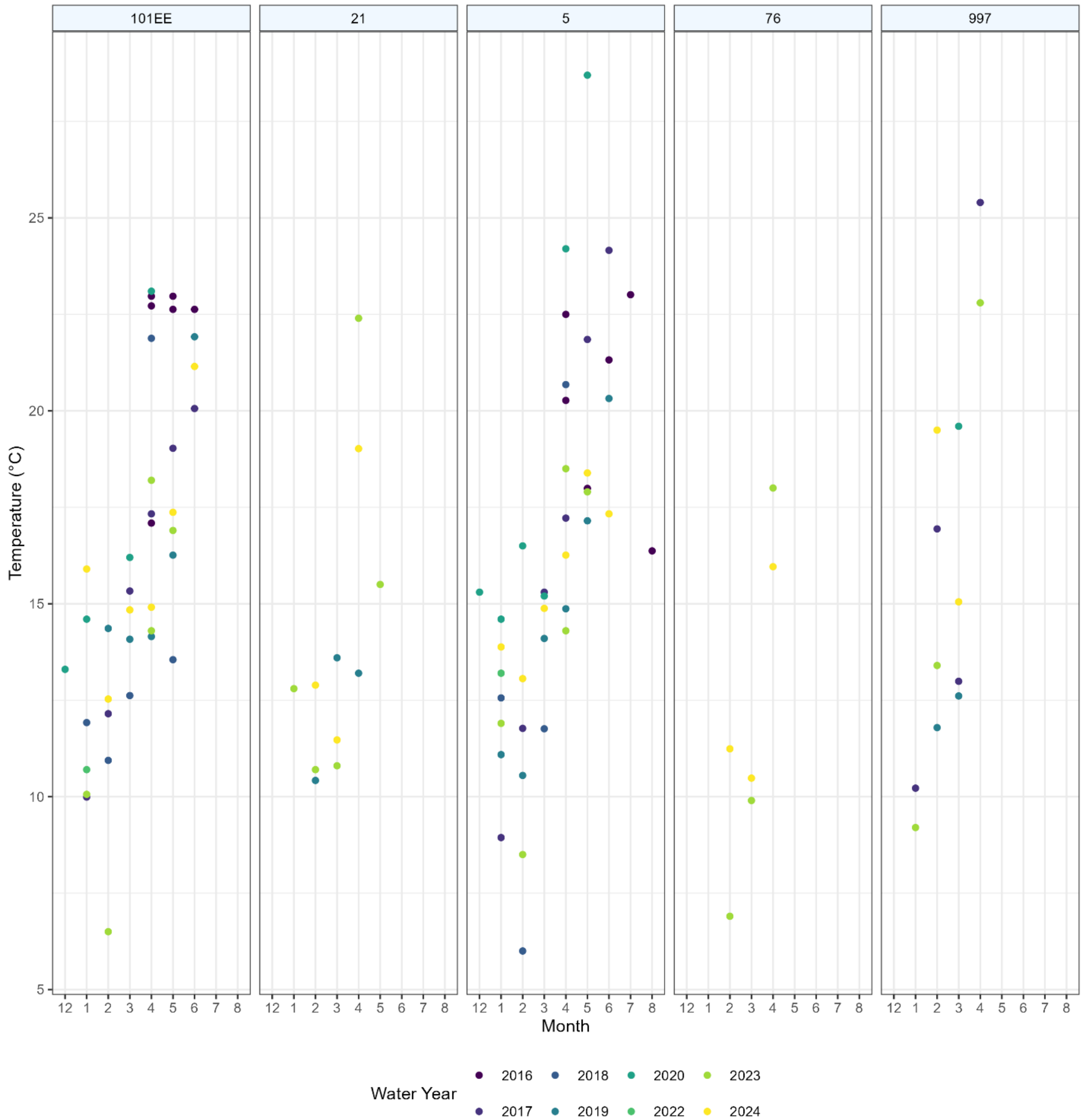


Figure 4-3. Plot of historical temperature values going back to the 2015-2016 (2016) water year for reference and remediated ponds surveyed in 2023-2024 (2024).

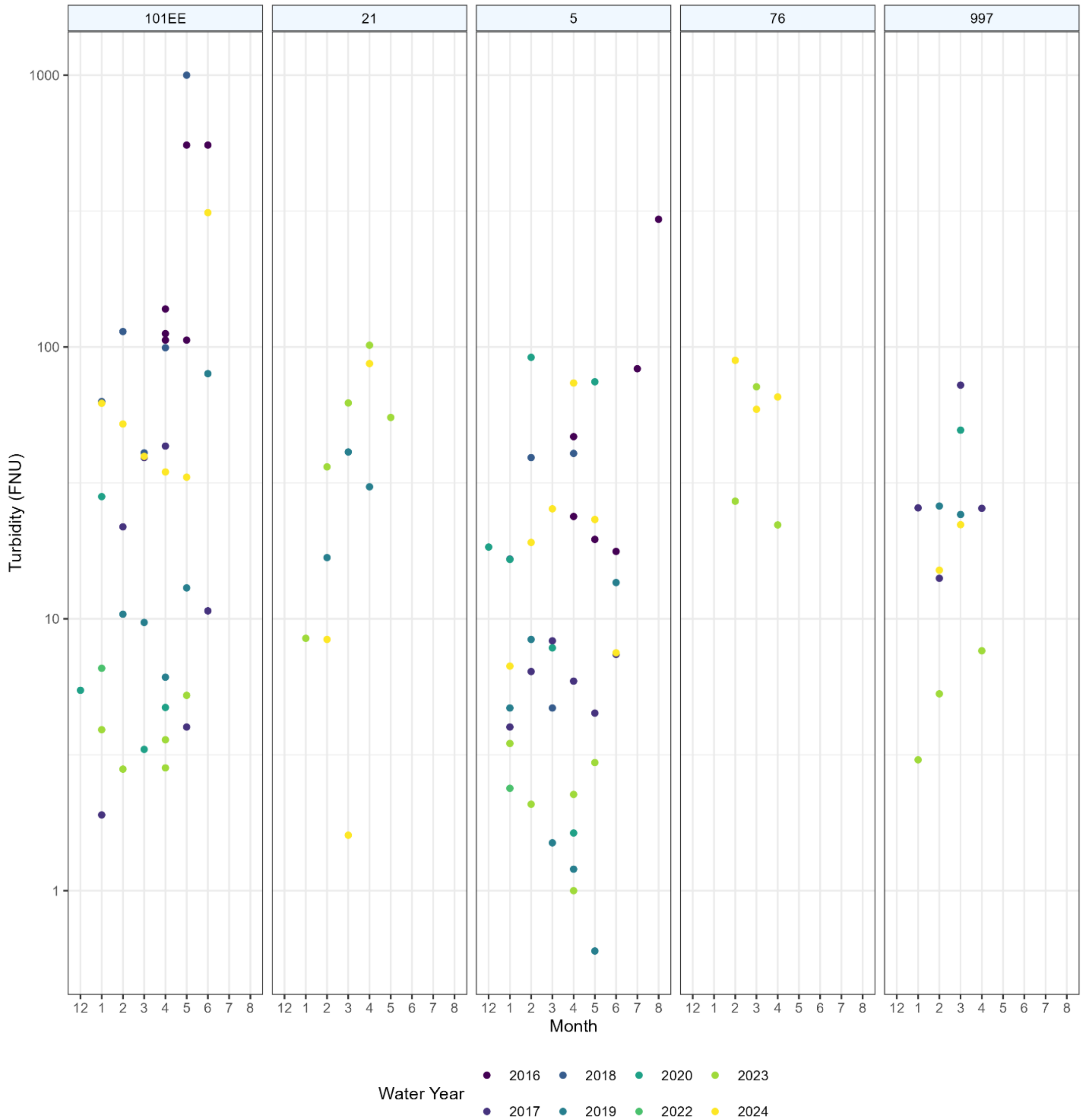


Figure 4-4. Plot of historical turbidity values going back to the 2015-2016 (2016) water year for reference and remediated ponds surveyed in 2023-2024 (2024).

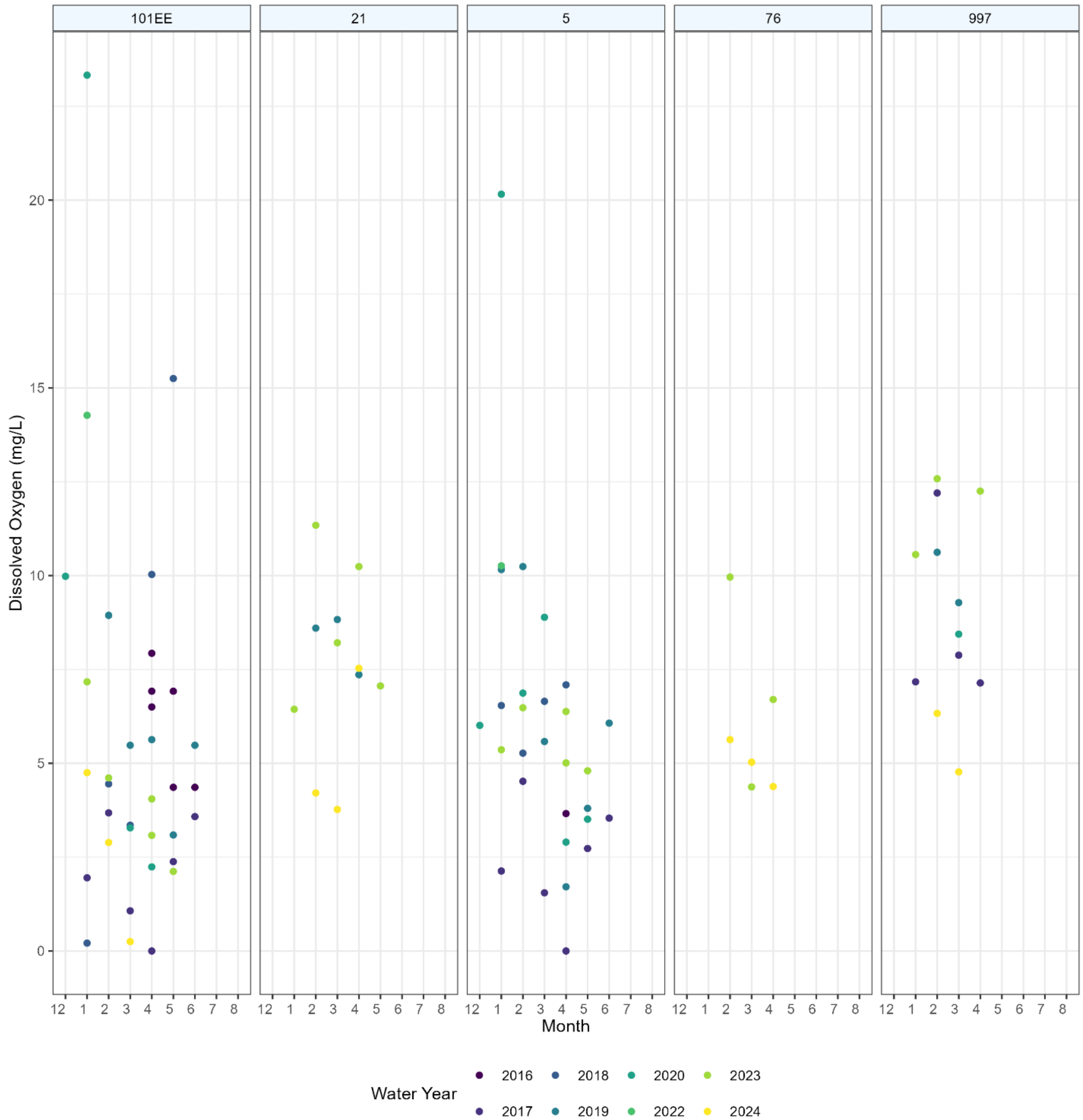


Figure 4-5. Plot of historical dissolved oxygen values going back to the 2015-2016 (2016) water year for reference and remediated ponds surveyed in 2023-2024 (2024). During the 2024 surveys, the dissolved oxygen probe was improperly deployed, preventing flow over the membrane. As a result, 0.0 mg/L values have been omitted, and non-zero values are likely artificially low.

4.2 Pond 5 – Reference

Pond 5 has been monitored for 16 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 hydrologic monitoring was conducted at Pond 5 (see Figure 4-6). Above-normal water years were 1994-1995, 2015-2016, 2016-2017, and 2018-2019. All other monitoring years, including this year, 2023-2024, were conducted either in a normal or below-normal water year, drought year, or consecutive drought year.

Table 4-1. Pond 5 (Reference) Summary of Historical 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	2020-2021	2021-2022	2022-2023	2023-2024
Hydrology	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●
Vegetation	●	●	●	●				●	●	●	●	●	●	●	●	●
Wildlife	●	●	●	●	●			●	●	●	●	●			●	●

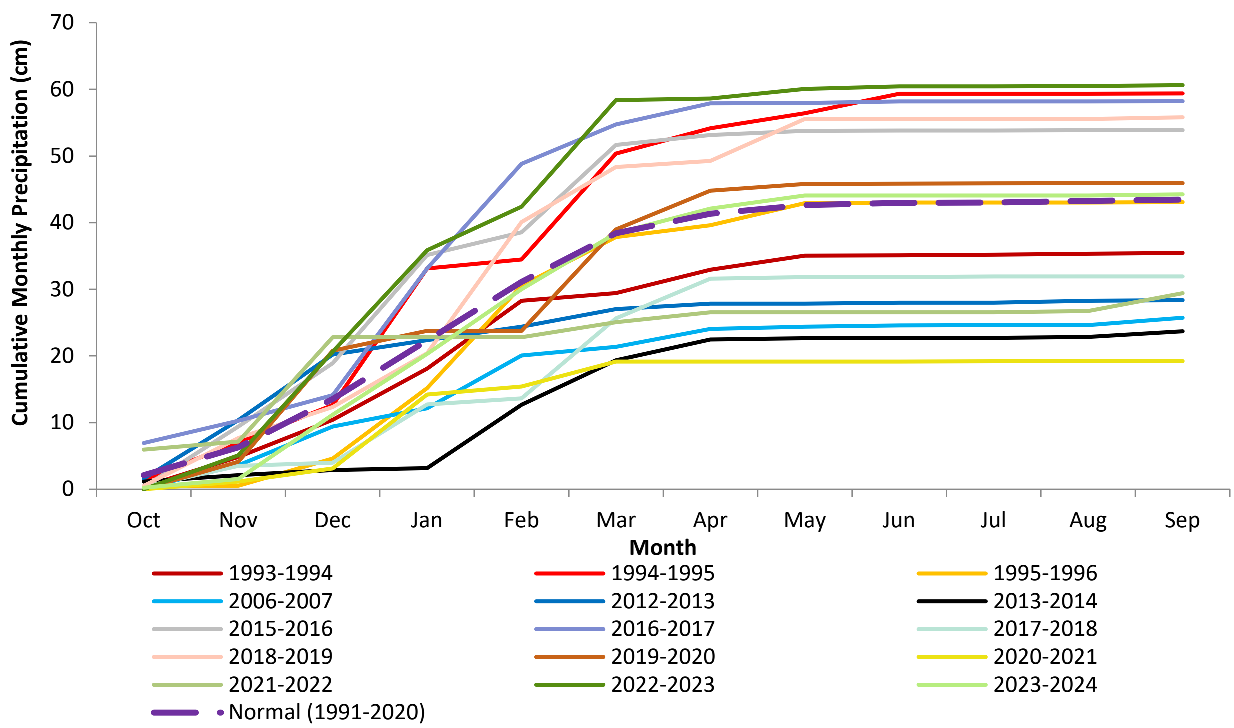


Figure 4-6. Cumulative monthly precipitation for years that hydrologic monitoring occurred at Pond 5 (Reference) compared to the 30-year normal (mean 1991-2020) (NOAA, 2023-2024).

4.2.1 Hydrologic Monitoring

Depth and inundation have been monitored at Pond 5 for 16 years (see Figure 4-7). Pond 5 has varied extensively in depth and inundation from year to year, remaining completely dry during the 2013-2014 consecutive drought year, while reaching a maximum depth of 130 cm and a maximum inundation of 7.8 acres during the 2016-2017 consecutive above-normal water year (see Figure 4-8). Pond 5 reached a maximum depth of 62 cm and a maximum inundation area of 4.81 acres in the 2023-2024 water year (see Table 3-4). Historical and 2023-2024 water year values of inundation extent, depth, and water quality measurements are presented in Figure 4-8**,** Figure 4-9**,** and Figure 4-10**.**

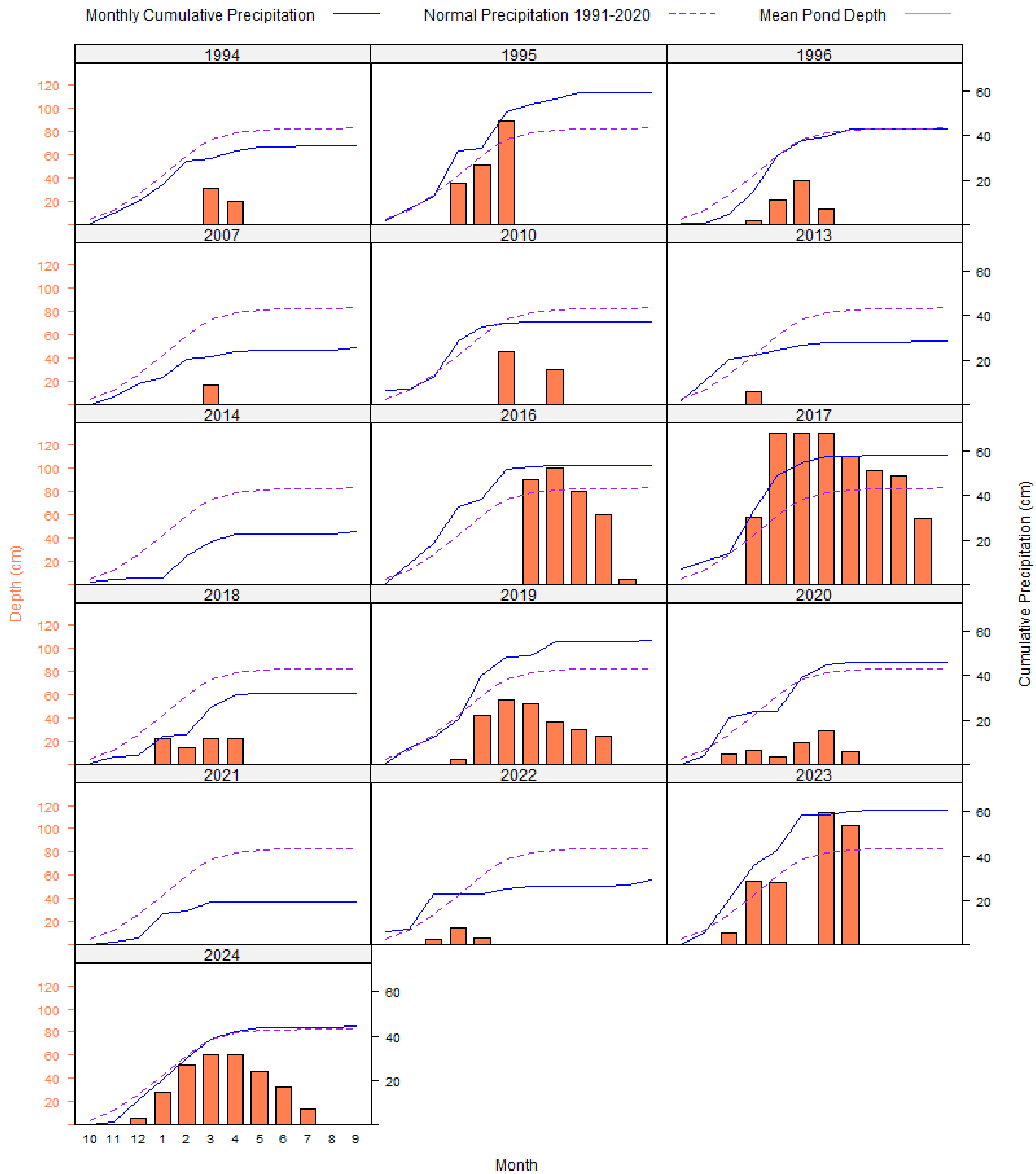


Figure 4-7. Cumulative monthly precipitation for years that hydrologic monitoring occurred at Pond 5 (Reference) compared to the 30-Year normal (mean 1991-2020) (NOAA, 2023-2024).

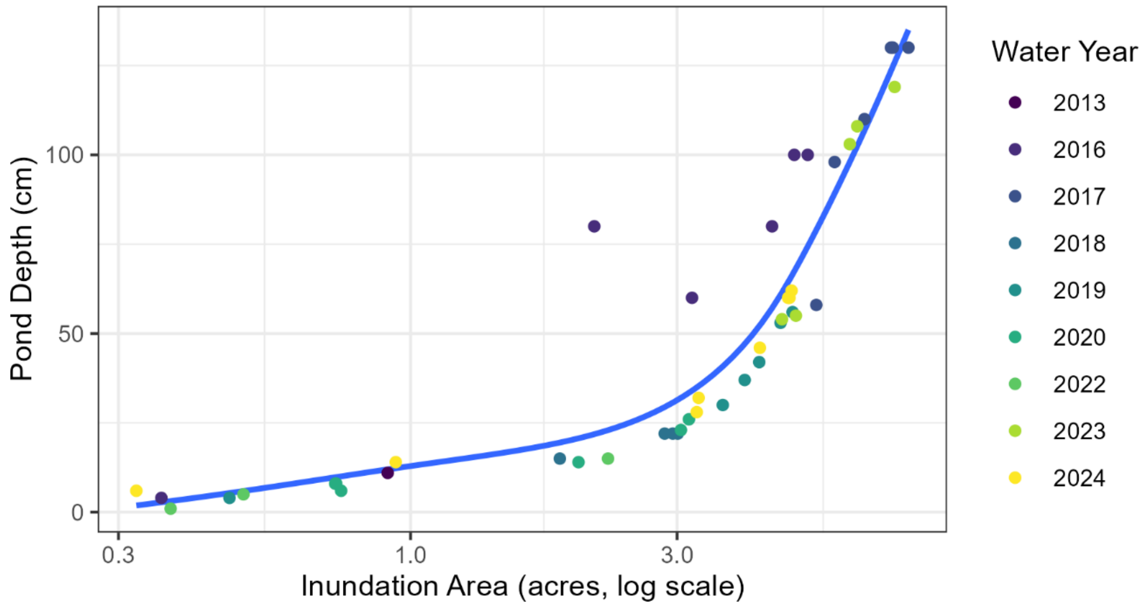


Figure 4-8. Pond 5 (Reference) Plot of Depth vs Inundation Area since 2015-2016 Water Year

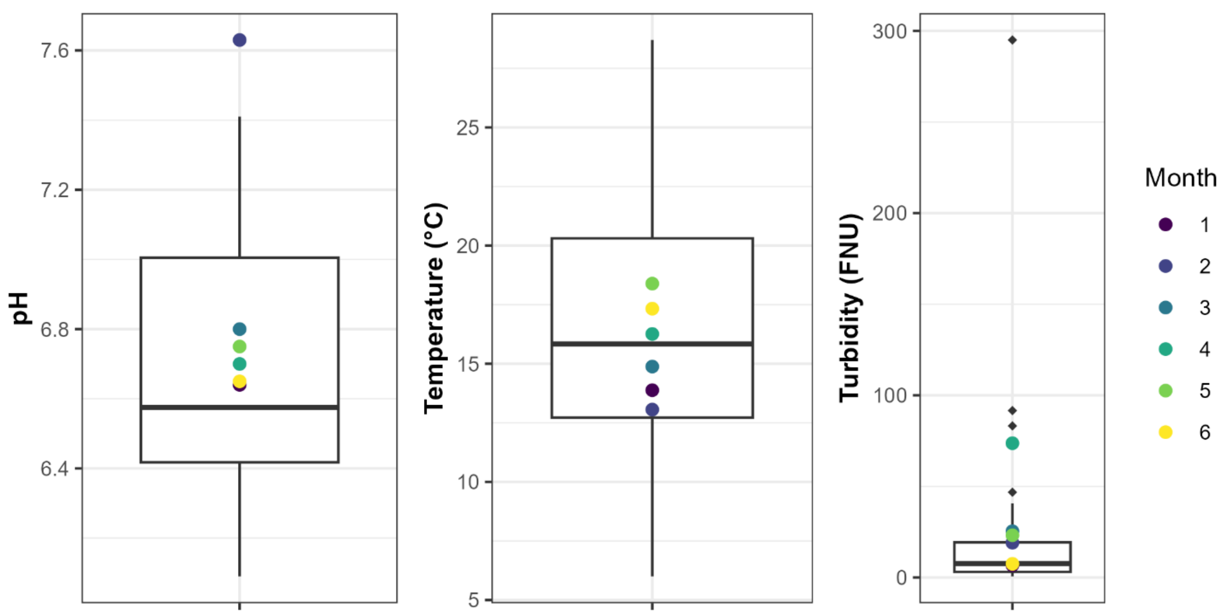


Figure 4-9. Pond 5 (Reference) historical and 2024 water quality measurements for pH, Temperature (C), and Turbidity (FNU). The line in the middle of the box represents the median, and the lower and upper ends of the box are the 25% and 75% quartiles of historical values respectively. The upper and lower whiskers represent largest and smallest values within 1.5 times above and below the size of the hinge, which is the 75% minus 25% quartiles, respectively. Black diamonds represent values outside of those statistics. Colored dots represent 2023-2024 water year values. All dissolved oxygen measurements were omitted due to improper probe deployment leading to 0.0 mg/L readings for dissolved oxygen.

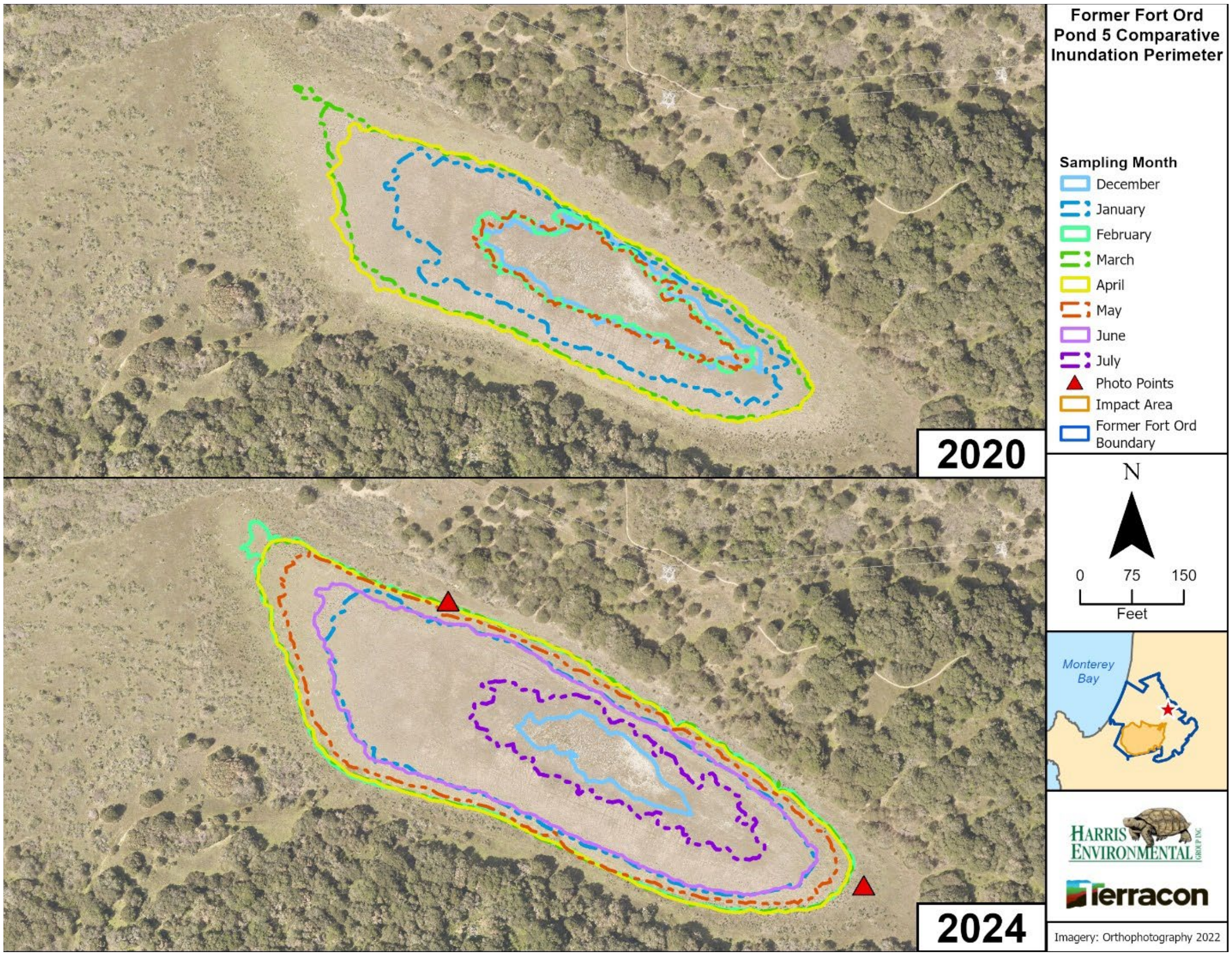


Figure 4-10. Pond 5 (Reference) inundation areas in 2020 and 2024 (both years had normal precipitation).

4.2.1.1 *Data Quality Objective 1*

Pond 5 met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 5 provided sufficient depth for CTS (60 cm through March) and fairy shrimp (46 cm through May).

4.2.1.2 *Data Quality Objective 2*

Pond 5 was inundated December through July with an inundation range of 0.94-4.81 acres and a mean of 3.29 acres. The vernal pool was dry by August 2nd, 2024.

4.2.1.3 *Performance Standard: Hydrologic Conditions and Inundation Area*

Pond 5 sustained suitable habitat for CTS and fairy shrimp in the 2023-2024 water year. Pond 5 is a reference vernal pool and was not required to meet the performance standards. Instead, the vernal pool was used as a control for comparison to the remediated vernal pools.

4.2.2 Vegetation Monitoring

Vegetation data were collected at Pond 5 in 2007 and 2016-2024 (Shaw, 2008; Burleson and DD&A, 2017; Burleson, 2018, 2019, and 2020; Terracon, 2021, 2022, 2023; Harris-Terracon, 2024). 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 subsequent 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 2016-2024, data were collected using methodologies described in the Methods section of this report. Data from 2016 and 2024 were compared stratum-to-stratum as well as visually in Figure 4-11.

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

Stratum	Percentage	
	2016	2024
1	26%	29.7%
2	32%	N/A
3	38%	23.7%
4	4%	N/A
6	N/A	40.6%
7	N/A	4.9%
10	N/A	1.1%

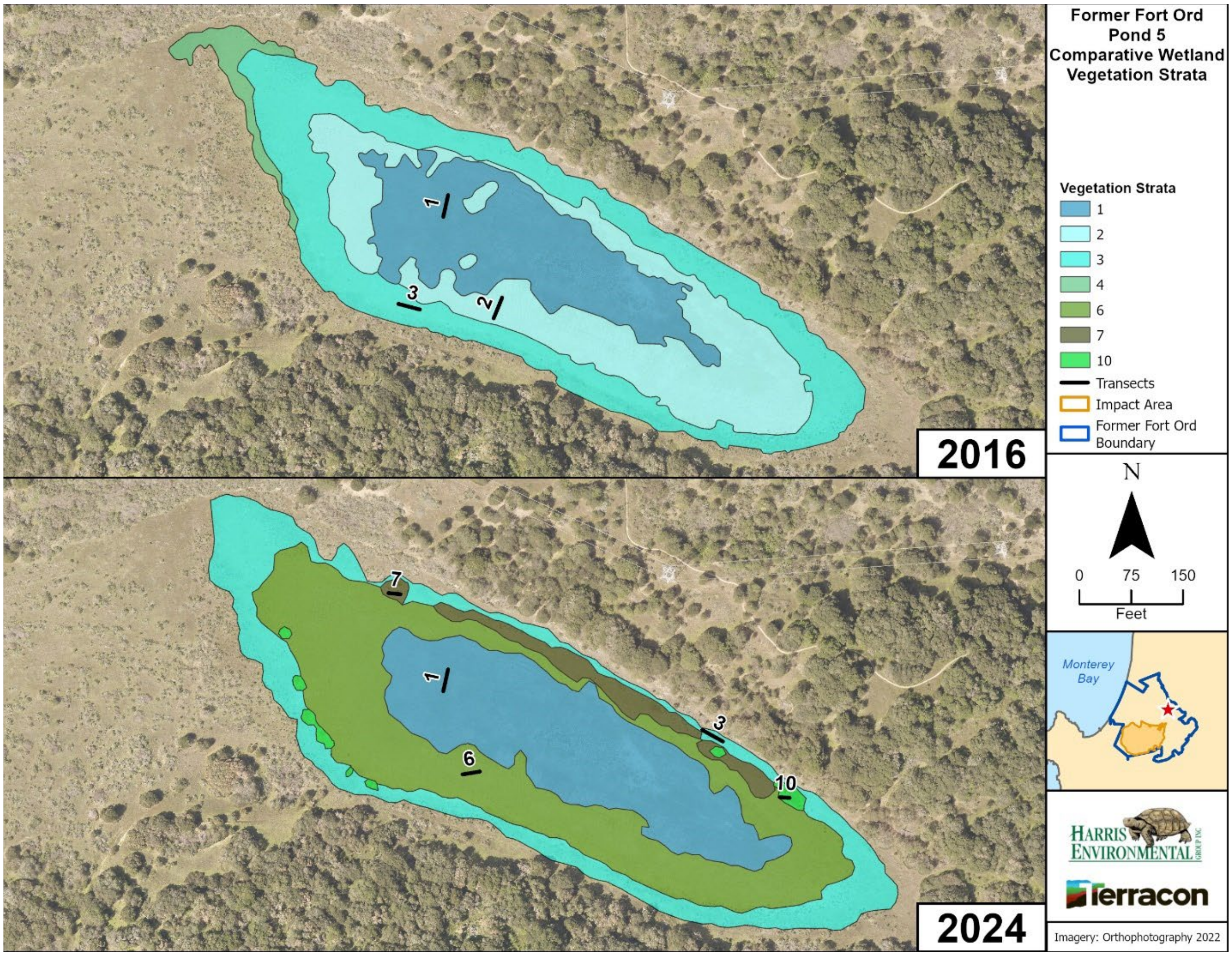


Figure 4-11. Pond 5 (Reference) vegetation strata and transects for 2016 and 2024.

The absolute percent vegetative cover observed in 2024 was greater than all previous recorded years and most like 2019 (see Table 4-3). Vegetative cover ranged from 36.3% in 2007 to 80.0% in 2024, whereas thatch/bare ground ranged from 20.0% in 2024 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%
2021	39.3%	60.7%
2022	41.2%	58.8%
2023	74.5%	25.5%
2024	80.0%	20.0%

Species richness on transects and for the overall basin has fluctuated between 2007 and 2024 with the highest richness observed on transects in 2018 and for the overall basin in 2019. Species richness on transects was 4, 7, 29, 41, 35, 23, 31, 29, 24, and 24 species in 2007, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, and 2024, respectively; whereas overall basin species richness was 26, 40, 73, 88, 94, 69, 70, 76, 68, and 60 species, respectively (see Table 4-4, and Appendix G Table G-1). The species richness is represented on the RACs as the length of the curve and number of species along the curve (see Figure 4-12 and Figure 4-13).

Species composition at Pond 5 varied between monitoring years. This variability of species composition is illustrated on the RACs as the species codes shift along the curve and losses and gains occur from year to year. Despite overall composition variability, the dominant species in the vernal pool were pale spikerush (*Eleocharis macrostachya*) and salt grass (*Distichlis spicata*) in the majority of monitoring years. Both species are in the top five in every monitoring year. Baltic rush (*Juncus balticus*), cut-leaf geranium (*Geranium dissectum*), smooth cat's-ear (*Hypochaeris glabra*), and bugle hedge nettle (*Stachys ajugoides*) were dominant species in 2021 and 2022. By 2023, Howell's quillwort (*Isöetes howellii*), grass poly (*Lythrum hyssopifolia*), salt grass, and Lemmon's canary grass (*Phalaris lemmonii*) were important species. In 2024, while pale spikerush still remained the dominant species, associated subdominants shifted to Baltic rush, western goldenrod (Euthamia occidentalis), salt grass, and brown-headed rush (*Juncus phaeocephalus*). A complete comparison of species composition observed during the surveys at Pond 5 in 2007 and 2016-2024 can be found in Appendix H. Figure 4-15 shows a subset of this comparison for species observed with a 2% absolute cover or greater.

The evenness from each year is represented by the slope of the RACs. The evenness is fairly similar from year to year with richness uniformly distributed along the entire curve with a slightly higher concentration or plateau of species toward the tail end. This plateau illustrates that there are a high number of species with low abundance. As explained in Verberk (2011), "Structurally complex systems, such as a fen [or vernal pool] system are species rich and have a more even community abundance pattern, possibly owing to a fine partitioning of available niches". When comparing year to year, a more even distribution of the top species occurs in 2017, 2018, and 2020-2022 at Pond 5 (see Figure 4-14, and Appendix I). Whereas 2016, 2019, 2023, and 2024 have steeper slopes and higher abundance of the dominant species at the top of the curves.

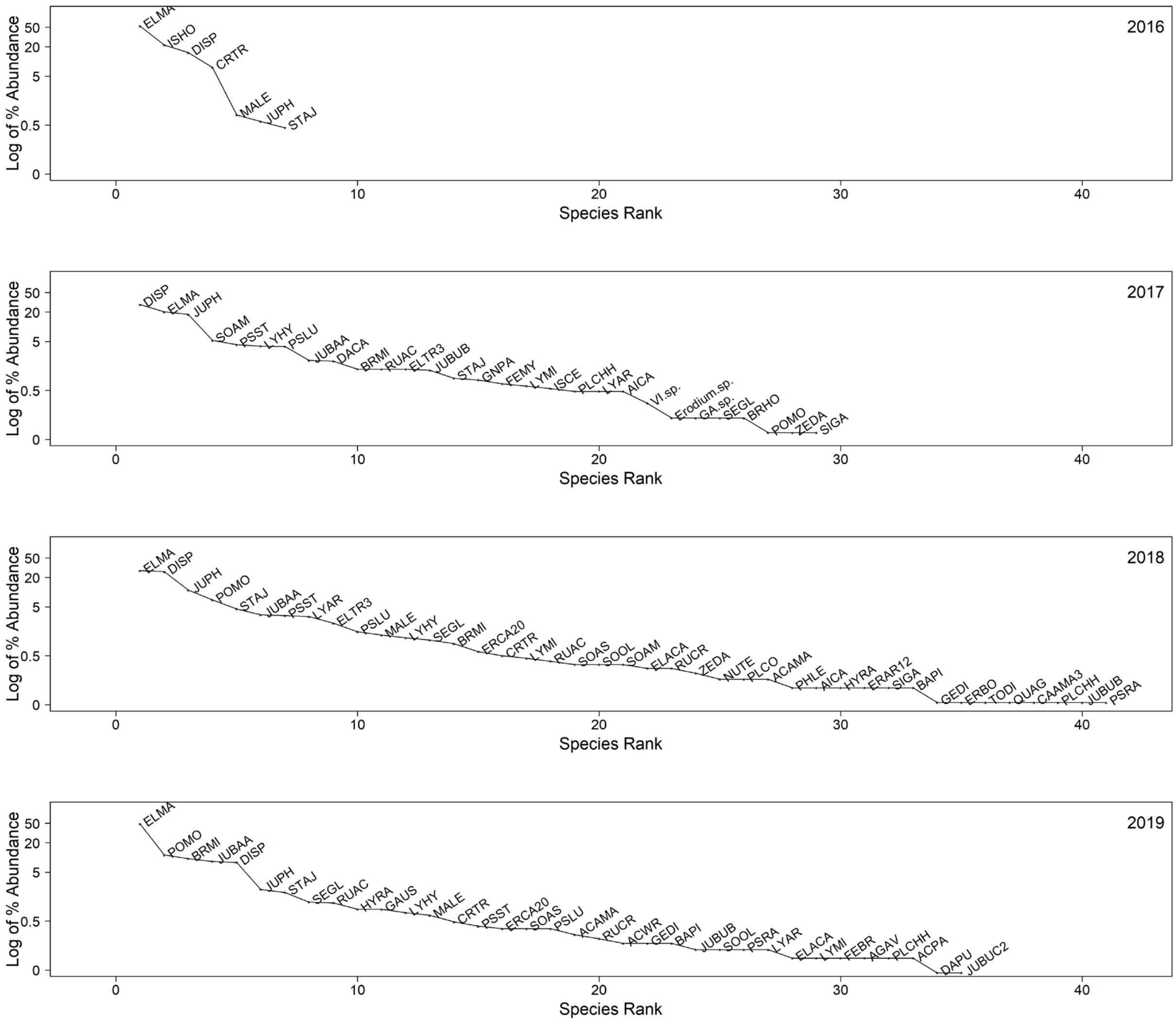


Figure 4-12. Rank abundance curves at Pond 5 (Reference) in 2016-2019. Note that the y-axis is in log-10 scale.

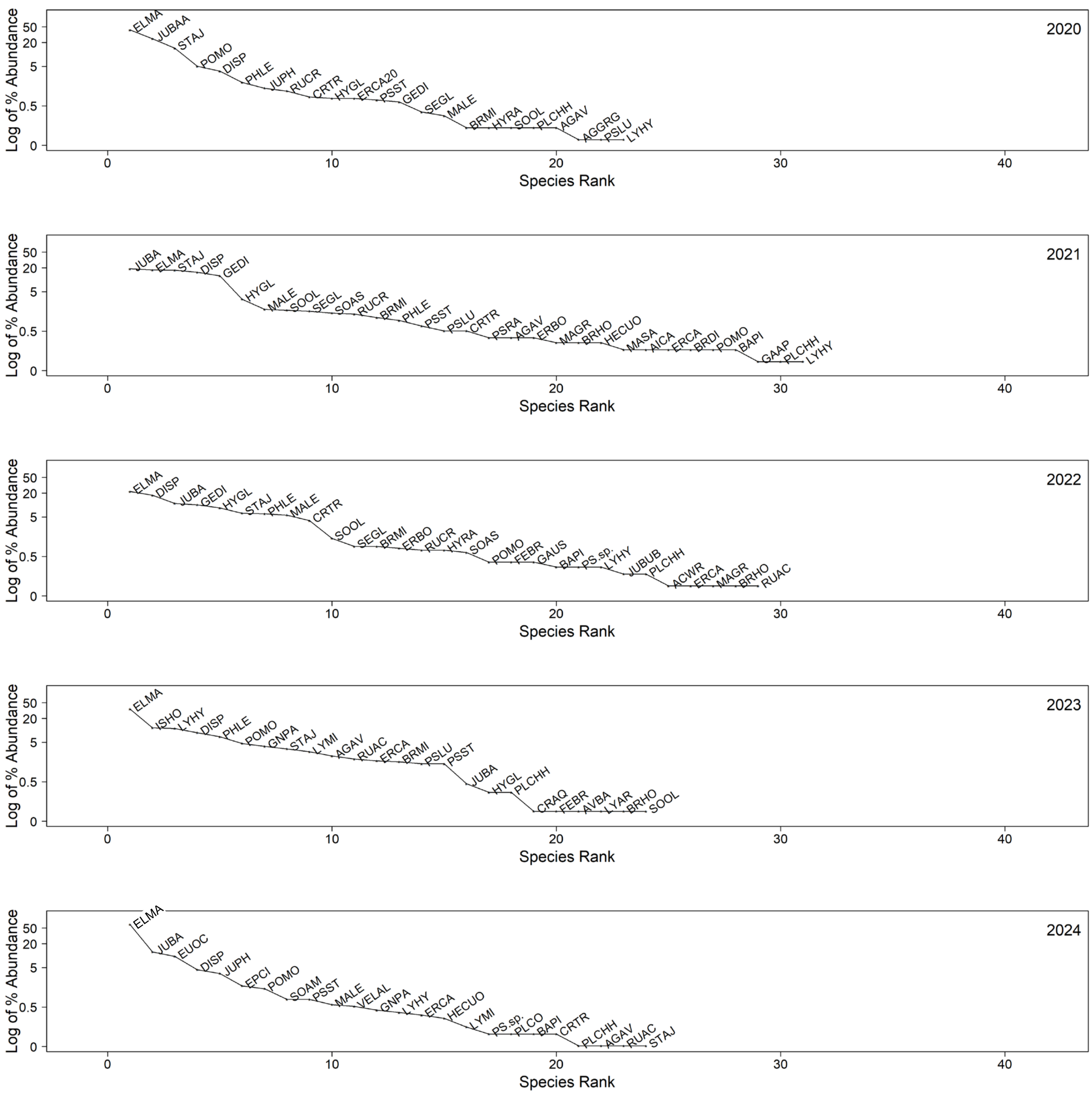


Figure 4-13. Rank abundance curves at Pond 5 (Reference) in 2020-2024. Note that the y-axis is in log-10 scale.

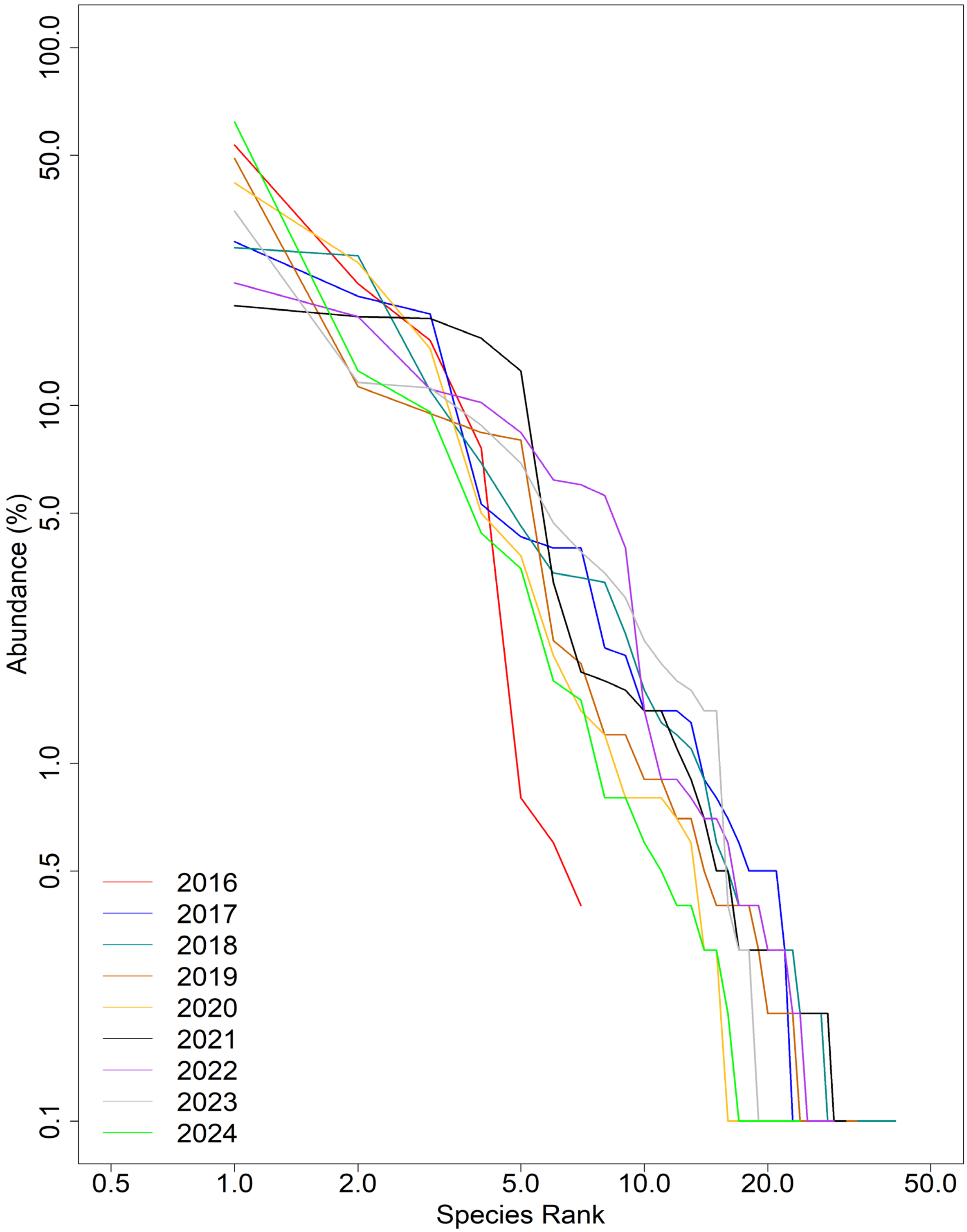


Figure 4-14. Rank abundance curves at Pond 5 (Reference) in 2016-2024. Note that both the x-axis and y-axis are in log-10 scale.

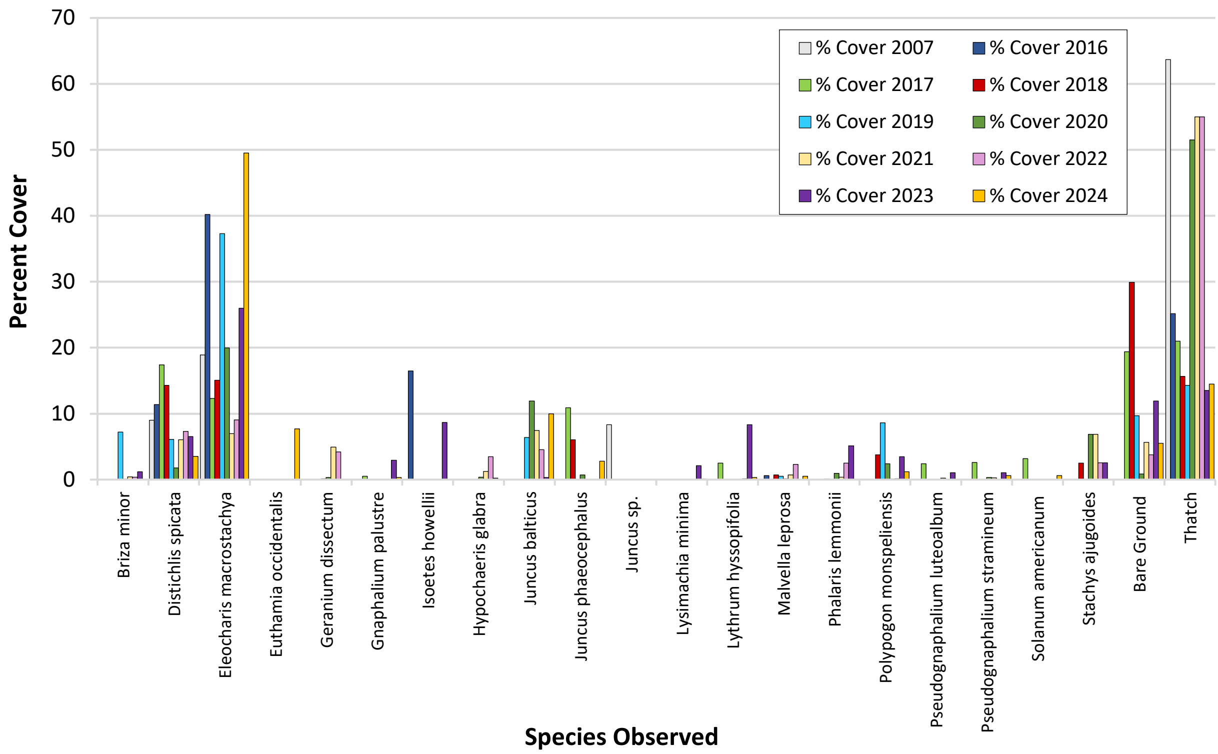


Figure 4-15. Percent cover of dominant species at Pond 5 (Reference).

Native and non-native species richness on Pond 5 transects varied through time, with the highest overall richness recorded in 2018. Richness in 2024 was the same as 2023 (see Table 4-4). The relative percent cover of native species varied through time, with the highest native cover observed in 2016 at 100.0% and the lowest value observed in 2019 at 73.6%. Values for native relative percent cover in 2024 were within 2.1% of the highest value in 2016 (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
2021	16	15	0
2022	14	14	1
2023	12	12	0
2024	18	5	1

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%
2021	75.0%	25.0%	0.0%
2022	73.9%	25.9%	0.3%
2023	76.3%	23.7%	0.0%
2024	97.9%	2.0%	0.1%

Wetland species richness on Pond 5 transects increased through time until 2018, then decreased in years 2019-2022. The non-wetland species richness was more variable, with the highest value recorded in 2018 (see Table 4-6). By 2023, wetland species richness increased by four species while non-wetland species decreased by four species; these results remained the same in 2024. The relative percent cover of wetland species in 2024 was the highest recorded since 2016, while non-wetland species cover decreased from previous years and was most like 2020 cover (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
2021	4	6	3	7	1	10
2022	4	6	2	7	1	9
2023	6	7	3	3	1	4
2024	4	9	3	4	0	4

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%
2021	35.3%	36.5%	3.1%	4.2%	1.7%	19.1%
2022	28.7%	39.4%	1.6%	8.0%	1.4%	20.9%
2023	61.4%	29.0%	3.1%	3.7%	0.1%	2.7%
2024	62.4%	33.9%	1.4%	1.7%	0.0%	0.5%

4.2.2.1 *Data Quality Objective 3*

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

4.2.2.2 *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.

4.2.3 Wildlife Monitoring

Wildlife data were collected at Pond 5 in 1994-1996, 2007, 2010, 2016-2020, 2023, and 2024 (Jones and Stokes, 1996; Shaw, 2008, 2011; Burleson and DD&A, 2017; Burleson, 2018, 2019, 2020; Terracon, 2021; Harris-Terracon, 2024). Fairy shrimp were present in 1995 and 2019. California tiger salamander larvae were observed in 1995, 2010, 2016, 2017, 2019, 2023, and 2024. Table 4-8 shows historical wildlife monitoring results.

Table 4-8. Pond 5 (Reference) Historical 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
2023	Common (1, 44)	Not detected
2024	Common (6, 33, 3)	Not detected

4.2.3.1 *Data Quality Objective 1*

Pond 5 provided suitable depth for CTS and fairy shrimp as discussed in Section 4.2.1.1.

4.2.3.2 *Data Quality Objective 4*

Fairy shrimp were not detected in 2024. California tiger salamanders were present in 2024; therefore, the water quality was adequate to support this species. Water quality parameters at Pond 5 were within historical ranges in 2024, with the exception of a single high pH measurement (see Figure 4-H). Additionally, all dissolved oxygen measurements of 0.0 mg/L were omitted due to improper probe deployment. The pH ranged from 7.63 in February to 6.65 in June with a mean of 6.86. Temperatures ranged from 13.06°C in February to 18.39°C in May with a mean of 15.63°C. The turbidity ranged from 6.7 FNU (Formazin Nephelometric Units) in January to 73.7 FNU in April with a mean of 25.9 FNU (see Table 3-4).

4.2.3.3 *Data Quality Objective 5*

California tiger salamanders were present in 2024. They were also detected in 1995, 2010, 2016, 2017, 2019, and 2023; but were not present 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 generally observed in above-normal water years, with the exception of 2010, which was a below-normal water year.

Fairy shrimp were not detected in 2024, which is generally consistent with baseline monitoring. Fairy shrimp were not detected in 1994, 1996, 2007, 2010, 2016-2018, 2020 and 2023; but were observed in 1995 and 2019 in low-moderate numbers. Fairy shrimp detections typically occur between January and March and all surveys at Pond 5 occurred in March or later. Similar to CTS, fairy shrimp detection appears to be associated with above-normal water years, although detection is more unpredictable given their dynamic lifecycle.

4.2.3.4 *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.

4.2.4 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
Hydrologic Conditions & Inundation Area	DQO 1	Suitable for Comparison
	DQO 2	Suitable for Comparison
Plant Cover & Species Diversity	DQO 3	Suitable for Comparison
Wildlife Usage	DQO 1	Suitable for Comparison
	DQO 4	Suitable for Comparison, Except for Dissolved Oxygen
	DQO 5	Suitable for Comparison

4.3 Pond 101 East (East) – Reference

Pond 101 East (East) was monitored for sixteen 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 hydrologic monitoring was conducted at Pond 101 East (East) (see Figure 4-16). Above-normal water years were 2015-2016, 2016-2017, and 2018-2019. All other monitoring, including 2023-2024, 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 Historical 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	2020-2021	2021-2022	2022-2023	2023-2024
Hydrology		●	●		●	●	●	●	●	●	●	●	●	●	●	●
Vegetation								●	●	●	●	●	●	●	●	●
Wildlife	●	●	●	●				●	●	●	●	●			●	●

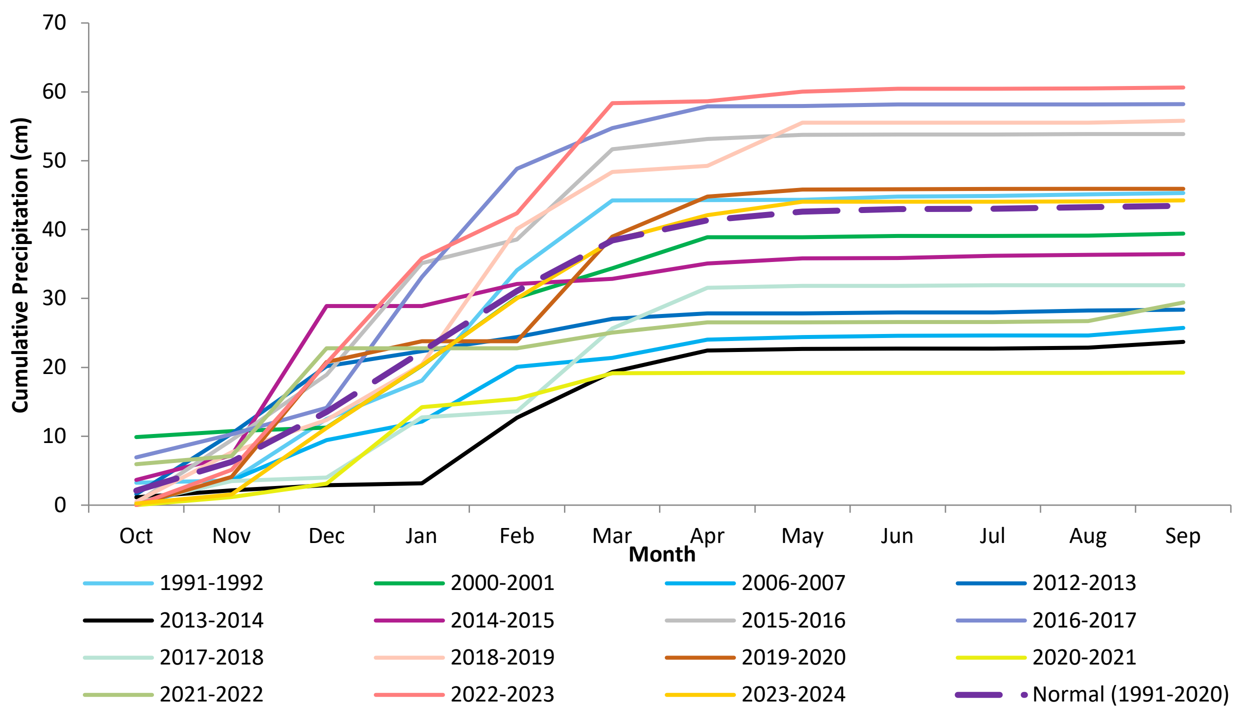


Figure 4-16. Cumulative monthly precipitation for years that hydrologic monitoring occurred at Pond 101 East (East) (Reference) compared to the 30-year normal (mean 1991-2020) (NOAA, 2023-2024).

4.3.1 Hydrologic Monitoring

Historically, Pond 101 East (East) varied in depth and inundation, remaining completely dry during the 2014-2015 consecutive drought year, while reaching a maximum depth of 160 cm and a maximum inundation of 9.38 acres during the 2016-2017 consecutive above-normal water year (see Figure 4-17).

Pond 101 East (East) reached a maximum depth of 53 cm and a maximum inundation area of 2.65 acres in the 2024 water year, becoming hydrologically connected to Pond 101 East (West). Historical and 2024 water year values of inundation extent, depth, and water quality measurements are presented in Figure 4-18, Figure 4-19, and Figure 4-20.

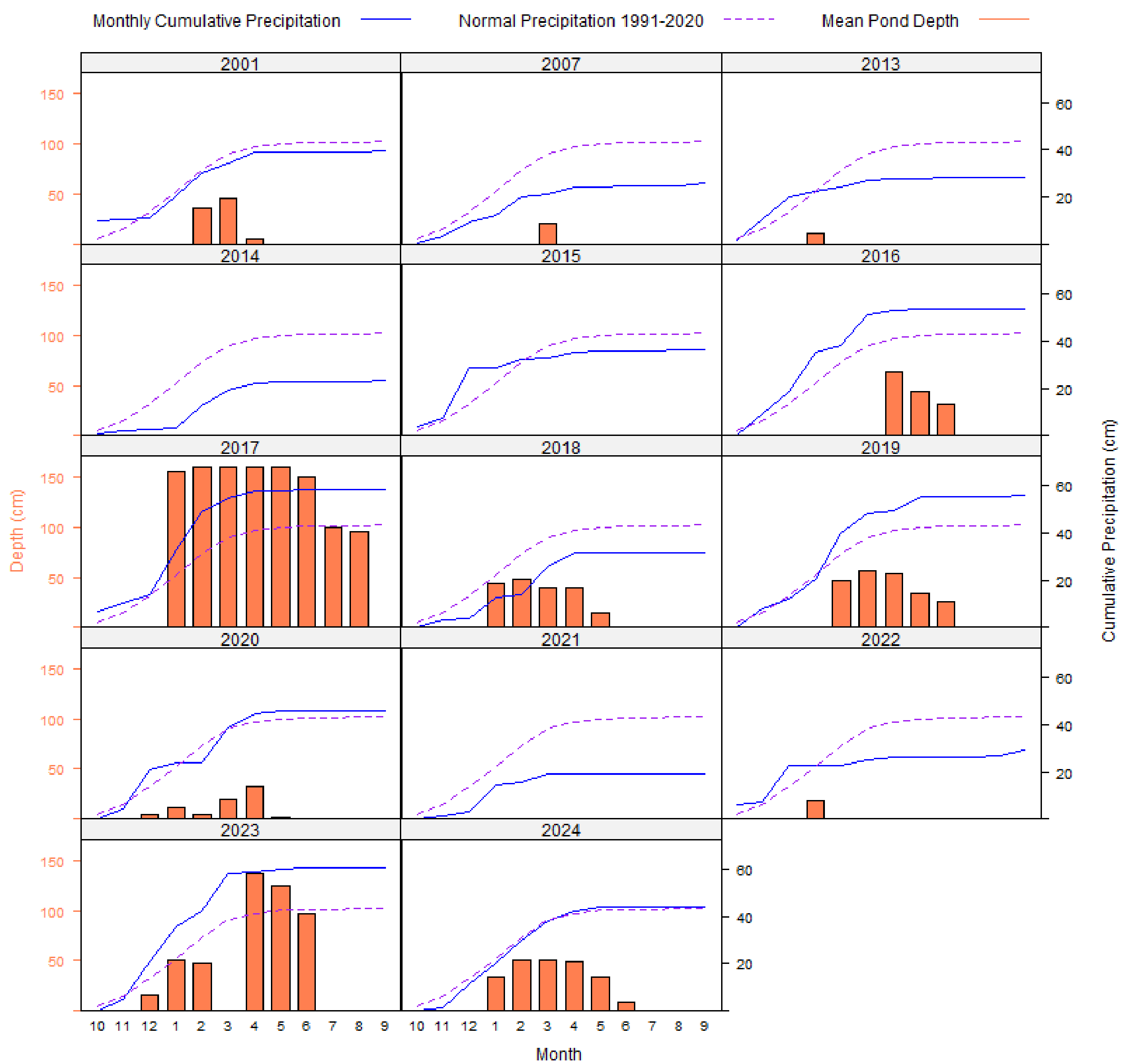


Figure 4-17. Cumulative monthly precipitation for years that hydrologic monitoring occurred at Pond 101 East (East) (Reference) Compared to the 30-year normal (mean 1991-2020) (NOAA, 2023-2024).

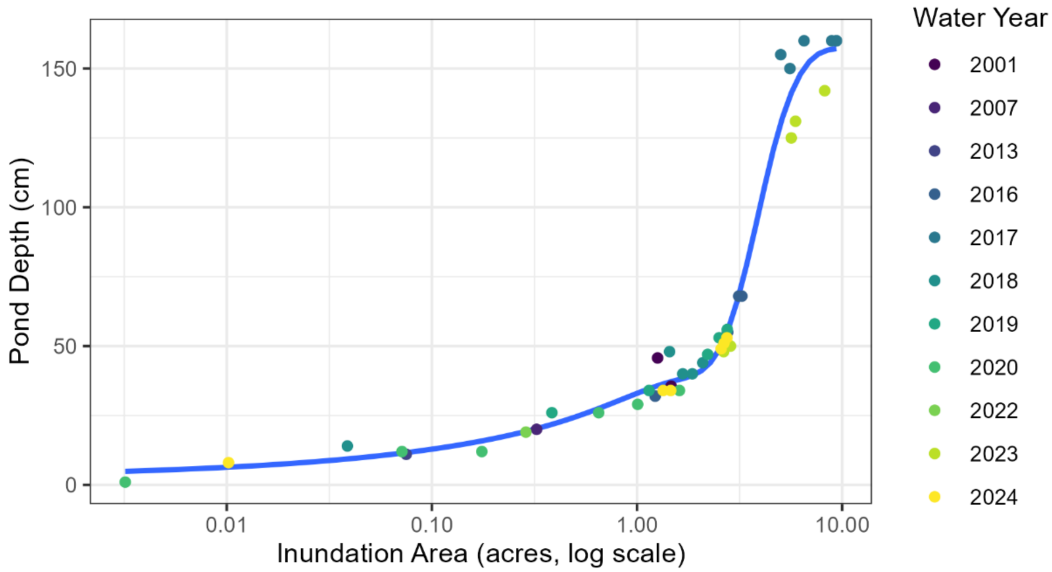


Figure 4-18. Pond 101 East (East) (Reference) plot of depth vs inundation area since 2001.

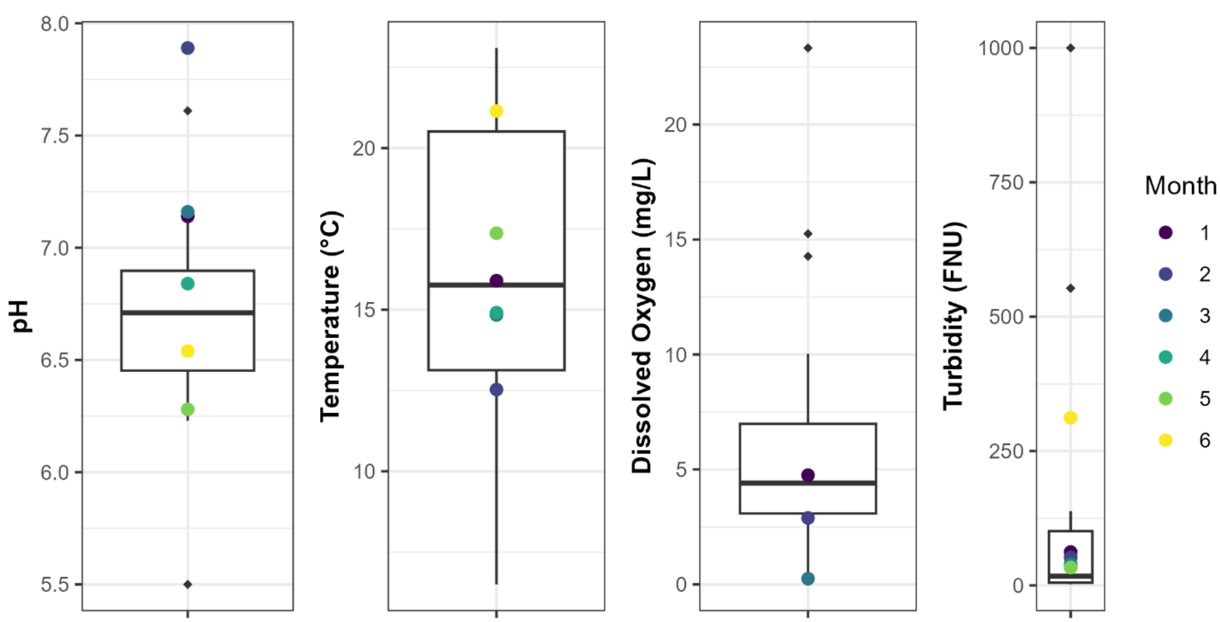


Figure 4-19. Pond 101 East (East) (Reference) historical and 2024 water quality measurements for pH, Temperature (C), Dissolved Oxygen (mg/L), and Turbidity (FNU). The line in the middle of the box represents the median, and the lower and upper ends of the box are the 25% and 75% quartiles of historical values respectively. The upper and lower whiskers represent largest and smallest values within 1.5 times above and below the size of the hinge, which is the 75% minus 25% quartiles, respectively. Black diamonds represent values outside of those statistics. Colored dots represent 2023-2024 (2024) water year values. One dissolved oxygen measurement of 0.0 mg/L was omitted, and the remaining values are likely artificially low due to improper probe deployment.

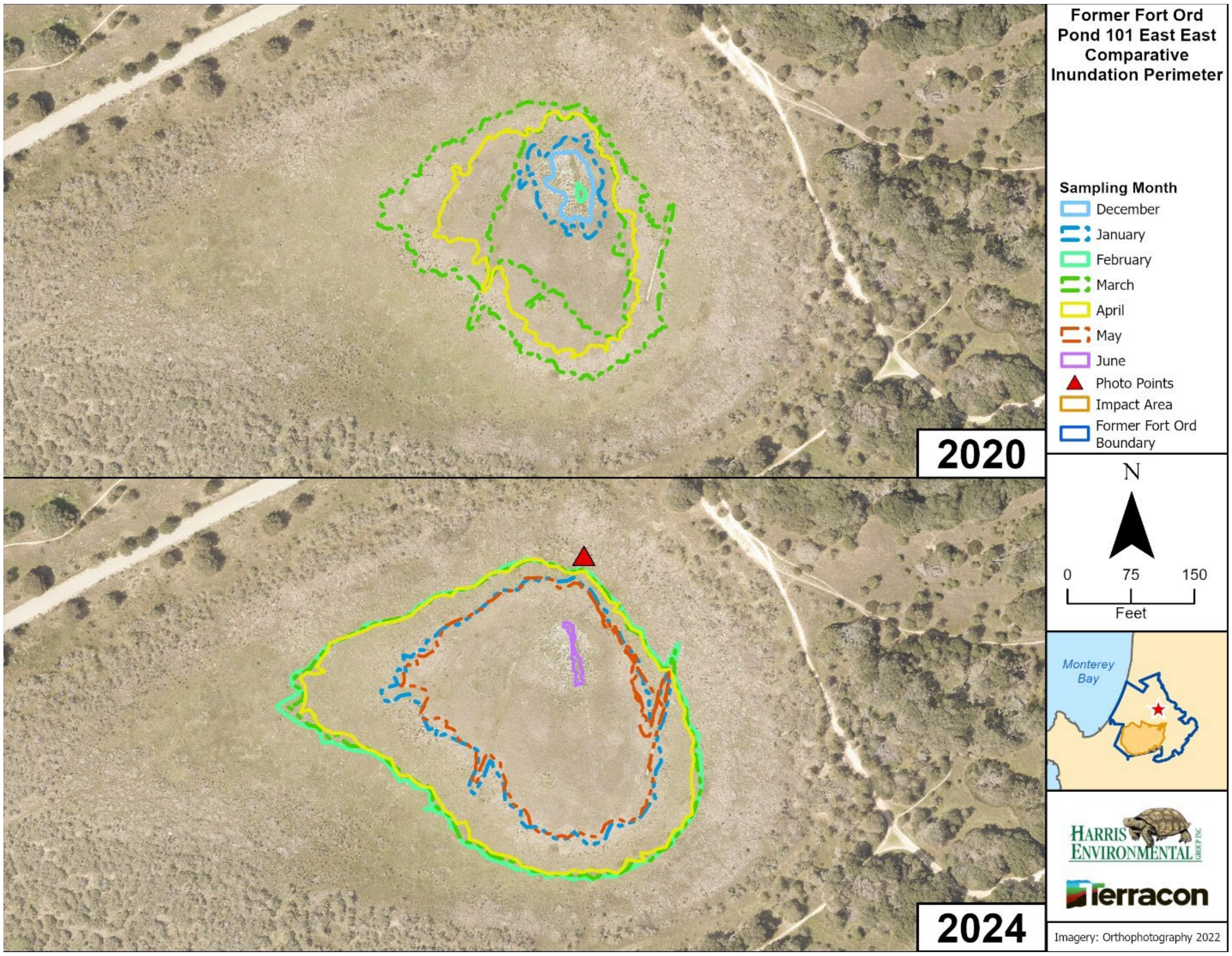


Figure 4-20. Pond 101 East (East) (Reference) inundation areas in 2020 and 2024 (both years had normal precipitation).

4.3.1.1 *Data Quality Objective 1*

Pond 101 East (East) met the required average depths of 25 cm from the first rain event through March for CTS and 10 cm for 18 consecutive days through May for fairy shrimp. Pond 101 East (East) provided sufficient depth for both CTS (51 cm through March) and fairy shrimp (34 cm through May).

4.3.1.2 *Data Quality Objective 2*

Pond 101 East (East) was inundated from January through June with an inundation range of 0.01-4.81 acres and a mean of 1.58 acres. The vernal pool was dry by July 2024.

4.3.1.3 *Performance Standard: Hydrologic Conditions and Inundation Area*

Pond 101 East (East) sustained suitable habitat for CTS and for fairy shrimp in 2024 water year. Pond 101 East (East) is a reference vernal pool and was not required to meet the performance standards. Instead, the vernal pool was used as a control for comparison to the remediated vernal pools.

4.3.2 Vegetation Monitoring

Vegetation data were collected at Pond 101 East (East) in 2016-2024 (Burleson and DD&A, 2017; Burleson, 2018, 2019, 2020; Terracon, 2021, 2022, 2023; Harris-Terracon, 2024). Data were collected using the methodology described in the Methods section of this report. Data from 2016 and 2024 were compared stratum-to-stratum in Table 4-11 as well as visually in Figure 4-21.

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

Stratum	Percentage	
	2016	2024
1	0.4%	N/A
2	48%	5%
3	44%	61%
4	8%	31%
9	N/A	3%

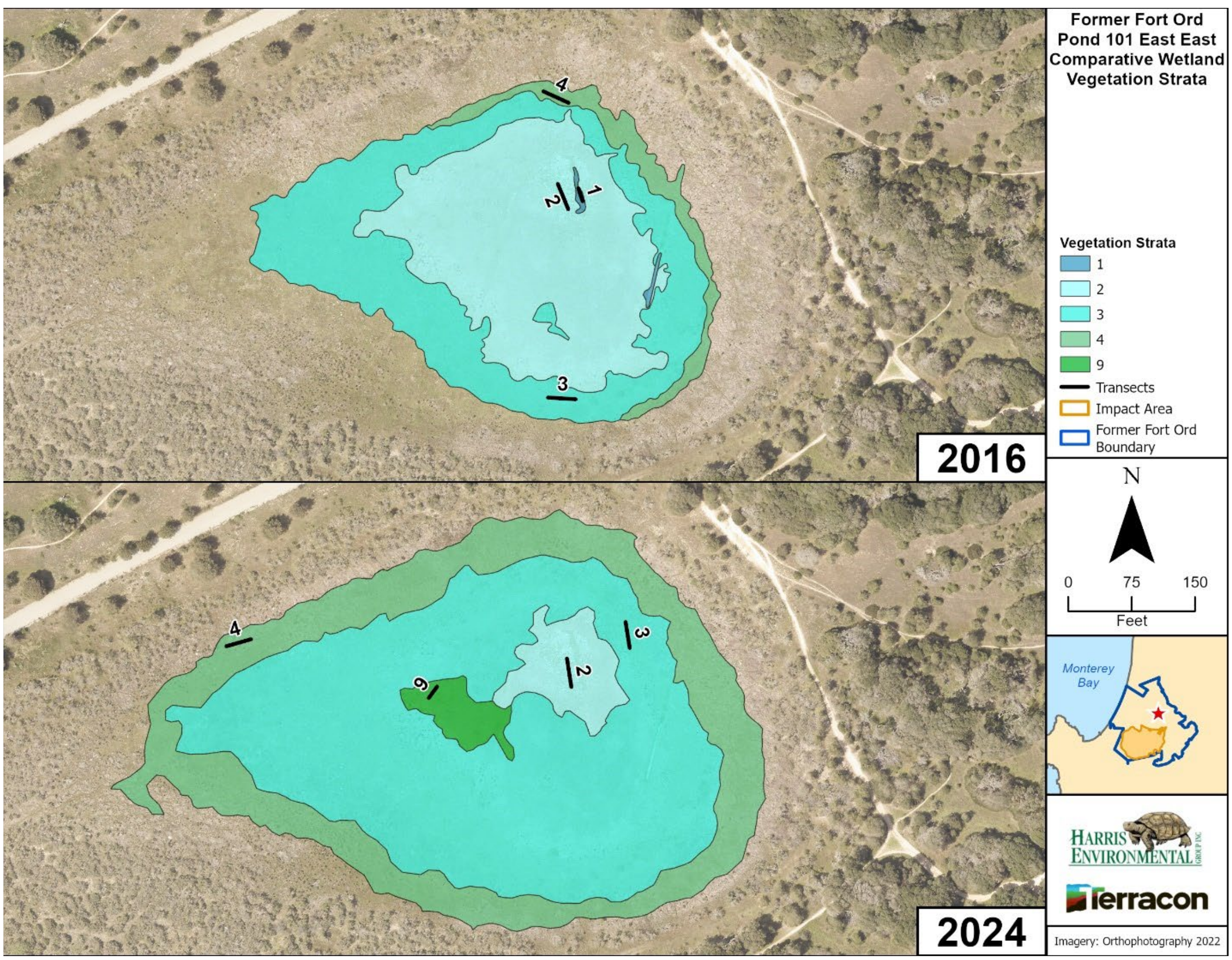


Figure 4-21. Pond 101 East (East) (Reference) vegetation strata and transects for 2016 and 2024.

The absolute percent vegetative cover observed at Pond 101 East (East) in 2024 was the third highest recorded since 2016 and was most similar to 2019 (see Table 4-12). Vegetative cover in previous years ranged from 38.5% in 2021 to 84.6% in 2017, whereas thatch/bare ground ranged from 16.6% in 2017 to 61.6% in 2021.

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%
2021	38.5%	61.6%
2022	55.5%	44.5%
2023	82.6%	17.4%
2024	76.8%	23.2%

Species richness on transects varied over time with the highest richness observed in 2020 and the lowest richness observed in 2023. For the overall basin, the species richness fluctuated between 2016 and 2024 with the highest richness observed in 2018. Species richness on transects was 18, 18, 32, 37, 43, 21, 38, 16, and 28 species in 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, and 2024, respectively; whereas overall basin species richness was 37, 59, 89, 84, 86, 68, 72, 56, and 65 species, respectively (see Table 4-13 and Appendix G Table G-2). The species richness is represented on the RACs as the length of the curve and number of species along the curve (see Figure 4-22 and Figure 4-23).

Species composition and dominant species at Pond 101 East (East) varied between monitoring years. This variability of species composition is illustrated on the RACs as the species codes shift along the curve and losses and gains occur from year to year. The dominant species shift is shown through the changes in the species at the top of the curve. Pale spikerush (*Eleocharis macrostachya*) and Baltic rush (*Juncus balticus*) were the dominant species in 2016 and 2020; Baltic rush, sheep sorrel (*Rumex acetosella*), and purple cudweed (*Gnaphalium palustre*) were the dominant species in 2017; pale spikerush, common toadrush (*Juncus bufonius* var. *bufonius*) and alkali mallow (*Malvella leprosa*) were dominant in 2018; pale spikerush, sheep sorrel, and Baltic rush were dominant in 2019; and alkali mallow, Baltic rush, and cut-leaved geranium (*Geranium dissectum*) were dominant in 2021. The dominant species in 2022 were similar to the previous year, except pale spikerush, rather than Baltic rush was most dominant. In 2023, the dominant species shifted to non-native Pacific bentgrass (*Agrostis avenacea*) with native purple cudweed as a subdominant. By 2024, the dominant species was again pale spikerush, with rabbitfoot grass (*Polypogon monspeliensis*), Baltic rush, Pacific bentgrass, and sheep sorrel as important subdominants. A complete comparison of species composition observed during the surveys at Pond 101 East (East) from 2016-2024 can be found in Appendix H. Figure 4-25 shows a subset of this comparison for species observed with a 2% cover or greater.

The evenness from each year is represented by the slope of the RACs. The evenness is fairly similar from year to year with richness uniformly distributed along the entire curve and a slightly higher concentration or plateau of species toward the tail end. This plateau illustrates that there are a high number of species with low abundance. As explained in Verberk (2011), "Structurally complex systems, such as a fen [or vernal pool] system are species rich and have a more even community abundance pattern, possibly owing to a fine partitioning of available niches". When comparing year to year, a more even distribution of the top species occurs in 2018, 2020, 2021, 2022, and 2023 at Pond 101 East (East) (see Figure 4-24, and Appendix I). Whereas 2016, 2017, 2019, and 2024 have a steeper slope and higher abundance of the dominant species at the top of the curve.

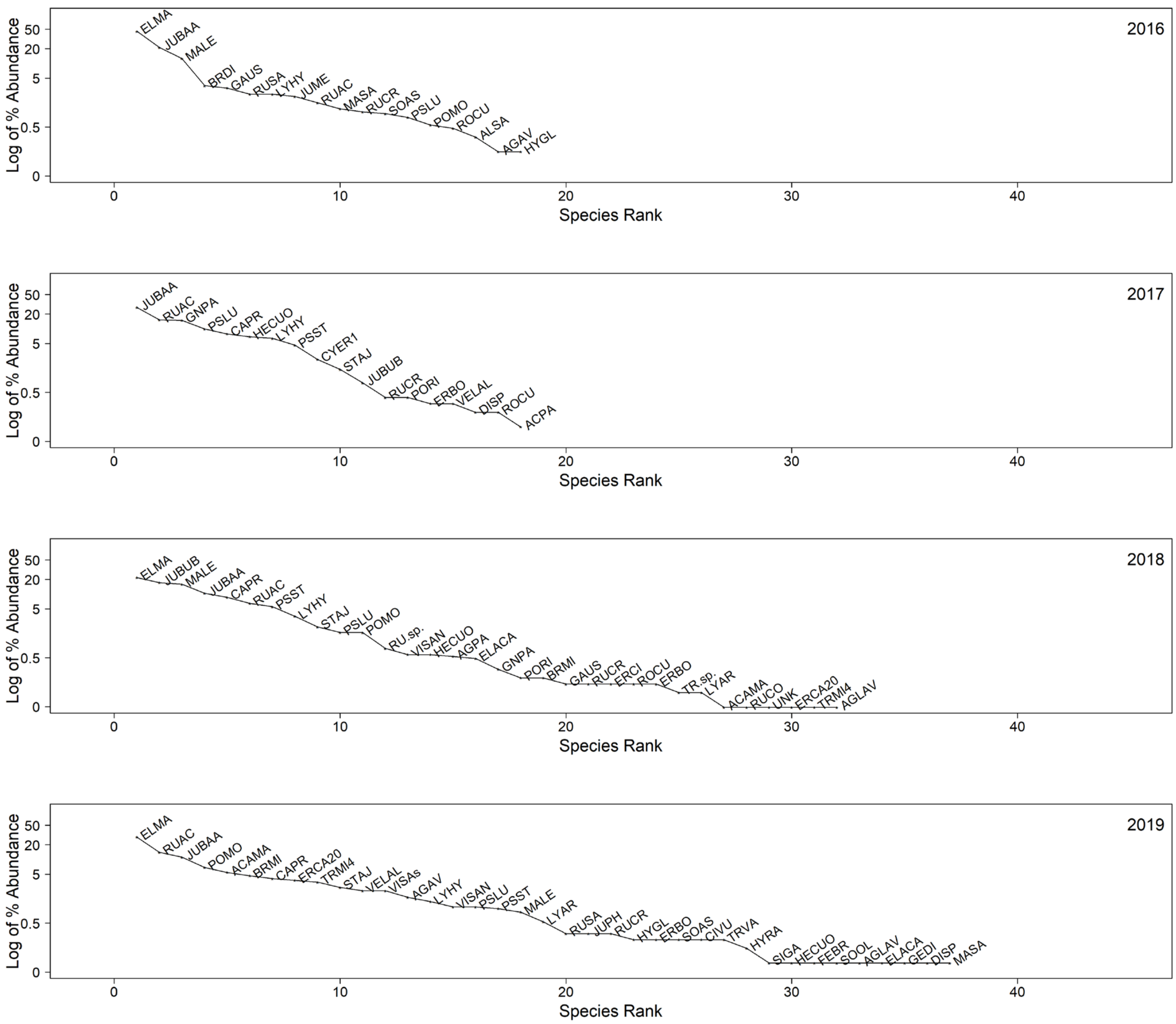


Figure 4-22. Rank abundance curves at Pond 101 East (East) (Reference) in 2016-2019. Note that the y-axis is in log-10 scale.

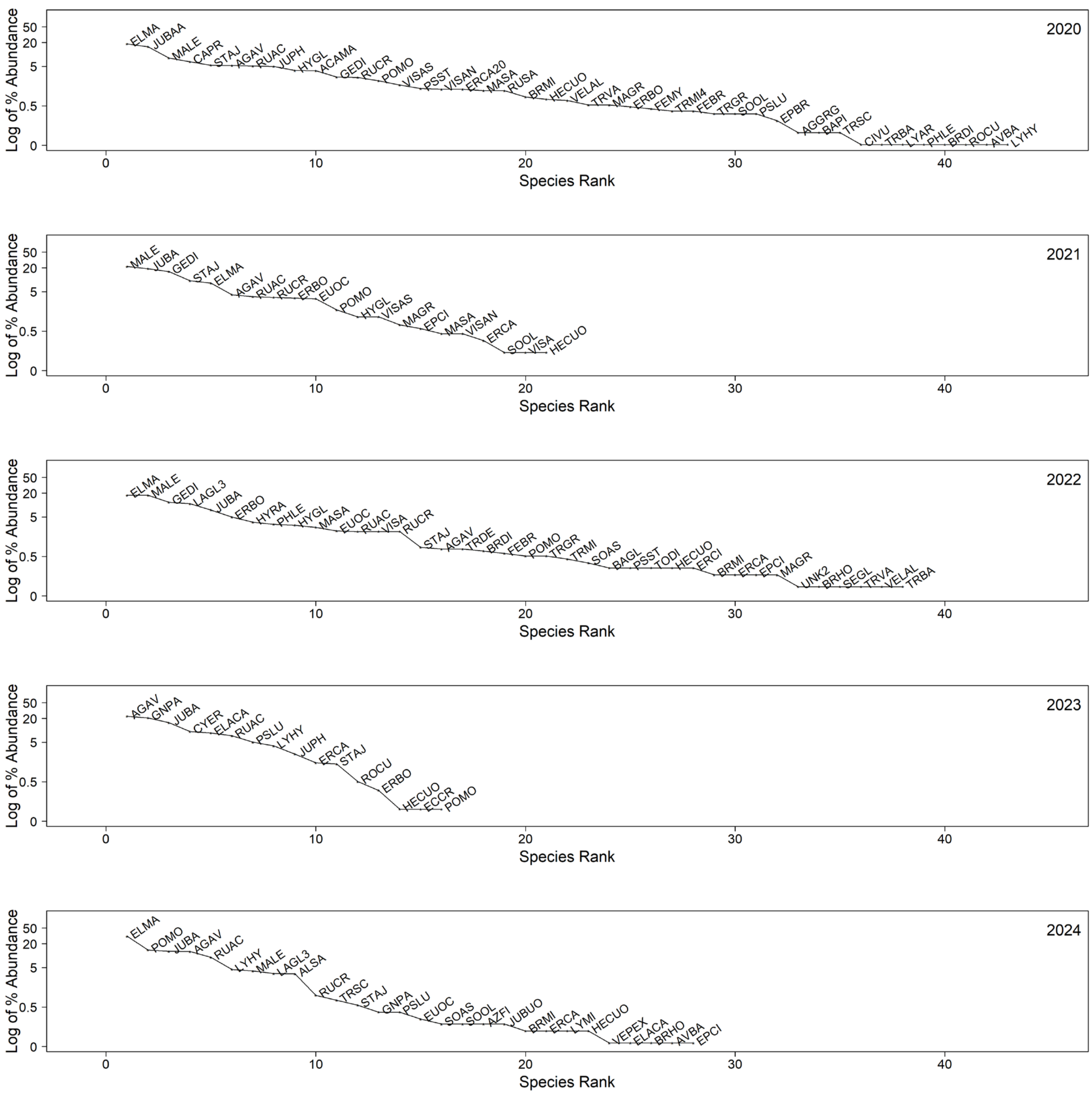


Figure 4-23. Rank abundance curves at Pond 101 East (East) (Reference) in 2020-2024. Note that the y-axis is in log-10 scale.

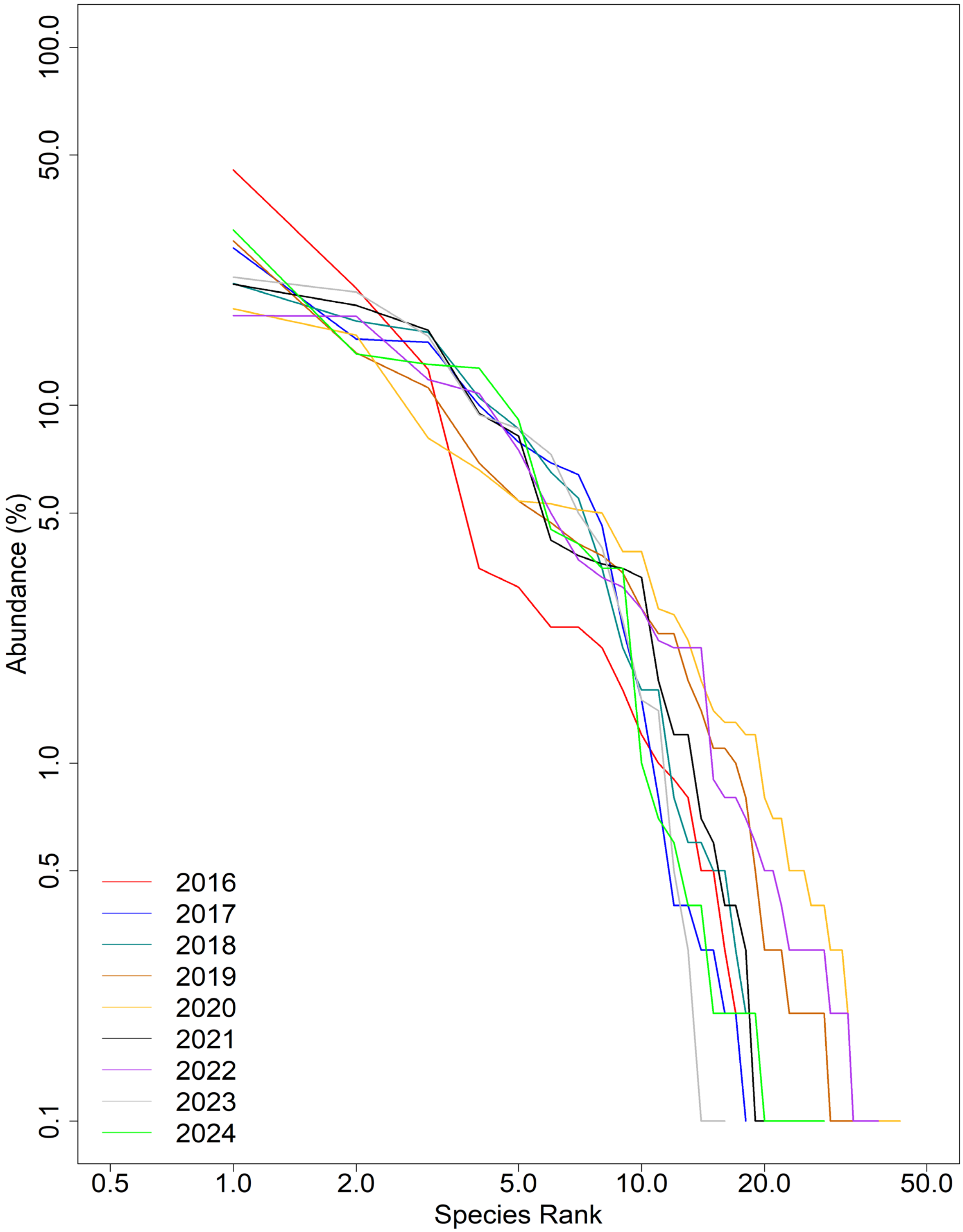


Figure 4-24. Rank abundance curves at Pond 101 East (East) (Reference) in 2016-2024. Note that the x-axis and the y-axis are in log-10 scale.

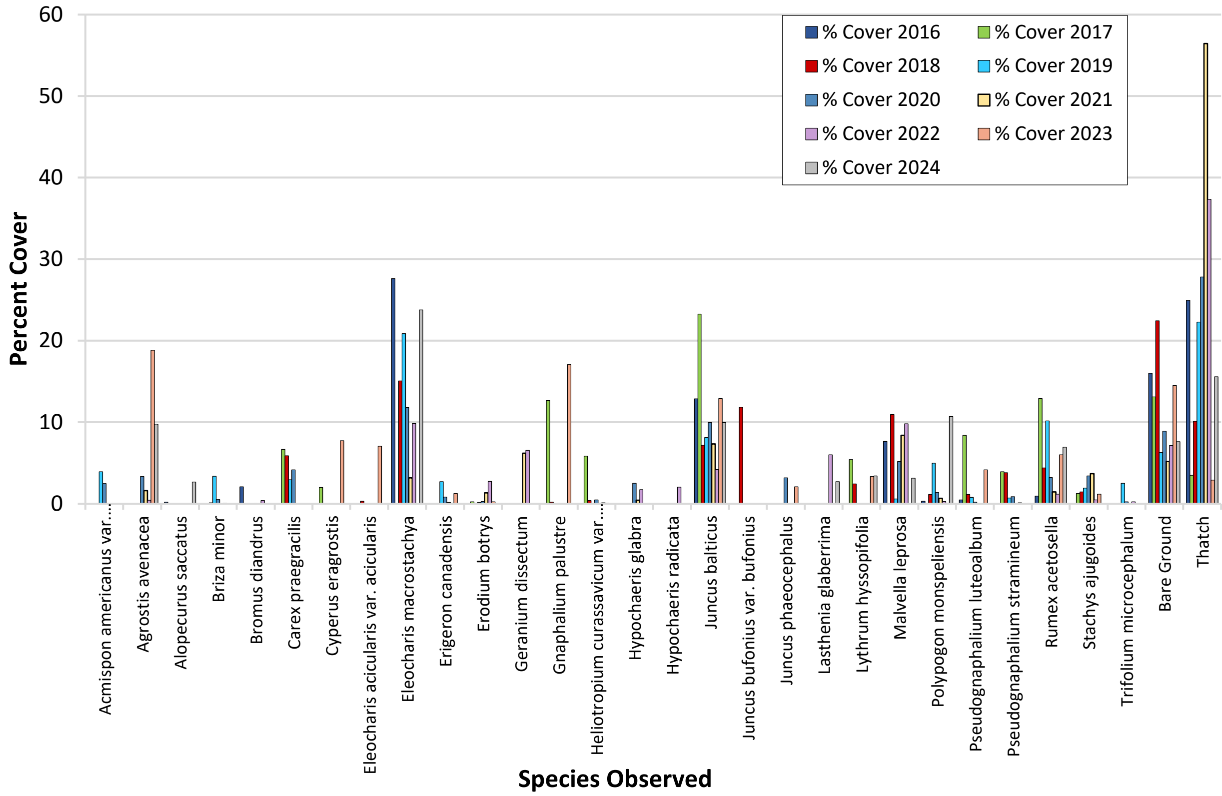


Figure 4-25. Percent cover of dominant species at Pond 101 East (East) (Reference).

Native species richness on Pond 101 East (East) varied through time, with the highest native richness recorded in 2020 and the lowest recorded in 2016 and 2023 (see Table 4-13). The relative percent cover of native species varied until 2020, after which native cover declined every year to the lowest value observed in 2024 at 57.8% (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
2021	10	11	0
2022	21	16	1
2023	9	7	0
2024	17	11	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%
2021	64.1%	35.9%	0.0%
2022	66.4%	33.5%	0.1%
2023	60.3%	39.7%	0.0%
2024	57.8%	42.2%	0.0%

Wetland species richness in Pond 101 East (East) transects increased between 2016 and 2020, decreased to the lowest recorded value in 2021, then fluctuated within the range of previous values between 2022 and 2024 (see Table 4-15). Likewise, non-wetland species richness on transects generally increased from 2016 to 2019, then generally decreased from 2020 to 2024. Wetland species cover fluctuated, rising initially from 2016 to 2017, decreasing overall from 2018 to 2021, then increasing again from 2022 to 2024 (see Table 4-16). Non-wetland species cover varied between surveys until peaking in 2021 and 2022 to the highest recorded value, then sharply dropping to the lowest recorded value in 2023. By 2024, non-wetland cover increased somewhat to the second lowest value.

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
2021	2	4	1	4	4	6
2022	4	6	8	7	1	12
2023	4	6	1	3	0	2
2024	7	10	2	5	1	3

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%
2021	17.7%	24.7%	3.6%	29.3%	1.9%	22.8%
2022	29.7%	13.8%	4.2%	29.1%	2.1%	21.1%
2023	14.5%	53.4%	0.1%	9.1%	0.0%	22.9%
2024	40.5%	31.8%	1.1%	13.5%	0.2%	12.9%

4.3.2.1 *Data Quality Objective 3*

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

4.3.2.2 *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.

4.3.3 Wildlife Monitoring

Wildlife data were collected at Pond 101 East (East) in 1992, 2001, 2007, 2010, 2016-2020, and 2023 (Jones and Stokes, 1992; Harding ESE, 2002; Shaw, 2008; Shaw, 2011; Burleson and DD&A, 2017; Burleson, 2018, 2019, 2020; Terracon, 2021; Harris-Terracon, 2024). California tiger salamander larvae were observed in 1992, 2010, 2016-2019, 2023, and 2024. Fairy shrimp were present in 2001, 2019, and 2020. Table 4-17 shows historical wildlife monitoring results.

Table 4-17. Pond 101 East (East) (Reference) Historical 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)
2023	Common (1, 29)	Not detected
2024	Common – Abundant (180, 82, 93)	Not detected

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

4.3.3.1 *Data Quality Objective 1*

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

4.3.3.2 *Data Quality Objective 4*

Fairy shrimp were not detected in 2024. California tiger salamanders were present at Pond 101 East (East) in 2024; therefore, the water quality was adequate to support this species. Compared to other vernal pools and previous Pond 101 East (East) data, water quality parameters at Pond 101 East (East) were within historical ranges in 2024, with the exception of a single high pH measurement. Additionally, one dissolved oxygen measurement of 0.0 mg/L was omitted, and the remaining values are likely artificially low due to improper probe deployment. The pH ranged from 7.89 in February to 6.28 in May with a mean of 6.97. Temperature ranged from 12.53°C in February to 21.15°C in June with a mean of 16.12°C. Dissolved oxygen ranged from 0.25 mg/L in March to 4.75 mg/L in January in with a mean of 5.72 mg/L. Turbidity ranged from 6.1 FNU in April to 79.8 FNU in June with a mean of 23.8 FNU.

4.3.3.3 *Data Quality Objective 5*

California tiger salamanders were detected in 2024, and were also present in 1992, 2010, 2016-2019, and 2023. 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 not detected in 2024, which was generally consistent with previous monitoring years. Fairy shrimp were also not detected in 1992, 2007, 2010, and 2016-2018, but were detected in 2001, 2019, and 2020. It was possible that survey event timing prevented detections since previous fairy shrimp detections were generally made in February and March, while surveys during years with no detections occurred later between March and May, with the exception of 2020. Detections during the March through May surveys in 2020 suggest that detection is likely associated with the timing of precipitation and resultant ponding, rather than specific months.

4.3.3.4 *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.

4.3.4 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
Hydrologic Conditions & Inundation Area	DQO 1	Suitable for Comparison
	DQO 2	Suitable for Comparison
Plant Cover & Species Diversity	DQO 3	Suitable for Comparison
Wildlife Usage	DQO 1	Suitable for Comparison
	DQO 4	Suitable for Comparison
	DQO 5	Suitable for Comparison

4.4 Pond 997 – Reference

Pond 997 was monitored for six 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 hydrologic monitoring was conducted at Pond 997 (see Figure 4-26). The 2016-2017 and 2018-2019 water years were above-normal; whereas the 2019-2020 water year was similar to the cumulative normal. All other monitoring, including 2023-2024, was conducted either in a below-normal water year, drought year, or consecutive drought year.

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

Survey	Water Year							
	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024
Hydrology	●	●	●	●	●	●	●	●
Vegetation	●	●	●	●	●	●	●	●
Wildlife	●		●					●

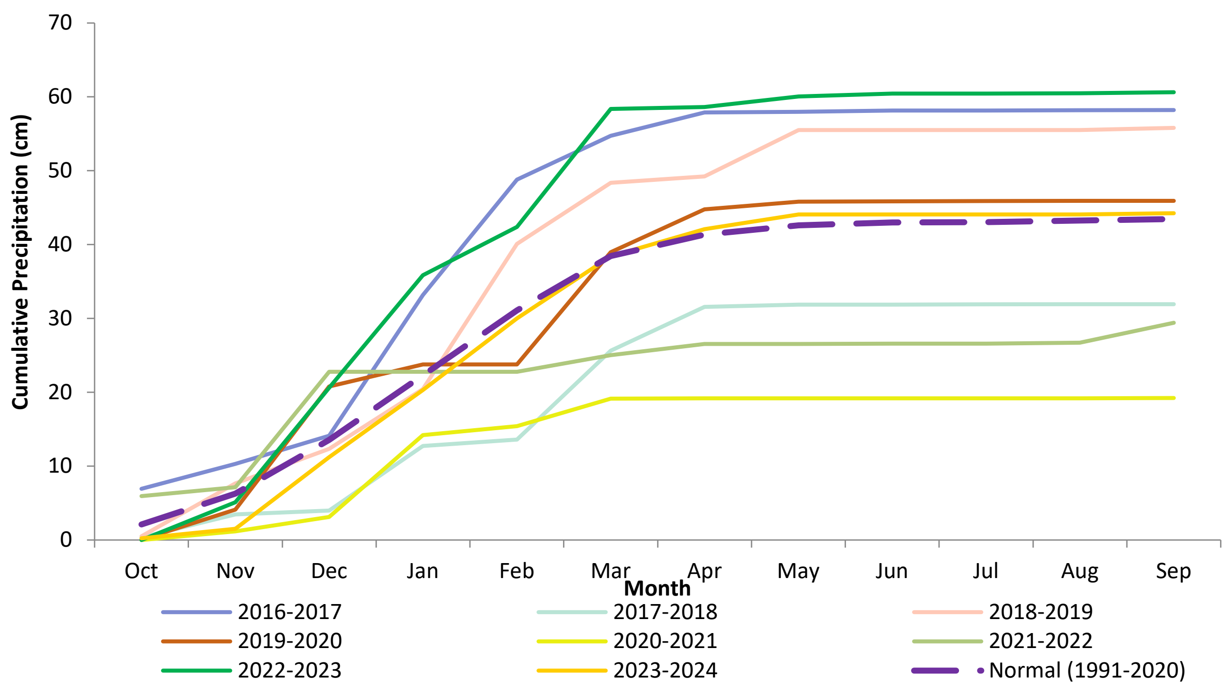


Figure 4-26. Cumulative monthly precipitation for years that hydrologic monitoring occurred at Pond 997 (Reference) compared to the 30-year normal (mean 1991-2020) (NOAA, 2023-2024).

4.4.1 Hydrologic Monitoring

Pond 997 is situated within a small and shallow basin in the northern part of the Fort Ord National Monument. Although approximately 13% of vegetation within the Pond 997 watershed was masticated in 2017, Pond 997 was monitored for eight years as a reference vernal pool (see Figure 4-27). Historical and 2023-2024 values of inundation extent, depth, and water quality measurements are presented in Figure 4-28, Figure 4-29, and Figure 4-30.

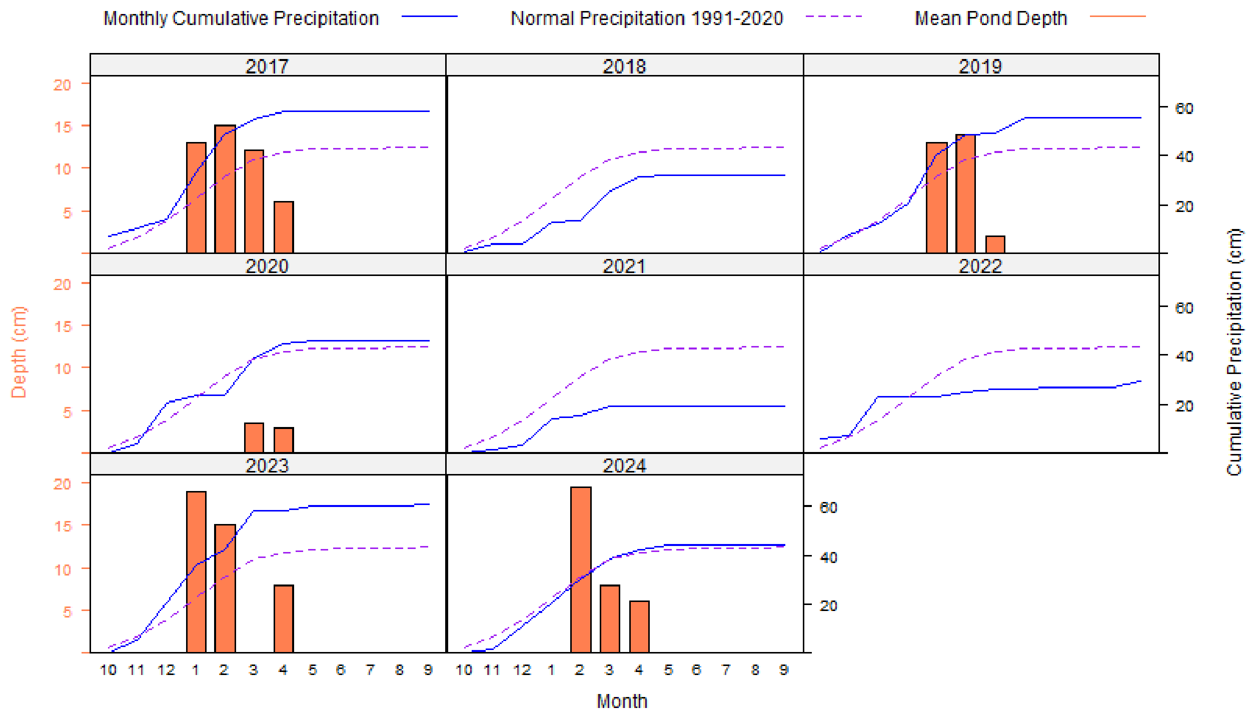


Figure 4-27. Cumulative monthly precipitation for years that hydrologic monitoring occurred at Pond 997 (Reference) compared to the 30-year normal (mean 1991-2020) (NOAA, 2023-2024).

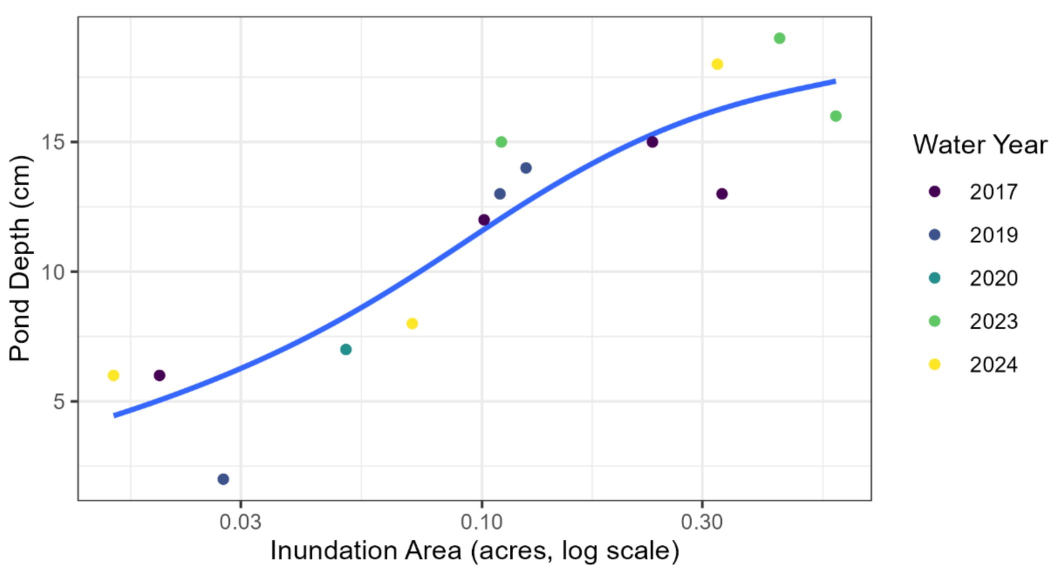


Figure 4-28. Pond 997 (Reference) plot of depth vs inundation area since the 2016-2017 (2017) water year.

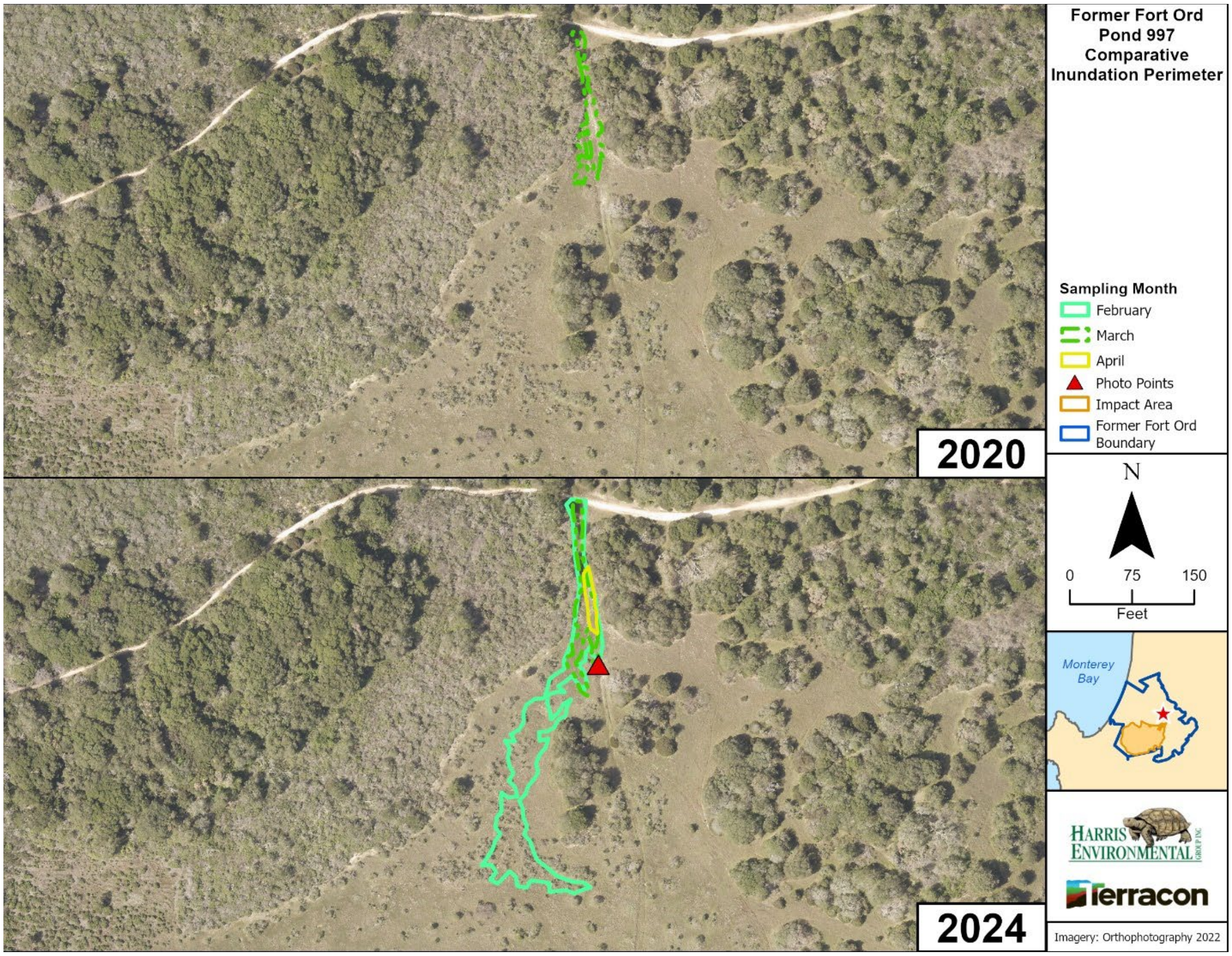


Figure 4-29. Pond 997 (Reference) inundation areas in 2020 and 2024 (both years had normal precipitation).

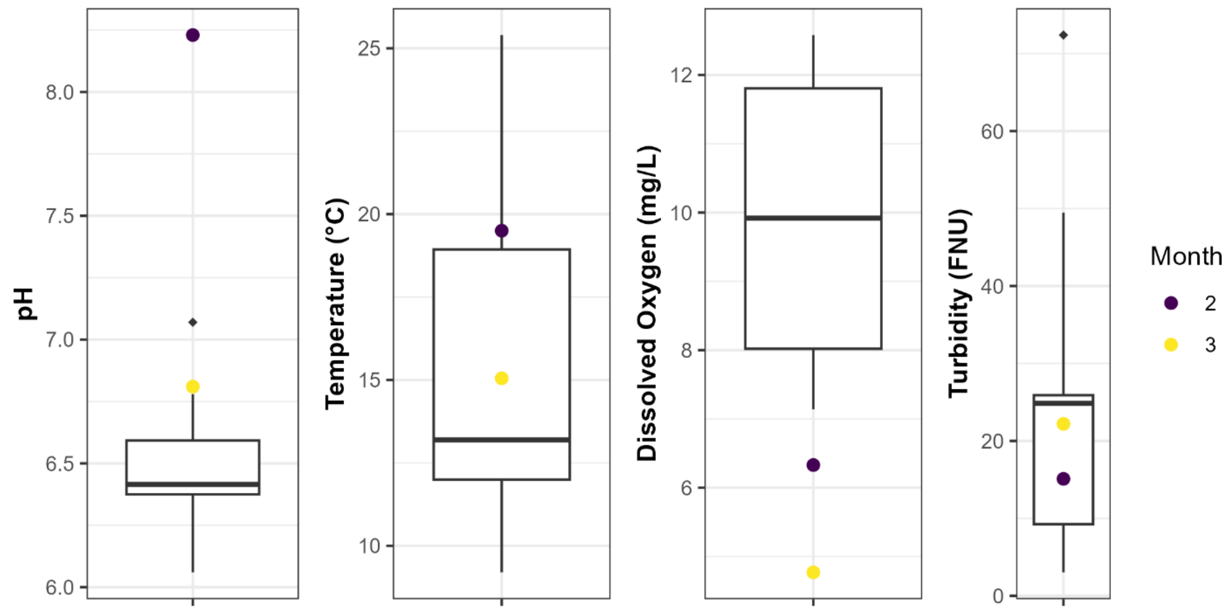


Figure 4-30. Pond 997 (Reference) historical and 2024 water quality measurements for pH, temperature (C), dissolved oxygen (mg/L), and turbidity (FNU). The line in the middle of the box represents the median, and the lower and upper ends of the box are the 25% and 75% quartiles of historical values respectively. The upper and lower whiskers represent largest and smallest values within 1.5 times above and below the size of the hinge, which is the 75% minus 25% quartiles, respectively. Black diamonds represent values outside of those statistics. Colored dots represent 2024 water year values. Dissolved oxygen values are likely artificially low due to improper probe deployment.

4.4.1.1 *Data Quality Objective 1*

Pond 997 did not meet the required average depths of 25 cm from the first rain event through March for CTS. It did however, meet the 10 cm for 18 consecutive days through May requirement for fairy shrimp. It sustained an average of 19.5 cm for the month of February.

4.4.1.2 *Data Quality Objective 2*

Pond 997 was inundated February through May with an inundation range of 0.02-0.32 acres and a mean of 0.14 acres. The vernal pool was dry by the May vegetation monitoring survey.

4.4.1.3 *Performance Standard: Hydrologic Conditions and Inundation Area*

In 2024 water year, Pond 997 did not sustain suitable habitat for CTS, but it did for fairy shrimp. Pond 997 is a reference vernal pool and was not required to meet the performance standard. Instead, the vernal pool was used as a control for comparison to the remediated vernal pools.

4.4.2 Vegetation Monitoring

Vegetation data were collected at Pond 997 from 2017-2024 (Burleson, 2018, 2019, 2020; Terracon, 2021, 2022, 2023; Harris-Terracon, 2024). Data were collected using the methodology described in the Methods section of this report. Data from 2017 and 2024 were compared stratum-to-stratum as well as visually in Figure 4-31. 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 2024 to compare to past years (see Figure 4-36 in Section 4.4.2.1).

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

Stratum	Percentage	
	2017	2024
1	3%	7.3%
2 (CCG)	2%	3.1%
3	89%	11.3%
4	2%	N/A
5	N/A	76.4%
Upland	4%	1.9%

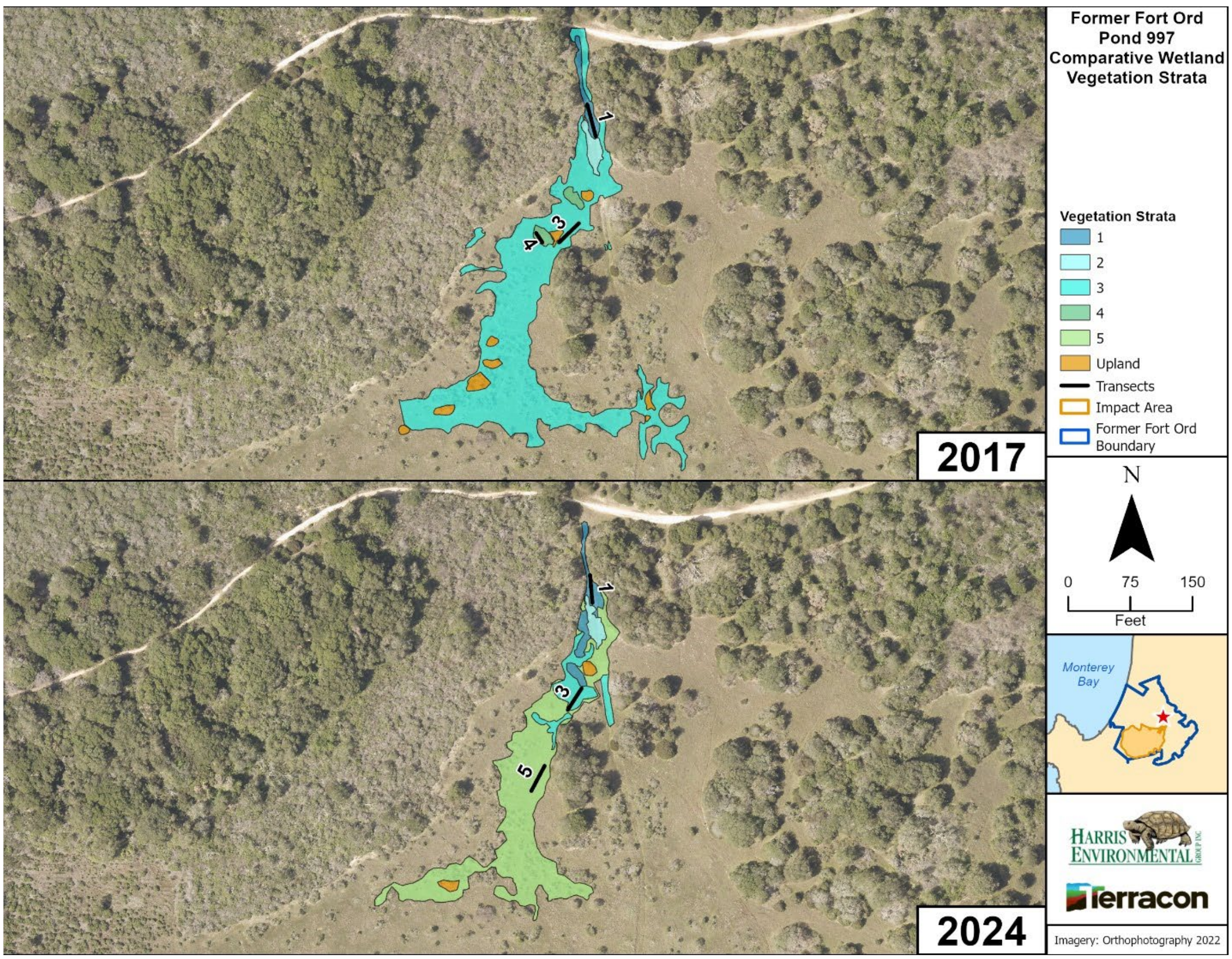


Figure 4-31. Pond 997 (Reference) vegetation strata and transects for 2017 and 2024.

The absolute percent vegetative cover at Pond 997 varied through the monitoring years (see Table 4-21). Vegetative cover ranged from 44.7% in 2018 to 83.5% in 2023, whereas thatch/bare ground ranged from 16.7% in 2023 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%
2021	45.1%	55.0%
2022	46.9%	53.1%
2023	83.5%	16.7%
2024	66.7%	33.3%

Species richness on transects varied over time, ranging from 27 in 2017 and 2021 to 48 in 2019. Species richness in the overall basin also varied over time. In 2024, the value increased from the previous year and was most like 2017. Species richness on transects was 27, 45, 48, 42, 27, 35, 28, and 37 species in 2017, 2018, 2019, 2020, 2021, 2022, 2023, and 2024, respectively; whereas overall basin species richness was 65, 87, 82, 82, 59, 76, 49, and 66 species, respectively (see Table 4-22 and Appendix G Table G-3). The species richness is represented on the RACs as the length of the curve and number of species along the curve (see Figure 4-32 and Figure 4-33).

Species composition at Pond 997 varied between monitoring years. This variability of species composition is illustrated on the RACs as the species codes shift along the curve and losses and gains occur from year to year. Despite overall composition variability, the dominant species in the vernal pool were fairly consistent. Coyote thistle (*Eryngium montereyense*) and brown-headed rush (*Juncus phaeocephalus*) were the dominant species from 2018-2020, while coyote thistle and California oatgrass (*Danthonia californica*), were dominant in 2017 and 2021. Rattlesnake grass (*Briza maxima*) was an additional dominant species in 2021. Long-beaked filaree (*Erodium botrys*) and smooth cat's-ear (*Hypochaeris glabra*) became more dominant than coyote thistle in 2022. In 2023, dominant species included more wetland species than in the previous two years with grass poly (*Lythrum hyssopifolia*), and Howell's quillwort (*Isöetes howellii*) becoming subdominant to rattlesnake grass. The trend towards more wetland species continued in 2024, as brown-headed rush became the most dominant, followed closely by California oatgrass, long-beaked filaree, Hickman's popcorn flower (*Plagiobothrys chorisianus* var. *hickmanii*), and rabbitfoot grass (*Polypogon monspeliensis*). A complete comparison of species composition observed during the surveys at Pond 997 in 2017-2024 can be found in Appendix H. Figure 4-35 shows a subset of the observed species with 2% cover or greater.

The evenness from each year is represented by the slope of the RACs. The evenness is fairly similar from year to year with richness distributed along the entire curve. As explained in Verberk (2011), "Structurally complex systems, such as a fen [or vernal pool] system are species rich and have a more even community abundance pattern, possibly owing to a fine partitioning of available niches". When comparing year to year, a more even distribution of the top species occurs in 2017, 2018-2020, 2022, 2023, and 2024 at Pond 997 (see Figure 4-34, and Appendix I). A steeper distribution of the dominant species however, as shown by a steeper slope, occurs in 2021.

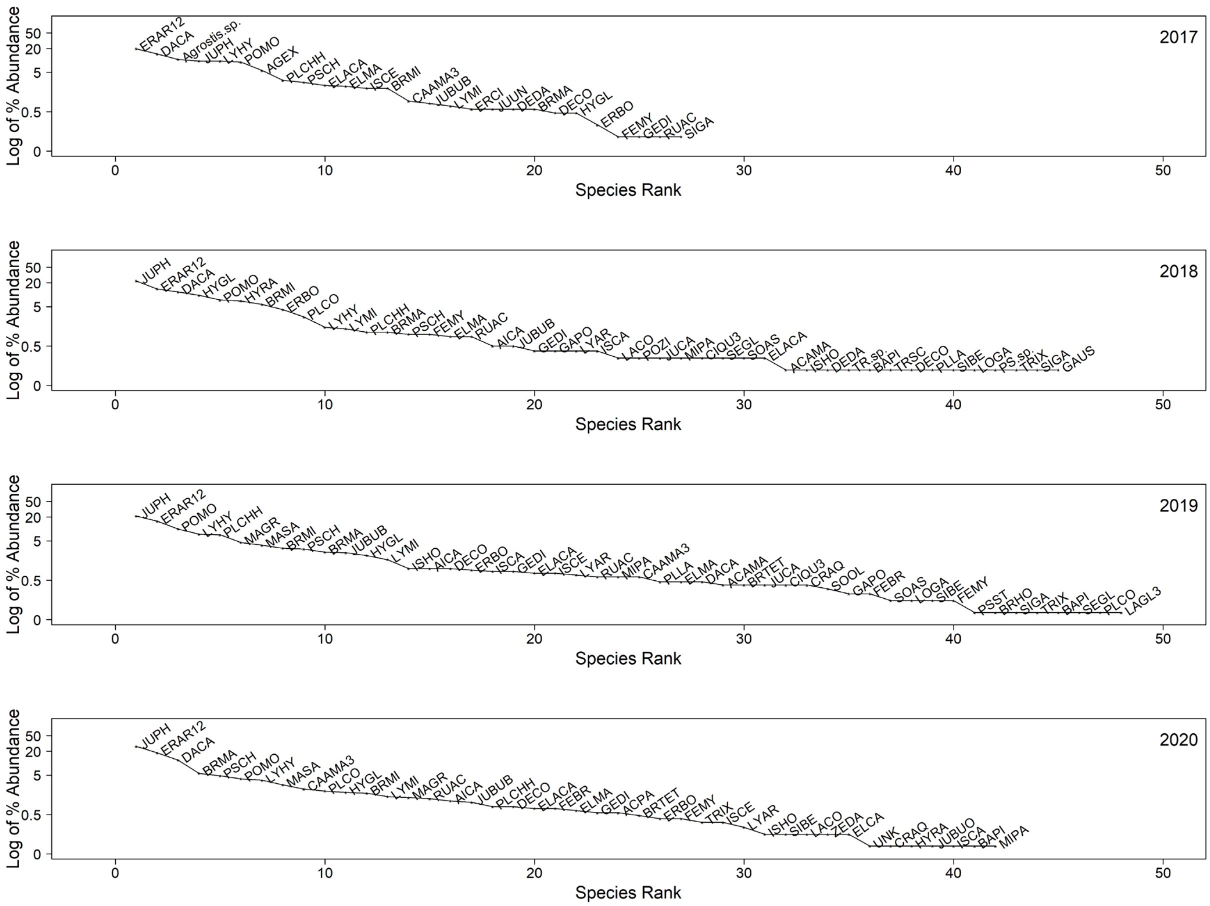


Figure 4-32. Rank abundance curves at Pond 997 (Reference) in 2017-2020. Note that the y-axis is in log-10 scale.

**Eryngium armatum* (ERAR12) changed to *Eryngium montereyense* (ERMO) in 2024

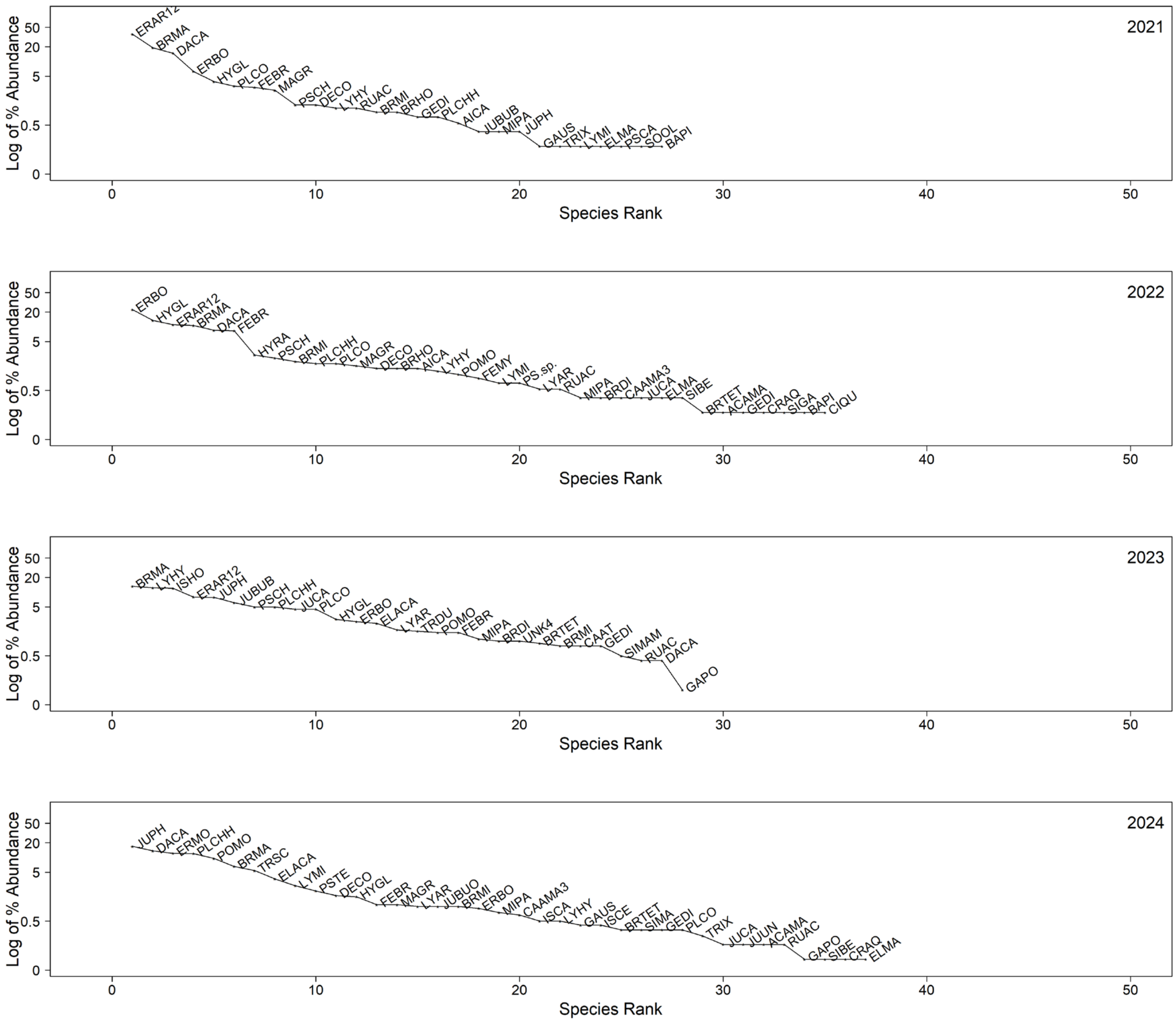


Figure 4-33. Rank abundance curves at Pond 997 (Reference) from 2021-2024*. Note that the y-axis is in log-10 scale.

**Eryngium armatum* (ERAR12) changed to *Eryngium montereyense* (ERMO) in 2024

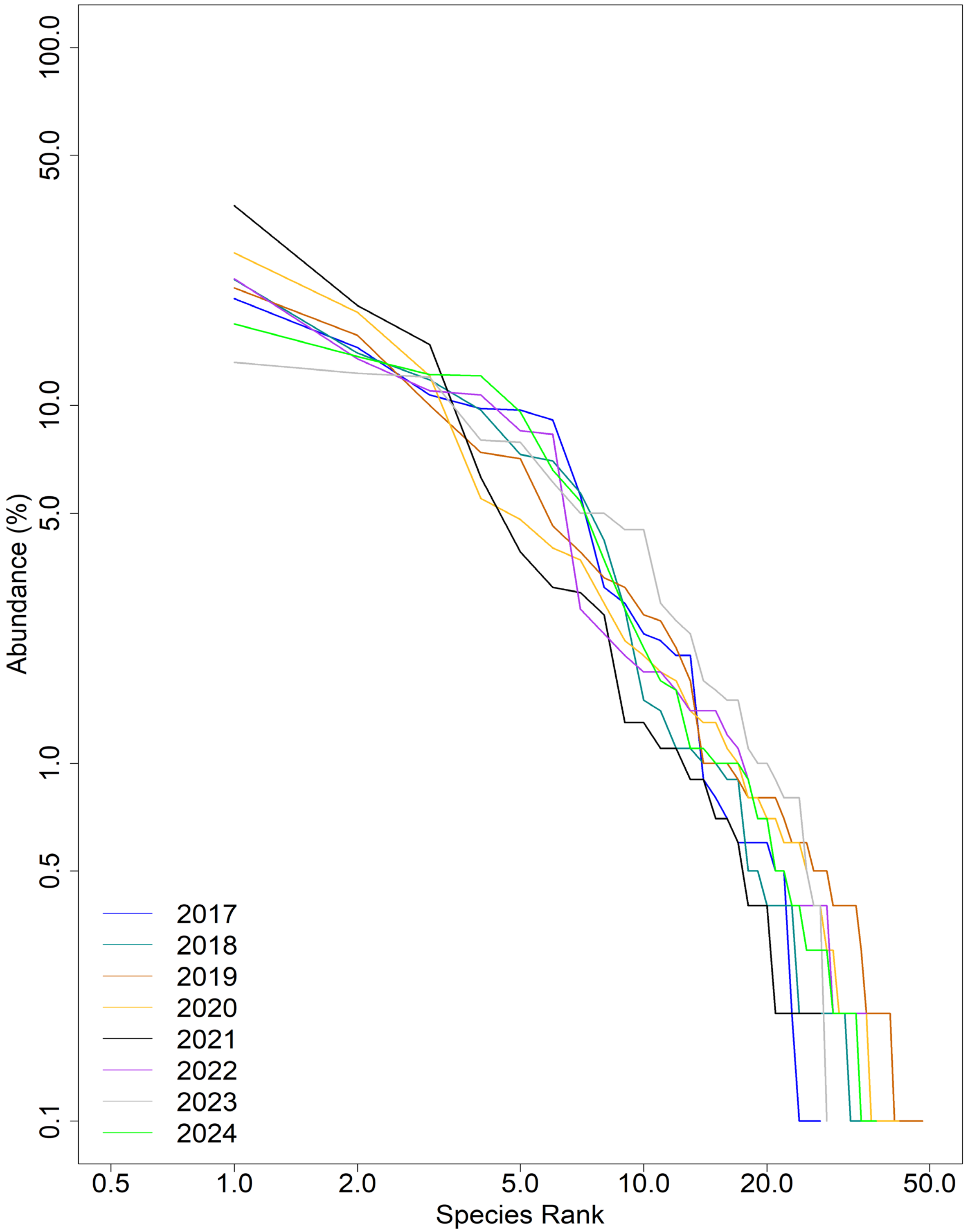


Figure 4-34. Rank abundance curves at Pond 997 (Reference) in 2017-2024. Note that the x-axis and y-axis are in log-10 scale.

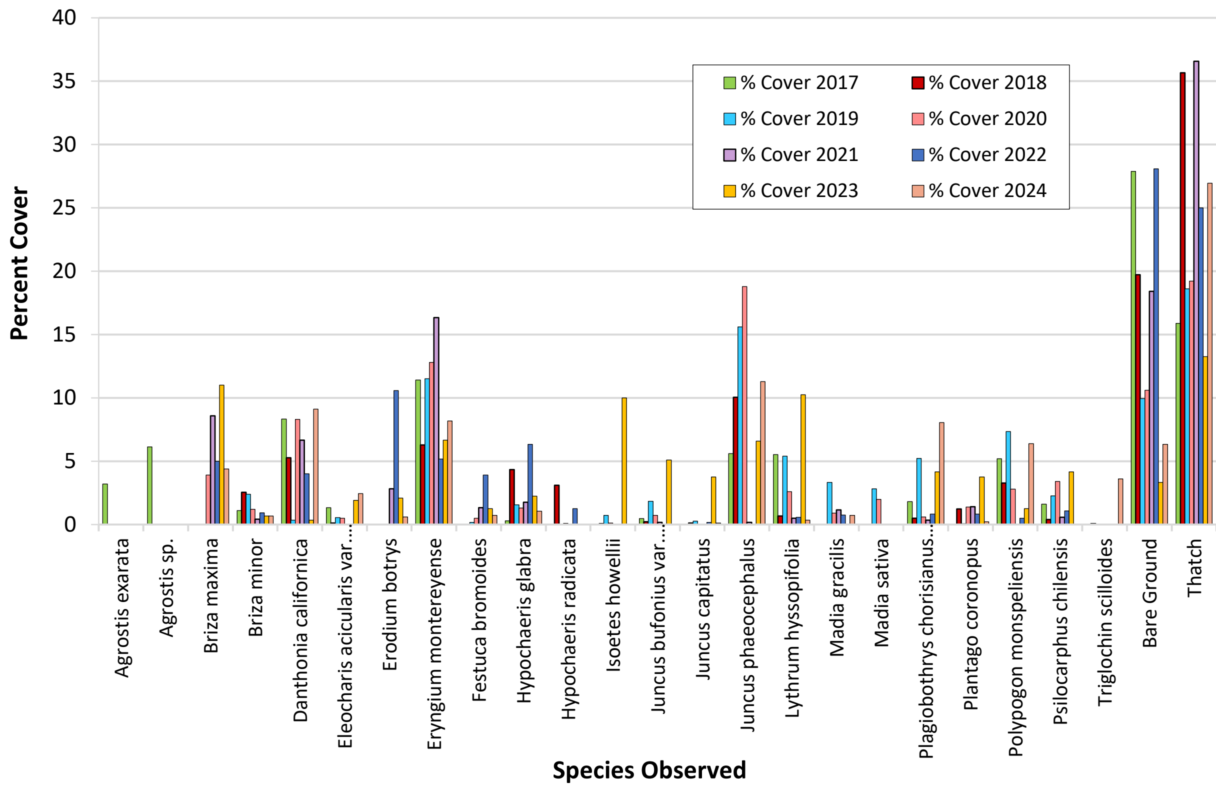


Figure 4-35. Percent cover of dominant species at Pond 997 (Reference).

Native and non-native species richness on Pond 997 transects varied through time, with the highest native richness recorded in 2019 and 2020 and the highest non-native richness also occurring in 2019. The lowest recorded native and non-native richness values occurred in 2017 and 2021. Native species richness in 2024 was the same as 2018, whereas non-native species richness was most similar to 2020, 2021, and 2023 (see Table 4-22). Native relative percent cover has fluctuated from year to year to the highest amount in 2024 (see Table 4-23). Conversely, non-native relative percent cover in 2024 was the second lowest recorded value and the same as 2020.

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
2021	15	12	0
2022	16	18	1
2023	13	14	1
2024	24	13	0

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

Year	Native	Non-Native	Unidentified
2017	66.3%	23.0%	10.7%
2018	56.3%	43.5%	0.2%
2019	68.5%	31.5%	0.0%
2020	76.3%	23.6%	0.1%
2021	59.1%	40.9%	0.0%
2022	29.7%	69.6%	0.7%
2023	50.0%	49.0%	1.0%
2024	76.4%	23.6%	0.0%

Wetland and non-wetland species richness on Pond 997 transects varied over time with 2024 results falling within the range of previous values (see Table 4-24). Similarly, the relative percent cover of wetland and non-wetland species fluctuated between 2017 and 2024, with the lowest recorded value of wetland cover observed in 2022 and the highest in 2017 (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
2021	3	5	4	4	1	10
2022	4	7	4	7	0	13
2023	4	6	4	4	0	10
2024	9	8	5	3	0	12

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%
2021	2.0%	38.4%	19.0%	8.9%	0.2%	31.4%
2022	3.6%	16.0%	12.8%	29.8%	0.0%	37.8%
2023	31.5%	28.9%	7.4%	9.0%	0.0%	23.2%
2024	24.8%	43.3%	16.2%	1.2%	0.0%	14.4%

4.4.2.1 *Contra Costa Goldfields*

Populations and cover estimates of CCG have been collected from 2017-2024, whereas only its presence was noted in wetland reports from previous years (Burleson, 2018, 2019, and 2020; Terracon, 2021, 2022, 2023; Harris-Terracon, 2024). The area of CCG at Pond 997 has varied slightly from 2017 to 2024 (see Table 4-26 and Figure 4-36). The lowest total area recorded was 0.005 acres in 2021, and the highest was 0.02 acres in 2017, 2020, 2022, and 2024. The density also fluctuated from 10% cover in 2017, 2020 and 2021, to as much as 35% in 2019. In 2022, cover was 20%, and in 2023 and 2024, cover was 30%. The CCG population was in a similar location in all survey years. Changes in population size can be attributed to natural fluctuation as no remediation has occurred at Pond 997 apart from mastication of a small portion of its watershed in 2017. It is notable that the area of CCG at Pond 997 has fluctuated by an order of magnitude between two consecutive drought years in 2021 and 2022.

Table 4-26. Pond 997 (Reference) Contra Costa Goldfields Estimated Cover.

Year	Area (acres)	Density (% cover)
2017	0.02	10%
2018	0.01	25%
2019	0.01	35%
2020	0.02	10%
2021	0.005	10%
2022	0.02	20%
2023	0.01	30%
2024	0.02	30%

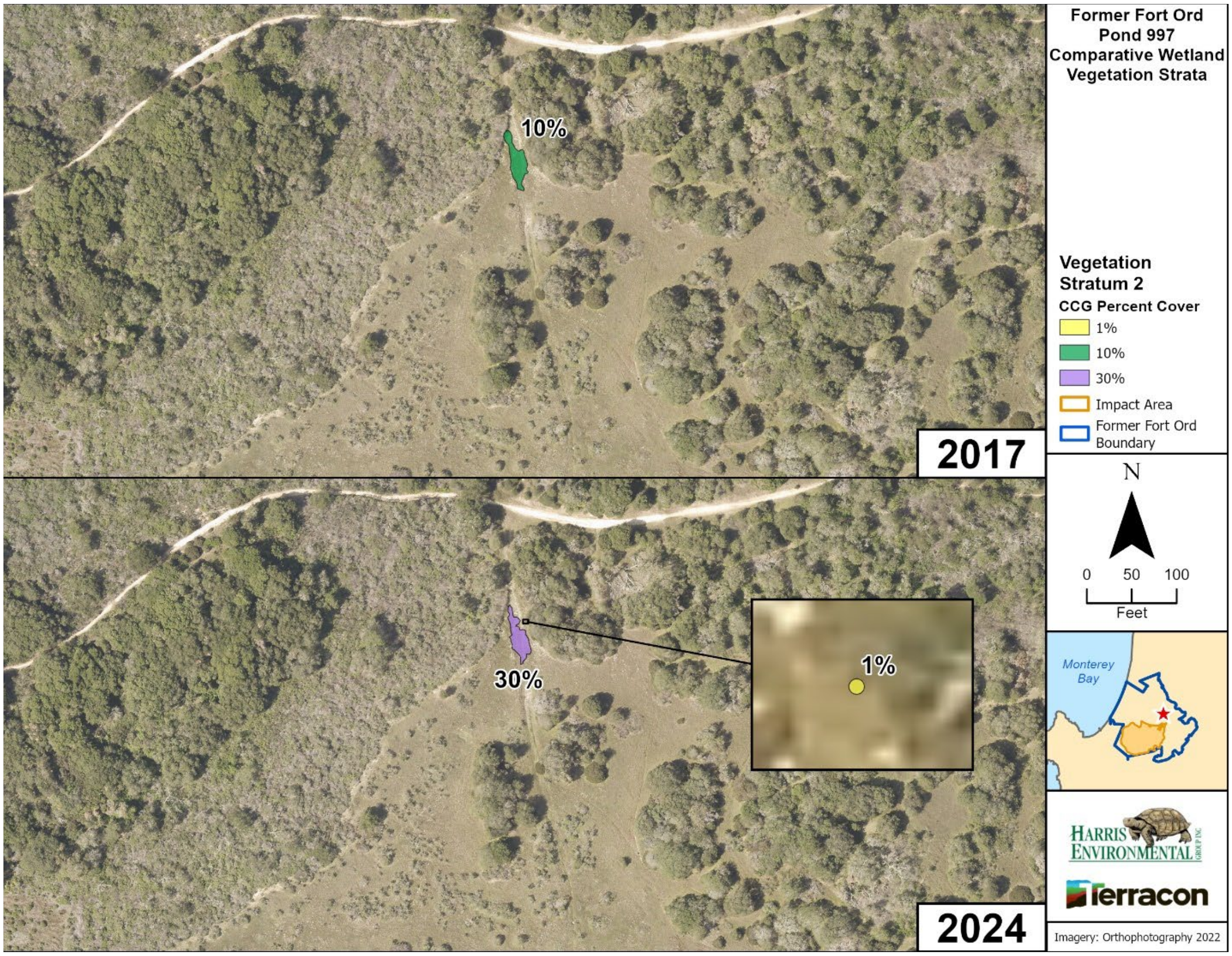


Figure 4-36. Contra Costa goldfields populations at Pond 997 (Reference) in 2017 and 2024.

4.4.2.2 *Data Quality Objective 3*

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

4.4.2.3 *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.

4.4.3 Wildlife Monitoring

Wildlife data were collected at Pond 997 in 2017, 2019, and 2024 (Burleson, 2018, 2020; Harris-Terracon, 2024). California tiger salamanders and fairy shrimp were not detected in 2024. The vernal pool did not hold sufficient depth for surveys to be completed in 2018, 2020, 2021 or 2022, and was dry by the time wildlife surveys occurred on late April 2023. Table 4-27 shows historical wildlife monitoring results.

Table 4-27. Pond 997 (Reference) Historical Wildlife Monitoring Results.

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2017	Not detected	Not detected
2019	Not detected	Not detected
2024	Not detected	Not detected

4.4.3.1 *Data Quality Objective 1*

Pond 997 did not provide suitable depth for CTS but did provide suitable depth for fairy shrimp as discussed in Section 4.4.1.1.

4.4.3.2 *Data Quality Objective 4*

Neither CTS nor fairy shrimp were detected in 2024 at Pond 997. This was most likely due to insufficient depth; however, the water quality was adequate. Compared to other vernal pools and previous Pond 997 data, water quality parameters were within normal ranges, except for a single high pH measurement and dissolved oxygen values falling below historical ranges. However, dissolved oxygen measurements are likely artificially low due to improper probe deployment. The pH ranged from 6.81 in March to 8.23 in February with a mean of 7.52. Temperature ranged from 15.05°C in March to 19.5°C in February with a mean of 17.28°C. Dissolved oxygen ranged from 4.77 mg/L in March to 6.33 mg/L in February with a mean of 5.55 mg/L. Turbidity ranged from 15.1 FNU in February to 22.2 FNU in March with a mean of 18.65 FNU (see Table 3-12).

4.4.3.3 *Data Quality Objective 5*

Pond 997 did not provide suitable depth for CTS at the time of the wildlife surveys in 2017, 2019 or 2024, however depth was adequate for fairy shrimp in 2024. Neither CTS nor fairy shrimp were detected in any monitoring year.

4.4.3.4 *Performance Standard: Plant Cover and Species Diversity*

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

4.4.4 Conclusion

Pond 997 is used for comparison to remediated vernal pools (see Table 4-28).

Table 4-28. Success at Pond 997 (Reference) Based on Performance Standards and Applicable Data Quality Objectives.

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

4.5 Pond 21—Year 2

Pond 21 was monitored in 2024 as a year 2 post-mastication and post-subsurface munitions remediation vernal pool. Pond 21 was monitored for baseline conditions in 1992, 1999, 2009, and 2019, after which vegetation within its watershed was masticated in late 2021 to prepare Unit 5 for surface munitions removal. In the fall of 2022, subsurface munitions remediation occurred within the basin of Pond 21, resulting in five excavations ranging in depth from 1-inch to 22-inches, and a total disturbed area of less than 5 ft^2 (KEMRON, 2023). Table 4-29 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which hydrologic monitoring was conducted at Pond 21 (see Figure 4-37). The 2008-2009 water year was below normal, whereas water year 2018-2019 and 2022-2023 were above normal. In 1991-1992, 1998-1999, and 2023-2024, the water years were similar to the cumulative normal water year.

Table 4-29. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife.

Survey	Water Year					
	1991-1992	1998-1999	2008-2009	2018-2019	2022-2023	2023-2024
Hydrology	●	●		●	●	●
Vegetation		●		●	●	●
Wildlife	●	●	●	●	●	●

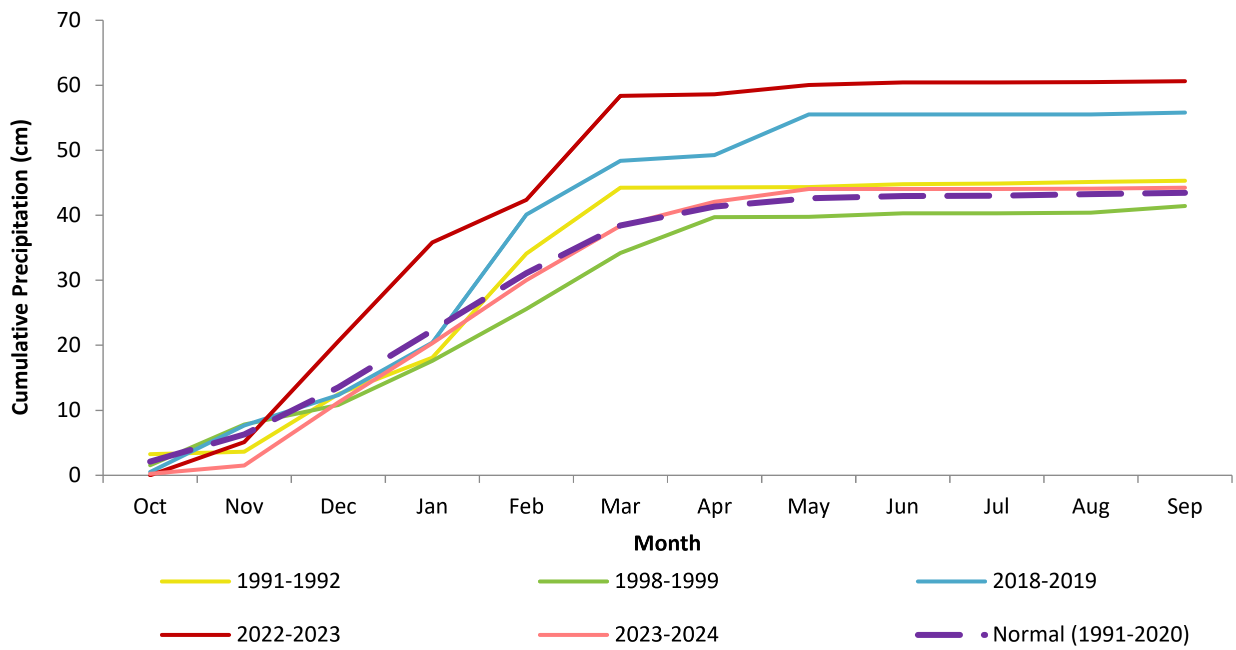


Figure 4-37. Cumulative monthly precipitation for years that hydrologic monitoring occurred at Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) compared to the 30-year normal (mean 1991-2020) (NOAA, 2023-2024).

4.5.1 Hydrologic Monitoring

Pond 21 is situated within a basin with a medium steep profile in the southern part of the Fort Ord National Monument inside the Impact Area. Pond 21 is most similar to reference Pond 101 East (East), although it has a smaller basin. Historically, Pond 21 reached a maximum depth of 35.5 cm in the 1999 water year but inundation area was not measured that year. In 2024, Pond 21 reached a maximum depth of 15 cm and a maximum inundation of 0.81 acres (see Figure 4-38 and Figure 4-39). Pond 21 inundation extent, depth, and water quality measurements are presented in Figure 4-39, Figure 4-40, and Figure 4-41. During the seven years of monitoring of Pond 21 the cumulative precipitation was the highest in 2023, which resulted in the longest hydroperiod on record for that vernal pool.

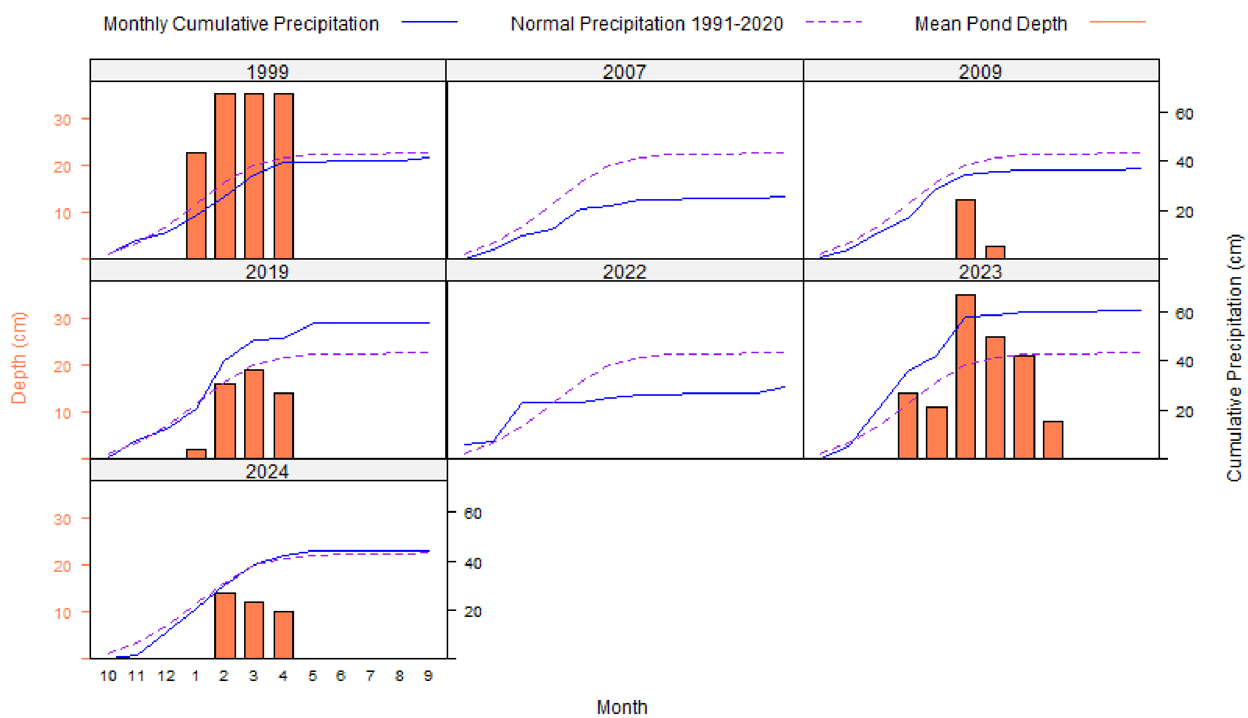


Figure 4-38. Cumulative monthly precipitation for years that hydrologic monitoring occurred at Pond 21 compared to the 30-year normal (mean 1991-2020) (NOAA, 2023-2024).

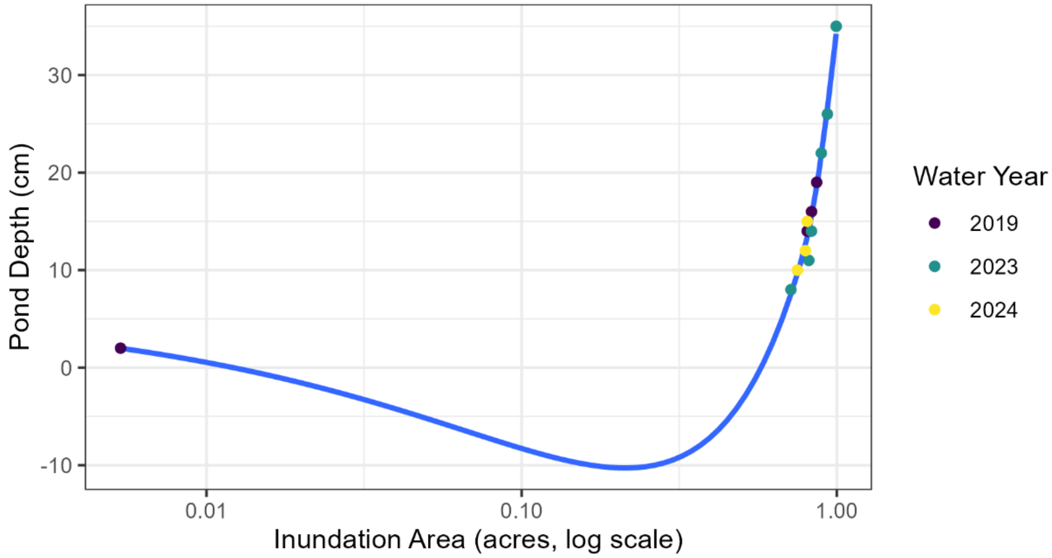


Figure 4-39. Pond 21 plot of depth vs inundation area since 2019.

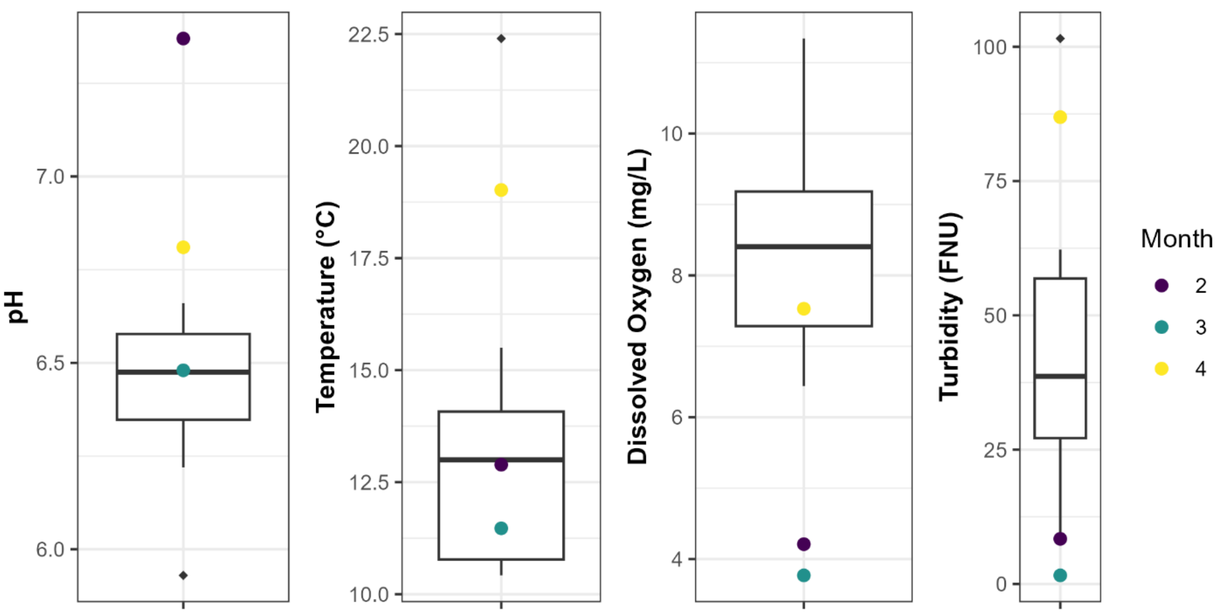


Figure 4-40. Pond 21 historical and 2024 water quality measurements for pH, temperature (C), dissolved oxygen (mg/L), and turbidity (FNU). The line in the middle of the box represents the median, and the lower and upper ends of the box are the 25% and 75% quartiles of historical values respectively. The upper and lower whiskers represent largest and smallest values within 1.5 times above and below the size of the hinge, which is the 75% minus 25% quartiles, respectively. Black diamonds represent values outside of those statistics. Colored dots represent 2023-2024 water year values. Dissolved oxygen values are likely artificially low due to improper probe deployment.

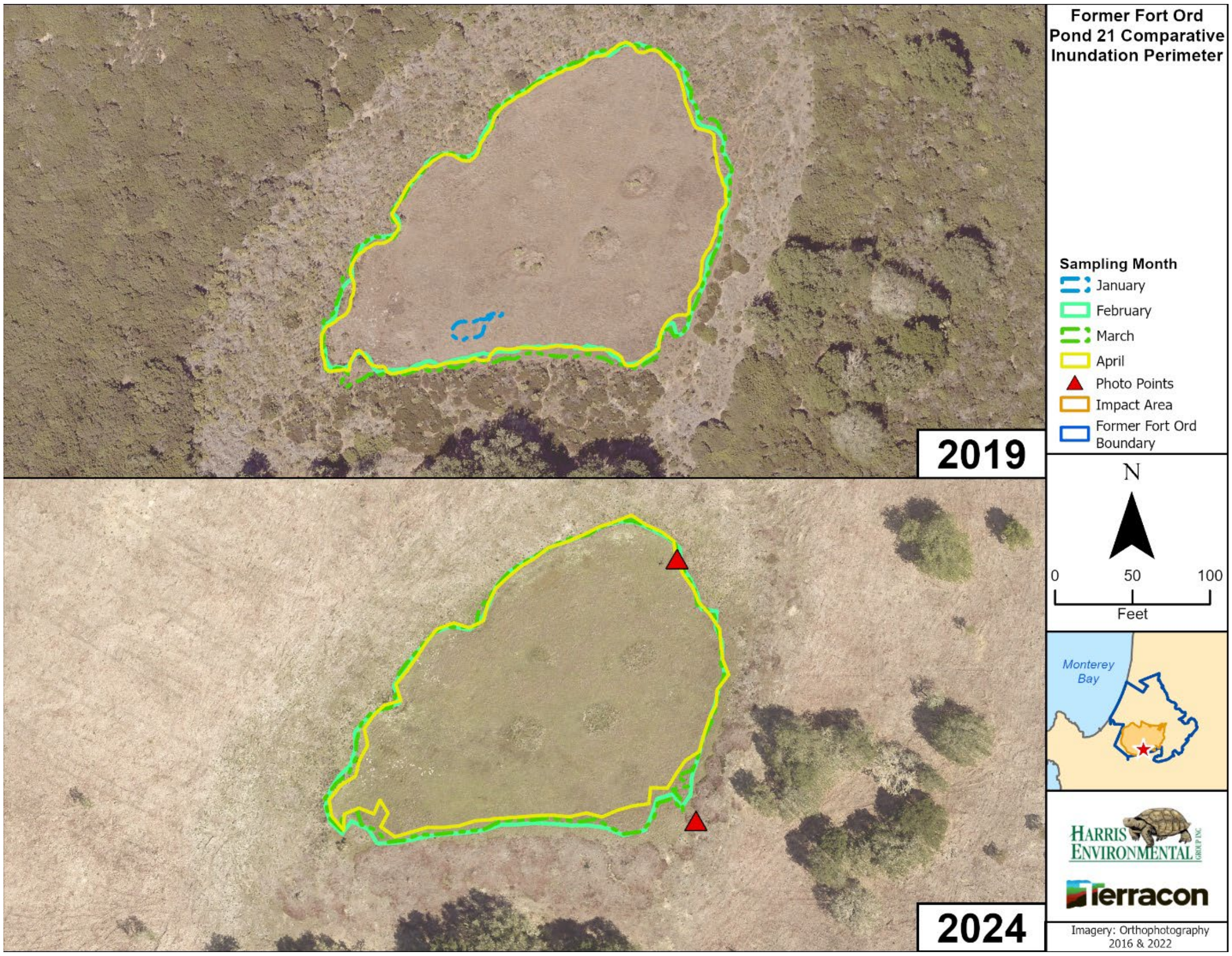


Figure 4-41. Pond 21 inundation areas in 2019 (baseline) and 2024.

4.5.1.1 *Data Quality Objective 1*

Pond 21 did not meet the required average depths of 25 cm from the first rain event through March for CTS. It did, however, meet the 10 cm for 18 consecutive days through May requirement for fairy shrimp. It sustained an average of 12.5 cm through the month of April.

4.5.1.2 *Data Quality Objective 2*

Pond 21 was inundated February through April with an inundation range of 0.75-0.81 acres and a mean of 0.78 acres. The vernal pool was dry by the May vegetation survey.

4.5.1.3 *Performance Standard: Hydrologic Conditions and Inundation Area*

Pond 21, a post-mastication and post-subsurface munitions remediation vernal pool, was partially on track for this performance standard for Year 2 in 2024. Pond 21 partially satisfied DQO 1 indicating that it did not sustain suitable habitat for CTS, but it did sustain suitable habitat for fairy shrimp in 2024. Pond 21 had similar inundation extent in the 2024 water year as in baseline and therefore, DQO 2 was met.

4.5.2 Vegetation Monitoring

Vegetation data were collected at Pond 21 in 1999, 2019, 2023, and 2024. In 1999, data were collected along one transect with a length of 316 ft. Quadrats were placed at 10-ft intervals, alternating from right to left along the transect. Because 1999 data were collected differently than in 2019, strata were combined across the vernal pool to allow for comparison. In 2019, 2023, and 2024, data were collected using the methodology described in the Methods section of this report (HLA, 1999; Terracon, 2020; Harris-Terracon, 2024). Data from 2019 and 2024 were compared stratum-to-stratum in Table 4-30 as well as visually in Figure 4-42.

Table 4-30. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary.

Stratum	Percentage	
	2019	2024
1	27%	63%
2	71%	29%
3	N/A	3%
4	N/A	2%
Upland	2%	3%

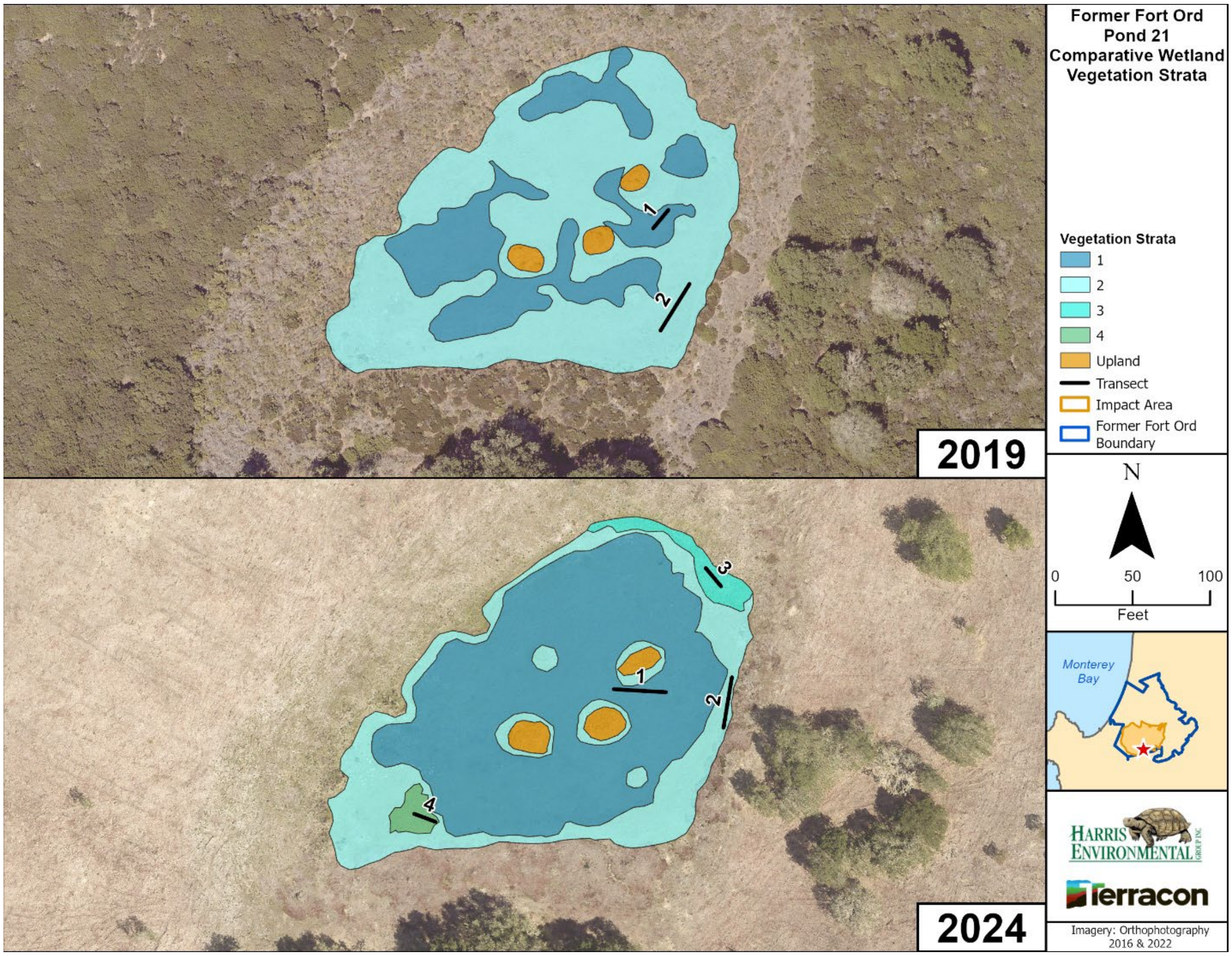


Figure 4-42. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) vegetation strata and transects for 2019 and 2024.

The absolute percent cover for both vegetation and thatch/bare ground at Pond 21 were within the range of baseline values in 2024 (see Table 4-31). When compared to reference vernal pools the absolute percent vegetative cover and thatch/bare ground cover were within the range of values and most similar to Pond 101 East (East) (see Table 4-32).

Table 4-31. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) Absolute Percent Cover.

Year	Vegetative Cover	Thatch/Bare Ground
1999*	18.6%	81.6%
2019*	73.6%	26.3%
2023	82.0%	18.0%
2024	73.7%	26.3%

*baseline year

Table 4-32. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2024.

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	80.0%	20.0%
101 East (East)	76.8%	23.2%
997	66.7%	33.3%
21	**73.7%**	**26.3%**

Species richness in 2024 was greater than the baseline values. Species richness on transects was 22, 22, 19, and 32 in 1999, 2019, 2023, and 2024 respectively; whereas overall basin species richness was 59, 47, and 75 species in 2019, 2023, and 2024 respectively, and not recorded in 1999 (see Table 4-33 and Appendix B Table B-4). Pond 21 species richness was greater than the values observed for the overall basin at the reference vernal pools but was within the range of reference values for transects (see Table 4-34, and Appendix G Table G-4). The species richness is represented on the RACs as the length of the curve and number of species along the curve (see Figure 4-43 and Figure 4-44).

Species composition at Pond 21 varied somewhat between the monitoring years, though the dominant species remained similar after 2019. This species composition is illustrated on the RACs as the species codes shift along the curve and losses and gains occur from year to year. The most dominant species in the 1999 baseline year was common toad rush (*Juncus bufonius* var. *bufonius*; not pictured in the RAC data). By the 2019 baseline year, the dominant species were brown-headed rush (*Juncus phaeocephalus*) and coyote thistle (*Eryngium montereyense*), both of which remained the dominant species in 2023. Other important species in all monitoring years were pale spikerush (*Eleocharis macrostachya*) and Hickman's popcorn flower (*Plagiobothrys chorisianus* var. *hickmanii*), however by 2023, rabbitfoot grass (*Polypogon monspeliensis*) and white root (*Carex barbarae*) became subdominant, marking a shift from the baseline years. This species composition remained in place in 2024; only coyote thistle became more dominant than brown-headed rush. A complete comparison of species composition observed at Pond 21 in 1999, 2019, 2023, and 2024 can be found in Appendix H. Figure 4-45 shows a subset of this comparison for species observed with 2% cover or greater.

The evenness from each year is represented by the slope of the RACs. The evenness between the 2019 baseline year and 2024 differs slightly. In both years there is a steeper slope and higher abundance of the dominant species at the top of the curve, however richness is more evenly distributed along the rest of the curve in 2019 than in 2024 (see Figure 4-44 and Appendix I). When comparing the RAC curve of Pond 21 in 2024 to reference vernal pools, it is most similar to Pond 5 which has a similar overall shape, with a steeper slope at the top of the curve.

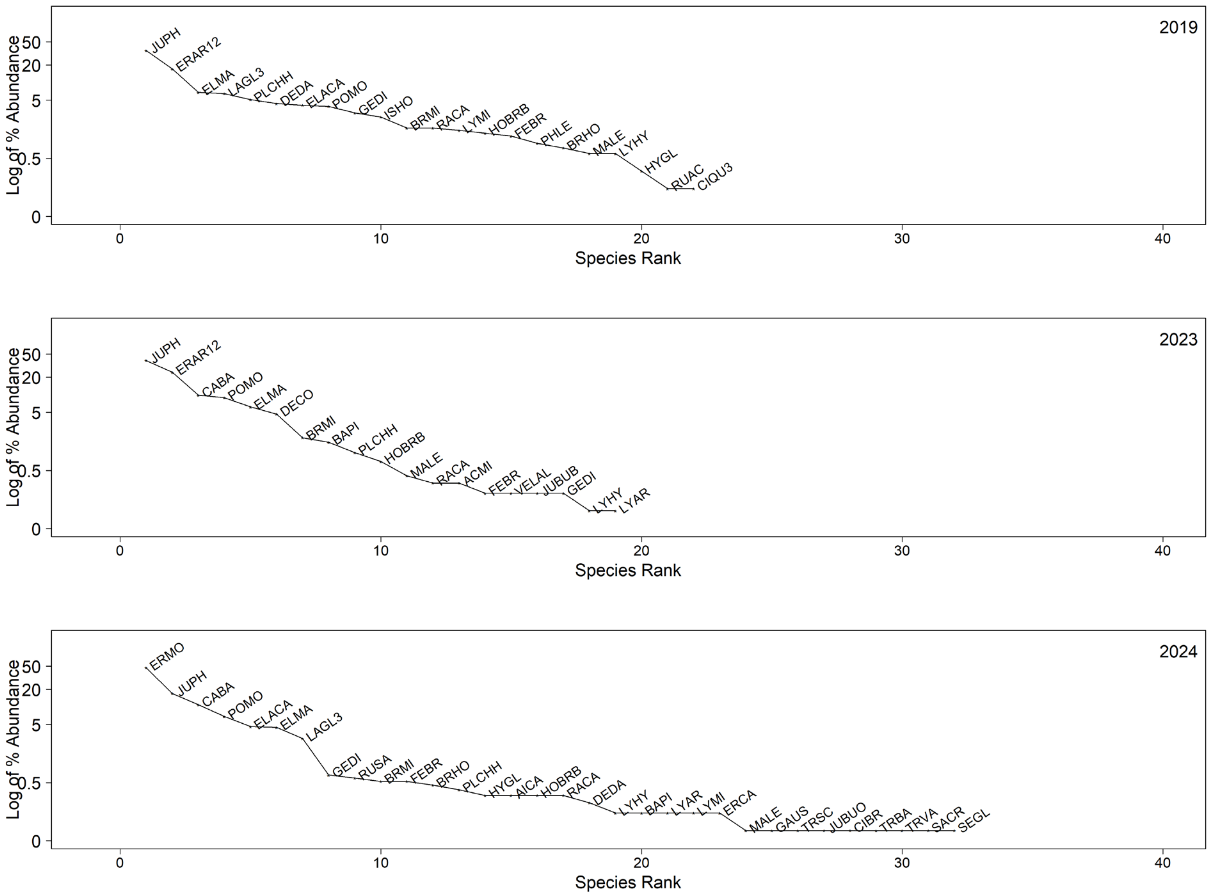


Figure 4-43. Rank abundance curves at Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) in 2019, 2023, and 2024*. Note that the y-axis is in log-10 scale.

**Eryngium armatum* (ERAR12) changed to *Eryngium montereyense* (ERMO) in 2024

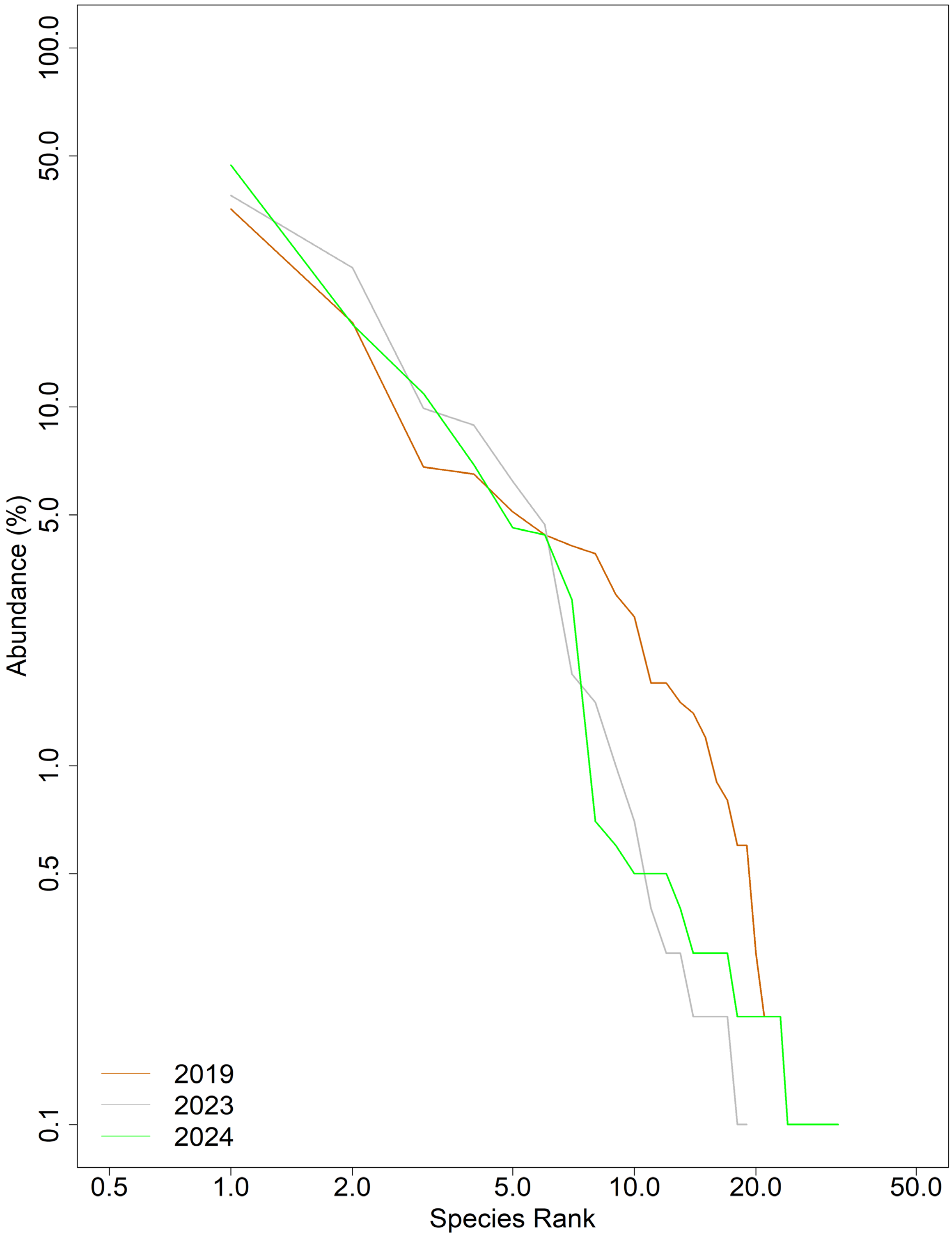


Figure 4-44. Rank abundance curves at Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) in 2019, 2023, and 2024. Note that the x-axis and y-axis are in log-10 scale.

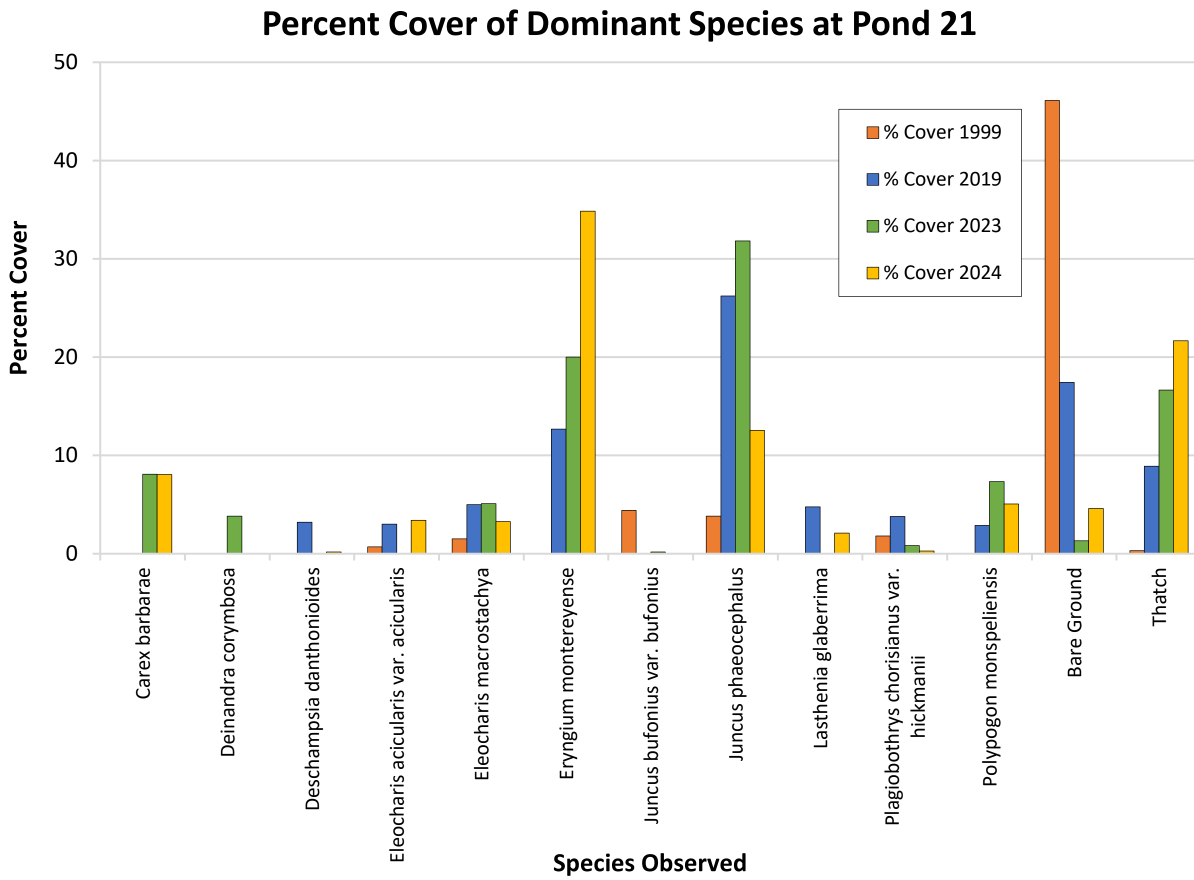


Figure 4-45. Percent cover of dominant species at Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation).

Native and non-native species richness on Pond 21 transects were greater in 2024 than the baseline years of monitoring (see Table 4-33). When compared to reference vernal pools, native and non-native richness fell within the range of values (see Table 4-34). The relative percent cover of native and non-native species were within the range of baseline and reference values (see Table 4-35 and Table 4-36).

Table 4-33. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness.

Year	Native	Non-Native	Unidentified
1999*	17	5	0
2019*	14	8	0
2023	13	6	0
2024	22	10	0

*baseline year

Table 4-34. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2024.

Vernal Pool	Native	Non-Native	Unidentified
5	18	5	1
101 East (East)	17	11	0
997	24	13	0
21	**22**	**10**	**0**

Table 4-35. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants.

Year	Native	Non-Native	Unidentified
1999*	95.9%	4.1%	0.0%
2019*	88.4%	11.6%	0.0%
2023	88.6%	11.4%	0.0%
2024	90.0%	10.0%	0.0%

*baseline year

Table 4-36. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2024.

Vernal Pool	Native	Non-Native	Unidentified
5	97.9%	2.0%	0.1%
101 East (East)	57.8%	42.2%	0.0%
997	76.4%	23.6%	0.0%
21	**90.0%**	**10.0%**	**0.0%**

Wetland and non-wetland species richness on Pond 21 transects were greater in 2024 than in baseline, whereas wetland and non-wetland species richness fell within the range of reference values (see Table 4-37 and Table 4-38). The relative percent cover of wetland species was greater than in baseline years, whereas non-wetland cover was less (see Table 4-39). When compared to reference vernal pools, the relative percent cover of wetland species fell within the range of values, whereas non-wetland species cover was less (see Table 4-40).

Table 4-37. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness.

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1999*	7	5	5	2	0	3
2019*	6	8	2	3	0	3
2023	3	5	5	2	0	4
2024	6	9	5	4	0	8

*baseline year

Table 4-38. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2024.

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	9	3	4	0	4
101 East (East)	7	10	2	5	1	3
997	9	8	5	3	0	12
21	**6**	**9**	**5**	**4**	**0**	**8**

Table 4-39. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species.

Year	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
1999*	38.1%	50.5%	5.0%	4.7%	0.0%	1.6%
2019*	25.6%	65.0%	3.3%	1.5%	0.0%	4.5%
2023	7.3%	73.1%	12.3%	0.7%	0.0%	6.6%
2024	12.5%	72.6%	12.0%	1.0%	0.0%	2.0%

*baseline year

Table 4-40. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2024.

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	62.4%	33.9%	1.4%	1.7%	0.0%	0.5%
101 East (East)	40.5%	31.8%	1.1%	13.5%	0.2%	12.9%
997	24.8%	43.3%	16.2%	1.2%	0.0%	14.4%
21	**12.5%**	**72.6%**	**12.0%**	**1.0%**	**0.0%**	**2.0%**

4.5.2.1 *Data Quality Objective 3*

Observable changes in hydrophytic vegetation between surveys were largely associated with precipitation fluctuations. This is expected given the dynamic nature of vernal pools and the close relationship between the hydroperiod and wetland vegetation composition (Bauder, 2000). This year precipitation was close to the cumulative normal following two years of consecutive drought. The wet conditions favored wetland obligate species.

Vegetative cover in Pond 21 was dominated by native and wetland plant species during year 2 post-mastication and post-subsurface munitions remediation monitoring in 2024. Pond 21 wetland vegetation results were generally within range of either baseline and/or reference vernal pools with the exception of non-wetland species relative percent cover, which was less than baseline and reference vernal pool values. These results are not concerning, as low non-wetland cover values support a well-functioning vernal pool ecosystem.

4.5.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 21, a post-mastication and 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 within range of the reference vernal pool conditions or differed in a favorable trajectory for native and wetland species.

4.5.3 Wildlife Monitoring

Wildlife data were collected at Pond 21 in 1992, 1999, 2009, 2019, 2023, and 2024 (USACE, 1992; HLA, 1999; Shaw, 2010; Burleson, 2020; Harris-Terracon, 2024). California tiger salamander larvae were observed in 2019 and 2023, but not in 2024. Fairy shrimp were not detected at Pond 21 in any monitoring year. Table 4-41 shows historical wildlife monitoring results.

Table 4-41. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) Historical Wildlife Monitoring Results.

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
1992*	Not detected	Not detected
1999*	Not detected	Not detected
2009*	Not detected	Not detected
2019*	Few (4)	Not detected
2023	Few (1, 8)	Not detected
2024	Not detected	Not detected

*baseline year

4.5.3.1 *Data Quality Objective 1*

Pond 21 did not provide suitable depth for CTS, but did provide suitable depth for fairy shrimp as discussed in Section 4.5.1.1.

4.5.3.2 *Data Quality Objective 4*

Neither fairy shrimp nor CTS were detected at Pond 21 in 2024. The water quality was adequate; compared to other vernal pools and previous Pond 21 data, the water quality data were within normal ranges. The pH ranged from 6.48 in March to 7.37 in February with a mean of 6.88. Temperature ranged from 11.47°C in March to 19.02°C in April with a mean of 14.46°C. Dissolved oxygen ranged from 3.77 mg/L in March to 7.53 mg/L in April with a mean of 5.17 mg/L. However, dissolved oxygen measurements are likely artificially low due to improper probe deployment. Turbidity ranged from 1.6 FNU in March to 86.9 FNU in April with a mean of 32.3 FNU (see Table 3-24).

4.5.3.3 *Data Quality Objective 5*

California tiger salamanders were not present in 2024, which was consistent with baseline results from 1992, 1999, and 2009. CTS were found in the 2019 baseline and 2023 monitoring years. CTS were found at reference Ponds 5 and 101 East (East) however, which was not consistent with results at Pond 21.

The local CTS population surrounding Pond 21 appears to be low based on 2019 and 2023 survey results. A low local population combined with the fact that CTS do not breed each year and that the pond did not provide suitable depth may explain the “not detected” status during 2024 surveys.

Fairy shrimp were not detected in 2024, which was consistent with baseline monitoring and all reference ponds.

4.5.3.4 *Performance Standard: Wildlife Usage*

Pond 21, a post-mastication vernal pool, is partially on track to meet the performance standard in year 2. CTS were not detected in 2024 which is inconsistent with 2019 baseline and reference pond results. Fairy shrimp were not detected in 2024 which was consistent with all baseline years and all reference ponds.

4.5.4 Conclusion

Pond 21, a post-mastication and post-subsurface munitions remediation vernal pool, was in year 2 of monitoring in 2024. Pond 21 is on track to meet the plant cover and species diversity performance standards but was partially on track to meet hydrologic conditions and wildlife usage (see Table 4-42). This is due to the vernal pool lacking adequate depth for CTS and having no detections of CTS, which is inconsistent with 2019 baseline and reference ponds. Pond 21 will continue to be monitored in the future.

Table 4-42. Success at Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives.

Performance Standard	Applicable DQO	Success
Hydrologic Conditions & Inundation area	DQO 1	Partially on track
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	Partially on track
	DQO 4	On track
	DQO 5	Partially on track

4.6 Pond 76 –Year 2 and Year 1

Pond 76 was monitored in 2024 as a Year 2 post-mastication and Year 1 post-subsurface munitions remediation vernal pool. Pond 76 was not monitored for baseline conditions as mastication began in the area prior to its recognition as a vernal pool basin. Subsurface anomaly investigations were completed at the end of 2023. Table 4-43 summarizes the years that monitoring occurred and surveys were conducted. The cumulative precipitation graph shows precipitation for years in which hydrologic monitoring was conducted at Pond 76 (see Figure 4-46). The 2023-2024 water year was similar to the cumulative normal.

Table 4-43. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) Summary of Historic Surveys for Hydrology, Vegetation, and Wildlife.

Survey	Water Year	
	2022-2023	2023-2024
Hydrology	●	●
Vegetation	●	●
Wildlife	●	●

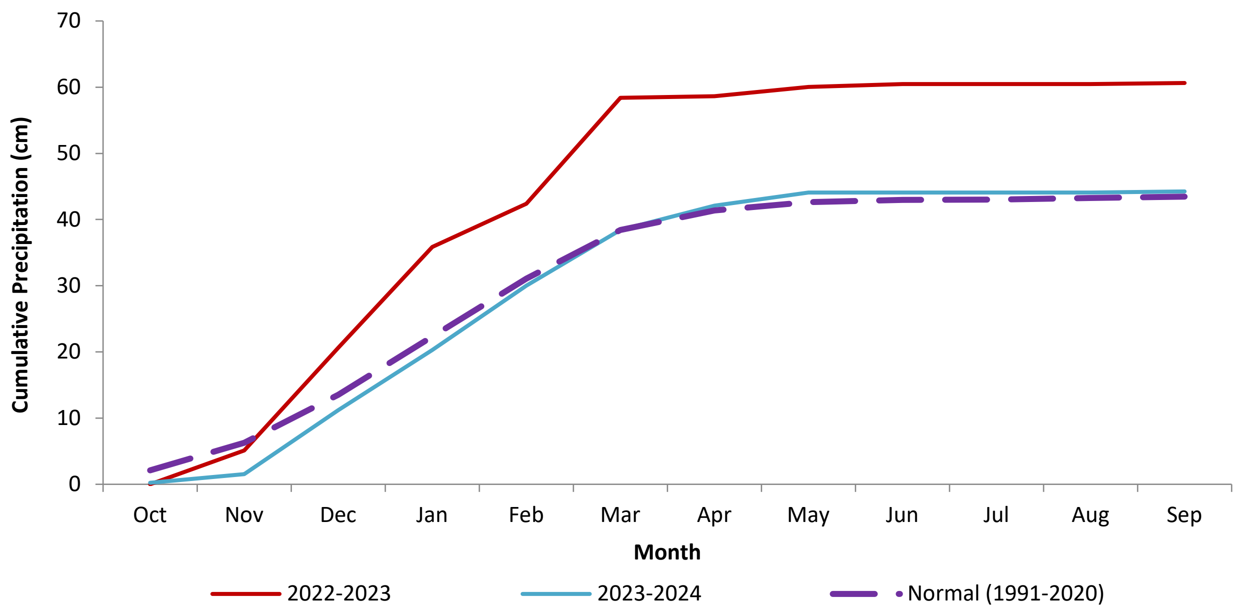


Figure 4-46. Cumulative monthly precipitation for years that hydrologic monitoring occurred at Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) compared to the 30-year normal (mean 1991-2020) (NOAA, 2023-2024).

4.6.1 Hydrologic Monitoring

Pond 76 is located in a small, shallow basin in the southern Fort Ord National Monument. In 2023, vernal pool depth was estimated due to the absence of a staff gauge, which was available for measurements in 2024. Due to limited data, hydrologic conditions and DQO assessments for Pond 76 can only be compared to reference vernal pools, with Pond 997 being the most analogous due to its size and depth. Pond 76 was inundated from February to April during the 2024 water year. Inundation extent, depth, and water quality data are illustrated in Figure 4-47, Figure 4-48, Figure 4-49, and Figure 4-50.

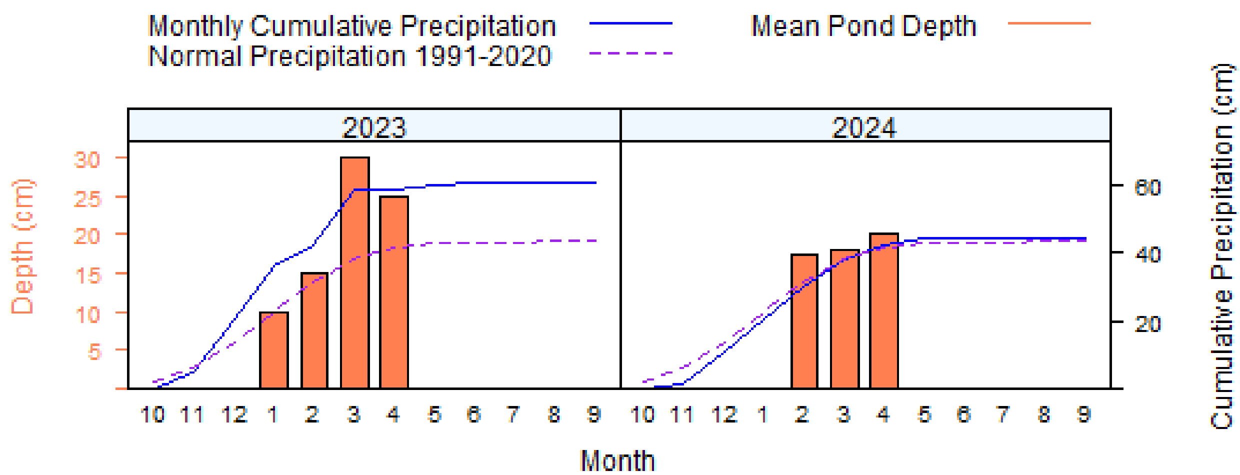


Figure 4-47. Cumulative monthly precipitation for years that hydrologic monitoring occurred at Pond 76 compared to the 30-year normal (mean 1991-2020) (NOAA, 2023-2024).

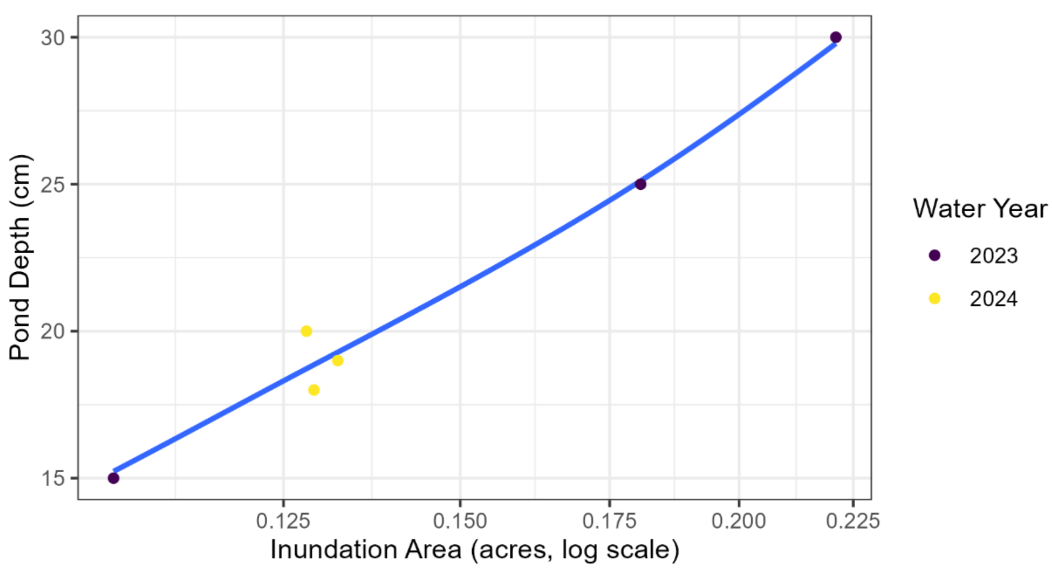


Figure 4-48. Pond 76 plot of depth vs. inundation area since the 2022-2023 water year.

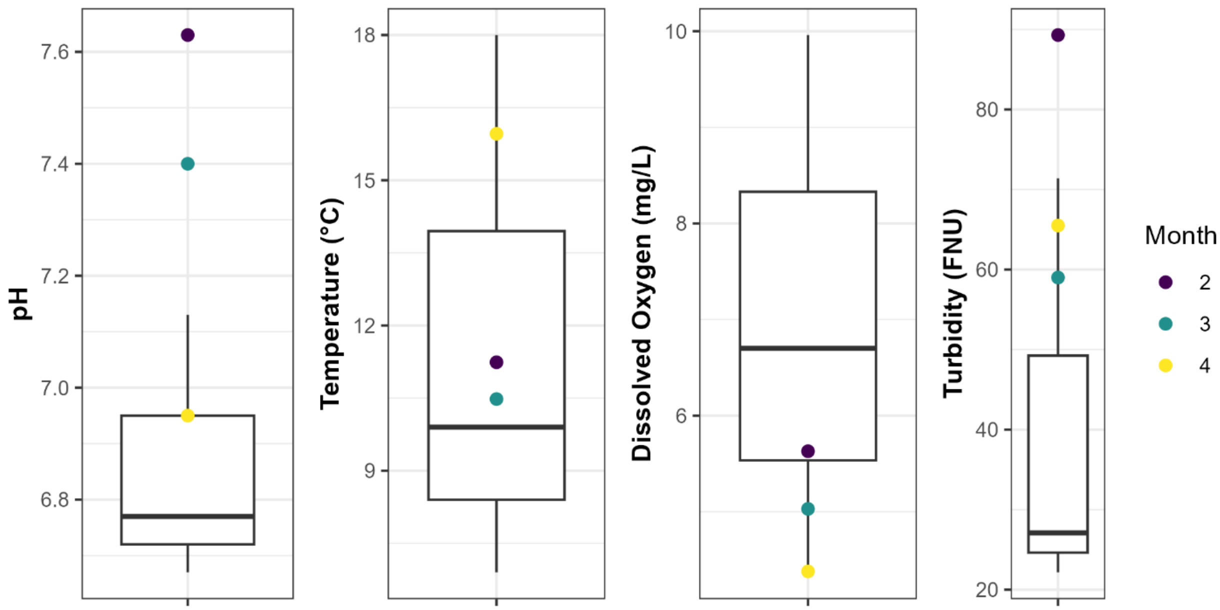


Figure 4-49. Pond 76 historical and 2024 water quality measurements for pH, temperature (C), dissolved oxygen (mg/L), and turbidity (FNU). The line in the middle of the box represents the median, and the lower and upper ends of the box are the 25% and 75% quartiles of historical values respectively. The upper and lower whiskers represent largest and smallest values within 1.5 times above and below the size of the hinge, which is the 75% minus 25% quartiles, respectively. Black diamonds represent values outside of those statistics. Colored dots represent 2023-2024 water year values. Dissolved oxygen values are likely artificially low due to improper probe deployment.

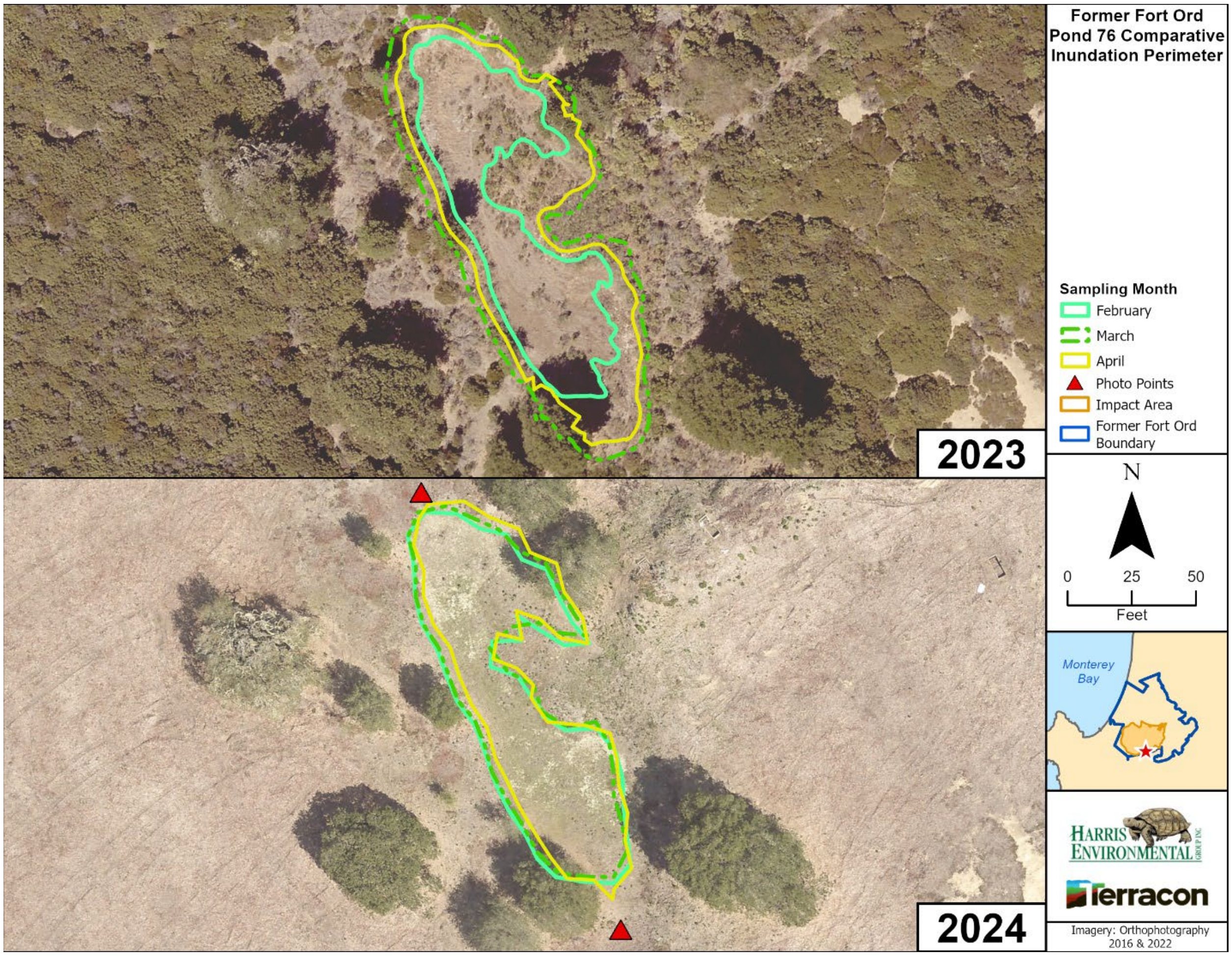


Figure 4-50. Pond 76 inundation areas in 2023 and 2024.

4.6.1.1 *Data Quality Objective 1*

Pond 76 did not meet the required average depths of 25 cm from the first rain event through March for CTS, however it did meet the 10 cm for 18 consecutive days through May requirement for fairy shrimp. It sustained an average of 18.25 cm through the month of April.

4.6.1.2 *Data Quality Objective 2*

Pond 76 was inundated February through April with a mean inundation area of 0.13 acres. The vernal pool was dry by the May survey.

4.6.1.3 *Performance Standard: Hydrologic Conditions and Inundation Area*

Pond 76, a post-mastication vernal pool, was partially on track for this performance standard for Year 1 and 2 in 2024. Pond 76 partially satisfied DQO 1 indicating that it did not sustain suitable habitat for CTS, but it did sustain suitable habitat for fairy shrimp in 2024. Pond 76 was inundated during the 2023-2024 water year and was similar to reference Pond 997. The vernal pool was on track to meet DQO 2.

4.6.2 Vegetation Monitoring

Vegetation data were collected at Pond 76 in 2023 and 2024 using the methodology described in the Methods section of this report (Harris-Terracon, 2024). Data from 2023 and 2024 were compared stratum-to-stratum in Table 4-44 as well as visually in Figure 4-51.

Table 4-44. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) Vegetative Strata Percentage within the Vernal Pool Basin Boundary.

Stratum	Percentage	
	2023	2024
1	34%	39%
2	32%	26%
3	34%	35%

Figure 4-51. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) vegetation strata and transects for 2023 and 2024.

Absolute percent vegetative cover for Pond 76 was 61.2% and 71.6% in 2023 and 2024, respectively (see Table 4-45). Pond 76 vegetative cover and thatch/bare ground were within the range of values observed at the reference vernal pools (see Table 4-46).

Table 4-45. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) and Absolute Percent Cover.

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
2023	61.2%	38.8%
2024	71.6%	28.4%

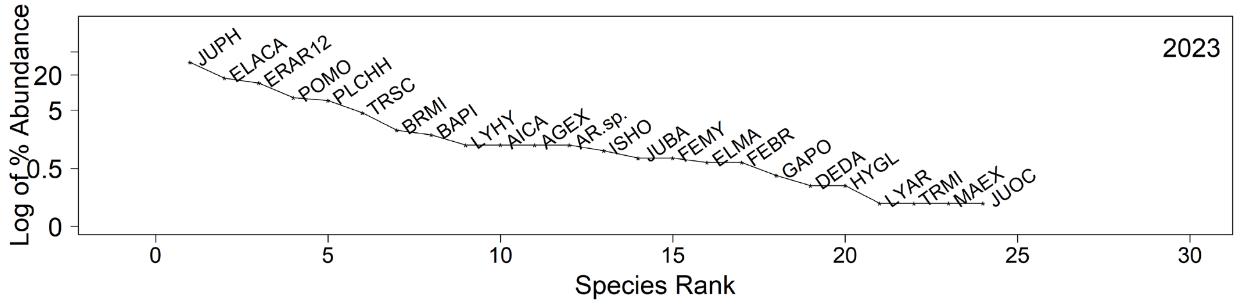
Table 4-46. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Absolute Percent Cover in 2024.

Vernal Pool	Vegetative Cover	Thatch/Bare Ground
5	80.0%	20.0%
101 East (East)	76.8%	23.2%
997	66.7%	33.3%
76	**71.6%**	**28.4%**

Species richness on transects was 24 and 16 species in 2023 and 2024, respectively, whereas overall basin species richness was 33 and 41 species in 2023 and 2024, respectively (see Table 4-47 and Appendix B Table B-5). Pond 76 species richness was less than the range of values observed at the reference vernal pools in 2024 (see Table 4-48 and Appendix G Table G-5). The species richness is represented on the RACs as the length of the curve and number of species along the curve (see Figure 4-52).

Species composition at Pond 76 is illustrated on the RACs as the species codes shift along the curve and losses and gains occur from year to year. The most dominant species were brown-headed rush (*Juncus phaeocephalus*) and needle spikerush *(Eleocharis acicularis* var. *acicularis*), followed by coyote thistle (*Eryngium montereyense*), rabbitfoot grass (*Polypogon monspeliensis*), Hickman's popcorn flower (*Plagiobothrys chorisianus* var. *hickmanii*), and flowering quillwort (*Triglochin scilloides*).
The entire species composition observed at Pond 76 can be found in Appendix H. Figure 4-54 shows a subset of this composition for species observed with 2% cover or greater.

The evenness in 2024 is represented by the slope of the RAC. When comparing vegetation in Pond 76 in 2024 to reference vernal pools, it is most similar to Pond 101 East (East) which has a similar overall shape, including a moderately steep slope at the beginning of the curve. A steeper beginning of a RAC conveys less evenness between the dominant species and the rest of the basin flora, however the less dominant species show the vernal pool has high richness and overall evenness (see Figure 4-53 and Appendix I). As explained in Verberk (2011), "Structurally complex systems, such as a fen [or vernal pool] system are species rich and have a more even community abundance pattern, possibly owing to a fine partitioning of available niches".



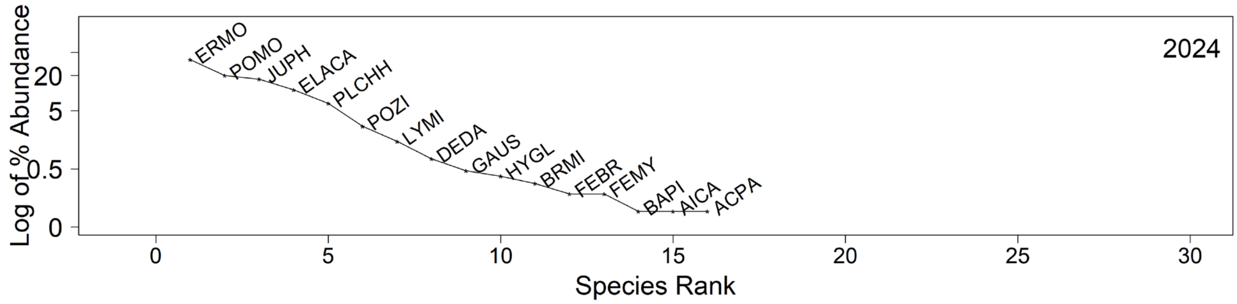


Figure 4-52. Rank abundance curves at Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) in 2023 and 2024. Note that the y-axis is in log-10 scale.*

**Eryngium armatum* (ERAR12) changed to *Eryngium montereyense* (ERMO) in 2024

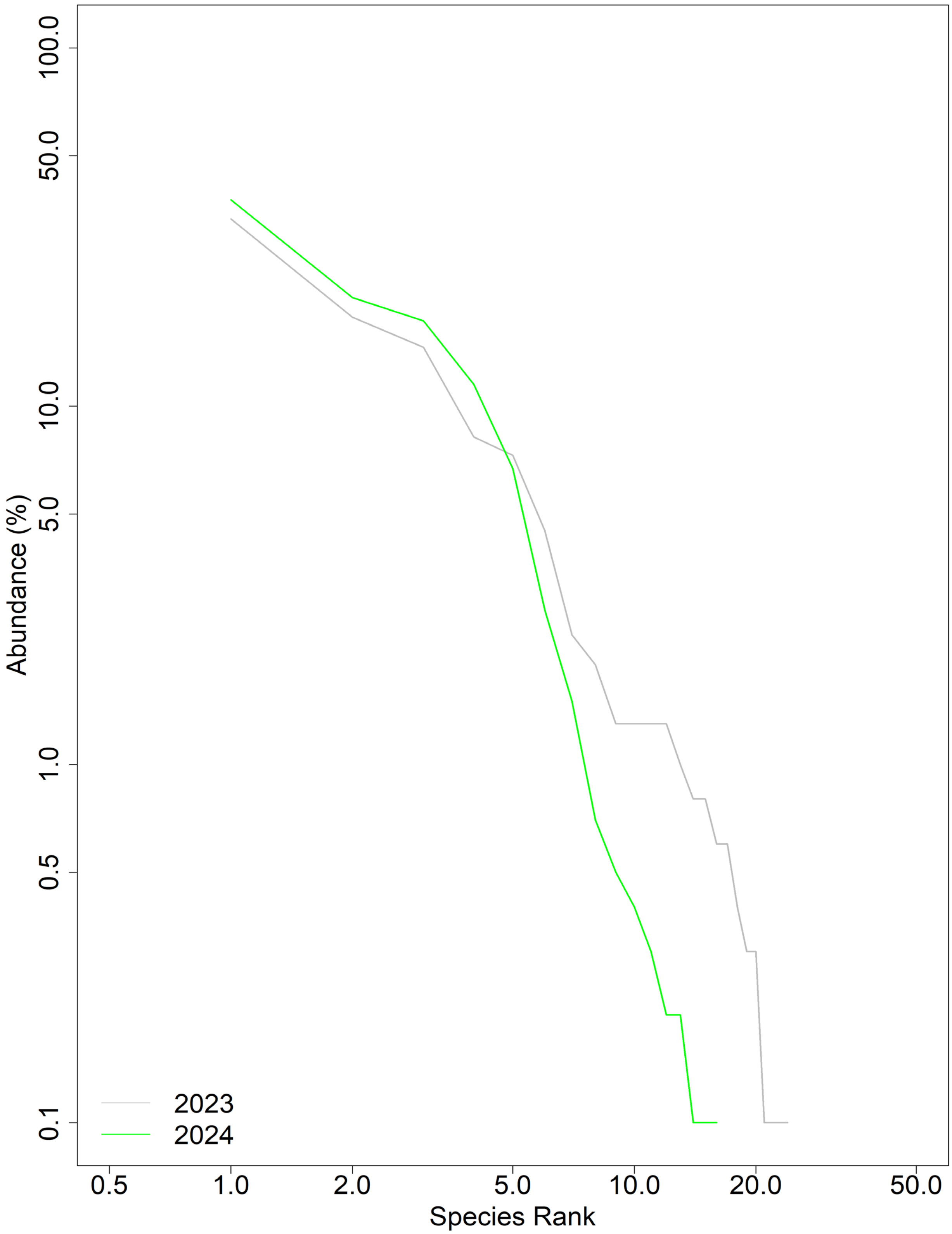


Figure 4-53. Rank abundance curves at Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) in 2023 and 2024. Note that the y-axis is in log-10 scale.

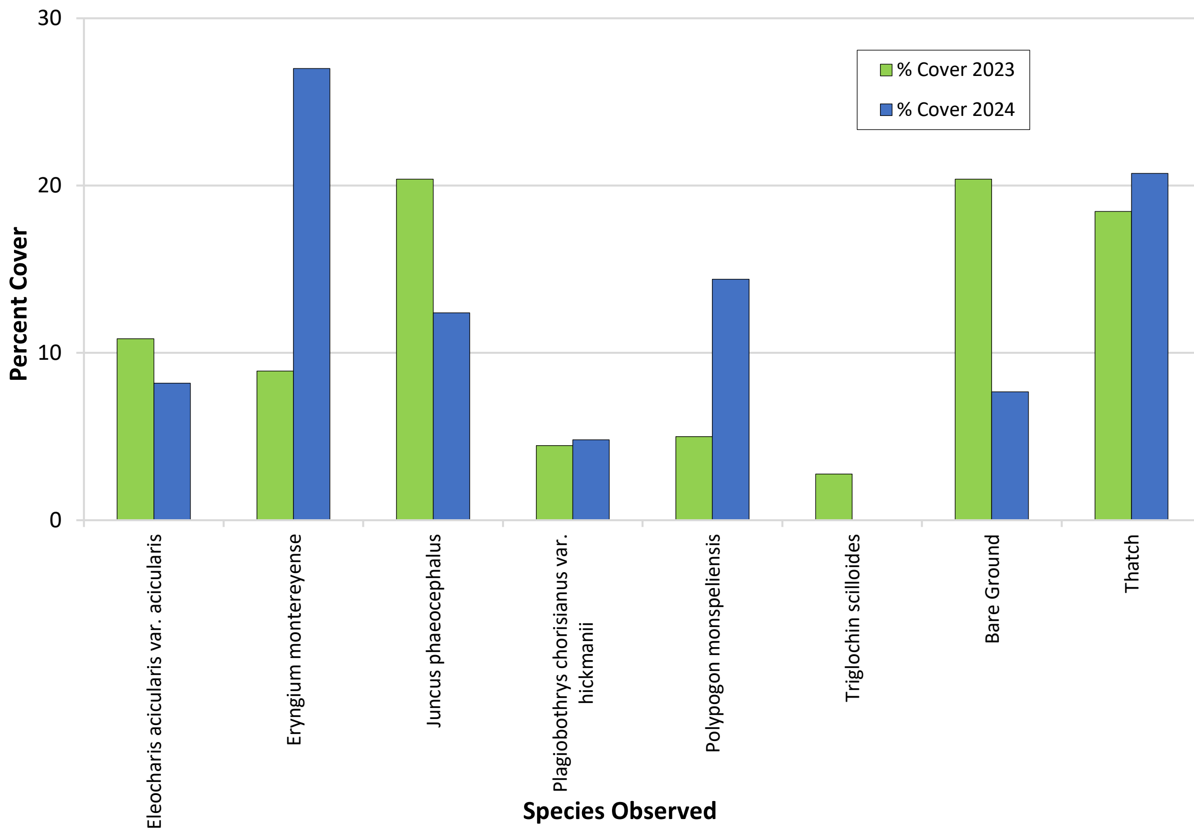


Figure 4-54. Percent cover of dominant species at Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation).

Pond 76 had a greater number of native species than non-native species in 2023 (Year 1) and 2024, although the overall richness decreased between the two years (see Table 4-47). The native richness was less than reference vernal pools and non-native richness was within the range of values observed at reference (see Table 4-48). The relative percent cover of native species was greater than the relative percent cover of non-native species, although non-native cover increased between 2023 (Year 1) and 2024 (see Table 4-49). Pond 76 native and non-native species relative percent cover fell within the range of reference vernal pools (see Table 4-50).

Table 4-47. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) Native and Non-Native Species Richness.

Vernal Pool	Native	Non-Native	Unidentified
2023	15	8	1
2024	10	6	0

Table 4-48. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Native and Non-Native Species Richness in 2024.

Vernal Pool	Native	Non-Native	Unidentified
5	18	5	1
101 East (East)	17	11	0
997	24	13	0
76	**10**	**6**	**0**

Table 4-49. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Native and Non-Native Plants.

Vernal Pool	Native	Non-Native	Unidentified
2023	84.0%	14.7%	1.3%
2024	78.8%	21.2%	0.0%

Table 4-50. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Native and Non-Native Plants in 2024.

Vernal Pool	Native	Non-Native	Unidentified
5	97.9%	2.0%	0.1%
101 East (East)	57.8%	42.2%	0.0%
997	76.4%	23.6%	0.0%
76	**78.8%**	**21.2%**	**0.0%**

The wetland species richness in Pond 76 was predominantly facultative wetland in 2024, which was similar to richness results in 2023 (Year 1), although richness decreased in 2024 (see Table 4-51). In 2024, there were nine wetland plants and two non-wetland plants observed on transects. Pond 76 was similar to the reference vernal pools with more wetland than non-wetland species, although the wetland and non-wetland richness at Pond 76 were less than the range of values observed at the reference vernal pools (see Table 4-52). The relative percent cover of wetland species at Pond 76 was greater than the previous monitoring year as well as the range of values observed at the reference vernal pools (see Table 4-53 and Table 4-54). Likewise, the non-native cover was less than in 2023 (Year 1) and the range of reference values.

Table 4-51. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) Wetland and Non-Wetland Species Richness.

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2023	6	7	3	2	0	6
2024	3	5	1	2	0	5

Table 4-52. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Wetland and Non-Wetland Species Richness in 2024.

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	4	9	3	4	0	4
101 East (East)	7	10	2	5	1	3
997	9	8	5	3	0	12
76	**3**	**5**	**1**	**2**	**0**	**5**

Table 4-53. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) Relative Percent Cover of Wetland and Non-Wetland Species.

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
2023	32.5%	58.5%	2.5%	2.0%	0.0%	4.5%
2024	20.9%	77.4%	0.3%	0.3%	0.0%	1.2%

Table 4-54. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) and Reference Vernal Pool Relative Percent Cover of Wetland and Non-Wetland Species in 2024.

Vernal Pool	Wetland			Non-Wetland		Not Listed
	OBL	FACW	FAC	FACU	UPL	
5	62.4%	33.9%	1.4%	1.7%	0.0%	0.5%
101 East (East)	40.5%	31.8%	1.1%	13.5%	0.2%	12.9%
997	24.8%	43.3%	16.2%	1.2%	0.0%	14.4%
76	**20.9%**	**77.4%**	**0.3%**	**0.3%**	**0.0%**	**1.2%**

4.6.2.1 *Data Quality Objective 3*

Vegetative cover in Pond 76 was dominated by native and wetland plant species during year 2 post-mastication and Year 1 post-subsurface munitions remediation monitoring in 2024. While there are no baseline data available for comparison, 2024 Year 1 post-subsurface munitions remediation results can be compared to 2023 Year 1 post-mastication results, so long as careful consideration of treatment comparisons and environmental influences are taken into account. Pond 76 native and wetland species richness were less than the range of reference values and 2023 (Year 1) data, while non-native species richness fell within the range of reference. However, wetland cover was greater than 2023 (Year 1) and reference results, while non-wetland cover was less than both. Non-native species richness and cover, native species cover, and non-wetland richness all fell within the range of reference and/or 2023 (Year 1) values.

Although a reduction in native and wetland species richness would normally be a cause for concern, it is more likely that the increase in precipitation in the 2022-2023 and 2023-2024 water years created conditions favorable to a smaller number of wetland species. The results show that wetland cover increased while non-wetland cover decreased between the two monitoring years. Higher precipitation years can reduce species richness, especially that of non-native species, but also native species richness if inundation remains high throughout the season, as many ponds did in 2023. Javornik & Collinge (2016) referred to high precipitation years in vernal pool environments as an “ecological filter", which impairs the establishment of non-native species. The species that were the most abundant in 2024 were largely native and hydrophytic due to high-to-normal precipitation over the last two water years.

4.6.2.2 *Performance Standard: Plant Cover and Species Diversity*

Pond 76, a post-mastication and post-subsurface munitions remediation vernal pool, was on track to meet the performance standard for Year 1 and 2 in 2024. The species composition, although dissimilar from reference vernal pools in 2024, was favorable for wetland and native plant richness and cover.

4.6.3 Wildlife Monitoring

No historical baseline wildlife data were available for comparison, however 2023 survey results for CTS are available. California tiger salamanders were not detected during 2024 surveys while fairy shrimp were detected in the March 13 survey. Fairy shrimp were not surveyed in 2023 as there were time constraints precluding survey efforts. Table 4-55 shows historic wildlife monitoring results.

Table 4-55. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) Historical Wildlife Monitoring Results.

Sampling Year	CTS Larvae Abundance (# Individuals)	Fairy Shrimp Abundance (# Individuals)
2023	Not detected	N/A*
2024	Not detected	Present (13)

*Aquatic invertebrates/fairy shrimp not surveyed in 2023.

4.6.3.1 *Data Quality Objective 1*

Pond 76 did not provide suitable depth for CTS but did for fairy shrimp as discussed in Section 4.6.1.1.

4.6.3.2 *Data Quality Objective 4*

Fairy shrimp were detected while CTS were not detected at Pond 76. The water quality was adequate. Compared to other vernal pools and previous Pond 76 data, the water quality data were within normal ranges. The pH ranged from 6.95 in April to 7.63 in February with a mean of 7.33. Temperature ranged from 10.48°C in March to 15.96°C in April with a mean of 12.56°C. Dissolved oxygen ranged from 4.38 mg/L in April to 5.63 mg/L in February with a mean of 5.01 mg/L. However, dissolved oxygen measurements are likely artificially low due to improper probe deployment. Turbidity ranged from 59 FNU in March to 89.3 FNU in February with a mean of 71.27 FNU (see Table 3-24).

4.6.3.3 *Data Quality Objective 5*

California tiger salamanders were not detected in 2024. The only prior surveys conducted at Pond 76 were in 2023, which also had no CTS detections. This was consistent with reference Pond 997, which also had no CTS detections in 2024.

Fairy shrimp were detected at Pond 76 in 2024, but not at reference Pond 997 during any monitored events. Given the characteristic life cycle of fairy shrimp, which can survive in a cyst stage for decades, it is likely that this species was already present at Pond 76 before remediation activities began.

4.6.3.4 *Performance Standard: Wildlife Usage*

Pond 76, a post-mastication vernal pool, is partially on track to meet the performance standard for year 2. Depths were not suitable for CTS but were suitable for fairy shrimp habitat according to DQO 1. The vernal pool was only evaluated against the performance standard with consideration to reference vernal pools because there was no baseline wildlife data for Pond 76.

4.6.4 Conclusion

Pond 76, a post-mastication vernal pool, was in Year 2 of monitoring for post-mastication and Year 1 of monitoring for post-excavation in 2024. Pond 76 was on track to meet the plant cover and species diversity performance standards but was partially on track to meet hydrologic conditions and wildlife usage (see Table 4-56). This is due to the vernal pool lacking adequate depth for CTS but suitable for fairy shrimp. Pond 76 will continue to be monitored in the future.

Table 4-56. Success at Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) Based on Performance Standards and Applicable Data Quality Objectives.

Performance Standard	Applicable DQO	Success
Hydrologic Conditions & Inundation Area	DQO 1	Partially on track
	DQO 2	On track
Plant Cover & Species Diversity	DQO 3	On track
Wildlife Usage	DQO 1	Partially on track
	DQO 4	On track
	DQO 5	On track

5 CONCLUSION

The 2023-2024 water year marked a significant return to near-normal precipitation levels, the first since the 2019-2020 water year. This year came after a volatile weather period, beginning with the lowest recorded rainfall in 2020-2021, a second year of drought in 2021-2022, then followed by an above-average water year in 2022-2023.

Both remediated vernal pools were partially on track to meet the hydrologic and inundation standard. Ponds 21 and 76 are historically shallow vernal pools that, like Pond 997, did not provide adequate depth for CTS, and therefore only partially met DQO 1. However, while fairy shrimp were not found at any of the reference vernal pools, Pond 76 had adequate depth for fairy shrimp in 2024, which were found in low abundance.

Vernal pools are dynamic ecosystems, and to analyze their condition, RACs were utilized to assess species distribution, relative abundance, species evenness, and richness. Comparison plots for all monitoring years from 2015 to 2024 reveal significant annual variations in species richness, shifts in species composition, and changes in the distribution and relative abundance of species (see Appendix I). While some pools exhibit consistent dominant species year over year, others reflect notable variations.

Throughout the years, species evenness remained relatively low and consistent. This trend may be attributed to the high species richness observed in these vernal pools as well as the specific sampling methodologies employed. This is supported by a study of subalpine meadow communities with the same sampling scale as data collected at Ford Ord vernal pools. The researchers found a consistent negative correlation between species richness and evenness in these communities along the successional gradient at the sampling scale of 0.5 m x 0.5 m quadrats along transect lines (Hui Zhang, 2012). In addition to low evenness, richness was uniformly distributed along the entire curve with a slightly higher concentration or plateau of species toward the tail end. This plateau represents the species that are likely contributing around 1% and only found once along the transect.

When evaluating the performance of the remediated vernal pools against reference and baseline data, both Ponds 21 and 76 were on track to meet the vegetation performance standard (see Table 5-1). At Pond 21, both native and non-native species richness, as well as wetland and non-native richness, aligned closely with baseline and reference results, with one notable exception, in which non-wetland cover was lower than in baseline and reference values. Pond 76 remained mostly consistent with the 2023 (Year 1) data and the reference vernal pools, although it exhibited reduced native and wetland richness in 2024. Nevertheless, wetland cover increased and non-wetland cover decreased, highlighting an overall abundance of wetland species despite the decrease in richness. Overall, both remediated vernal pools predominantly supported wetland and native species, with relative percent cover significantly dominated by wetland species.

Ponds 21 and 76 will continue to be monitored for hydrology, wetland vegetation and wildlife usage.

Table 5-1. 2024 Remediated Vernal Pools and Performance Standards Status.

Vernal Pool	Monitoring Status	Hydrology		Wetland Vegetation	Wildlife		
		DQO 1 (depth)	DQO 2 (inundation)	DQO 3 (richness and cover)	DQO 1 (depth)	DQO 4 (water quality)	DQO 5 (wildlife presence)
Pond 21	Year 2 Post-Mastication and Post-Subsurface Munitions Remediation	Partial	On track	On track	Partial	On track	Partial
Pond 76*	Year 2 Post-Mastication & Year 1 Post-Subsurface Munitions Remediation	Partial	On track	On track	Partial	On track	On track

*Only evaluated against reference vernal pools and/or year 1; 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.

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.

[Burleson] 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 and DD&A] Burleson 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. 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. 2019. 2018 Annual Wetland Vegetation and Wildlife Monitoring Report. Prepared for the Department of the Army, U.S. Army Corps of Engineers, Sacramento, CA.

Burleson. 2020. 2019 Annual Wetland Vegetation and Wildlife Monitoring Report. Prepared for the Department of the Army, U.S. Army Corps of Engineers, Sacramento, CA.

[Terracon] Burleson Consulting Inc., A Terracon Company. 2021. 2020 Annual Wetland Vegetation and Wildlife Monitoring Report. Prepared for the Department of the Army, U.S. Army Corps of Engineers, Sacramento, CA.

Calow, P. 1999. Blackwell's Concise Encyclopedia of Ecology. Wiley-Blackwell Publishing Ltd. pp 109.

Esri. 2024a. *ArcGIS Field Maps* (Version 24.2.1). [Mobile application software]. https://www.esri.com/en-us/arcgis/products/field-maps/overview

Esri. 2024b. *ArcGIS Pro* (Version 3.3.1) [Software]. https://www.esri.com/en-us/arcgis/products/arcgis-pro/overview

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.

[HLA] Harding Lawson and Associates. 1999. 1999 Annual Habitat Monitoring Report Former Fort Ord, Monterey County, California. Prepared for U. S. Department of the Army, Sacramento, CA.

[Harris-Terracon] Harris Environmental Group, Inc. and Terracon Consultants, Inc. 2024. 2023 Annual Wetland Vegetation and Wildlife Monitoring Report. Prepared for the Department of the Army, U.S. Army Corps of Engineers, Sacramento, CA.

Javornik & Collinge. 2016. "Influences of annual weather variability on vernal pool plant abundance and community composition." Aquatic Botany 134. Elsevier. pp. 61-67.

Jones and Stokes Associates, Inc. 1992. Flora and Fauna Baseline Study of Fort Ord, California. Prepared for Army Corps of Engineers, Sacramento, CA.

Jones and Stokes Associates Inc. 1996. 1996 Annual Wetland Monitoring Report for UXO Removal at Former Fort Ord. Prepared for Army Corps of Engineers, Sacramento, CA.

[KEMRON] KEMRON Environmental Services. 2023. MRS-BLM Unit 5 MEC Remedial Action, Technical Memorandum, Former Fort Ord, California. (OE-1019A). Prepared for U. S. Department of the Army, Sacramento, CA.

Kindt, R. 2016. BiodiversityR: package for community ecology and suitability analysis.

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/

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.

[NCEI NOAA] National Centers for Environmental Information of the National Oceanic and Atmospheric Administration. 2023. 30-Year Normal Precipitation Data for the Monterey Weather Forecast Office. [Internet]. Accessed on January 6, 2024. Available at: https://www.ncei.noaa.gov/access/services/data/v1?dataset=normals-monthly-1991-2020&startDate=0001-01-01&endDate=9996-12-31&stations=USW00023259&format=pdf

[NOAA] National Oceanic and Atmospheric Administration. (2023-2024). Climatological Report (Monthly) for Monterey Airport. National Weather Service. National Weather Service.

[Shaw] Shaw Environmental, Inc. 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. 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. 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.

[Terracon] Terracon Consultants Inc. 2022. 2021 Annual Wetland Vegetation and Wildlife Monitoring Report. Prepared for the Department of the Army, U.S. Army Corps of Engineers, Sacramento, CA.

Terracon. 2023. 2022 Annual Wetland Vegetation and Wildlife Monitoring Report. Prepared for the Department of the Army, U.S. Army Corps of Engineers, Sacramento, CA.

[USACE] 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.

USACE, Sacramento District. 1997. Installation-Wide Multi-Species Habitat Management Plan for Former Fort Ord, California. April. Sacramento, CA.

[USFWS and CDFG] United States 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.

USFWS and CDFG. 2003. Interim Guidance on Site Assessment for Determining the Presence or a Negative Finding of the California Tiger Salamander.

USFWS. 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.

Verberk, W. 2011. Explaining General Patterns in Species Abundance and Distributions. *Nature Education Knowledge* 3(10):38 [Internet]. Accessed October 19, 2021. Available at: https://www.nature.com/scitable/knowledge/library/explaining-general-patterns-in-species-abundance-and-23162842/

Zhang H, John R, Peng Z, Yuan J, Chu C, (eds.) 2012. The Relationship between Species Richness and Evenness in Plant Communities along a Successional Gradient: A Study from Sub-Alpine Meadows of the Eastern Qinghai-Tibetan Plateau, China. Available at: PLoS ONE 7(11): e49024. doi:10.1371/ journal.pone.0049024

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APPENDIX A

Water Quality Results and Inundation Area for Vernal Pools by Month

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Table A-1 Hydrology Results for December Monitoring

Pond	Monitoring Status	Date	Inundated Surface Area (acres)	Max Depth (cm)	Dissolved Oxygen (mg/L)	Temperature (C)	Turbidity (FNU)	pH
5	Reference	2023-12-15	0.3229	6	NS	NS	NS	NS
101EE	Reference	2023-12-15	0	0	-	-	-	-
997	Reference	2023-12-15	0	0	-	-	-	-
76	Year 2, Year 1	2023-12-19	0	0	-	-	-	-
21	Year 2	2023-12-19	0	0	-	-	-	-

NS = Not Surveyed

Table A-2 Hydrology Results for January Monitoring

Pond	Monitoring Status	Date	Inundated Surface Area (acres)	Max Depth (cm)	Dissolved Oxygen (mg/L)	Temperature (C)	Turbidity (FNU)	pH
5	Reference	2024-01-23	3.2522	28	NS	13.88	6.7	6.64
101EE	Reference	2024-01-23	1.4594	34	4.75	15.9	62.1	7.14
997	Reference	2024-01-23	0	0	-	-	-	-
76	Year 2, Year 1	2024-01-23	0	0	-	-	-	-
21	Year 2	2024-01-23	0	0	-	-	-	-

NS = Not Surveyed

Table A-3 Hydrology Results for February Monitoring

Pond	Monitoring Status	Date	Inundated Surface Area (acres)	Max Depth (cm)	Dissolved Oxygen (mg/L)	Temperature (C)	Turbidity (FNU)	pH
5	Reference	2024-02-05	NS	42	NS	NS	NS	NS
101EE	Reference	2024-02-05	NS	47	NS	NS	NS	NS
997	Reference	2024-02-05	NS	21	NS	NS	NS	NS
76	Year 2, Year 1	2024-02-05	NS	16	NS	NS	NS	NS
21	Year 2	2024-02-05	NS	13	NS	NS	NS	NS
5	Reference	2024-02-21	4.8078	62	NS	13.06	19.1	7.63
101EE	Reference	2024-02-21	2.7432	53	2.89	12.53	52.1	7.89
997	Reference	2024-02-21	0.3235	18	6.33	19.5	15.1	8.23
76	Year 2, Year 1	2024-02-21	0.1322	19	5.63	11.24	89.3	7.63
21	Year 2	2024-02-21	0.806	15	4.21	12.89	8.4	7.37

NS = Not Surveyed

Table A-4 Hydrology Results for March Monitoring

Pond	Monitoring Status	Date	Inundated Surface Area (acres)	Max Depth (cm)	Dissolved Oxygen (mg/L)	Temperature (C)	Turbidity (FNU)	pH
5	Reference	2024-03-12	4.7666	60	NS	14.88	25.4	6.8
101EE	Reference	2024-03-12	2.6543	51	0.25	14.84	39.6	7.16
997	Reference	2024-03-12	0.0706	8	4.77	15.05	22.2	6.81
76	Year 2, Year 1	2024-03-13	0.129	18	5.03	10.48	59	7.4
21	Year 2	2024-03-13	0.795	12	3.77	11.47	1.6	6.48

NS = Not Surveyed

Table A-5 Hydrology Results for April Monitoring

Pond	Monitoring Status	Date	Inundated Surface Area (acres)	Max Depth (cm)	Dissolved Oxygen (mg/L)	Temperature (C)	Turbidity (FNU)	pH
5	Reference	2024-04-17	4.7398	60	NS	16.26	73.7	6.7
101EE	Reference	2024-04-17	2.571	49	NS	14.91	34.7	6.84
997	Reference	2024-04-17	0.0159	6	NS	NS	NS	NS
76	Year 2, Year 1	2024-04-18	0.128	20	4.38	15.96	65.5	6.95
21	Year 2	2024-04-18	0.7502	10	7.53	19.02	86.9	6.81

NS = Not Surveyed

Table A-6 Hydrology Results for May Monitoring

Pond	Monitoring Status	Date	Inundated Surface Area (acres)	Max Depth (cm)	Dissolved Oxygen (mg/L)	Temperature (C)	Turbidity (FNU)	pH
76	Year 2, Year 1	2024-05-16	0	0	-	-	-	-
21	Year 2	2024-05-16	0	0	-	-	-	-
5	Reference	2024-05-17	4.2191	46	NS	18.39	23.2	6.75
101EE	Reference	2024-05-17	1.341	34	NS	17.37	33.2	6.28
997	Reference	2024-05-17	0	0	-	-	-	-

NS = Not Surveyed

Table A-7 Hydrology Results for June Monitoring

Pond	Monitoring Status	Date	Inundated Surface Area (acres)	Max Depth (cm)	Dissolved Oxygen (mg/L)	Temperature (C)	Turbidity (FNU)	pH
5	Reference	2024-06-14	3.2776	32	NS	17.33	7.5	6.65
101EE	Reference	2024-06-14	0.0102	8	NS	21.15	312	6.54

NS = Not Surveyed

Table A-8 Hydrology Results for July Monitoring

Pond	Monitoring Status	Date	Inundated Surface Area (acres)	Max Depth (cm)	Dissolved Oxygen (mg/L)	Temperature (C)	Turbidity (FNU)	pH
5	Reference	2024-07-17	0.9407	14	NS	NS	NS	NS
101EE	Reference	2024-04-17	0	0	-	-	-	-

NS = Not Surveyed

Table A-9 Hydrology Results for August Monitoring

Pond	Monitoring Status	Date	Inundated Surface Area (acres)	Max Depth (cm)	Dissolved Oxygen (mg/L)	Temperature (C)	Turbidity (FNU)	pH
5	Reference	2024-08-02	0	0	-	-	-	-

NS = Not Surveyed

APPENDIX B

Vegetation Transect Data

Table B-1. Pond 5 (Reference) Wetland Vegetation Transect Data by Stratum

POND 5			
Date	8/13/2024		
Surveying Personnel	EP, BB, BC		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond 5 held water from December and was dry by the time surveys were completed on 8/13/24. Stratum 1 was repeated from 2016 and 2018-2023. Stratum 3 was repeated from 2016-2023. Stratum 6 was repeated from 2018-2020. Stratum 7 was repeated from 2019-2021. Stratum 10 and its transect were newly established in 2024. Transect 1 was repeated from 2016 and 2018-2022, whereas Transects 3, 6, and 7 were relocated to more representative locations.			

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m		Quadrat #4 @ - m		Quadrat #5 @ - m		Quadrat #6 @ - m	
			Species	**%**	**Species**	**%**	**Species**	**%**	**Species**	**%**	**Species**	**%**	**Species**	**%**
1	**10m**	**30%**	ELMA	90	ELMA	86	ELMA	90	ELMA	88	ELMA	92	ELMA	87
			TH	4	TH	2	TH	2	MALE	2	STAJ	1	MALE	1
			BG	6	BG	12	BG	8	TH	4	CRTR	1	TH	2
									BG	6	TH	1	BG	10
											BG	5		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m		Quadrat #4 @ - m		Quadrat #5 @ - m		Quadrat #6 @ - m	
			Species	**%**	**Species**	**%**	**Species**	**%**	**Species**	**%**	**Species**	**%**	**Species**	**%**
3	**10m**	**24%**	SOAM	4	JUPH	45	SOAM	3	SOAM	2	PSST	2	EPCI	28
			JUPH	7	ELMA	24	POMO	2	POMO	1	ERCA	2	VELAL	10
			PLCO	2	EPCI	5	PSST	3	BAPI	1	LYHY	1	ELMA	33
			PSST	3	POMO	1	ERCA	1	PSST	3	JUPH	13	POMO	1
			ELMA	61	SOAM	1	LYHY	1	GNPA	2	POMO	1	LYHY	1
			LYHY	1	LYHY	1	DISP	6	DISP	2	GNPA	1	ERCA	1
			ERCA	1	PS sp.	1	GNPA	1	ERCA	1	RUAC	1	PSST	2
			POMO	1	TH	20	JUPH	3	AGAV	1	PLCHH	1	SOAM	2
			LYMI	1	BG	2	ELMA	30	ELMA	37	SOAM	1	TH	20
			TH	16			TH	46	TH	48	ELMA	45	BG	2
			BG	3			BG	4	BG	2	TH	30		
											BG	2		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m		Quadrat #4 @ - m		Quadrat #5 @ - m		Quadrat #6 @ - m	
			Species	%	Species	%	Species	%	Species	%	Species	%	Species	%
6	10m	41%	ELMA	65	ELMA	72	ELMA	57	ELMA	65	ELMA	68	ELMA	59
			MALE	2	MALE	1	DISP	16	MALE	2	DISP	10	DISP	14
			DISP	12	DISP	14	POMO	6	POMO	2	MALE	1	MALE	1
			POMO	2	POMO	4	MALE	1	DISP	11	POMO	3	POMO	3
			CRTR	1	TH	6	TH	10	TH	12	TH	12	TH	15
			TH	12	BG	3	BG	10	BG	8	BG	6	BG	8
			BG	6										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m	
			Species	%	Species	%	Species	%
7	5m	5%	JUBA	88	JUBA	91	JUBA	60
			PSST	2	ELMA	4	POMO	1
			ELMA	4	TH	4	LYHY	1
			LYHY	1	BG	1	PS sp.	1
			GNPA	1			BAPI	1
			LYMI	1			SOAM	2
			TH	1			LYMI	1
			BG	2			GNPA	1
							ELMA	8
							TH	20
							BG	4
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m	
			Species	%	Species	%	Species	%
10	5m	1%	HECUO	1	ELMA	8	ELMA	8
			EUOC	65	HECUO	2	EUOC	50
			ELMA	8	GNPA	1	HECUO	2
			GNPA	1	EUOC	70	TH	35
			TH	17	TH	10	BG	5
			BG	8	BG	9		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 5 2024 Species List					
Species Name	**Common Name**	**Species Code**	**Species Name**	**Common Name**	**Species Code**
Acmispon americanus* var. *americanus	Spanish lotus	ACAMA	*Madia sativa*	coast tarweed	MASA
Agrostis avenacea	Pacific bent grass	AGAV	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
Azolla filiculoides	fern-like azolla	AZFI	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Baccharis glutinosa	marsh baccharis	BAGL	*Plantago coronopus*	cut-leaved plantain	PLCO
Briza maxima	rattlesnake grass	BRMA	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Briza minor	annual quaking grass	BRMI	*Potamogeton* sp.	pondweed	PO sp.
Callitriche heterophylla var. *bolanderi*	Bolander's water starwort	CAHEB	*Pseudognaphalium* sp.	cudweed	PS sp.
Carpobrotus edulis	ice plant	CAED	*Pseudognaphalium californicum*	California everlasting	PSCA
Cirsium vulgare	bull thistle	CIVU	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Cressa truxillensis	spreading alkaliweed	CRTR	*Pseudognaphalium ramosissimum*	pink everlasting	PSRA
Cyperus eragrostis	tall cyperus	CYER	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Distichlis spicata	salt grass	DISP	*Quercus agrifolia*	coast live oak	QUAG
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACA	*Ranunculus lobbii*	Lobb's buttercup	RALO
Eleocharis macrostachya	pale spikerush	ELMA	*Rubus ursinus*	California blackberry	RUUR
Elymus triticoides	beardless wild rye	ELTR3	*Rumex acetosella*	sheep sorrel	RUAC
Epilobium ciliatum	fringed willowherb	EPCI	*Rumex crispus*	curly dock	RUCR
Erigeron canadensis	horseweed	ERCA	*Salix lasiolepis*	arroyo willow	SALA6
Erodium botrys	long-beaked filaree	ERBO	*Schoenoplectus californicus*	California bulrush	SCCA
Euthamia occidentalis	western goldenrod	EUOC	*Senecio glomeratus*	cutleaf burnweed	SEGL
Frankenia salina	alkali heath	FRSA	*Solanum americanum*	small-flowered nightshade	SOAM
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO	*Sonchus asper*	prickly sow thistle	SOAS
Helminthotheca echioides	bristly oxtongue	HEEC	*Stachys ajugoides*	bugle hedge nettle	STAJ
Heteromeles arbutifolia	toyon	HEAR	*Stachys bullata*	California hedge nettle	STBU
Isoetes howellii	Howell's quillwort	ISHO	*Toxicodendron diversilobum*	poison oak	TODI
Juncus balticus	Baltic rush	JUBA	*Typha angustifolia*	narrowleaf cattail	TYAN
Juncus phaeocephalus	brown-headed rush	JUPH	*Verbena lasiostachys* var. *lasiostachys*	western vervain	VELAL
Laennecia coulteri	Coulter's horseweed	LACO13	*Zeltnera davyi*	Davy's centuary	ZEDA
Lysimachia arvensis	scarlet pimpernel	LYAR	**Groundcover Codes**		
Lysimachia minima	chaffweed	LYMI	BG	Bare Ground	
Lythrum hyssopifolia	grass poly	LYHY	TH	Thatch/Duff	
Madia gracilis	gumweed	MAGR	AL	Algae	

Table B-2. Pond 101 East (East) (Reference) Wetland Vegetation Transect Data by Stratum

POND 101 East (East)

Date	6/27/2024		
Surveying Personnel	EP, BB		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			

Notes

Pond 101 East (East) held water from January until the June vegetation monitoring event. Biologists identified four strata at the vernal pool (see Table 3 10 and Figure 3 4). Stratum 2 was repeated from 2016, 2018-2020, and 2023. Stratum 3 was repeated from 2016, 2021, and 2022. Stratum 4 was repeated from 2016, 2022, and 2023. Stratum 9 was repeated from 2022. Transects 2 and 3 were relocated because the transect no longer fell within the respective strata. Transect 4 was repeated from the 2021 location. Transect 9 was relocated to a more representative location.Species richness may seem lower this year due to heavy cover from AGAV, making it difficult to see smaller plants.

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m		Quadrat #4 @ - m		Quadrat #5 @ - m		Quadrat #6 @ - m	
			Species	%	Species	%	Species	%	Species	%	Species	%	Species	%
2	10m	5%	ELMA	80	ELMA	77	ELMA	82	ELMA	78	ELMA	85	ELMA	79
			POMO	1	POMO	2	TRSC	3	TRSC	4	TRSC	2	TRSC	1
			TRSC	1	TRSC	1	BG	7	BG	6	POMO	1	AGAV	1
			BG	8	BG	8	TH	8	TH	12	ALSA	1	BG	10
			TH	10	TH	12					BG	4	TH	9
											TH	7		
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m		Quadrat #4 @ - m		Quadrat #5 @ - m		Quadrat #6 @ - m	
			Species	%	Species	%	Species	%	Species	%	Species	%	Species	%
3	10m	61%	AGAV	35	AGAV	43	AGAV	24	AGAV	19	AGAV	20	AGAV	10
			POMO	30	POMO	20	POMO	30	POMO	25	POMO	29	POMO	55
			LYHY	12	MALE	2	MALE	1	MALE	5	MALE	4	MALE	1
			MALE	5	ELMA	1	GNPA	1	GNPA	1	JUBUO	2	LYHY	5
			HECUO	2	LYHY	12	ELMA	1	LYHY	12	LYHY	5	RUCR	2
			RUCR	1	RUCR	2	LYHY	14	ELMA	3	LYMI	2	ELMA	2
			GNPA	2	AZFI	1	STAJ	2	STAJ	1	STAJ	3	GNPA	1
			VEPEX	1	ELACA	1	RUCR	1	RUCR	1	AZFI	1	STAJ	2
			JUBUO	1	GNPA	1	EPCI	1	AZFI	1	RUCR	1	BG	2
			ELMA	2	BG	1	BG	1	BG	4	BG	13	TH	20
			BG	5	TH	16	TH	24	TH	28	TH	20		
			TH	4										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m		Quadrat #4 @ - m		Quadrat #5 @ - m		Quadrat #6 @ - m	
			Species	%	Species	%	Species	%	Species	%	Species	%	Species	%
4	10m	31%	JUBA	40	JUBA	32	JUBA	30	JUBA	37	JUBA	40	JUBA	30
			EUOC	1	RUAC	24	RUAC	35	RUAC	31	RUAC	26	AGAV	15
			RUCR	2	AGAV	8	AGAV	6	AGAV	11	PSLU	1	RUAC	28
			AGAV	12	LYHY	3	LYHY	3	AVBA	1	EUOC	1	BRMI	1
			ERCA	2	SOAS	2	SOOL	1	BRMI	1	POMO	1	PSLU	1
			RUAC	2	PSLU	1	EUOC	1	PSLU	1	BG	6	SOAS	1
			LYHY	1	STAJ	1	POMO	1	LYHY	1	TH	25	BG	3
			SOOL	2	BRHO	1	PSLU	1	BG	4			TH	21
			PSLU	1	EUOC	1	BG	5	TH	13				
			BG	6	BG	11	TH	17						
			TH	31	TH	16								
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m	
			Species	%	Species	%	Species	%
9	5m	3%	MALE	20	MALE	16	MALE	12
			ALSA	16	ALSA	23	ALSA	16
			POMO	11	POMO	6	POMO	13
			LYHY	3	LAGL3	23	LAGL3	22
			LAGL3	12	RUCR	1	RUCR	3
			RUCR	2	ELMA	2	ELMA	3
			ELMA	4	LYHY	1	AGAV	1
			BG	24	BG	20	BG	12
			TH	8	TH	8	TH	18
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 101 East (East) 2024 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Agrostis avenacea	Pacific bent grass	AGAV	*Lonicera involucrata* var. *ledebourii*	black twinberry	LOINL
Agrostis exarata	spike bent grass	AGEX	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Alopecurus saccatus	Pacific foxtail	ALSA	*Lysimachia minima*	chaffweed	LYMI
Avena barbata	slender wild oat	AVBA	*Lythrum hyssopifolia*	grass poly	LYHY
Azolla filiculoides	fern-like azolla	AZFI	*Madia sativa*	coast tarweed	MASA
Baccharis glutinosa	marsh baccharis	BAGL	*Malvella leprosa*	alkali mallow	MALE
Baccharis pilularis	coyote brush	BAPI	*Persicaria lapathifolia*	willoweed	PELA
Briza minor	annual quaking grass	BRMI	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
Bromus hordeaceus	soft chess	BRHO	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Carex praegracilis	clustered field sedge	CAPR	*Potentilla rivalis*	brook cinquefoil	PORI
Cirsium brevistylum	Indian thistle	CIBR	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Cirsium vulgare	bull thistle	CIVU	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Conium maculatum	poison hemlock	COMA	*Rorippa curvisiliqua*	western yellowcress	ROCU
Cynosurus echinatus	bristly dogtail grass	CYEC	*Rumex acetosella*	sheep sorrel	RUAC
Cyperus eragrostis	tall cyperus	CYER	*Rumex crispus*	curly dock	RUCR
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACA	*Rumex fueginus*	golden dock	RUFU
Eleocharis macrostachya	pale spikerush	ELMA	*Rumex salicifolius*	willow dock	RUSA
Epilobium ciliatum	fringed willowherb	EPCI	*Senecio glomeratus*	cutleaf burnweed	SEGL
Erigeron canadensis	horseweed	ERCA	*Solanum americanum*	small-flowered nightshade	SOAM
Erodium botrys	long-beaked filaree	ERBO	*Sonchus asper*	prickly sow thistle	SOAS
Erodium cicutarium	redstem filaree	ERCI	*Sonchus oleraceus*	common sow thistle	SOOL
Euthamia occidentalis	western goldenrod	EUOC	*Stachys ajugoides*	bugle hedge nettle	STAJ
Festuca bromoides	brome fescue	FEBR	*Trifolium microcephalum*	small head clover	TRMI
Festuca perennis	Italian rye grass	FEPE	*Trifolium variegatum*	variegated clover	TRVA
Galium aparine	goose grass	GAAP	*Triglochin scilloides*	flowering quillwort	TRSC
Geranium dissectum	cut-leaved geranium	GEDI	*Verbena lasiostachys* var. *lasiostachys*	western vervain	VELAL
Gnaphalium palustre	lowland cudweed	GNPA	*Veronica peregrina* ssp. *xalapensis*	speedwell	VEPEX
Heliotropium curassavicum var. *oculatum*	Chinese pusley	HECUO	*Vicia sativa* ssp. *nigra*	common vetch	VISAN
Helminthotheca echioides	bristly oxtongue	HEEC	*Vicia sativa* ssp. *sativa*	spring vetch	VISAS
Hypochaeris glabra	smooth cat's-ear	HYGL	Groundcover Codes		
Juncus balticus	Baltic rush	JUBA	BG	Bare Ground	
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	TH	Thatch/Duff	
Juncus bufonius var. *occidentalis*	round-fruited toad rush	JUBUO	AL	Algae	
Juncus phaeocephalus	brown-headed rush	JUPH			

Table B-3. Pond 997 (Reference) Wetland Vegetation Transect Data by Stratum

POND 997			
Date	5/14-5/15/2024		
Surveying Personnel	EP, BB		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Pond 997 held water from February through March 2024. Biologists identified four strata at the vernal pool. Strata 1, 2, and 3 were repeated from 2017-2023, whereas Stratum 5 was repeated from 2018-2020 and 2023. Transect 1 was relocated to avoid the CCG population growing there. Transect 3 was repeated from 2023. Transect 5 was relocated to a more representative area. No transect was placed in Stratum 2 in order to not disturb the CCG population. ***NOTE: ERAR12 is now ERMO (*Eryngium montereyense*)***			

Transect #	**Transect Length**	**Relative %Cover of Wetland**	**Quadrat #1 @ - m**		**Quadrat #2 @ - m**		**Quadrat #3 @ - m**		**Quadrat #4 @ - m**		**Quadrat #5 @ - m**		**Quadrat #6 @ - m**	
			Species	**%**	**Species**	**%**	**Species**	**%**	**Species**	**%**	**Species**	**%**	**Species**	**%**
1	**10m**	**7%**	PLCHH	10	PLCHH	24	PLCHH	24	PLCHH	23	PLCHH	33	PLCHH	30
			ERMO	7	ERMO	10	ERMO	19	ERMO	13	POMO	12	ERMO	24
			JUPH	2	PSTE	10	PSTE	6	POMO	20	ERMO	17	POMO	16
			PSTE	2	TRSC	9	TRSC	4	PSTE	5	PSTE	1	TRSC	5
			POMO	12	POMO	21	POMO	18	LYMI	1	TRSC	8	PSTE	1
			ELMA	1	JUPH	2	JUPH	1	TRSC	7	LYMI	1	LYMI	1
			LYMI	1	LYMI	1	LYMI	1	ELACA	1	BG	5	BG	3
			TRSC	15	BG	12	CRAQ	1	BG	9	TH	23	TH	20
			BG	10	TH	11	LYHY	1	TH	21				
			TH	40			ELACA	1						
							BG	4						
							TH	20						
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m		Quadrat #4 @ - m		Quadrat #5 @ - m		Quadrat #6 @ - m	
			Species	**%**	**Species**	**%**	**Species**	**%**	**Species**	**%**	**Species**	**%**	**Species**	**%**
			JUPH	12	DACA	38	DACA	26	DACA	22	DACA	22	DACA	30
			DACA	9	ERMO	4	JUPH	15	JUPH	6	JUPH	5	JUPH	3
			BRMA	5	MIPA	4	BRMA	5	LYHY	1	BRMA	3	TRSC	3
			BRMI	1	PLCO	2	LYMI	1	HYGL	1	JUBUO	1	ELACA	8
			ERMO	15	BRMA	8	MAGR	3	MAGR	2	BRMI	1	ERMO	5
			ERBO	1	JUPH	3	ERMO	3	RUAC	2	MIPA	1	BRMA	5
			CAAMA3	3	HYGL	1	TRSC	4	BRTET	2	CAAMA3	1	LYMI	1
			LYMI	2	BRTET	1	ERBO	1	BRMA	8	LYHY	1	HYGL	1
			TRSC	3	ISCE	1	ELACA	4	ERMO	4	PLCHH	1	DECO	1
			ELACA	6	ERBO	1	HYGL	2	ACAMA	1	ERMO	6	FEBR	1
			HYGL	2	LYMI	2	FEBR	1	CAAMA3	1	ERBO	1	BRMI	1
3	**10m**	**11%**	LYAR	1	ELACA	3	JUBUO	1	ELACA	6	TRSC	2	LYHY	1
			MAGR	1	MAGR	2	JUCA	1	FEBR	1	LYMI	1	BRTET	1
			JUBUO	1	FEBR	1	BRMI	1	LYMI	1	FEBR	2	ISCE	1
			JUUN	1	BRMI	1	ISCE	1	ISCA	1	ELACA	8	ISCA	1
			MIPA	1	TRSC	3	CAAMA3	1	TRSC	2	ISCE	1	JUBUO	2
			FEBR	1	GEDI	1	ISCA	1	GEDI	1	HYGL	1	ERBO	1
			ISCA	1	LYAR	1	BG	4	ERBO	1	JUBUO	1	LYAR	1
			ISCE	1	JUCA	1	TH	25	BG	5	BG	1	BG	8
			PLCO	2	BG	5			TH	32	TH	40	TH	25
			BG	3	TH	17								
			TH	28										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m		Quadrat #4 @ - m		Quadrat #5 @ - m		Quadrat #6 @ - m	
			Species	%	Species	%	Species	%	Species	%	Species	%	Species	%
5	10m	76%	JUPH	23	JUPH	30	JUPH	24	JUPH	26	JUPH	31	JUPH	20
			BRMA	5	BRMA	5	BRMA	6	BRMA	8	DACA	4	MAGR	3
			BRMI	1	SIMA	3	DECO	8	DECO	3	BRMA	12	ERMO	5
			SIBE	1	LYMI	1	LYMI	3	LYAR	4	MIPA	2	ACAMA	1
			SIMA	1	ERBO	1	ERMO	7	LYMI	6	BRMI	1	LYAR	1
			DECO	7	HYGL	1	LYAR	1	DACA	5	LYMI	3	LYMI	3
			LYAR	1	ERMO	4	BRMI	1	HYGL	3	HYGL	3	HYGL	2
			LYHY	1	GAUS	1	FEBR	1	ERMO	4	LYHY	1	GEDI	1
			GAUS	2	LYAR	1	HYGL	1	FEBR	2	POMO	2	BRMI	3
			CAAMA3	1	FEBR	1	JUBUO	2	JUBUO	2	LYAR	1	BRMA	9
			MAGR	1	DACA	7	ELACA	1	ERBO	2	GAUS	1	POMO	14
			LYMI	2	JUBUO	1	BG	11	CAAMA3	1	ELACA	2	FEBR	1
			MIPA	1	DECO	1	TH	33	BRMI	1	TRIX	1	JUUN	1
			ERBO	1	ISCA	1	TRIX	1	ELACA	3	BG	6	JUBUO	1
			ISCA	1	BG	6			GEDI	1	TH	30	ERBO	1
			HYGL	1	TH	36			MAGR	1			BG	8
			GAPO	1					GAUS	1			TH	26
			TRIX	1					BG	7				
			ELACA	1					TH	20				
			FEBR	1										
			DACA	1										
			TH	38										
			BG	7										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 997 2024 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Aira caryophyllea	silvery hair-grass	AICA	*Juncus uncialis*	inch-high rush	JUUN
Avena barbata	slender wild oat	AVBA	*Lasthenia conjugens*	Contra Costa goldfields	LACO
Baccharis pilularis	coyote brush	BAPI	*Lasthenia glaberrima*	smooth goldfields	LAGL3
Briza maxima	rattlesnake grass	BRMA	*Luzula comosa*	Pacific woodrush	LUCO6
Briza minor	annual quaking grass	BRMI	*Lysimachia arvensis*	scarlet pimpernel	LYAR
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	*Lysimachia minima*	chaffweed	LYMI
Callitriche marginata	California water-starwort	CAMA	*Lythrum hyssopifolia*	grass poly	LYHY
Castilleja ambigua ssp. *ambigua*	Johnny-Nip	CAAMA3	*Madia gracilis*	gumweed	MAGR
Cicendia quadrangularis	timwort	CIQU	*Microseris paludosa*	marsh microseris	MIPA
Cotula coronopifolia	brass buttons	COCO	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Crassula aquatica	aquatic pygmy-weed	CRAQ	*Plantago coronopus*	cut-leaved plantain	PLCO
Danthonia californica	California oat grass	DACA	*Plantago lanceolata*	English plantain	PLLA
Deinandra corymbosa	coastal tarweed	DECO	*Pogogyne zizyphoroides*	Sacramento mesa mint	POZI
Distichlis spicata	salt grass	DISP	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACA	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Eleocharis macrostachya	pale spikerush	ELMA	*Pseudognaphalium* sp.		PS sp.
Erodium botrys	long-beaked filaree	ERBO	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Eryngium montereyense	coyote thistle	ERMO	*Psilocarphus tenellus*	slender woolly-marbles	PSTE
Festuca bromoides	brome fescue	FEBR	*Quercus agrifolia*	coast live oak	QUAG
Festuca perennis	Italian rye grass	FEPE	*Rumex acetosella*	sheep sorrel	RUAC
Frangula californica	California coffeeberry	FRCA12	*Senecio glomeratus*	cutleaf burnweed	SEGL
Galium aparine	goose grass	GAAP	*Sidalcea malviflora* ssp. *malviflora*	checkerbloom	SIMAM
Galium porrigens	climbing bedstraw	GAPO	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Gamochaeta ustulata	purple cudweed	GAUS	*Sonchus asper*	prickly sow thistle	SOAS
Geranium dissectum	cut-leaved geranium	GEDI	*Sonchus oleraceus*	common sow thistle	SOOL
Heterocodon rariflorum	western pearlflower	HERA	*Taraxia ovata*	sun cups	TAOV
Horkelia cuneata var. *cuneata*	wedge-leaved horkelia	HOCUC	*Toxicodendron diversilobum*	poison oak	TODI
Hypochaeris glabra	smooth cat's-ear	HYGL	*Triglochin scilloides*	flowering quillwort	TRSC
Hypochaeris radicata	rough cat's-ear	HYRA	*Triteleia ixioides*	coast pretty face	TRIX
Isolepis carinata	keeled bulrush	ISCA	*Zeltnera davyi*	Davy's centuary	ZEDA
Isolepis cernua	low bulrush	ISCE	Groundcover Codes		
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	BG	Bare Ground	
Juncus bufonius var. *occidentalis*	round-fruited toad rush	JUBUO	TH	Thatch/Duff	
Juncus capitatus	dwarf rush	JUCA	AL	Algae	

Table B-4. Pond 21 (Year 1 Post-Mastification and Post-Subsurface Munitions Remediation) Wetland Vegetation Transect Data by Stratum

POND 21			
Date	5/30/2024		
Surveying Personnel	EP. BB		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Pond 21 held water from February through May 2024. Biologists identified four strata at the vernal pool. Strata 1 and 2 were repeated from 2019 and 2023. Stratum 3 was repeated from 2023. Stratum 4 and its associated transect were identified and established in 2024. Transects 1 and 2 were relocated to more representative locations; additionally Transect 1 was increased from 5m to 10m. transect 3 was repeated from 2023.			

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m		Quadrat #4 @ - m		Quadrat #5 @ - m		Quadrat #6 @ - m	
			Species	%	Species	%	Species	%	Species	%	Species	%	Species	%
1	10m	63%	ERMO	61	ERMO	69	ERMO	65	ERMO	35	ERMO	60	JUPH	29
			JUPH	3	JUPH	4	JUPH	4	JUPH	5	JUPH	3	ELMA	35
			ELMA	3	ELMA	1	ELMA	1	ELMA	3	ELMA	5	LAGL3	12
			LAGL3	4	LAGL3	2	LAGL3	3	LAGL3	10	HOBRB	2	HOBRB	1
			POMO	4	ELACA	7	ELACA	3	HOBRB	1	LAGL3	3	PLCHH	1
			ELACA	7	POMO	1	ELACA	1	RACA	1	ELACA	7	ELACA	2
			PLCHH	1	DEDA	1	PLCHH	1	ELACA	3	BG	6	BG	4
			RACA	1	RACA	1	BG	7	PLCHH	1	TH	14	TH	16
			BG	6	BG	6	TH	15	BG	4				
			TH	10	TH	8			TH	37				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m		Quadrat #4 @ - m		Quadrat #5 @ - m		Quadrat #6 @ - m	
			Species	%	Species	%	Species	%	Species	%	Species	%	Species	%
2	10m	29%	ERMO	55	ERMO	61	ERMO	55	ERMO	63	ERMO	59	ERMO	44
			POMO	9	POMO	5	POMO	9	POMO	12	POMO	11	POMO	15
			JUPH	6	JUPH	3	JUPH	8	JUPH	2	JUPH	5	JUPH	10
			BRHO	1	RACA	1	ELMA	5	GEDI	1	BRMI	1	LAGL3	2
			AICA	1	GEDI	1	LAGL3	2	ELACA	4	AICA	1	HYGL	3
			BRMI	1	ELMA	5	BRHO	1	HYGL	1	ELACA	10	GEDI	1
			GEDI	2	ELACA	2	GEDI	1	DEDA	1	BRHO	1	BRHO	1
			ELACA	6	LYMI	1	ELACA	2	BRMI	1	GEDI	1	ELACA	7
			JUBUO	1	BRHO	1	LYHY	1	FEBR	1	SEGL	1	PLCHH	1
			LYAR	1	BRMI	1	FEBR	1	BRHO	1	CIBR	1	AICA	1
			MALE	1	FEBR	1	BG	6	TRBA	1	BG	3	ELMA	1
			LYMI	1	BG	5	TH	9	TRVA	1	TH	6	DEDA	1
			LYHY	1	TH	13			AICA	1			BG	4
			FEBR	1					TRSC	1			TH	9
			BG	7					LYAR	1				
			TH	6					BG	4				
									TH	4				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m	
			Species	%	Species	%	Species	%
3	5m	3%	CABA	45	CABA	50	CABA	50
			BAPI	1	POMO	10	POMO	12
			GEDI	1	BRMI	1	BRMI	1
			POMO	3	FEBR	1	FEBR	1
			BRMI	1	ERCA	1	GEDI	1
			FEBR	1	BG	3	BAPI	1
			SACR	1	TH	34	BG	6
			ERCA	1			TH	28
			GAUS	1				
			BG	7				
			TH	38				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m	
			Species	%	Species	%	Species	%
4	5m	2%	JUPH	50	JUPH	50	JUPH	44
			RUSA	5	BG	1	RUSA	3
			BG	1	TH	49	BG	3
			TH	44			TH	50
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Pond 21 2024 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Acmispon americanus var. *americanus*	Spanish lotus	ACAMA	*Lysimachia minima*	chaffweed	LYMI
Acmispon parviflorus	hill lotus	ACPA	*Lythrum hyssopifolia*	grass poly	LYHY
Agrostis exarata	spike bent grass	AGEX	*Madia exigua*	small tarweed	MAEX
Aira caryophyllea	silvery hair-grass	AICA	*Madia gracilis*	gumweed	MAGR
Arctostaphylos hookeri	Hooker's manzanita	ARHO	*Madia sativa*	coast tarweed	MASA
Arctostaphylos tomentosa ssp. *tomentosa*	woolly leaf manzanita	ARTOT	*Malvella leprosa*	alkali mallow	MALE
Avena barbata	slender wild oat	AVBA	*Phalaris lemmonii*	Lemmon's canary grass	PHLE
Baccharis pilularis	coyote brush	BAPI	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Briza minor	annual quaking grass	BRMI	*Pogogyne serpylloides*	thymeleaf beardstyle	POSE2
Bromus hordeaceus	soft chess	BRHO	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Carex barbarae	whiteroot	CABA	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Carex pachystachya	chamisso sedge	CAPA	*Pseudognaphalium ramosissimum*	pink everlasting	PSRA
Cicendia quadrangularis	timwort	CIQU	*Pseudognaphalium stramineum*	cottonbatting plant	PSST
Cirsium brevistylum	Indian thistle	CIBR	*Quercus agrifolia*	coast live oak	QUAG
Clinopodium douglasii	yerba buena	CLDO	*Ranunculus californicus*	California buttercup	RACA
Danthonia californica	California oat grass	DACA	*Ribes speciosum*	fuchsia-flower gooseberry	RISP
Deinandra corymbosa	coastal tarweed	DECO	*Rumex conglomeratus*	clustered dock	RUCO
Deschampsia danthonioides	annual hair grass	DEDA	*Rumex salicifolius*	willow dock	RUSA
Drymocallis glandulosa var. *wrangelliana*	sticky cinquefoil	DRGLW	*Sagina apetala*	annual pearlwort	SAAP
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACA	*Sanicula crassicaulis*	Pacific sanicle	SACR
Eleocharis macrostachya	pale spikerush	ELMA	*Senecio glomeratus*	cutleaf burnweed	SEGL
Erigeron canadensis	horseweed	ERCA	*Silybum marianum*	milk thistle	SIMA
Eryngium montereyense	coyote thistle	ERMO	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Festuca bromoides	brome fescue	FEBR	*Sonchus asper*	prickly sow thistle	SOAS
Festuca myuros	rattail sixweeks grass	FEMY	*Sonchus oleraceus*	common sow thistle	SOOL
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	*Trifolium depauperatum*	sack clover	TRDE
Heterocodon rariflorum	western pearlflower	HERA	*Trifolium microcephalum*	small head clover	TRMI
Hordeum brachyantherum ssp. *brachyantherum*	meadow barley	HOBRB	*Trifolium variegatum*	variegated clover	TRVA
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	HOMAG	*Triglochin scilloides*	flowering quillwort	TRSC
Hypochaeris glabra	smooth cat's-ear	HYGL	*Uropappus lindleyi*	silver puffs	URLI5
Hypochaeris radicata	rough cat's-ear	HYRA	*Verbena lasiostachys* var. *lasiostachys*	western vervain	VELAL
Juncus bufonius var. *occidentalis*	round-fruited toad rush	JUBUO	*Zeltnera davyi*	Davy's centuary	ZEDA
Juncus occidentalis	western rush	JUOC	**Groundcover Codes**		
Juncus patens	spreading rush	JUPA	BG	Bare Ground	
Juncus phaeocephalus	brown-headed rush	JUPH	TH	Thatch/Duff	
Lasthenia glaberrima	smooth goldfields	LAGL3	AL	Algae	
Logfia gallica	narrowleaf cottonrose	LOGA			

Table B-5. Pond 76 (Year 1 Post-Mastification) Wetland Vegetation Transect Data by Stratum

POND 76			
Date	5/22/2024		
Surveying Personnel	EP, BB		
Vegetation Type	**% Cover**	**Species**	**Notes**
Emergent Vegetation			
Floating Vegetation			
Submerged Vegetation			
Open Water			
Notes			
Pond 76 held water from February to March, 2024. Biologists identified three strata at the vernal pool. Strata 1, 2, and 3 were repeated from 2023. Transects 1, 2, and 3 were all relocated because they no longer fell within the strata.			

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m		Quadrat #4 @ - m		Quadrat #5 @ - m		Quadrat #6 @ - m	
			Species	%	Species	%	Species	%	Species	%	Species	%	Species	%
1	10m	39%	PLCHH	20	PLCHH	7	PLCHH	6	PLCHH	9	PLCHH	16	PLCHH	5
			ERMO	35	ERMO	50	ERMO	45	ERMO	45	ERMO	38	ERMO	40
			ELACA	18	ELACA	16	JUPH	7	JUPH	5	ELACA	18	ELACA	12
			DEDA	1	JUPH	3	ELACA	4	ELACA	7	LYMI	2	POMO	16
			LYMI	1	LYMI	1	LYMI	1	POMO	13	DEDA	2	DEDA	1
			POMO	6	POMO	2	POMO	18	LYMI	1	POMO	6	LYMI	1
			JUPH	2	DEDA	1	DEDA	1	DEDA	1	BG	6	BG	4
			BG	5	BG	9	BG	5	BG	9	TH	12	TH	21
			TH	12	TH	11	TH	13	TH	10				
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m		Quadrat #4 @ - m		Quadrat #5 @ - m		Quadrat #6 @ - m	
			Species	%	Species	%	Species	%	Species	%	Species	%	Species	%
2	10m	26%	JUPH	27	JUPH	22	JUPH	21	ERMO	42	JUPH	35	JUPH	41
			ERMO	30	ERMO	18	ERMO	22	JUPH	8	ERMO	11	ERMO	20
			PLCHH	2	PLCHH	1	PLCHH	1	ELACA	6	GAUS	2	ELACA	8
			HYGL	1	ELACA	1	LYMI	1	LYMI	1	ELACA	1	GAUS	3
			LYMI	1	LYMI	1	ELACA	4	HYGL	1	BG	8	LYMI	1
			ELACA	2	POMO	1	BG	8	POMO	1	TH	43	BAPI	1
			POMO	1	BG	8	TH	43	BG	14			BG	6
			BG	21	TH	48			TH	27			TH	20
			TH	15										
			TOTAL	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**	**TOTAL**	**100**

Transect #	Transect Length	Relative %Cover of Wetland	Quadrat #1 @ - m		Quadrat #2 @ - m		Quadrat #3 @ - m	
			Species	%	Species	%	Species	%
3	5m	35%	POMO	53	POMO	50	POMO	49
			PLCHH	2	JUPH	7	JUPH	3
			JUPH	5	PLCHH	2	HYGL	1
			ERMO	7	POZI	15	DEDA	1
			ELACA	8	ELACA	9	ELACA	9
			BRMI	1	LYMI	2	POZI	14
			ACPA	1	HYGL	1	LYMI	1
			LYMI	1	BRMI	1	PLCHH	1
			FEMY	1	FEBR	1	AICA	1
			BG	3	BG	4	BRMI	1
			TH	18	TH	8	FEBR	1
							ERMO	2
							FEMY	1
							BG	5
							TH	10
			TOTAL	100	TOTAL	100	TOTAL	100

Pond 76 2024 Species List

Species Name	Common Name	Species Code	Species Name	Common Name	Species Code
Aira caryophyllea	silvery hair-grass	AICA	*Lysimachia minima*	chaffweed	LYMI
Baccharis pilularis	coyote brush	BAPI	*Lythrum hyssopifolia*	grass poly	LYHY
Briza minor	annual quaking grass	BRMI	*Madia exigua*	small tarweed	MAEX
Bromus hordeaceus	soft chess	BRHO	*Madia sativa*	coast tarweed	MASA
Cirsium brevistylum	Indian thistle	CIBR	*Plagiobothrys chorisianus* var. *hickmanii*	Hickman's popcornflower	PLCHH
Danthonia californica	California oat grass	DACA	*Pogogyne zizyphoroides*	Sacramento mesa mint	POZI
Deschampsia danthonioides	annual hair grass	DEDA	*Polypogon monspeliensis*	rabbitfoot grass	POMO
Drymocallis glandulosa var. *wrangelliana*	sticky cinquefoil	DRGLW	*Pseudognaphalium luteoalbum*	weedy cudweed	PSLU
Eleocharis acicularis var. *acicularis*	needle spikerush	ELACA	*Psilocarphus chilensis*	round woolly-marbles	PSCH
Eleocharis macrostachya	pale spikerush	ELMA	*Quercus agrifolia*	coast live oak	QUAG
Erigeron canadensis	horseweed	ERCA	*Rumex salicifolius*	willow dock	RUSA
Eryngium montereyense	coyote thistle	ERMO	*Senecio glomeratus*	cutleaf burnweed	SEGL
Festuca bromoides	brome fescue	FEBR	*Sisyrinchium bellum*	western blue-eyed grass	SIBE
Festuca myuros	rattail sixweeks grass	FEMY	*Sonchus oleraceus*	common sow thistle	SOOL
Gamochaeta ustulata	purple cudweed	GAUS	*Trifolium microcephalum*	small head clover	TRMI
Geranium dissectum	cut-leaved geranium	GEDI	*Triglochin scilloides*	flowering quillwort	TRSC
Hypochaeris glabra	smooth cat's-ear	HYGL	*Uropappus lindleyi*	silver puffs	URLI5
Hypochaeris radicata	rough cat's-ear	HYRA	**Groundcover Codes**		
Juncus balticus	Baltic rush	JUBA	BG	Bare Ground	
Juncus bufonius var. *occidentalis*	round-fruited toad rush	JUBUO	TH	Thatch/Duff	
Juncus patens	spreading rush	JUPA	AL	Algae	
Juncus phaeocephalus	brown-headed rush	JUPH			

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APPENDIX C

Stratum Cover by Vernal Pool

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Table C-1. Pond 5 (Reference) Wetland Vegetation Cover by Stratum

POND 5				
Stratum	**Relative % Cover of Wetland**	**Species Code**	**Species Common Name**	**% Cover**
1	**29.7%**	CRTR	spreading alkaliweed	0.2
		ELMA	pale spikerush	88.8
		MALE	alkali mallow	0.5
		STAJ	bugle hedge nettle	0.2
		TH	Thatch	2.5
		BG	Bare Ground	7.8
		TOTAL		**100.0**
3	**23.7%**	AGAV	Pacific bent grass	0.2
		BAPI	coyote brush	0.2
		DISP	salt grass	1.3
		ELMA	pale spikerush	38.3
		EPCI	fringed willowherb	5.5
		ERCA	horseweed	1.0
		GNPA	lowland cudweed	0.7
		JUPH	brown-headed rush	11.3
		LYHY	grass poly	0.8
		LYMI	chaffweed	0.2
		PLCHH	Hickman's popcornflower	0.2
		PLCO	cut-leaved plantain	0.3
		POMO	rabbitfoot grass	1.2
		PS sp.	cudweed	0.2
		PSST	cottonbatting plant	2.2
		RUAC	sheep sorrel	0.2
		SOAM	small-flowered nightshade	2.2
		VELAL	western vervain	1.7
		TH	Thatch	30.0
		BG	Bare Ground	2.5
		TOTAL		**100.0**

Table C-1 (continued). Pond 5 (Reference) Wetland Vegetation Cover by Stratum

POND 5				
Stratum	**Relative % Cover of Wetland**	**Species Code**	**Species Common Name**	**% Cover**
6	**40.6%**	ELMA	pale spikerush	64.3
		MALE	alkali mallow	1.3
		DISP	salt grass	12.8
		POMO	rabbitfoot grass	3.3
		CRTR	spreading alkaliweed	0.2
		TH	Thatch	11.2
		BG	Bare Ground	6.8
		TOTAL		**100.0**
7	**4.9%**	BAPI	coyote brush	0.3
		ELMA	pale spikerush	5.3
		GNPA	lowland cudweed	0.7
		JUBA	Baltic rush	79.7
		LYHY	grass poly	0.7
		LYMI	chaffweed	0.7
		POMO	rabbitfoot grass	0.3
		PS sp.	cudweed	0.3
		PSST	cottonbatting plant	0.7
		SOAM	small-flowered nightshade	0.7
		TH	Thatch	8.3
		BG	Bare Ground	2.3
		TOTAL		**100.0**
10	**1.1%**	ELMA	pale spikerush	8.0
		EUOC	western goldenrod	61.7
		GNPA	lowland cudweed	0.7
		HECUO	Chinese pusley	1.7
		TH	Thatch	20.7
		BG	Bare Ground	7.3
		TOTAL		**100.0**

Table C-2. Pond 101 East (East) (Reference) Wetland Vegetation Cover by Stratum

POND 101 East (East)				
Stratum	**Relative % Cover of Wetland**	**Species Code**	**Species Common Name**	**% Cover**
2	**5%**	AGAV	Pacific bent grass	0.2
		ALSA	Pacific foxtail	0.2
		ELMA	pale spikerush	80.2
		POMO	rabbitfoot grass	0.7
		TRSC	flowering quillwort	2.0
		TH	Thatch	9.7
		BG	Bare Ground	7.2
		TOTAL		**100.0**
3	**61%**	AGAV	Pacific bent grass	25.2
		AZFI	fern-like azolla	0.5
		ELACA	needle spikerush	0.2
		ELMA	pale spikerush	1.5
		EPCI	fringed willowherb	0.2
		GNPA	lowland cudweed	1.0
		HECUO	Chinese pusley	0.3
		JUBUO	round-fruited toad rush	0.5
		LYHY	grass poly	10.0
		LYMI	chaffweed	0.3
		MALE	alkali mallow	3.0
		POMO	rabbitfoot grass	31.5
		RUCR	curly dock	1.3
		STAJ	bugle hedge nettle	1.3
		VEPEX	speedwell	0.2
		TH	Thatch	18.7
		BG	Bare Ground	4.3
		TOTAL		**100.0**

Table C-2 (continued). Pond 101 East (East) (Reference) Wetland Vegetation Cover by Stratum

POND 101 East (East)				
Stratum	**Relative % Cover of Wetland**	**Species Code**	**Species Common Name**	**% Cover**
4	**31%**	AGAV	Pacific bent grass	8.7
		AVBA	slender wild oat	0.2
		BRHO	soft chess	0.2
		BRMI	annual quaking grass	0.3
		ERCA	horseweed	0.3
		EUOC	western goldenrod	0.7
		JUBA	Baltic rush	34.8
		LYHY	grass poly	1.3
		POMO	rabbitfoot grass	0.3
		PSLU	weedy cudweed	1.0
		RUAC	sheep sorrel	24.3
		RUCR	curly dock	0.3
		SOAS	prickly sow thistle	0.5
		SOOL	common sow thistle	0.5
		STAJ	bugle hedge nettle	0.2
		TH	Thatch	20.5
		BG	Bare Ground	5.8
		TOTAL		**100.0**
9	**3%**	AGAV	Pacific bent grass	0.3
		ALSA	Pacific foxtail	18.3
		ELMA	pale spikerush	3.0
		LAGL3	smooth goldfields	19.0
		LYHY	grass poly	1.3
		MALE	alkali mallow	16.0
		POMO	rabbitfoot grass	10.0
		RUCR	curly dock	2.0
		TH	Thatch	11.3
		BG	Bare Ground	18.7
		TOTAL		**100.0**

Table C-3. Pond 997 (Reference) Wetland Vegetation Cover by Stratum

POND 997				
Stratum	**Relative % Cover of Wetland**	**Species Code**	**Species Common Name**	**% Cover**
1	**7.3%**	CRAQ	aquatic pygmy-weed	0.2
		ELACA	needle spikerush	0.3
		ELMA	pale spikerush	0.2
		ERMO	coyote thistle	15.0
		JUPH	brown-headed rush	0.8
		LYHY	grass poly	0.2
		LYMI	chaffweed	1.0
		PLCHH	Hickman's popcornflower	24.0
		POMO	rabbitfoot grass	16.5
		PSTE	slender woolly-marbles	4.2
		TRSC	flowering quillwort	8.0
		TH	Thatch	22.5
		BG	Bare Ground	7.2
		TOTAL		**100.0**
2 (CCG)	**3.1%**	**-**	**-**	**-**
3	**11.3%**	ACAMA	Spanish lotus	0.2
		BRMA	rattlesnake grass	5.7
		BRMI	annual quaking grass	0.8
		BRTET	dwarf brodiaea	0.7
		CAAMA3	Johnny-Nip	1.0
		DACA	California oat grass	24.5
		DECO	coastal tarweed	0.2
		ELACA	needle spikerush	5.8
		ERBO	long-beaked filaree	1.0
		ERMO	coyote thistle	6.2
		FEBR	brome fescue	1.2
		GEDI	cut-leaved geranium	0.3
		HYGL	smooth cat's-ear	1.3
		ISCA	keeled bulrush	0.7
		ISCE	low bulrush	0.8
		JUBUO	round-fruited toad rush	1.0
		JUCA	dwarf rush	0.3
		JUPH	brown-headed rush	7.3
		JUUN	inch-high rush	0.2
		LYAR	scarlet pimpernel	0.5
		LYHY	grass poly	0.5
		LYMI	chaffweed	1.3
		MAGR	gumweed	1.3
		MIPA	marsh microseris	1.0
		PLCHH	Hickman's popcornflower	0.2
		PLCO	cut-leaved plantain	0.7
		RUAC	sheep sorrel	0.3
		TRSC	flowering quillwort	2.8
		TH	Thatch	27.8
		BG	Bare Ground	4.3
		TOTAL		**100.0**

Table C-3 (continued). Pond 997 (Reference) Wetland Vegetation Cover by Stratum

POND 997				
Stratum	**Relative % Cover of Wetland**	**Species Code**	**Species Common Name**	**% Cover**
5	**76.4%**	ACAMA	Spanish lotus	0.2
		BRMA	rattlesnake grass	7.5
		BRMI	annual quaking grass	1.2
		CAAMA3	Johnny-Nip	0.3
		DACA	California oat grass	2.8
		DECO	coastal tarweed	3.2
		ELACA	needle spikerush	1.2
		ERBO	long-beaked filaree	0.8
		ERMO	coyote thistle	3.3
		FEBR	brome fescue	1.0
		GAPO	climbing bedstraw	0.2
		GAUS	purple cudweed	0.8
		GEDI	cut-leaved geranium	0.3
		HYGL	smooth cat's-ear	1.8
		ISCA	keeled bulrush	0.3
		JUBUO	round-fruited toad rush	1.0
		JUPH	brown-headed rush	25.7
		JUUN	inch-high rush	0.2
		LYAR	scarlet pimpernel	1.5
		LYHY	grass poly	0.3
		LYMI	chaffweed	3.0
		MAGR	gumweed	0.8
		MIPA	marsh microseris	0.5
		POMO	rabbitfoot grass	2.7
		SIBE	western blue-eyed grass	0.2
		SIMA	milk thistle	0.7
		TRIX	coast pretty face	0.5
		TH	Thatch	30.5
		BG	Bare Ground	7.5
		TOTAL		**100.0**
Upland	**1.9%**	-	-	-

Table C-4. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 21				
Stratum	**Relative % Cover of Wetland**	**Species Code**	**Species Common Name**	**% Cover**
1	**63%**	DEDA	annual hair grass	0.2
		ELACA	needle spikerush	5.0
		ELMA	pale spikerush	8.0
		ERMO	coyote thistle	48.3
		HOBRB	meadow barley	0.7
		JUPH	brown-headed rush	8.0
		LAGL3	smooth goldfields	5.7
		PLCHH	Hickman's popcornflower	0.7
		POMO	rabbitfoot grass	0.8
		RACA	California buttercup	0.5
		TH	Thatch	16.7
		BG	Bare Ground	5.5
		TOTAL		**100.0**
2	**29%**	AICA	silvery hair-grass	0.7
		BRHO	soft chess	1.0
		BRMI	annual quaking grass	0.7
		CIBR	Indian thistle	0.2
		DEDA	annual hair grass	0.3
		ELACA	needle spikerush	5.2
		ELMA	pale spikerush	1.8
		ERMO	coyote thistle	56.2
		FEBR	brome fescue	0.7
		GEDI	cut-leaved geranium	1.2
		HYGL	smooth cat's-ear	0.7
		JUBUO	round-fruited toad rush	0.2
		JUPH	brown-headed rush	5.7
		LAGL3	smooth goldfields	0.7
		LYAR	scarlet pimpernel	0.3
		LYHY	grass poly	0.3
		LYMI	chaffweed	0.3
		MALE	alkali mallow	0.2
		PLCHH	Hickman's popcornflower	0.2
		POMO	rabbitfoot grass	10.2
		RACA	California buttercup	0.2
		SEGL	cutleaf burnweed	0.2
		TRBA	bearded clover	0.2
		TRSC	flowering quillwort	0.2
		TRVA	variegated clover	0.2
		TH	Thatch	7.8
		BG	Bare Ground	4.8
		TOTAL		**100.0**

Table C-4 (continued). Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) Wetland Vegetation Cover by Stratum

POND 21				
Stratum	**Relative % Cover of Wetland**	**Species Code**	**Species Common Name**	**% Cover**
3	**3%**	BAPI	coyote brush	0.7
		BRMI	annual quaking grass	1.0
		CABA	whiteroot	48.3
		ERCA	horseweed	0.7
		FEBR	brome fescue	1.0
		GAUS	purple cudweed	0.3
		GEDI	cut-leaved geranium	0.7
		POMO	rabbitfoot grass	8.3
		SACR	Pacific sanicle	0.3
		TH	Thatch	33.3
		BG	Bare Ground	5.3
		TOTAL		**100.0**
4	**2%**	JUPH	brown-headed rush	48.0
		RUSA	willow dock	2.7
		TH	Thatch	47.7
		BG	Bare Ground	1.7
		TOTAL		**100.0**
Upland	**3%**	**-**	**-**	**-**

Table C-5. Pond 76 (Year 2 Post-Mastication) Wetland Vegetation Cover by Stratum

POND 76				
Stratum	**Relative % Cover of Wetland**	**Species Code**	**Species Common Name**	**% Cover**
1	**39%**	DEDA	annual hair grass	1.2
		ELACA	needle spikerush	12.5
		ERMO	coyote thistle	42.2
		JUPH	brown-headed rush	2.8
		LYMI	chaffweed	1.2
		PLCHH	Hickman's popcornflower	10.5
		POMO	rabbitfoot grass	10.2
		TH	Thatch	13.2
		BG	Bare Ground	6.3
		TOTAL		**100.0**
Stratum	**Relative % Cover of Wetland**	**Species Code**	**Species Common Name**	**% Cover**
2	**26%**	BAPI	coyote brush	0.2
		ELACA	needle spikerush	3.7
		ERMO	coyote thistle	23.8
		GAUS	purple cudweed	0.8
		HYGL	smooth cat's-ear	0.3
		JUPH	brown-headed rush	25.7
		LYMI	chaffweed	0.8
		PLCHH	Hickman's popcornflower	0.7
		POMO	rabbitfoot grass	0.5
		TH	Thatch	32.7
		BG	Bare Ground	10.8
		TOTAL		**100.0**
Stratum	**Relative % Cover of Wetland**	**Species Code**	**Species Common Name**	**% Cover**
3	**35%**	ACPA	hill lotus	0.3
		AICA	silvery hair-grass	0.3
		BRMI	annual quaking grass	1.0
		DEDA	annual hair grass	0.3
		ELACA	needle spikerush	8.7
		ERMO	coyote thistle	3.0
		FEBR	brome fescue	0.7
		FEMY	rattail sixweeks grass	0.7
		HYGL	smooth cat's-ear	0.7
		JUPH	brown-headed rush	5.0
		LYMI	chaffweed	1.3
		PLCHH	Hickman's popcornflower	1.7
		POMO	rabbitfoot grass	50.7
		POZI	Sacramento mesa mint	9.7
		TH	Thatch	12.0
		BG	Bare Ground	4.0
		TOTAL		**100.0**

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APPENDIX D

CTS and Aquatic Invertebrate Data from Aquatic Surveys at Vernal Pools Monitored in 2024

Table D-1. CTS Aquatic Survey Results for Vernal Pools Monitored in 2024 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	3/12/2024†	6	6	23.5	15-26	25	-	-	-	10 hrs 40 min
	4/17/2024	33	30	46	29-66	54	28	15-40	31	8 hrs 32 min
	5/15/2024	3	3	61	56-71	56	34	31-38	-	8 hrs 45 min
101 East (East)	3/12/2024	180	30	30	12-47	45	16	5-30	21	5 hrs
	4/17/2024	82	30	62	30-105	52	34	12-56	25	5 hrs
	5/15/2024	93	30	90	56-135	66	50	28-75	40	3 hrs 42 min
997	3/13/2024	0	-	-	-	-	-	-	-	4 min
	4/18/2024	DRY	-	-	-	-	-	-	-	-
21	3/13/2024	0	-	-	-	-	-	-	-	2 hrs 15 min
	4/18/2024	0	-	-	-	-	-	-	-	1 hr 50 min
	5/16/2024	DRY	-	-	-	-	-	-	-	-
76	3/13/2024	0	-	-	-	-	-	-	-	24 min
	4/18/2024	0	-	-	-	-	-	-	-	28 min
	5/16/2014	DRY	-	-	-	-	-	-	-	-

*The mean was rounded to the nearest whole number
†CTS too small to determine SVL during March survey

Table D-2. Aquatic Invertebrates Observed During Aquatic Surveys at Vernal Pools Monitored in 2024

Vernal Pool	Aquatic Invertebrate																	
	CA Fairy Shrimp (Order Anostraca)	Clam Shrimp (Order Spinicaudata)	Water Flea (Order Cladocera)	Seed Shrimp (Order Ostracoda)	Copepods (Order Eucopepoda)	Scuds (Order Amphipoda)	Mayfly Larvae (Order Ephemeroptera)	Dragonfly Larvae (Sub-order Anisoptera)	Damselfly Larvae (Sub-order Zygoptera)	Backswimmer (Family Notonectidae)	Waterboatmen (Family Corixidae)	Predaceous Diving Beetle (Family Dytiscidae)	Giant Water Bug (Family Belostomatidae)	Water Scorpion (Family Nepidae)	Mosquito Larvae (Family Culicidae)	Water Scavenger Beetle (Family Hydrophilidae)	Dipteran Larvae (Order Diptera)	Snail (Class Gastropoda)
5	-	●	●	●	●	●	●	●	●	●	●	-	-	-	●	●	●	●
101 East (East)	-	●	●	●	●	●	●	●	●	●	●	●	●	-	●	●	●	●
997	-	●	●	●	-	-	●	-	-	-	-	●	-	-	●	●	●	-
21	-	●	●	-	●	-	●	●	●	●	●	●	-	-	●	●	●	●
76	●	●	●	●	●	-	●	●	-	●	●	●	-	-	●	●	●	-

Table D-3. Fairy Shrimp Aquatic Survey Results for Vernal Pools Monitored in 2024 at Former Fort Ord

Vernal Pool	Sampling Date	Abundance (# of Individuals)
5	3/12/2024, 4/17/2024, 5/15/2024	Not detected
101 East (East)	3/12/2024, 4/17/2024, 5/15/2024	Not detected
997	3/13/2024	Not detected
21	3/13/2024, 4/18/2024	Not detected
76	3/13/2024, 4/18/2024	Low (13)

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APPENDIX E

Site Photos

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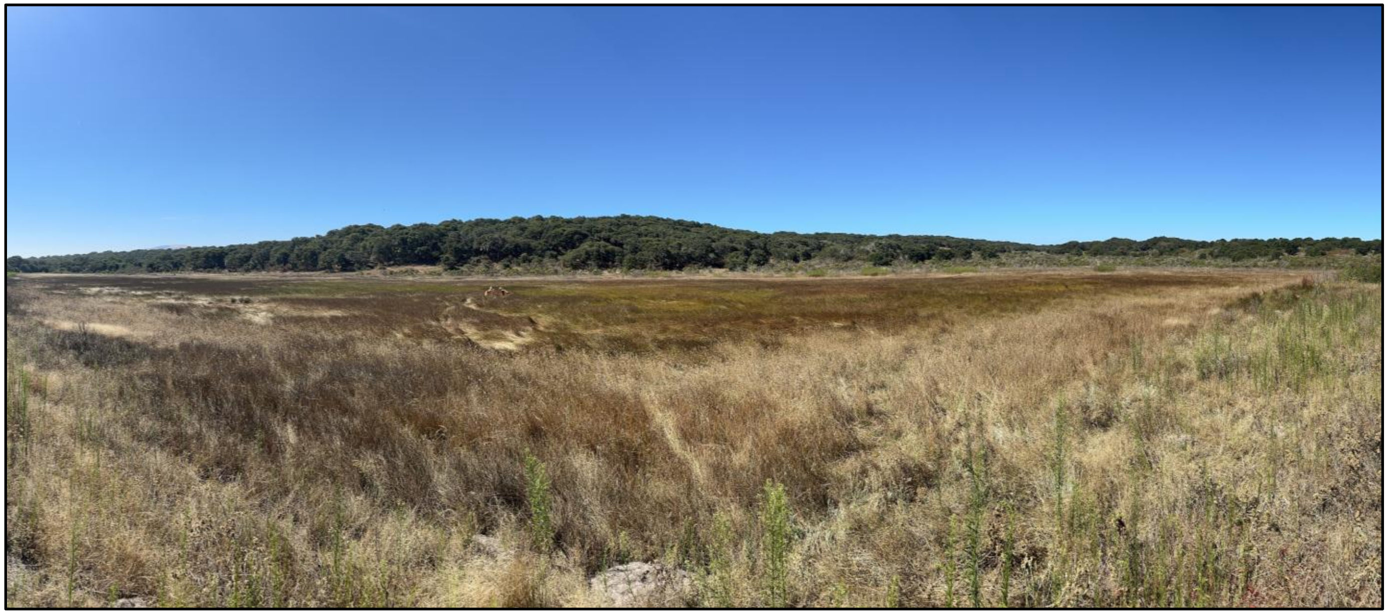

Figure E-1. Pond 5 (Reference): Vegetation Photo Point (S) on 8/13/2024

Figure E-2. Pond 5 (Reference): Vegetation Photo Point (W) on 8/13/2024

Figure E-3. Pond 101 East (East) (Reference): Vegetation Photo Point on 7/27/2024

Figure E-4. Pond 997 (Reference): Vegetation Photo Point on 5/24/2024

Figure E-5. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation): Vegetation Photo Point (NE) on 5/30/2024

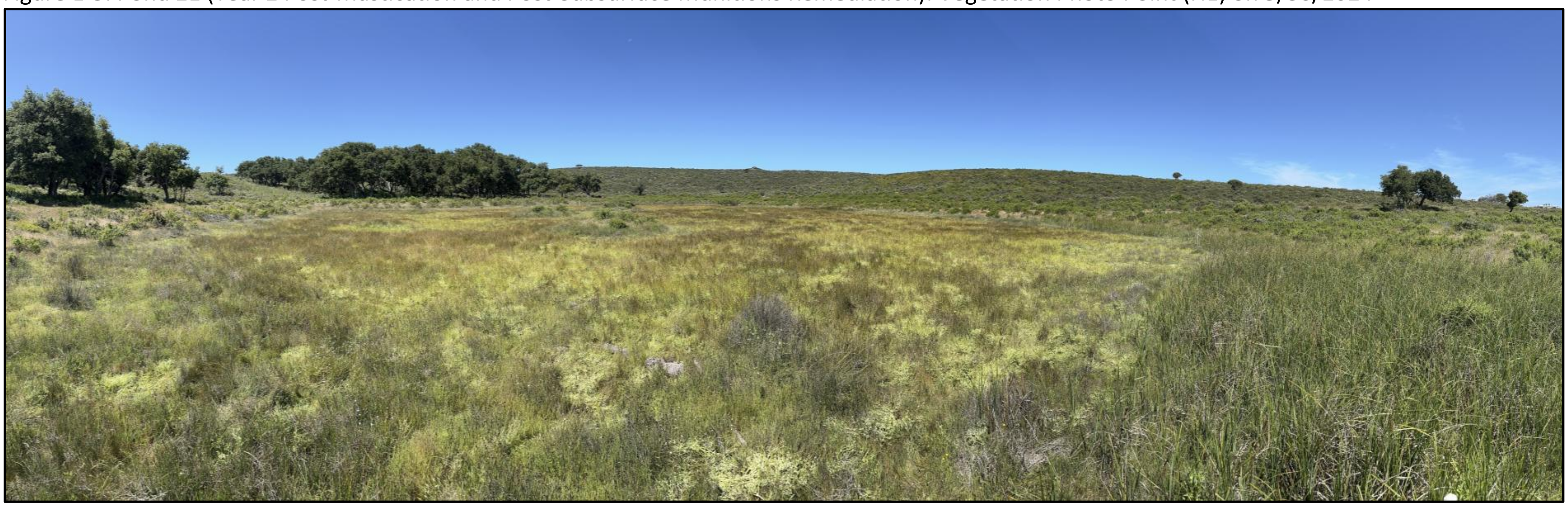

Figure E-6. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation): Vegetation Photo Point (SW) on 5/30/2024

Figure E-7. Pond 76 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation): Vegetation Photo Point on 5/22/2024

APPENDIX F

Historic Hydrology Monitoring Results for Reference and Remediated Vernal Pools

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Table F-1. Pond 5 (Reference) Historical Hydrology Results on Former Fort Ord 1994 - 2024

Water Year	Date	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1994	1994-03-29	NS	16.67	NS	NS	30.48	2.755
	1994-04-13	8.6	20	NS	NS	20.32	NS
1995	1995-01-11	NS	15.55	NS	NS	27.94	0.172
	1995-01-26	NS	13.88	NS	NS	43.18	0.517
	1995-02-10	NS	15	NS	NS	50.80	0.459
	1995-02-24	NS	13.33	NS	NS	50.80	0.517
	1995-03-10	NS	NS	NS	NS	76.20	1.72
	1995-03-24	NS	22.22	NS	NS	102.00	6.887
1996	1996-01-03	-	-	-	-	0.00	0
	1996-01-18	NS	12.2	NS	NS	5.08	0
	1996-01-30	NS	13.33	NS	NS	5.08	0.014
	1996-02-14	NS	17.78	NS	NS	15.00	0.41
	1996-02-29	NS	13.33	NS	NS	28.00	0.5
	1996-03-14	NS	17.78	NS	NS	38.00	NS
	1996-03-28	NS	20	NS	NS	38.00	1.03
	1996-04-11	6.92	22.22	NS	NS	15.00	1.03
	1996-04-25	NS	24.44	NS	NS	12.00	186
	1996-05-09	-	-	-	-	0.00	0
2007	2006-12-01	-	-	-	-	0.00	-
	2007-01-23	-	-	-	-	0.00	-
	2007-03-06	7.2	NS	NS	NS	17.00	NS
2010	2010-03-11	NS	NS	NS	NS	45.72	NS
	2010-05-25	NS	NS	NS	NS	30.48	NS
2013	2012-11-26	-	-	-	-	0.00	0
	2012-12-19	-	-	-	-	0.00	0.01
	2013-01-22	NS	NS	NS	NS	11.00	0.91
	2013-02-25	-	-	-	-	0.00	0.02
	2013-03-15	-	-	-	-	0.00	0
	2013-04-12	-	-	-	-	0.00	0
	2013-05-10	-	-	-	-	0.00	0

Table F-1 Pond 5 (Reference) Historical Hydrology Results on Former Fort Ord 1994 - 2024

Water Year	Date	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
2014	2013-12-11	-	-	-	-	0.00	0
	2014-02-18	-	-	-	-	0.00	0
	2014-03-17	-	-	-	-	0.00	0
	2014-04-07	-	-	-	-	0.00	0
	2014-05-06	-	-	-	-	0.00	0
	2014-06-03	-	-	-	-	0.00	0
2016	2016-04-05	6.18	22.5	3.66	46.8	80.00	2.132
	2016-04-19	6.51	20.27	NS	23.8	100.00	5.139
	2016-05-09	6.45	17.99	NS	19.6	100.00	4.862
	2016-06-08	6.48	21.32	NS	17.7	80.00	4.437
	2016-07-07	6.37	23.01	NS	83.2	60.00	3.19
	2016-08-10	6.85	16.37	NS	295	4.00	0.358
	2016-09-12	-	-	-	-	0.00	0
2017	2017-01-25	6.09	8.94	2.13	4	58.00	5.3242
	2017-02-27	6.24	11.77	4.52	6.4	130.00	7.784
	2017-03-23	6.54	15.3	1.55	8.3	130.00	7.3
	2017-04-20	6.38	17.22	0	5.9	130.00	7.243
	2017-05-25	6.28	21.85	2.73	4.5	110.00	6.493
	2017-06-20	7.12	24.16	3.54	7.4	98.00	5.742
	2017-07-28	NS	NS	NS	NS	94.00	NS
	2017-08-16	NS	NS	NS	NS	57.00	NS
2018	2018-01-15	7.12	12.56	6.54	16.6	22.00	2.9466
	2018-02-23	7.12	6	5.27	39.2	15.00	1.85
	2018-03-21	7.01	11.76	6.65	4.7	22.00	3.0072
	2018-04-18	7.29	20.68	7.09	40.6	22.00	2.85
	2018-05-22	-	-	-	-	0.00	0
2019	2018-12-12	-	-	-	-	0.00	0
	2019-01-14	6.7	11.09	10.16	4.7	4.00	0.474
	2019-02-13	6.89	10.55	10.24	8.4	42.00	4.208
	2019-03-07	6.58	14.1	5.58	1.5	56.00	4.828
	2019-04-04	6.41	14.87	1.71	1.2	53.00	4.5947
	2019-05-09	6.51	17.15	3.8	0.6	37.00	3.9636
	2019-06-06	7.09	20.32	6.07	13.6	30.00	3.6211
	2019-07-09	NS	NS	NS	NS	25.00	NS
	2019-08-13	-	-	-	-	0.00	0

Table F-1 Pond 5 (Reference) Historical Hydrology Results on Former Fort Ord 1994 - 2024

Water Year	Date	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
2020	2019-12-04	NS	NS	NS	NS	9.00	NS
	2019-12-20	7.28	15.3	6.01	18.37	8.00	0.7359
	2020-01-08	NS	NS	NS	NS	11.00	NS
	2020-01-30	7.41	14.6	20.16	16.54	14.00	1.9979
	2020-02-21	NS	NS	NS	NS	8.00	NS
	2020-02-27	6.52	16.5	6.87	91.61	6.00	0.751
	2020-03-17	NS	NS	NS	NS	15.00	NS
	2020-03-27	6.33	15.2	8.89	7.82	23.00	3.0472
	2020-04-15	NS	NS	NS	NS	33.00	NS
	2020-04-28	6.57	24.2	2.9	1.63	26.00	3.1494
	2020-05-18	NS	NS	NS	NS	15.00	NS
	2020-05-26	6.71	28.7	3.51	74.48	8.00	0.7328
	2020-06-10	-	-	-	-	0.00	0
2021	2021-01-07	-	-	-	-	0.00	0
	2021-02-01	-	-	-	-	0.00	0
	2021-03-29	-	-	-	-	0.00	0
2022	2021-10-28	-	-	-	-	0.00	0
	2021-12-17	NS	NS	NS	NS	5.00	0.5021
	2022-01-14	6.44	13.2	10.26	2.38	15.00	2.2563
	2022-02-01	NS	NS	NS	NS	10.00	NS
	2022-02-17	NS	NS	NS	NS	1.00	0.3719
	2022-03-02	-	-	-	-	0.00	-
	2022-03-22	-	-	-	-	0.00	-
	2022-03-30	-	-	-	-	0.00	-
2023	2022-12-12	NS	NS	NS	NS	10.00	NS
	2023-01-18	6.4	11.9	5.36	3.48	55.00	4.8949
	2023-02-17	6.69	8.5	6.48	2.08	54.00	4.6222
	2023-04-05	6.91	14.3	6.38	2.26	119.00	7.3529
	2023-04-27	6.99	18.5	5.01	1	108.00	6.3024
	2023-05-11	7.08	17.9	4.8	2.96	103.00	6.1122

Table F-1 Pond 5 (Reference) Historical Hydrology Results on Former Fort Ord 1994 - 2024

Water Year	Date	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
2024	2023-12-15	NS	NS	NS	NS	6.00	0.3229
	2024-01-23	6.64	13.88	NS	6.7	28.00	3.2522
	2024-02-05	NS	NS	NS	NS	42.00	NS
	2024-02-21	7.63	13.06	NS	19.1	62.00	4.8078
	2024-03-12	6.8	14.88	NS	25.4	60.00	4.7666
	2024-04-17	6.7	16.26	NS	73.7	60.00	4.7398
	2024-05-17	6.75	18.39	NS	23.2	46.00	4.2191
	2024-06-14	6.65	17.33	NS	7.5	32.00	3.2776
	2024-07-12	NS	NS	NS	NS	14.00	0.9407
	2024-08-02	-	-	-	-	0.00	0

NS = Not Surveyed

Pond 5 was monitored 16 years between 1994 and 2024. Pond 5 is a reference vernal pool and no remediation has occurred. The historic data and precipitation are summarized below:

- 1994 (Jones & Stokes, 1996)
  - In a precipitation year below normal, Pond 5 held water during both monitoring events in March and April with a maximum recorded inundation of 2.75 acres. The temperatures were within a normal range.
  - Yearly cumulative precipitation 13.96 inches
  - Data collected only in March and April
  - Inundated during both monitoring events
  - Recorded inundation maximum 2.75 acres in March
  - Depth range 20-31 cm, mean 26
  - temperature 17°-20° C, mean 18.5° C
- 1995 (Jones & Stokes, 1996)
  - In a water-year that was above normal, Pond 5 was inundated by January monitoring and stayed inundated through March. Pond 5 inundation area was large compared to other monitored years and filled to 6.89 acres with a maximum depth of 102 cm. The temperature fluctuated greatly, which can be expected.
  - Yearly cumulative precipitation 23.38 inches
  - Data collected January-March, six monitoring events
  - Inundated during all monitoring events
  - Inundation range 0.17-6.89 acres, mean 1.72 acres
  - Depth range 28->100 cm, mean 58 cm
  - temperature range 13°-22° C, mean 16° C
- 1996 (Jones & Stokes, 1996)
  - In a water-year that was approximately normal, ponding occurred from January-May. The maximum depth was much lower than the previous year but similar to the 1994 water-year.
  - Yearly cumulative precipitation 16.96 inches
  - Data collected January-May, ten monitoring events
  - Inundated mid-January to early-May
  - No inundation area recorded

  - Depth range 5-38 cm, mean 20 cm
  - No water quality data collected
- 2007 (Shaw, 2008)
  - In a below normal rain year, Pond 5 was inundated to 1.58 acres. The pH at Pond 5 was neutral and the turbidity was relatively low.
  - Yearly cumulative precipitation 10.13 inches
  - Data collected December-March, three monitoring events
  - Some inundation in March, which comprised an area of 1.58 acres
  - Depth 17 cm
  - One water quality sample 7.20 pH, 5.1 FNU turbidity
- 2010 (Shaw, 2011)
  - DD&A conducted wildlife surveys in March and May. Only depth records were taken but data was not reported.
  - Below normal rain year
  - Yearly cumulative precipitation 14.6 inches
  - Maximum recorded depth was 46 cm
- 2013 (Tetra Tech, 2014)
  - In a drought year with below normal precipitation, Pond 5 was only inundated in December and January and was a fraction of the size with a maximum inundation of 0.91 acres.
  - Drought year with yearly cumulative precipitation of 11.17 inches
  - Data collected November-May, seven monitoring events
  - Inundated in December and January
  - Inundation range 0.01-0.91 acres, mean 0.46 acres
  - Depth 11 cm, only one depth recorded
  - No water quality data collected
- 2014 (Tetra Tech, 2015)
  - In a consecutive drought year Pond 5 did not fill.
  - Consecutive drought year with yearly cumulative precipitation 9.33 inches
  - Data collected December-June, six monitoring events
- 2016 (Burleson, 2017)
  - In a consecutive drought with precipitation above normal, Pond 5 was inundated from the first recorded monitoring in April through August. The maximum inundation area was 5.33 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was higher on average than some of the other large vernal pools, however, Pond 5 was often monitored in the late afternoon.
    Dissolved oxygen had a large range. Turbidity was low on average with a few high readings at the end of the season. It is likely that Pond 5 was inundated earlier in the water-year and maximum inundation was most likely not captured. It should be noted that data collection did not start with the first storm or inundation.
  - Consecutive drought year with yearly cumulative precipitation 21.21 inches
  - Data collected April-September, seven monitoring events
  - Inundated April through August
  - Inundation range 0.36-5.33 acres, mean 3.89 acres
  - Depth range 4-100 cm, mean 74 cm
  - pH range 6.37-6.85, mean 6.51
  - temperature range 16.4°-25.1° C, mean 20.7° C
  - dissolved oxygen range 0.34-7.30 mg/L, mean 4.65 mg/L

- turbidity range 17.7-295.0 FNU, mean 83.8 FNU

- 2017 (Burleson, 2018)
  - After the end of a Historical drought with precipitation above normal, Pond 5 was inundated from the first recorded monitoring in January through September (Pond 5 did not 0 by last recorded monitoring in September). The maximum inundation area was 7.78 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord, with a few high readings in the middle of the season. Dissolved oxygen had a small range, with moderate levels. Turbidity was low on average.
  - Yearly cumulative precipitation 22.92 inches
  - Data collected January - September, nine monitoring events
  - Inundated January through September (pond did not 0 at last reading in September)
  - Inundation range 5.32-7.78 acres, mean 6.65 acres
  - Depth range 45-~130 cm, mean 95 cm
  - pH range 6.09-7.12, mean 6.44
  - temperature range 8.9°-24.2° C, mean 16.5° C
  - dissolved oxygen range 0.00-4.52 mg/L, mean 2.41 mg/L
  - turbidity range 4.0-8.3 FNU, mean 6.1 FNU
- 2018 (Burleson, 2019)
  - In a below normal water-year, Pond 5 was inundated from the first recorded monitoring in January through April. The maximum inundation area was 3.01 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed.
    Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range, with moderate levels. Turbidity was low on average.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected November - May, six monitoring events
  - Inundated November through April
  - Inundation range 1.85-3.01 acres, mean 2.66 acres
  - Depth range 15-22 cm, mean 20 cm
  - pH range 7.01-7.29, mean 7.14
  - temperature range 6.00°-20.68° C, mean 12.75° C
  - dissolved oxygen range 5.27-7.09 mg/L, mean 6.39mg/L
  - turbidity range 4.7-40.6 FNU, mean 25.3 FNU
- 2019 (Burleson, 2020)
  - In an above normal water-year, Pond 5 was inundated from the first recorded monitoring in January through July. The maximum inundation area was 4.83 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range, with moderate levels. Turbidity was low on average.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - August, eight monitoring events
  - Inundated January through July
  - Inundation range 0.47-4.83 acres, mean 3.61 acres
  - Depth range 4-56 cm, mean 35 cm
  - pH range 6.41-7.09, mean 6.70
  - temperature range 10.55°-20.32° C, mean 14.68° C
  - dissolved oxygen range 1.71-10.24 mg/L, mean 6.26 mg/L
  - turbidity range 0.6-13.6 FNU, mean 5.0 FNU

- 2020 (Chenega, 2021)
  - In a close to normal water year, Pond 5 was inundated from the first recorded monitoring in December through May. The maximum inundation area was 3.15 acres. Water quality was generally within historical ranges. Slightly acidic to slightly alkaline pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen in January was highest on record, but otherwise within historical range. Turbidity values were somewhat elevated in February and May, but not outside of historical range.
  - Yearly cumulative precipitation 18.08 inches
  - Data collected December - June, 13 monitoring events
  - Inundated December through May
  - Inundation range 0-3.15 acres, mean 1.49 acres
  - Depth range 0-33 cm, mean 13.6 cm
  - pH range 6.33-7.41, mean 6.80
  - temperature range 14.6°-28.7° C, mean 19.08° C
  - dissolved oxygen range 2.9-20.16 mg/L, mean 8.06 mg/L
  - turbidity range 1.63-91.61 FNU, mean 35.08 FNU
- 2021 (Chenega, 2022)
  - In a year of lowest cumulative precipitation of 7.57 inches in last 30 years, Pond 5 did not fill
  - Data collected Jan-March, three monitoring events
- 2022 (Chenega, 2023)
  - In consecutive below normal water year, Pond 5 was briefly inundated from mid- December to beginning of March
  - Yearly cumulative precipitation of 11.69 inches
  - Data collected October - March, 8 monitoring events
  - Inundated December through March
  - Inundation range 0-2.26 acres, mean 0.63 acres
  - Depth range 0-15 cm, mean 5.17 cm
  - pH single reading of 6.44
  - temperature single reading of 13.2° C
  - dissolved oxygen single reading of 10.26 mg/L
  - turbidity single reading of 2.38 FNU
- 2023 (Chenega, 2024)
  - In a well above normal water-year, Pond 5 was inundated from the first recorded monitoring in December through the last monitoring event in May, when it still held water. The maximum inundation area was 6.3 acres. Water quality was within normal ranges. Slightly acidic to slightly basic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range, with moderate levels. Turbidity was low.
  - Yearly cumulative precipitation 27.22 inches (from Oct 1st to June 30th)
  - Data collected December - May, six monitoring events
  - Inundated December through June, when the last monitoring event occurred
  - Inundation range 4.62-7.35 acres, mean 5.86 acres
  - Depth range 10-119 cm, mean 75 cm
  - pH range 6.40-7.08, mean 6.81
  - temperature range 8.5°-18.5° C, mean 14.22° C
  - dissolved oxygen range 4.8-6.48 mg/L, mean 5.61 mg/L
  - turbidity range 1-3.48 FNU, mean 2.36 FNU
- 2024 (Harris, 2024)
  - In a normal water year, Pond 5 was inundated from the first recorded monitoring in December

through July. The maximum inundation was area was 4.8 acres. Water quality was within normal ranges. Slightly acidic to slightly basic pH values were observed. Temperature was within normal averages for Fort Ord. Turbidity was low. Dissolved oxygen measurements for Pond 5 were omitted due to improper deployment of the dissolved oxygen probe.

- Inundated December through July, last monitoring event in August
- Inundation range 0.3-4.8 acres, mean 3.2 acres
- Depth range 6-62 cm, mean 38.5 cm
- pH range 6.6-7.6, mean 6.8
- Temperature range 13°-18.4° C, mean 15.6° C
- Turbidity range 6.7-73.7 FNU, mean 25.9 FNU

F-2. Pond 101EE (Reference) Historical Hydrology Results on Former Fort Ord 2001 - 2024

Water Year	Date	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
2001	2001-02-12	NS	NS	NS	NS	35.56	1.467
	2001-03-26	6.3	NS	NS	NS	45.72	1.26
	2001-04-18	6.81	NS	NS	NS	5.08	NS
	2001-05-23	-	-	-	-	0.00	0
	2001-06-01	-	-	-	-	0.00	0
2007	2007-01-23	-	-	-	-	0.00	0
	2007-03-06	7.61	NS	NS	NS	20.00	0.324
2013	2012-11-26	-	-	-	-	0.00	0
	2012-12-19	-	-	-	-	0.00	0
	2013-01-22	NS	NS	NS	NS	11.00	0.075
	2013-02-25	-	-	-	-	0.00	0
	2013-03-15	-	-	-	-	0.00	0
	2013-04-12	-	-	-	-	0.00	-
	2013-05-10	-	-	-	-	0.00	-
2014	2013-12-11	-	-	-	-	0.00	0
	2014-02-18	-	-	-	-	0.00	0
	2014-03-17	-	-	-	-	0.00	0
	2014-04-07	-	-	-	-	0.00	0
	2014-05-06	-	-	-	-	0.00	0
	2014-06-03	-	-	-	-	0.00	0
2015	2015-03-18	-	-	-	-	0.00	0
	2015-04-16	-	-	-	-	0.00	0
	2015-05-28	-	-	-	-	0.00	0
2016	2016-04-05	6.44	17.09	7.93	138	68.00	3.244
	2016-04-18	6.38	22.72	6.5	112	68.00	3.132
	2016-04-21	7.07	22.97	6.92	106	55.00	2.765
	2016-05-09	7.07	22.97	6.92	106	55.00	2.765
	2016-05-10	6.49	22.63	4.36	553	32.00	1.226
	2016-06-08	6.49	22.63	4.36	553	32.00	1.226
	2016-07-07	-	-	-	-	0.00	0

F-2. Pond 101EE (Reference) Historical Hydrology Results on Former Fort Ord 2001 - 2024

Water Year	Date	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
2017	2017-01-24	5.5	9.99	1.95	1.9	155.00	5.02
	2017-02-27	6.23	12.15	3.68	21.8	160.00	9.37
	2017-03-20	6.23	15.33	1.07	39.2	160.00	8.89
	2017-04-20	6.49	17.33	0	43.2	160.00	9.38
	2017-05-25	6.89	19.03	2.38	4	160.00	6.523
	2017-06-21	6.91	20.06	3.58	10.7	150.00	5.566
	2017-07-27	NS	NS	NS	NS	100.00	NS
	2017-08-16	NS	NS	NS	NS	95.00	NS
2018	2018-01-19	6.82	11.92	0.21	63	44.00	2.0915
	2018-02-23	6.8	10.94	4.45	114	48.00	1.4411
	2018-03-21	6.97	12.62	3.35	40.8	40.00	1.8605
	2018-04-17	7.12	21.88	10.03	99.4	40.00	1.6709
	2018-05-22	6.42	13.55	15.25	1000	14.00	0.0387
	2018-06-19	-	-	-	-	0.00	0
2019	2018-12-12	-	-	-	-	0.00	0
	2019-01-14	-	-	-	-	0.00	0
	2019-02-14	6.88	14.36	8.94	10.4	47.00	2.2104
	2019-03-07	6.51	14.08	5.48	9.7	56.00	2.7552
	2019-04-04	6.8	14.15	5.63	6.1	53.00	2.5143
	2019-05-09	6.38	16.26	3.09	13	34.00	1.144
	2019-06-06	7.13	21.92	5.48	79.8	26.00	0.3847
	2019-07-09	-	-	-	-	0.00	0
2020	2019-12-04	NS	NS	NS	NS	13.00	NS
	2019-12-13	-	-	-	-	0.00	0
	2019-12-20	-	-	-	-	0.00	0
	2019-12-23	-	-	-	-	0.00	0
	2019-12-31	6.84	13.3	9.98	5.46	12.00	0.0715
	2020-01-06	NS	NS	NS	NS	11.00	NS
	2020-01-30	6.68	14.6	23.33	28.16	12.00	0.1752
	2020-02-19	NS	NS	NS	NS	8.00	NS
	2020-02-27	NS	NS	NS	NS	1.00	0.0032
	2020-03-11	-	-	-	-	0.00	0
	2020-03-20	NS	NS	NS	NS	26.00	0.6504
	2020-03-30	6.36	16.2	3.28	3.31	34.00	1.6103
	2020-04-17	NS	NS	NS	NS	37.00	NS
	2020-04-28	6.56	23.1	2.24	4.72	29.00	1.0074

F-2. Pond 101EE (Reference) Historical Hydrology Results on Former Fort Ord 2001 - 2024

Water Year	Date	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
	2020-05-19	NS	NS	NS	NS	4.00	NS
	2020-05-26	-	-	-	-	0.00	0
2021	2021-01-07	-	-	-	-	0.00	0
	2021-02-01	-	-	-	-	0.00	0
	2021-02-12	-	-	-	-	0.00	0
	2021-03-29	-	-	-	-	0.00	0
2022	2021-10-28	-	-	-	-	0.00	0
	2021-12-15	-	-	-	-	0.00	-
	2022-01-14	6.9	10.7	14.27	6.58	19.00	0.2873
	2022-02-01	NS	NS	NS	NS	2.00	NS
	2022-02-17	-	-	-	-	0.00	-
	2022-03-02	-	-	-	-	0.00	-
2023	2022-12-12	NS	NS	NS	NS	16.00	NS
	2023-01-18	6.68	10.06	7.17	3.91	50.00	2.8555
	2023-02-17	6.52	6.5	4.61	2.8	48.00	2.6451
	2023-04-05	6.76	14.3	4.05	2.83	142.00	8.2233
	2023-04-27	6.95	18.2	3.08	3.59	131.00	5.9252
	2023-05-11	6.74	16.9	2.12	5.23	125.00	5.6507
	2023-06-16	NS	NS	NS	NS	97.00	NS
2024	2023-12-15	-	-	-	-	0.00	0
	2024-01-23	7.14	15.9	4.75	62.1	34.00	1.4594
	2024-02-05	NS	NS	NS	NS	47.00	NS
	2024-02-21	7.89	12.53	2.89	52.1	53.00	2.7432
	2024-03-12	7.16	14.84	0.25	39.6	51.00	2.6543
	2024-04-17	6.84	14.91	NS	34.7	49.00	2.571
	2024-05-17	6.28	17.37	NS	33.2	34.00	1.341
	2024-06-14	6.54	21.15	NS	312	8.00	0.0102
	2024-07-12	-	-	-	-	0.00	0

NS = Not Surveyed

Pond 101 East (East) was monitored 14 years between 2001 and 2019. Pond 101 East (East) is a reference vernal pool and no remediation has occurred. The historic data and precipitation are summarized below:

- 2001 (Harding ESE, 2002)
  - In a year with early storms followed by below normal precipitation, Pond 101 East (East) was recorded as inundated from February through May with a maximum inundation of 1.47 acres. The water quality results indicate a slightly acidic to neutral pH.
  - Early storms with cumulative precipitation below normal (15.52 inches)

  - Data collected in January-May, five monitoring events
  - Inundated for all monitoring events
  - Inundation range 0.24-1.61 acres, mean 0.92 acres
  - Depth range 2-18 cm, mean 11.3 cm
  - Water quality data was collected twice, pH 6.3-6.81, mean 6.56

- 2007 (Shaw, 2008)
  - In a below normal water-year, Pond 101 East (East) was inundated only in the month of March. The water quality results indicated a slightly alkaline pH.
  - Cumulative precipitation was below normal (10.13 inches)
  - Data collected from December-June, 6 monitoring events
  - Inundated only in March to 0.32 acres and 20 cm depth
  - Inundation area was not recorded
  - pH 7.61
- 2013 (Tetra Tech, 2014)
  - In a 0 consecutive drought year with below normal cumulative precipitation, Pond 101 East (East) is thought to have held water briefly in January. It is unconfirmed if the brief inundation was at Pond 101 East (West) or 101 East (East) since the data were documented under Pond 101 East, with no further signification of East or West.
  - Consecutive drought year with cumulative precipitation below normal (11.17 inches)
  - Data collected November-May, seven monitoring events
  - Inundated in January, 0.08 acres
  - Depth 11 cm in January
  - No water quality data collected
- 2014 (Tetra Tech, 2015)
  - In a 0 consecutive drought year with below normal cumulative precipitation, Pond 101 East (East) did not hold water the entire year.
  - Consecutive drought year with cumulative precipitation below normal (9.33 inches)
  - Data collected December-June, six monitoring events
  - 0 in all monitoring events
  - No water quality data collected
- 2015 (Burleson, 2016)
  - In a 0 consecutive drought year with below normal cumulative precipitation, Pond 101 East (East) did not hold water.
  - Consecutive drought year with early storms above normal and cumulative precipitation slightly below normal (14.35 inches)
  - Data collected March to May, three monitoring events
  - 0 in all monitoring events
  - No water quality data collected
- 2016 (Burleson, 2017)
  - In a consecutive drought year with cumulative precipitation above normal, Pond 101 East (East) held water from April-June. Water quality results indicated a slightly acidic to neutral pH, normal temperatures, moderate to high dissolved oxygen and moderate turbidity. It should be noted that data collection did not start with the first storms or inundation. Maximum inundation could have been missed.
  - Drought year with cumulative precipitation above normal (21.21 inches)
  - Data collected April-July, five monitoring events
  - Inundated from April-June
  - Inundation range 1.23-3.24 acres, mean 2.59 acres
  - Depth range 32-68 cm, mean 56 cm

- pH range 6.38-7.07, mean 6.60
- temperature range 17.1°-23.0° C, mean 21.4° C
- dissolved oxygen range 4.36-7.93 mg/L, mean 6.43 mg/L
- turbidity range 106-553 FNU, mean 227 FNU

- 2017 (Burleson, 2018)
  - After the end of a Historical drought with precipitation above normal, Pond 101 East (East) was inundated from the first recorded monitoring in January through September (Pond 101EE did not 0 at last recorded monitoring in September). The maximum inundation area was 9.374 acres (101EE was connected to 101EW). Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small
  - range, with moderate levels. Turbidity had a large range, with moderate levels.
  - Yearly cumulative precipitation 22.92 inches
  - Data collected January - September, nine monitoring events
  - Inundated January through September (pond did not 0 by last recorded monitoring in September)
  - Inundation range 5.02-9.40 acres, mean 7.46 acres (pond was connected to 101 East (West) for range and mean values)
  - Depth range 77-~160 cm, mean 135 cm
  - pH range 5.5-6.91, mean 6.38
  - temperature range 10.0°-20.1° C, mean 15.7° C
  - dissolved oxygen range 0.0-3.68 mg/L, mean 2.11 mg/L
  - turbidity range 1.9-43.2 FNU, mean 20.13 FNU
- 2018 (Burleson, 2019)
  - In a below normal water-year, Pond 101 East (East) was inundated from the first recorded monitoring in January through May. The maximum inundation area was 2.09 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a large range. Turbidity had a large range, with an out-of-range reading in May.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected November - June, seven monitoring events
  - Inundated January through May
  - Inundation range 0.04-2.09 acres, mean 1.42 acres
  - Depth range 14-48 cm, mean 38 cm
  - pH range 6.42-7.12, mean 6.83
  - temperature range 10.94°-21.88° C, mean 14.18° C
  - dissolved oxygen range 0.21-15.25 mg/L, mean 6.66 mg/L
  - turbidity range 40.8-1000 FNU, mean 263.44 FNU
- 2019 (Burleson, 2020)
  - In an above normal water-year, Pond 101 East (East) was inundated from the second recorded monitoring in February through June. The maximum inundation area was 2.76 acres. Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range with moderate levels. Turbidity had a large range with moderate levels.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - July, seven monitoring events
  - Inundated February through June
  - Inundation range 0.38-2.76 acres, mean 1.80 acres
  - Depth range 26-56 cm, mean 43 cm
  - pH range 6.38-7.13, mean 6.74
  - temperature range 14.08°-21.92° C, mean 16.15° C

  - dissolved oxygen range 3.09-8.94 mg/L, mean 5.72 mg/L
  - turbidity range 6.1-79.8 FNU, mean 23.8 FNU
- 2020 (Chenega, 2021)
  - In a close to normal water year, Pond 101 East (East) was inundated intermittently from the first recorded monitoring in December through May. The maximum inundation area was 1.61 acres. Water quality was generally within historical ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen in January was highest on record, but otherwise within the historical range. Turbidity values were within the historical range.
  - Yearly cumulative precipitation 18.08 inches
  - Data collected December - May, 15 monitoring events
  - Inundated intermittently from December through May, dried out three times
  - Inundation range 0-1.61 acres, mean 0.32 acres
  - Depth range 0-37 cm, mean 11.69 cm
  - pH range 6.33-6.87, mean 6.61
  - temperature range 13.3°-23.1° C, mean 16.8° C
  - dissolved oxygen range 2.24-23.33 mg/L, mean 9.707 mg/L
  - turbidity range 3.31-28.16 FNU, mean 10.11 FNU
- 2021 (Chenega, 2022)
  - In a year of lowest cumulative precipitation of 7.57 inches in last 30 years, Pond 101 East (East) did not fill
  - Data collected Jan-March, four monitoring events
- 2022 (Chenega, 2023)
  - In consecutive below normal water year, Pond 101 East (East) was briefly inundated from mid-December to beginning of March
  - Yearly cumulative precipitation of 11.69 inches
  - Data collected October - March, 6 monitoring events
  - Inundated January through February
  - Inundation range 0-0.29 acres, mean 0.1 acres
  - Depth range 0-19 cm, mean 5.25 cm
  - pH single reading of 6.9
  - temperature single reading of 10.7° C
  - dissolved oxygen single reading of 14.27 mg/L
  - turbidity single reading of 6.58 FNU
- 2023 (Chenega, 2024)
  - In a well above normal water-year, Pond 101 East (East) was inundated from the first recorded monitoring in December through the last monitoring event in June, when it still held water. The maximum inundation area was 8.22 acres, when it was hydrologically connected to Pond 101 East (West). Water quality was within normal ranges. Neutral to slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a narrow range with moderate levels. Turbidity values stayed low during monitoring events.
  - Yearly cumulative precipitation 27.22 inches (from Oct 1st to June 30th)
  - Data collected December - June, seven monitoring events
  - Inundated December through June, when the last monitoring event occurred
  - Inundation range 2.64-8.22 acres, mean 5.06 acres
  - Depth range 16-142 cm, mean 87 cm
  - pH range 6.52-6.95, mean 6.73
  - temperature range 6.5°-18.2° C, mean 13.19° C
  - dissolved oxygen range 2.12-7.17 mg/L, mean 4.21 mg/L

  - turbidity range 2.8 – 5.23 FNU, mean 3.67 FNU
- 2024
  - In a normal water year, Pond 101EE was inundated from the second recorded monitoring in January through June. The maximum inundation was area was 2.7 acres. Water quality was within normal ranges. Slightly acidic to slightly basic pH values were observed. Temperature was within normal averages for Fort Ord. Turbidity was moderate. Dissolved oxygen measurements of 0.0 mg/L for Pond 101EE were omitted due to improper deployment of the dissolved oxygen probe.
  - Inundated December through June, last monitoring event in July
  - Inundation range 0.01-2.7 acres, mean 1.8 acres

  - Depth range 8-53 cm, mean 39.4 cm
  - Dissolved oxygen range 0.3-4.8 mg/L DO, mean 2.6 mg/L DO
  - pH range 6.3-7.9, mean 7.0
  - Temperature range 12.5°-21.2° C, mean 16.1° C
  - Turbidity range 33.2-312 FNU, mean 89.0 FNU

F-3. Pond 997 (Reference) Historical Hydrology Results on Former Fort Ord 2017 - 2024

Water Year	Date	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
2017	2017-01-25	6.4	10.22	7.17	25.6	13	0.3311
	2017-02-27	6.78	16.94	12.2	14.1	15	0.234
	2017-03-23	6.43	12.99	7.88	72.4	12	0.101
	2017-04-19	7.07	25.4	7.14	25.5	6	0.02
	2017-05-24	-	-	-	-	0	0
2018	2018-01-19	-	-	-	-	0	0
	2018-02-23	-	-	-	-	0	0
	2018-03-20	-	-	-	-	0	0
	2018-04-18	-	-	-	-	0	0
2019	2018-12-12	-	-	-	-	0	0
	2019-01-14	-	-	-	-	0	0
	2019-02-13	6.39	11.79	10.62	26	13	0.1093
	2019-03-05	6.37	12.61	9.28	24.2	14	0.1245
	2019-04-09	NS	NS	NS	NS	2	0.0275
	2019-05-09	-	-	-	-	0	0
	2019-07-09	-	-	-	-	0	0
2020	2019-12-04	-	-	-	-	0	0
	2019-12-20	-	-	-	-	0	0
	2019-12-23	-	-	-	-	0	0
	2020-01-06	-	-	-	-	0	0
	2020-01-30	-	-	-	-	0	0
	2020-03-20	-	-	-	-	0	0
	2020-03-27	6.06	19.6	8.44	49.45	7	0.0507
	2020-04-17	NS	NS	NS	NS	6	NS
	2020-04-28	-	-	-	-	0	0
2021	2021-01-07	-	-	-	-	0	0
	2021-02-01	-	-	-	-	0	0
	2021-03-29	-	-	-	-	0	0
	2021-04-05	-	-	-	-	0	0
2022	2021-10-28	-	-	-	-	0	0
	2021-12-17	-	-	-	-	0	0
	2022-03-02	-	-	-	-	0	-

F-3. Pond 997 (Reference) Historical Hydrology Results on Former Fort Ord 2017 - 2024

Water Year	Date	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
2023	2022-12-12	-	-	-	-	0	0
	2023-01-20	6.16	9.2	10.56	3.03	19	0.4414
	2023-02-17	6.6	13.4	12.58	5.3	15	0.1101
	2023-04-05	6.57	22.8	12.25	7.63	16	0.5843
	2023-04-27	-	-	-	-	0	0
2024	2023-12-15	-	-	-	-	0	0
	2024-01-23	-	-	-	-	0	0
	2024-02-05	NS	NS	NS	NS	21	NS
	2024-02-21	8.23	19.5	6.33	15.1	18	0.3235
	2024-03-12	6.81	15.05	4.77	22.2	8	0.0706
	2024-04-17	NS	NS	NS	NS	6	0.0159
	2024-05-17	-	-	-	-	0	0

NS = Not Surveyed

Pond 997 was monitored eight years between 2017 and 2024. Pond 997 is a reference vernal pool and no remediation has occurred. The historic data and precipitation are summarized below:

- 2017 (Burleson, 2018)
  - After the end of a Historical drought with precipitation above normal, Pond 997 was inundated from the first recorded monitoring in January through April. The maximum inundation area was 0.33 acres. Water quality was within normal ranges. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord.
    Dissolved oxygen had a small range, with moderate levels. Turbidity had a large range, with moderate levels.
  - Yearly cumulative precipitation 22.92 inches
  - Data collected January - May, five monitoring events
  - Inundated January through April
  - Inundation range 0.02-0.33 acres, mean 0.17 acres
  - Depth range 6-15 cm, mean 12 cm
  - pH range 6.40-7.07, mean 6.67
  - temperature range 10.2°-25.4° C, mean 16.4° C
  - dissolved oxygen range 7.14-12.20 mg/L, mean 8.60 mg/L
  - turbidity range 14.1-72.4 FNU, mean 34.4 FNU
- 2018 (Burleson, 2019)
  - In a below normal water-year, Pond 997 did not hold water.
  - Yearly cumulative precipitation 12.57 inches
  - Data collected January - April, four monitoring events
  - 0 in all monitoring events
  - No water quality data collected
- 2019 (Burleson, 2020)
  - In an above normal water-year, Pond 997 was inundated from the second recorded monitoring in February through April. The maximum inundation area was 0.12 acres. Water quality was within

normal ranges. Water quality data were collected in February and March. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range, with moderate levels.

Turbidity had a small range, with moderate levels.

- Yearly cumulative precipitation 21.97 inches
- Data collected January through May, five monitoring events
- Inundated February through April
- Inundation range 0.03-0.12 acres, mean 0.09 acres
- Depth range 2-14 cm, mean 10 cm
- pH range 6.37-6.39, mean 6.38
- temperature range 11.79°-12.61° C, mean 12.20° C
- dissolved oxygen range 9.28-10.62 mg/L, mean 9.95 mg/L
- turbidity range 24.2-26.0 FNU, mean 25.1 FNU

• 2020 (Chenega, 2021)
  - In a close to normal water year, Pond 997 was inundated from late March through mid- April. The maximum inundation area was 0.05 acres. Water quality was measured only once but it was within Historical ranges. Slightly acidic pH value was observed.
  - Yearly cumulative precipitation 18.08 inches
  - Data collected December - April, nine monitoring events
  - Inundated from late March through mid-April
  - Inundation range 0-05 acres, mean 0.05 acres
  - Depth range 0-7 cm, mean 1.44 cm
  - pH value of 6.06
  - temperature value of 19.6
  - dissolved oxygen value of 8.44
  - turbidity value of 49.45

• 2021 (Chenega, 2022)
  - In a year of lowest cumulative precipitation of 7.57 inches in last 30 years, Pond 997 did not fill
  - Data collected Jan-April, four monitoring events
  - 2022 (Chenega, 2023)
  - In consecutive below normal water year, Pond 997 did not fill
  - Yearly cumulative precipitation of 11.69 inches
  - Data collected October - March, 3 monitoring events

• 2023
  - In a well above normal water-year, Pond 997 was inundated from the second recorded monitoring event in January to April. The maximum inundation area was 0.58 acres.
    Water quality was within normal ranges. Water quality data were collected in January, February and March. Slightly acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range, with moderate levels. Turbidity had a small range, with low levels.
  - Yearly cumulative precipitation 27.22 inches (from Oct 1st to June 30th)
  - Data collected December through April, five monitoring events
  - Inundated January to April
  - Inundation range 0.11-0.58 acres, mean 0.38 acres
  - Depth range 15-19 cm, mean 16.67 cm
  - pH range 6.16-6.57, mean 6.44
  - temperature range 9.2°-22.8° C, mean 15.13° C
  - dissolved oxygen range 10.56-12.58 mg/L, mean 11.8 mg/L
  - turbidity range 3.03-7.63 FNU, mean 5.32 FNU

- 2024 (Harris, 2024)
  - In a normal water year, Pond 997 was inundated from the third recorded monitoring in February through April. The maximum inundation was area was 0.3 acres. Water quality was within normal ranges. Slightly acidic to slightly basic pH values were observed. Temperature was within normal averages for Fort Ord. Turbidity was low.
  - Inundated February through April, last monitoring event in May
  - Inundation range 0.02-0.3 acres, mean 0.14 acres
  - Depth range 6-21 cm, mean 13.3 cm
  - Dissolved oxygen range 4.8-6.3 mg/L DO, mean 5.6 mg/L DO
  - pH range 6.8-8.2, mean 7.5
  - Temperature range 15°-19.5° C, mean 17.3° C
  - Turbidity range 15.1-22.2 FNU, mean 18.7 FNU

Table F-4. Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation) Historical Hydrology Results on Former Fort Ord 1999 - 2024

Water Year	Date	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
1999	1999-01-12	6.8	NS	NS	NS	22.86	0.29
	1999-02-16	NS	NS	NS	NS	35.56	NS
	1999-03-25	5.7	NS	NS	NS	35.56	NS
	1999-04-20	8.15	NS	NS	NS	35.56	NS
2007	2006-12-01	-	-	-	-	0.00	-
	2007-01-23	-	-	-	-	0.00	-
	2007-03-06	-	-	-	-	0.00	-
2009	2009-03-12	NS	NS	NS	NS	12.70	NS
	2009-04-02	NS	NS	NS	NS	5.08	NS
	2009-04-22	-	-	-	-	0.00	-
2019	2018-12-12	-	-	-	-	0.00	0
	2019-01-17	NS	NS	NS	NS	2.00	0.0053
	2019-02-12	6.51	10.42	8.6	16.8	16.00	0.8319
	2019-03-05	6.39	13.6	8.83	41.1	19.00	0.8634
	2019-04-02	6.66	13.2	7.36	30.6	14.00	0.806
	2019-05-06	-	-	-	-	0.00	0
	2019-07-09	-	-	-	-	0.00	0
2022	2022-01-12	-	-	-	-	0.00	0
2023	2022-12-14	-	-	-	-	0.00	0
	2023-01-12	6.44	12.8	6.44	8.48	14.00	0.8313
	2023-02-15	6.56	10.7	11.34	36.23	11.00	0.8153
	2023-03-30	6.22	10.8	8.21	62.26	35.00	0.9961
	2023-04-28	6.63	22.4	10.24	101.53	26.00	0.9342
	2023-05-12	5.93	15.5	7.06	55.06	22.00	0.8935
	2023-06-09	NS	NS	NS	NS	8.00	0.7156
2024	2023-12-19	-	-	-	-	0.00	0
	2024-01-23	-	-	-	-	0.00	0
	2024-02-05	NS	NS	NS	NS	13.00	NS
	2024-02-21	7.37	12.89	4.21	8.4	15.00	0.806
	2024-03-13	6.48	11.47	3.77	1.6	12.00	0.795
	2024-04-18	6.81	19.02	7.53	86.9	10.00	0.7502
	2024-05-16	-	-	-	-	0.00	0

NS = Not Surveyed

Pond 21 was monitored seven years between 1999 and 2024 (baseline, Years 1 and 2). The historic data and precipitation are summarized below:

- 1992 (Jones & Stokes, 1992)
  - In a year with near-normal precipitation, Pond 21 was surveyed once in March 1992. It should be noted that data collection did not start with the first storms or inundation.
  - Yearly cumulative precipitation near-normal (17.84 inches)
  - Data collected March, one monitoring event
  - Inundated March
  - Depth 20 cm
  - temperature 15˚C
  - pH, turbidity, and dissolved oxygen data were not collected
- 1999 (HLA, 1999)
  - In a year with near-normal precipitation following an El Niño year, Pond 21 held water from January-April. The maximum inundation area was 0.94 acres. Water quality was within normal ranges. Slightly basic to slightly acidic pH values were observed. Turbidity had a small range, with moderate levels. Temperature and dissolved oxygen were not measured.
  - Yearly cumulative precipitation near-normal (16.31 inches)
  - Data collected January-April, four monitoring events
  - Inundated January through April
  - Inundation range 0.29-0.94 acres, mean 0.63 acres
  - Depth range 23-36 cm, mean 32 cm
  - pH range 5.7-8.15, mean 6.88
  - turbidity range 5-24 NTU, mean 11 NTU
  - temperature and dissolved oxygen data were not collected
- 2007 (Shaw, 2008)
  - In a below-normal rain year, Pond 21 did not hold water.
  - Yearly cumulative precipitation 10.13 inches
  - Data collected December to June, six monitoring events
  - Dry in all monitoring events
  - No water quality data collected
- 2019 (Burleson, 2020)
  - In an above-normal water-year, Pond 21 was inundated from the first recorded monitoring in January through April. The maximum inundation area was 0.86 acres. Water quality was within normal ranges. Slightly acidic pH values were observed.
    Temperature was within normal averages for Fort Ord. Dissolved oxygen had a small range. Turbidity had a small range, with moderate levels.
  - Yearly cumulative precipitation 21.97 inches
  - Data collected January - May, six monitoring events
  - Inundated January through April
  - Inundation range 0.01-0.86 acres, mean 0.63 acres
  - Depth range 2-19 cm, mean 13 cm
  - pH range 6.39-6.66, mean 6.52
  - temperature range 10.42°-13.60° C, mean 12.41° C
  - dissolved oxygen range 7.36-8.83 mg/L, mean 8.26 mg/L
  - turbidity range 16.8-41.1 FNU, mean 29.5 FNU
- 2022 (unreported data)
  - In a consecutive drought year, Pond 21 was surveyed once opportunistically in January.
    There was no noticeable ponding, but the soil near the staff gauge was wet.

  - Yearly cumulative precipitation of 11.69 inches
- 2023
  - In a well above-normal water-year, Pond 21 was inundated from the second monitoring event in January through May. The maximum inundation area was 1 acre. Water quality was within normal ranges. Acidic pH values were observed. Temperature was within normal averages for Fort Ord. Dissolved oxygen had a narrow range. Turbidity had a moderate range, with moderate levels.
- 2024 (Harris, 2024)
  - In a normal water year, Pond 21 was inundated from the third recorded monitoring in February through April. The maximum inundation was area was 0.8 acres. Water quality was within normal ranges. Slightly acidic to slightly basic pH values were observed. Temperature was within normal averages for Fort Ord. Turbidity was low.
  - Inundated February through April, last monitoring event in May
  - Inundation range 0.75-0.81 acres, mean 0.78 acres
  - Depth range 10-15 cm, mean 12.5 cm
  - Dissolved oxygen range 4.2-7.5 mg/L DO, mean 5.2 mg/L DO
  - pH range 6.8-7.4, mean 6.9
  - Temperature range 11.5°-19.0° C, mean 14.5° C
  - Turbidity range 1.6-86.9 FNU, mean 32.3 FNU

F-5. Pond 76 (Year 2 Post-Mastication and Year 1 Post-Subsurface Munitions Remediation) Historical Hydrology Results on Former Fort Ord 2023 - 2024

Water Year	Date	pH	Temperature (C)	Dissolved Oxygen (mg/L)	Turbidity (FNU)	Max Depth (cm)	Inundated Surface Area (acres)
2023	2023-01-12	5.95	12.2	7.51	86.45	10	NS
	2023-02-15	7.13	6.9	9.96	27.09	15	0.1049
	2023-03-30	6.67	9.9	4.37	71.39	30	0.221
	2023-04-28	6.77	18	6.7	22.16	25	0.1807
	2023-06-09	-	-	-	-	0	0
2024	2023-12-19	-	-	-	-	0	0
	2024-01-23	-	-	-	-	0	0
	2024-02-05	NS	NS	NS	NS	16	NS
	2024-02-21	7.63	11.24	5.63	89.3	19	0.1322
	2024-03-13	7.4	10.48	5.03	59	18	0.129
	2024-04-18	6.95	15.96	4.38	65.5	20	0.128
	2024-05-16	-	-	-	-	0	0

NS = Not Surveyed

Pond 76 was monitored two years between 2023 and 2024 (Year 2 post-mastication and Year 1 post-subsurface munitions remediation; baseline data unavailable). The historic data and precipitation are summarized below:

- 2024 (Harris, 2024)
  - In a normal water year, Pond 76 was inundated from the third recorded monitoring in February through April. The maximum inundation was area was 0.13 acres. Water quality was within normal ranges. Neutral to slightly basic pH values were observed. Temperature was within normal averages for Fort Ord. Turbidity was moderate.
  - Inundated February through April, last monitoring event in May
  - Inundation range 0.128-0.132 acres, mean 0.13 acres
  - Depth range 16-20 cm, mean 18.3 cm
  - Dissolved oxygen range 4.4-5.6 mg/L DO, mean 5 mg/L DO
  - pH range 6.95-7.63, mean 7.3
  - Temperature range 10.5°-16° C, mean 12.6° C
  - Turbidity range 59-89.3 FNU, mean 71.3 FNU

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APPENDIX G

Vegetation Species Richness of Native and Non-Native Species and Wetland Indicator Category by Vernal Pool

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Table G-1. Pond 5 (Reference) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 5			
Stratum	**Native**	**Non-Native**	**Unidentified**
1	4	0	0
3	12	5	1
6	4	1	0
7	7	2	1
10	4	0	0
Basin Total	40	17	2

Table G-2. Pond 101 East (East) (Reference) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 101 East (East)			
Stratum	**Native**	**Non-Native**	**Unidentified**
2	3	2	0
3	11	4	0
4	4	11	0
9	4	4	0
Basin Total	40	25	0

Table G-3. Pond 997 (Reference) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 997			
Stratum	**Native**	**Non-Native**	**Unidentified**
1	9	2	0
3	17	11	0
5	17	10	0
Basin Total	43	22	1

Table G-4. Pond 21 (Reference) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 21			
Stratum	**Native**	**Non-Native**	**Unidentified**
1	9	1	0
2	15	10	0
3	5	4	0
4	2	0	0
Basin Total	54	21	0

Table G-5. Pond 76 (Year 2 Post Mastication) Vegetation Species Richness of Native and Non-Native Species by Stratum

Pond 76			
Stratum	**Native**	**Non-Native**	**Unidentified**
1	6	1	0
2	7	2	0
3	8	6	0
Basin Total	27	14	0

Table G-6. Vegetation Species Richness of Native and Non-Native Species within Entire Vernal Pool Basin at Vernal Pools Monitored in 2024

Pond	Native	Non-Native	Unidentified	Total
5	40	17	2	59
101 East (East)	40	25	0	65
997	43	22	1	66
21	54	21	0	75
76	27	14	0	41

Table G-7. Pond 5 (Reference) Number of Wetland Plants by Indicator Category by Stratum

Pond 5						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	2	1	0	1	0	0
3	3	6	3	3	0	3
6	1	3	0	1	0	0
7	2	4	1	1	0	2
10	1	2	0	0	0	1
Basin Total	12	13	9	9	0	16

Table G-8. Pond 101 East (East) (Reference) Number of Wetland Plants by Indicator Category by Stratum

Pond 101 East (East)						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
2	2	2	0	0	0	1
3	5	6	1	1	0	2
4	2	4	2	4	1	2
9	3	2	1	1	0	1
Basin Total	9	20	10	9	3	14

Table G-9. Pond 997 (Reference) Number of Wetland Plants by Indicator Category by Stratum

Pond 997						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	7	4	0	0	0	0
3	6	6	4	3	0	9
5	3	8	4	1	0	11
Basin Total	13	14	10	8	1	20

Table G-10. Pond 21 (Reference) Number of Wetland Plants by Indicator Category by Stratum

Pond 21						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	4	5	1	0	0	0
2	6	7	4	3	0	5
3	0	1	2	1	0	5
4	0	2	0	0	0	0
Basin Total	6	18	16	9	1	25

Table G-11. Pond 76 (Year 2 Post Mastication) Number of Wetland Plants by Indicator Category by Stratum

Pond 76						
Stratum	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**
1	2	5	0	0	0	0
2	2	4	0	0	0	3
3	3	5	1	2	0	3
Basin Total	6	12	5	5	1	12

Table G-12. Wetland Plants by Indicator Category within Entire Vernal Pool Basin at Vernal Pools Monitored in 2024

Number of Wetland Plants Observed at Vernal Pools Monitored in 2024							
Pond	**OBL**	**FACW**	**FAC**	**FACU**	**UPL**	**NL**	**Total**
5	12	13	9	9	0	16	59
101 East (East)	9	20	10	9	3	14	65
997	13	14	10	8	1	20	66
21	6	18	16	9	1	25	75
76	6	12	5	5	1	12	41

APPENDIX H

Species Composition of Follow-Up Wetland Vegetation Monitoring by Vernal Pool

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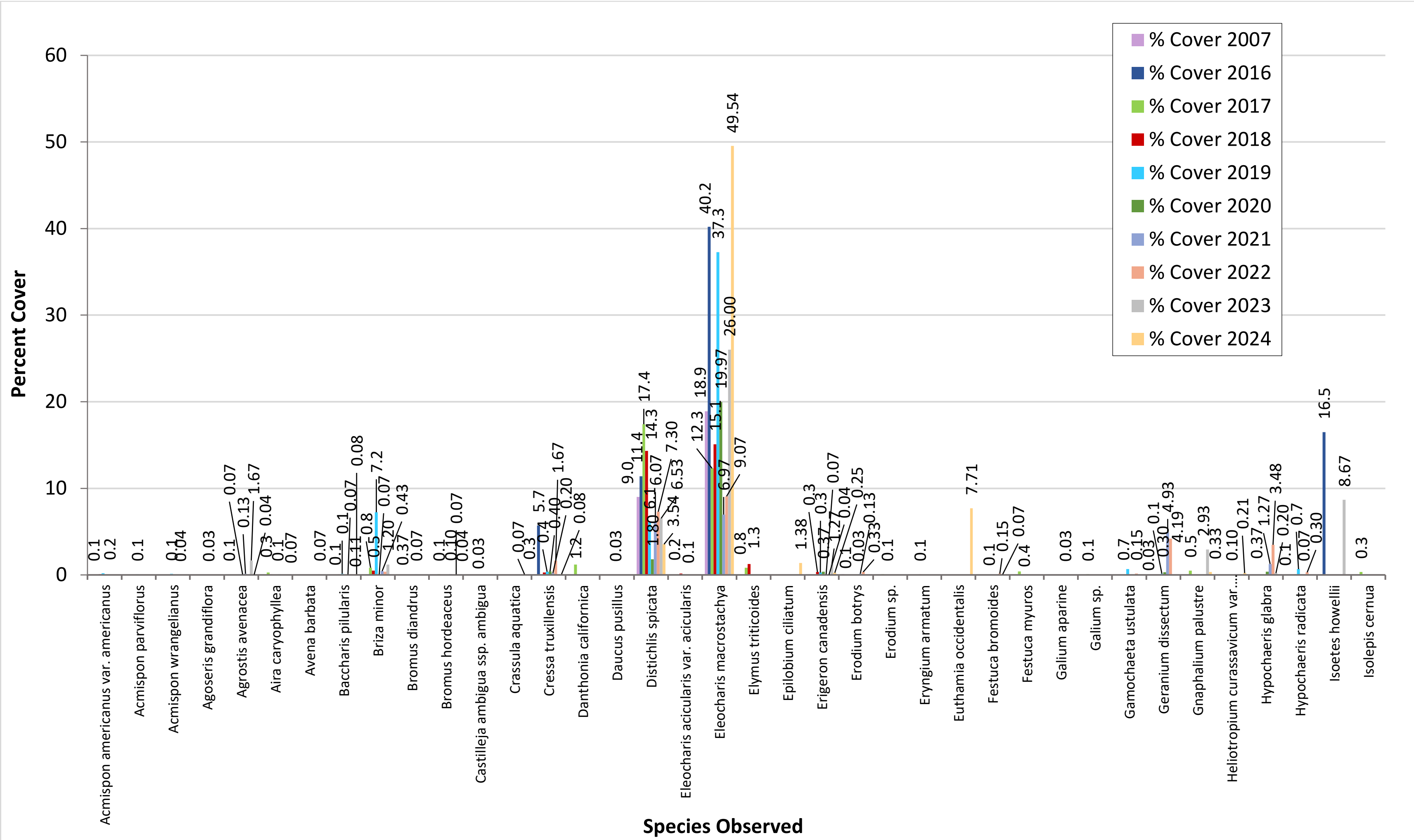

Figure H-1. Comparison Graph of Percent Cover by Wetland Plant Species for 2007, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, and 2024 at Pond 5 (Reference).

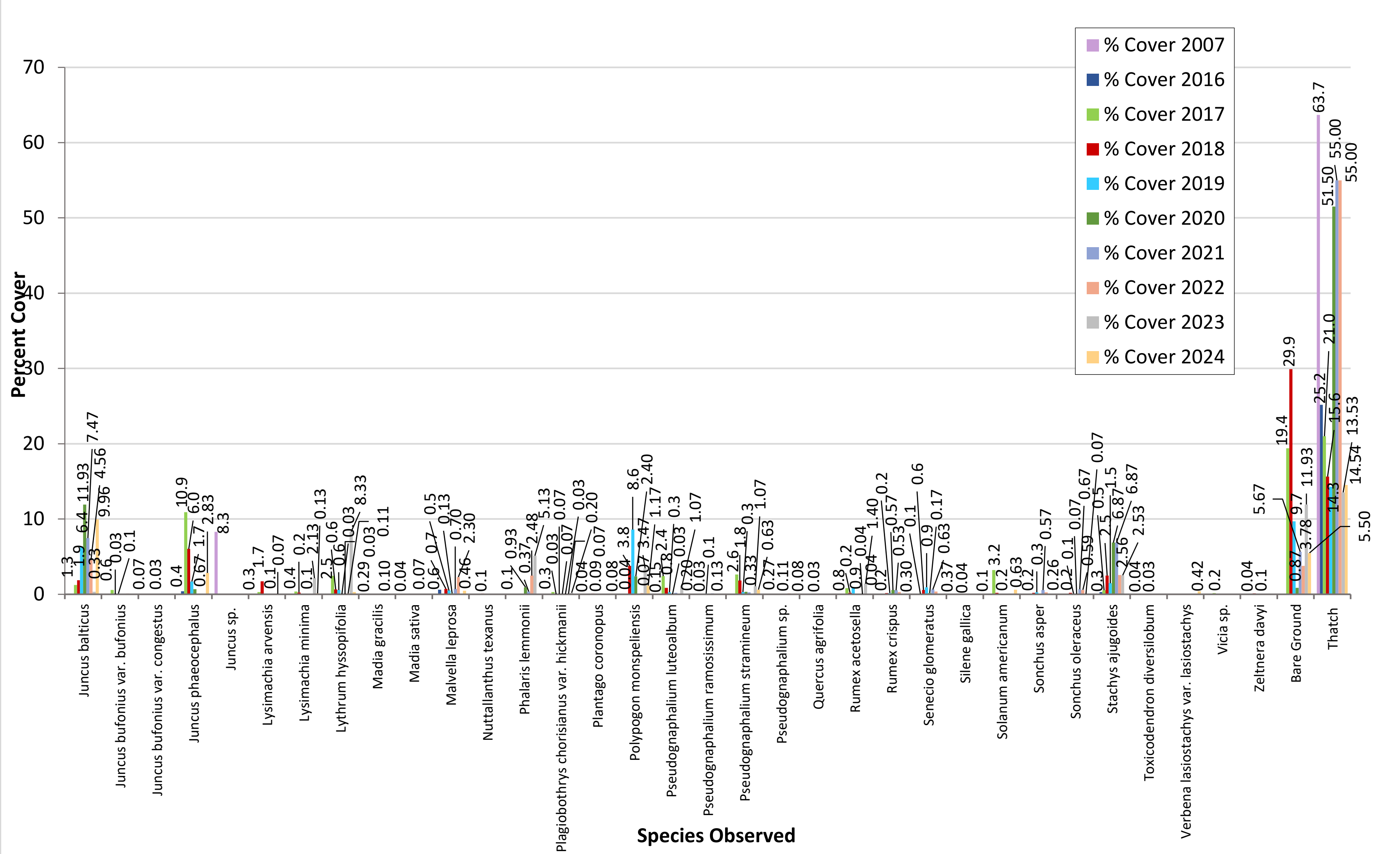

Figure H-1. (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 2007, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, and 2024 at Pond 5 (Reference).

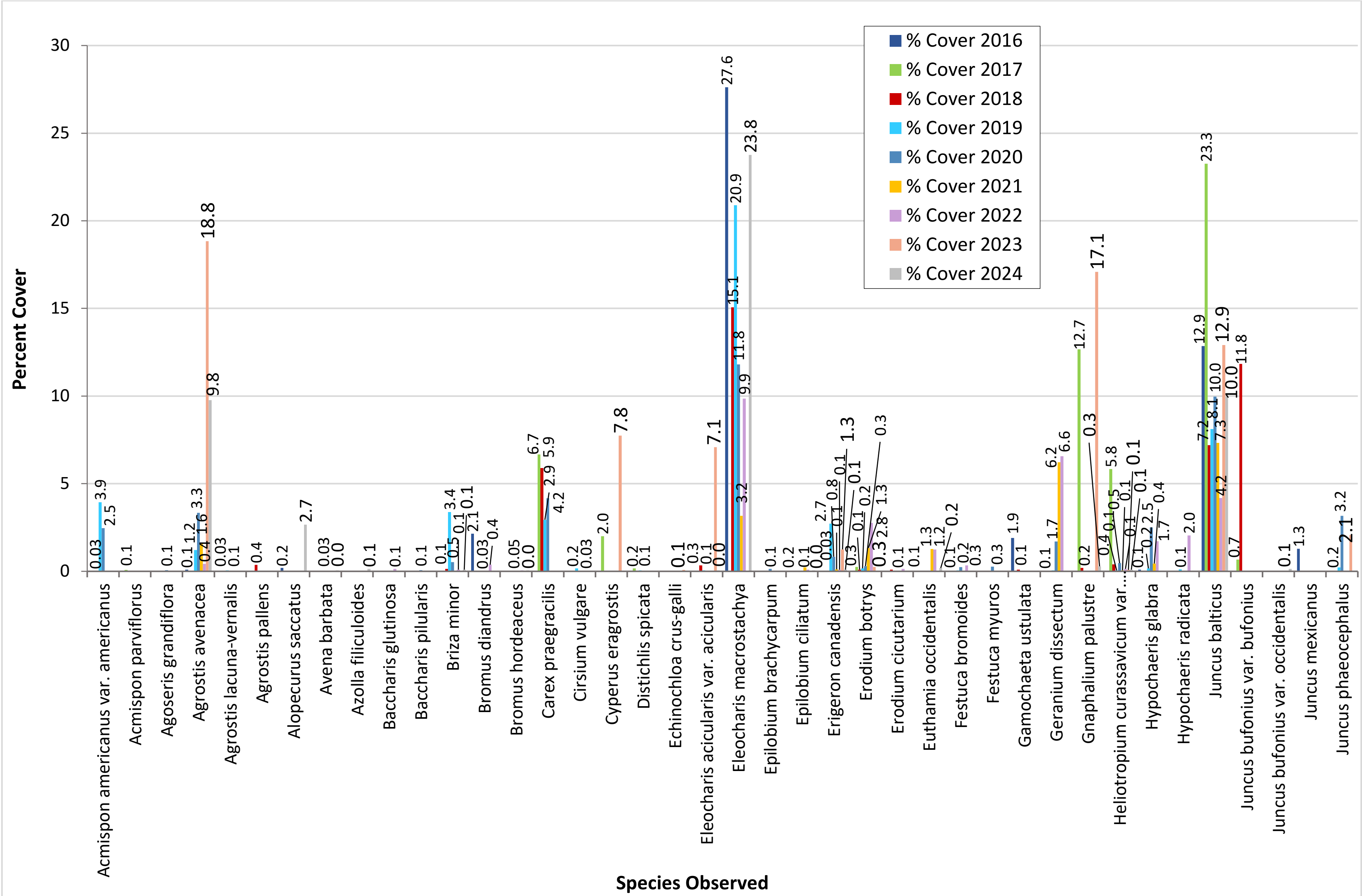

Figure H-2. Comparison Graph of Percent Cover by Wetland Plant Species for 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, and 2024 at Pond 101 East (East)(Reference).

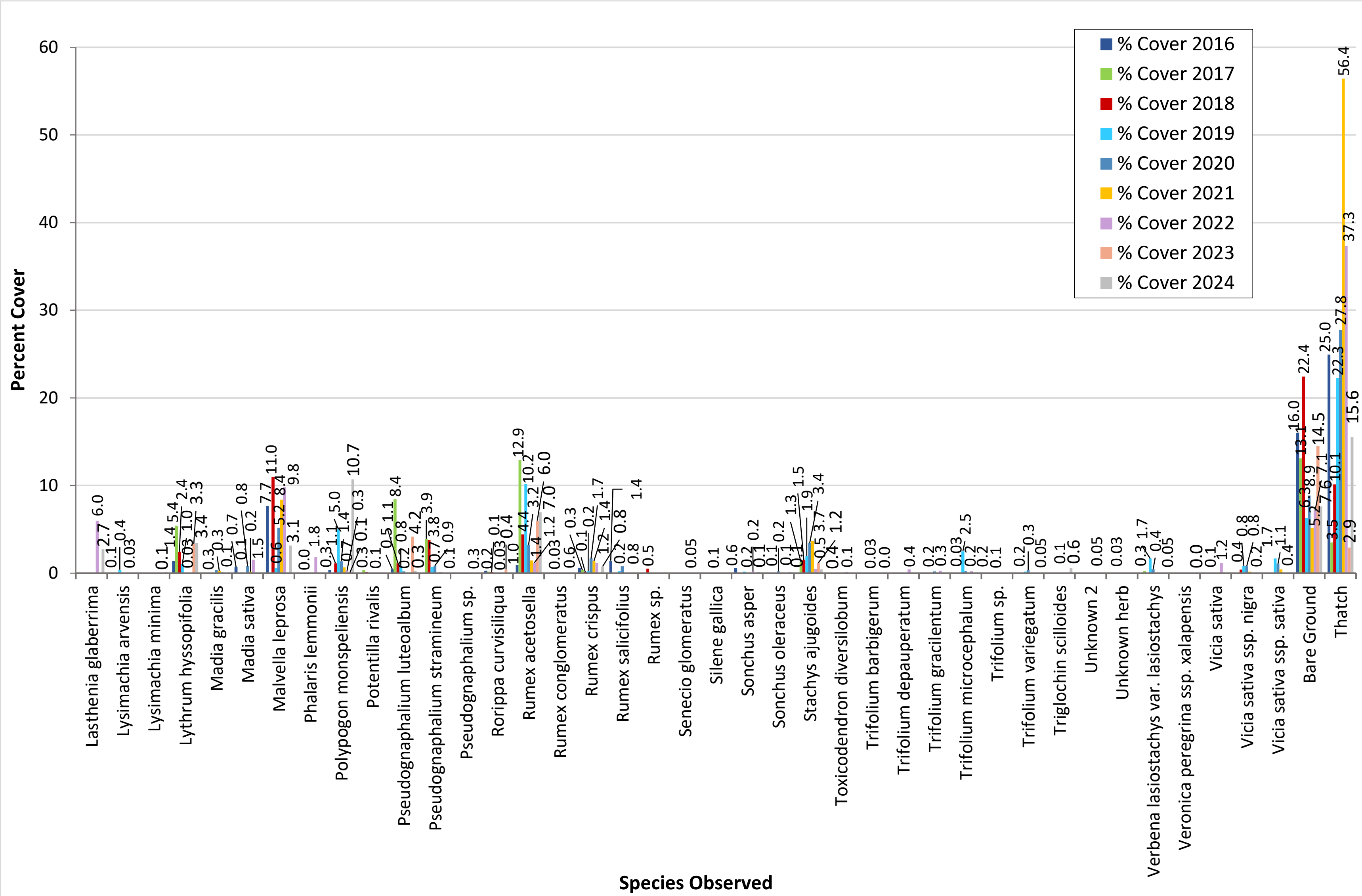

Figure H-2 (continued). Comparison Graph of Percent Cover by Wetland Plant Species for 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, and 2024 at Pond 101 East (East) (Reference).

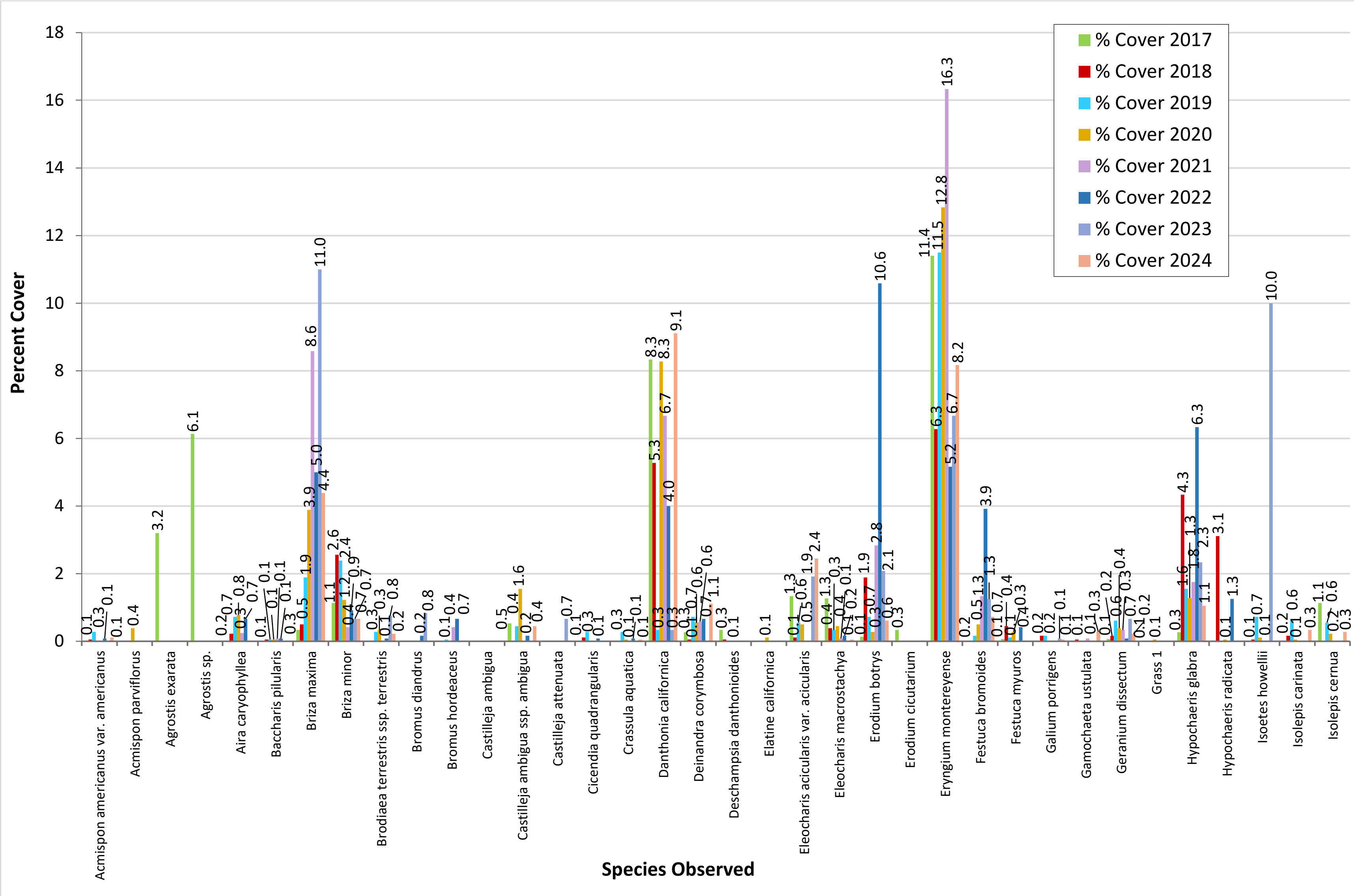

Figure H-3. Comparison Graph of Percent Cover by Wetland Plant Species for 2017, 2018, 2019, 2020, 2021, 2022, 2023, and 2024 at Pond 997 (Reference).

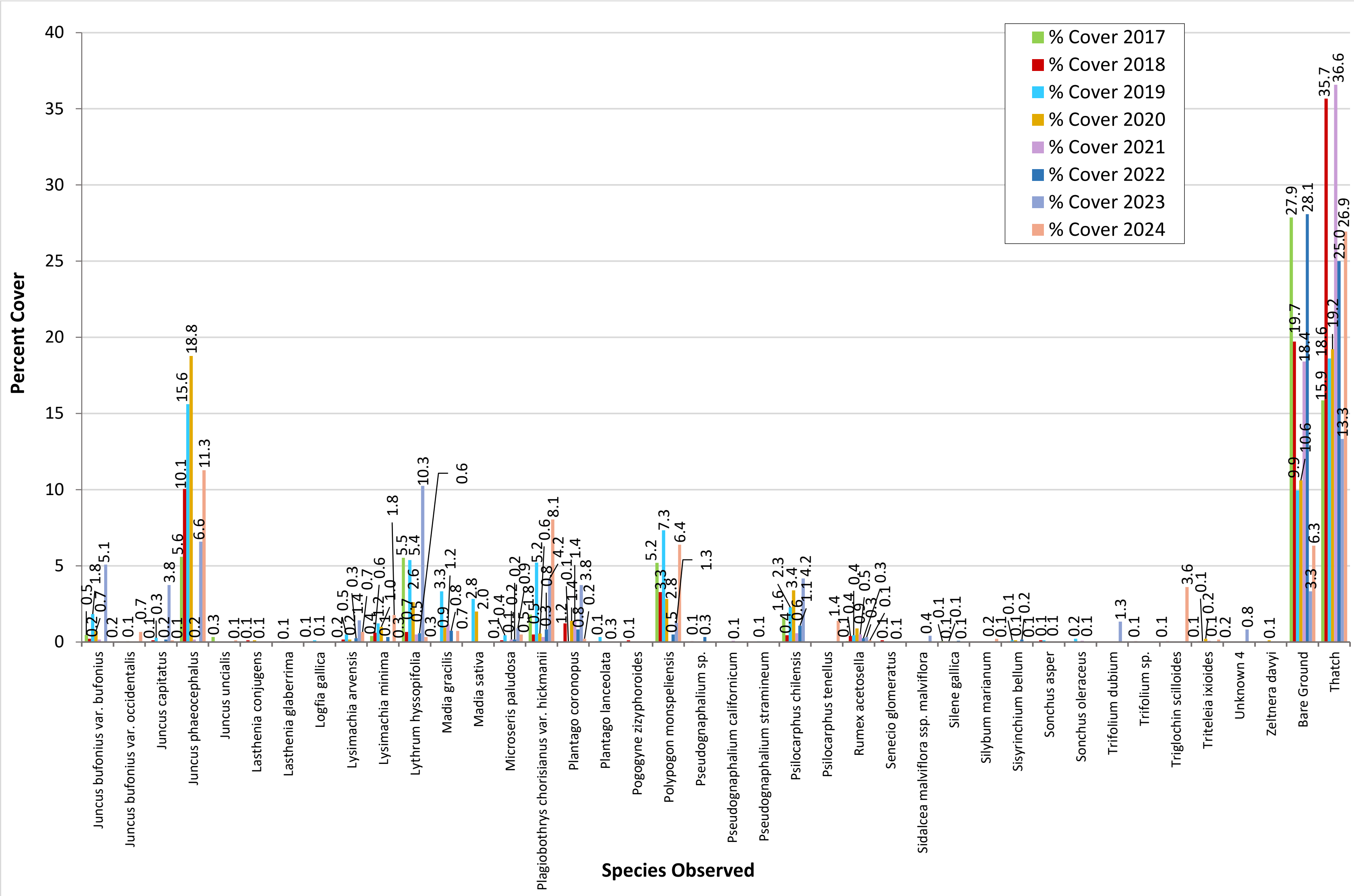

Figure H-4 (Continued)**.** Comparison Graph of Percent Cover by Wetland Plant Species for 2017, 2018, 2019, 2020, 2021, 2022, 2023, and 2024 at Pond 997 (Reference).

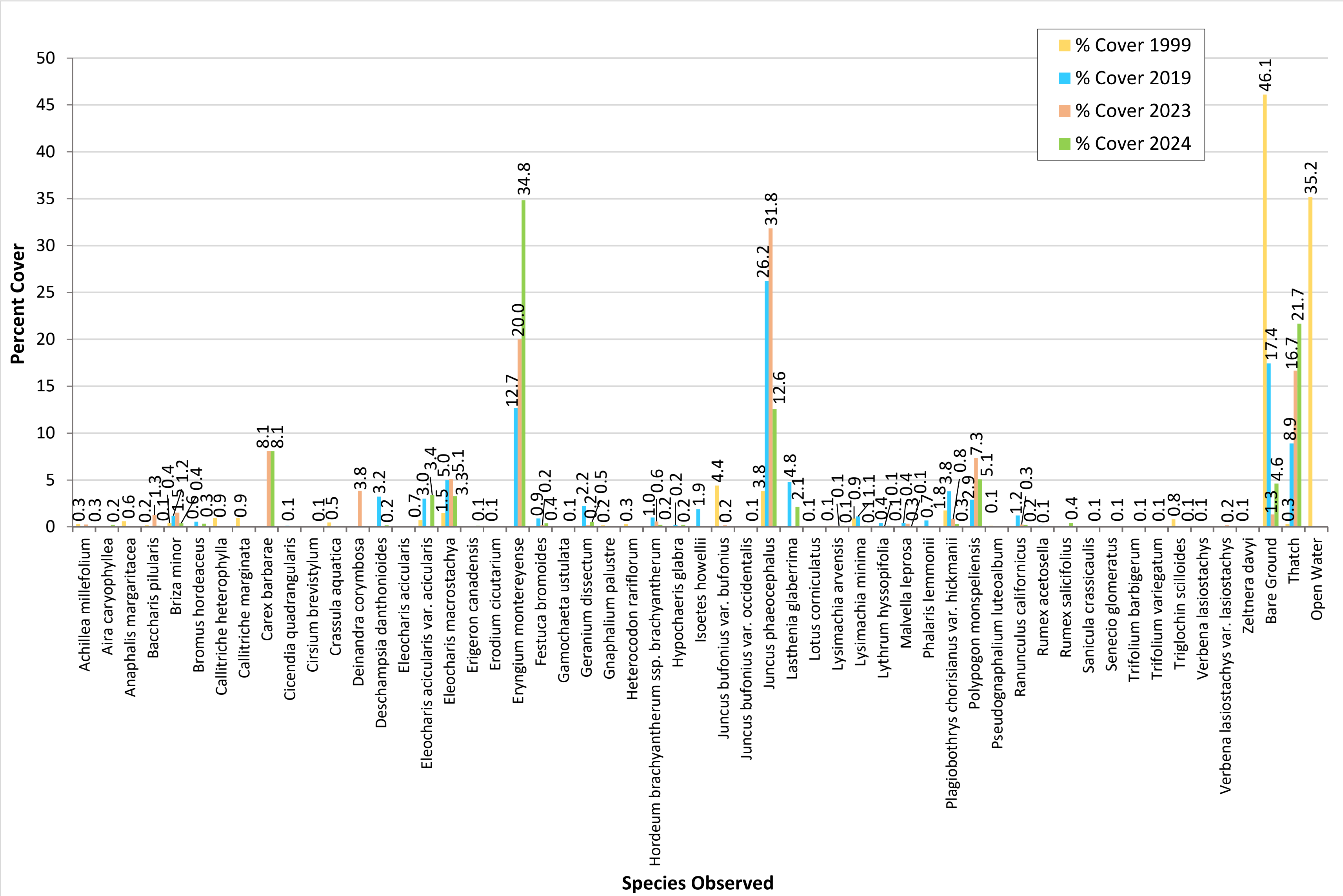

Figure H-5. Comparison Graph of Percent Cover by Wetland Plant Species for 1999, 2019, 2023, and 2024 at Pond 21 (Year 2 Post-Mastication and Post-Subsurface Munitions Remediation).

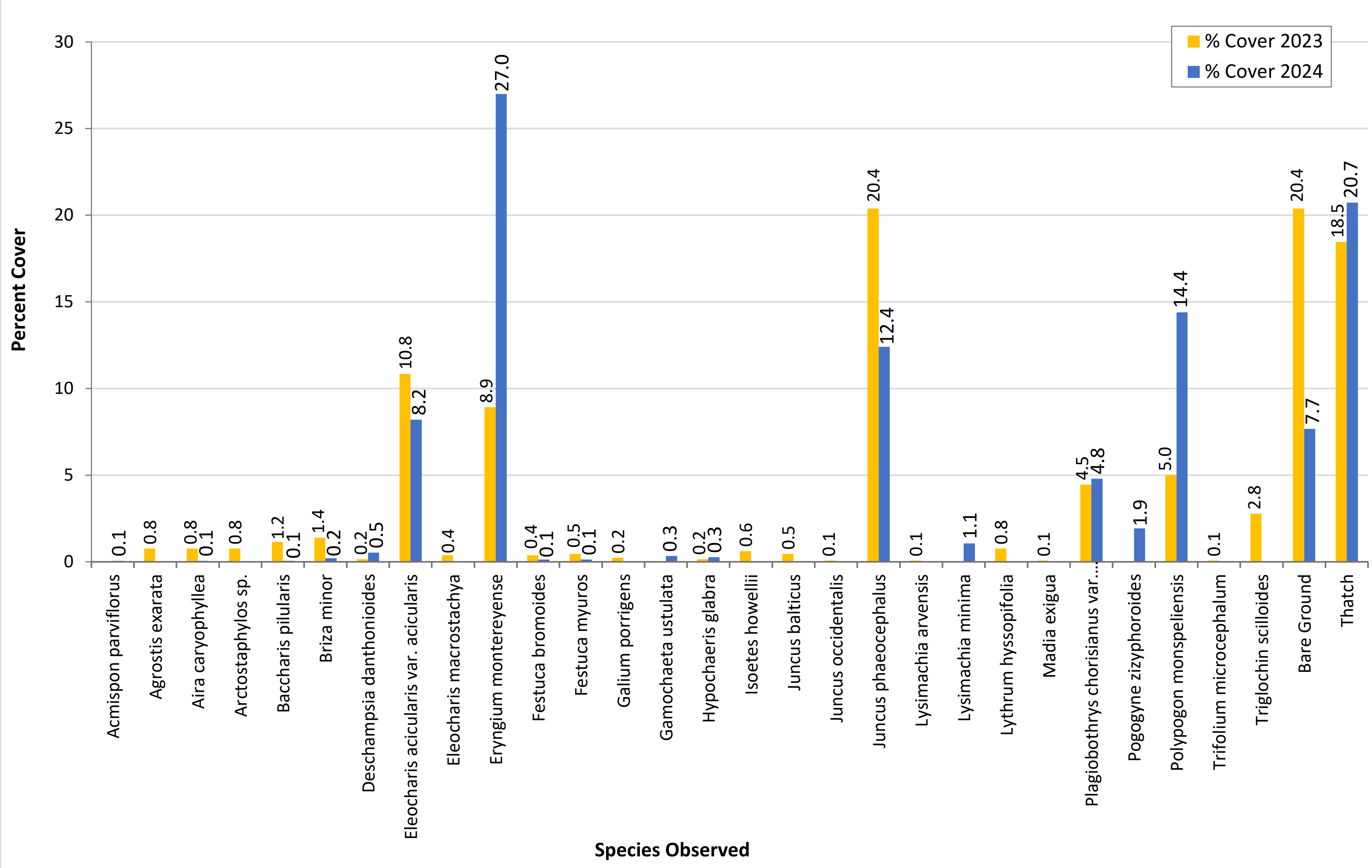

Figure H-5. Comparison Graph of Percent Cover by Wetland Plant Species for 2023 and 2024 at Pond 76 (Year 2 Post-Mastication, Year 1 Post-Subsurface Munitions Remediation).

APPENDIX I

Rank Abundance Curves

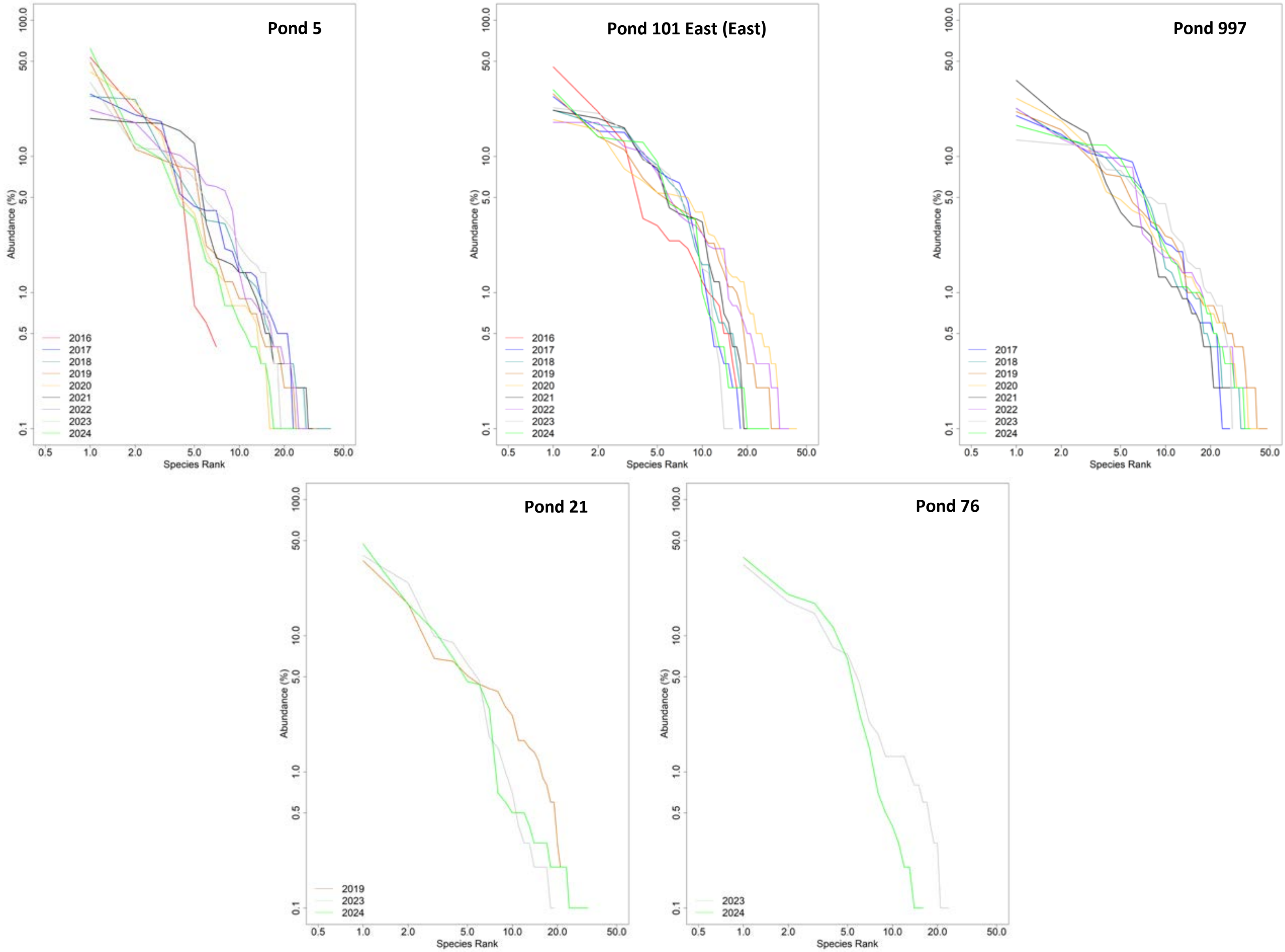

Figure I-1. Comparison Plots for RACs by Pond for all years. The top three plots are reference vernal pools. The bottom two plots are remediated vernal pools in their first and second years of monitoring. Both the x-axis and y-axis are in log-10 scale.