David Magney Environmental Consulting

FLORA AND RARE PLANTS OF BITTER CREEK NATIONAL WILDLIFE REFUGE

Prepared for:

U.S. FISH AND WILDLIFE SERVICE HOPPER MOUNTAIN NATIONAL WILDLIFE REFUGE COMPLEX HEADQUARTERS

September 2015 Draft

DMEC Mission Statement:

To provide quality environmental consulting services, with integrity, that protect and enhance the human and natural environment.

David Magney Environmental Consulting

Flora and Rare Plants of Bitter Creek National Wildlife Refuge

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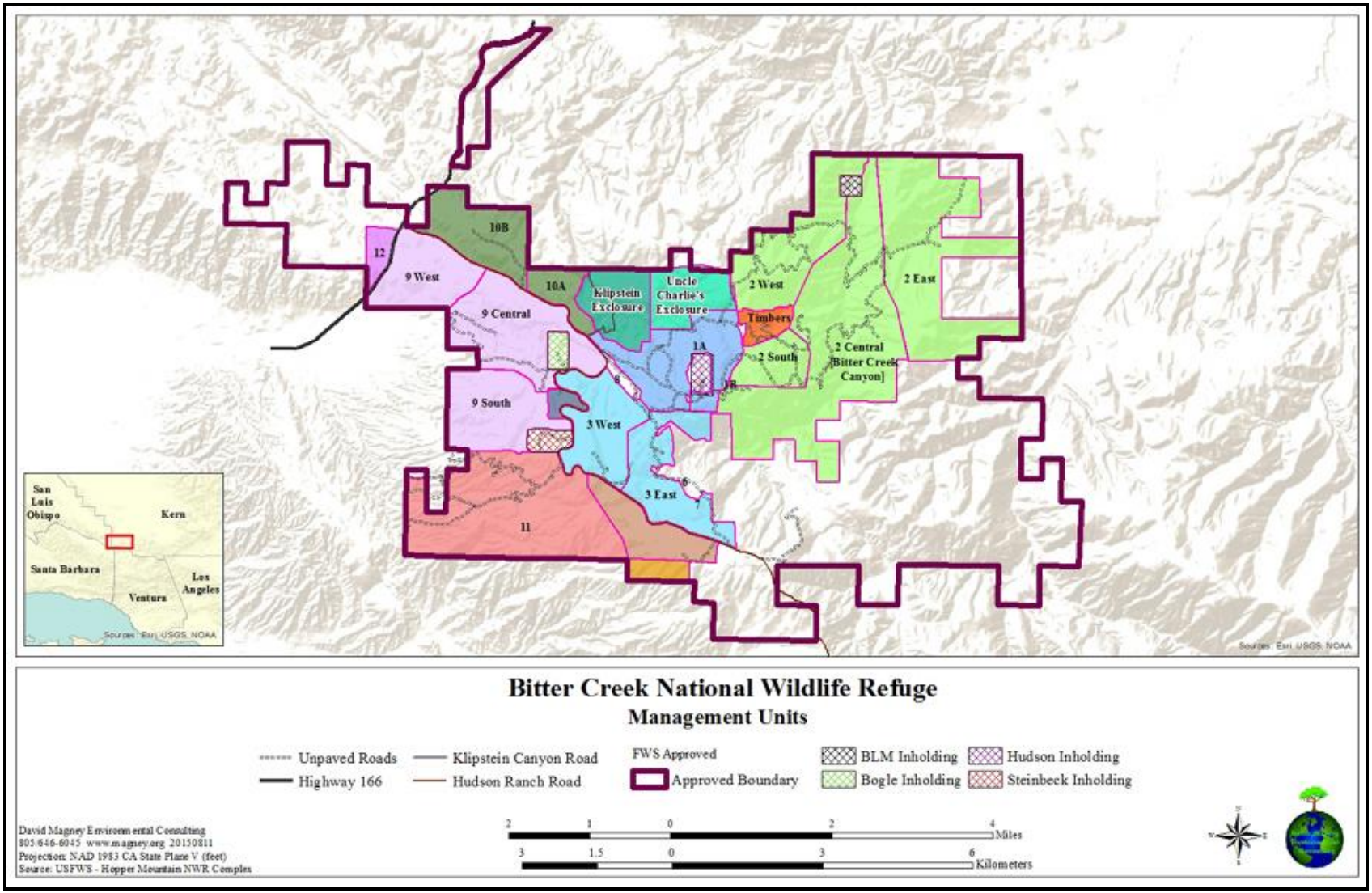
SECTION 1. INTRODUCTION

The Bitter Creek National Wildlife Refuge (NWR) is located within and adjacent to the San Emigdio Mountains, mostly in southwestern Kern County, and partially in Ventura County. It is between the San Joaquin Valley and the Cuyama Valley, and south of the Carrizo Plain. The Refuge is composed of 21 management units, exclosures, and other areas. These include management units 1A, 1B, 2 South, 2 West, 2 Central (Bitter Creek Canyon), 2 East, 3 West, 3 West, 6, 7, 8, 9 South, 9 Central, 9 West, 10A, 10B, 11, 12, as well as Uncle Charlie's Exclosure, Klipstein Exclosure, and Timbers. There are also some areas of the Refuge along Bitter Creek Canyon that are not in named management units, such as the Headwall Oaks area in the upper portion of Bitter Creek Canyon. Collectively, these management units encompass 14,097 acres (5,705 hectares). There are an additional 9,475 acres (3,834 hectares) that are not yet part of the refuge, but are within the approved acquisition boundary. These areas were not surveyed as part of this effort. Elevations on the Refuge range from 1,600 feet to 4,680 feet.

This report provides a summary of the results of the first year spring and summer floristic surveys, conducted by David Magney Environmental Consulting (DMEC), within Bitter Creek NWR, Kern and Ventura Counties, California. This initial floristic survey includes a summary of the flora and habitats, including special-status species reported or observed onsite. The location of Bitter Creek NWR is shown on Figure 1, General Location Map of Bitter Creek NWR. The focus of this work is to provide the U.S. Fish and Wildlife Service (USFWS) with information on the flora of each of the refuge's management units in support of their prescribed grazing efforts, particularly in regard to which management units contain populations of special-status plants. Appendix H of the U.S. Fish and Wildlife Service's *Final Comprehensive Conservation Plan and Environmental Assessment* (CCP) contains detailed information about the goals and strategies of the prescribed grazing plan for Bitter Creek NWR (USFWS 2013).

Figure 1. General Location Map of Bitter Creek NWR Management Units



SECTION 2. METHODS

Field Survey Methods

DMEC botanists/ecologists performed floristic field surveys during the spring and summer months of 2015 to identify and detect as many vascular plant species as possible at each of the 21 management units of Bitter Creek NWR, as well as some additional areas. Each management unit was walked over to account for as many plant species as possible onsite, using existing roads to provide primary access to as much of each management unit as possible. Management units that were expected to have a higher likelihood of ocurrences of endangered plant species were surveyed with the greatest detail. Due to resource constraints, the entirety of each management unit was not surveyed. Surveys were timed to coincide with the entierety of the spring and summer bloom time. Areas that were surveyed early were re-visited to identify later blooming species.

DMEC's Spring 2015 surveys took place over five weeks including 23 to 27 February, 9-13, 16-20 March, 30 March to 3 April, and 20-24 April. DMEC's Summer 2015 survey took place over one week, from 13-17 July. Surveys generally started at lower elevations and moved upslope as time went on, in order to follow the peak blooming season.

Global Positioning System (GPS) units were carried to track footpaths and to mark waypoints. Figure 2, Map of Floristic Surveys of Bitter Creek NWR, contains all of the waypoints taken by David Magney, Joe Broberg, and David Torfeh, and provides a general view of which areas of the Refuge were surveyed. A total of 1,176 waypoints were taken during the 2015 surveys.

Waypoints were established for each site where floristic data were gathered and correspond to checklists in each botany team's field notes. Waypoints were established in a non-random fashion to provide samples of various plant species and plant associations observed by the botany teams in the field. Survey effort (number of waypoints per unit area) was variable from location to location. Likewise the area surveyed at each waypoint was variable, but in general, a circle with a diameter of approximately 100 feet was surveyed at each waypoint. All vascular plants observed within each survey point were recorded and dominant species (visually estimated by cover) were noted.

Any species collected as herbarium voucher specimens, collected for identification and verification, were also recorded. Voucher specimens were collected from each of the 21 managmenent units, with the specimens being deposited into the herbaria at the University of California, Santa Barbara (UCSB), Ranch Santa Ana Botanic Garden (RSA) and Bitter Creek NWR, with the intent of having representative physical specimens from each of the 21 managment units, whenever possible. Dominant, associated, and vouchered species for each waypoint are included in the Bitter Creek NWR Matrix Table and the associated geodatabase.

Voucher specimens were identified by using botanical reference manuals (Baldwin et al. 2012, Twisselmann 1995, and the Calflora Database 2015). Photographs of the specimens were sometimes sent to experts on specific plant groups for further identification or verification. Not all voucher specimens were so treated, and a small number of specimens collected are undetermined as to identity.

Photographs were taken at most survey waypoints, with many of the species observed photographed with a digital camera. Photographs of general habitat conditions were also taken at most waypoints.

Previous botanical surveys of Bitter Creek NWR were conducted by Tim Thomas, Carl Wishner, Pam De Vries, and Misa Werner. DMEC observed 29 species that were previously unrecorded on the refuge. DMEC did not observe every species that had been previously recorded at Bitter Creek NWR.

Literature Survey

DMEC conducted a search of the California Department of Fish and Wildlife's (CDFW's) California Natural Diversity Database (CNDDB) RareFind5 (CDFW 2015) for Bitter Creek NWR and surrounding areas to identify which special-status species have been previously reported from the survey areas. DMEC also conducted a literature/database search of California Native Plant Society's (CNPS') *Inventory of Rare and Endangered Plants of California* (CNPS 2015) and the *Flora of Kern County* (Twisselmann 1995) to account for other special-status plant species not tracked by CNDDB with potential to occur in the vicinity of the proposed project site. Additional references were examined in preparation for field surveys and during report preparation (De Vries 2009, 2010, 2012a, 2012b, 2013, Magney 2015, Thomas & Wishner 1996, Werner 1997).

A search of CNDDB records for the Ballinger Canyon, Calif. USGS 7.5-minute topographic quadrangle (in which the majority of the refuge lies) and the eight surrounding quads (Elkhorn Hills, Maricopa, Pentland, Cuyama, Santiago Creek, Fox Mountain, Cuyama Peak, and Apache Canyon) yielded 36 special-status plant species.

Several of these, including the federally endangered *Eremalche parryi* ssp. *kernensis* (Kern Mallow) are known to occur on the refuge. Two more federally endangered plants have a high likelihood to occur on the refuge because of the proximity of known populations and suitable habitat: *Caulanthus californicus* (California Jewelflower) and *Monolopia congdonii* (San Joaquin Woolly Threads). DMEC's 2015 surveys focused on the three federally endangered species listed above.

The Consortium of California Herbaria (CCH) and the Calflora online databases were consulted on numerous occasions for several purposes, including:

- determining which taxa have been collected previously from Bitter Creek NWR;
- determining the relative rarity/commonness of taxa found onsite but not previously reported from the Refuge or Kern or Ventura Counties; and
- determining the known distribution of selected taxa.

The Jepson Manual: Higher Plants of California (Baldwin et. al 2012) and the *Flora of Kern County* (Twisselmann 1995) were used to identify various taxa found at one or more of the management units, as well as *A Flora of Ventura County, California* (Magney 2015). Finally, botanist colleagues and taxonomic experts were consulted regarding identification of select taxa (i.e. Cypher pers. comm., Wilken pers. comm.).

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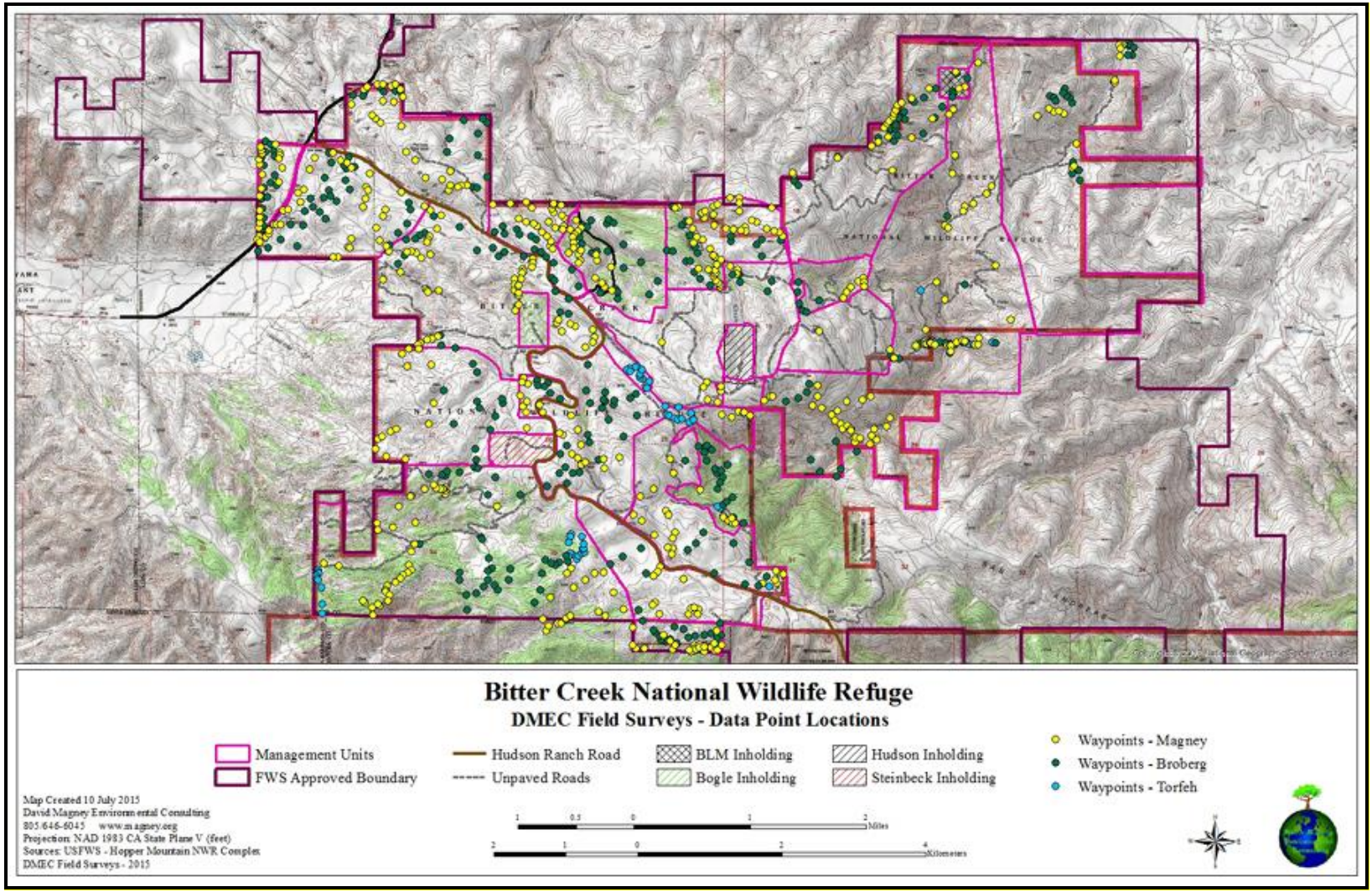
Figure 2. Map of Floristic Surveys of Bitter Creek NWR



The plant communities of the 21 management units were classified according to CDFG's/CNPS's *A Manual of California Vegetation* [*Manual*] (Sawyer et al. 2009), which follows the National and International Vegetation Classification systems. DMEC also identified additional alliances and associations of plant species that are not currently described by Sawyer et al. (2009), but occurred consistently across the management units. These currently undescribed alliances and/or associations are presented in this report as well, based on criteria and methods CDFW and CNPS used to develop the second edition of the *Manual*, and will be considered for inclusion in future editions (J. Evans pers. comm.[1]).

Sawyer et al. (2009) recognize on Pages 30 and 31 that their description on grassland (herbland) alliances and associations are still not well understood, and that a substantial amount of work still needs to be done before California herblands can be adequately described and understood, which is currently part of CNPS's California grasslands assessment initiative project[2]. The *Manual* states on Page 31 that it will "begin to report the grassland variation in this edition based on recent studies". Since large areas of Bitter Creek NWR are dominated by herblands that have not been studied much by vegetation ecologists, and that annual herblands in California are still poorly described and understood, it is no surprise that many new plant associations are present on Bitter Creek NWR and other large areas in the region, such as the former San Emigdio Ranch[3] (DMEC 2010a) and Tejon Ranch (DMEC 2010b).

[1] Julie Evans, CNPS Vegetation Program Director, personal communication (email) 13 May 2010 regarding acceptability of naming new, undescribed, vegetation alliances.
[2] David Magney is a member of the CNPS Vegetation Committee and part of the Grasslands Assessment Initiative.
[3] DMEC conducted botanical surveys (spring and summer 2010) of the grassland areas of the former San Emigdio Ranch, now part of the Wildlands Conservancy's Wind Wolves Preserve.

SECTION 3. BOTANICAL RESOURCES

The botanical resources of the project site include the flora and plant communities occupying the property landscape, including special-status species and sensitive habitats.

FLORA

Including DMEC's 2015 surveys and previous floristic surveys, a total of 483 vascular plant species[4] have been recorded at Bitter Creek NWR. DMEC observed 315 species during 2015. 29 of these were species that were previously unrecorded on the Refuge. Appendix A, Plant Species Observed at Bitter Creek NWR, contains a table that lists the 315 plant species observed by DMEC during the 2015 surveys, which management units they were observed in, and the number of occurrences that were observed. Of the 315 vascular plant taxa observed and identified by DMEC, 274 (83%) are native and the remaining 56 (17%) are introduced naturalized species. This is a higher ratio of native to non-native plants compared to the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). Over the entire refuge, an average of 11.6 species were observed at each waypoint.

DMEC observed approximately 62 species of non-vascular plants, including 57 lichens and 5 mosses. Most of these have not yet been identified to the species level. Because surveys did not primarily focus on non-vascular plants, there are likely more non-vascular plant species on the refuge.

Special-status plant species are defined in this report as those listed by the state or federal governments (CDFW 2015) or in the *Inventory of Rare and Endangered Plants of California* (California California Native Plant Society [CNPS] 2015). Of the vascular plants that were identified, 8 are special-status species, listed by the California Native Plant Society (2015) and also tracked by the CDFW's Natural Diversity Database (CNDDB)[5]. One, *Eremalche parryi* ssp. *kernensis* (Kern Mallow) is listed as federally endangered.

There is taxonomic debate centered on the difference between *Eremalche parryi* ssp. *kernensis* and *Eremalche parryi* ssp. *parryi* (Parry's Mallow), which likely cannot be solved without extensive genetic studies. DMEC has identified both of these subspecies at Bitter Creek NWR based on the treatment in *The Jepson Manual* (Baldwin et al. 2012), as well as a site visit and personal communication with Ellen Cypher of the CSU Stanislaus Endangered Species Recovery Program[6].

[4] "Species" here includes subspecies, varieties, and hybrids.
[5] Not all special-status species tracked by CNPS are mapped by the CNDDB; however, the CNDDB maintains paper files for those not yet mapped, with the intention of mapping occurrences with funding becomes available.
[6] Ellen Cypher, PhD, personal communication, 1 April 2015.

SPECIAL-STATUS PLANT SPECIES

Special-status plant species are plants that are listed by the USFWS, California Fish and Game Commission, CDFW, and/or the California Native Plant Society (CNPS). CNPS has developed lists of rare plants native to California that are rare statewide and included in it's *Inventory of Rare and Endangered Plants of California* (CNPS 2015), and locally rare plants for selected areas of the state (Lake 2004, Magney 2013, Wilken 2007). To date, CNPS has not developed a list of locally rare plants for any part of Kern County. CNPS has five statewide rare plant lists/ranks: 1A, 1B, 2A, 2B, 3, and 4. For Ventura County, CNPS has two categories, rare and uncommon (Magney 2013).

Ten (10) special-status plant species were directly observed (or reported) within the refuge. Table 1, Special-status Plant Species observed at Bitter Creek NWR, provides a complete list of the special-status plant species observed by DMEC during the 2015 spring and summer surveys, or previously observed by others. Figure 3, Locations of Special-status Plants at Bitter Creek NWR, maps the locations of all special-status plants on the refuge. Maps of individual units that contain special-status plants are included in the management unit summaries below.

Table 1. Special-status Plant Species Observed at Bitter Creek NWR

Listing Status: Federal/State/CNPS	Scientific Name	Common Name	Management Unit(s)
None/None/CNPS 4	*Androsace elongata* ssp. *acuta*	California Rockjasmine	2 South, Uncle Charlie's Exclosure
None/Rare/ CNPS 4	*Castilleja plagiotoma*	Mojave Indian Paintbrush	11
None/None/ CNPS 1B	*Caulanthus lemmonii*[7]	Lemmon's Jewelflower	3, 10B
None/None/ CNPS 1B	*Deinandra halliana*	Hall's Tarplant	10A
FE/None/CNPS 1B	*Eremalche parryi* ssp. *kernensis*	Kern Mallow	2 Central, 2 West, 9 South, 7, 11
None/None/CNPS 4	*Fritillaria agrestis*	Stink Bells	11
None/None/CNPS 4	*Gilia latiflora* ssp. *cuyamensis*	Cuyama Gilia	3 East, 11
None/None/CNPS 4	*Lupinus elatus*[8]	Silky Lupine	3
None/None/CNPS 4	*Mentzelia eremophila*	Pinyon Blazing Star	11
None/None/CNPS 4	*Perideridia pringlei*	Adobe or Pringle Yampah	6, 7

[7] Found by Pam De Vries but not observed by DMEC (De Vries 2010).
[8] Ibid.

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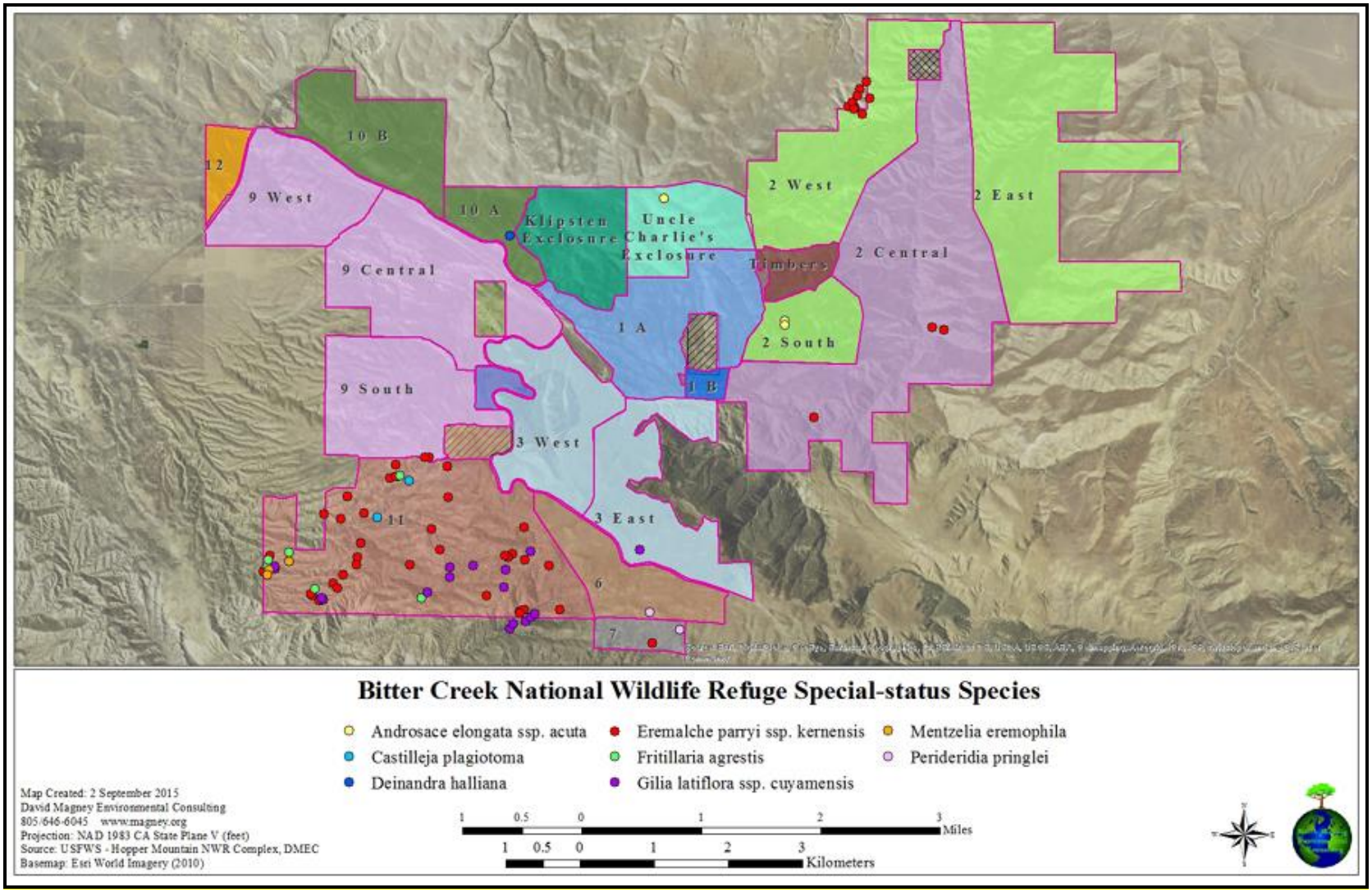
Figure 3. Locations of Special-status Plants at Bitter Creek NWR



PLANT COMMUNITIES/VEGETATION TYPES

The vegetation of Bitter Creek NWR is comprised of three predominant habitat types, including woodlands/forests, scrublands, and grasslands/herblands. The Refuge management units contain thirty-three (33) specific vegetation alliances recognized in the *Manual of California Vegetation* (Sawyer et al. 2009), identified on the refuge during the 2015 floristic surveys. An additional twenty-three (23) vegetation alliances were identified that occurred consistently across the management units, and are considered by DMEC to be candidates for recognition as California vegetation alliances. These are listed below according to their basic form, following the CNPS/CDFW vegetation classification system (Sawyer et al. 2009), with published alliances and newly named alliances distinguished in the list. Several of these have been described as alliances and/or associations by CNPS since the publication of the *Manual of California Vegetation* (Buck-Diaz et al. 2013). Appendix B, Vegetation Alliances at Bitter Creek NWR, contains a table that lists the fifty-six (56) total vegetation alliances and indicates where they occur in the respective management units.

Forest and Woodland

Seven (7) forest and woodland vegetation alliances (communities) were observed on the refuge, including:

- *Ailanthus altissima* Provisional Semi-natural Stand (NEW)
- *Juniperus californica* Woodland Alliance
- *Quercus john-tuckeri* Woodland Alliance
- *Quercus* X*alvordiana* Provisional Woodland Alliance (NEW)
- *Pinus monophylla* Woodland Alliance
- *Salix laevigata* Woodland Alliance (Riparian)
- *Salix gooddingii* Woodland Alliance (Riparian)

Juniper and oak dominated woodland alliances are the most abundant woodland alliances, both floristically and spatially, on the Refuge. Generally, the higher elevation portions on the southern part of the refuge have more forested area, while the lower elevation portions are dominated by grassland and herbland alliances (with the exception of the Klipstein and Uncle Charlie's Exclosures). *Quercus john-tuckeri* (Tucker's Oak) occurs more frequently in the southern areas of the Refuge, while *Quercus* x*alvordiana* (Alvord Oak) occurs more frequently on the northern areas of the Refuge, primarily in the Klipstein and Uncle Charlie's Exclosures.

Shrubland

Fifteen (15) shrubland vegetation alliances (communities) were observed on the Refuge, including:

- *Artemisia tridentata* ssp. *tridentata* Shrubland Alliance
- *Atriplex canescens* Shrubland Alliance
- *Atriplex lentiformis* Shrubland Alliance (Riparian)
- *Eastwoodia elegans* Provisional Shrubland Alliance (NEW)

- *Ericameria linearifolia* Provisional Shrubland Alliance
- *Ericameria nauseosa* Shrubland Alliance
- *Eriogonum fasciculatum* var. *polifolium* Shrubland Alliance
- *Eriogonum heermannii* Provisional Shrubland Alliance
- *Gutierrezia californica* Provisional Shrubland Alliance
- *Hesperoyucca whipplei* Provisional Shrubland Alliance (NEW)
- *Lupinus albifrons* Shrubland Alliance
- *Prunus virginiana* Provisional Shrubland Alliance
- *Ribes quercetorum* Provisional Shrubland Alliance
- *Salix exigua* Shrubland Alliance
- *Tamarix* spp. Shrubland Semi-natural Alliance

Ericameria linearfolia Shrubland Alliance is the most abundant shrubland alliance on the Refuge. *Atriplex canescens* Shrubland Alliance is primarily found in the eastern part of the Refuge, in the Bitter Creek watershed. *Eriogonum fasciculatum* var. *polifolium* Shrubland Alliance occurs in patches, primarily in areas that are otherwise dominated by *Juniperus californica* Woodland Alliance.

Grassland/Herbland

Thirty-four (34) herbland vegetation alliances (communities) were observed on the Refuge, including:

- *Amsinckia intermedia* Provisional Herbaceous Alliance (NEW)
- *Amsinckia menziesii* Herbaceous Alliance
- *Amsinckia tessellata* Herbaceous Alliance
- *Amsinckia vernicosa* Provisional Herbaceous Alliance (NEW)
- *Artemisia dracunculus* Herbaceous Alliance
- *Avena* (*barbata*, *fatua*) Semi-natural Stands
- *Brassica* and other mustards Semi-natural Stands
- *Bromus diandrus* Provisional Semi-natural Stands (NEW)
- *Bromus madritensis* ssp. *rubens* Semi-natural Stands
- *Bromus madritensis* ssp. *rubens-Schismus* (*arabicus*, *barbatus*) Herbaceous Semi-natural Stands
- *Bromus tectorum* Semi-Natural Stands
- *Claytonia perfoliata* Provisional Herbaceous Alliance (NEW)
- *Corethrogyne filaginifolia* Provisional Herbaceous Alliance (NEW)
- *Distichlis spicata* Herbaceous Alliance
- *Elymus multisetus* Provisional Herbaceous Alliance
- *Elymus triticoides* Herbaceous Alliance
- *Eriogonum angulosum-Bromus rubens* Provisional Herbaceous Alliance (NEW)
- *Eriogonum elongatum* Provisional Herbaceous Alliance (NEW)
- *Erodium cicutarium* Provisional Semi-natural Stands (NEW)
- *Eschscholzia californica* Herbaceous Alliance
- *Eschscholzia lemmonii* Provisional Herbaceous Alliance (NEW)
- *Hordeum murinum* Provisional Herbaceous Alliance (NEW)
- *Juncus* (*balticus, mexicanus*) Herbaceous Alliance

- *Lasthenica gracilis* Provisional Herbaceous Alliance (NEW)
- *Mentzelia pectinata* Provisional Herbaceous Alliance (NEW)
- *Mentzelia veatchiana* Provisional Herbaceous Alliance (NEW)
- *Microsteris gracilis* Provisional Herbaceous Alliance (NEW)
- *Monolopia lanceolata* Provisional Herbaceous Alliance (NEW)
- *Phacelia ciliata* Provisional Herbaceous Alliance (NEW)
- *Phacelia tanacetifolia* Provisional Herbaceous Alliance (NEW)
- *Poa secunda* Herbaceous Alliance
- *Stipa cernua* Provisional Herbaceous Alliance
- *Stipa pulchra* Herbaceous Alliance
- *Typha* (*angustifolia, domingensis, latifolia*) Herbaceous Alliance

The herbland (grassland) vegetation alliances are the most floristically rich and varied of the three general forms (woodlands, shrublands, herblands). The alliances dominated by annual species are found most extensively in the lower elevation management units. These areas are heavily dominated by annual forb species such as *Amsinckia* Herbaceous Alliance, *Phacelia ciliata* Herbaceous Alliance, and *Erodium cicutarium* Semi-natural Stands. They are also dominated by annual exotic grass alliances such as *Bromus diandrus* Semi-natural Stands and *Bromus madritensis* ssp. *rubens* Semi-natural Stands.

The herbland alliances are predominantly composed of annual species, which can actually morph from one alliance to another depending on the season in which they are sampled. For example, an area dominated by *Amsinckia* Herbaceous Alliance may change into *Bromus diandrus* Herbaceous Semi-natural Stand between early spring and late spring. This phenomenon was also observed on Tejon Ranch (DMEC 2010b) and the Wind Wolves Preserve (DMEC 2010a), both located in southwestern Kern County.

SUMMARY OF MANAGEMENT UNITS

A summary of the flora, special-status plants, and recommendations for each of the management units is provided below. Figure 3 above illustrates the location of each management unit.

Management Unit 1A

Mangement Unit 1A Location

Management Unit 1A is located in the central part of the Refuge, immediately east of the crew bunkhouse. It surrounds the Hudson inholding. This management unit is approximately 770 acres (312 hectares) in size, ranging in elevation from approximately 3,500 ft. above sea level at its northern edge to 4,000 ft. at its southern edge. It is mostly comprised of gently rolling hills, with some steeper slopes and drainages in the northeastern corner of the unit. The distribution of the flora in each management unit is provided as Appendix A.

Management Unit 1A Flora

This management unit was farmed and grazed historically, and is heavily disturbed. DMEC observed a total of 95 vascular plant taxa (including species, subspecies, and varieties) at a total of 47 waypoints. An average of 9.6 species was observed at each waypoint. Of these 95 taxa, 73 (76.8%) are native and 22 (23.2%) are naturalized non-natives. This ratio of native plants to non-native plants is similar to the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). This unit is primarily dominated by non-native annual grasses such as *Bromus diandrus* ssp. *diandrus* (Ripgut Brome), a dominant at 36% of the waypoints, *Bromus madritensis* ssp. *rubens* (Red Brome) at 32% of the waypoints, and *Avena fatua* (Wild Oats) at 30% of the waypoints. There are some drainages in the northeastern portion of this unit, bordering Uncle Charlie's exclosure, that are dominated by *Quercus* x*alvordiana* (Alvord Oak). This area is not as dominated by exotic annual grasses and has a diversity of annual herbaceous species such as *Amsinckia vernicosa* (Green Fiddleneck), *Gilia jacens* (Nevada Gilia), *Collinsia heterophylla* (Chinese Houses), and others.

Management Unit 1A Special-status Species

No special-status species were observed in this management unit.

Management Unit 1A Recommendations

Because the majority of Mangament Unit 1A is dominated by exotic annual grasses, and because no special-status species were observed, this unit is a good candidate for prescribed grazing. Grazing for this unit should be managed so that grazing animals do not impact the drainages in the northeastern portion too heavily, and so that grazing is concentrated on the exotic annual grasses that dominate the rest of the unit.

Unit 1A is primarily dominated by non-native annual grasses such as Bromus diandrus *ssp.* diandrus *(Ripgut Brome) and* Bromus madritensis *ssp.* rubens *(Red Brome).*

A southeast-facing slope dominated by Eschscholzia lemmonii *var.* lemmonii *(Lemmon's Poppy).*

A small area in the northeastern portion of unit 1A is dominated by Quercus *x*alvordiana *(Alvord Oak).*

Management Unit 1B

Management Unit 1B Location

Management Unit 1B is a small 55-acre (22.3-hectare) unit located in the center of the Refuge. It is bordered by Unit 1A to the north and west, by Unit 3 East to the south, and by Unit 2 Central (Bitter Creek Canyon) to the east. This management unit is at approximately 4,000 ft. in elevation, and is situated on the rim of Bitter Creek Canyon. It is mostly flat, with slight topographical variation.

Management Unit 1B Flora

DMEC observed a total of 24 vascular plant taxa (including species, subspecies, and varieties) in Unit 1B at a total of 10 waypoints. An average of 7.3 species was observed at each waypoint. Of these 24 taxa, 11 (45.8%) are native and 13 (54.2%) are non-native. This ratio of native plants to non-native plants is considerably lower than the rest of the Refuge[9]. This unit is primarily dominated by the non-native annual grass *Bromus madritensis* ssp. *rubens*, a dominant at 80% of the waypoints. Other frequent dominants include *Hirschfeldia incana* (Summer Mustard) at 60% of the waypoints, *Bromus diandrus* ssp, *diandrus* at 50% of the waypoints, and *Corethrogyne filaginifolia* (California Cudweed Aster) at 50% of the waypoints.

DMEC also surveyed a small fenced exclosure to the west of Unit 1B. This area has a spring and wetland species such as *Salix laevigata* (Red Willow), as well as an occurrence of *Malvella leprosa* (Alkali Mallow), a species that had not yet been recorded at the Refuge.

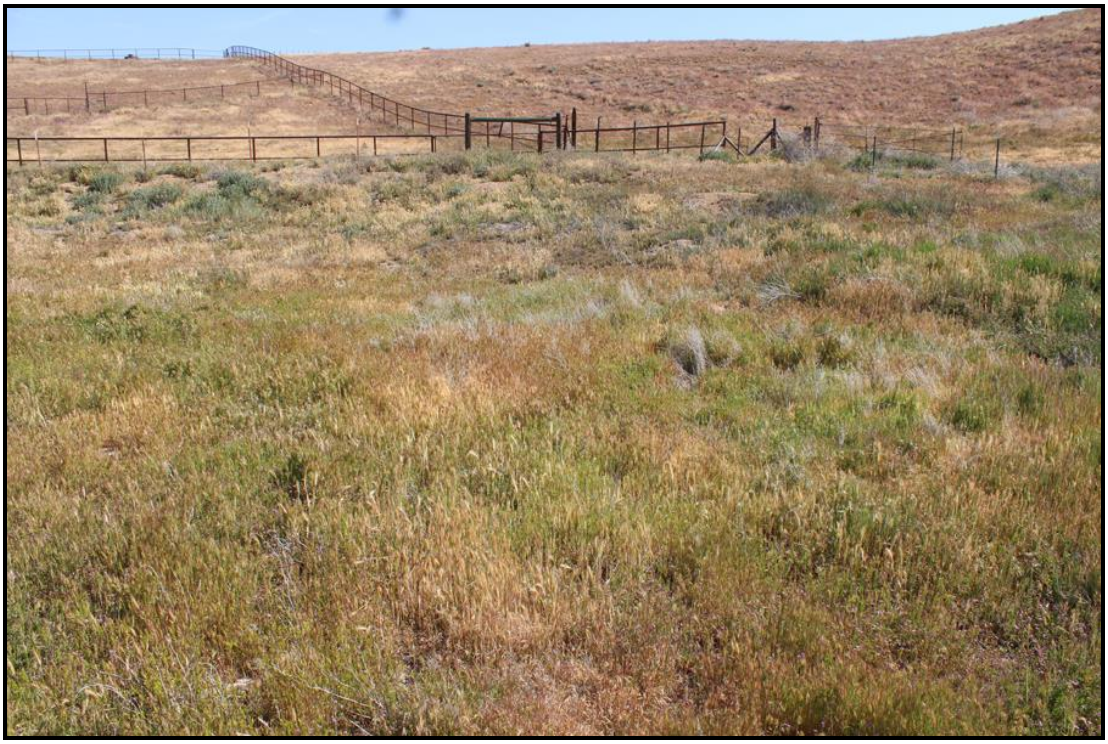
Management Unit 1B Special-status Species

No special-status species were observed in this unit by DMEC.

Management Unit 1B Recommendations

Because Management Unit 1B is dominated by exotic annual grasses, and because no special-status species were observed, it is a good candidate for prescribed grazing. The wetland area to the west of this unit should not be grazed, or only grazed lightly during appropriate seasons.

[9] This unit was surveyed during the summer 2015 survey, when many native annual herbs had dried up and were not as visible. More native species would likeley have been found during the spring.



The exclosure to the west of unit 1B (foreground) contains wetland obligate species. Unit 1B (background) is dominated by non-naitve annual grasses.

Management Unit 2 East

Management Unit 2 East Location

Management Unit 2 East is located in the northeastern most part of the Refuge. It is bordered by Unit 2 Central (Bitter Creek Canyon) to the west. This unit is approximately 1,640 acres (664 hectares) in size. This unit has some of the lowest elevations on the Refuge, and the unit as a whole ranges from approximately 1,800 ft. to 3,340 ft. in elevation. It has several large canyons and many small gullies, with many steep slopes.

Management Unit 2 East Flora

This management unit was farmed and grazed historically, and is heavily disturbed. It is mostly composed of *Amsinckia* Herbaceous Alliance and *Bromus madritensis* ssp. *rubens* Semi-natural Stands. DMEC observed a total of 53 vascular plant taxa at a total of 36 waypoints[10]. An average of 8 taxa was observed at each waypoint. Of these 53 taxa, 42 (79.2%) are native and 11 (19.8%) are non-native. This ratio of native to non-native plants is slightly higher than that which occurs in the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). This unit is primarily dominated by *Amsinkcia tessellata* var. *tessellata* (Bristly Fiddleneck), a dominant at 69% of the waypoints, *Bromus madritensis* ssp. *rubens* at 47% of waypoints, and *Erodium cicutarium* (Red-stemmed Filaree) at 28% of the waypoints. There are very few shrubs and no trees in this unit.

[10] Some of these waypoints were unintentionally taken outside but immediately adjacent the refuge boundary, and are being included in this summary.

There are large portions of this unit that DMEC did not cover during the 2015 surveys due to lack of roads and difficulty of access. DMEC plans to focus on these areas during the spring 2016 survey.

Management Unit 2 East Special-status Species

No special-status species were observed by DMEC in this unit.

Management Unit 2 East Recommendations

Unit 2 East exhibits a moderate diversity of native forbs, but is also heavily dominated by non-native annual grasses. DMEC believes that this unit is a good candidate for appropriately managed grazing for the goals outlined in the CCP.

Amsinckia tessellata Herbaceous Alliance *in unit 2 East*

Management Unit 2 Central (Bitter Creek Canyon)

Management Unit 2 Cental Location

Management Unit 2 Central is located in the eastern part of the Refuge. It is bordered by Unit 2 East, Unit 2 West, Timbers, Unit 2 South, and the headwall of Bitter Creek Canyon. This unit is approximately 2,322 acres (940 hectares) in size. It includes both the bottom and rim of Bitter Creek Canyon, and has drastic changes in elevation ranging from approximately 1,650 ft. to 3,900 ft. This unit is mostly comprised of extremely steep slopes and Bitter Creek itself.

Management Unit 2 Central Flora

Management Unit 2 Central is a highly diverse area with a variety of habitats ranging from the riparian corridor at the bottom of the canyon to Tucker Oak Woodland in the upper canyon. DMEC observed a total of 149 vascular plant taxa at a total of 118 waypoints. An average of 9.1 species was observed at each waypoint. Of these 149 taxa, 126 (84.6%) are native and 23 (15.4%) are non-native. This is a high ratio of native to non-native plants compared to the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). This unit is primarily dominated by *Bromus madritensis* ssp. *rubens*, a dominant at 19.4% the of waypoints, *Atriplex canescens* ssp. *canescens* (Fourwing Saltbush) at 16.8% of the waypoints, and *Amsinkcia tessellata* var. *tessellata* (Bristly Fiddleneck) at 15.4% of the waypoints. Two species previously unrecorded at Bitter Creek NWR were found in this unit: *Phragmites australis* (Common Reed) and *Senecio spartioides* (Broomlike Ragwort).

Management Unit 2 Central Special-status Species

One special-status plant, *Eremalche parryi* ssp. *kernensis*, (Kern Mallow, CNPS rank 1B.1 and federally Endangered) was found in unit 2 Central. This taxon was found in five locations, on the eastern slopes of Bitter Creek canyon[11]. The locations of this species can be seen in Figure 4, Locations of Special-status Plants in Management Unit 2 Central.

Management Unit 2 Central Recommendations

Unit 2 Central is highly diverse and contains many different microhabitats due to its variation in topography and its extensive riparian corridor. It also contains several ocurrences of the federally Endangered Kern Mallow, and DMEC expects that there are likely more ocurrences of this species within the canyon corridor. The CCP does not outline Uncle Charlie's Exclosure as a priority grazing area (USFWS 2013), and DMEC agrees with this decision. This unit should be managed to maintain herbland (grassland), shrub, and riparian habitat.

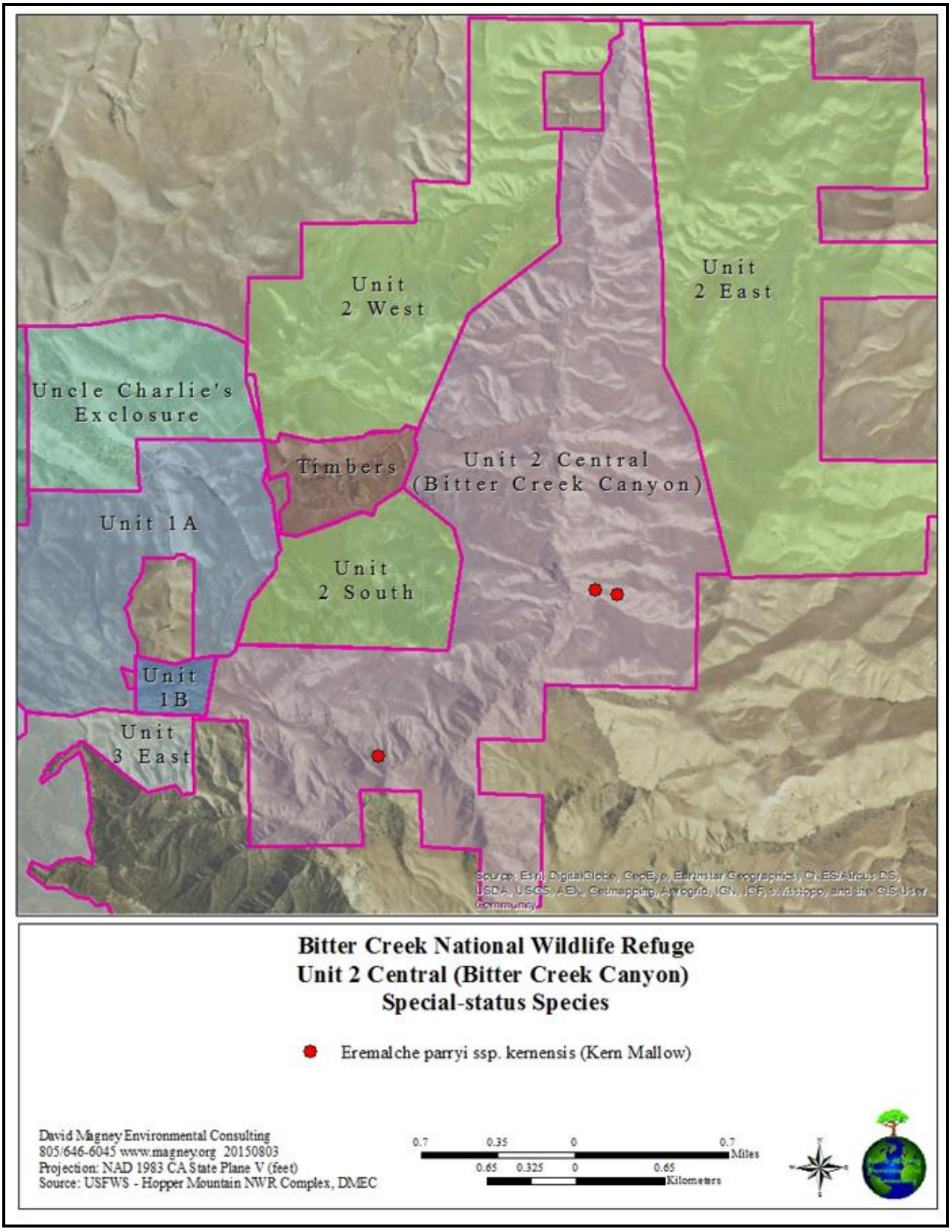
The corridor of Bitter Creek Canyon is primarily dominated by Atriplex lentiformis *ssp.* lentiformis *(Quail Brush), while upland slopes are dominated by* Atriplex canescens *ssp.* canescens *(Fourwing Saltbush),* Amsinckia tessellata *var.* tessellata *(Bristly Fiddleneck), and non-native annual grasses.*

[11] Several of these were found in a preflowering state but are highly likely to be *Eremalche parryi* ssp. *kernensis* due to leaf size.

Eremalche kernensis *ssp.* kernensis *(Kern Mallow) on a slope of Bitter Creek Canyon.*

A large population of Clarkia cylindrica *ssp.* cylindrica *(Speckled Clarkia) found on a slope of Bitter Creek Canyon during April 2015.*

Figure 4. Locations of Special-status Plants in Management Unit 2 Central



Management Unit 2 South

Management Unit 2 South Location

Management Unit 2 South is located in the central eastern part of the Refuge. It is bordered by Timbers to the north, Unit 1A to the west, and Unit 2 Central (Bitter Creek Canyon) to the south and east. This unit is approximately 339 acres (137 hectares) in size. It ranges from approximately 3,100 ft. to 4,000 ft. in elevation. The entire unit is composed of steep slopes that trend east, into Bitter Creek Canyon.

Management Unit 2 South Flora

DMEC observed a total of 55 vascular plant taxa at a total of 47 waypoints in Unit 2 South. An average of 6.9 species was observed at each waypoint. Of these 55 taxa, 38 (69.1%) are native and 17 (30.9%) are non-native[12]. This ratio of native to non-native plants is lower than the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). This unit is primarily dominated by the non-native annual grasses *Bromus diandrus* ssp. *diandrus*, a dominant at 51% of the waypoints and *Bromus madritensis* ssp. *rubens* at 42.5% of the waypoints. This unit also contains large patches of the native bunchgrass *Elymus multisetus* (Big Squirreltail Grass), which was observed at 17 waypoints and a dominant at 3 of them.

Management Unit 2 South Special-status Species

One special-status species was observed in this unit: *Androsace elongata* ssp. *acuta*, California Rockjasmine (CNPS Rank 4.2). This taxon was observed in two locations, however, it is highly likely that it occurs in other areas in the unit. The locations of this species can be seen in Figure 5, Locations of Special-status Plants in Management Unit 2 South.

Management Unit 2 South Recommendations

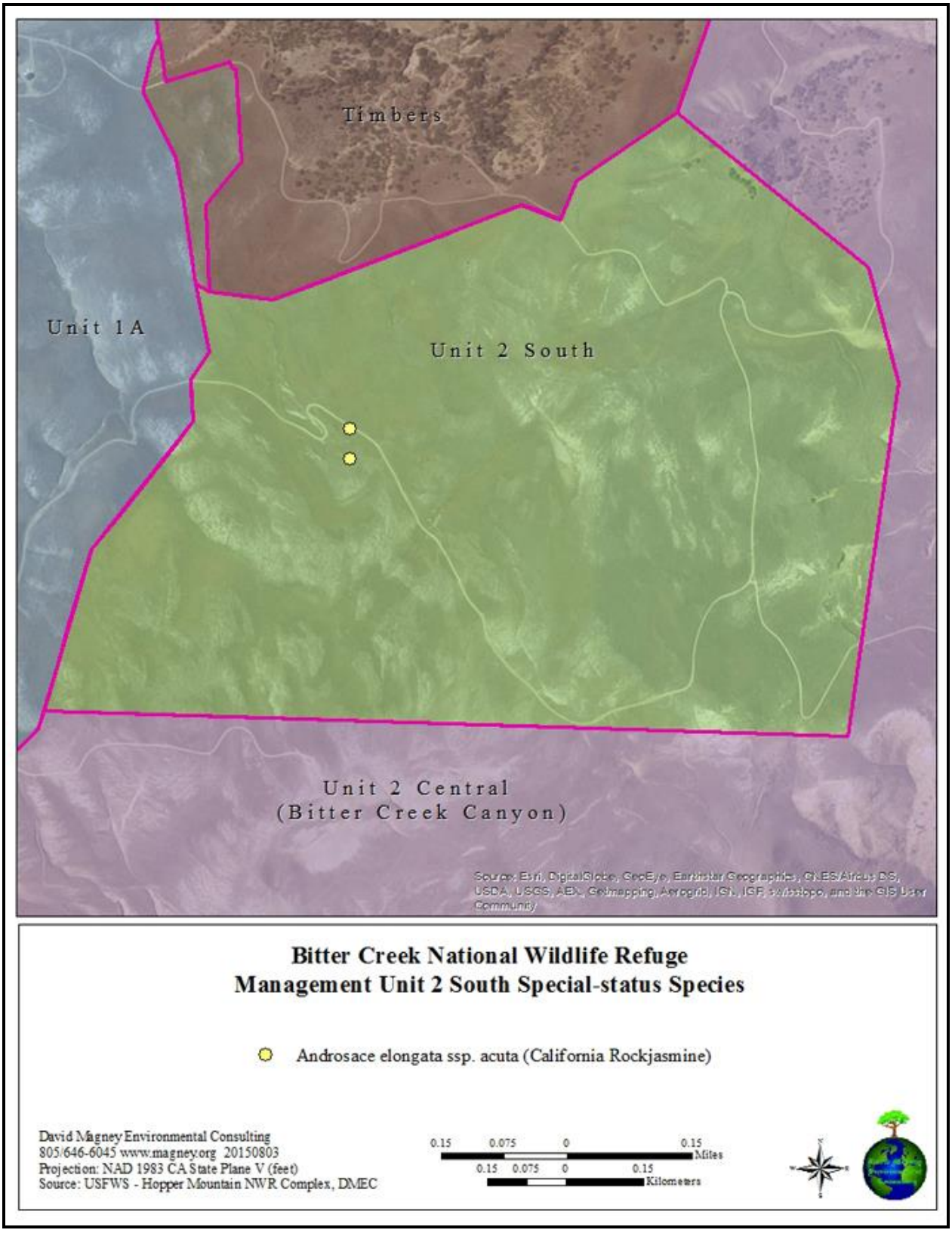
Unit 2 South is heavily dominated by non-native annual grasses. These grasses have created a dense thatch in which little else can grow. This unit contains one special-status species, *Androsace elongate* ssp. *acuta* (California Rockjasmine). DMEC does not expect that grazing, as long as it is managed to prevent overgrazing, will damage this species. This unit is a good candidate for application of prescribed grazing as outlined in Appendix H of the CCP (USFWS 2013).

[12] This unit was almost entirely surveyed during the summer 2015, when many native forbs had dried up and were not as visible. A spring survey most likely would have yielded a high numbber of total species and a higher ratio of native to non-native species.

Bromus diandrus *ssp.* diandrus *(Ripgut Brome) and* Bromus madritensis *ssp.* rubens *(Red Brome) are the main dominants of Unit 2 South.*

Androsace elongata *ssp.* acuta *(California Rockjasmine).*

Figure 5. Locations of Special-status Plants in Management Unit 2 South



Management Unit 2 West

Management Unit 2 West Location

Management Unit 2 West is located in the northeastern of the Refuge. It is bordered by Unit 2 Central (Bitter Creek Canyon) to the east, Timbers to the south, and Uncle Charlie's Exclosure to the west. This unit is approximately 911 acres (369 hectares) in size. It ranges from approximately 1,960 ft. to 3,600 ft. in elevation. It is composed of gentle slopes in the western portion and a series of drainages that drain east into Bitter Creek Canyon in the eastern portion.

Management Unit 2 West Flora

DMEC observed a total of 96 vascular plant taxa at a total of 54 waypoints in Unit 2 West[13]. An average of 6.9 taxa was observed at each waypoint. Of these 96 taxa, 77 (80.2%) are native and 19 (19.8%) are non-native. This ratio of native to non-native plants is slightly higher than the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). This unit is mainly comprised of herbland (grassland), and shrublands comprised of *Atriplex canescens* and *Eriogonum fasciculatum* ssp. *polifolium* (south-facing slopes), and *Ericameria linearifolia* (north facing slopes). The most frequent dominants of this unit are *Atriplex canescens* ssp. *canescens* (Fourwing Saltbush), a dominant at 30% of the waypoints, *Bromus madritensis* ssp. *rubens* at 28% of the waypoints, and *Amsinckia tessellata* var. *tessellata* at 20% of the waypoints.

Management Unit 2 West Special-status Species

One special-status species was observed in this unit; *Eremalche parryi* ssp. *kernensis*, Kern Mallow (federally listed as Endangered). This taxon was observed in high densities in several of the small canyons in the central part of this unit. This taxon was recorded at 9 waypoints, and at 2 waypoints it was a dominant species. The locations of this taxon can be seen in Figure 6, Locations of Special-status Plants in Management Unit 2 West.

Management Unit 2 West Recommendations

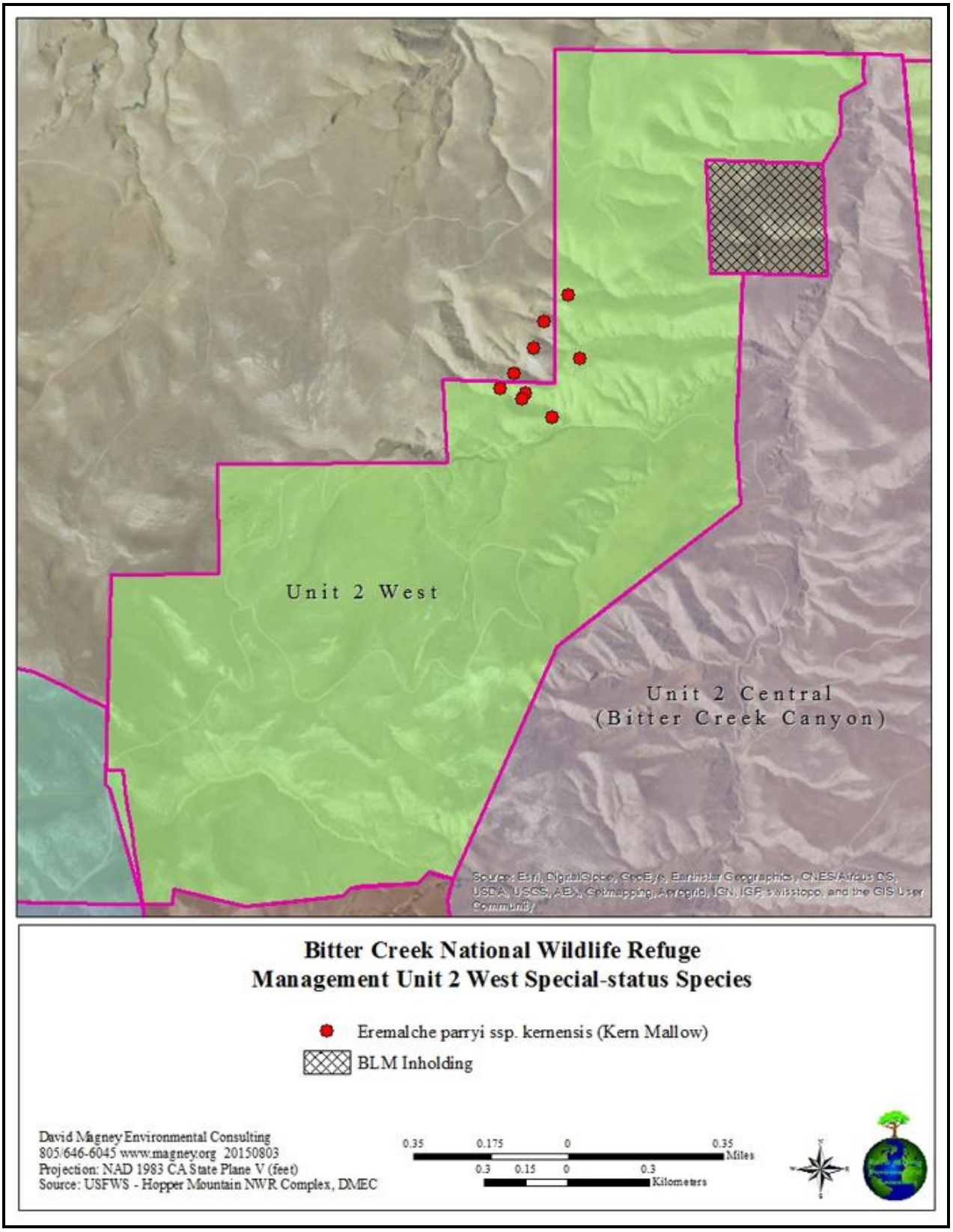
Unit 2 West exhibits a high diversity of native plants. Portions of the unit have gradual slopes and are dominated by non-native grasses; these areas are good canditates for prescribed grazing. However, other areas of the unit are comprised of sparsely vegetated, steep slopes that would be highly susceptible to erosion. Additionally, there are several large populations of the federally Endangered Kern Mallow. Taking this into account, DMEC recommends that Unit 2 West is not grazed, unless these populations can be protected.

[13] 8 of these waypoints were unintentionally taken in a small BLM inholding that is surrounded by Unit 2 West. These waypoints are being included as part of the summary of the flora of Unit 2 West.

Atriplex canescens *Shrubland Alliance (foreground) and* Monolopia lanceolata *Herbaceous Alliance (background).*

A large population of Eremalche kernensis *ssp.* kernensis *(Kern Mallow).*

Figure 6. Locations of Special-status Plants in Management Unit 2 West



Management Unit 3 West

Management Unit 3 West Location

Management Unit 3 West is located in the central part of the Refuge. It is bordered by 9 Central and 1A to the north, 3 East to the east, Units 6 and11 to the south, and Units 8 and 9 south to the west. This unit is approximately 642 acres (260 hectares) in size. It ranges from approximately 3,620 ft. to 4,500 ft. in elevation. Unit 3 West is mostly comprised of gradual slopes, with two canyons that drain to the northern edge of the unit.

Management Unit 3West Flora

Management Unit 3 West was farmed and grazed historically, and most of it is heavily disturbed. DMEC observed a total of 134 vascular plant taxa at a total of 55 waypoints. An average of 14.8 taxa was observed at each waypoint. Of these 134 taxa, 111 (82.8%) are native and 23 (17.2%) are non-native. This is a higher ratio of native to non-native plants than the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). This unit is primarily dominated by *Bromus diandrus* ssp. *diandrus*, a dominant at 25% of the waypoints, *Erodium cicutarium* at 25% of the waypoints, and *Bromus madritensis* ssp. *rubens* at 24% of the waypoints. The native bunchgrass *Poa secunda* ssp. *secunda* (One-sided Bluegrass) occurs frequently on north-facing slopes in this unit and is a dominant at 20% of the waypoints. Although this unit is primarily dominated by non-native grasses, it has a high level of species richness. This is probably due to the large canyons, rocky outcrops, and the large area that burned in a wildfire recently. The burned area exhibits a high species richness of flowering annuals.

Management Unit 3 West Special-status Species

No special-status species were observed by DMEC during the 2015 surveys.

Pam De Vries observed *Caulanthus lemmonii* (Lemmon's Wild Cabbage, CNPS Rank 1B.2) and *Lupinus elatus* (Silky Lupine, CNPS Rank 4.3) in Unit 3 (she does not specify 3 East or West) (De Vries 2010). DMEC also observed similar species of *Caulanthus* and *Lupinus* in Units 3 East and 3 West; however, we identified them as *Caulanthus coulteri*, *Caulanthus inflatus*, and *Lupinus formosus*, which are not a special-status species.

Management Unit 3 West Recommendations

Unit 3 West exhibits a high diversity of native plants, but is also heavily dominated by exotic annual grasses. DMEC believes that this unit is a good candidate for appropriately managed grazing. In fact, the high divesrity of native forbs in the burned area of this unit suggests that removing the dense thatch created by grasses such as Ripgut Brome can be beneficial. Grazing practices should ensure that the diverse native forbs and grasses in this unit are not overbrowsed. More surveys should be conducted to determine if special-status species occur in this unit, and if so where.

Large areas of unit 3 West are heavily dominated by Bromus diandrus *ssp.* diandrus.

A recently burned north-facing slope with a high diversity of wildflowers.

Management Unit 3 East

Management Unit 3 East Location

Management Unit 3 East is located in the southern part of the Refuge. It is bordered by Units 1A and 1B to the north, Headwall Oaks to the east, Unit 6 to the south, and Unit 3 West to the west. This unit is approximately 692 acres (280 hectares) in size. Unit 3 East ranges from 3,230 ft. to 4,700 ft. in elevation. It contains gradual slopes, some small canyons, and part of the headwall of Bitter Creek Canyon.

Management Unit 3 East Flora

DMEC observed a total of 122 vascular plant taxa in this unit at a total of 53 waypoints. An average of 13.4 taxa was observed at each waypoint. Of these 122 taxa, 101 (82.8%) are native and 21 (17.2%) are non-native. This is a higher ratio of native to non-native plants compared to the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). By far the most frequent dominant in this unit is *Bromus diandrus* ssp. *diandrus*, which is a dominant at 72% of the waypoints. *Bromus madritensis* ssp. *rubens* is a dominant at 13% of waypoints, and the native bunchgrass *Poa secunda* ssp. *secunda* is a dominant at 15% of waypoints. Interesting plant species in this unit include a large patch of *Prunus virginiana* var. *demissa* (Western Chokecherry) near an old homestead site, as well as slopes dominated by *Mentzelia pectinata* (San Joaquin Blazing Star) and *Madia elegans* ssp. *elegans* (Common Madia).

Management Unit 3 East Special-status Species

One special-status species was observed in 2015 by DMEC in this unit; *Gilia latiflora* ssp. *cuyamensis* (Cuyama Gilia, CNPS Rank 4.3). This taxon was found in one location, although it is likely that it occurs in other locaitons in the unit. The location of this ocurrence is mapped on Figure 7, Locations of Special-status Plants in Management Unit 3 East.

Pam De Vries observed *Caulanthus lemmonii* (Lemmon's Wild Cabbage, CNPS Rank 1B.2) and *Lupinus elatus* (Silky Lupine, CNPS Rank 4.3) in Unit 3 (she does not specify 3 East or West) (De Vries 2010). DMEC also observed similar species of *Caulanthus* and *Lupinus* in Units 3 East and 3 West; however, we identified them as *Caulanthus coulteri*, *Caulanthus inflatus*, and *Lupinus formosus*, which are not special-status species.

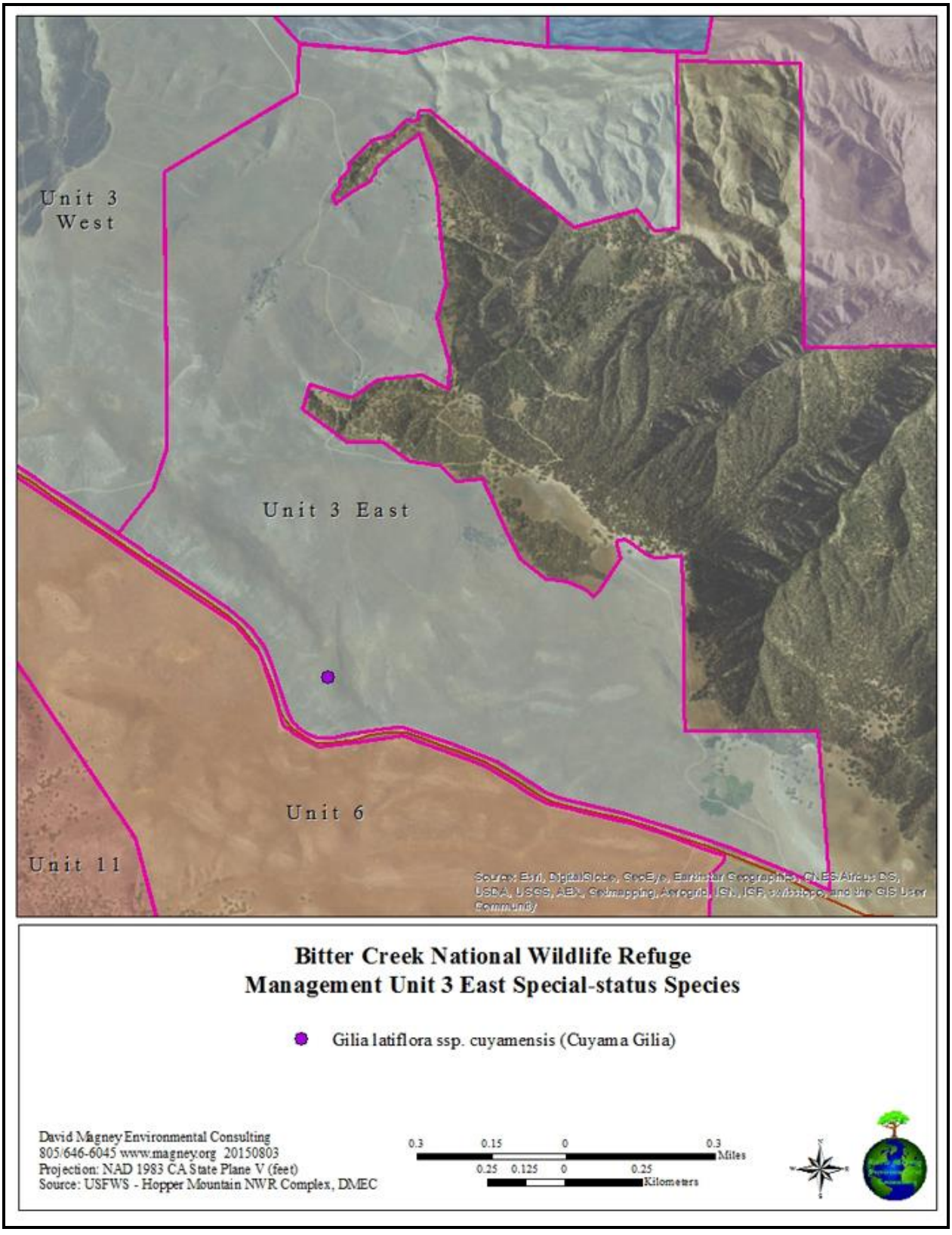
Management Unit 3 East Recommendations

Unit 3 East exhibits a high diversity of native forbs, but is also almost exclusively dominated by *Bromus diandrus*. DMEC believes that this unit is a good candidate for appropriately managed grazing. *Gilia latiflora* ssp. *cuyamensis* (Cuyama Gilia) is not expected to be impacted by cattle grazing, and should not be harmed as long as overgrazing does not occur.

Gilia latiflora *ssp.* cuyamensis *(Cuyama Gilia)*

A west-facing slope dominated by Mentzelia pectinata (*San Joaquin Blazingstar). The* Bromus diandrus *ssp.* diandrus *in the background is typical of unit 3 East.*

Figure 7. Locations of Special-status Plants in Management Unit 3 East



Management Unit 6

Management Unit 6 Location

Management Unit 6 is located in the southern most part of the Refuge. It is bordered by Units 3 West and 3 East to the north, Unit 7 to the south, and Unit 11 to the west. This unit is approximately 444 acres (180 hectares) in size. It is fairly uniform in elevation, ranging from approximately 4,430 ft. to 4,600 ft. in elevation, and is composed of moderate to steep slopes.

Management Unit 6 Flora

Management Unit 6 was farmed and grazed historically, and is heavily disturbed. DMEC observed a total of 95 vascular plant taxa at a total of 48 waypoints. An average of 12.1 taxa was observed at each waypoint. Of these 95 taxa, 77 (81%) are native and 18 (19%) are non-native. This is a higher ratio of native to non-native plants compared to the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). This unit is primarily dominated by *Bromus diandrus* ssp. *diandrus*, a dominant at 31% of the waypoints, *Corethrogyne filaginifolia* var. *filaginifolia* at 25% of the waypoints, *Erodium cicutarium* at 21% of the waypoints, and *Bromus madritensis* ssp. *rubens* at 21% of the waypoints. The native bunchgrass *Poa secunda* ssp. *secunda* is a dominant at about 19% of waypoints in this unit, primarily on north-facing slopes. One species previously unrecorded at the Refuge was observed; *Tragopogon dubius* (Yellow Salsify), a non-native forb.

Management Unit 6 Special-status Species

DMEC observed one special-status species in Management Unit 6, *Perideridia pringlei*, Adobe Yampah (CNPS Rank 4.3). The location of this occurrence can be mapped on Figure 8, Locations of Special-status Plants in Management Unit 6.

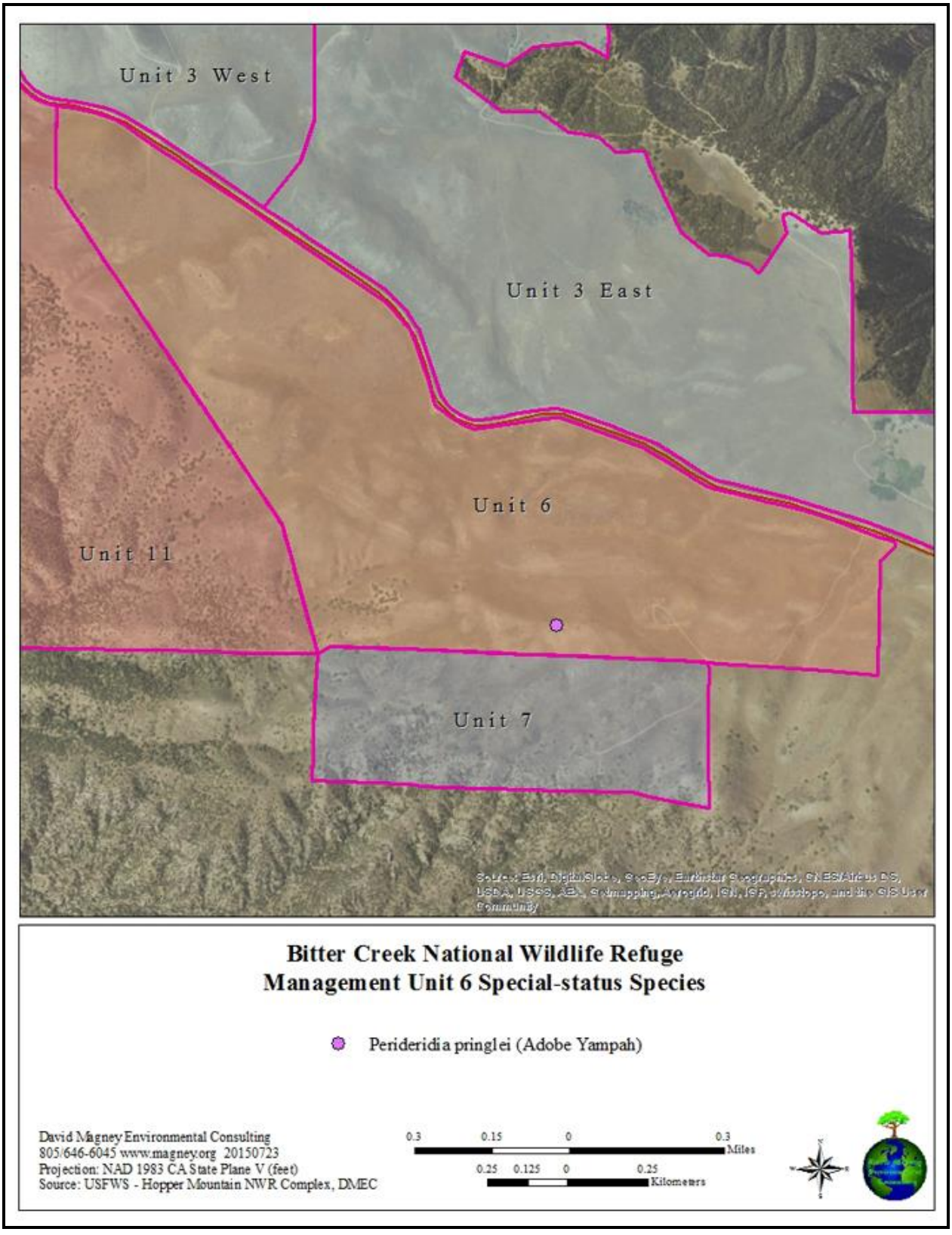
Management Unit 6 Recommendations

Management Unit 6 exhibits a high diversity of native forbs, but is also heavily dominated by non-native annual forbs grasses. The single occurrence of *Perideridia pringlei* will likely not be harmed by appropriately managed grazing. DMEC plans to do a focused survey for Kern Mallow within the small patch of Juniper woodland that borders Unit 11 in the southwestern portion of Unit 6. If no Kern Mallow is found, DMEC believes that this unit is a good candidate for prescribed grazing as outlined in Appendix H of the CCP.

Perideridia pringlei *(Adobe Yampha) in a post-flowering state, observed during the July 2015 survey.*

A north-facing slope dominated by Poa secunda *ssp.* secunda *(One-sided Bluegrass).*

Figure 8. Locations of Special-status Plants in Management Unit 6



Management Unit 7

Management Unit 7 Location

Management Unit 7 is located in the southern most part of the Refuge. It is the only management unit that is within Ventura County. It is bordered by Unit 6 to the north. This unit is approximately 129 acres (52 hectares) in size. It ranges from approximately 4,315 ft. to 4,700 ft. in elevation. This unit contains both gradual and steep slopes, and a series of drainages that trend to the southwest.

Management Unit 7 Flora

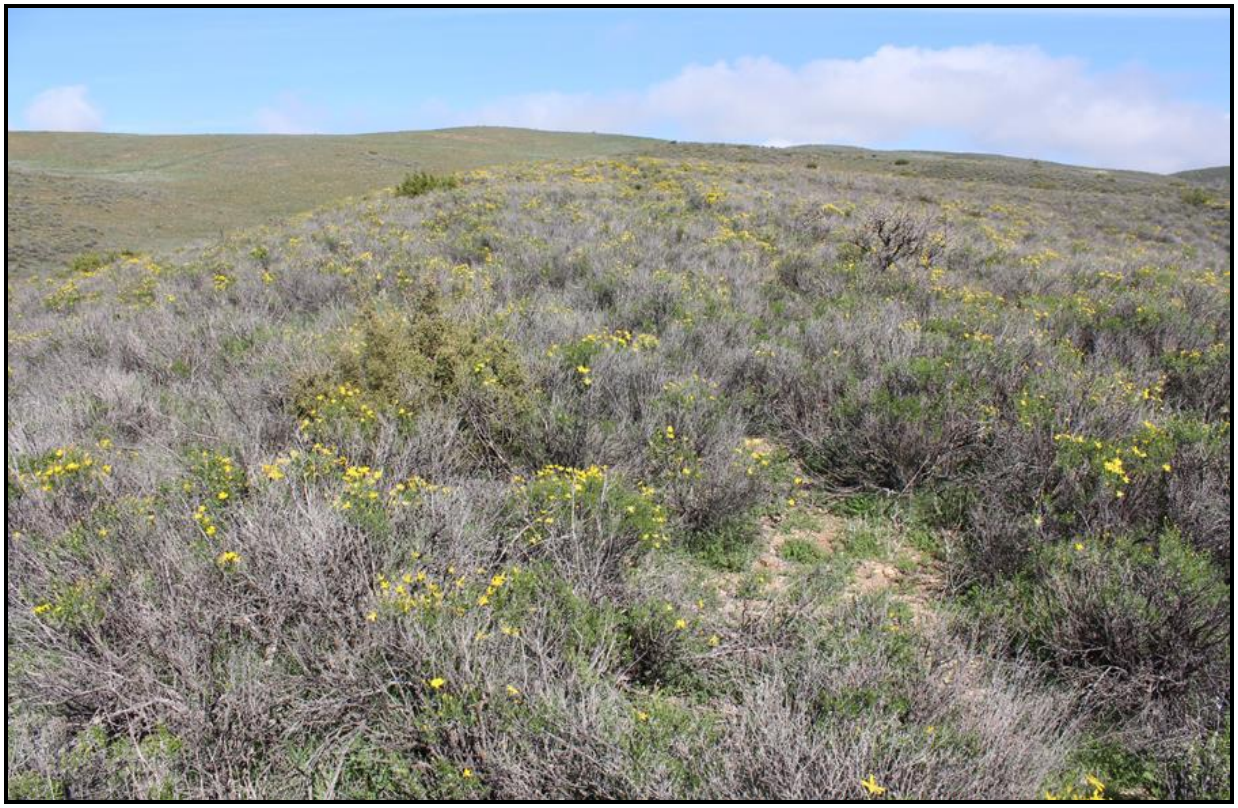
Management Unit 7 lies on a transition zone between herbland (grassland), and the Pinyon-Juniper woodland that defines the Cuyama Badlands region. DMEC observed a total of 99 vascular plant taxa at a total of 44 waypoints. An average of 12.7 taxa was observed at each waypoint. Of these 99 taxa, 88 (88.9%) are native and 11 (11.1%) are non-native. This is a high ratio of native to non-native plants compared to the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). This unit is primarily dominated by *Ericameria linearifolia* (Interior Goldenbush), a dominant at 48% of the waypoints, *Juniperus californica* (California Juniper) at 27% of the waypoints, and *Erodium cicutarium* at 20% of the waypoints.

Management Unit 7 Special-status Species

Two special-status plants, *Eremalche parryi* ssp. *kernensis*, Kern Mallow (CNPS Rank 1B.1 and federally Endangered) and *Perideridia pringlei*, Adobe Yampah (CNPS Rank 4.3) were found in Unit 7. The location of these taxa are mapped on Figure 9, Locations of Special-status Plants in Management Unit 7.

Management Unit 7 Recommendations

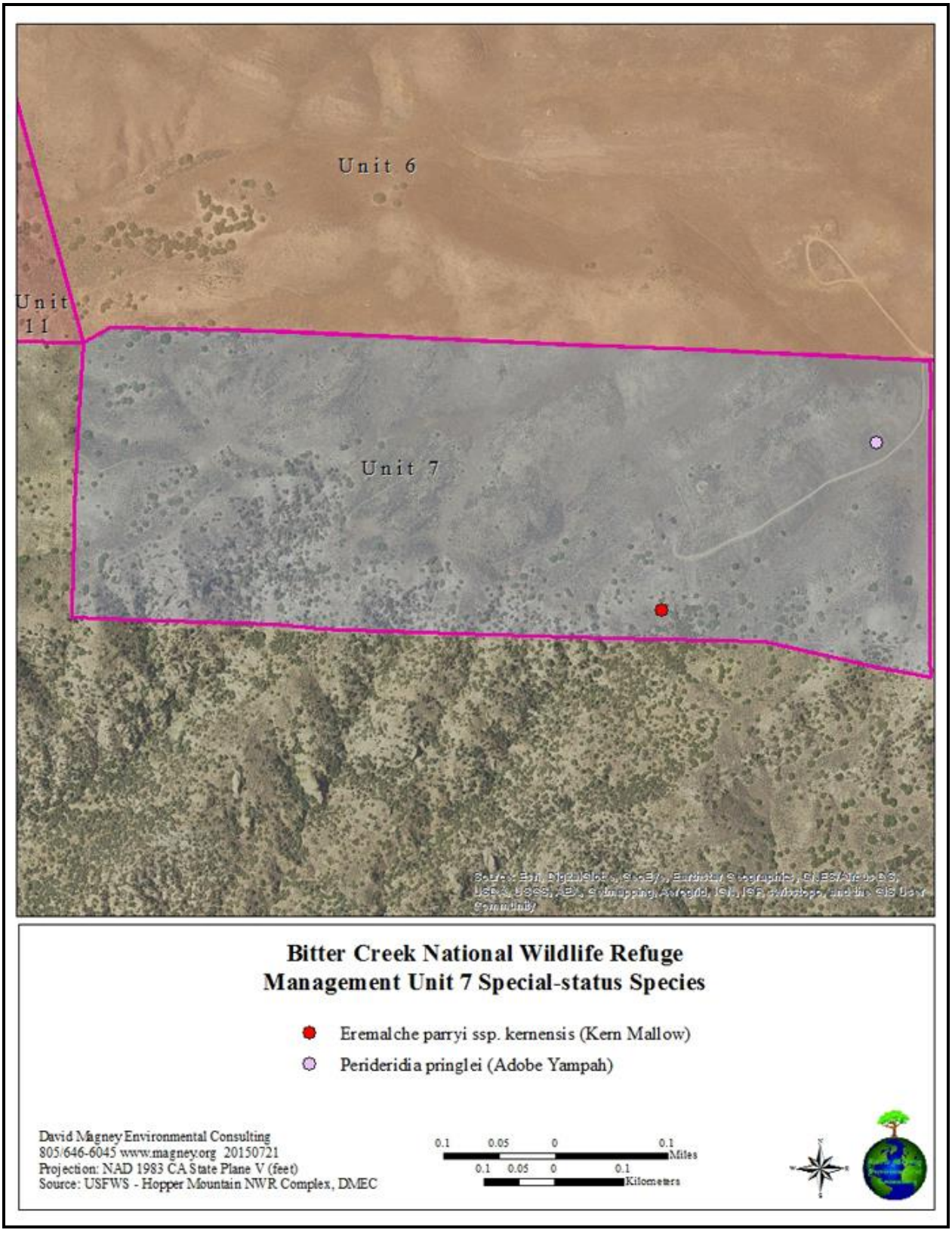
Management Unit 7 exhibits a high diversity of native plants. It also has two special-status species, including the federally listed Kern Mallow. The CCP does not outline this unit as a priority grazing area (USFWS 2013), and DMEC agrees with this decision. This unit should be managed to maintain herbland (grassland), shrub, and Juniper woodland habitat. Special-status plant populations in this area should be monitored to ensure that they remain viable.



Much of unit 7 is dominated by Ericameria linearifolia *(Interior Goldenbush).*

Eremalche kernensis *ssp.* kernensis *(Kern Mallow).*

Figure 9. Locations of Special-status Plants in Management Unit 7



Management Unit 8

Management Unit 8 Location

Management Unit 8 is located in the western central part of the Refuge. It is bordered by Unit 9 Central to the northwest, Unit 9 South to the west and south, and Unit 3 West to the east. It is bounded by Hudson Ranch Road on its eastern edge. This unit is approximately 68 acres (27.5 hectares) in size. It ranges from approximately 3,860 ft. to 4,090 ft. in elevation. This unit contains gradual slopes and rock outcrops.

Management Unit 8 Flora

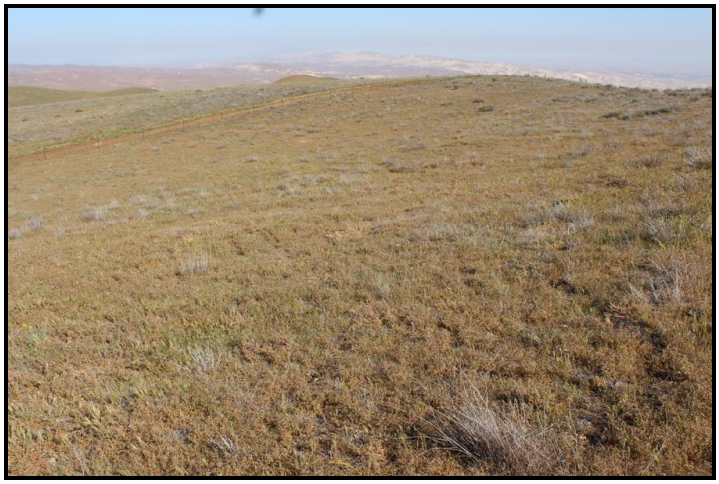
Management Unit 8 is mostly comprised of an old homesteading site and it is highly disturbed. It contains a large patch of *Ailanthus altissima* (Tree of Heaven) that surrounds the old buildings. DMEC observed a total of 59 vascular plant taxa at a total of 13 waypoints. An average of 16.5 taxa was observed at each waypoint. Of these 59 taxa, 44 (74.6%) are native and 15 (25.4%) are non-native. This ratio of native to non-native plants similar to the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012), although it is lower than most of the other management units at Bitter Creek NWR. This unit is primarily dominated by non-native grasses and forbs such as *Bromus madritensis* ssp. *rubens*, a dominant at 46% of the waypoints, *Erodium cicutarium* at 38% of the waypoints and *Bromus diandrus* ssp. *diandrus* at 31% of the waypoints.

Management Unit 8 Special-status Species

No special-status plants were observed in this unit.

Management Unit 8 Recommendations

Because the majority of Mangament Unit 8 is dominated by exotic annual grasses and forbs, and because no special-status species were observed, this unit is a good candidate for prescribed grazing as outlined in Appendix H of the CCP.



Unit 8 is mainly composed of Bromus madritensis *ssp.* rubens *and* Erodium cicutarium*, with scattered* Corethrogyne filaginifolia *var.* filaginifolia.

Management Unit 9 West

Management Unit 9 West Location

Management Unit 9 West is located in the northwest part of the Refuge. It is bordered by Unit 10B to the north, Unit 9 Central to the east, and Unit 12 to the west (across highway 33/166). This unit is approximately 602 acres (243.6 hectares) in size. This unit ranges from approximately 2,900 ft. to 3,200 ft. in elevation. It contains a series of hills with graduals slopes, and is directly within the San Andreas Fault zone.

Management Unit 9 West Flora

Management Unit 9 West was grazed and farmed historically, and is mostly comprised of herbland (grassland). DMEC observed a total of 82 vascular plant taxa at a total of 64 waypoints. An average of 14.8 taxa was observed at each waypoint. Of these 82 taxa, 64 (78%) are native and 18 (22%) are non-native. This ratio of native to non-native plants is slightly higher than the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). This unit is primarily dominated by grasses and forbs such as *Erodium cicutarium*, a dominant at 67% of the waypoints, *Amsinckia tessellata* var. *tessellata* at 34% of the waypoints, and *Bromus diandrus* ssp. *diandrus* at 30% of the waypoints. This unit contains a patch of *Ailanthus altissima* (Tree of Heaven) that surrounds a gully at the northern edge of the unit. One species was found in this unit that had previously not been recorded on the refuge; *Chenopodium murale*, a non-native annual herb.

Management Unit 9 West Special-status Species

No special-status plants were observed in this unit.

Management Unit 9 West Recommendations

Because the majority of Management Unit 9 West is dominated by exotic annual grasses and forbs, and because no special-status species were observed, this unit is a good candidate for prescribed grazing.

Phacelia ciliata *Herbaceous Alliance.*

Erodium cicutarium *Herbaceous Alliance*

Management Unit 9 Central

Management Unit 9 Central Location

Management Unit 9 Central is located in the northwest part of the Refuge. It is bordered by Unit 10B and 10A to the north, Unit 1A to the east, and Units 1A and 9 South to the south. This unit is approximately 986 acres (399 hectares) in size. This unit ranges from approximately 3,100 ft. to 3,880 ft. in elevation. It contains gradual slopes as well as several canyons with steep slopes.

Management Unit 9 Central is directly within the San Andreas Fault zone. Fault action has created at least one large sag pond at the southern end of the unit.

Management Unit 9 Central Flora

Management Unit 9 Central is a highly diverse area that is mostly comprised of herbland (grassland), with patches of *Ericameria linearifolia* Shrubland Alliance and *Eriogonum fasciculatum* Shrubland Alliance. DMEC observed a total of 149 vascular plant taxa at a total of 103 waypoints. An average of 12.1 taxa was observed at each waypoint. Of these 149 taxa, 118 (79.2%) are native and 31 (20.8%) are non-native. This ratio of native to non-native plants is higher than the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012. This unit is primarily dominated by grasses and forbs such as *Bromus madritensis* ssp. *rubens*, a dominant at 29% of the waypoints, *Amsinckia tessellata* var. *tessellata* at 27% of the waypoints) and *Bromus diandrus* ssp. *diandrus* at 23% of the waypoints. Two species were found by DMEC in this unit that were previously un-recorded on the refuge; the native shrub *Lycium andersonii* (Anderson Thornbush) and the non-native annual herb *Bassia hyssopifolia* (Fivehook Bassia).

Management Unit 9 Central Special-status Species

No special-status plants were observed in this unit.

Management Unit 9 Central Recommendations

The majority of Management Unit 9 Central is dominated by non-native annual grasses and forbs. No special-status species were observed. This unit is a good candidate for grazing as outlined in Appendix H of the CCP (USFWS 2013). Grazing should concentrate on non-native grasses, and should be managed to avoid overgrazing which could impact the diversity of native plants in this unit as well as cause erosion in the canyons.

A south-facing slope dominated by Eriogonum fasciculatum *ssp.* polifolium *(California Wild Buckwheat), interspersed with wildflowers such as* Eschscholzia lemmonii *ssp.* lemmonii *(Lemmon's Poppy) and* Caulanthus coulteri *(Coulter's Jewelflower).*

Phacelia ciliata *Herbaceous Alliance (foreground) and* Amsinckia tessellata *Herbaceous Alliance (background).*

Management Unit 9 South

Management Unit 9 South Location

Management Unit 9 South is located on the western edge of the Refuge. It is bordered by Unit 9 Central to the north, Unit 11 to the south, and it surrounds most of Unit 8. This unit is approximately 749 acres (303 hectares) in size. This unit ranges from approximately 3,450 ft. to 4,100 ft. in elevation. It contains a series of hills with graduals slopes, as well as a large drainage that drains into the Cuyama Valley.

Management Unit 9 South Flora

Management Unit 9 South was grazed and likely farmed historically, and is mostly comprised of herbland (grassland), with patches dominated by shrubs. DMEC observed a total of 91 vascular plant taxa at a total of 29 waypoints. An average of 15.4 taxa was observed at each waypoint. Of these 91 taxa, 78 (85.7%) are native and 13 (14.3%) are non-native. This ratio of native to non-native plants is high compared to the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). Portions of this unit are dominated by *Ericameria linearifolia*, a dominant at 41% of the waypoints[14], while the rest is primarily dominated by grasses and forbs such as *Amsinkcia tessellata* var. *tessellata* at 38% of the waypoints, *Bromus diandrus* ssp. *diandrus* at 31% of the waypoints and *Erodium cicutarium* at 27.5% of the waypoints.

Management Unit 9 South Special-status Species

Eremalche parryi ssp. *kernensis*, Kern Mallow (CNPS Rank 1B.1 and federally Endangered), was observed at one location in the southeast portion of this unit, very close to the border with Unit 11. The location of this species is mapped on Figure 10, Locations of Special-status Plants in Management Unit 9 West.

Management Unit 9 South Recommendations

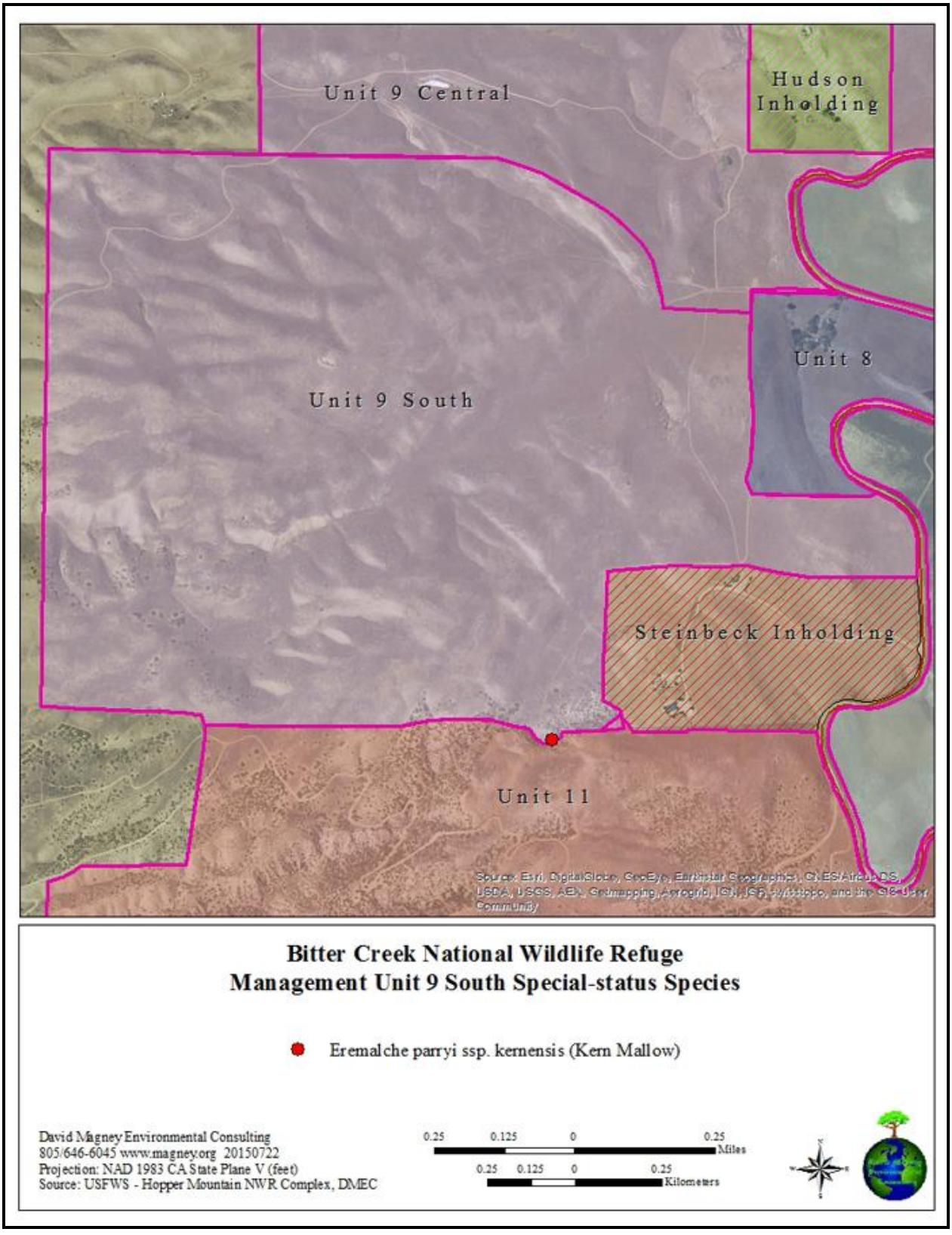
Because the majority of mangament Unit 9 South is dominated by exotic annual grasses and forbs, it is a good candidate for grazing. The small area on the southeastern portion of the unit that contains Kern Mallow could be fenced off and included as part of Unit 11 (if this has not already happened with the construction of the new fence that was built in spring 2015 between Units 9 South and 11). If this action is taken, Unit 9 South should first be more extensively surveyed for Kern Mallow, particularly the areas that border Unit 11 and the large canyon in the southwestern part of the unit.

[14] DMEC took many of the waypoints for this unit in these shrub patches due to their botanical diversity, but as a whole they do not dominate the unit as extensively as herbland (grassland).

A north-facing slope dominated by Bromus diandrus *ssp.* diandrus *(Ripgut Brome), with a large population of* Allium peninsulare *var.* peninsulare *(Mexicali Onion).*

Eremalche kernensis *ssp.* kernensis *(Kern Mallow) on the border between units 9 South and 11.*

Figure 10. Locations of Special-status Plants in Management Unit 9 South



Management Unit 10A

Management Unit 10A Location

Management Unit 10A is located in the northwest part of the Refuge. It is bordered by Unit 10B to the west, Unit 9 Central to the south, and the Klipstein Exclosure to the east. Unit 10A is approximately 226 acres (91.5 hectares) in size. It ranges from approximately 3,000 ft. to 3,600 ft. in elevation. It contains a series of hills with gradual and steep slopes, and is directly within the San Andreas Fault zone.

Management Unit 10A Flora

Management Unit 10A was grazed and possibly farmed historically, and other than a small patch of *Quercus* X*alvordiana*, it is mostly comprised of herbland (grassland). DMEC observed a total of 61 vascular plant taxa at a total of 39 waypoints. An average of 11.8 taxa was observed at each waypoint. Of these 61 taxa, 52 (85.2%) are native and 9 (14.8%) are non-native. This ratio of native to non-native plants is high when compared to the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). This unit is primarily dominated by grasses and forbs such as *Erodium cicutarium*, a dominat at 41% of the waypoints, *Bromus madritensis* ssp. *rubens* at 33% of the waypoints, and *Amsinckia tessellata* var. *tessellata* at 23.1% of the waypoints.

Management Unit 10A Special-status Species

One special-status species was observed by DMEC in Unit 10A at one location, *Deinandra halliana*, (Hall's Tarplant, CNPS Rank 1B.1). This species had not yet been recorded at the Refuge. The location of this species can be seen in Figure 11, Locations of Special-status Plants in Management Unit 10A. It is likely that there are other ocurrences of this species in Unit 10A and other units.

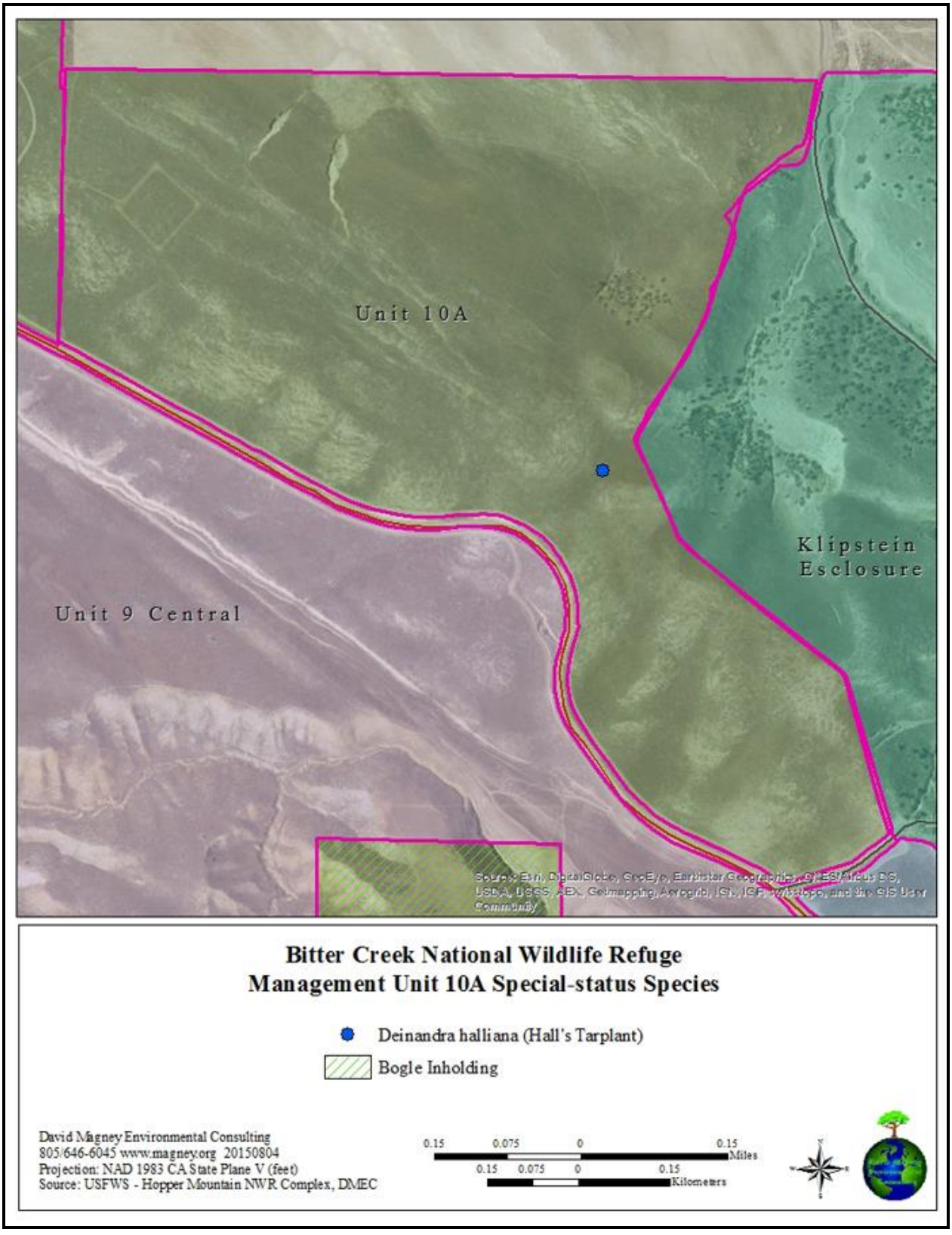
Management Unit 10A Recommendations

Because the majority of Management Unit 10A is dominated by non-native annual grasses and forbs, it is a good candidate for application of prescribed grazing as outlined in Appendix H of the CCP (USFWS 2013). However, *Deinandra halliana* (Hall's Tarplant) occurs in this unit, which is imperiled in the state of California. Overgrazing is listed as a threat to this species, which only has 18 other known populations (CNPS 2015). Any prescribed grazing in this unit should be of short duration and early in the grazing season, as Hall's Tarplant is a summer flowering annual.

Unit 10A is heavily dominated by non-native grasses, such as the Bromus diandrus *ssp.* diandrus *seen in the foreground. The far side of the fence is grazed and is dominated by* Amsinckia tessellata *var.* tessellata .

A north-facing slope dominated by Bromus diandrus *ssp.* diandrus *and* Amsinckia vernicosa *(Green Fiddleneck).*

Figure 11. Locations of Special-status Plants in Management Unit 10A



Management Unit 10B

Management Unit 10B Location

Management Unit 10B is located in the northwestern most part of the Refuge. It is bordered by Unit 10A to the west, and Units 9 Central and 9 West to the south. Unit 10B is approximately 598 acres (242 hectares) in size. It ranges from approximately 2,800 ft. to 3,360 ft. in elevation. It contains a series of hills with gradual slopes, several small canyons, and is directly within the San Andreas Fault zone.

Management Unit 10B Flora

Management Unit 10B was grazed and possibly farmed historically, and is mostly comprised of herbland (grassland). DMEC observed a total of 79 vascular plant taxa at a total of 49 waypoints. An average of 11.8 taxa was observed at each waypoint. Of these 79 taxa, 65 (82.3%) are native and 14 (17.7%) are non-native. This ratio of native to non-native plants is higher than the the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). This unit is primarily dominated by non-native grasses and forbs such as *Erodium cicutarium*, a dominant at 39% of the waypoints, *Bromus diandrus* ssp. *diandrus* at 39% of the waypoints, *Amsinckia tessellata* var. *tessellata* at 26.5% of waypoints, and *Bromus madritensis* ssp. *rubens* at 26.5% of waypoints.

Management Unit 10B Special-status Species

No special-status plants were observed by DMEC in this unit.

Pam De Vries observed a large population of *Caulanthus lemmonii* (Lemmon's Wild Cabbage, CNPS Rank 1B.2) in a canyon at the southwestern edge of this unit (De Vries 2010). DMEC conducted a survey focusing on this area and did not find this species. However, this survey was conducted during the summer 2015 survey, at a time when most annual plants were dried out and difficult to recognize.

Management Unit 10B Recommendations

Because the majority of Management Unit 10A is dominated by exotic annual grasses and forbs, and because no special-status species were observed, this unit is a good candidate for application of prescribed grazing as outlined in Appendix H of the CCP (USFWS 2013). More surveys should be done to determine if *Caulanthus lemmonii* is present, and if so where.

Bromus diandrus *ssp.* diandrus *and* Amsinckia tessellata *var.* tessellata *in Unit 10B.*
The upper right part of this picture is grazed private land.

Management Unit 11

Management Unit 11 Location

Management Unit 11 is located in the southwestern corner of the Refuge. It is bordered by Unit 9 South to the north, Unit 6 to the east, and Ballinger Canyon (off Refuge) to the south. Unit 11 is approximately 1,790 acres (724 hectares) in size. It ranges from approximately 3,400 ft. to 4,400 ft. in elevation. Unit 11's topography is typical of the Cuyama Badlands and is composed of many small ridges and drainanges.

Management Unit 11 Flora

Management Unit 11 is highly diverse and is mostly comprised of *Juniperus californica* Woodland Alliance. There are some areas in the easternmost part of the unit that are dominated by herbland (grassland). DMEC observed a total of 173 vascular plant taxa at a total of 126 waypoints. An average of 14.9 taxa was observed at each waypoint. Of these 173 taxa, 156 (90.2%) are native and 17 (9.8%) are non-native. This ratio of native to non-native plants is very high when compared to the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). This unit is primarily dominated by native trees, shrubs, and forbs such as *Juniperus californica* (California Juniper), a dominant at 67% of the waypoints, *Ericameria linearifolia* at 31% of the waypoints, *Amsinckia tessellata* var. *tessellata* at 20% of the waypoints, and *Eriogonum fasciculatum* var. *polifolium* at 17% of the waypoints.

Unit 11 contains many plant species that are found infrequently or not at all on the rest of the refuge. Species found by DMEC during the 2015 surveys that had not been previously recorded

on the refuge include: *Abronia pogonantha* (Mojave Sand-verbena), *Cryptantha circumscissa* (Cushion Forget-Me-Not), *Encelia virginensis* (Virgin River Brittlebush), *Eriogonum cithariforme* var. *cithariforme* (Cithara Buckwheat), *Lepidospartum squamatum* (Scale Broom), *Mentzelia eremophila* (Pinyon Blazingstar), and *Malacothrix glabrata* (Desert Dandelion).

Management Unit 11 Special-status Species

Five special-status species were observed in this unit. These include *Castilleja plagiotoma* (Mojave Indian Paintbrush, CNPS Rank 4.2), *Eremelache parryi* ssp. *kernensis* (Kern Mallow, CNPS Rank 1B.1 and federally listed as Endangered), *Fritillaria agrestis* (Stinkbells, CNPS Rank 4.2), *Gilia latiflora* ssp. *cuyamensis* (Cuyama Gilia, CNPS Rank 4.3), and *Mentzelia eremophila* (Pinyon Blazingstar, CNPS Rank 4.2). *Eremalche parryii* ssp. *kernensis* is particularly abundant in Unit 11; it is present at 38 of the waypoints (30% of the total waypoints) and is a dominant at 3 of these. A map detailing the location of these special-status species can be seen on Figure 12, Locations of Special-status Plants in Management Unit 11.

Management Unit 11 Recommendations

Management Unit 11 exhibits a high diversity of native plants, and little suitable forage for cattle. It has five special-status species, including the federally Endangered Kern Mallow. The CCP does not outline Unit 11 as a priority grazing area (USFWS 2013), and DMEC agrees with this decision. This unit should be managed to maintain herbland (grassland), shrub, and Juniper Woodland habitat. The special-status species in this unit should continue to be monitored to ensure their viability.

Slopes dominated by Juniperus californica *(California Juniper) and* Eriogonum fasciculatum *var.* polifolium *are typical of Unit 11.*

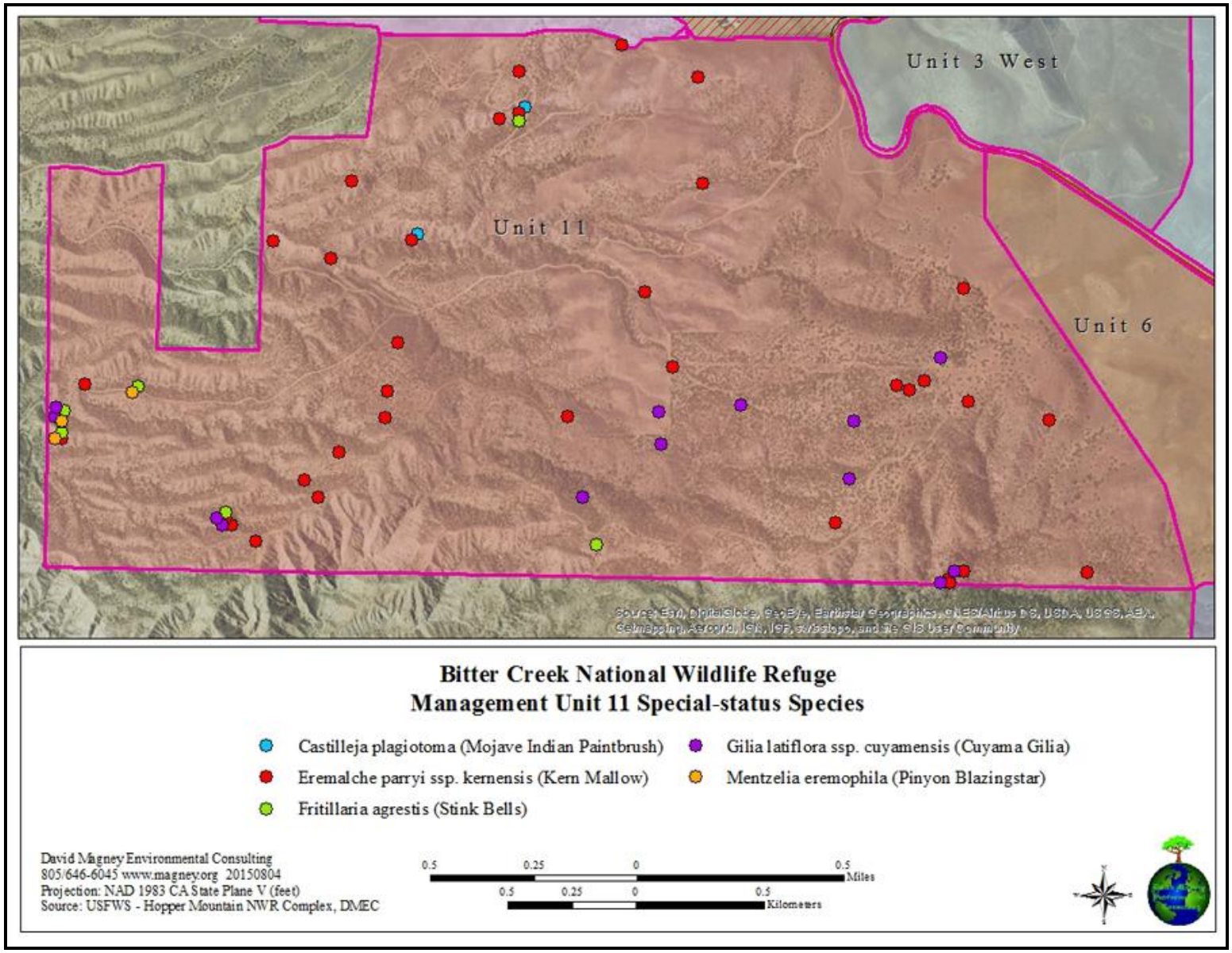
Castilleja plagiotoma *(Mojave Indian Paintbrush), a special-status plant only found in Unit 11.*

Close up of a pistillate Eremalche kernensis *ssp.* kernensis. *The presence of some individuals exhibiting pistillate flowers differentiates it from the more common* Eremalche parryi *ssp.* parryi *(Parry's Mallow).*

Fritillaria agrestis *(Stink Bells), special-status plant also only found in Unit 11.*

Mentzelia eremophila *(Pinyon Blazingstar), a special-status species only found in Unit 11 that had not been recorded on the refuge prior to the 2015 surveys.*

Figure 12. Locations of Special-status Plants in Management Unit 11



Management Unit 12

Management Unit 12 Location

Management Unit 12 is located in the northwestern corner of the Refuge. It is bordered by Unit 9 West to the east, and the Carrizo Plain to the west and north. Unit 12 is approximately 128 acres (52 hectares) in size. It ranges from approximately 2,850 ft. to 3,050 ft. in elevation. It is comprised of small hills and gradual slopes.

Management Unit 12 Flora

Management Unit 12 is entirely comprised of herbland (grassland), with only a few scattered shrubs. DMEC observed a total of 59 vascular plant taxa at a total of 49 waypoints. An average of 8.8 taxa was observed at each waypoint. Of these 59 taxa, 47 (79.7%) are native and 12 (20.3%) are non-native. This ratio of native to non-native plants is slightly higher when compared to the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). This unit is primarily dominated by non-native grasses and forbs (native and non-native) such as *Erodium cicutarium*, a dominant at 69% of the waypoints), *Amsinckia tessellata* var. *tessellata* at 49% of the waypoints, and *Bromus madritensis* ssp. *rubens* at 20.4% of the waypoints). One new species was found in this unit that was previously unrecorded on the refuge: *Trifolium glomeratum* (Clustered Clover). *Salsola tragus* (Russian Thistle) became a dominant during the summer months based on observations from State Route 33/166; however, DMEC did not conduct any surveys of this unit other than in the spring.

Management Unit 12 Special-status Species

No special-status plants were observed in this unit.

Management Unit 12 Recommendations

Because the majority of Management Unit 12 is dominated by exotic annual grasses and forbs, and because no special-status species were observed, this unit is a good candidate for application of prescribed grazing as outlined in Appendix H of the CCP (USFWS 2013). Unit 12 contains a high amount of *Salsola tragus* (Russian Thistle, present at 26.5% of waypoints). Overgrazing could increase populations of *Salsola tragus*, and possibly spread it to other units. Any prescribed grazing application should take this into account, and minimize disturbances that would spread this and other invasive plants.

An area of Unit 12 heavily dominated by Erodium cicutarium. *Old* Salsola tragus *(Russian Thistle) plants can be seen piled up against the fencline.*

A Lupinus albifrons *(Silver Bush Lupine) surrounded by* Amsinckia tessellata *Herbaceous Alliance.*

Klipstein Exclosure

Klipstein Exclosure Location

Klipstein Exclosure is located in the northern central part of the Refuge. It is bordered by Uncle Charlie's Exclosure to the west, Unit 1A to the south, and Unit 10A to the west. Klipstein Exclosure is approximately 475 acres (192 hectares) in size. It ranges from approximately 3,000 ft. to 3,700 ft. in elevation. It contains a series of drainages with associated steep slopes, including Klipstein Canyon, which drain into the San Joaquin Valley.

Klipstein Exclosure Flora

Klipstein Exclosure is a diverse unit containing several different habitat types. The southwestern and southeastern parts of the exclosure contain areas dominated by non-native bromes. North-facing slopes are dominated by *Quercus* x*alvordiana*, *Juniperus californica*, and *Ericameria linearifolia*. South-facing slopes are dominated by *Eriogonum fasciculatum* ssp. *polifolium* and a variety of wildflowers. DMEC observed a total of 104 vascular plant taxa at a total of 53 waypoints. An average of 12.3 taxa was observed at each waypoint. Of these 104 taxa, 87 (83.6%) are native and 17 (16.4%) are non-native. This ratio of native to non-native plants is higher than the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). Overall, this exclosure is primarily dominated by *Ericameria linearifolia*, a dominant at 38% of the waypoints, *Quercus* x*alvordiana* at 28.3% of waypoints, and *Bromus madritensis* ssp. *rubens* at 25% of the waypoints. One species that was previously unrecorded on the refuge was observed in one of the upper branches of Klipstein Canyon; *Arundo donax* (Giant Reed), an invasive species that colonizes riparian areas.

Klipstein Exclosure Special-status Species

No special-status plants were observed in this unit.

Klipstein Exclosure Recommendations

Klipstein Exclosure exhibits a high diversity of native plants. It contains steep, forested slopes, and poor browse for cattle. The CCP does not outline Klipstein Exclosure as a priority grazing area (USFWS 2013), and DMEC agrees with this decision. However, the areas of the exclosure that are dominated by non-native grasses would likely benefit from some prescribed grazing, if cattle could be limited to these areas. This unit should be managed to maintain herbland (grassland), shrub, and oak woodland habitat. The patch of *Arundo donax* (Giant Reed) should be removed to ensure that this species does not spread into Klipstein Canyon.

Part of the south-facing slope of Klipstein Canyon, dominated by Phacelia tanacetifolia *(Lacy Phacelia) and* Monolopia lanceolata *(Common Monolopia).*

A north-facing slope dominated by Quercus xalvordiana *and* Ericameria linearifolia.

A south-facing slope dominated by Caulanthus coulteri *(Coulter's Jewelflower).*

A stand of Arundo donax *(Giand Reed).*

Uncle Charlie's Exclosure

Uncle Charlie's Exclosure Location

Uncle Charlie's Exclosure is located in the central northern part of the Refuge. It is bordered by Klipstein Exclosure to the west, Unit 1A to the south, and Unit 2 west to the east. Uncle Charlie's Exclosure is approximately 422 acres (170.8 hectares) in size. It ranges from approximately 3,000 ft. to 3,740 ft. in elevation. It contains gradual slopes as well as several drainages with steep slopes on either side.

Uncle Charlie's Exclosure Flora

Uncle Charlie's Exclosure is primarily composed of herbland (grassland), Alvord Oak woodland (on north-facing slopes), and California Buckwheat shrubland (south-facing slopes). Uncle Charlie's Exclosure is a diverse unit, and DMEC observed a total of 95 vascular plant taxa at a total of 68 waypoints. An average of 12.5 taxa was observed at each waypoint. Of these 95 taxa, 86 (90.5%) are native and 9 (9.5%) are non-native. This ratio of native to non-native plants is much higher than the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). This exclosure is primarily dominated by native trees, shrubs, and forbs such as *Amsinckia tessellata*, a dominant at 30.8% of the waypoints, *Ericameria linearifolia* at 26.5% of the waypoints, and *Quercus* x*alvordiana* at 19.1% of the waypoints.

Uncle Charlie's Exclosure Special-status Species

DMEC observed one ocurrence of *Androsace elongata* ssp. *acuta*, California Rockjasmine (CNPS Rank 4.2) in Uncle Charlie's Exclosure. Figure 13, Locations of Special-status Plants in Uncle Charlie's Exclosure, details the location of this occurrence. There are likely other ocurrences of this species in the exclosure.

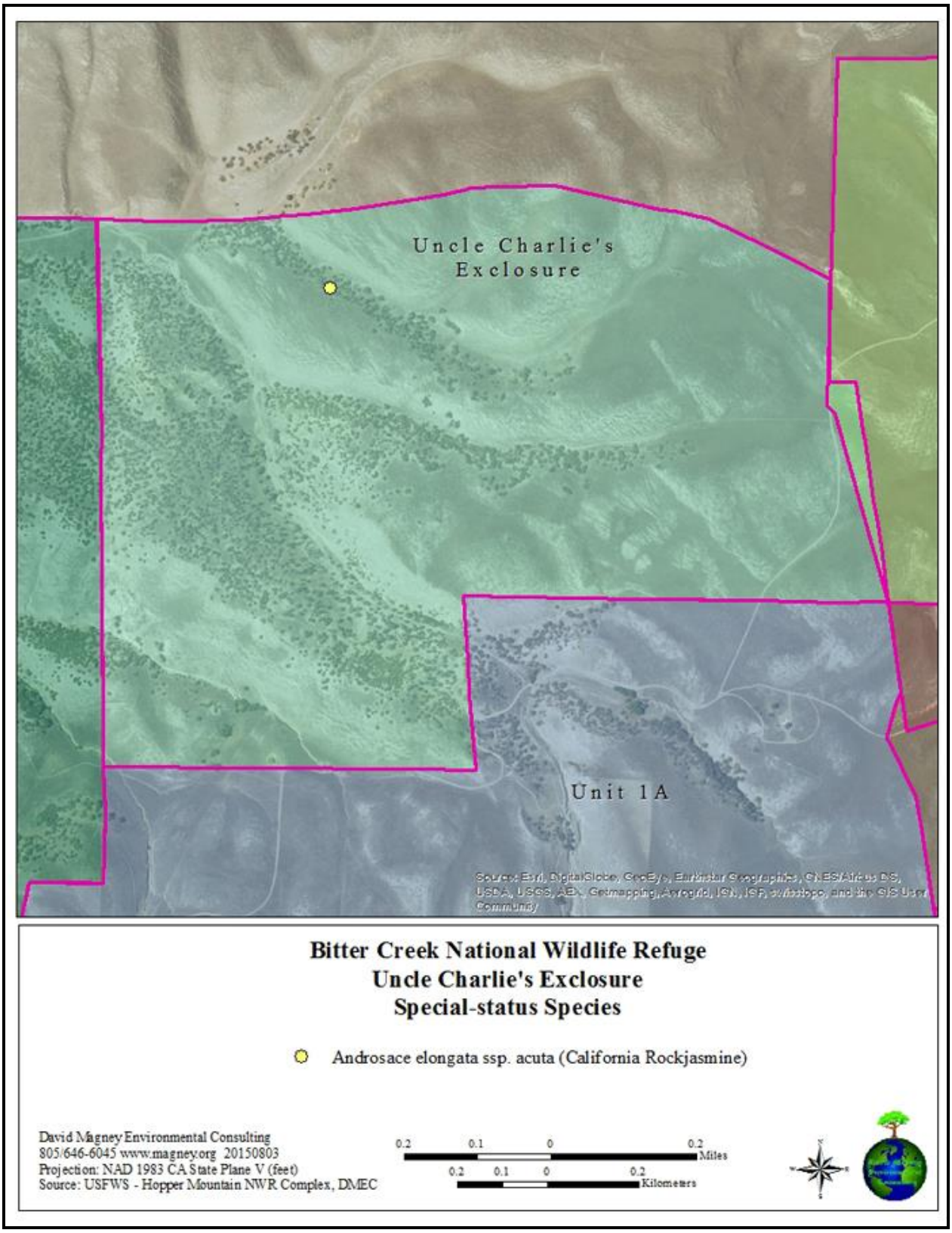
Uncle Charlie's Exclosure Recommendations

Uncle Charlie's Exclosure exhibits a high diversity of native plants. It also has one special-status species. The CCP does not outline Uncle Charlie's Exclosure as a priority grazing area (USFWS 2013), and DMEC agrees with this decision. This unit should be managed to maintain herbland (grassland), shrub, and oak woodland habitat.

Amsinckia tessellata *Herbaceous Alliance (foreground) and* Quercus xalvodiana *Woodland Alliance (background).*

A population of Androsace elongata *ssp.* acuta *(California Rockjasmine) found in Uncle Charlie's Exclosure.*

Figure 13. Locations of Special-status Plants in Uncle Charlie's Exclosure



Timbers

Timbers Location

Timbers is located in the eastern central part of the Refuge. It is bordered by Unit 2 West to the north, Unit 2 Central (Bitter Creek Canyon) to the east, Unit 2 South to the south, and Unit 1A to the west. Timbers is approximately 145 acres (59 hectares) in size. It ranges from approximately 2,650 ft. to 3,750 ft. in elevation. It is mostly comprised of steep slopes and a side canyon that drains into Bitter Creek Canyon.

Timbers Flora

The southern most portions of Timbers contains slopes dominated by herbland (grassland). The rest is dominated by *Quercus* x*alvordiana*, *Juniperus californica*, and *Ericameria linearifolia*. DMEC observed a total of 72 vascular plant taxa at a total of 15 waypoints. An average of 12.2 taxa was observed at each waypoint. Of these 73 taxa, 57 (79.2%) are native and 16 (20.8%) are non-native. This ratio of native to non-native plants is slightly higher than the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). Overall, Timbers is primarily dominated by *Bromus madritensis* ssp. *rubens*, a dominant at 60% of the waypoints, *Bromus diandrus* ssp. *diandrus* at 27% of the waypoints, and *Poa secunda* ssp. *secunda* 27% of the waypoints[15].

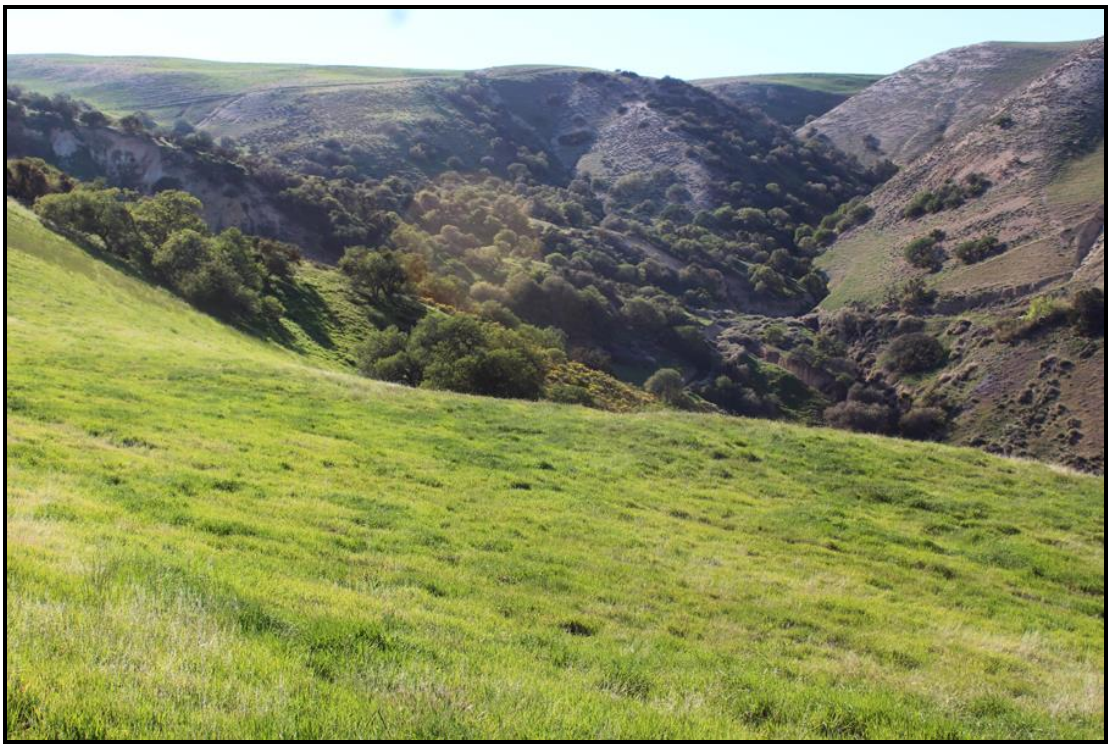
Timbers Special-status Species

No special-status plants were observed in this unit.

Timbers Recommendations

The Timbers unit exhibits a moderate diversity of native plants. It is mostly composed of steep slopes that would be highly susceptible to erosion. The areas dominated by non-native grasses would likely benefit from prescribed grazing; however, it may be hard to separate these areas from the steep forested areas. The CCP does not outline Timbers as a priority grazing area (USFWS 2013), and DMEC agrees with this decision. This unit should be managed to maintain herbland (grassland), shrub, and oak woodland habitat.

[15] The areas dominated by trees and shrubs were not surveyed as thoroughly as the herbland (grassland) areas, due to difficulty of access.



Timbers is dominated by non-native annual grassland (foreground) and Quercus xalvordiana *Woodland Alliance (background).*

Headwall Oaks (Upper Bitter Creek Canyon)

Headwall Oaks Location

The Headwall Oaks Unit is located in the southern central part of the Refuge. It is bordered by Unit 3 East to the north, west and south, and non-refuge land to the east. Headwall Oaks is approximately 247 acres (100 hectares) in size. It ranges from approximately 3,100 feet to 4,330 feet in elevation. It is comprised of the steep slopes of a portion of the headwall of Bitter Creek Canyon.

Headwall Oaks Flora

Headwall Oaks is is a highly diverse portion of the Refuge that is primarily forested, and is dominated by *Pinus monophylla* (Singleleaf Pinyon Pine), *Juniperus californica*, and *Quercus john-tuckeri* (Tucker's Oak). There is also a riparian corridor and a sag pond at the southern end. DMEC observed a total of 137 vascular plant taxa (including subspecies and varieties) at a total of 31 waypoints. An average of 14.4 taxa was observed at each waypoint. Of these 137 taxa, 119 (86.9%) are native and 18 (13.1%) are non-native. This ratio of native to non-native plants is high when compared to the rest of California, which has about 75% native and 25% non-native (Baldwin et al. 2012). Headwall Oaks is primarily dominated by *Quercus john-tuckeri*, a dominant at 32% of the waypoints, *Juniperus californica* at 29% of the waypoints, and *Bromus madritensis* ssp. *rubens* at 23% of the waypoints.

Headwall Oaks Special-status Species

No special-status plants were observed in this unit.

Headwall Oaks Recommendations

Headwall Oaks exhibits a high diversity of native plants. It is primarily composed of steep forested slopes and is mostly unsuitable for grazing. The CCP does not outline Headwall Oaks as a priority grazing area (USFWS 2013), and DMEC agrees with this decision. This unit should be managed to maintain herbland (grassland), shrub, forest, and riparian habitat.

The forest of Headwall Oaks (background) is composed of Pinus monophylla *(Single Leaf Pinyon Pine)*, Quercus john-tuckeri *(Tucker's Oak), and* Juniperus californica *(California Juniper).*

SECTION 4. RECOMMENDATIONS

DMEC's 2015 surveys of Bitter Creek NWR found a species-rich flora with diverse habitats, including several special-status species. Although the majority of the refuge was surveyed by DMEC staff in 2015, additional springtime surveys are planned for 2016. This will ensure that areas not covered in the 2015 surveys will be covered. These additional surveys will likely increase the number of taxa recorded on the Refuge, and possibly find additional populations of special-status plants.

DMEC observed eight (8) special-status plant species during the 2015 surveys, and an additional two (2) were observed by Pam De Vries in 2010. These, and other species, should be protected from land use activities that would adversely affect them. Certainly, additional populations of these special-status species are present onsite, and other special-status species may also be present. There are still some areas that DMEC has not yet surveyed that contain suitable habitat for the federally Endangered species *Cualanthus californica* (California Jewelflower) and *Monolopia congdonii* (San Joaquin Woollythreads). DMEC plans to survey these areas in the spring of 2016.

DMEC estimated 33 published (Sawyer et al. 2009) plant communities (alliances) occur on the Refuge, and another 23 new plant communites occurred consistently across one or more of the management units. The natural vegetation should be mapped and classified to better characterize and understand the flora of the Refuge. The waypoints for this floristic survey can be used as groundtruthing points as a starting point for mapping all the plant communities present.

For the most part, the management units outlined as priority grazing areas in Appendix H of the CCP are suitable for prescribed grazing. DMEC agrees that reducing Residual Dry Matter (RDM) and creating a mosaic of grassland habitat types would benefit special-status wildlife, such as San Joaquin Kit Fox, Giant Kangaroo Rat, Blunt-nosed Leopard Lizard, and others. Much of the Refuge is dominated by dense stands of non-native grasses that create a thatch in which little else can grow. Reducing this thatch would also likely improve habitat for native forbs. However, overgrazing presents a severe threat to native plant populations, particularly annual herbaceous plants and bunchgrasses, and may increase the cover of non-grass invasive plants such as thistles. Grazing should be closely monitored to ensure that overgrazing does not occur. Presence of invasive plants should also be closely monitored to determine if grazing increases invasive plant cover. The Bitter Creek Flora Geodatabase developed by DMEC can be used to determine baseline distributions of plant species on the Refuge.

As long as stocking rates are are appropriate and livestock are moved frequently to prevent overgrazing, DMEC recommends that Units 1A, 1B, 2 South, 2 East, 3 West, 3 East, 6, 8, 9 Central, 9 West, 10A, 10B, and 12 be grazed in accordance with the goals and strategies outlined in Appendix H of the CCP. Out of these, DMEC found non-listed special-status species in Units 2 South, 3 East, 6, and 10A. Grazing should be closely monitored in these units to ensure that livestock do not destroy any populations of special-status species.

Units 2 West and 9 South were outlined as priority grazing areas, but contain ocurrences of the federally Endangered species *Eremalche parryi* ssp. *kernensis* (Kern Mallow). DMEC

recommends that these units not be grazed unless the populations of this plant can be adequately protected from grazing animals. Unit 2 West only contains one occurrence of this species that could easily be fenced off, if it is not already with the new fence that was constructed during the spring of 2015.

Based on the 2015 floristic surveys, DMEC finds that Bitter Creek NWR contains significant and valuable botanical resources that warrant preservation. The Refuge and its associated biological resources is deserving of management for long-term conservation and preservation as an important part of the biodiversity of Kern and Ventura Counties, and the State of California.

SECTION 5. ACKNOWLEDGEMENTS

This report was written by David Magney and Joe Broberg. Mr. Broberg and Vickie Peters created the graphics for this report. Mr. Magney, Mr. Broberg, and David Torfeh conducted the botanical resources surveys and photographed the property over the spring and summer of 2015, with assistance from Jason Storlie and Katherine Warner. Mr. Magney took the lead on plant identification. Mr. Broberg and Mr. Torfeh assisted with data compilation and management. Mr. Broberg created the geodatabase. Mr. Magney and Ms. Peters proofread and edited the report.

Jason Storlie, the Complex Biologist for the Hopper Mountain NWR Complex, provided logistical and project coordination assistance throughout this project, and also assisted with some field surveys. Ken Convery, Deputy Project Leader for the Hopper Mountain NWR Complex, provided guidance and logistical support as well.

Brian Cypher, PhD, coordinated the project funding through the University of California, Stanislaus, and coordinated primary communication between DMEC and the USFWS.

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PERSONAL COMMUNICATIONS

Cypher, Ellen, PhD, California Department of Fish and Game, retired, personal communication, 1 April 2015.

Evans, Julie, CNPS Vegetation Program Director, personal communication (email) 13 May 2010 regarding acceptability of naming new, undescribed, vegetation alliances.

Wilken, Dieter, PhD, Research Associate Santa Barbara Botanic Garden, retired, personal communication email 27-28 February 2015 regarding identification of Gilia brecciarum at Bitter Creek NWR.

DMEC

APPENDIX A. PLANT SPECIES OBSERVED AT BITTER CREEK NWR

The table below provides a list of plant species observed by DMEC during the 2015 surveys and which management units those species occurred in. The numbers refer to the number of ocurrences observed in each management unit.

Species[16]	Management Unit[17]																				
Botanical Name	**1A**	**1B**	**2C**	**2E**	**2S**	**2W**	**3E**	**3W**	**6**	**7**	**8**	**9C**	**9S**	**9W**	**10B**	**10A**	**11**	**12**	**K**	**T**	**UC**	**HO**
Abronia pogonantha																	1					
Achillea millefolium var. *millefolium*			6				7	5	3	4												
Acmispon brachycarpus			2	1		1				1		3		2				4				
Acmispon glaber var. *glaber*										1											1	
Acmispon procumbens var. *procumbens*							1															
Acmispon wrangelianus			2			2		1		5		2	1	2	1		9		4			1
Agoseris grandiflora							1	1	1		1						1					1
Agoseris retrorsa							2	3	2			1		1			6		3		6	
Ailanthus altissima *	2							1			2			2								
Allium howellii var. *howellii*												3	2		2	1		2	2			
Allium peninsulare var. *peninsulare*	3		11				2	5	4			15	10							1		5
Allophyllum gilioides ssp. *gilioides*							1														1	2
Amaranthus blitoides *							1															

[16] Botanical name nomenclature generally follows *The Jepson Manual* (Baldwin et al. 2012) and Flora of North America Committee (1993+).
[17] K= Klipstein Exclosure, T= Timbers, UC= Uncle Charlie's Exclosure, HO= Headwall Oaks. Values in each management unit cell indicates number of occurrences of the taxon observed within the unit.

Species[16]	Management Unit[17]																					
Botanical Name	**1A**	**1B**	**2C**	**2E**	**2S**	**2W**	**3E**	**3W**	**6**	**7**	**8**	**9C**	**9S**	**9W**	**10B**	**10A**	**11**	**12**	**K**	**T**	**UC**	**HO**
Amsinckia intermedia	1		13	2	1		2	4	1	1		6		10	6	3	2		4	1		6
Amsinckia menziesii var. *menziesii*	2		4			1					1	3		4	1	2				2	2	2
Amsinckia tessellata var. *gloriosa*	2		1				1			2		11		8	22	9	2	1	8	1	11	
Amsinckia tessellata var. *tessellata*	25		75	21	30	17	34	33	24	34	10	72	23	56	21	27	86	38	21	8	37	10
Amsinckia vernicosa var. *vernicosa*	5		10	1	3										5	7			11	1	25	
Androsace elongata* ssp. *acuta					2																1	
Anisocoma acaulis																	1					
Arctostaphylos glauca																	1					
Artemisia dracunculus			3				1			2							1					4
Artemisia tridentata ssp. *tridentata*																	9					2
Arundo Donax *																			1			
Asclepias californica								2														
Asclepias eriocarpa								1														
Asclepias erosa	2	5	1		8	2		3	2													
Asclepias fascicularis	2						1															
Astragalus didymocarpus var. *didymocarpus*			3	1		1		3		9		12	1	28			5	14		1		
Astragalus douglasii var. *douglasii*			1					1														1
Astragalus lentiginosus var. *nigricalycis*				2			2			4	3	2	2	4	1		6	8				1
Athysanus pusillus	1		1									1			1	1	2		3			4
Atriplex argentea var. *mohavensis*			1	1										2				1				
Atriplex canescens ssp. *canescens*	1		56	3	1	20	1					7		2	4		3					

Species[16]	Management Unit[17]																				
Botanical Name	**1A**	**1B**	**2C**	**2E**	**2S**	**2W**	**3E**	**3W**	**6**	**7**	**8**	**9C**	**9S**	**9W**	**10B**	**10A**	**11**	**12**	**K**	**T**	**UC**	**HO**
Atriplex lentiformis ssp. *breweri*			6																			
Atriplex lentiformis ssp. *lentiformis*			10									1		3								
Avena barbata *	3	2	6	11	2	2	11	8	3	1	3	3	10	2	5	8	1		1	2	8	2
Avena fatua *	26	2	24		18	1	10	17	17			21			2		1		5	1		1
Baccharis salicifolia ssp. *salicifolia*	1		4																	1		2
Bacharris glutinosa												1										
Balsamorhiza deltoidea					1		2	2	6				2			1						
Bassia hyssopifolia *												6										
Bloomeria crocea ssp. *montana*	1		1					1	4							1						
Boechera pulchra									1								8					
Bolboschoenus maritimus var. *paludosus*			5			1						1										
Bowlesia incana																			2	1	1	
Bromus arenarius *	5		2		2		4	1	2			5										2
Bromus berteroanus *	1	1					1															
Bromus carinatus var. *marginatus* *	1		1				1	1														
Bromus diandrus ssp. *diandrus* *	27	7	40	4	39	5	45	31	30	2	8	49	11	39	24	18	2	9	13	3	11	7
Bromus hordeaceus ssp. *hordeaceus* *	16		22	1	22	3	18	11	6		6	15	3						2	2	1	4
Bromus madritensis ssp. *rubens* *	28	9	65	18	26	18	32	39	24	23	11	69	21	34	28	20	89	31	35	10	46	23
Bromus tectorum var. *tectorum* *	7	1	3		3	1	14	6	14	13	5	5			1		2		2	1		7
Calandrinia ciliata	3		17	3	1	3	1	4		5	1	6	1	12	10	14	1		13	7	21	
Calyptridium monandrum						1		1		5							23					1

Species[16]	Management Unit[17]																					
Botanical Name	**1A**	**1B**	**2C**	**2E**	**2S**	**2W**	**3E**	**3W**	**6**	**7**	**8**	**9C**	**9S**	**9W**	**10B**	**10A**	**11**	**12**	**K**	**T**	**UC**	**HO**
Camissonia (?)																	1					
Camissonia campestris ssp. *campestris*			1					2		3	3	7	4	7	1		29	2	3			
Camissonia contorta	1						2	1	2			1					18				5	9
Camissonia strigulosa																			1			
Camissoniopsis pallida ssp. *pallida*																	1					
Capsella bursa-pastoris var. *bursa-pastoris* *			4	1			1							1						2		
Castilleja affinis ssp. *affinis*							1															
Castilleja exserta ssp. *exserta*	1			3				2		2	2	9	3	13	2	1	8	9	3	1	1	1
Castilleja plagiotoma																	2					
Castilleja subinclusa ssp. *subinclusa*			3			1	2	2		1		3	2				4				3	3
Caulanthus coulteri var. *coulteri*	1		2				1	3		3		1	1				10		7		3	1
Caulanthus inflatus								1							2		1					
Caulanthus lasiophyllus	1		34	9	1	5	6	2	1	10		29	9	35	12		52	18	7	2	5	10
Centrostegia thurberi var. *thurberi*																	4					
Chaenactis stevioides						1											1					
Chenopodium album *												9		1			2					
Chenopodium californicum	2		1			1		2							3		5		3		5	3
Chenopodium murale *														1								
Chorizanthe clevelandii																	1					
Chorizanthe uniaristata																						1
Chorizanthe xanti var. *xanti*																	1					1

Species[16]	Management Unit[17]																					
Botanical Name	**1A**	**1B**	**2C**	**2E**	**2S**	**2W**	**3E**	**3W**	**6**	**7**	**8**	**9C**	**9S**	**9W**	**10B**	**10A**	**11**	**12**	**K**	**T**	**UC**	**HO**
Cirsium occidentale var. *occidentale* *																						3
Cirsium vulgare *	1							1			1	1										
Clarkia cylindrica ssp. *cylindrica*	1		19	1	1	1	5	6	7	2	1	8	5		8	7	1		8		7	4
Clarkia purpurea ssp. *quadrivulnera*							1															
Clarkia speciosa									1													
Clarkia tembloriensis ssp. *tembloriensis*			1																			
Claytonia exigua ssp. *exigua*	1											4	1				20		3		6	
Claytonia exigua x*parviflora*																	7					
Claytonia parviflora ssp. *parviflora*	1		3			1	2	1	1	5		5	6	1	1	4	23		22	1	26	7
Claytonia parviflora ssp. *viridis*												1			1		6					1
Claytonia perfoliata ssp. *perfoliata*	3		17	7	2	4	8	9	7	6	1	21	6	9	16	11	5	8	7	6	13	2
Collinsia heterophylla var. *heterophylla*			5					8			2	5	4				13		6		15	5
Convolvulus arvensis *	6	7			1		4	4	1			1										
Cordylanthus rigidus																	1					
Corethrogyne filaginifolia var. *filaginifolia*	37	8	7		20	4	29	37	31	5	8	36	16	32	24	21	8	13	9	1	24	3
Crassula connata			1	5																		
Croton setigerus	1	2	3	2				6				6		1	3							
Cryptantha circumscissa																	3					3
Cryptantha intermedia var. *intermedia*	1		3		1		6	11	2	11	1	8	9		3	14	45		20	3	33	14
Cryptantha oxygona										1						1	11		6		5	4

Species[16]	Management Unit[17]																					
Botanical Name	**1A**	**1B**	**2C**	**2E**	**2S**	**2W**	**3E**	**3W**	**6**	**7**	**8**	**9C**	**9S**	**9W**	**10B**	**10A**	**11**	**12**	**K**	**T**	**UC**	**HO**
Cuscuta californica var. *californica*										2	1						6					1
Datura wrightii				1				2	4		1	1			1			1				
Deinandra halliana																1						
Deinandra pallida												3										
Delphinium gypsophilum ssp. *gypsophilum*			4		1			2				2										
Delphinium patens ssp. *montanum*									1													
Descurainia pinnata ssp. *glabra*							1	4	2	5	3	3	1	3	1		6	4	6		4	3
Descurainia sophia *	9	1	2		3		8	11	15	8	5	29	9	19	2	5	9	7	3		2	2
Dichelostemma capitatum ssp. *capitatum*	1		15	13	4	10	24	25	14	21	11	26	10	23	19	19	31	14	7	7	28	3
Distichlis spicata	1		11			2		1				29		5			2					
Dudleya lanceolata			1														1					
Eastwoodia elegans			6	1								4					13	1				1
Elymus condensatus			1				1	2									1					1
Elymus elymoides	2		3	1	1	1	5	1	3	2	1	7	2		3	7	1	1	2	2	12	1
Elymus glaucus												3										
Elymus multisetus	5		1		17	1	1	2	2			2							1			
Elymus triticoides ssp. *triticoides*	3		8			2		5	2			9					4		1			1
Elymus xgouldii			2														1					
Emmenanthe penduliflora var. penduliflora								1									6			1	1	1
Encelia virginensis																	4					
Ephedra viridis										5		1	1				26		1			1
Epilobium canum ssp. *latifolium*			5					1		1							1					1

Species[16]	Management Unit[17]																				
Botanical Name	**1A**	**1B**	**2C**	**2E**	**2S**	**2W**	**3E**	**3W**	**6**	**7**	**8**	**9C**	**9S**	**9W**	**10B**	**10A**	**11**	**12**	**K**	**T**	**UC**	**HO**
Eremalche parryi* ssp. *kernensis			5			6				1			1				38			1		
Eremalche parryi ssp. *parryi*	1		2					1				1					1				1	
Eremothera boothii ssp. *decorticans*			2			2	1			1		4	1				10					
Eriastrum densifolium ssp. *austromontanum*							4	5	1													
Eriastrum densifolium ssp. *elongatum*								1														
Eriastrum pluriflorum							5	1		1		4	2				27					8
Ericameria linearifolia	11	3	12		1	4	12	8	13	33	4	42	19	6	6	14	70	1	32	3	31	15
Ericameria nauseosa var. *mohavensis*	1	1	7				4	2	10	3		6	2	2	1	1	8		1		2	2
Erigeron foliosus var. *foliosus*					1		5	5	2		1	2										
Eriogonum angulosum	3	1	8				5	5	4	7	1	26	7	2	5		33	1		1		1
Eriogonum cithariforme var. *agninum*																	1					
Eriogonum elongatum var. *elongatum*	5		6		1	5	9	15	12	3	7	4	4	7	8	16	7	4	2		7	
Eriogonum fasciculatum var. *polifolium*	1		16	2		3	2	1		9		13	2		2		57		7	1	9	3
Eriogonum gracile	1				1																	
Eriogonum gracillimum								1	1													
Eriogonum heermannii var. *heermanni*																	1					
Eriogonum nudum									1													
Eriogonum ordii							1					1					5					
Eriogonum pusillum																	1					
Eriogonum roseum					4				3													
Eriogonum viridescens																	4					

Species[16]	Management Unit[17]																					
Botanical Name	**1A**	**1B**	**2C**	**2E**	**2S**	**2W**	**3E**	**3W**	**6**	**7**	**8**	**9C**	**9S**	**9W**	**10B**	**10A**	**11**	**12**	**K**	**T**	**UC**	**HO**
Eriophyllum confertiflorum var. *c.*			6					1	1	1		1	3				4				5	1
Eriophyllum pringlei										2							29			1		1
Erodium cicutarium *	28		47	16	15	18	37	39	35	34	13	66	25	61	34	26	71	41	28	8	37	13
Erodium moschatum var. *moschatum* *			8	1		1															1	
Erysimum moniliforme[18]			1				2	1		1		3	6				3				6	3
Erythranthe guttata	1											2										1
Eschscholzia californica ssp. *californica*	22	4	21		32	6	29	41	16	5	10	18	16	2	22	29	4		19	3	33	3
Eschscholzia lemmonii ssp. *lemmonii*	3		3	1		5				1		6	2	5	4		7	2	3		4	
Eulobus californicus			1	1								1					5					1
Euphorbia ocellata ssp. *ocellata*			1									4			1		1					
Festuca bromoides *								1														1
Festuca microstachys			2																			
Festuca myuros *	1		2		1		2	2			1								1			4
Frankenia salina								1				3		1								
Fritillaria agrestis																	6					
Galium andrewsii ssp. *intermedium*																	1					2
Galium aparine			1				1										1				1	4
Gilia capitata ssp. *abrotanifolia*			1				3	4	2			4	3				5		3		1	1
Gilia jacens	3		1			1	2	2	1	6		13	3	7	10	6	22	6	10	1	24	4
Gilia latiflora* ssp. *cuyamensis							1										13					

[18] This species is listed as *Erysimum capitatum* var. *capitatum* (Baldwin et al. 2012). However, DMEC believes that *Erysimum monoliforme* Eastwood is a distinct species that occurs in the San Emigdio Mountain region.

Species[16]	Management Unit[17]																					
Botanical Name	**1A**	**1B**	**2C**	**2E**	**2S**	**2W**	**3E**	**3W**	**6**	**7**	**8**	**9C**	**9S**	**9W**	**10B**	**10A**	**11**	**12**	**K**	**T**	**UC**	**HO**
Gilia latiflora ssp. *latiflora*							3	9			1											
Gilia minor												1										
Gutierrezia californica	1	2	16	5		3	6	3	1	13		15	5	1	2		14	1		1		4
Helianthus annuus			1	1																		
Heliotropium curassavicum var. *oculatum*			1					1				5		1								
Herniaria hirsuta ssp. *cinerea*							1					2		3			2					1
Hesperocnide tenella																	1					
Hesperoevax acaulis var. *ambusticola*							1										10		1			
Hesperoyucca whipplei							1			2							14					
Heterotheca sessiliflora ssp. *echioides*	1						1		1													
Hirschfeldia incana *	23	8			2	1	6	29	21	2	4	45	4	5	7	1	1		3			1
Hordeum depressum													1					1				
Hordeum murinum ssp. *glaucum* *	6	2	10	3	4	3	7	4	5	2	2	27	5	20	4	8	2	16	3	2	5	3
Isocoma acradenia var. *bracteosa*	3		21	3	1	8	5	1	1			33	1	17	7	3	5	12		2		1
Iva axillaries ssp. *robustior*							2		2			4		1			1					1
Juglans regia ssp. *regia* *											1											
Juncus bufonius var. *bufonius*												1										
Juncus mexicanus	1		1			1		1	1			13		1			3					
Juniperus californica	3	1	7			1	18	7	8	21	3	8	11	10	6		108		17	4	14	15
Krascheninnikovia lanata																	13	1				
Lactuca serriola *	5	1	4		1	1		8	4		3	11		1	1		2		1			

Species[16]	Management Unit[17]																				
Botanical Name	**1A**	**1B**	**2C**	**2E**	**2S**	**2W**	**3E**	**3W**	**6**	**7**	**8**	**9C**	**9S**	**9W**	**10B**	**10A**	**11**	**12**	**K**	**T**	**UC**	**HO**
Lagophylla ramosissima ssp. *ramosissima*			1		2	1																
Lasthenia californica ssp. *californica*								1		1							2				1	
Lasthenia gracilis	1						3			6		3	3	4	2	1	27	1	5	1	6	6
Lasthenia microglossa																	1					3
Layia glandulosa																	1		1			
Layia pentachaeata ssp. *albida*																			11		7	
Lepidium nitidum	2		7		2	1	1	1	3			6	3	4	6	1			2	1	2	
Leptosiphon filipes																						2
Leptosiphon parviflorus							3	1	2				2				14		2	1	11	2
Leptosiphon pygmaeus ssp. *continentalis*																						2
Leptosyne bigelovii			1							2							10	1				
Linanthus dichotomus							1	1					1				5					
Lithophragma cymbalaria																						2
Lithophragma parviflorum var. *parviflorum*				1			2		1	2									1	2	1	1
Loeseliastrum schottii																	4					
Logfia filaginoides																	2				1	1
Lomatium macrocarpum							1		2		1										1	1
Lomatium utriculatum	8	1	7	1	7	2	20	16	14	12	5	22	13	16	17	18	8	17	13	7	23	1
Lonicera subspicata var. *denudata*																	1					3
Lupinus albifrons var. *albifrons*							4	9	11	8	3	10	12	2	3		2	6				3
Lupinus bicolor	2					2	5	7	5	4	4	6	3	12	16	23		2	6	4	13	3
Lupinus formosus var. *formosus*					1		13	6	10		1			2	1	2						

Species[16]	Management Unit[17]																					
Botanical Name	**1A**	**1B**	**2C**	**2E**	**2S**	**2W**	**3E**	**3W**	**6**	**7**	**8**	**9C**	**9S**	**9W**	**10B**	**10A**	**11**	**12**	**K**	**T**	**UC**	**HO**
Lupinus microcarpus var. *microcarpus*			4				6	9	4	1	3	13	6	3	2	2	18	2	6		1	4
Lupinus succulentus			4	7																		
Lycium andersonii												1										
Madia elegans ssp. *elegans*							1		1													
Malacothrix coulteri			1			1						2		4	4	2	5	3	3		1	
Malacothrix glabrata											1						7		1			
Malacothrix saxatilis var. *commutata*																	1					
Malva parviflora *			2																			
Marah fabacea	1		8	1		2	4	4	1		1	2	4	2	4	6	4	4	5	1	5	4
Marrubium vulgare *	2	1										3	1	1							2	
Melica imperfecta			4				1					1	3		1		1					1
Melilotus indicus *												3										
Mentzelia affinis			2	3		3	1	4	4	1		1										
Mentzelia eremophila																	3					
Mentzelia pectinata			2	1		3	3	9		2		1	1				7		1			1
Mentzelia veatchiana			1				6	5	7	16	1	1	4		1		56		2	1	2	
Microsteris gracilis	3		2		4	1	10	9	21	9	5	3	5	9	4	7	1	6	7	1	11	3
Minuartia douglasii			1		1		1										5					1
Mirabilis multiflora var. *pubescens*			3		2			6	2	1		3	3	1	2							
Monolopia lanceolata			14	5		3	1	2			1	6	2		2		3	1	11			
Mucronea perfoliata var. *perfoliata*																	2					
Muilla maritima							2	1		1	2	2	2				16	1	1		1	1
Myosurus minimus																			1			
Nemophila menziesii var. *menziesii*							1		3	1						1			2		8	

Species[16]	Management Unit[17]																					
Botanical Name	**1A**	**1B**	**2C**	**2E**	**2S**	**2W**	**3E**	**3W**	**6**	**7**	**8**	**9C**	**9S**	**9W**	**10B**	**10A**	**11**	**12**	**K**	**T**	**UC**	**HO**
Nemophila pedunculata			5			2										1			1		1	
Nicotiana attenuata								1														
Nicotiana quadrivalis var. *quadrivalis*			1					3														1
Osmorhiza brachypoda																						2
Oxytheca perfoliata																	3					
Packera breweri					2		2	2	5	2			3						6		7	4
Papaver heterophyllum	1		10	1				5			1	5	4			2	15		13	1	5	1
Pectocarya linearis ssp. *ferocula*			3														3					1
Pectocarya penicillata			2			1						1		1			5				1	5
Pectocarya setosa																	18					2
Pellaea mucronata var. *mucronata*						1																
Penstemon centranthifolius			1							2							4					1
Penstemon laetus var. *laetus*							1															1
Perideridia pringlei									1	1												
Phacelia ciliata var. *alba*												1	1	5	2		1		1			
Phacelia ciliata var. *ciliata*	8		12			2	5	9	6	14	1	11	8	30	21	25	6	11	9	2	27	
Phacelia distans			1				2	4		1		1	3				41		2	1	1	7
Phacelia douglasii var. *douglasii*			1	2				1		6	1						1		1			
Phacelia egena	1						11	10	2		2		1			1						
Phacelia fremontii									3	8	1		1				41					1
Phacelia tanacetifolia	3		21	8		6	2	8		6		14	12	1	15	1	1	4	11		11	1
Pholistoma membranaceum			9			2				1			1			1	20	1	13	1	10	1

Species[16]	Management Unit[17]																				
Botanical Name	**1A**	**1B**	**2C**	**2E**	**2S**	**2W**	**3E**	**3W**	**6**	**7**	**8**	**9C**	**9S**	**9W**	**10B**	**10A**	**11**	**12**	**K**	**T**	**UC**	**HO**
Phoradendron densum						1				6							20					2
Phoradendron serotinum ssp. *tomentosum*	2		4				2			1						2	3		8	2	7	5
Phragmites australis			3																			
Pinus monophylla						1	1			6							4					6
Plagiobothrys arizonicus			1			1	1			2		1							3	1		5
Plagiobothrys canescens			2	2		1								2	3	2					3	
Platystemon californicus	2		2			1	2	2	8	4	1	1	2	4		2	6		13	5	27	2
Poa bulbosa ssp. *bulbosa**		1																				
Poa bulbosa ssp. *vivapara* *			3		1		4		2		1	2								1		1
Poa secunda ssp. *juncifolia*														1							1	
Poa secunda ssp. *secunda*	1		32	6	8	5	24	27	16	9	6	22	13	1	5	5	45	10	10	6	2	6
Polygonum aviculare ssp. *depressum* *												3										
*Polypogon monspeliensis**			5					1				2								1		
Populus fremontii ssp. *fremontii*												2										
Prunus virginiana var. *demissa*							2															1
Pseudognaphalium luteoalbum *			1																			
Pterostegia drymarioides						1											2					
Quercus john-tuckeri			7			1	5			4							1		1			14
Quercus xalvordiana	4		2													3	1		23	4	21	1
Rafinesquia californica					1		1	7			1	2	1									
Ribes quercetorum	1		1			1	1	1					1			2			1	2	7	7
Robinia pseudo-acacia *														1								

Species[16]	Management Unit[17]																					
Botanical Name	**1A**	**1B**	**2C**	**2E**	**2S**	**2W**	**3E**	**3W**	**6**	**7**	**8**	**9C**	**9S**	**9W**	**10B**	**10A**	**11**	**12**	**K**	**T**	**UC**	**HO**
Rumex crispus *												2										
Rumex hymenosepalus												2							1			
Ruppia cirrhosa												1										
Salix exigua var. *exigua*			1			1																
Salix gooddingii			1			1						1										
Salix laevigata																				1		2
Salsola tragus *	2			6		1	2	6	1			3		3	10			12	1			
Salvia carduacea																	1					
Salvia columbariae	1		5			1	1	1		6		3	1				30		6		2	2
Sambucus nigra ssp. *caerulea*	1						3	1	1	3	1	1	1				1		1		2	1
Schismus arabicus *	1		5	1	2	4	3	1	2	9	1	6	3	10			54	6		1		8
Schismus barbatus *			1			1						2						1				
Senecio spartioides			1																			
Senecio vulgaris *												2					1	1				
Sisymbrium altissimum *	10	2	7		2		34	39	20	1	9	25	8	9	5	6	7	1	5			11
Solanum umbelliferum	2		2				1	4				2	1		3	2	1		2		6	3
Sonchus asper ssp. *asper**			1			1						2							1	1		
Sonchus oleraceus *			1									1										
Spergularia marina								1														
Stanleya pinnata var. *pinnata*			3														1		3		3	1
Stellaria media *						1														1		
Stellaria nitens						1	1							1		3					2	
Stephanomeria exigua ssp. *exigua*	1								1			1					4					
Stephanomeria virgata ssp. *pleurocarpa*			1									1			1		1					
Stephanomeria virgata	3		1					4	5			4		1								

Species[16]	Management Unit[17]																					
Botanical Name	**1A**	**1B**	**2C**	**2E**	**2S**	**2W**	**3E**	**3W**	**6**	**7**	**8**	**9C**	**9S**	**9W**	**10B**	**10A**	**11**	**12**	**K**	**T**	**UC**	**HO**
ssp. *virgata*																						
Stipa cernua			1		1				1										1			
Stipa pulchra	2		4		1			6	5			7	2		1		1	1				2
Stipa speciosa								1	1	1		1					11		1			2
Tamarix ramosissima *			13			1		1				4		1			1			1		
Tauschia parishii									2			1										
Tetrapteron graciliflorum										2							1				2	1
Thysanocarpus curvipes var. *curvipes*	2		11		4		5	7	8	1	1	4	2	2	7	11	1		18	2	17	6
Toxicoscordion brevibracteatum						1		2		1							8					2
Toxicoscordion fremontii							1	1														1
Tragopogon dubius *									1													
Trichostema lanceolatum			2																			
Trifolium albopurpureum var. *albopurpureum*							1	2		1	1											1
Trifolium glomeratum *	1					1		2		3	2	4	2	3		1	5	2	1		2	1
Trifolium willdenovii	1		5					2				2		6	2	1			2	2		
Tropidocarpum gracile	4		22	1	6	4		5	1	6	8	6	1	11	10	16	3	4	15	6	31	2
Typha domingensis			6			1																
Uropappus lindleyi	7		13			1	20	17	11	5	5	17	8	3	2	2	34		7	1	5	4
Urtica dioica ssp. *holosericea*	1		4			3					1	5							1			1
Vicia americana ssp. *americana*								1														
Xanthium strumarium						2																

Notes: Scientific nomenclature follows Flora of North America Committee (1993-2009 - *Flora of North America*) or Baldwin et al. (2012 - T*he Jepson Manual: Higher Plants of California*).
Common names follow Abrams and Ferris (1960), Neihaus and Ripper (1976), and DeGarmo (1980).

Bold typeface indicates special-status species.

An "*" indicates non-native species that have become naturalized or persist without cultivation.

DMEC

APPENDIX B. VEGETATION ALLIANCES AT BITTER CREEK NWR

Plant Communities[19]	Management Unit[20]																				
	1A	1B	2E	2C	2S	2W	3W	3E	6	7	8	9W	9C	9S	10A	10 B	11	12	K	UC	T	HO
Forest and Woodland																						
Ailanthus altissima Provisional Semi-natural Stand +	X										X	X										
Juniperus californica Woodland Alliance				X		X		X	X	X			X	X			X		X	X	X	X
Quercus john-tuckeri Woodland Alliance				X		X		X		X							X		X			X
Quercus x*alvordiana* Woodland Alliance +	X																		X	X	X	X
Pinus monophylla Woodland Alliance						X				X							X					X
Salix laevigata Woodland Alliance																					X	
Salix gooddingii Woodland Alliance																						
Shrubland																						
Artemisia tridentata ssp. *tridentata* Shrubland Alliance																	X					X
Atriplex canescens Shrubland Alliance				X	X			X				X	X			X	X					
Atriplex lentiformis Shrubland Alliance				X																		
Ephedra viridis Shrubland Alliance																	X					
Ericameria linearifolia Provisional Shrubland Alliance				X	X	X		X	X	X	X		X	X		X	X		X	X		X
Ericameria nauseosa Shrubland Alliance				X													X			X		

[19] A plus sign "+" represents newly described (here) vegetation alliances.
[20] K= Klipstein Exclosure, UC= Uncle Charlie's Exclosure, T= Timbers HO= Headwall Oaks

Plant Communities[19]	Management Unit[20]																				
	1A	1B	2E	2C	2S	2W	3W	3E	6	7	8	9W	9C	9S	10A	10 B	11	12	K	UC	T	HO
Eriogonum fasciculatum var. *polifolium* Shrubland Alliance			X	X						X			X	X			X		X	X		
Eriogonum heermannii Provisional Shrubland Alliance																	X					
Gutierrezia californica Provisional Shrubland Alliance			X	X			X	X				X	X				X					X
Shrubland																						
Hesperoyucca whipplei Shrubland Alliance +																	X					
Lupinus albifrons Shrubland Alliance								X	X			X	X	X								
Prunus virginiana Provisional Shrubland Alliance																						
Ribes quercetorum Provisional Shrubland Alliance				X			X							X						X	X	X
Salix exigua Shrubland Alliance						X																
Tamarix spp. Shrubland Semi-natural Alliance				X																		
Grassland/Herbland																						
Amsinckia intermedia Herbaceous Alliance +			X	X									X		X				X			
Amsinckia menziesii Herbaceous Alliance +												X	X									X
Amsinckia tessellata Herbaceous Alliance +	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Amsinckia vernicosa Herbaceous Alliance +	X			X	X										X	X			X	X		
Artemisia dracunculus Herbaceous Alliance										X							X					
Avena (*barbata, fatua*) Semi-natural Stands	X	X	X	X		X		X	X	X			X			X			X		X	
Brassica and other mustards Semi-natural Stands		X			X	X	X	X	X	X		X	X	X		X		X				X
Bromus diandrus Semi-natural Stands +	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
Bromus rubens Semi-natural Stands	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bromus rubens- Schismus (*arabicus, barbatus*) Herbaceous Semi-natural Alliance					X		X			X			X				X	X				X
Bromus tectorum Semi-Natural Stands									X	X	X											

Plant Communities[19]	Management Unit[20]																					
	1A	1B	2E	2C	2S	2W	3W	3E	6	7	8	9W	9C	9S	10A	10 B	11	12	K	UC	T	HO
Claytonia perfoliata Herbaceous Alliance+			X	X		X	X	X	X			X			X	X		X	X			
Corethrogyne filaginifolia Herbaceous Alliance +	X	X			X	X	X	X	X			X	X		X	X		X	X	X		
Distichlis spicata Herbaceous Alliance				X		X						X	X									
Elymus multisetus Provisional Herbaceous Alliance					X					X			X		X				X			
Elymus triticoides Herbaceous Alliance				X		X	X						X				X					
Grassland/Herbland																						
Eriogonum angulosum-Bromus rubens Herbaceous Alliance +					X		X	X	X	X		X	X	X								
Eriogonum elongatum Herbaceous Alliance +	X			X			X	X	X	X	X		X	X	X	X		X		X		
Erodium cicutarium Semi-natural Stands +	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Eschscholzia californica Herbaceous Alliance				X	X	X	X													X	X	
Eschscholzia lemmonii Herbaceous Alliance +				X									X			X				X		
Hordeum murinum Herbaceous Alliance +	X			X	X			X				X	X	X			X	X				
Juncus (*balticus, mexicanus*) Herbaceous Alliance				X					X				X				X					
Lasthenica gracilis Herbaceous Alliance +								X		X				X			X		X	X		X
Mentzelia pectinata Herbaceous Alliance +							X	X					X	X			X					
Mentzelia veatchiana Herbaceous Alliance +							X	X		X							X					
Microsteris gracilis Herbaceious Alliance +								X				X						X		X		
Monolopia lanceolata Herbaceous Alliance +			X	X		X			X					X		X			X			
Phacelia ciliata Herbaceous Alliance +										X		X	X	X		X	X	X	X	X		
Phacelia tanacetifolia Herbacious Alliance +			X	X			X	X				X	X	X	X			X		X		
Poa secunda Herbaceous Alliance			X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X

Plant Communities[19]	Management Unit[20]																				
	1A	1B	2E	2C	2S	2W	3W	3E	6	7	8	9W	9C	9S	10A	10 B	11	12	K	UC	T	HO
Stipa cernua Provisional Herbaceous Alliance					X																	
Stipa pulchra Herbacous Alliance				X														X				
Typha Herbaceous Alliance				X																		