Interim Core Map Documentation for Colusa grass

Version 1

Review Completed: April 2026

Core Map Developer: EPA's Office of Pesticide Programs

Species Summary

The Colusa grass (*Neostapfia colusana*; entity ID 580) was federally listed as threatened in 1997. The U.S. Fish and Wildlife Service (FWS) initially proposed a designation of critical habitat for the Colusa grass in 2002. After several comment periods and considerations of exclusions under 4(b)(2) of the Endangered Species Act, FWS finalized the critical habitat in 2005 and made administrative revisions to the critical habitat in 2006 (Critical Habitat; Final Rule, administrative revisions, 2006; Evaluation of Economic Exclusions From August 2003 Final Designation, 2005). The species is found in central to northern California and current known occurrences are in the Solano-Colusa Vernal Pool Region, Southern Sierra Foothills Vernal Pool Region and San Joaquin Valley Vernal Pool Region (as specified by FWS in Recovery Plan, 2005). The species is endemic to/ exclusively occurs in vernal pools. The species is known to occur in Merced, Stanislaus, Yolo and Solano Counties, with most occurrences in Merced County. The species was historically in Colusa County, but these occurrences have been extirpated. Additional information on the species is provided in **Appendix 1**.

Description of Core Map

The core map for the Colusa grass is based on biological information. The core map is defined by vernal pool habitat within: (1) the species range, and (2) areas of known occurrences of Colusa grass. Several FWS known occurrences are more recent than the FWS-established range and critical habitat. Therefore, many areas containing known occurrences of Colusa grass are within the range, but some occurrences exist outside the range. Some areas containing FWS known occurrences were excluded from the critical habitat (Evaluation of Economic Exclusions from August 2003 Final Designation, 2005), so EPA used the range as a starting point for developing the core map.

The range map and the names and general locations of known occurrences are available in FWS documentation. Vernal pool habitat was established using the California Fish and Wildlife Services (CA FWS) Areas of Conservation Emphasis (ACE) habitat data, version 3.0.[1] EPA identified vernal pool habitat within the Colusa grass range and clipped the range to only areas with CA FWS-identified vernal pool habitat within the range in the core map. FWS documentation notes that both agriculture and urbanization of land are the primary cause of habitat reduction for this species (Five Year Review, 2024). Agricultural is likely detrimental to the suitability of habitat and reproduction of Colusa grass, given that the species requires approximately three months of inundation for germination (Five Year Review, 2024). EPA determined it was appropriate to remove cultivated land from the vernal pool habitat within the

[1] Vernal Pools, Areas of Conservation Emphasis (ACE), version 3.0, last updated on 4/24/2025. https://gis.data.ca.gov/datasets/CDFW::vernal-pools-ace-ds2732-1/about

range using EPA's modified cultivated land layer available on EPA's GeoPlatform[2] by following the methodology described in "Process EPA Uses to Develop Core Maps for Draft Pesticide Use Limitation Areas for Species Listed by the FWS and their Designated Critical Habitats."[3]

The most recent 5-Year Review identifies six protection areas containing the 21 extant occurrences of Colusa grass and their land ownership (**Figure A2-3**, reproduced from Five Year Review, 2024). Because precise location data for extant occurrences were not available, EPA identified land ownership parcels for the protection areas containing the extant occurrences of Colusa grass using California Department of Forestry and Fire Protection (CAL FIRE) California Land Ownership data.[4] Additional information on Geographic Information System (GIS) steps used is in **Appendix 2.** The CAL FIRE property parcels containing known occurrences were clipped to only areas containing vernal pool habitat identified in the ACE data. The CAL FIRE dataset did not contain a property parcel for one FWS identified protection areas, which contains three known occurrences. Additionally, two occurrences are on land "managed as part of Grassland Regional Park" (another FWS identified protection area) but the land had not yet been acquired by Yolo County when the Five Year Review (2024) was published. In order to incorporate these occurrences and protection areas in the core map, EPA identified their course location based on information provided by FWS and publicly available maps and identified CA FWS vernal pool habitat within the area of the occurrences (see **Appendix 2** for detailed steps). EPA merged the occurrence data into a single "KnownOccuranceAll" layer and clipped it to only areas with CA FWS-identified vernal pool habitat.

Similar to the range, EPA's modified cultivated land layer also intersected with the areas outside the range identified as containing known occurrences ("KnownOccuranceAll" layer). However, because these areas are identified as protection areas by FWS (Five Year Review, 2024), EPA did not remove cultivated land from the "KnownOccuranceAll" layer. Additional information on the data used is provided in **Appendix 2.**

Land cover within the core map was assessed using the National Land Cover Database (NLCD).[5] The overlap between core map contained 4% cultivated land (as defined by NLCD data). However, because the core map was already manipulated using EPA's modified cultivated land layer,[6] the area is identified as potential locations for vernal pools by ACE, and accounts for 4% of the total core map, cultivated land (as defined by NLCD) was not further removed from the core map. Landcover categories within the core map area are included in **Table 1**. Landcover in the core map is predominantly grassland herbaceous lands with some emergent herbaceous wetlands.

Figure 1 depicts the resulting interim core map for the Colusa grass. The size of this core map is approximately 306,147 acres. Landcover categories within the core map area include CA FWS identified known vernal pool habitats.

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[2] Modified Cultivated Layer, developed by OCSPP's Office of Pesticide Program for use in species core map development, last updated on 12/16/2024, available at https://epa.maps.arcgis.com/home/item.html?id=159e70ce4c284f5b972c687037f8a668

[3] US EPA, Dec. 2024, *Process EPA Uses to Develop Core Maps for Draft Pesticide Use Limitation Areas for Species Listed by the U.S. Fish & Wildlife Service (FWS) and their Designated Critical Habitats*. Available at https://www.epa.gov/system/files/documents/2024-12/core_map_process.pdf

[4] California Land Ownership, last updated 5/15/2024 https://gis.data.ca.gov/datasets/CALFIRE-Forestry::california-land-ownership-1/explore?location=36.984319%2C-119.270600%2C6.28

[5] Dewitz, J., 2023, National Land Cover Database (NLCD) 2021 Products: U.S. Geological Survey data release, https://doi.org/10.5066/P9JZ7AO3

[6] Modified Cultivated Layer, developed by OCSPP's Office of Pesticide Program for use in species core map development, last updated on 12/16/2024, available at https://epa.maps.arcgis.com/home/item.html?id=159e70ce4c284f5b972c687037f8a668

The core map developed for the Colusa grass is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include Colusa grass. This core map incorporates information developed by FWS and made available to the public; however, the core map has not been formally reviewed by FWS. This interim core map may be revised in the future to incorporate species expert feedback from FWS. This interim core map has an "moderate" best professional judgment classification because of the assumptions made when connecting species life history or biological needs (habitat suitability) with a GIS dataset (cultivated land in the EPA modified cultivated land layer)[7] and assumptions when identifying vernal pool polygons near FWS-identified protection areas/ occurrences when land parcels could not be referenced. The map is based on suitable habitat (vernal pools) within the range and known locations outside the range based on descriptions provided by FWS. EPA removed some additional areas based on biological needs of the species. This core map does not replace or revise any range or designated critical habitat developed by FWS for this species.

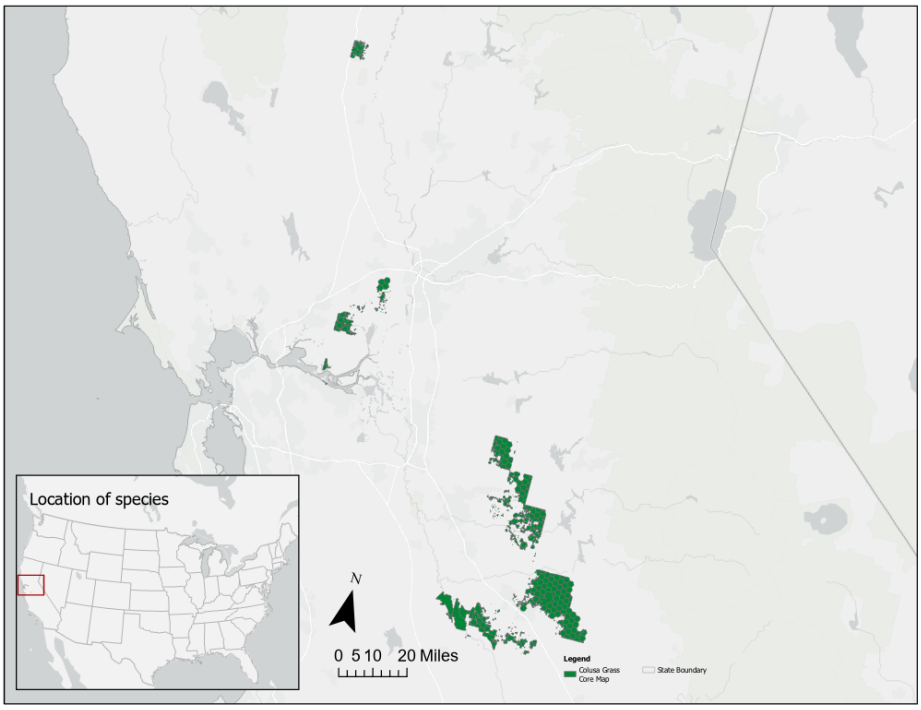


Figure 1. Interim core map for Colusa grass. The total acreage is approximately 306,147 acres.

[7] Modified Cultivated Layer, developed by OCSPP's Office of Pesticide Program for use in species core map development, last updated on 12/16/2024, available at https://epa.maps.arcgis.com/home/item.html?id=159e70ce4c284f5b972c687037f8a668

Table 1. Percentage of Interim Core Map Represented by National Land Cover Database (NLCD)[8] Land Covers and Associated Example Pesticide Use Sites/Types.

Example pesticide use sites/types	NLCD Landcover (Value)	% of core map represented by landcover[9]
Forestry	Deciduous Forest (41)	0
Forestry	Evergreen Forest (42)	0
Forestry	Mixed Forest (43)	0
Agriculture	Pasture/Hay (81)	2
Agriculture	Cultivated Crops (82)	4
Mosquito adulticide, residential	Open space, developed (21)	1
Mosquito adulticide, residential	Developed, Low intensity (22)	0
Mosquito adulticide, residential	Developed, Medium intensity (23)	0
Mosquito adulticide, residential	Developed, High intensity (24)	0
Invasive species control	Woody Wetlands (90)	0
Invasive species control	Emergent Herbaceous Wetlands (95)	11
Invasive species control	Open water (11)	1
Invasive species control	Grassland/herbaceous (71)	72
Invasive species control	Scrub/shrub (52)	1
Invasive species control	Barren land (rock/sand/clay; 31)	0
Total Acres	**Interim Core Map Acres**	**~317,100**

Evaluation of Known Location Information

There are four datasets with known location information:

- Descriptions of locations provided by FWS
- Occurrence locations in iNaturalist
- Occurrence locations in the Global Biodiversity Information Facility (GBIF)
- Occurrence locations in NatureServe

EPA evaluated these sets of data before selecting the type of and developing the core map. FWS appeared to have the best available occurrences information, providing a map that depicted the current known locations and names and descriptions of current land ownership. FWS known occurrences are in Solano, Yolo, Merced and Stanislaus counties (**Figure A1-3 in Appendix 1**). The range of the species is from central to northern California (**Figure A1-1. in Appendix 1**). Occurrences in iNaturalist, GBIF, and NatureServe did not support further expanding the core map outside of the FWS range and known occurrences. **Appendix 1** includes more information on the available known location information.

Approach Used to Create Core Map

[8] Dewitz, J., 2023, National Land Cover Database (NLCD) 2021 Products: U.S. Geological Survey data release, https://doi.org/10.5066/P9JZ7AO3

[9] Rounded to the nearest percent.

EPA compiled available information for the Colusa grass from FWS, as well as observation information available from various publicly available sources (including iNaturalist, GBIF, and NatureServe). The information compiled for Colusa grass, is included in **Appendix 1**. Influential information that impacted the development of the core map included:

- The range of the Colusa grass.
- The fact that some areas with known occurrences of Colusa grass are not included in the critical habitat.
- The location of known occurrences of Colusa grass, some of which are outside of the range.
- The species requires vernal pool habitat to grow and reproduce.
- The locations and land ownership of the six protection areas containing 21 extant known occurrences of Colusa grass

EPA used the compiled information to identify the core map type including species range and known location information. The extant populations are located near either the species' range or known locations identified by FWS and require vernal pools to grow and reproduce. Therefore, EPA based the core map on the vernal pool habitats from the CA FWS that intersect with/are near the species' range or known locations identified by FWS. The entire range of the species was not used as the core map because the range contains habitats where the species does not occur, and several known locations are found outside of the species range.

EPA used the best available data sources to generate the core map. Data sources are discussed in detail in **Appendix 2**. including the state dataset from California identifying vernal pool complexes. For this core map, EPA used the vernal pool habitats identified by CA FWS that intersect within the species' range. Land parcels for FWS known locations were established based on the descriptions of the protection areas provided by FWS. Land parcel extents were gathered from CAL FIRE Land Ownership dataset.[10] EPA identified vernal pool habitat within the applicable CAL FIRE Land Ownership parcels for this core map. In the 2024 5-year Review, FWS noted that "Yolo County is awaiting transfer of ownership" of one of the protection areas containing two of the extant occurrences. The 2024 Five Year Review also noted that the protection area is "Managed as part of the Grasslands Regional Park," which is another protection area and land owned by Yolo County. At the time of development of this core map, the CAL FIRE data was last updated in May 2024, and it is unknown if this land transfer to Yolo has been finalized or included in the CAL FIRE data. Therefore, EPA evaluated the ACE vernal pool layer and included the extent of four CA FWS vernal pool hexagonal polygons that are proximal to Grassland Regional Park land parcel (**Figure A2-4**) in the core map to ensure that these protection area occurrences were included in the core map. **Appendix 2** provides more details on the GIS analysis and steps used to generate the core map. Similarly, 2024 Five Year Review indicates that four occurrences occur on private property. For these locations, EPA evaluated the ACE vernal pool layers and included the extent of two CA FWS vernal pool hexagonal polygons that are proximal to the locations described by FWS for the Core Map (see **Figure A2-7**). **Appendix 2** provides more details on the GIS analysis and steps used to generate the core map

Discussion of Approaches and Data that were Considered but not Included in Core Map

[10] California Land Ownership, last updated 5/15/2024 https://gis.data.ca.gov/datasets/CALFIRE-Forestry::california-land-ownership-1/explore?location=36.984319%2C-119.270600%2C6.28

The species range was considered but was not selected as the core map because the range map includes habitats not consistent with the species' needs as well as habitats that are (i.e., vernal pools). Additionally, the range map was last updated in 2018 and does not include some areas with known populations as of the Five-Year Review (2024). These known locations identified in the 2024 Five-Year Review are included in the core map.

Critical habitat was considered but was not selected as the basis of the core map because it does not include some known occurrences of the species.

A combination of biological information was used to develop the core map of vernal pool habitat within the range and locations of known occurrences existing outside the range.

Appendix 1. Information Compiled for Colusa Grass During Step 1

1. **Recent FWS documents/links and other data sources**
   - Five Year Review (2024) (https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/15555.pdf)
   - Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (2005) (https://ecos.fws.gov/docs/recovery_plan/Vernal%20Pool%20Ecosystem%20Final%20Recovery%20Plan.pdf)
   - Designation of Critical Habitat for Four Vernal Pool Crustaceans and Eleven Vernal Pool Plants; Final Rule, administrative revisions. (2006) (referenced as Critical Habitat; Final Rule, administrative revisions. 2006) (https://www.govinfo.gov/content/pkg/FR-2006-02-10/pdf/06-1080.pdf#page=1)
   - Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for Four Vernal Pool Crustaceans and Eleven Vernal Pool Plants in California and Southern Oregon; Evaluation of Economic Exclusions From August 2003 Final Designation (2005) (Referenced as Evaluation of Economic Exclusions From August 2003 Final Designation, 2005) https://www.govinfo.gov/content/pkg/FR-2005-08-11/pdf/05-15569.pdf#page=1
   - Five Year review (2008) https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/1253.pdf

2. **Background information**
   - **Status**: Federally listed as threatened in 1997
   - **Resiliency, redundancy, and representation** (the 3Rs)

     No direct information (no species status assessment).
     - **Habitat**
       - Endemic to California vernal pool habitat. (5-Year Review, 2008)
       - Long-term inundation of approximately three months is required for seed germination, and it appears that deeper pools and stock ponds are most likely to provide the long inundation period required. (5-Year Review, 2008)
       - Colusa grass has the broadest ecological range among the Orcuttieae tribe, as it occurs on the rim of alkaline basins in the Sacramento and San Joaquin Valleys, on acidic soils of alluvial fans and stream terraces along the eastern margin of the San Joaquin Valley and into the adjacent foothills, as well as in Northern Claypan and Northern Hardpan vernal pool types. (5-Year Review, 2008)
       - Has been found growing in pools ranging from 0.02 to 617.5 acres. (5-Year Review, 2008)
     - **Taxonomy**
       - Annual plant in the grass family (Poaceae) and in the Orcuttieae taxonomic tribe
     - **Relevant Pesticide Use Sites** (Five Year Review, 2024)
       - No specific pesticide use sites were described in FWS documents; however, FWS documentation includes pesticide use as a new threat to the species.
       - Specifically, agricultural runoff, drift, precipitation or aerial deposition could contaminate vernal pools and can concentrate the dry down phase.

- **Recovery Criteria/Objectives (from 5-Year Review, 2024)**
    - Percent suitable vernal pool habitat within each prioritized core area for the species is protected: 95% in Grasslands Ecological Area, 95% in Davis Communications Annex, 95% in Jepson Prairie, 95% in Madera, 95% in Merced, 85% in Farmington, 85% in Turlock, and 85% in Waterford.
    - 90% of the species occurrences distributed across the species geographic range and genetic range are protected. Protection of extreme edges of populations protects the genetic differences that occur there.
    - Reintroductions must be carried out and meet success criteria established in the recovery plan.
    - Additional localities that are detected (and determined essential to recovery goals) are permanently protected.
    - Habitat protection results in protection of hydrology essential to vernal pool ecosystem function, and monitoring indicates that hydrology that contributes to population viability has been maintained through at least one multi-year period that includes above average, average, and below average local rainfall, a multi-year drought, and a minimum of 5 years of post-drought monitoring.
    - Habitat management and monitoring plans that facilitate maintenance of vernal pool ecosystem function and population viability have been developed and implemented for all habitat protected.
    - Mechanisms are in place to provide for management in perpetuity and long-term monitoring of all protected habitat.
    - Monitoring indicates that ecosystem function has been maintained in the areas protected for at least one multi-year period that includes above average, average, and below average local rainfall, a multi-year drought, and a minimum of 5 years of post-drought monitoring.
    - Seed banking actions have been completed.
    - Status surveys, 5-year status reviews, and population monitoring show populations within each vernal pool region where the species occur are viable (e.g., evidence of reproduction and recruitment) and have been maintained (stable or increasing) for at least one multi-year period that includes above average, average, and below average local rainfall, a multi-year drought, and minimum of 5 years of post-drought monitoring.
    - Status surveys, status reviews, and habitat monitoring show that threats identified during and since the listing process have been ameliorated or eliminated. Site-specific threats identified through standardized site assessments and habitat management planning also must be ameliorated or eliminated.
    - Research actions necessary for recovery and conservation of the covered species have been identified (these are research actions that have not been specifically identified in the recovery actions but for which a process to develop them has been identified). Research actions (both specifically identified in the recovery actions and determined through the process) on species biology and ecology, habitat management and restoration, and methods to eliminate or ameliorate threats have been completed and incorporated into habitat protection, habitat management and monitoring, and species monitoring plans, and refinement of recovery criteria and actions.

- Research on genetic structure has been completed and results incorporated into habitat protection plans to ensure that within and among population genetic variation is fully representative by populations protected.
- Research necessary to determine appropriate parameters to measure population viability for each species has been completed.
- Recovery Implementation Team is established and functioning to oversee range-wide recovery efforts.
- Vernal pool regional working groups are established and functioning to oversee regional recovery efforts.
- Participation plans for each vernal pool region have been completed and implemented.
- Vernal pool regional working groups have developed and implemented outreach and incentive programs that develop partnerships contributing to achieving recovery criteria.

- **Recovery Actions (from Recovery Plan, 2005)**
  - Protect vernal pool habitat in the largest block possible from loss, fragmentation, degredation, and incompatible uses.
  - Manage Restore and monitor vernal pool habitat to promote the recovery of listed species and the long-term conservation of the species of concern.
  - Conduct range-wide status surveys and status reviews for all species addressed in this recovery plan to determine species status and progress toward achieving recovery of listed species and long-term conservation of species of concern.
  - Conduct research and use results to refine recovery actions and criteria and guide overall recovery and long-term conservation efforts.
  - Develop and implement participation programs for vernal pool recovery.

3. Description of Species Range

- Figure A1-1 depicts the FWS range. The range was last updated on 3/20/2018. The total acreage of the range is around 821,476 acres.

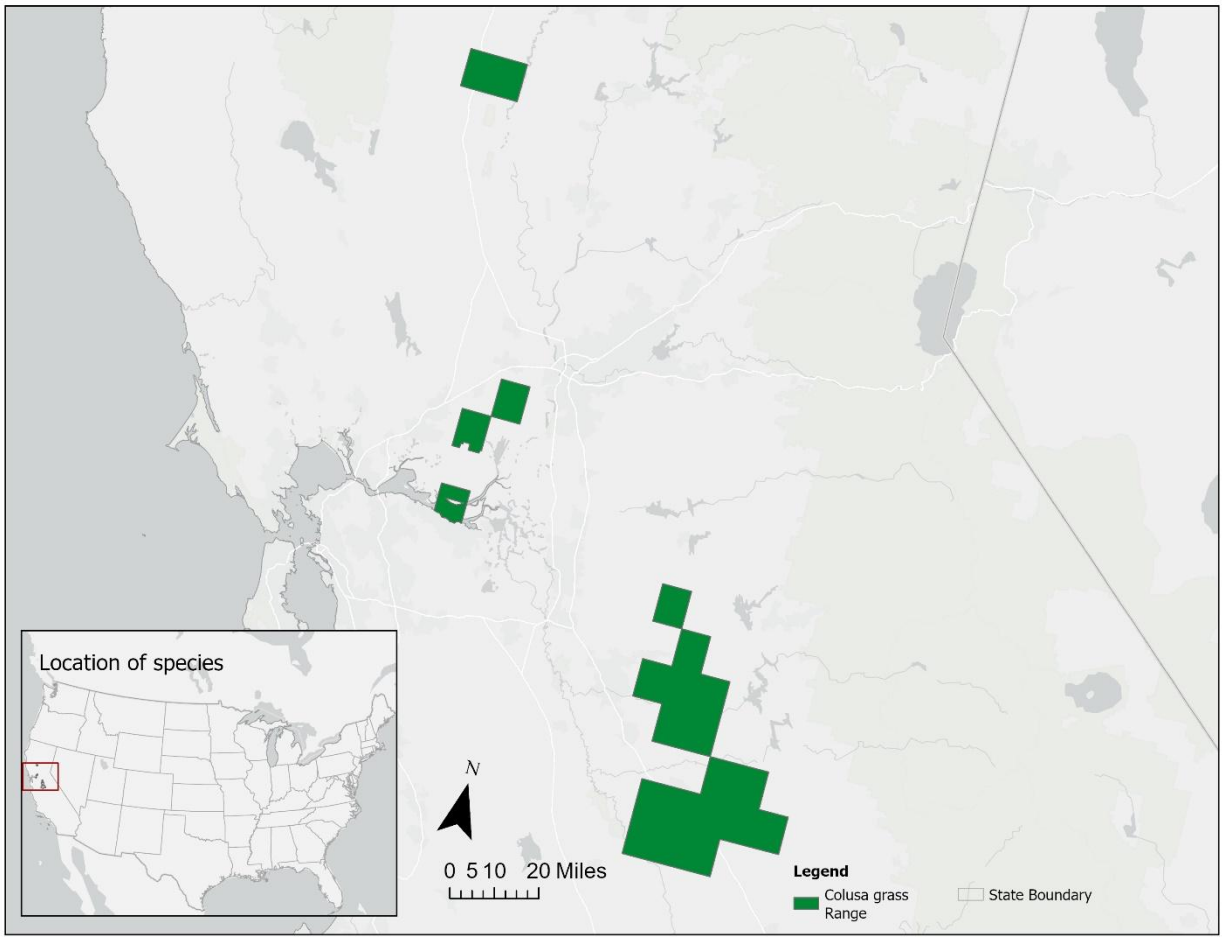


Figure A1-1. FWS range for the Colusa grass. The total acreage of the range is approximately 821,476 acres.

4. **Critical Habitat**
    - **Figure A1-2** depicts the FWS critical habitat for the Colusa grass. The critical habitat was designated in 2005 and administrative revisions to the designation were released in 2006. The critical habitat contains approximately 152,093 acres (Designation of Critical Habitat; Final rule; administrative revisions, 2006)
    - Some areas with existing populations of Colusa grass were excluded from the critical habitat under Section 4(b)(2) of the Endangered Species Act (ESA), which allows for exclusions due to economic impacts or impacts to national security. Specific census tracts excluded for the Colusa grass were (Evaluation of Economic Exclusions From August 2003 Final Designation. 2005):
        - census tract 06095253500
        - census tract 06099000102
        - census tract 06099000101
    - In the 2006 Evaluation of Economic Exclusions, Final Rule, FWS notes that they considered but excluded "… a total of approximately 374,732 ac (151,648 ha) of essential habitat for one or more of the fifteen listed vernal pool species… under section 4(b)(2)."
    - Areas excluded are Carrizo Plain National Monument (not applicable to Colusa grass/ within the Colusa grass range) and "lands with significant economic impacts to

landowners (358,699 ac (145,160 ha) within 23 census tracts in Sacramento, Butte, Placer, Solano, Monterey, Fresno, Stanislaus, Madera, Merced, Shasta, and Tehama Counties."

- Note: areas occupied by the 15 vernal pool species considered in this Rule are unique. Colusa grass does not occupy all the counties where exclusions were made for the other 14 vernal pools species.

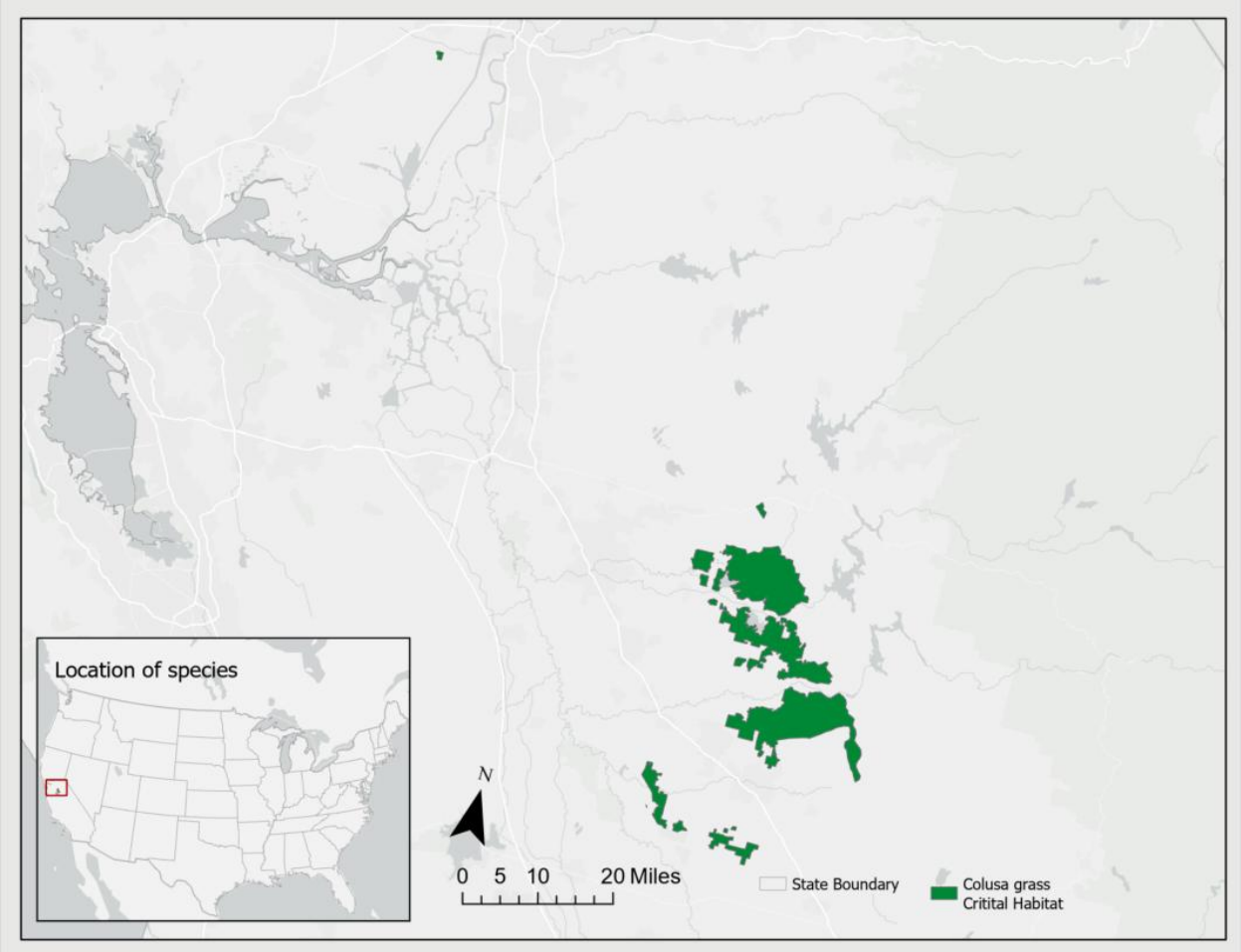


Figure A1-2. Colusa grass critical habitat

5. **Known Locations**
    - Known Locations Described in FWS Recovery Documents
        - Colusa grass is found in Yolo, Solano, Stanislaus, and Merced counties of California. The historical distribution also extended into Colusa County (Five Year Review 2024).
        - Colusa grass is known to occur within three of FWS's "vernal pool regions" (vernal pool regions delineated in the 2005 Recovery Plan): (1) Solano-Colusa vernal pool region, (2) San Joaquin Valley vernal pool region, and (3) and Southern Sierra Foothill vernal pool region (see **Figure A1-3**; Five Year Review, 2024).

- In 2024, 21 extant population occurrences of Colusa grass were known to occur in six “protection areas” described by FWS (see **Figure A2-3;** Five Year Review, 2024)
- **Figure A1-3** depicts known locations of vernal pools containing Colusa grass (Five Year Review, 2024).
- Several of these known locations are found outside of the current species range and critical habitat.

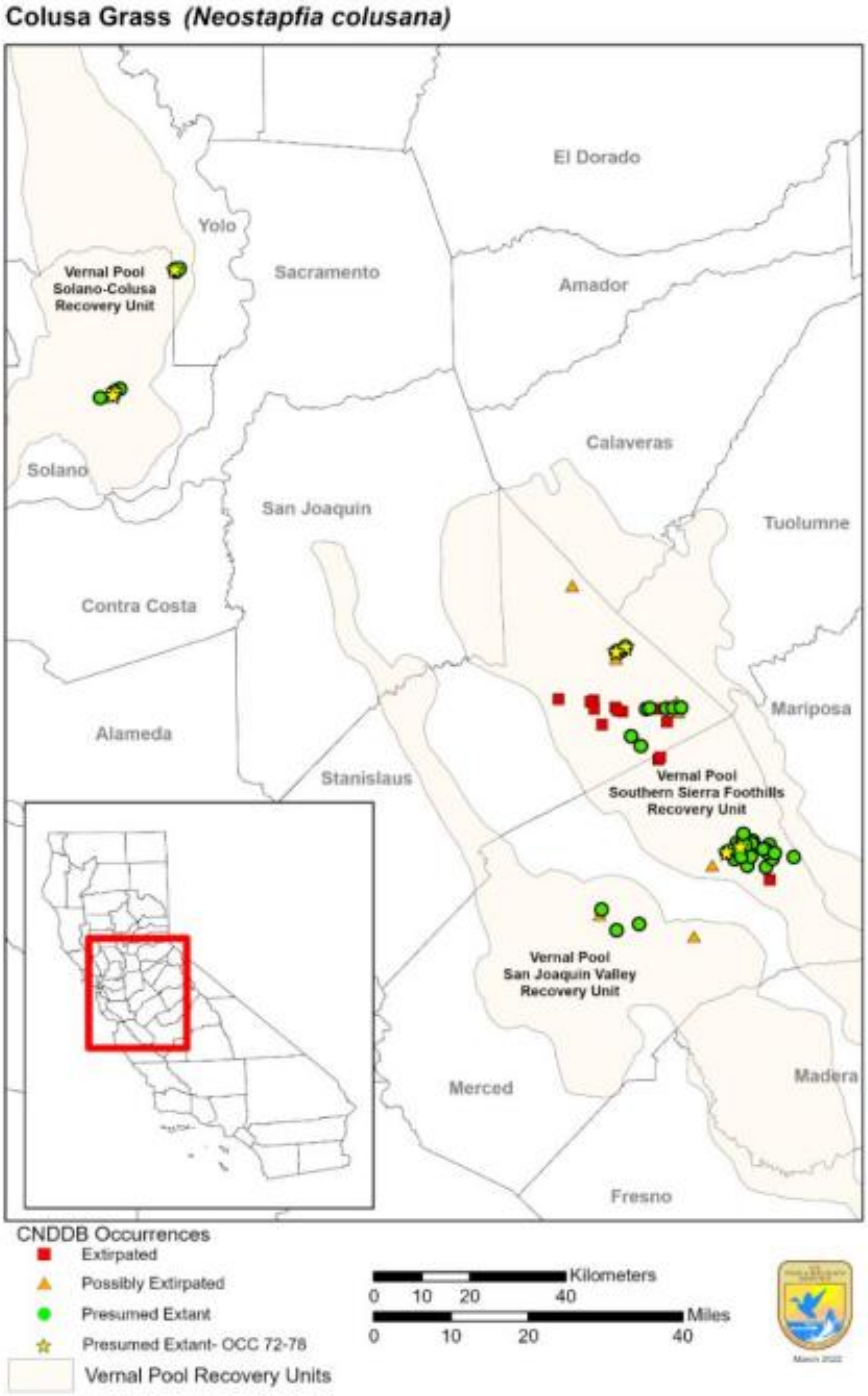


Figure A1-3. Known location information extracted from 2024 FWS Five Year Review for the Colusa Grass. Colusa grass Diversity Database occurrence records,[11] showing county, vernal pool region (Recovery Plan, 2005), and the seven occurrences identified since the 2008 5-year review (occurrence #72–78).

[11] [Diversity Database] California Natural Diversity Database. 2023. RareFind 5 [Internet]. Occurrence Reports for Neostapfia colusana (Accessed by FWS August 15, 2023). California Department of Fish and Wildlife, California.

- **Occurrences Included in Public Databases**
  EPA queried iNaturalist, GBIF, and NatureServe.

  iNaturalist (available here) included 10 research grade observations from January 2017-March 2024. The coordinates of these observations were obscured due to the species status, so the coarse location of the observations was reviewed. One observation in near Yosemite Lake in Merced County. This is within FWS's San Joquin Valley Recovery Unit and within the overlap between the range and ACE vernal pool habitat. The other 9 observations are near Fairfiled, CA, which is part of FWS's Solano-Colusa Recovery Unit. These 9 occurrences are near Solano, CA portion of the range and near the known occurrences within Jepson Prairie. When accounting for positional obscuration by iNaturalist, although these occurrences all appear to be west of the range and outside of the core map, they are likely within the range.

  GBIF (available here) included roughly 12 occurrences, but only 3 contained geographic coordinates. The coordinates of the three occurrences were plotted and were in three different areas of the range.

  NatureServe (available here) was searched but no occurrences with georeferenced data were available.

Appendix 2. GIS Data Review and Method to Develop Core Map (Step 3)

This core map was created based on biological information, including range, known location, and species habitat (vernal pools). EPA used FWS known location and range data, as well as publicly available datasets (described below) to develop this core map. The interim core map consists of vernal pools that intersects with/is near species range or those that intersect with/is near the known locations given by FWS (with cultivated land excluded from vernal pool habitat within the range where there are no documented occurrences).

1. **Dataset References and Software**

- Software used: ArcGIS Pro
- FWS Species Range – last updated on 3/20/2018
- CA FWS vernal pools habitats (available here)-last updated 4/22/2025
    - Vernal Pools, Areas of Conservation Emphasis (ACE), version 3.0, last updated on 4/22/2025.
- CAL FIRE California Land Ownership data (available here) last updated 3/5/2025
    - California Multi-Source Land Ownership, including state and federal land ownership from federal data, California Protected Areas Database and other sources.
- EPA's Modified Cultivated Layer, developed by OCSPP's Office of Pesticide Program for use in species core map development, last updated on 12/16/2024 (available here)[12]
- The following maps were used as reference material to confirm locations and extent of the six protection areas containing the 21 extant occurrences described by FWS identified (**Figure A2-3**):
    - Grassland Regional Park (referred to by FWS as Davis Communication Annex),[13] available here
    - Jepson Reserve Boundaries, available here
    - Grassland Wildlife Management Area, available here
    - Vernal Pools and Grassland Reserve (Virginia Smith Trust), available here
    - Flying M Ranch, available here

2. **Datasets Used in Core Map Development**

The CA FWS habitat data set was used to identify vernal pool habitats and can be found here (also linked above). The CAL FIRE California Land Ownership data set was used to identify land parcels identified as protection areas containing known occurrences of Colusa grass can be found here (also linked above). EPA's Modified Cultivated Layer, found here, was used to eliminate cultivated land from the vernal pool habitat that was identified within the range (but was not extracted from the known occurrence protection areas).

[12] Utilized following methods described in US EPA, Dec. 2024, *Process EPA Uses to Develop Core Maps for Draft Pesticide Use Limitation Areas for Species Listed by the U.S. Fish & Wildlife Service (FWS) and their Designated Critical Habitats*. Available at https://www.epa.gov/system/files/documents/2024-12/core_map_process.pdf

[13] Air Force Western Region Public Affairs, Nov 2008, *McClellan officials transfer land to local community, https://www.af.mil/News/Article-Display/Article/121879/mcclellan-officials-transfer-land-to-local-community/*

3. Core Map Development

Development of Core Map Within the Range

- EPA started with the range data from FWS and filtered for the Colusa grass, creating a new "Colusa_grass_range" layer.
- The CA FWS vernal pool habitat data was imported as a layer and selected by attribute where "Vernal Pool" is equal to "Y." A new layer was created from the selection, which included only areas that were identified as vernal pool habitat.
- EPA used ESRI's Pairwise Clip Tool[14] to clip the Colusa grass range layer to only areas with CA FWS vernal pool habitat (see **Figure A2-1** below for the result of the first 3 bullets).
- EPA used ESRI's Pairwise Erase Tool[15] following the methodology described in EPA's Core Map Process Document,[16] to erase cultivated land from the CA FWS vernal pool habitat within the range (see **Figure A2-2**).
- EPA named this layer "ColusaGrassVPHRange_EraseCultivate."

Development of Core Map Within the Areas of Known Occurrence

- Steps taken to add occurrences within (1) Grasslands Regional Park, (2) Jepson Prairie Reserve, (3) Merced National Wildlife Refuge, (4) Grasslands Wildlife Management Area, (5) Vernal Pools and Grassland Reserve (Virginia Smith Trust Preserve) protection areas (see **Figure A2-3**) to the core map:
    - Because precise location data for extant occurrences were not available, EPA identified land parcels from California land ownership data using the location names provided by FWS for protection areas containing known extant occurrences (5-Year Review, 2024, also included here as **Figure A2-3**).
    - EPA started with the CAL FIRE California Landownership data and filtered for the "Own_Agency" is equal to the "Landownership" provided by FWS for the protection areas listed above ("Yolo, County of," "United States Fish and Wildlife Service," "Solano Land Trust," and "University of California") using a definition query.
    - EPA visually reviewed the locations of the FWS named protection areas as described in publicly available information and maps,[17, 18, 19, 20] and compared it to parcels within the CAL FIRE data set found after the definition query to identify the appropriate polygons to maintain for core map development.
        - Note: **Figure A2-3** lists the landownership of Grassland Wildlife Management Area as "Private." EPA compared the location of the Management Area

[14] https://pro.arcgis.com/en/pro-app/latest/tool-reference/analysis/pairwise-clip.htm
[15] https://pro.arcgis.com/en/pro-app/latest/tool-reference/analysis/pairwise-erase.htm
[16] US EPA, Dec. 2024, *Process EPA Uses to Develop Core Maps for Draft Pesticide Use Limitation Areas for Species Listed by the U.S. Fish & Wildlife Service (FWS) and their Designated Critical Habitats*. Available at https://www.epa.gov/system/files/documents/2024-12/core_map_process.pdf
[17] Jepson Prarie Reserve Boundaries, Available from University of California, Davis Natural Reserves Accessed here: https://naturalreserves.ucdavis.edu/sites/g/files/dgvnsk1091/files/inline-files/Jepson%20topo%202013.pdf
[18] US FWS, Grassland Wildlife Management Area, map imbedded on webpage accessed 4/15/2025 https://www.fws.gov/refuge/grasslands-wildlife-management-area
[19] Vernal Pools and Grassland Reserve (Virginia Smith Trust) Regional Location Map, Available from University of California, Merced Accessed 4/15/2025 here: https://mvpgr.ucmerced.edu/sites/mvpgr.ucmerced.edu/files/documents/maps/mvpgr_regional_location.pdf
[20] Yolo County Government, Map of Park Facilities Accessed 4/15/2025 here: https://www.yolocounty.gov/government/general-government-departments/parks/parks-information/map-of-park-facilities

provided by FWS[18] with the land parcels in the CAL FIRE data set. However, the land parcels identified by CAL FIRE for the same location are classified under US FWS ownership (rather than privately owned). Therefore, EPA used the polygons identified as FWS property in the CAL FIRE dataset for the Colusa grass protection area in Grassland Wildlife Management Area.

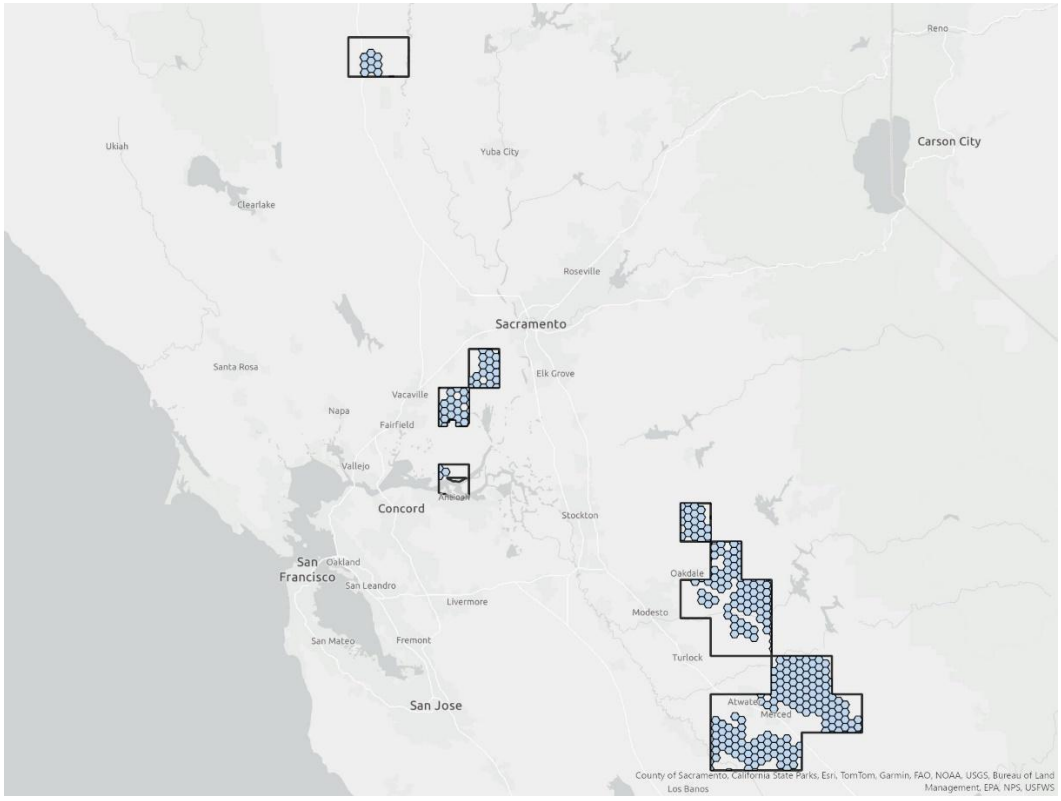
- After identifying the polygons that appropriately reflected Grasslands Regional Park, Jepson Prairie Reserve, Merced National Wildlife Refuge, Grasslands Wildlife Management Area, Vernal Pools and Grassland Reserve (Virginia Smith Trust Preserve) protection areas, EPA selected by attribute from the CAL FIRE data set where "OBJECT ID"s equal the IDs provided for each protection area in **Table A2-1.**
- EPA then made a new layer from the selected features to contain all the CAL FIRE land parcel polygons containing FWS known occurrences.
- EPA named this layer "LandParcels with FWSOccurrences."

- Adding "Areas managed as part of Grassland Regional Park" / protected occurrences 49 and 58 (see **Figure A2-3)** to the core map:
  - Based on information in the 2024 5-Year Review (**Figure A2-3**), Yolo County was awaiting land ownership transfer of remaining land near Grasslands Regional Park which contains two known extant occurrences.
  - The CAL FIRE California Land Ownership data was last updated on 3/5/2025, but it is unclear if this land has been transferred to Yolo County or if that transfer has been reflected in the data.
  - EPA overlayed the CA FWS vernal pool habitat data with the CAL FIRE Land Ownership data to determine if vernal pool habitat was present outside Grassland Regional Park
  - EPA selected the three vernal pool hexagonal polygons from the CA FWS vernal pool habitat data that surrounded Grassland Regional Park (see **Figure A2-4** and **Table A2-1**) to ensure that the occurrences in the area surrounding the Park were included in the core map.
  - Since the precise location of the occurrences 49 and 58 are unknown, EPA also selected a fourth vernal pool hexagonal polygon (Object ID 47276) from the CA FWS vernal pool habitat data that was proximal (northeast) to Grassland Regional Park and lay on the border of the range and thus, would not be fully included in the range/ vernal pool overlap (see **Figure A2-4** and **Table A2-1**). This was the only vernal pool habitat proximal to Grassland Regional Park the area that did not overlap with the range.
  - EPA created a layer from the selected CAL FWS vernal pool habitat hexagons (see **Figure A2-4** and **Table A2-2** for a list of Object IDs) to account for all "Areas managed as part of Grassland Regional Park."
  - EPA named this layer "Vernal_Pools_Near_GRP."
- Adding protected occurrences from Flying M Ranch
  - Based on information in the 2024 5-Year Review (**Figure A2-3**), Flying M Ranch is Private property under conservation easement with The Nature Conservancy. EPA was not able to identify a property parcel for this protection area using the CAL FIRE dataset.
  - EPA used select by attribute to select two vernal pool hexagonal polygons that align with the property extent that would otherwise be eliminated from the core map based on the cultivated land.
  - These vernal pool hexagons were added to the core map to ensure that all vernal pool habitat within FWS identified protection areas for Colusa grass were included in the core map.

- EPA created a layer from the s`election of two CAL FWS vernal pool habitat hexagons (**Table A2-3** for a list of Object IDs) to account for Flying M Ranch outside of the range.
- EPA named this layer "FlyingMRanchVPHabitat."
- Combining occurrence layers
    - EPA used ESRI's Merge tool[21] to combine the following known occurrence layers into a single layer named "KnownOccuranceAll":
        - "LandParcels with FWSOccurrences."
        - "Vernal_Pools_Near_GRP,"
        - "FlyingMRanchVPHabitat."
    - EPA used ESRI's Pairwise Clip Tool[22] to clip the "KnownOccuranceAll" layer to only areas with CA FWS vernal pool habitat
    - Note: EPA did <u>not</u> erase cultivated land from the known occurrence layer because these are areas identified as protection areas by FWS.

Finalizing Core Map

- EPA used ESRI's Merge tool[23] to combine the following parts into a single core map layer
    - "ColusaGrassVPHRange_EraseCultivate."
    - "KnownOccuranceAll"
- Core map name: ColusaGrass_Core_Map.



[21] https://pro.arcgis.com/en/pro-app/latest/tool-reference/big-data-analytics/merge-layers.htm
[22] https://pro.arcgis.com/en/pro-app/latest/tool-reference/analysis/pairwise-clip.htm
[23] https://pro.arcgis.com/en/pro-app/latest/tool-reference/big-data-analytics/merge-layers.htm

Figure A2-1. Result of overlapping FWS identified range of Colusa grass (black) and the CA FWS vernal pool habitat areas (blue) in Northern California.

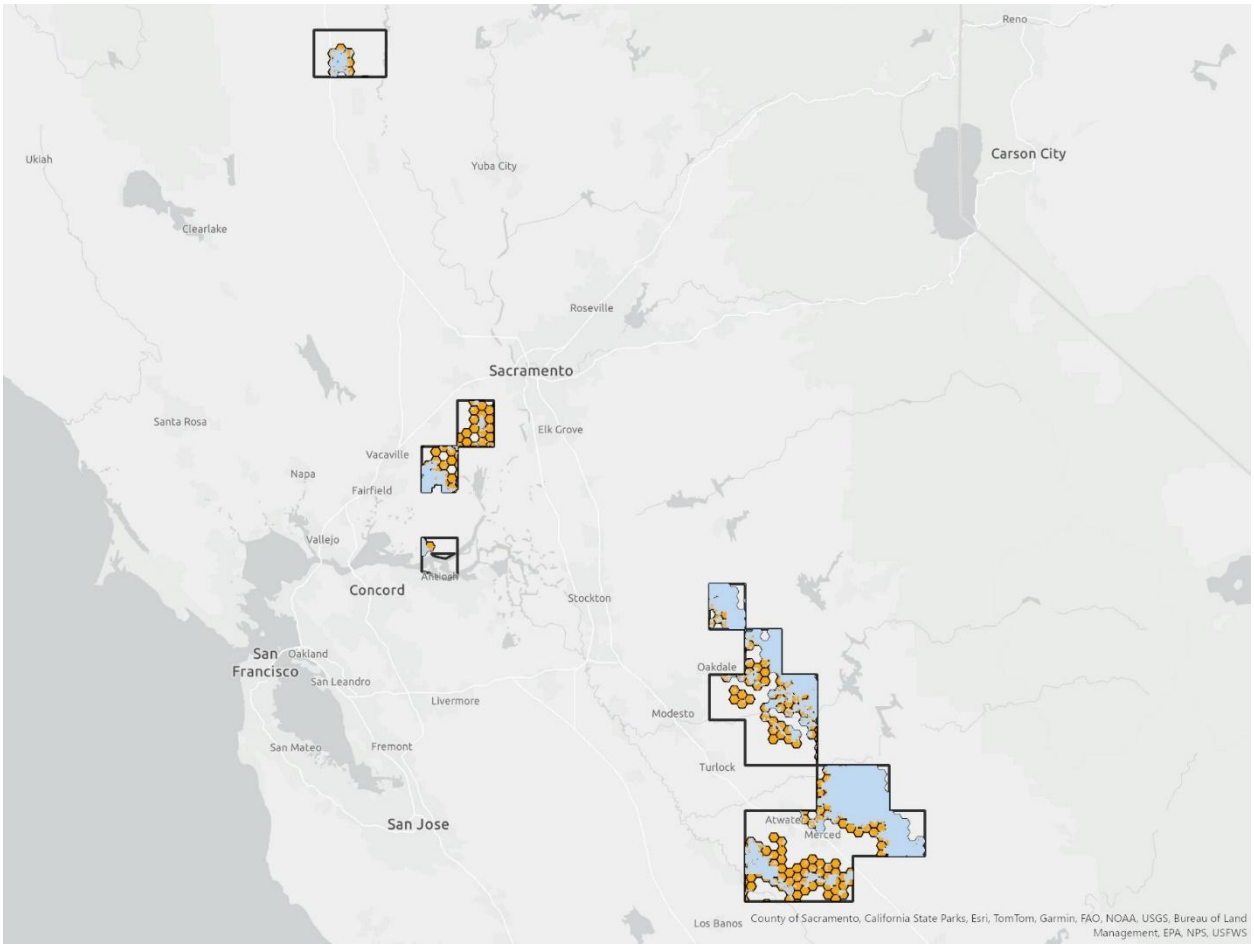


Figure A2-2. Result of erasing cultivated land (orange) from the vernal pool habitat (blue) identified within the FWS range of Colusa grass (black)

Landownership	Easement Holder	Protection Area	Acreage	Protected Occurrence Number(s)	Management Plan
Yolo County[1]	Not applicable	Grasslands Regional Park	313.5	74	Colusa grass is not covered under the current habitat conservation plan because the species is not expected to be adversely impacted by the covered activities (ICF 2018, p. C-37).
Yolo County is awaiting transfer of ownership[1]	Not applicable	Managed as part of the Grasslands Regional Park	320.0	49, 58	Colusa grass is not covered under the current habitat conservation plan because the species is not expected to be adversely impacted by the covered activities (ICF 2018, p. C-37).
Solano Land Trust	The Nature Conservancy	Jepson Prairie Reserve Easement	1,558.6	19, 72 (partial)	Greater Jepson Prairie Ecosystem Regional Management Plan (Service 2005, p. 11).

Landownership	Easement Holder	Protection Area	Acreage	Protected Occurrence Number(s)	Management Plan
Service (FWS)	Not applicable	Merced National Wildlife Refuge	2,475.2	51	San Luis National Wildlife Refuge Complex Conservation Plan (Service 2015; entire); and the Annual Grazing Plan East Bear Greek, Snowbird and Arena Plains Units (Merced NWR 2023, entire).
Private	Service (FWS)	Grasslands Wildlife Management Area	2,565.1	50	San Luis National Wildlife Refuge Complex Conservation Plan (Service 2015; entire); and the Annual Grazing Plan East Bear Greek, Snowbird and Arena Plains Units (Merced NWR 2023, entire).
University of California Merced	The Nature Conservancy	Vernal Pools and Grassland Reserve (Virginia Smith Trust Preserve)	6,375.5	14, 15, 59, 66, 67, 68, 69, 70, 77, 78	UC Merced Management Plan (Airola 2008, entire); Conceptual Landscape Restoration Plan (LAS 2020, entire)
Private	The Nature Conservancy	Flying M Ranch Easement	4,948.4	01, 32 (partial), 38, 43	UC Merced Management Plan (Airola 2008, entire); Conceptual Landscape Restoration Plan (LAS 2020, entire)
Total	-	-	**18,556.3 acres protected**	**19 occurrences are fully protected; 2 occurrences partially protected**	

[1]Protected area does not currently meet the requirements for protected habitat as outlines in the Recovery Plan's recovery criteria (Service 2005, p. III-93).

Figure A2-3: FWS Identified Protection Areas Containing Known Occurrences, Known Land Ownership, and Management Plans, Reproduced from 2024 5-Year Review for Colusa Grass

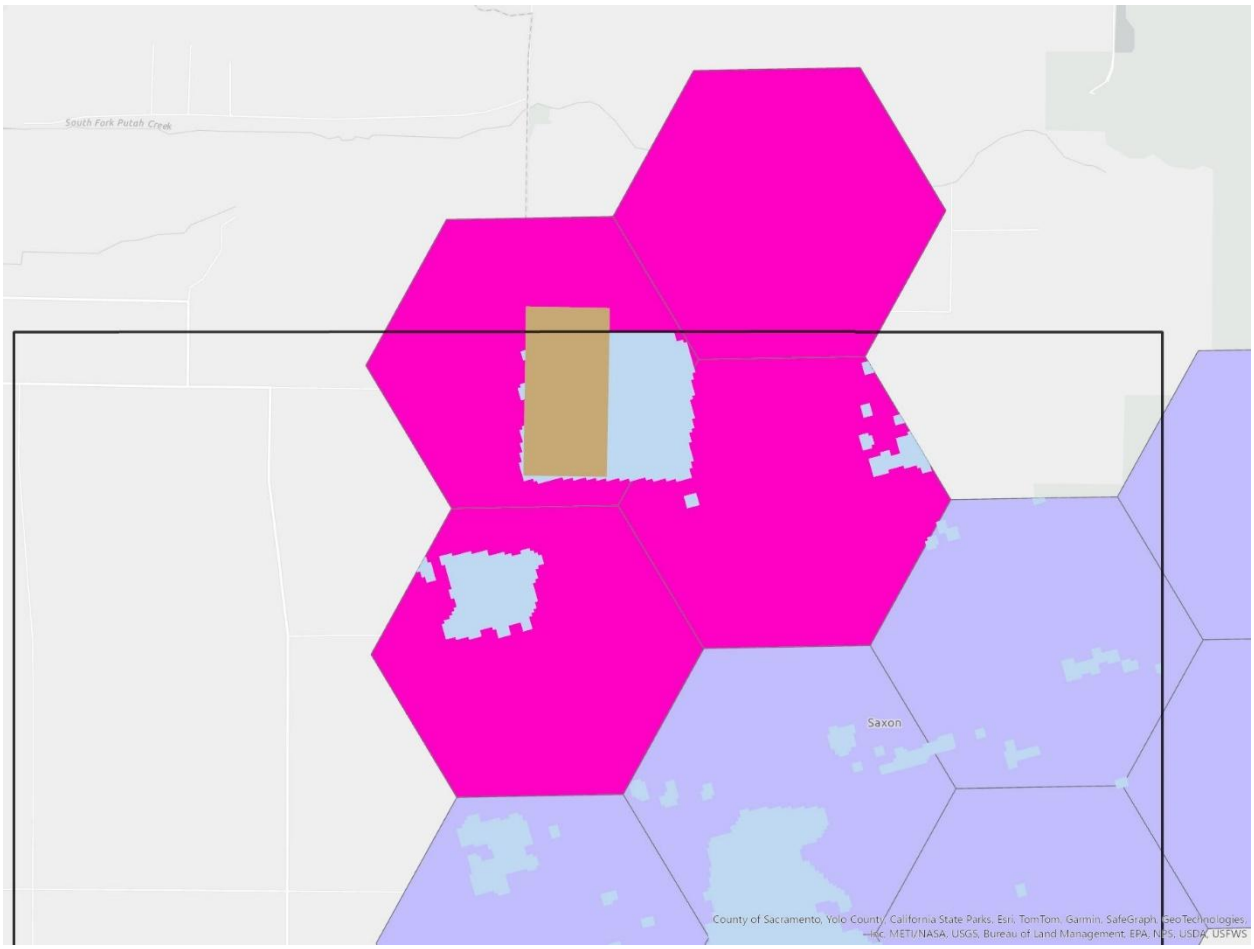


Figure A2-4: Adding Vernal Pools proximal to Grassland Regional Park (brown) to account for land not yet acquired by Yolo County. Vernal pool habitat (all hexagons, both pink and purple) falls within and outside the FWS range of Colusa grass (black). The pink hexagons were included as part of core map and treated as "protected areas" to ensure the occurrences described by FWS were included in the core map. The light blue polygons are the vernal pool areas within the range after the cultivated land was removed.

Table A2-1: List of Object IDs of Polygons Extracted from California Land Ownership Data for FWS Identified Protection Areas Containing Known Occurrences

FWS Protection Area	CAL FIRE Data Set Own Agency	CAL FIRE Data Set Object ID(s)	Proximity to Range
Grassland Regional Park	Yolo, County of	16204	Partially inside, partially outside
Areas managed as part of Grassland Regional Park	NA	NA	Unknown
Jepson Prairie	Solano Land Trust	44563	Partially inside, partially outside
Merced National Wildlife Refuge	United States Fish and Wildlife Service	41828	Completely within range
Grassland Wildlife Management Area	United States Fish and Wildlife Service	35923, 35952, 35955, 35956, 35960, 35962, 35989,36005, 36006, 36015, 36021, 36023, 36027, 36030, 36033, 36037, 36046, 36048, 36049, 360110, 360112, 41829, 41830, 41831, 41832, 41833	Completely outside range
Vernal Pools and Grassland Reserve (Virginia Smith Trust Preserve)	University of California	57308	Completely within range
Flying M Ranch		NA	Estimated within range

Table A2-2 Vernal Pool hexagonal polygons selected from CA FWS vernal pool data to add vernal pool habitat proximal to Grassland Regional Park to the core map

FID	Object ID	HEX ID
18403	18404	21210
33181	33182	21139
47275	47276	20995
49591	49592	21067

Table A2-3 Vernal Pool hexagonal polygons selected from CA FWS vernal pool data to add vernal pool habitat proximal to Flying M Ranch to the core map

FID	Object ID	HEX ID
123	35829	28807
246	54781	28717