**Summary of CDFW ACE data sources**

**Background**

[Areas of Conservation Emphasis (ACE)](https://wildlife.ca.gov/Data/Analysis/Ace) is a California Department of Fish and Wildlife (CDFW) effort to gather spatial data on wildlife, vegetation, and habitats from across the state, and then synthesize this information into thematic maps to help inform discussions on the conservation of biodiversity, habitat connectivity, and climate change resiliency. The ACE project draws from multiple sources of vetted species occurrence data, as well as predictive species modelling efforts.

Data sources are listed in the ACE Fact Sheets for each data layer, linked below, and are summarized in this document.

[Terrestrial Biodiversity](https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=150831&inline) and [Aquatic Biodiversity](https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=150856&inline)

* Species range data
* Modeled species distribution data
* Species occurrence data

[Terrestrial Significant Habitats](https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=150834&inline) and [Aquatic Significant Habitats](https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=150855&inline)

* Vegetation maps
* Occurrence data, such as monarch overwintering sites
* Specific habitat element mapping, such as mountain meadow and vernal pools maps

[Terrestrial Connectivity](https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=150835&inline)

* Statewide connectivity models
* Regional Connectivity models
* Species-specific connectivity models

[Terrestrial Climate Change Resilience](https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=150836&inline)

* Vegetation refugia maps

**Biodiversity**

**Terrestrial vertebrate** **distribution** **data** was based on California Wildlife Habitat Relationships (CWHR) Predicted Habitat Suitability models for amphibians, birds, mammals, and reptiles. These models represent potential suitable habitat within the range of each species based the CWHR species range, CWHR species habitat relationship table (CDFW 2014), and the best available habitat/landcover map, FVEG15\_1 (Calfire 2015). All native terrestrial vertebrate species for which a CWHR Predicted Habitat Suitability Model was available were included in the counts. If any potentially suitable habitat for a species was mapped within a hexagon, the species was counted as potentially present in the hexagon. Terrestrial vertebrate counts were based on full species only; counts did not consider subspecies or varieties because range maps were generally not available at the subspecific level.The CWHR Predicted Habitat Suitability Models for each species are available in [BIOS](https://wildlife.ca.gov/Data/BIOS).

**Fish** **distribution** **data** was based on fish ranges as mapped in Pisces (Santos et al. 2014, https://pisces.ucdavis.edu/). The Department is in the process of updating these range maps. If the species range intersected a watershed, the species was counted as potentially present in the watershed. Fish species counts were based on full species only; if separate ranges were available for subspecies, these were combined at the full species level before running the analysis. The Pisces range map for each species is available in [BIOS](https://wildlife.ca.gov/Data/BIOS).

**Invertebrate distribution data** was based on observation point data. Freshwater macroinvertebrate data were extracted from the California Environmental Data Exchange Network database (CEDEN, accessed September 15, 2017). Records were queried from four CEDEN “Projects” (NLA, SWAMP, DFW-ABL, and EMAP). Records primarily consist of data collected under the State Water Board’s Surface Water Ambient Monitoring Program (SWAMP) using the SWAMP Bioassessment Protocols (Ode et al. 2016). A small percentage of samples (i.e., less than 10%) were collected by other programs, but almost all of these followed the same sampling protocols. The vast majority of invertebrate identifications were performed by taxonomists at the DFW-Aquatic Bioassessment Laboratory following the procedures documented by the Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT). The extracted records were screened to remove non-freshwater invertebrate taxa and non-native taxa.

**Plant distribution data** was based on Jepson ecoregion designations as published in the Jepson Manual and provided by the Jepson Herbarium, UC Berkeley. All native plants in the Jepson manual were included. Although plant information was available at the subspecies level, we merged these to full species during processing to be consistent with terrestrial vertebrate distribution data. The Jepson ecoregion designations are equivalent to plant ranges, where the range is defined by the boundaries of the Jepson ecoregions in which the species occurs. This results in every hexagon within a given ecoregion having the same native plant count (every plant species that occurs in the ecoregion is counted across the entire ecoregion), and therefore the native plant richness data could not be normalized to identify the highest richness areas within each ecoregion. Because of this, the plant data was not included in the ecoregional native richness summary. However, rare and endemic plant data is available at a finer resolution and was included in the overall ecoregional terrestrial species biodiversity summary.

**Rare species location data** were derived from available documented, mapped species occurrences. Sources included “presumed extant” California Natural Diversity Database (CDFW 2017) records (excluding extirpated and possibly extirpated records); additional museum records from the California Academy of Sciences, the Museum of Vertebrate Zoology at UC Berkeley, and the Consortium of California Herbaria (from years 1999-2009); and additional datasets from the CDFW BIOS online map viewer (https://www.wildlife.ca.gov/Data/BIOS), used with permission from the contributors. All documented occurrences with accuracy ±1 mile or better were included in order to incorporate as many known occurrences as possible. No cut-off date of observation was used, based on the assumption that occurrences still may be present if the habitat has not been modified and the occurrences have not been documented as extirpated. A one mile buffer was added to all occurrence points and polygons to standardize accuracy. Rare species included in ACE 3 include State and Federally-listed species, Species of Special Concern (SSC), fully-protected species, and California Rare Plant Rank (CRPR) 1B and 2 rare plants. This list includes all species that were defined as Species of Greatest Conservation Need (SGCN) in the State Wildlife Action Plan (SWAP; CDFW 2015) based on their rarity status. Taxa were defined and aggregated at the taxonomic unit at which they are listed and tracked by the California Natural Diversity Database (CNDDB), which may be by species, subspecies, distinct population segment (DPS), or evolutionarily significant unit (ESU).

**Significant habitats datasets**

California Aquatic Resource Inventory (CARI; SFEI 2017)

California Natural Diversity Database (CDFW 2017)

Vegetation - Anza-Borrego Desert State Park [ds165]

Vegetation - Point Reyes [ds169]

Vegetation - San Felipe Valley [ds172]

Vernal Pool Amphibians, Shrimp, Plants - San Diego [ds188] (Beauchamp and Bauder 2002)

Vegetation - Napa County and Blue Ridge Berryessa [ds201]

Vegetation - Pine Creek, WA and Fitzhugh Creek, WA [ds484]

Vegetation - Lassen Foothills [ds564]

Vegetation - Northern Sierra Nevada Foothills [ds566]

Vegetation - Gabilan Ranch, 2006 [ds614]

Vegetation - San Benito River, 2007 [ds616]

Vegetation - McKenzie Preserve [ds703]

Vegetation - Oak Grove, San Diego County, 2011 [ds712]

Vegetation - Garcia River, Mendocino County, 2005 [ds722]

Vegetation - Joshua Tree National Park, 2012 [ds730]

Vegetation - Mojave Desert for DRECP - Final [ds735]

Vegetation - Canada de San Vicente - San Diego County [ds770]

Unique and Important Vegetation Observations for the DRECP, 2013 [ds820]

Vegetation - Liberty Island, 2012 [ds821]

Vegetation - Santa Monica Mountains NRA [ds935]

Vegetation - Palos Verdes NCCP Preserve [ds939]

Vegetation - Pinnacles National Monument [ds947]

Vernal Pools, South Coast Ranges [ds948] (Holland 2003)

Vernal Pool Complexes, Modoc National Forest [ds949] (Holland 2001)

Vegetation - Marin County Open Space District [ds957]

Vegetation - John Muir National Historic Site [ds958]

Vegetation - Lower Santa Clara River [ds983]

Vegetation - Sequoia and Kings Canyon National Parks Vegetation Mapping Project [ds984]

Vegetation - Fish Slough [ds985]

Vegetation - Whiskeytown National Recreation Area Vegetation Mapping Project [ds986]

Vegetation - Marin Municipal Water District (MMWD) [ds996]

Vegetation - Mid Peninsula Open Space [ds997]

Vegetation Map - Johnson Valley - CDFW [ds1019]

Vegetation - Suisun Marsh - 2012 [ds1029]

Vegetation - Western Madera County [ds1057]

Vernal Pool Distribution - California's Great Valley - 2012 [ds1070] (Witham et al. 2014)

Vegetation - Carrizo Plain National Monument, Ecological Reserve and Adjacent Elk Range [ds1094]

Vegetation - Western Riverside County Update - 2012 [ds1196]

Vegetation (fveg) - CALFIRE FRAP [ds1327] (CALFIRE 2015)

Vegetation - Proposed Tehachapi Pass High Speed Rail Corridor [ds1328]

Vegetation - Orange County - 2012 [ds1336]

Vegetation - Cow Creek - 2013 [ds1345]

Vegetation - Mill Creek - 2013 [ds1346]

Vegetation - Point Mugu [ds1500]

National Wetlands Inventory - California - USFWS [ds2630] (USFWS 2017)

Vegetation - Great Valley Ecoregion [ds2632]

Mountain Meadows - Sierra Nevada - UC Davis [ds2671] (Fryjoff-Hung & Viers 2012)

Vegetation - Suisun Marsh - 2015 [ds2676] (i.e., Suisun\_2015)

Vegetation - Sonoma County [ds2691] (i.e., Sonoma)

**Terrestrial Connectivity Datasets**

Statewide datasets:

Natural Landscape Blocks – California Essential Habitat Connectivity Analysis [ds621] (Spencer et al. 2010)

Essential Connectivity Areas - California Essential Habitat Connectivity Analysis [ds620, ds623] (Spencer et al. 2010)

Terrestrial Landscape Intactness (1km) - 2016 [ds2670], <https://databasin.org/datasets/e3ee00e8d94a4de58082fdbc91248a65>

Omniscape (TNC 2018)

<https://www.scienceforconservation.org/science-in-action/connectivityroadmap>

Regional datasets:

South Coast Missing Linkages [ds419] (South Coast Wildlands 2008)

Wildlife Linkages – San Joaquin Valley [ds417] (Endangered Species Recovery Program 1996; USFWS 1998, Table 11)

Wildlife Corridors - San Joaquin Valley [ds423]

Habitat Connectivity – Ventura County [ds565] (subset of South Coast Missing Linkages, ds419; South Coast Wildlands 2008)

Linkage Design for the California Desert Linkage Network [ds822] (Penrod et al. 2012)

Linkage Design for the California Bay Area Linkage Network [ds852] (Penrod et al. 2013)

Northern Sierra Nevada Foothills Wildlife Linkages [ds1005] (Krause et al. 2015)

Northern Sierra Nevada Foothills Riparian Corridors [ds1018] (Krause et al. 2015)

Safe Passages Connectivity Planning - Riverbank, CA - 2014 [ds1028] (Huber et al. 2014)

San Diego MSCP, MHCP, and CMSP Cores and Linkages (SDMMP and TNC 2017, Volume 2B, Section 8)

Orange County Central/Coastal NCCP Special Linkages (County of Orange 1996, Section 4.4)

**Terrestrial Climate Change Resilience Datasets**

Vegetation Climate Exposure Refugia 2040\_2069 - ICE [ds2657] (Thorne et al 2016)

Vegetation Climate Exposure Refugia 2070\_2099 - ICE [ds2658] (Thorne et al 2016)

Vegetation Climate Exposure CNRM CM5 RCP45 2070\_2099 - ICE [ds2653] (Thorne et al 2016)

Vegetation Climate Exposure CNRM CM5 RCP85 2070\_2099 - ICE [ds2654] (Thorne et al 2016)

Vegetation Climate Exposure MIROC ESM RCP45 2070\_2099 - ICE [ds2655] (Thorne et al 2016)

Vegetation Climate Exposure MIROC ESM RCP85 2070\_2099 - ICE [ds2656] (Thorne et al 2016)