Conserving Biodiversity

The people of California employ several strategies to conserve the state's extraordinary natural heritage, both on land and at sea. These strategies include conservation planning, land ownership and stewardship, habitat restoration, and environmental law compliance. Government agencies, tribal governments, organizations, and individuals all cooperate in implementing these important protective measures.

Lands Conservation

North Table Mountain, Butte County, where diverse wildflower fields and cattle coexist. Grazing at appropriate levels helps maintain the health of the system by reducing cover of non-native grasses.

One of the greatest challenges for California is balancing the needs of society with those of nature. These needs are not always in opposition, however. Healthy ecosystems supply people with vital services such as clean water and air, flood protection, and pollination. To protect these valuable services, and biodiversity in general, land must be set aside to sustain the ecological health of California.

Nearly 23.5 million acres, approximately 23 percent of California, have already been set aside for conservation. Public lands, such as federal and state parks and wilderness areas, maintain a high degree of unspoiled wildness while providing some level of access for hunting, fishing, and other recreational activities. Not all protected lands are public, however. Non-profit organizations such as land trusts may purchase land to protect its natural character or important resources; private companies may purchase and manage areas to compensate for activities on other lands that may cause harm to protected species.

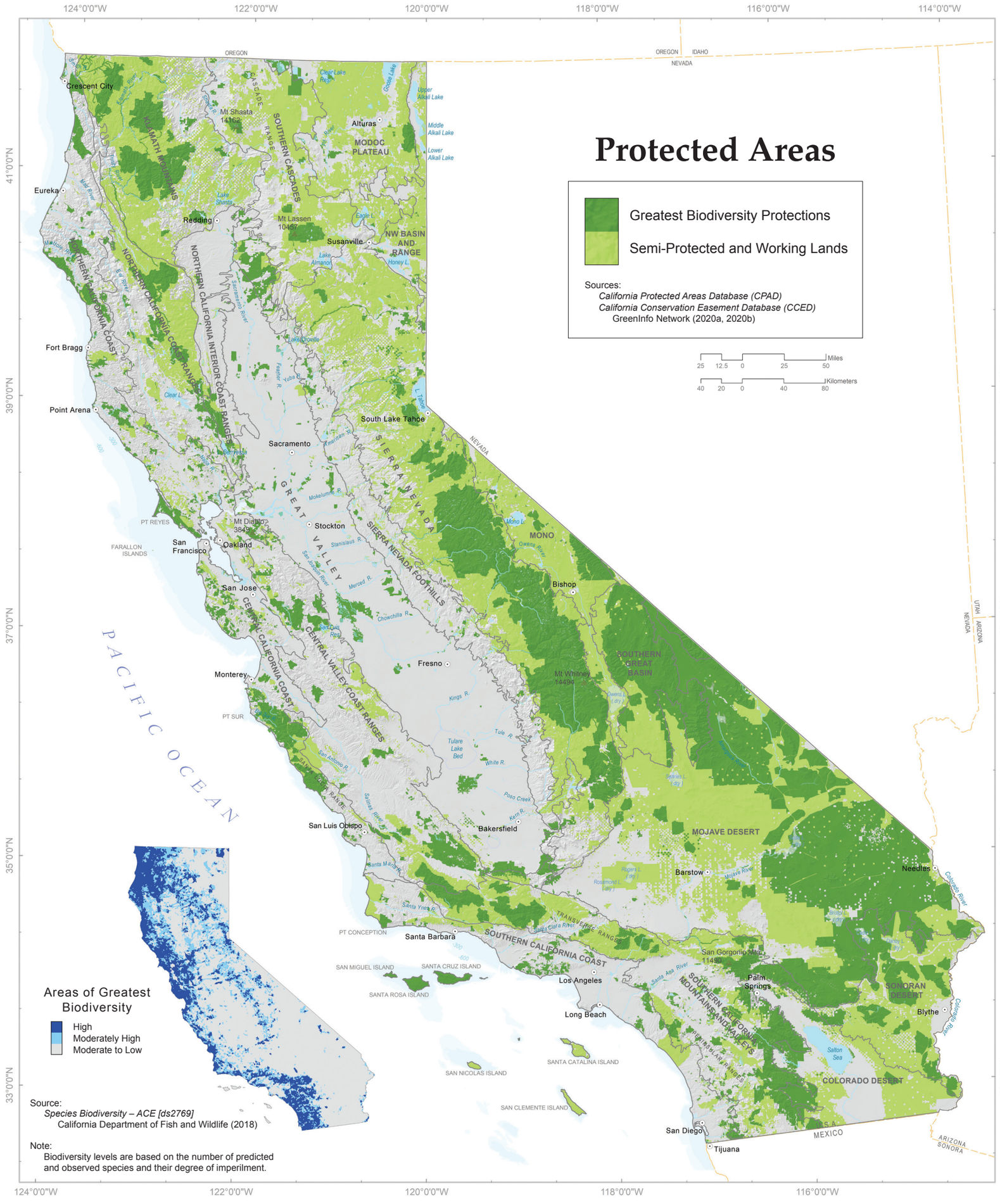
But "sparing" the land from human use is not the only path to conserving biodiversity. "Sharing" the land is a complementary approach, recognizing that well-planned human activities can limit detrimental impacts to, or even enhance, natural systems while also providing opportunities for human enterprise such as energy development, livestock grazing, mining, and timber harvesting.

Most federal lands such as national forests, grasslands, and deserts are managed by the U.S. Forest Service and Bureau of Land Management. These agencies are required to consider all possible uses and benefits when developing land management strategies. This multiple-use approach includes conserving plants and wildlife, protecting historical and cultural resources, and providing recreational opportunities, as well as sustaining extractive economic activities.

Private landowners may enter into agreements called conservation easements with government or non-profit organizations. They receive tax credits or other financial benefits in exchange for relinquishing some of their rights to develop the land while retaining others, such as the right to continue farming or ranching. Conservation easements document land use rights and restrictions that stay with the land in perpetuity, ensuring long-term protective measures. Other landowners agree to manage in a way that supports native wildlife, such as protecting spotted owl nest trees from timber harvest or flooding agricultural fields for use by waterfowl. These private "working lands" and the semi-protected public lands described above add up to about 30 million acres, an additional 30 percent of California, that contribute to environmental conservation.

Many state and federal programs promote conservation of wildlife and their habitats by providing financial resources and technical assistance to managers of public and private lands, significantly advancing conservation in California. Since 2015, the California Wildlife Conservation Board alone has leveraged over 100 million dollars, in partnership with government and non-government entities, to acquire and manage lands for resource protection and public access.

The highest levels of land protections tend to correspond with areas difficult for humans to use, as shown in the map to the right. These areas include much of the forbidding Mojave Desert and the rugged Sierra Nevada. These places are important for numerous species. However, comparison with the inset map shows many areas of California's richest biodiversity are frequently unprotected. The challenge for Californians is to bring these areas into better alignment: to confer the necessary levels of protections upon those places that are home to the greatest number of species, and those which are most vulnerable, so that the unique spectrum of life found in California is preserved for generations to come.


Protected Areas
Greatest Biodiversity Protections
Semi-Protected and Working Lands
Sources:
California Protected Areas Database (CPAD)
California Conservation Easement Database (CCED)
GreenInfo Network (2020a, 2020b)
Miles
25 12.5 0 25 50
Kilometers
40 20 0 40 80
Areas of Greatest Biodiversity
High
Moderately High
Moderate to Low
Source:
Species Biodiversity – ACE [ds2769]
California Department of Fish and Wildlife (2018)
Note:
Biodiversity levels are based on the number of predicted and observed species and their degree of imperilment.
124°0'0"W
122°0'0"W
120°0'0"W
118°0'0"W
116°0'0"W
114°0'0"W
41°0'0"N
39°0'0"N
37°0'0"N
35°0'0"N
33°0'0"N
OREGON
IDAHO
NEVADA
ARIZONA
UTAH
MEXICO
Crescent City
Eureka
Redding
Mt Shasta 14162
Mt Lassen 10457
Alturas
Susanville
Fort Bragg
Point Arena
Sacramento
South Lake Tahoe
Stockton
Mt Diablo 3849
Oakland
San Francisco
San Jose
Monterey
Fresno
Bishop
Mt Whitney 14494
San Luis Obispo
Bakersfield
Barstow
Needles
Santa Barbara
Los Angeles
Long Beach
San Gorgonio Mtn 11490
Palm Springs
Blythe
San Diego
Tijuana
PACIFIC OCEAN
KLAMATH MOUNTAINS
SOUTHERN CASCADES
MODOC PLATEAU
NW BASIN AND RANGE
NORTHERN CALIFORNIA INTERIOR COAST RANGES
NORTHERN CALIFORNIA COAST RANGES
SIERRA NEVADA
GREAT VALLEY
SIERRA NEVADA FOOTHILLS
CENTRAL CALIFORNIA COAST
CENTRAL VALLEY COAST RANGES
SOUTHERN GREAT BASIN
MOJAVE DESERT
SONORAN DESERT
COLORADO DESERT
SOUTHERN CALIFORNIA COAST
TRANSVERSE RANGES
SOUTHERN CALIFORNIA MOUNTAINS AND VALLEYS
PENINSULAR RANGES
PT REYES
FARALLON ISLANDS
PT SUR
PT CONCEPTION
SAN MIGUEL ISLAND
SANTA CRUZ ISLAND
SANTA ROSA ISLAND
SAN NICOLAS ISLAND
SANTA CATALINA ISLAND
SAN CLEMENTE ISLAND
MONO
Mokelumne R.
Stanislaus R.
San Joaquin River
Merced R.
Chowchilla R.
Kings R.
Tulare Lake Bed
White R.
Kern R.
Tule R.
Poso Creek
Santa Ynez R.
Santa Clara River
Santa Ana River
Mojave River
Colorado River
Salton Sea
Owens River
Owens L. (dry)
Rogers L. (dry)
Rosamond L. (dry)
Searles L. (dry)
Lake Almanor
Eagle L.
Honey L.
Upper Alkali Lake
Middle Alkali Lake
Lower Alkali Lake
Clear Lake Res.
Goose Lake
Lake Shasta
Trinity R.
Klamath River
Smith R.
Mad River
Eel River
Mattole R.
Sacramento River
Feather R.
Yuba R.
Lake Oroville
Clear L.
American R.
Bear R.
Putah Creek
L. Tahoe
Carrizo Plain
Santa Maria R.
San Antonio R.
Salinas River

Marine Managed Areas

California's marine resources are treasured for their natural beauty and for the economic and recreational opportunities they provide. Effective management of these resources requires balancing natural biodiversity and habitat conservation goals with human use and enjoyment of California's coast. A mosaic of different types of Marine Managed Areas (MMAs) in the state's nearshore waters aims to achieve these equally important goals. The California Department of Fish and Wildlife manages these MMAs, which include several designations with different levels of protection (see box).

In 1999, the California Legislature passed the Marine Life Protection Act, which required the state to redesign its existing patchwork of Marine Protected Areas (MPAs) into a science-based, ecologically connected statewide MPA Network. Prior to the passage of the Marine Life Protection Act, less than three percent of state waters were protected. Today, California's Network includes 124 MPAs and protects 16 percent of state waters. State Marine Reserves, where no take of any kind is allowed, are considered the backbone of the Network, accounting for nine percent of protected waters. Spanning the entire 1,100-mile California coast, the Network is one of the largest ecologically connected marine networks in the world.

The MPA Network was designed to protect and connect habitats such as kelp forests, rocky tidepools, sandy beaches, and deep marine canyons. A connected network allows the larvae of many coastal species to move from inside protected areas to other places, both inside and outside protected areas, populating habitats across the coast. Some MMAs share boundaries with land-based state and national parks, overlap with federally managed marine reserves, or are surrounded by larger national marine sanctuaries, further connecting coastal habitats both on land and at sea.

A Red Abalone (*Haliotis rufescens*) and a Black and Yellow Rockfish (*Sebastes chrysomelas*) in South Point State and Federal Marine Reserve, Channel Islands
CDFW photo: Amanda Van Diggelen

Abalone survey at the Sea Lion Cove State Marine Conservation Area
CDFW photo: Chenchen Shen

The management of the Network is a collaborative effort led by the Department. MPA Management Program activities fall under four focal areas: Outreach and Education, Research and Monitoring, Policy and Permitting, and Enforcement and Compliance (CDFW 2020n). The Department partners with other state and federal agencies, tribal governments, non-governmental organizations, researchers, and community members to carry out these program activities. Conserving the diversity of California's living marine resources is a core goal of the management program, which can help promote resiliency and safeguard the intrinsic and economic value of California's extraordinarily diverse coastal communities for generations to come.

Marine Managed Areas

The Marine Managed Areas Improvement Act established these MMA designations (CDFW 2020n). Three of these classifications (State Marine Reserves, State Marine Conservation Areas, and State Marine Parks) are a subset of MMAs called Marine Protected Areas.

State Marine Reserve: Prohibits damage or take, whether recreational or commercial, of all marine resources.

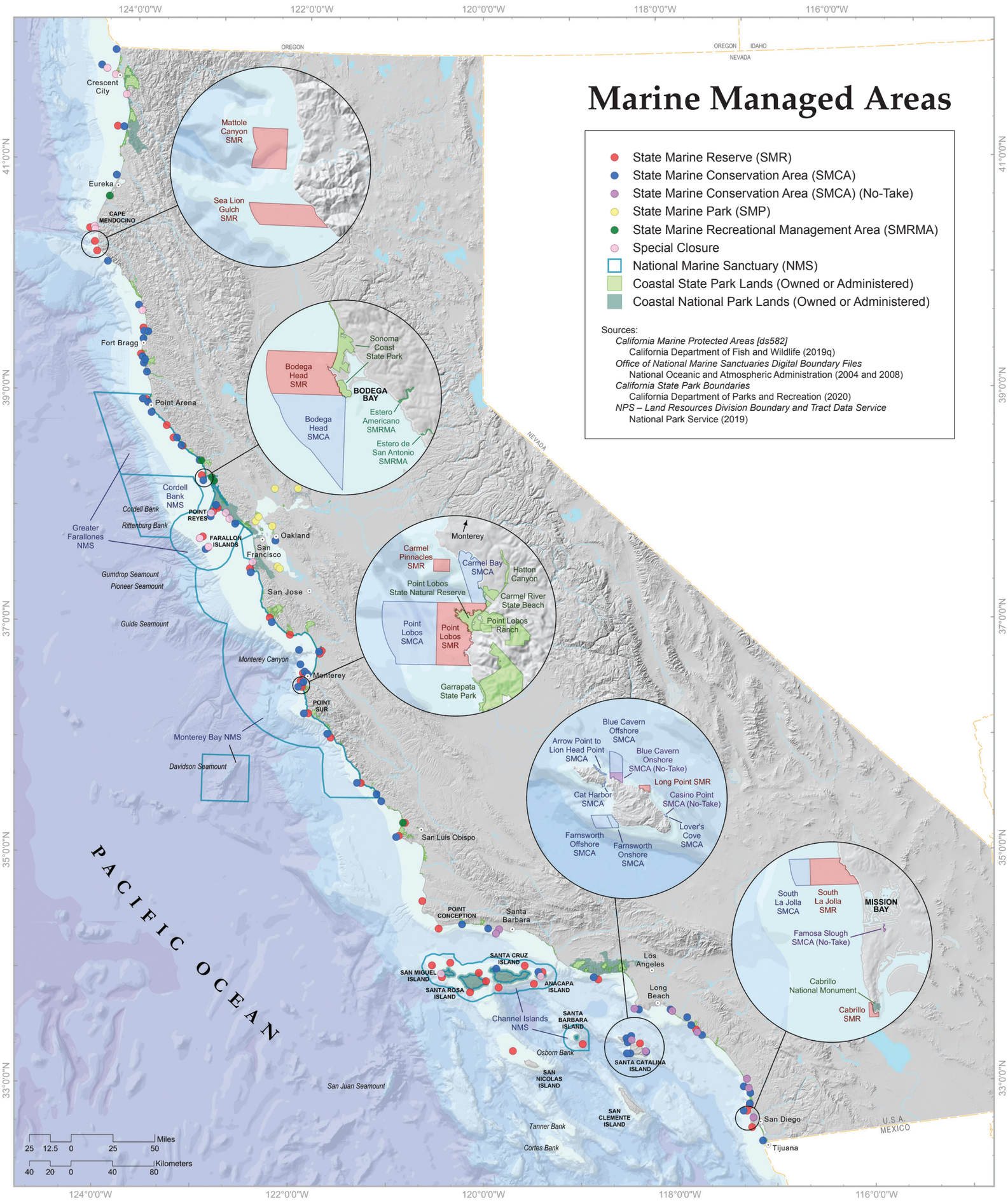
State Marine Conservation Area: Allows some recreational and/or commercial take of marine resources (restrictions vary).

State Marine Conservation Area (No-Take): Prohibits damage or take of all marine resources except for incidental take due to ongoing permitted activities.

State Marine Park: Prohibits damage or take of all marine resources for commercial use purposes.

State Marine Recreational Management Area: Limits recreational take of marine resources. Allows legal waterfowl hunting (restrictions vary).

Special Closure: Prohibits access or restricts boating activities in waters near sea bird rookeries or marine mammal haul-out sites (restrictions vary). Special closures are not considered MMAs but play an important role in marine resource management.

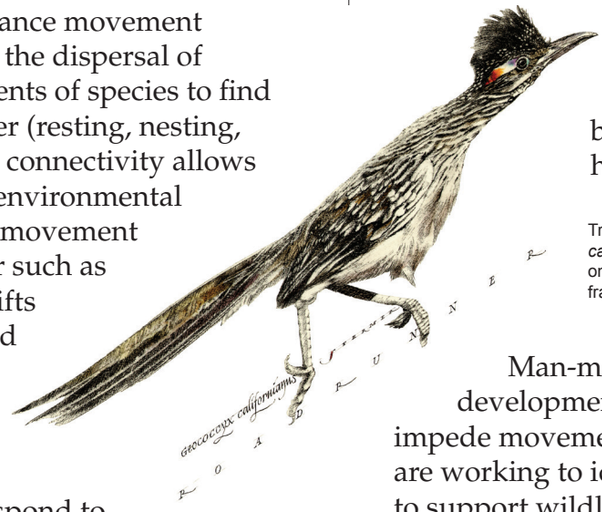

Marine Managed Areas
State Marine Reserve (SMR)
State Marine Conservation Area (SMCA)
State Marine Conservation Area (SMCA) (No-Take)
State Marine Park (SMP)
State Marine Recreational Management Area (SMRMA)
Special Closure
National Marine Sanctuary (NMS)
Coastal State Park Lands (Owned or Administered)
Coastal National Park Lands (Owned or Administered)
Sources:
California Marine Protected Areas [ds582]
California Department of Fish and Wildlife (2019q)
Office of National Marine Sanctuaries Digital Boundary Files
National Oceanic and Atmospheric Administration (2004 and 2008)
California State Park Boundaries
California Department of Parks and Recreation (2020)
NPS – Land Resources Division Boundary and Tract Data Service
National Park Service (2019)
124°0'0"W
122°0'0"W
120°0'0"W
118°0'0"W
116°0'0"W
41°0'0"N
39°0'0"N
37°0'0"N
35°0'0"N
33°0'0"N
OREGON
IDAHO
NEVADA
Crescent City
Eureka
CAPE MENDOCINO
Mattole Canyon SMR
Sea Lion Gulch SMR
Fort Bragg
Point Arena
Sonoma Coast State Park
Bodega Head SMR
BODEGA BAY
Bodega Head SMCA
Estero Americano SMRMA
Estero de San Antonio SMRMA
Cordell Bank NMS
Cordell Bank
Rittenburg Bank
POINT REYES
FARALLON ISLANDS
Greater Farallones NMS
Oakland
San Francisco
Gumdrop Seamount
Pioneer Seamount
San Jose
Guide Seamount
Monterey
Carmel Pinnacles SMR
Carmel Bay SMCA
Hatton Canyon
Point Lobos State Natural Reserve
Carmel River State Beach
Point Lobos SMCA
Point Lobos SMR
Point Lobos Ranch
Garrapata State Park
Monterey Canyon
POINT SUR
Monterey Bay NMS
Davidson Seamount
San Luis Obispo
PACIFIC OCEAN
Blue Cavern Offshore SMCA
Arrow Point to Lion Head Point SMCA
Blue Cavern Onshore SMCA (No-Take)
Long Point SMR
Cat Harbor SMCA
Casino Point SMCA (No-Take)
Lover's Cove SMCA
Farnsworth Offshore SMCA
Farnsworth Onshore SMCA
POINT CONCEPTION
Santa Barbara
SANTA CRUZ ISLAND
SAN MIGUEL ISLAND
SANTA ROSA ISLAND
ANACAPA ISLAND
Channel Islands NMS
SANTA BARBARA ISLAND
Osborn Bank
SAN NICOLAS ISLAND
San Juan Seamount
Los Angeles
Long Beach
SANTA CATALINA ISLAND
SAN CLEMENTE ISLAND
Tanner Bank
Cortes Bank
South La Jolla SMCA
South La Jolla SMR
MISSION BAY
Famosa Slough SMCA (No-Take)
Cabrillo National Monument
Cabrillo SMR
San Diego
U.S.A.
MEXICO
Tijuana
Miles
25 12.5 0 25 50
Kilometers
40 20 0 40 80

Habitat Connectivity

Mountain lion cub (*Puma concolor*). Mountain lions have large home ranges and often move several miles or more through the landscape every day, making habitat connectivity essential to their survival. CDFW photo

Habitat connectivity is a measure of how easily wildlife and plants can move through the landscape; it is determined by habitat types, barriers, and the spatial pattern of landforms. To maintain healthy wildlife populations and conserve biodiversity, it is important to protect natural areas that provide habitat—and equally important to ensure that species can move between those habitat areas. Habitat connectivity supports long-distance movement such as seasonal migration and the dispersal of young, as well as daily movements of species to find resources such as food and cover (resting, nesting, and hiding places). In addition, connectivity allows species to move in response to environmental changes, which might be rapid movement in response to a natural disaster such as a flood or forest fire, or slow shifts in the distributions of plants and animals in response to climate change. Without habitat connectivity, populations can become genetically isolated or may be unable to respond to changes in the environment, both of which can lead to population decline and local extinction. Ecological processes such as the movement of water, sand, and sediment, which are important for the maintenance of habitat areas like rivers, beaches, and dunes, also require connectivity.

Corridors and linkages are paths that connect natural areas. Some corridors are seasonal migration routes that are used year after year, such as paths used by mule deer and other large ungulates between winter and summer habitat areas. Others are narrow swaths of habitat that represent the last remaining natural connection through a modified landscape, such as a riparian habitat alongside a stream running through an urban or agricultural landscape. Linkages are broad swaths of natural habitat that connect larger natural areas and support species movement and ecological processes. The map on the facing page identifies a network of corridors and linkages needed to maintain habitat connectivity between remaining large natural habitat areas in California.



True to their name, Roadrunners (*Geococcyx californianus*) generally move by running along paths on the ground, which makes them sensitive to habitat fragmentation and to being hit by vehicles on roads.

The desert tortoise (*Gopherus agassizii*) is threatened by habitat loss and fragmentation. Although the species does not generally move long distances on a daily basis, connectivity between populations is important for maintaining genetic diversity and reproductive success. Linear infrastructure such as a highway can pose a complete barrier to its movement. CDFW photo: Dave Feliz

Man-made infrastructure such as roads, development, and dams can act as barriers that impede movement through the landscape. Researchers are working to identify barriers and develop solutions to support wildlife movement around them. For example, crossing structures such as culverts or wildlife bridges can allow species to cross under or over busy roadways. How an animal moves through the landscape and whether it will use a wildlife crossing structure depends on the characteristics and behavior of individual species. Information on wildlife movement and behavior must be considered, together with detailed maps of landscape configuration, to plan for habitat connectivity.

Mule deer (*Odocoileus hemionus*) galloping through an underpass. Researchers use wildlife cameras to understand how animals use habitat corridors in the landscape and how barriers affect this movement. Photo: Highway 89 Stewardship Team, Caltrans


Terrestrial Connectivity
Irreplaceable and Essential Corridors
Core Habitat Linkages
Supplemental Habitat Linkages
Intact Natural Habitat Areas
Limited Connectivity Opportunity
Source:
Terrestrial Connectivity – ACE [ds2734]
California Department of Fish and Wildlife (2019r)
Note:
This map depicts habitat areas and linkages that have been identified in 18 different studies by connectivity researchers in California, as of June 2019.
Miles
25 12.5 0 25 50
Kilometers
40 20 0 40 80
124°0'0"W
122°0'0"W
120°0'0"W
118°0'0"W
116°0'0"W
114°0'0"W
41°0'0"N
39°0'0"N
37°0'0"N
35°0'0"N
33°0'0"N
OREGON
NEVADA
IDAHO
UTAH
ARIZONA
MEXICO
SONORA
PACIFIC OCEAN
Crescent City
Eureka
Redding
Fort Bragg
Point Arena
Sacramento
South Lake Tahoe
Alturas
Susanville
Mt Shasta 14162
Mt Lassen 10457
Stockton
Oakland
San Francisco
San Jose
Monterey
Fresno
Bishop
Mt Whitney 14494
Bakersfield
San Luis Obispo
Santa Barbara
Los Angeles
Long Beach
San Diego
Tijuana
Barstow
Needles
Palm Springs
Blythe
San Gorgonio Mtn. 11490
Salton Sea
Colorado River
PT REYES
FARALLON ISLANDS
PT SUR
PT CONCEPTION
SAN MIGUEL ISLAND
SANTA ROSA ISLAND
SANTA CRUZ ISLAND
SANTA CATALINA ISLAND
SAN NICOLAS ISLAND
SAN CLEMENTE ISLAND
Explanation of Connectivity Categories
Irreplaceable and Essential Corridors:
areas that may represent the last available connections between two locations or are priority species movement corridors
Core Habitat Linkages:
areas identified as core habitat linkages in statewide or regional fine-scale connectivity studies
Supplemental Habitat Linkages:
areas that have connectivity importance but have not been specifically identified as essential corridors or core habitat linkages
Intact Natural Habitat Areas:
blocks of contiguous natural habitat greater than 2,000 acres where connectivity is generally intact
Limited Connectivity Opportunity:
areas with land use that may limit options for providing connectivity (e.g., agriculture, urban, Department of Defense), although there may be some important connectivity habitat within these areas

Regional Conservation Planning

The 1,800-acre Roddy Ranch property was conserved in 2013 through the East Contra Costa County NCCP for its value as an important wildlife movement corridor and a habitat for California Tiger Salamander (*Ambystoma californiense*) and California Red-legged Frog (*Rana draytonii*). CDFW photo: Sara Kern

California's human population is expected to increase by nearly 20 percent by the year 2060, to over 45 million people. Due to the widespread land conversion that will be required to support human needs, many species and natural communities are at risk of being lost. The heaviest growth is projected to occur in Southern California and the San Francisco Bay Area, in places that include several national biodiversity hotspots.

Conservation biologists have determined that the most effective way to ensure the survival of species is to protect natural areas large enough to support the diversity of habitats that species depend upon and connected enough to enable wildlife movement and adaptations to climate change (see the Climate Change chapter). People also recognize that having wildlands surrounding their neighborhoods and cities is an important part of their quality of life. The Department has several regional conservation planning tools that help to achieve these goals: the Natural Community Conservation Planning (NCCP) Program, the Regional Conservation Investment Strategies (RCIS) Program, and the Conservation and Mitigation Banking (Banking) Program. These programs have been developed in response to legislation promoting the conservation of California's species and natural habitats.

The impending federal listing of the California Gnatcatcher (*Polioptila californica*) as a threatened species was a primary impetus for the creation of the NCCP program in 1991. This species inhabits coastal sage scrub. Photo: Andy Reago and Chrissy McClarren

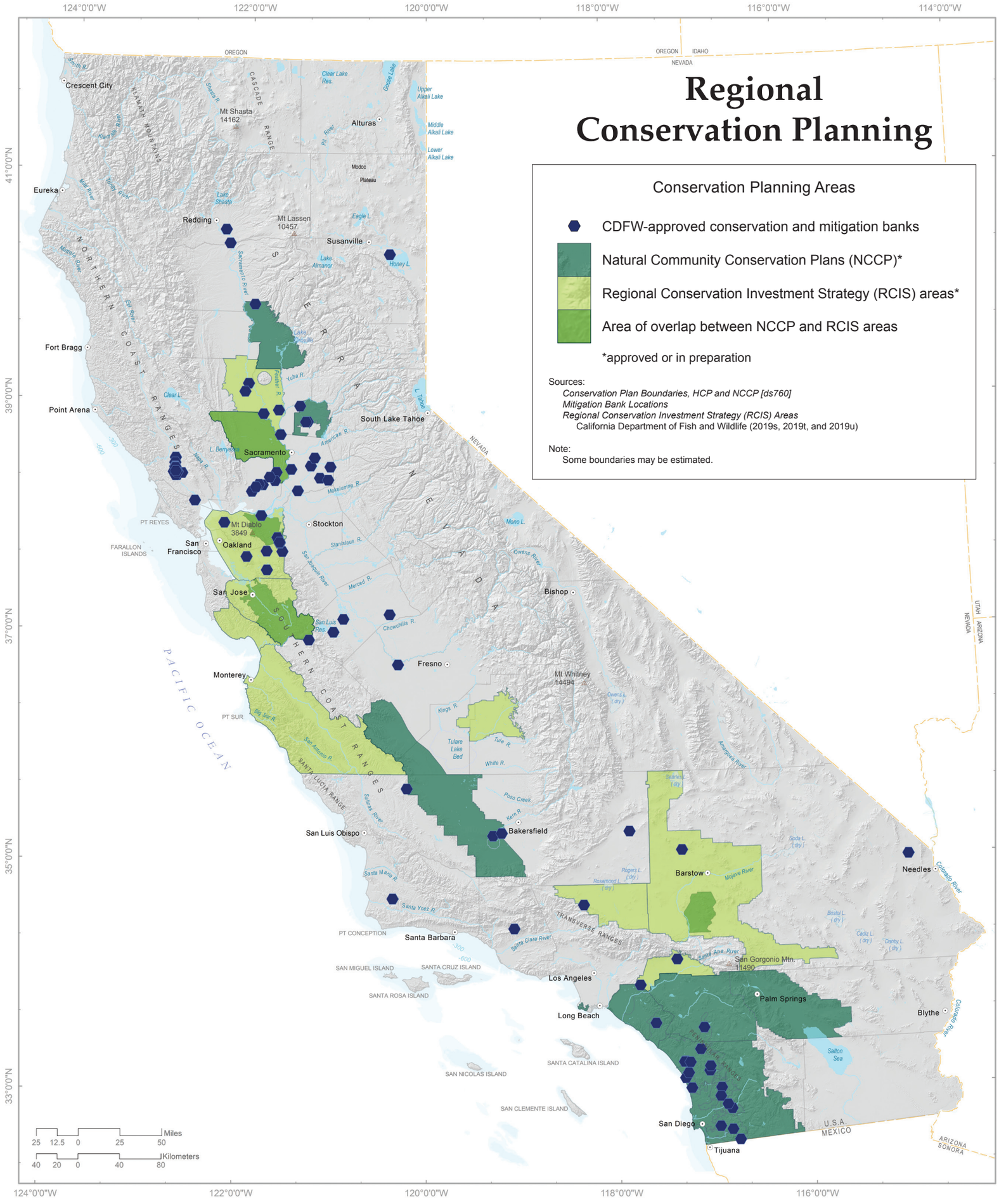
To address the conflicts between population growth and the preservation of California's rich biological diversity, the Department developed the NCCP program in 1991. The NCCP program relies on cooperation among government agencies at local, state, and federal levels; business and industry groups; landowners (more than 50 percent of special-status species occur on private land); conservation organizations; and the public. NCCP plans integrate the principles of conservation biology, endangered species laws, and local land use planning. Under an NCCP plan, an organization receives a permit for long-term habitat conservation in order to offset impacts to special-status species. To date, approved NCCPs include commitments to conserve more than 1.5 million acres of habitat.

More recently, the Department developed the RCIS program in 2017 to promote voluntary, non-binding regional conservation of species and habitats. RCISs first identify focal species, then specify objectives and actions to conserve and enhance habitat in the RCIS area for those species. Unlike an NCCP, there is no permit associated with an RCIS and no requirement to achieve the recommended conservation. However, if actions from the approved RCIS are implemented, mitigation credits may be created through Mitigation Credit Agreements to offset impacts from current or future projects. Nine RCISs are approved or in preparation as of this date, covering part or all of 11 counties.

The Banking program achieves conservation at a smaller landscape scale than NCCPs and RCISs. Banks are developed on a voluntary basis on privately or publicly owned land to conserve or enhance habitat and to create mitigation credits. Project proponents can then purchase mitigation credits to offset the environmental impacts caused by their projects. Banks are typically created as large, contiguous areas that maximize benefits to species. This is preferable to project-by-project mitigation, which tends to result in small, isolated patches of habitat. The Department is a signatory to over 80 banks.

The map at right shows the locations of NCCPs and RCISs that have been approved or are in preparation, as well as Department-approved banks. The Department encourages partnerships to form landscape-level strategies for wildlife and habitat conservation. It is a reliable method to address the pressures from economic and human population growth in California.

Regional Conservation Planning



Watershed Health

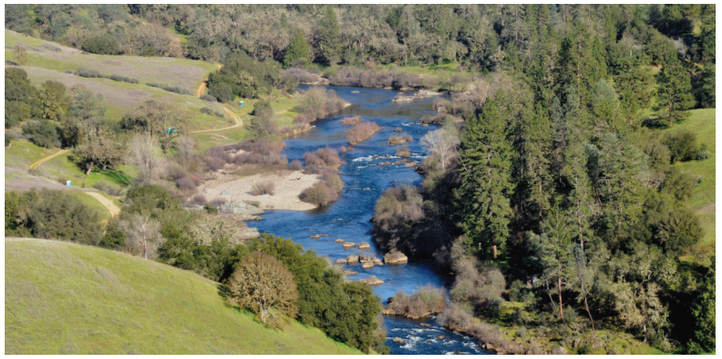
Streams and rivers are among the most biodiverse ecosystems on the planet, rivalling even coral reefs and rainforests. California's network of streams is over 200,000 miles long and supports thousands of species, many unique to California. Like all freshwater environments, streams are tightly linked to their terrestrial surroundings. Streams and their biota support a vast array of terrestrial biodiversity, especially in riparian areas. In turn, the health of streams depends on the health of the landscapes that they drain.

Stream-dwelling organisms are highly vulnerable to stressors associated with human activities. They absorb the effects of a vast array of stressors over time, including alterations to the stream channel and surrounding areas and to water quality and water quantity. Because different species of aquatic organisms are sensitive to different kinds of stresses, knowing which species can live in a specific stream can tell us a lot about the health of both the stream and its watershed. This is known as bioassessment.

Stonefly adult (*Salmoperla sylvanica*). Many insect species like this stonefly are sensitive to alterations of the upstream watershed.
Photo © John Sandberg

Many different groups of organisms call streams their home, but benthic macroinvertebrates (small, but visible, invertebrates like insects, snails, and crayfish) are well suited for bioassessments because they are abundant, highly diverse, and very well studied. Over the last 20 years, benthic invertebrate bioassessments have become widely adopted throughout California to assess, protect, and restore the state's freshwater ecosystems.

The two maps at the right summarize data about stream health based on benthic invertebrates, using a scoring tool called the California Stream Condition Index (CSCI, Mazor et al. 2016). The CSCI compares the specific invertebrate species observed in a test stream to a list of invertebrate taxa expected to occur if the stream is unaffected by human sources of stress. The expected list is created by comparing the stream to hundreds of similar reference streams, where upstream human disturbance is absent or minimal.



South Fork American River near Pilot Hill
Photo © Peter Ode

The CSCI score compares the species of invertebrates found at a site to those that would be expected in a similar healthy stream. CSCI scores are close to or greater than 1.0 when the community is intact. Scores significantly less than 1.0 indicate altered communities.

The smaller map represents the output of a landscape model that predicts the best CSCI scores that are expected to occur within a specific watershed given the amount of landscape development occurring there. These expected CSCI scores were modeled based on relationships between stream health and land use variables, including percentages of urbanization and agricultural development, roads density, and other variables. Watersheds with high values are expected to contain streams with high CSCI scores, whereas ones with lower values are expected to have poorer-scoring streams. More than 2,000 stream sites were included in this model.

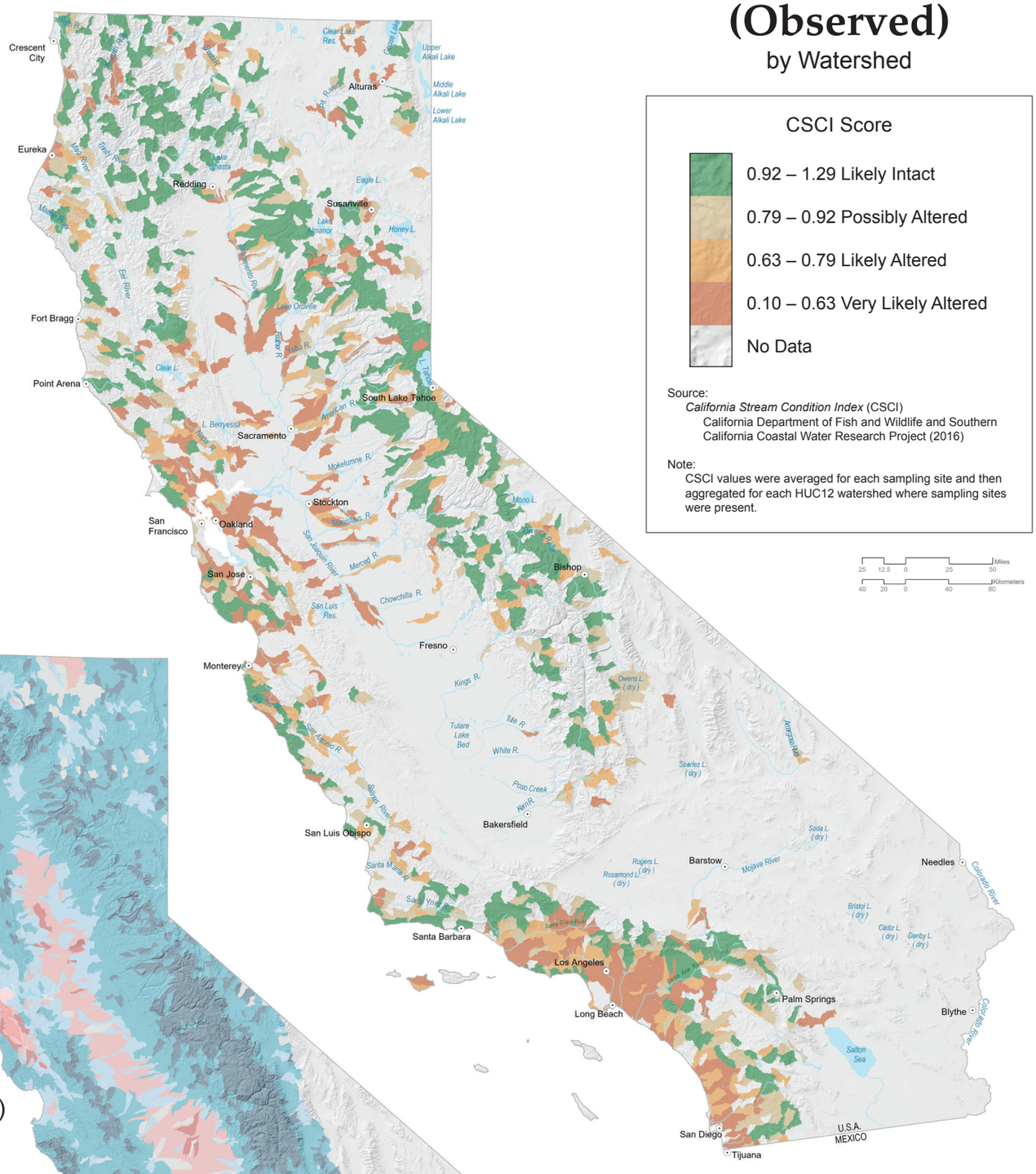
The larger map represents CSCI scores calculated from samples collected from over 3,000 unique stream locations. The color of each watershed represents the average CSCI score observed in streams within that watershed.

By comparing the information in these two maps, resource managers can identify areas where stream health may be underperforming or overperforming expectations. This provides much needed insight to guide prioritization decisions for protection, restoration, or additional monitoring and coordination.

Sampling for benthic macroinvertebrates
CDFW Photo

Stream Health (Observed)

by Watershed



CSCI Score

- 0.92 – 1.29 Likely Intact
- 0.79 – 0.92 Possibly Altered
- 0.63 – 0.79 Likely Altered
- 0.10 – 0.63 Very Likely Altered
- No Data

Source:
California Stream Condition Index (CSCI)
California Department of Fish and Wildlife and Southern California Coastal Water Research Project (2016)

Note:
CSCI values were averaged for each sampling site and then aggregated for each HUC12 watershed where sampling sites were present.

Stream Health (Maximum Expected)

by Watershed

- Likely Unconstrained
- Likely Constrained
- Not Modeled

Source:
Biological Integrity of Constrained Streams by Watershed [ds2808]
Southern California Coastal Waster Research Project (2018)
Beck et al. (2019)

Note:
Analysis was done using HUC12 watersheds with southeastern desert watersheds excluded from this comparison.

Habitat Restoration

The California Department of Fish and Wildlife and the Wildlife Conservation Board manage continuous and competitive grant programs that enhance and restore natural habitats. The programs are funded with state and federal resources, including significant funding from state bond acts. The programs also rely on partnerships with contributing local governments; tribes; water districts; non-profit organizations; federal, state, and local community conservation corps; and private landowners. Collaborative efforts focus on restoration of natural landscapes to provide habitat for California's diverse native plants, fish, and wildlife.

A mountain meadow restoration at Perazzo Meadows in the upper Little Truckee River Watershed, funded by the Proposition 1 Watershed Restoration Grant Program
CDFW photo: Vicki Lake

Restoring degraded habitats presents great opportunities to increase the biodiversity of native species. Restored habitats include rivers, streams, and their associated riparian areas, mountain meadows, inland and coastal wetlands, forests, and grasslands. Special status species are frequently targeted in these projects. Grant program agreements incorporate monitoring to ensure project effectiveness and to help inform planning and implementation of future projects.

General project goals include hydrologic function recovery, fish barrier removal, fuel load reduction, habitat connectivity, forest stand enhancement, and habitat and water quality improvements along the United States-Mexico border. Some projects are specifically designed to improve forest health after catastrophic fire, to sequester greenhouse gases, or to clean up and restore illegal cannabis cultivation sites. Hundreds of projects have been completed and are ongoing throughout the state. The map on the right shows the locations of active and completed restoration projects along with their funding sources. These programs have contributed hundreds of millions of dollars to support a future for California that ensures its rich biodiversity will remain self-supporting and resilient.

Ackerson Meadow, Central Sierra Meadow Restoration Planning Project
Photo: Celestial Reysner, WCB

Funds have also been awarded for activities that indirectly affect habitat restoration. Examples are cooperative fish rearing, acquisition of riparian easements, project monitoring, watershed assessment and planning, support for watershed organizations, and increased public access and outreach. Outreach components may be classroom education for children or technical workshops for adults and watershed groups involved in restoration projects. Thousands of young people have learned about the importance of protecting our watersheds to create the habitat conditions necessary for species to thrive. Some grant programs designate funds specifically for projects in disadvantaged communities.

Natural landscapes have been degraded and altered over the years, so numerous opportunities exist for restoration projects that will benefit California's biodiversity. Restoring natural habitats is a commitment that these programs and partners have embraced, with the aim of maintaining and restoring California's diverse ecosystems for generations to come.

Monarch butterfly (*Danaus plexippus*) at the Monarch Butterfly Grove at Pismo Beach, funded by the California Monarch Recovery Project
Photo: Celestial Reysner, WCB

Habitat Restoration Grants