

# FLORA AND FAUNA



Creative approaches to support the thriving of ecosystems, biodiversity, and human settlement in the County will be more and more essential as competition for space increases in the years to come.



## THE LAY OF THE LAND

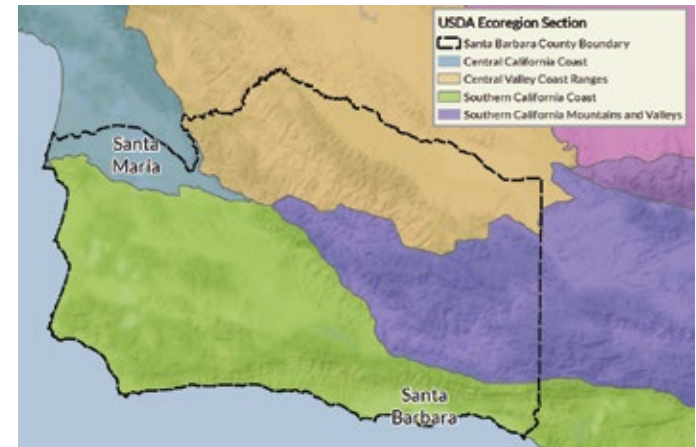
As part of one of the top 35 global biodiversity hotspots, Santa Barbara County is home to a remarkable array of species, habitats and **transition zones** which stem from the regions unique mix of **topography** and climate.<sup>1</sup> The County is unique within the California Floristic Province (the biodiversity hotspot the County is in) as it has fewer developed or altered natural landscapes than other parts of the hotspot; this adds to the value for conservation within Santa Barbara County.

Vegetation communities and species from California's Central Coast and South Coast, the Sierra Nevada, and the San Joaquin Valley can all be found locally due to convergence of four ecoregions within the County: Southern California Coast, Southern California Mountains and Valleys, Central California Coast, and Central Valley Coast Ranges. The Santa Ynez front range along the South Coast of Santa Barbara County marks a regionally significant divide in climate and species range, commonly referred to as the northern limit for many southern species and the southern limit for many northern species. This mixing of regions creates a diverse array of habitats in the County: dry interior grasslands and saltbush scrub in Cuyama Valley, sky islands of conifers in Los Padres National Forest, and chaparral and scenic oak woodland valleys that open into lush coastal wetland complexes at the mouth of its major rivers and streams.

### Convergence of Ecoregions

The County's flora and fauna flourish in an environment shaped by plate tectonics and major fault lines that formed the prominent east to west valleys of the County. This unusual geography is unique along the west coast of the United States, and has continued to shape these large valleys and ranges through somewhat volatile hydrology

### Converging Ecoregions (Figure 13)



This map shows the convergence of four ecoregions that are found within Santa Barbara County, adding to its role as a transition zone for habitats and species: Southern California Coast, Southern California Mountains and Valleys, Central California Coast, and Central Valley Coast Ranges. You can explore this further on the Atlas: Flora and Fauna - Ecoregions Inset Map.

and fragile substrates that promote landslides, erosion, and debris flows throughout much of the County. Coupled with this complex topography are microclimates that can change dramatically as they move from the coast to inland highlands and valleys. While the average summer high for Cuyama Valley can be 90 degrees Fahrenheit, Lompoc has an average summer high of only 74 degrees Fahrenheit. Precipitation varies from 8 inches annually in Cuyama Valley to 34 inches along the Santa Ynez Mountains on the South Coast. These extreme differences create a region defined by diversity and complex interactions of vegetation, topography, hydrology, and climate.

These unique and varied elements of climate, geology, soil, and topography together contribute to tremendous species diversity. Santa Barbara County is home to over 1,300 plant species, more than 500 bird species, 138 terrestrial and marine mammals and 43 reptiles, 17 amphibians, and over 20 (non-oceanic) fish species.<sup>2,3,4,5</sup> This impressive array also

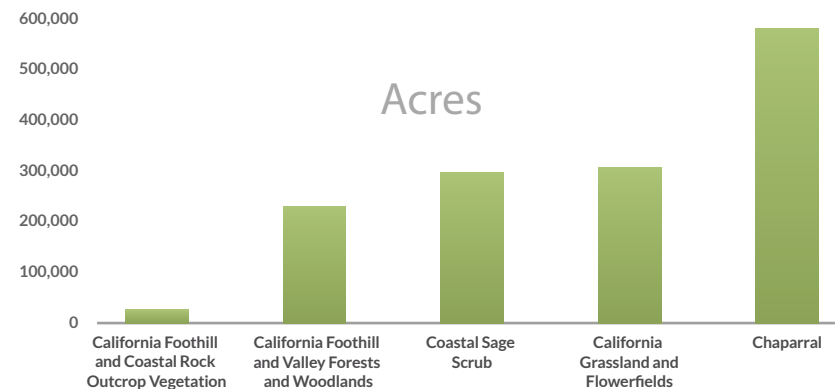
includes many **endemic species** – those species found nowhere else in the world except for within one specific region. Roughly 30 endemic animal species and 35 endemic plant species are found in the Santa Barbara region.<sup>6</sup> Many have evolved in this area of California because of geographic isolation, rare soil substrates, and limited mobility. Examples of endemic species in the County include the Lompoc kangaroo rat, kinsel oak, and the Santa Barbara jewel flower. Many other species are endemic to our region of California but are found outside the County including the Mount Pinos chipmunk, black bellied slender salamander and Cristina’s timema.

Vegetation provides habitat and home for the many unique and common animal species in the County, and varies greatly from north to south, east to west, and often from valley to valley. Of the 31 vegetation macrogroups found in California, 19 are found within Santa Barbara County.<sup>9</sup> Chaparral is the most common vegetation type in the County and covers much of the upland watersheds where it also serves as a natural buffer against erosion. In Santa Barbara County, chaparral hosts 400 different vegetative species across many different types of chaparral communities.<sup>10</sup> Other dominant and iconic vegetation types in the region include coastal sage scrub, California grasslands and flowerfields, and California foothill and valley forests and woodlands.

## Benefits of Biodiversity

Natural and man-made systems are intricately linked, with many benefits that are all too often overlooked. Large intact systems that support high levels of biodiversity tend to be more resistant to disease, and confer higher rates of ecosystem services. In southern California, for example, maintaining natural areas with western fence lizard and southern alligator lizard populations is one contributing factor that helps maintain a lower level of Lyme disease in the area (compared to areas in the eastern United States). Ticks carrying Lyme disease that bite a western fence lizard or southern alligator lizard are cleansed of the pathogen from proteins in the lizard's blood.<sup>7,8</sup> Apex predators also help by checking the populations of tick-carrying wildlife (deer and rodents). Conservation of biodiverse landscapes can offer surprising benefits!

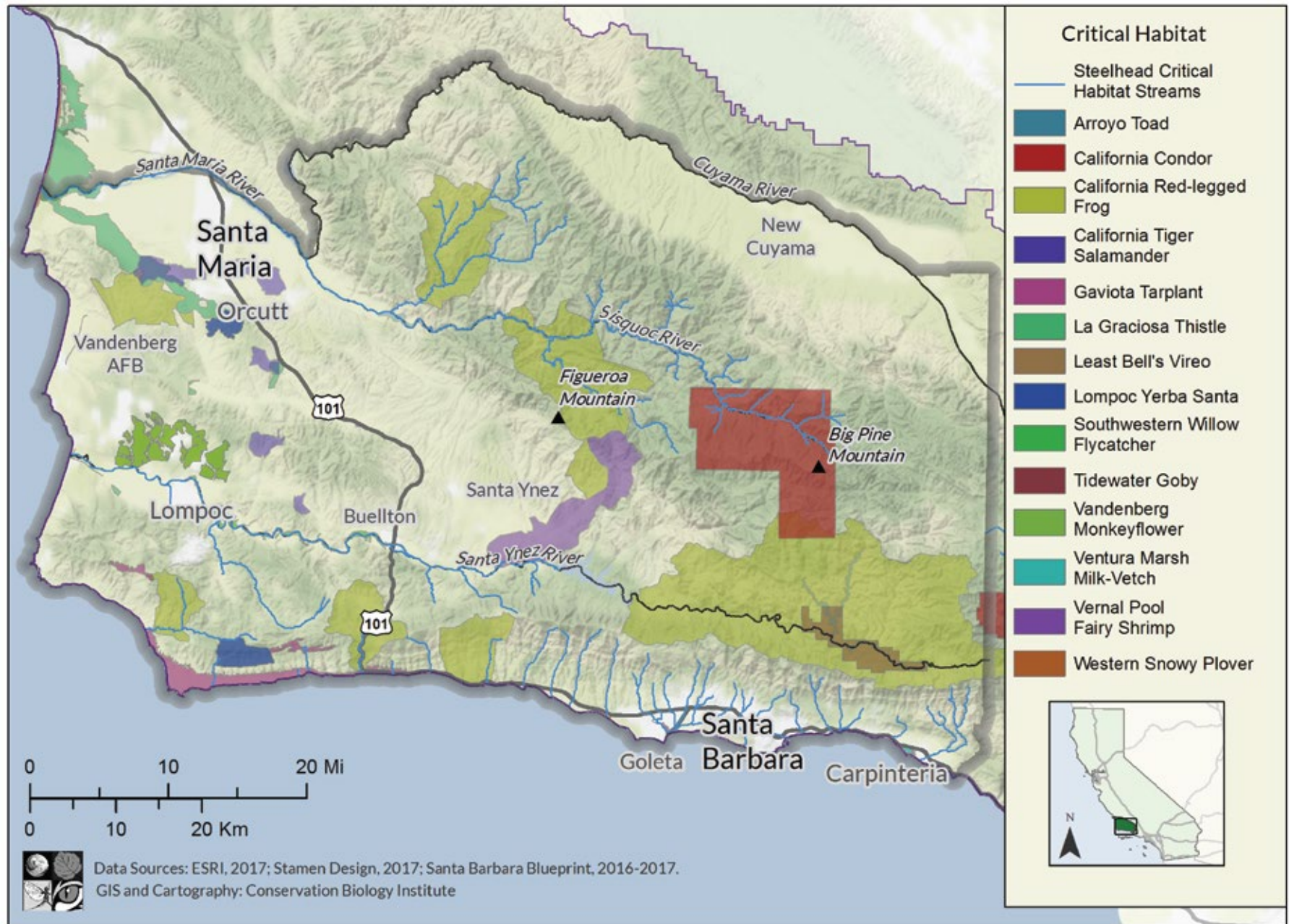
## Acres for the Top Five Classes of Vegetation in the County. (Figure 14)



Central Coast riverine, riparian ecosystems, and wetlands provide some of the most diverse and important areas for local wildlife. Wetland systems naturally create **ecotones** (places where edges of different habitats mix) and act as natural attractors for wildlife of all kinds. Abundant insects and algae attract waterfowl like ducks and grebes; fish stocks provide prey for raptors like ospreys and bald eagles; amphibians such as salamanders, newts, toads, and frogs breed in the seasonal waters of many wetlands, and move to surrounding upland habitat to hibernate or live out the rest of the year. Riparian areas also act as natural movement corridors for terrestrial species and aquatic species such as steelhead trout. They provide fresh water, food, and refuge for migratory and large-ranging species.

Santa Barbara County has over 6,982 miles of streams and rivers and 37,802 acres of wetlands, many of which are seasonal systems.<sup>11</sup> Maintaining the year-round riparian systems (fed by groundwater and springs) is vital for species resilience, especially in drought years. While abundant and productive when water is plentiful, natural wetland systems in Santa Barbara County have been heavily impacted from historical land conversion, lowered water tables, and surface water extraction from streams and rivers for other uses. This loss of riparian habitat and associated surface flows has contributed to the listing of many species as threatened or endangered.

Critical Habitat and Sensitive Species (Figure 15)



This map shows critical habitat lands and streams identified within Santa Barbara County that highlight many areas across the County as crucial for threatened and endangered species.

► You can explore this further on the Atlas: Flora and Fauna -Critical Habitat and Sensitive Species Inset Map.

## Critical Habitat

Even with half of County land in National Forest, wilderness, or other protected designations, much of the important biological diversity exists in the places where humans and other species share and compete for resources. Near the coast, along each of its interior valleys, and more recently into the foothills, residential and agricultural development, **invasive species**, and climate change threaten the health of native habitat and ecosystems. The combination of significant diversity and substantial human pressures results in high levels of threatened and endangered species in the County: 70 of the 298 species listed as threatened or endangered statewide exist in Santa Barbara County.<sup>11,12</sup> Creative approaches to support the thriving of ecosystems and biodiversity, as well human settlement in the County will be more and more essential as competition for space increases in the years to come. Some of these ideas are explored later in this chapter and throughout the Blueprint report.

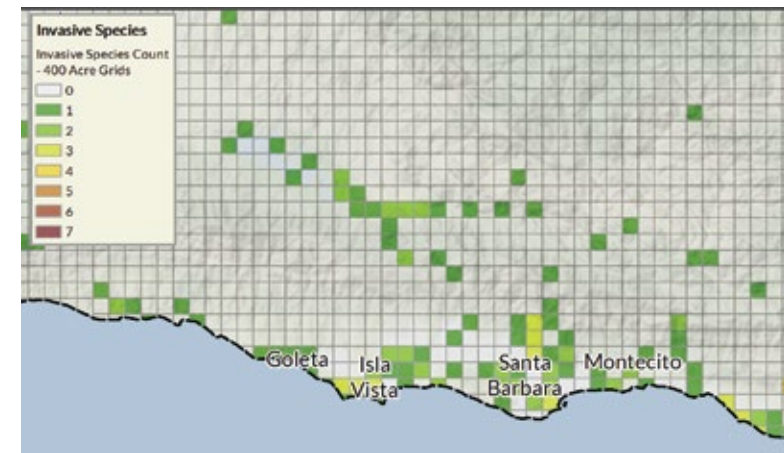
## COMMON FLORA AND FAUNA VALUES

Understanding the conservation challenge and opportunity around Santa Barbara County's flora and fauna requires information on both critical habitat (**Figure 15 critical habitat map**), and how experts and the community view these resources. In the process of developing the Blueprint (through research, stakeholder interviews, focus groups, and surveys), the community was asked to help clarify values and attitudes regarding the future of wildlife species and vegetative communities in the County. Each value statement offers only a high level summary statement on topics that are often quite nuanced (and covered in more depth throughout this report). Yet they are also helpful reminders that though opinion can vary greatly on the means by which flora and fauna should be conserved, there is also great agreement on the desired ends.

## Based on input to date, the community values:

- Protecting the native local biodiversity and unique array of habitats and species.
- Ecosystem-based approaches to flora and fauna conservation that recognize the natural boundaries and movement patterns in the County.
- Restoring natural processes, habitats, and keystone species that help maintain biodiversity and create refugia for future generations of wildlife.
- Providing local wildlife and vegetative communities with the ability to move/adapt in response to climate change.
- Agricultural spaces and practices that support local flora and fauna.

## Invasive Species Locations (Figure 16)



This map shows documented locations of invasive species within the South Coast region of Santa Barbara County. In addition to often taking over native species habitat, invasive species can increase fire risk, reduce overall biodiversity, and harm wildlife and cattle. For example, Mexican feather grass is an emerging invasive species that can overtake pasture lands, and forms indigestible balls in cattle's stomachs, with adverse health impacts on the cattle. The plant is a popular ornamental and landscaping plant, and its spread can be controlled in the County through working with gardens and nurseries. To find out more about how you can help control this invasive species visit: [Invasive Plant Spotlight](#). To learn more about invasive species in the County visit: [Invasive Plants of Santa Barbara County Guide and Case Study](#). You can explore this data further on the [Atlas: Flora and Fauna-Invasive Species Inset Map](#).

## BURTON MESA - BALANCING FIRE, DEVELOPMENT, RECREATION, AND UNIQUE NATURAL RESOURCES

Burton Mesa is a special place in Santa Barbara County just north of Lompoc that highlights issues related to how natural resources are managed in balance with needs for development, recreation, and open space. The unique suite of maritime chaparral species known as Burton Mesa chaparral is found only on sand formations north of the City of Lompoc where its habitat once covered over 22,000 acres.<sup>13</sup>

**Habitat loss to development:** Today only ~8,000 acres of habitat remain due to land conversion and residential development and the impact of invasive species. Burton Mesa chaparral today can be found on federal land on Vandenberg Air Force Base, across state land on the Burton Mesa Ecological Reserve and La Purisima Mission State Park and on private lands in the area known as Lompoc Wye. The area is also a prime target for residential development due to its proximity to Vandenberg Air Force Base, low housing costs, and easy commuter roadway access.

**Tensions over trail access:** Burton Mesa also hosts a network of over 50 miles of trails and access points for local recreational enjoyment of the landscape. These trails are central nature access points in a part of the County with less nature access than areas closer to Los Padres National Forest or the extensive trails and open space along the South Coast. The recreational popularity of the area has created tension between the public and the California Department of Fish and Wildlife. Bikes were banned from trails in 2007 and over half of the existing trails are slated to be closed, reducing historic access to some areas on the reserve in order to protect the native species and natural resources on the property.<sup>14</sup>



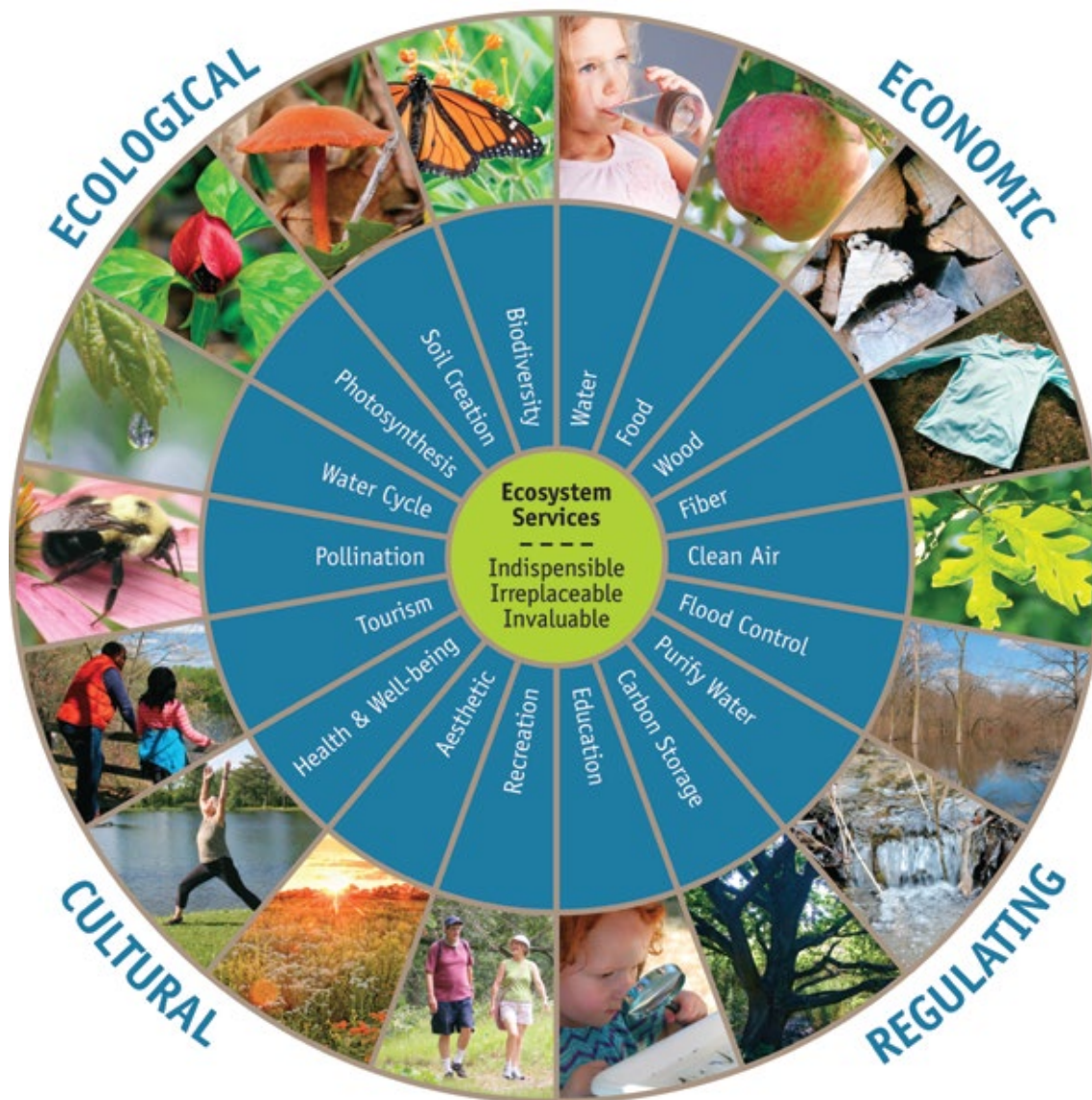
**Challenges with ecological versus resident-focused fire management:** Fires on Burton Mesa are part of the natural ecosystem, as they are in the rest of Santa Barbara County and many ecosystems throughout California. Fire in the Burton Mesa area appears to have occurred naturally in 100 year intervals, with some stands of the Burton Mesa Chaparral likely 80 years older or more. With many homes directly adjacent to Burton Mesa chaparral, the challenge of balancing fire safety for homeowners with the need for periodic fire to maintain this unique and endemic suite of plants is constant. The most important strategies for protection of homeowners' lives and property come through fire proofing residences, removing flammable residential vegetation (pines, palm trees, pampas grass), and being prepared for fires that will continue to burn through the area.

For the species, residents, and landowners that call Burton Mesa home, managing the area for its precious natural resources requires a balancing act between conservation, fire, development, and recreation. For more on human-wildland interface challenges, see the chapter on Community and the Land.

## ECOSYSTEM SERVICES

In addition to the intrinsic value of nature and wild spaces, the County's diverse ecosystems provide important services that support the quality of life residents and visitors enjoy. These 'ecosystem services' are most simply the benefits people derive from healthy and intact natural and working lands – economic, cultural, health, spiritual, and more. Common examples are listed in **Figure 17** on the next page.

From the Millennium Ecosystem Assessment effort of the early 2000s to natural capital valuation assessments, researchers and economists have been working for decades on methods for measuring and financially valuing ecosystem services, or 'natural capital' to help support better resource management. Projects measuring natural capital are being used to help make the case for land conservation: For example, the natural capital assessment done by the Santa Clara Valley Open Space Authority helped pass an open space ballot measure in 2014,<sup>15</sup> and is now being used to reward willing landowners for their stewardship of the land. Markets for certain ecosystem services such as atmospheric carbon sequestration, species habitat, and groundwater recharge are actively being explored around California (see **page 60** for example).



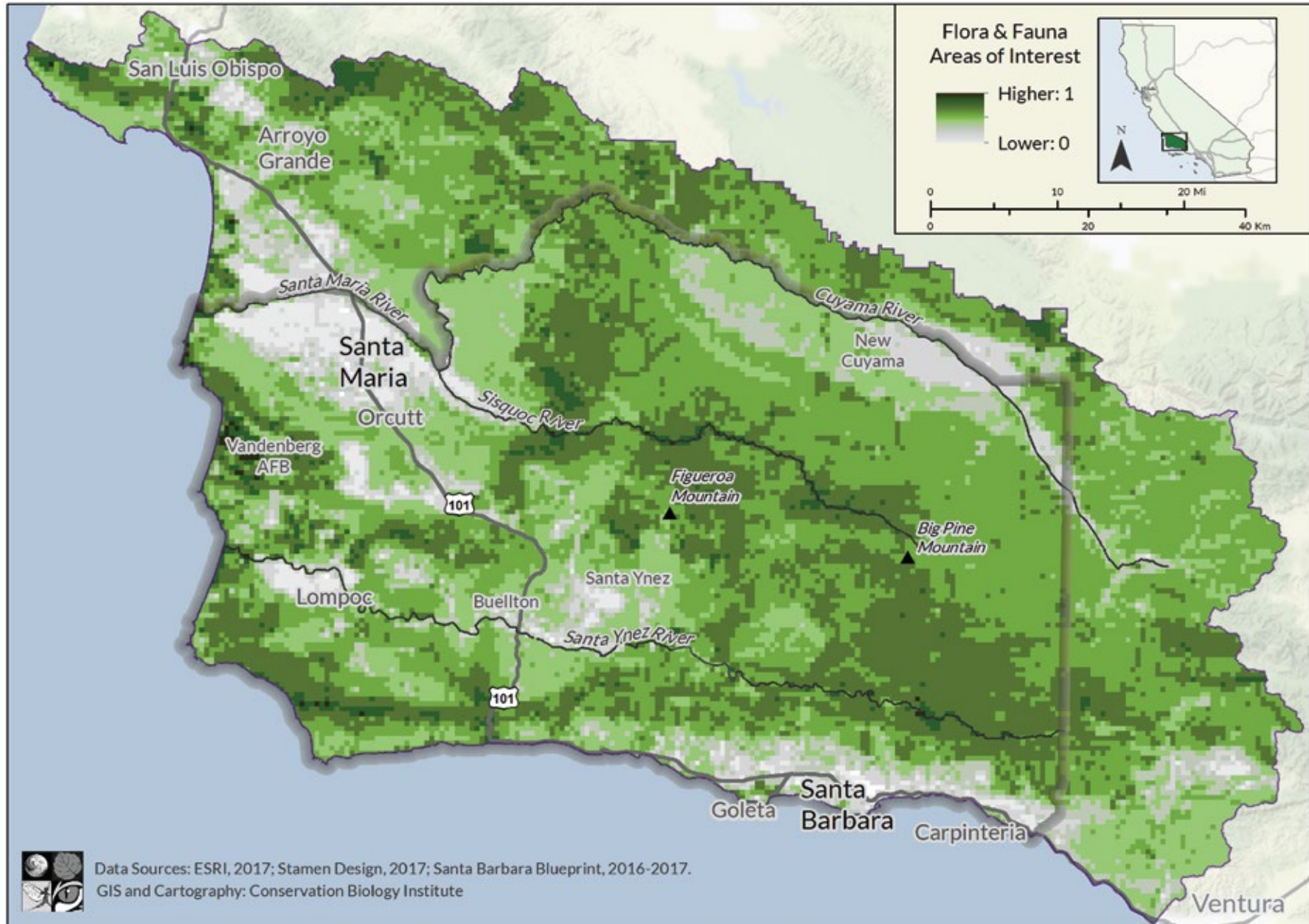
► Visit <http://www.millenniumassessment.org/> for details on this project.

## Ecosystem Services: Common Economic and Regulating Services and Sample Benefits.<sup>16</sup> (Figure 17)

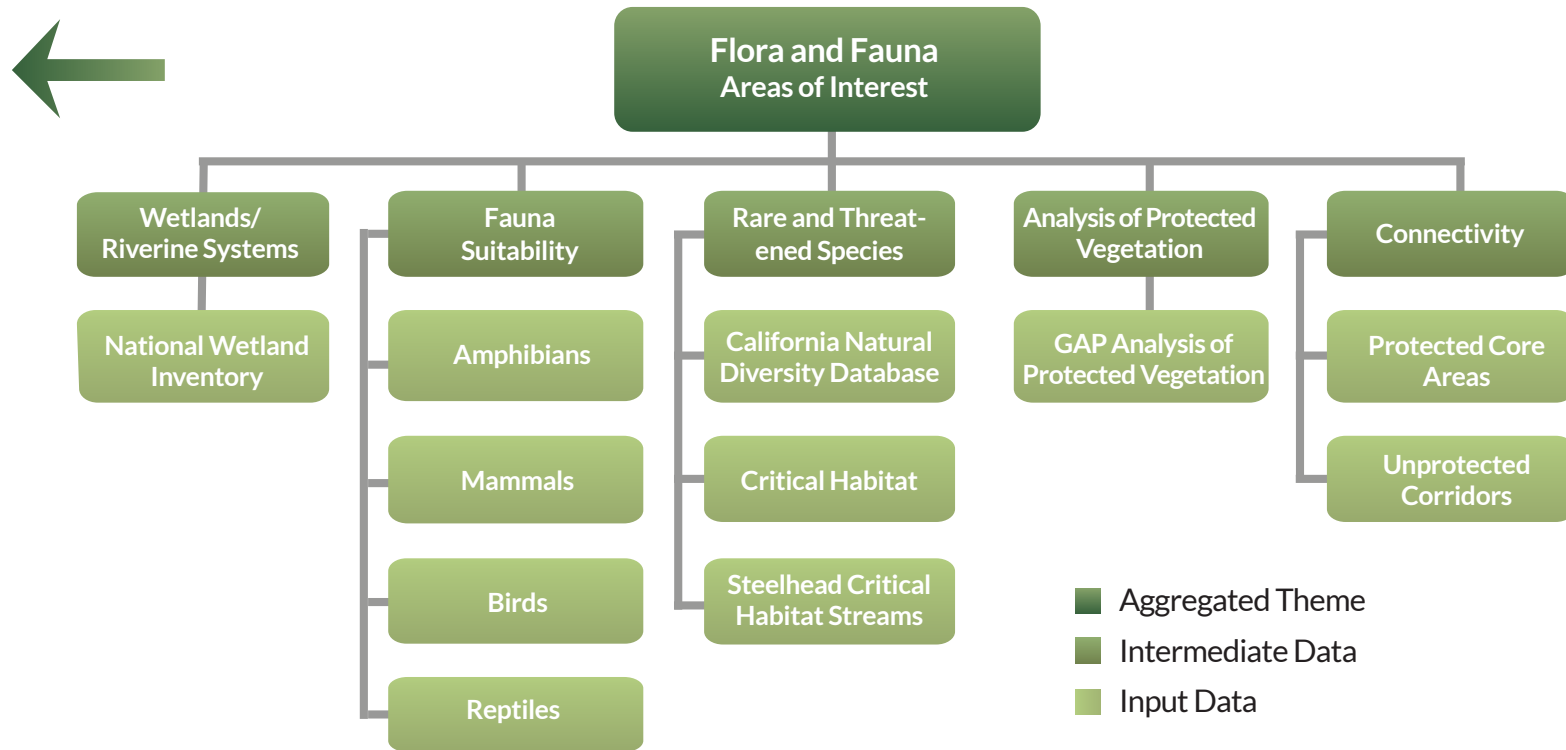
Services	General Ecological Functions	Ag & Ranch Land Benefits
Food	Producing crops, fish, game, and fruits	Ag lands provide nutrients and energy to sustain a growing global population
Medicinal Resources	Providing traditional medicines, pharmaceuticals, and assay organisms	
Ornamental Resources	Providing resources for clothing, jewelry, handicraft, worship, and decoration	Flower production
Energy and Raw Materials	Providing fuel, fiber, fertilizer, minerals, and energy	Ag lands produce renewable energy such as solar, wind, and biofuels, and provide host ground for mineral, oil, and gas extraction, as well as wood fibers such as timber, and non-wood fibers such as wool
Water Supply	Provisioning of surface and groundwater for drinking water, irrigation, and industrial use	Ag lands provide groundwater recharge and filtration services
Biological Control	Providing pest and disease control	With integrated pest management approaches, agricultural lands support beneficial insects and wildlife that can help control pests and disease
Climate Stability	Supporting a stable climate at global and local levels through carbon sequestration and other processes	Soil, crops, and surrounding vegetation affect local temperatures and precipitation while sequestering greenhouse gases
Air Quality	Providing clean, breathable air	Hedgerows and windbreaks can enhance air quality by reducing the movement of wind-borne dust and pathogens
Moderation of Extreme Events	Preventing and mitigating natural hazards such as floods, hurricanes, fires, and droughts	Ag lands can also contribute to fire suppression by providing natural breaks that keep wildfires from reaching urban areas
Pollination	Pollination of wild and domestic plant species	Ag lands provide nesting habitat and floral resources for wild pollinators such as bees, bats, and birds
Soil Formation/ Soil Retention	Creating soils for agricultural and ecosystems integrity; maintenance of soil fertility; retaining arable land, slope stability, and coastal integrity	Well managed soils can sequester carbon, reduce erosion, prevent landslides, purify water, and support nutrient cycling
Waste Treatment	Improving soil, water, and air quality by decomposing human and animal waste and removing pollutants	Well managed ag lands can reduce salinity and organic/inorganic constituents in surface and groundwater
Water Regulation	Providing natural irrigation, drainage, groundwater recharge, river flows, and navigation	Unlike pavement, agricultural vegetation maintains soil moisture, enhances water storage, and reduces runoff



## Flora and Fauna Areas of Interest (Figure 18)



This synthesis EEMS map highlights areas of interest for ecological resources by overlaying a variety of inputs from the Flora & Fauna theme. This and other maps featured throughout the report are meant to support meaningful visual insights about flora and fauna in the Santa Barbara County landscape, and to stimulate conversations about key issues. (See Appendix C for a more detailed description of the EEMS methodology.) [You can explore this map further and use the interactive EEMS Explorer on the Atlas: Flora and Fauna Areas of Interest \(EEMS\) - Santa Barbara County.](#)



## CONNECTING A MOSAIC OF LANDSCAPES

The landscapes in and around Santa Barbara County create a mosaic that has certainly been impacted by agriculture and urban development, but remains relatively intact compared to much of California's southern coast. Spectacular examples of this include uninterrupted expanses of natural vegetation seen along the Gaviota coast, the foothills and oak woodland valleys sweeping the interior of the County, and the large dune systems found near Guadalupe. Keeping these areas intact, unfragmented, and interconnected is essential for Santa Barbara County's species, and has implications for human well-being.

## Chaparral and Fire

Chaparral is the most dominant vegetation type in the County, especially in the upper watersheds. It has a closed canopy that protects against invasive species, dense coverage that protects against erosion, and is well-adapted to infrequent fire. Though chaparral shrubs regenerate quickly after fire from resprouting and from buried seeds, short-lived wildflowers like the coastal lotus and fire poppy thrive for a time as the chaparral regains its dense coverage. For centuries this process occurred in multi-decadal cycles, but chaparral fires recently have become more frequent due to human causes.<sup>19, 20</sup> These fires not only impact human structures and safety, but their increased frequency also leads to increased erosion in headwaters after fires, and potentially to conversion from chaparral to annual grasslands.

## Learning from Outside the County: Creating Markets for Habitat and Ecosystem Services

Sometimes referred to as mitigation banking, there are a number of experiments happening around California to pay landowners for the ecosystem service benefits provided by their land. The Central Valley Habitat Exchange is a cross-sector collaborative program that compensates landowners for sustainable management and restoration activities that show measurable enhancement of the ecosystem services, notably watershed health and species habitat. Practices include on-field flooding for bird habitat, managing row crops to benefit hawk habitat, or planting milkweed for monarch butterfly habitat.<sup>17</sup>

The California Department of Food and Agriculture and the United States Fish and Wildlife Service (USFWS) have begun conservation bank approval programs in California. The approach is growing in popularity as a private industry and conservation nonprofit strategy for effective engagement of private landowners in conservation activities. La Purisima Conservation Bank, focused on California tiger salamander habitat protection, is the only active endangered species conservation bank in Santa Barbara County.<sup>18</sup> This bank has allowed one landowner to capitalize on the presence of an endangered species, while also expediting the mitigation process for other landowners whose use of land will unintentionally harm the species. Carbon banking is another trend to watch: The carbon farming pilot featured on [page 60](#) may provide data to support carbon banking markets in the County in the years to come. These new approaches to conservation are promising, but not without challenges. Technical and financial barriers to quantifying ecosystem services remain, and designing sustainable financing mechanisms for providing payment for ecosystem service benefits will be important for applying these kinds of approaches in the County.

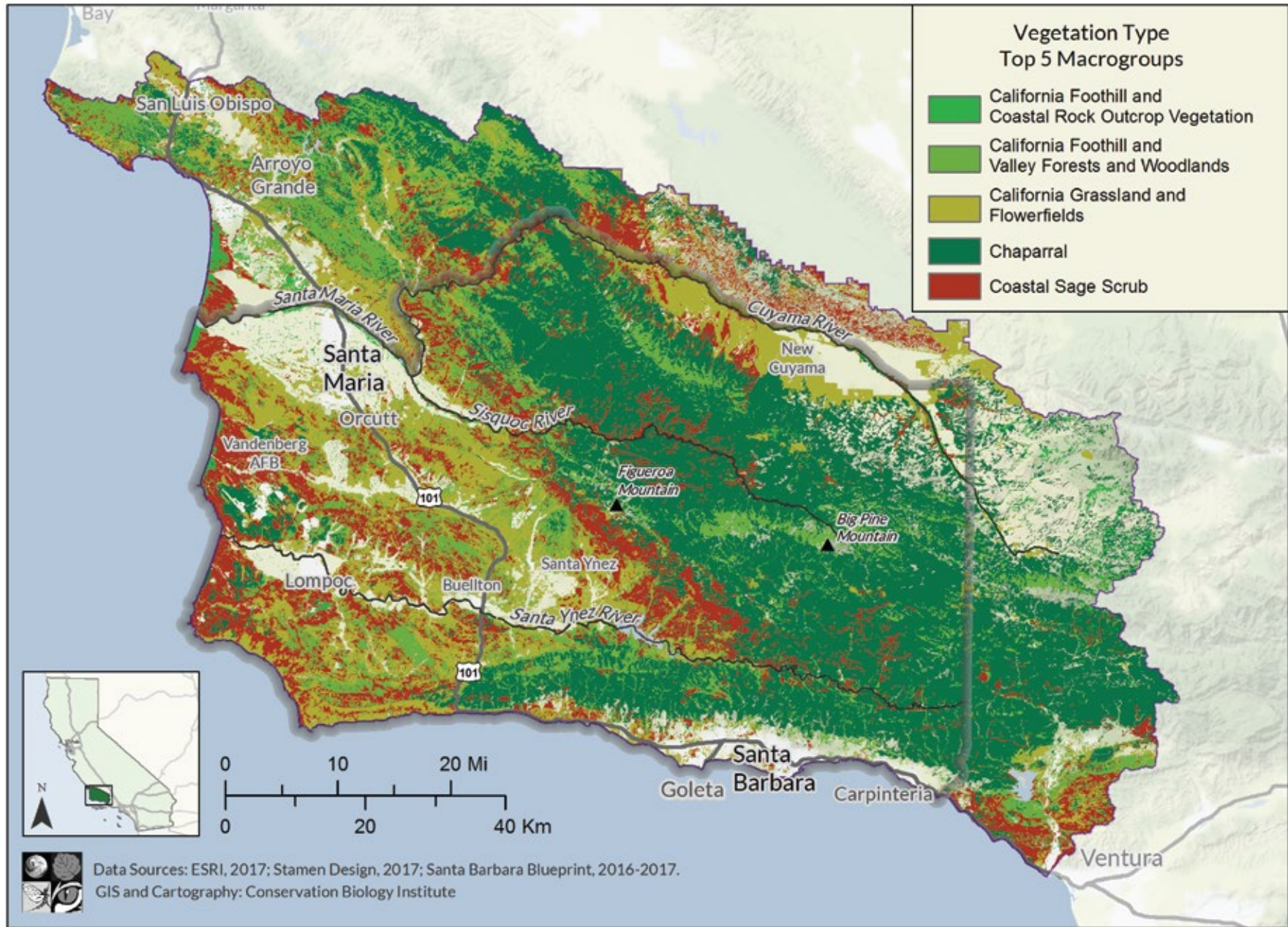
## Connectivity Corridors and Riparian Systems

All wildlife species need the ability to move across the landscape to find food, shelter, and to reproduce. With human development of urban areas, houses, and roads, connectivity across the landscape can be lost. Impermeable fencing and the presence of pets or even road noise can represent barriers for many species that constrain their ability or willingness to travel across landscapes. The resulting fragmentation of the landscape can effectively create habitat islands. If these islands become too small or isolated, plants and animals that cannot disperse to other suitable habitat areas will eventually be lost. Many of these impacts on wildlife can be avoided with careful planning and strategic conservation. The online Atlas may assist in helping organizations and developers identify the connectivity corridors to avoid. Impacts can also be mitigated with creative solutions such as: enhancement of natural riparian corridors along rivers and streams; by providing safe passage culverts under major highways and road barriers; and through use of wildlife fencing to deter animals from crossing paths with vehicles.<sup>21</sup> The importance of maintaining habitat connectivity will only increase as the warming climate increases pressure on plants and animals to migrate across the landscape and adapt to the continued change in environmental conditions.

## Groundwater Recharge and Species Protection

Species protection is not often thought of as compatible with augmenting urban or agricultural water supplies, but in some instances these two issues can be mutually beneficial. Deliveries from Lake Cachuma to downstream fish and human water users along the Santa Ynez River offer a good example of mutual benefits: This practice helps species within the river while also recharging groundwater basins around the river and delivering water for municipal and agricultural uses.<sup>22</sup> With local species increasingly vulnerable to many pressures in addition to water shortage, water management focused on win-win solutions that protect natural resources and the people who rely on them is a sound strategy for resilience.

## Largest Regional Vegetation Types (Figure 19)



This map shows vegetation across Santa Barbara County, while dominated by chaparral many other diverse vegetation types are also present.

■ You can explore this further on the Atlas: Flora and Fauna - Vegetation Inset Map.

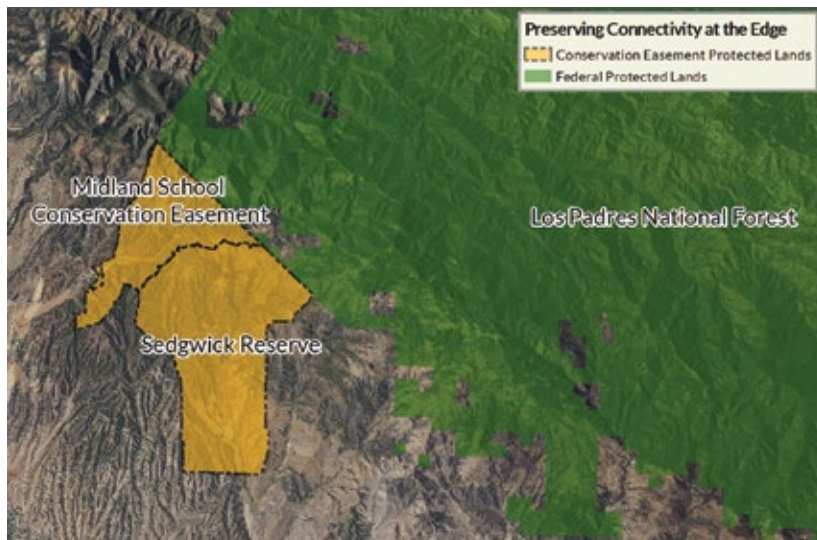
## ONGOING DIALOGUES

### FLORA AND FAUNA DISCUSSIONS

As population increases in the County, so do the tough decisions residents face about the future of shared landscapes. There are many ways to meet human development needs without severe impact to species habitat. Below are a few examples of innovative approaches to managing the difficult tradeoffs between conservation and development.

The Sedgwick Reserve, part of the UC Natural Reserve System and the adjacent Midland School collectively encompass over 8,500 acres of oak woodland and grassland habitat in the Santa Ynez Valley. Both properties share a boundary with the Los Padres National Forest. Conservation of properties of this size in close proximity to one another and to the large connected landscape of the national forest maximizes the habitat benefits of the conservation effort. In some cases

#### Connectivity at the Edge (Figure 20)



This map highlights an example of the habitat connectivity benefits of protecting neighboring properties adjacent to extant protected areas (such as the Los Padres National Forest). You can explore this map further on the Atlas: Flora and Fauna - Connected Lands Inset Map.

conservation of properties with lower habitat value may be considered if they are contiguous with existing conservation and their condition is able to be restored.

### Habitat Restoration

Restoration or repurposing of open space to provide better habitat can be a valuable alternative when preservation of pristine habitat is impossible. The Ocean Meadows Golf Course was bought in 2013 by the Trust for Public Land. The Trust gifted the land to University of California, Santa Barbara (UCSB), which worked with the USFWS and the State Coastal Conservancy to collaboratively develop high density student/faculty housing and restore 136 acres of estuarine and mesa habitat in Goleta. The land includes 64 acres of public open space, trails, and coastal access and will increase landscape connectivity by connecting several existing preserved properties, including UCSB's South Parcel, Coal Oil Point Reserve, and the City of Goleta's Sperling Preserve at Ellwood Mesa.<sup>25</sup>



Voluntary conservation comes in a number of forms, including conservation easements, grants, and other incentives for conservation and restoration on private lands. These partnerships are increasingly crucial for maintaining a healthy and vibrant landscape that supports ecosystems, agriculture and ranch lands, and sense of place in the County.

**Las Flores Property – Los Alamos:** The Land Trust for Santa Barbara County and ranch owner Steve Lyons developed a conservation easement across 653 acres of diverse landscape including Burton Mesa chaparral, coastal sage scrub, oak woodland, and intact riparian corridors and wetland habitat for California Tiger Salamander. The landowner was able to use the development value he gave up as a charitable deduction against his income taxes. He also reduced his potential estate taxes by decreasing the value of the property and permanently reduced his property taxes and the costs for maintaining 100 acres of active agricultural lands.<sup>26</sup>

**Hanson Ranch – Gaviota:** The California Rangeland Trust and landowner Louise Hanson protected 14,032 acres of land that can be seen from Highway 101 to Highway 1 near Gaviota. This large easement helps a landowner maintain a working cattle ranch, and also conserves 6-8 streams that are tributaries to the Santa Ynez River and Gaviota Creek, thereby ensuring habitat for the California Red Legged frog and many other coastal species forever.<sup>27</sup>

**Hibbits Farm – Lompoc:** Four generations of the Hibbits family have farmed the Lompoc Valley, building a diverse, successful farming operation run today by Art and Sherry Hibbits. Their 400-acre ranch features prime topsoil over 30 feet deep in places, and has supported a wide array of nuts, vegetables, and seed crops for over a century. The family decided to protect the enduring scenic and agricultural value of their land through a voluntary conservation agreement with the Land Trust for Santa Barbara County. The Land Trust was able to identify and attract funding to partially compensate the Hibbits through the United States Department of Agriculture's (USDA) Farm and Ranch Land Protection Program (FRPP). Here is the Hibbits' perspective on the value of the easement:

***“Our family’s goals in pursuing this conservation easement are to protect and encourage the continued agricultural uses on the ranch in a long-term sustainable manner, whereby productivity and economic viability are maintained and enhanced. We want future generations to have the maximum flexibility in future choices of crops, equipment, agricultural-related facilities, and farming practices. Our agreement with the Land Trust will clearly state these objectives.”***

**- Art Hibbits**

## Fostering a Sense of Place



Santa Barbara County is blessed with many outdoor recreation opportunities and a range of ways to interact with the local landscape. Having wild country so close is a privilege that many in the County hold dear, while others have limited awareness of and/or access to local resources (see page 77). Nature-based education helps foster deeper connection with place among residents, which can then support further engagement in protecting the landscapes and species that are part of the local community. Many nonprofits in the County such as the Guadalupe-Nipomo Dunes Center, Wilderness Youth Project, Nature Track, Sprout Up at UCSB, the Land Trust for Santa Barbara County, and others serve this role of nature-based education (with a strong focus on serving local youth). Supporting these programs helps people and our environment. The more we learn about and experience the benefits of the local landscape, the more we can come to appreciate and understand our place in it.

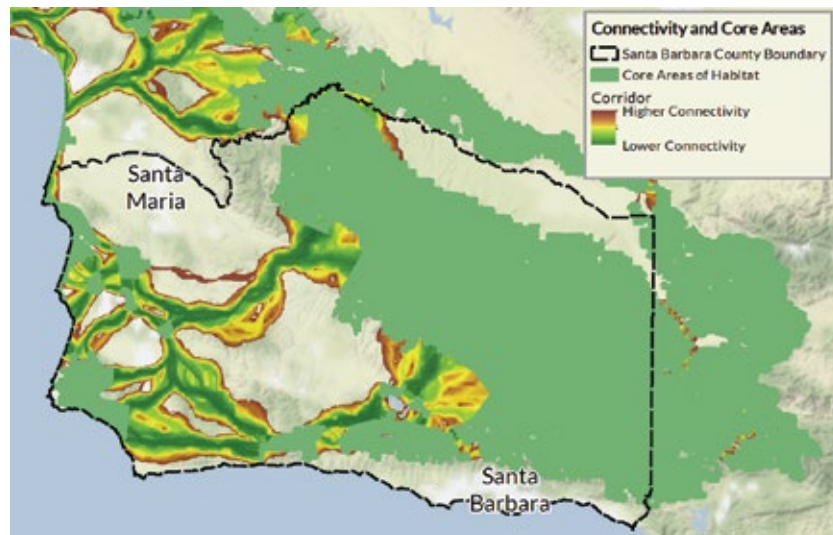
***“We simply need wild country available to us, even if we never do more than drive to its edge and look in. For it can be...a part of the geography of hope.”***

**- Wallace Stegner**

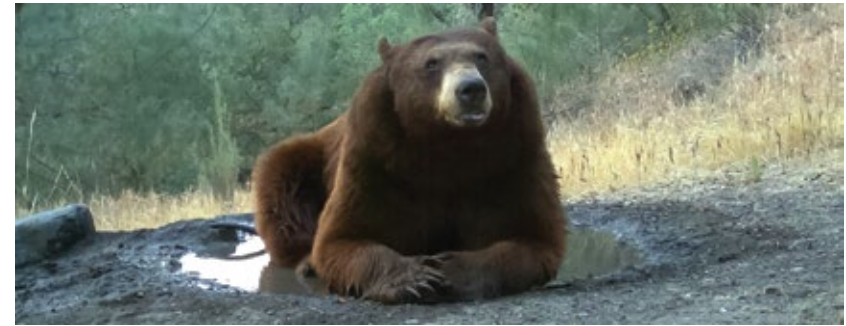
## FLORA, FAUNA, AND CLIMATE CHANGE

Climate change in Santa Barbara County creates an uncertain future for all flora and fauna, but the projections for local future climate generally indicate increased variability in precipitation and warming temperatures that increase evaporation and plant water demand (see Introduction). Species distributions and abundances will shift with changes in climate. Localized plant communities such as those associated with serpentine rock outcrops or cool mountaintop locations will be severely affected as they are on isolated islands of habitat. Uphill shifts in plant distributions have been documented in some areas of Southern California, pointing to a response from warming over the past few decades.<sup>23</sup> Species distributions are expected to shift northward, and new species may appear in the County from more southerly locations. The key to building resiliency and protecting against an unknown future is understanding which species are at greatest risk and maintaining "stepping-stone" connectivity for their natural movement to new habitat whenever possible.

### Connectivity and Core Areas (Figure 21)



(This map shows broad connectivity corridors across Santa Barbara County highlighting the need to connect cores of habitat throughout the region. You can explore this map further on the Atlas: Flora and Fauna - Connectivity Inset Map.



Climate microrefugia are local areas where climate change may be buffered by local topographic and soil conditions that promote cooler and wetter conditions, such as stream canyons and riparian zones. Riparian and riverine corridors provide paths for species movement and will likely become even more important in the future.<sup>24</sup> Maintaining and restoring riparian vegetation and tree canopies can be facilitated by avoiding introduction and dispersal of invasive plants and pests, maintaining freshwater input, and avoiding conversion and degradation of these areas.

### Coal Oil Point - A Glimpse Into the Past

Dogs on the beach at Coal Oil Point aren't a new occurrence for Cristina Sandoval, Director at UCSB's Coal Oil Point Reserve. One morning when she saw what she initially thought was a large black dog playing on the beach, Cristina realized she was instead watching a juvenile black bear playing in the waves early in the morning near the local surfing spot called 'Sands'. While coyotes and bobcats are often seen on this 138-acre reserve surrounded by Goleta, Isla Vista, and Ellwood, a bear was a new sighting. The bear did not stay for long after playing in the waves and jaunted back up Devereux Slough.

The journey of this bear likely involved using the existing culverts and riparian corridors that connect the Santa Ynez Range's watersheds to the ocean through the heavily urbanized Goleta area. That this bear was able to make the historically common journey in such a constrained urban environment highlights the importance of these landscape linkages. Connectivity not only provides a thoroughfare for species and natural processes to move across the landscape, but it can also provide special glimpses into the past.

## KEY TAKEAWAYS OF FLORA & FAUNA RESILIENCE

Potential resilience strategies for flora and fauna resources include embracing actions and processes that will support long term health for flora, fauna, and ecosystems in the County, such as:

- Maintaining connectivity at the ecosystem scale, with an emphasis on protection of riparian areas and unfragmented lands as wildlife corridors
  - Supporting incentive-based water and habitat conservation that produces mutually beneficial solutions
  - Improving knowledge of climate change impacts on species within the region and preparing for plant and animal species migration
  - Supporting conservation focused on broader ecosystems and species communities (i.e. mutual benefits for multiple species)
  - Supporting strategic and realistic approaches to invasive species management
- Visit [www.sbcblueprint.net](http://www.sbcblueprint.net) for more resources, project highlights, or to share your ideas!



## ENDNOTES

- <sup>1</sup> Critical Ecosystem Partnership Fund. California Floristic Province Overview. Accessed May 2017: <https://tinyurl.com/y9gvrldhm>
- <sup>2</sup> Hill, R., Hill, S., Gogol-Prokurat, M., Parisi, M., Truex, A., Haney, E., Gonzalez, R., Shaffer, K., Horenstein, J., Dixon, D. & Bartlett, T. 2015. Areas of Conservation Emphasis (ACE-II) Project Report. v2. California Department of Fish and Game. Data on Plant Diversity from the Jepson Ecoregions based on the Jepson Manual (Hickman 1993). Accessed May 2017: <https://www.wildlife.ca.gov/Data/Analysis/Ace>.
- <sup>3</sup> eBird Data on Santa Barbara County. Accessed May 2017: <https://tinyurl.com/yaoj8h5k>
- <sup>4</sup> Data source: Paul Collins on Amphibians, Mammals, and Reptile Species in the region. Pers comms. Late 2016.
- <sup>5</sup> Santos, N.R., Katz, J.V.E., Moyle, P.B., Viers, J.H. 2014. PISCES. Environmental Modelling & Software. Data accessed May 2017: <https://pisc.es.ucdavis.edu/>.



- <sup>6</sup> Smith, C. 2012. A Flora of the Santa Barbara Region, California. Santa Barbara Botanic Gardens & Capra Press; 2nd edition. Rare Plants of Santa Barbara County. Santa Barbara, Santa Barbara Botanic Gardens. Accessed May 2017: <https://tinyurl.com/y796ltn8>
- <sup>7</sup> Lane, R. S., & Quistad, G. B. 1998. Borreliacidal factor in the blood of the western fence lizard (*Sceloporus occidentalis*). The Journal of Parasitology, 29-34. Accessed May 2017: <https://tinyurl.com/y7w8248a>.
- <sup>8</sup> Klein, K. 2013, August 20. How California escapes the Lyme disease curse: Lizards!. Los Angeles Times. Accessed May 2017: <https://tinyurl.com/zbwc2lb>.
- <sup>9</sup> Halsey, R.W., & Keeley, J.E. 2016. Conservation Issues: California Chaparral. Reference Module in Earth Systems and Environmental Sciences. Accessed May 2017: <https://tinyurl.com/ydalz77r>
- <sup>10</sup> Data for Santa Barbara derived from California Department of Fish and Wildlife - California Natural Diversity Database April 2017. Accessed April 2017: <https://www.wildlife.ca.gov/Data/CNDDDB>. and Statewide data derived from California Department of Fish and Wildlife reports online. Accessed May 2017: Animal species - <https://tinyurl.com/ybl9r3p7> Plant species: <https://tinyurl.com/y7sxbw8h>
- <sup>11</sup> Data Processed to Santa Barbara County - Downloaded from the U.S. Fish and Wildlife, National Wetland Inventory. Accessed May 2017: <https://tinyurl.com/y92h8ccb>. And from the USGS, National Hydrography Dataset (Rivers and Streams Extracted). Accessed May 2017: <https://nhd.usgs.gov/data.html>.
- <sup>12</sup> In addition to formally listed species, others have been biologically recognized as threatened. California Native Plant Society maintains a list of plant species considered threatened or rare regardless of listing status: <https://tinyurl.com/yd6tam12>
- <sup>13</sup> Gevartz, E., Carroll, M., Burton, K., Collins, P., Holmgren, M., Spaine, L., & Nelson, A. 2007. California Department of Fish and Game - Final Land Management Plan Burton Mesa Ecological Reserve. Santa Barbara, Condor Environmental Planning Services, Inc. Accessed May 2017: <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=84926&inline>.
- <sup>14</sup> Jacobson, Willis. 2014, October 23. Local Cyclists, state Fish and Wildlife clash over Burton Mesa reserve. Lompoc Record. Accessed May 2017:
- <sup>15</sup> Batker, D., Schwartz, A., Schmidt, R., Mackenzie, A., Smith, J., & Robins, J. 2014. Nature's Value in Santa Clara County. Earth Economics, Tacoma, WA & the Santa Clara Valley Open Space Authority, San Jose, CA.
- <sup>16</sup> Category listing adapted from de Groot, R.S., Wilson, M.A., & Boumans, R.M.J. 2002. A typology for the classification, description, and valuation of ecosystem functions, goods, and services. Ecological Economics 41, 393-408, as presented in Batker, D., Schwartz, A., Schmidt, R., Mackenzie, A., Smith, J., & Robins, J. 2014. Nature's Value in Santa Clara County. Earth Economics, Tacoma, WA & the Santa Clara Valley Open Space Authority, San Jose, CA. Accessed May 2017: <https://tinyurl.com/y9z6v6ej>. The Ag and Ranch land column information is adapted from the 2013 Crop Report PLUS: Langholz, J. & DePaolis, F. 2014. Economic Contributions of Santa Barbara County Agriculture. Agricultural Impact Associates LLC and the Santa Barbara County Office of the Agricultural Commissioner. Accessed May 2017: <https://tinyurl.com/yctg8zaa> threatened or rare regardless of listing status: <http://www.cnps.org/cnps/rareplants/ranking.php>.
- <sup>17</sup> This program is a partnership of American Rivers, Environmental Defense Fund, Trout Unlimited, Point Blue Conservation Science, Sacramento-San Joaquin Delta Conservancy, Department of Water Resources, California Trout, Environmental Incentives, California Department of Conservation, Riparian Habitat Joint Venture (RHJV), and Audubon California. Learn more at <https://www.edf.org/ecosystems/central-valley-habitat-exchange>.
- <sup>18</sup> This bank is run by the Conservation Land Group: <https://conserveland.com/portfolio-items/la-purissima-conservation-bank/>. Other private banks that work in California include Wildlands Inc, Headwaters Economics, EcoTrust, Westervelt Ecological Services to name a few. This is a growing industry to keep an eye on in the coming decades, and many private companies take on the financial risk of landowner mitigation, including regulatory risk.
- <sup>19</sup> Syphard, A.D., Radeloff, V.C., Keeley, J.E., Hawbaker, T.J., Clayton, M.K., Stewart, S.I., & Hammer R.B. 2007. Human influence on California fire regimes. Ecological Applications 17: 1388-1402. Accessed May 2017: <http://dx.doi.org/10.1890/06-1128.1>. See also Steel, Z.L., Stafford, H.D., & Viers, J.H. 2015. The fire frequency-severity relationship and the legacy of fire suppression in California forests. Ecosphere 6(1):8. Accessed May 2017: <http://dx.doi.org/10.1890/ES14-00224.1>.
- <sup>20</sup> Currently the effects of climate change on fire patterns in chaparral are not well studied. Most available research points towards human caused influences and the expanded duration of fire season as the key variables impacting fire frequency. See for example: Keeley, Jon E. Syphard, Alexandra D. 2016. Climate Change and Future Fire Regimes: Examples from California. Geosciences. Accessed October 2017: <https://tinyurl.com/y7hqumhg>, and Mann ML, Battlori E, Moritz MA, Waller EK, Berck P, Flint AL, et al. 2016. Incorporating Anthropogenic Influences into Fire Probability Models: Effects of Human Activity and Climate Change on Fire Activity in California. PLoS ONE 11(4): e0153589. <https://tinyurl.com/yjctnpcf>
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- <sup>22</sup> Ward, C.J. 2015. Cachuma Lake Plays Key Role in Saving Endangered Steelhead Trout. KEYT News. Accessed May 2017: <https://tinyurl.com/yb86xd4t>.

<sup>23</sup> Kelly, A.E., & Goulden, M.L. 2008. Rapid shifts in plant distribution with recent climate change. *Proceedings of the National Academy of Sciences*, 105(33), 11823-11826. Accessed May 2017: DOI:10.1073/pnas.0802891105.

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<sup>25</sup> See <http://www.openspace.vcadmin.ucsb.edu/overview> for more information on this project.

<sup>26</sup> See <http://www.sblandtrust.org/portfolio-item/las-flores-hunt-property/> for information on this conservation easement.

<sup>27</sup> See <https://tinyurl.com/ybe2hjmz> for more information on this conservation easement.

