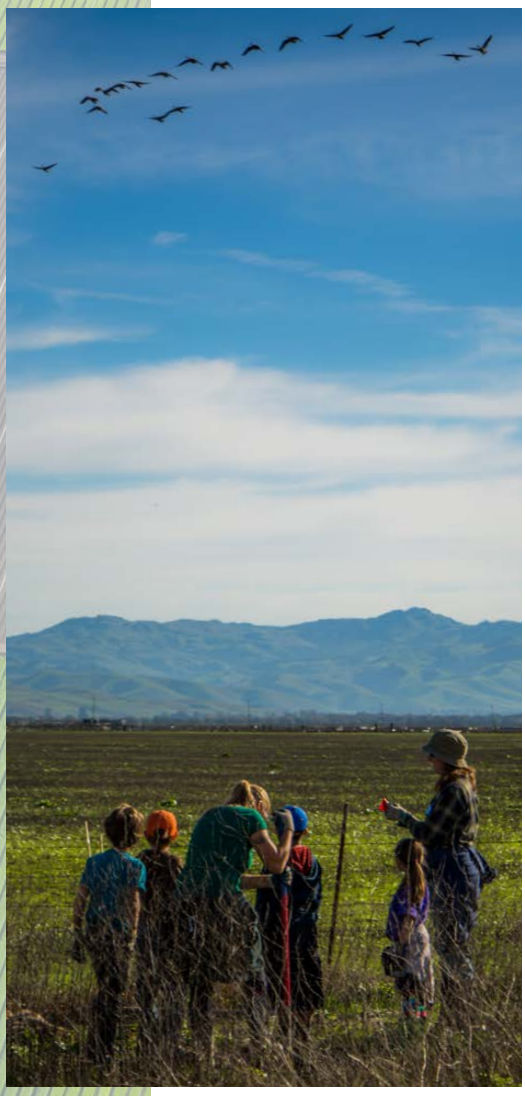
Pajaro Compass

A Network for Voluntary Conservation

The Pajaro Compass helps people to connect, learn, and partner in the Pajaro River watershed.



Pajaro Compass

Executive Summary

The Pajaro River watershed includes productive farms and ranches, rich natural areas, and culturally significant places, all at the intersection of expanding communities and growing infrastructure networks. While complex, this landscape also holds great opportunity for nature conservation and support of agriculture due to the many ways in which these places and their stakeholders overlap.

This document memorializes a process that engaged over 50 participants representing the natural resources, agriculture, and public agency spheres. Between June 2015 and June 2016, this group worked collaboratively and transparently to articulate collective values, goals and actions, and gain insight into how communication and cooperation could enhance their work.

Through narrative, maps, and other resources, this Pajaro Compass document advances understanding about the multiple benefits of the Pajaro River watershed focusing on six themes: water resources, biodiversity, agriculture, carbon and soil health, recreation, and community.

The Pajaro Compass launches a committed group of partners who champion the many values of the Pajaro River watershed for people and nature and, through coordinated action, ensure that agricultural and open space lands support these values in balance with new opportunities.

Above all, the Pajaro Compass provides a dynamic gateway for landowners and managers, public agencies, conservation organizations, funders, and elected officials to learn, connect, and engage in efforts to maintain a healthy and productive Pajaro River watershed.

Acknowledgments

The Pajaro Compass steering committee would like to thank the many willing participants from across the Pajaro River watershed region who represented conservation, agriculture, transportation, and government stakeholder interests at the Pajaro Compass meetings and working groups. Their contributions led to the formation of a vision for the Pajaro River watershed, and determined the spatial analysis, implementation strategies, and network opportunities outlined in this document. The participants in this process include:

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Leadership and technical support for this project was provide by The Nature Conservancy. Special thanks to Eliza McGovern for developing the Pajaro Compass Webmap and Megan Webb for cartography and map design.

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The Pajaro Compass document and associated online map tools are available at www.PajaroCompass.org.

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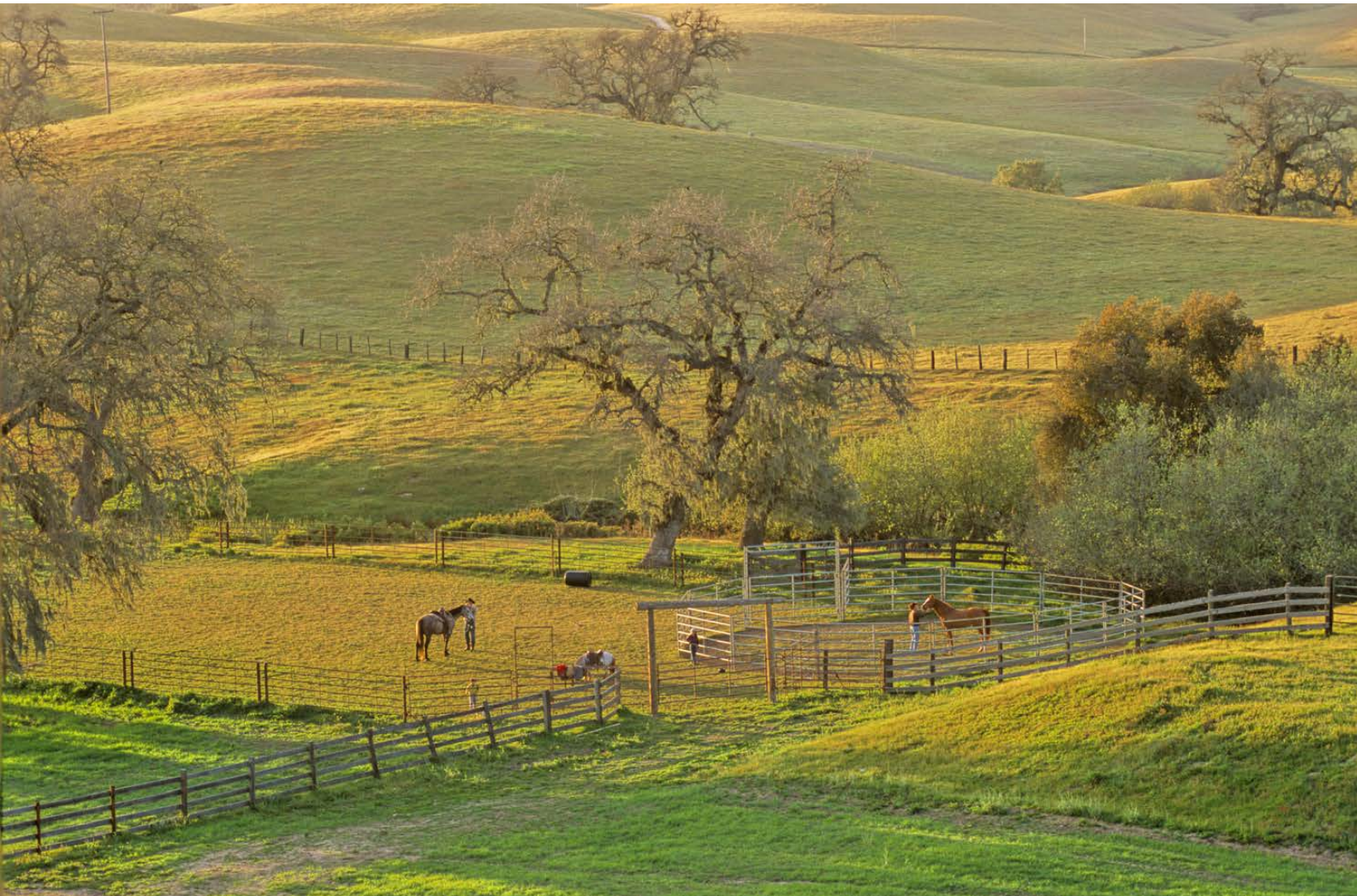
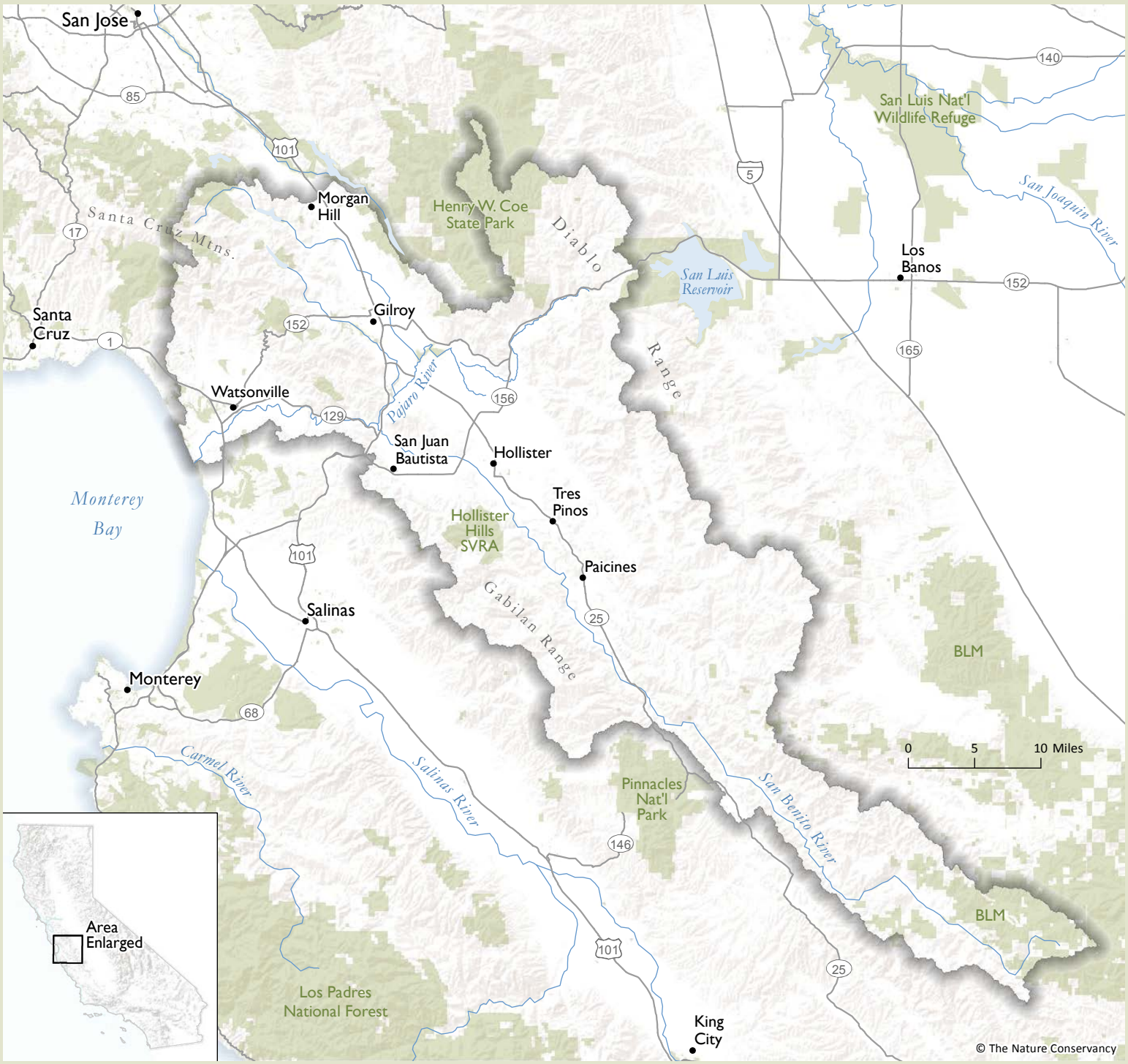
Appendices A, B, C, & D are included at the end of this document and are also available on our website: www.PajaroCompass.org





Note: This map is a product of the Pajaro Compass, a group of stakeholders who support a collaborative conservation vision for working and natural lands in the Pajaro River Watershed. It has been assembled largely from publicly available data and is not regulatory.

Pajaro River Watershed

Watershed Boundary

Public and Private Protected Lands

Figure 1. Map of the Pajaro River watershed.

Source: GreenInfo Network CPAD.



Introduction

The Pajaro River watershed is an area of approximately 1,300 square miles, and includes portions of three mountain ranges: Santa Cruz, Gabilan and Diablo. The Pajaro River watershed's rivers, tributaries, and creeks ultimately drain into Monterey Bay. Geologically complex, the Pajaro River watershed straddles the Pacific and North American Plates, bisected by the active San Andreas Fault. Lying within four counties—Santa Clara and Santa Cruz in the north, and San Benito and Monterey in the south—the region includes the cities of Gilroy, Watsonville, and Hollister and a population of approximately 140,000 people.

As a landscape, the Pajaro River watershed includes historic and productive ranches and farms, rich natural areas, culturally significant places at the intersection of expanding cities and towns, landscapes that are significant to Native Americans, and a growing transportation infrastructure network. Maintaining the complementary economic, natural and cultural values of the Pajaro River watershed is essential for the well-being of future generations. Watershed restoration, water supply protection, water quality enhancement, flood protection, agricultural economic viability, recreational and educational opportunities, and habitat protection all play a role in maintaining this unique landscape. In recent years, much has been accomplished in support of nature conservation and agricultural protection in the Pajaro River watershed, but there is a sense that there is more to accomplish in the face of sprawl, threats to agricultural viability, habitat fragmentation, and population growth.

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The difficulty of accomplishing large-scale conservation or support for agriculture in the Pajaro River watershed has been compounded by a mosaic of jurisdictions that prevent a watershed-focused effort. This has led to insufficient coordination between planning initiatives, piecemeal mitigation, and insufficient local support and capacity for conservation actions. These challenges have thwarted efforts to maintain the cultural, natural, and economic values of this important landscape.

Existing planning efforts like the Santa Clara Valley Greenprint and the Santa Clara Valley Habitat Plan have already helped to define strategic conservation actions in portions of the Pajaro River watershed. The Valley Greenprint and Habitat Plan provide important examples of how mapping resources and articulating strategies can focus efforts to support agriculture and open space lands in an urbanizing environment. However,

neither of these efforts encompass the Pajaro River watershed as a whole.

Drawing on ongoing efforts to coordinate the conservation, natural resource management and agriculture communities within the watershed, the Pajaro River Conservation Partnership began meeting informally in 2012 under the guidance of the Resource Conservation District of Santa Cruz County. The group recognized that both the environmental and economic vitality of the region are tied to maintaining the region's ranches, farms and open spaces. The Pajaro Compass grew out of this effort.

Between June 2015 and February 2016, the Pajaro Compass steering committee (comprised of The Nature Conservancy, the Resource Conservation District of Santa Cruz County, and the Santa Clara Valley Open Space Authority) convened three stakeholder meetings with a diverse group representing conservation, agriculture, transportation, and government interests. The group engaged in robust discussions and working sessions to develop a conservation vision for the Pajaro River watershed region, identify and map important landscape features, and develop an action plan focused on supporting, celebrating, and investing in the region's ranches, farms and open spaces.

The environmental and economic vitality of the region is tied to maintaining the region's ranches, farms and open spaces.

The Pajaro Compass sets the stage for future cooperation in service of six conservation themes and associated goals. In the sections to follow, each theme is discussed in further detail and accompanied by a map depicting where each theme's values touch ground in the Pajaro River watershed. Each theme also includes a list of activities that reflect ongoing and future implementation steps specific to that theme's conservation goal. The Action Plan includes conservation strategies that support multiple conservation goals.

What is the Pajaro Compass?

The Pajaro Compass is a collaborative visioning process and associated set of documents and maps that reflect the values and contributions of the participants. It highlights and builds understanding about places where cultural, economic, and multiple natural resource concerns intersect and may be leveraged to achieve multiple objectives. The supporting maps were primarily compiled from publicly-available information.

Significantly, the Pajaro Compass is neither proprietary to the participants nor is it meant to be implemented by a single organization. The Pajaro Compass Network provides ongoing support for organizations to voluntarily accomplish projects that advance one or more of the six conservation goals. The supporting maps were primarily compiled from publicly-available information.

The Pajaro Compass provides ongoing support for implementation by proposing a framework for engaged organizations committed to accomplishing projects that advance the six conservation goals—the Compass



Network. Pajaro Compass participants recognized that more effective on-the-ground project implementation will occur through participation in the Pajaro Compass Network, an ongoing forum for stakeholders to collaborate and develop project partnerships. Table 1 provides insight into how the Pajaro Compass participants view this process and the resulting document.

Table 1. What the Pajaro Compass is and what it isn't.

WHAT IT IS	WHAT IT ISN'T
A document and framework to advance the pace and scale of voluntary conservation throughout the Pajaro River watershed	An acquisition map or regulatory plan that dictates land use for any public or private entity
An initial assessment that identifies features on the landscape that are important to participants; including agriculture, biodiversity and habitat connectivity, water resources, recreation and other community values	A complete inventory of everything important within the area or a new data set
An analysis that illustrates how conservation values may work in concert with one another	A comprehensive solution for natural resource protection
A resource that helps stakeholders understand common priorities and facilitates collaboration	A requirement that Compass Network members or other stakeholders engage in projects
An ongoing and flexible forum for Compass Network members and other stakeholders to stay in touch, share resources and opportunities	A closed set of meetings with a rigid agenda
A way for Compass Network members to know where other participants are working, and what their strengths are	A commitment to work in a particular place or with a given strategy
A statement of support that addresses the needs and opportunities for keeping working agricultural lands viable	An effort to subvert private property rights

As a crucial part of this work, participants identified six themes to orient the Pajaro Compass around, spanning the natural, cultural, and economic heritage of the region: water resources, biodiversity, agriculture, carbon and soil health, recreation, and community. Next, they refined conservation goals linked to each theme that together reflect a vision for the Pajaro River watershed. Although an organization might focus on a subset of goals (or have additional goals beyond this list), the Pajaro Compass participants collectively support six conservation goals for the Pajaro River watershed:

WATER RESOURCES To conserve groundwater and surface water resources (including rivers, ponds, wetlands, and floodplains), thereby ensuring the long-term sustained benefits of these natural resources to local communities, economies, agriculture, and nature.

BIODIVERSITY To protect, steward, and restore natural communities and species, thereby ensuring the long-term health and resilience of the environment and preservation of California's unique natural heritage.

AGRICULTURE To support and enhance the economic productivity and environmental health of farms and ranches throughout the Pajaro River watershed and their continued use for agricultural production.

CARBON AND SOIL HEALTH To conserve and manage soils to enhance biological diversity and co-benefits including carbon storage, water infiltration and holding capacity, agricultural production, and positive influence on human health.

RECREATION To ensure the long-term protection and management of a regional network of parks and open space lands and to connect residents and visitors to nature- and agriculture-based recreation and learning opportunities.

COMMUNITY To engage with community members, identify common values related to conservation, invite participation, and together support projects, actions, and decisions that reflect community investment in place to ensure the long-term health and prosperity of the Pajaro River watershed.

Ways to use the Pajaro Compass

The Pajaro Compass is an entry point for participants and others to learn, connect, and engage in efforts to maintain a healthy and productive Pajaro River watershed. The Pajaro Compass document and associated online map tools are a resource for landowners and managers, public agencies, conservation organizations, funders, elected officials, and members of the public who are interested in understanding conservation needs and opportunities in the Pajaro River watershed. For willing partners, there are many voluntary strategies and activities described, as well as a framework for future collaboration. Engaging with the Pajaro Compass may take many pathways. For example,

- ***If you are a landowner or manager*** interested in voluntary conservation actions, you can explore the conservation values present in your area of the Pajaro River watershed, learn about actions that you can take to support those values, and discover some of the agencies, organizations, and technical resources available to assist you.
- ***If you are a farmer or a rancher,*** you can learn about voluntary activities and strategies that you can engage in to help achieve your natural resource objectives on your farm or ranch.
- ***If you are a conservation planner, scientist, or practitioner,*** you can find information to provide context for working within the Pajaro River watershed, as well as a network of agencies and organizations with whom you might want to collaborate.
- ***If you represent an entity working on infrastructure improvements,*** you can gain context about the natural resources in the area, and learn about strategies for avoiding impacts to those resources.
- ***If you are a funder*** you can learn about natural resource topics in the Pajaro River watershed, as well as the organizations and agencies doing projects in the watershed in line with your funding criteria.
- ***If you are seeking funding for a project,*** or need help developing a project for successful implementation, you can find information about funding agencies and network member organizations that can assist or collaborate.

The Pajaro Compass document and associated online map tools are a resource for landowners and managers, public agencies, conservation organizations, funders, elected officials, and members of the public who are interested in understanding conservation needs and opportunities in the Pajaro River watershed.

Case Studies

The Pajaro Compass highlights five case studies that describe past nature conservation and agriculture projects in the Pajaro River watershed that delivered multiple benefits and involved diverse partners. They are included, with the consent of all participants, as models of the kind of collaborations and variety of partnerships that can be created and supported through the Pajaro Compass. Each case study involves multiple partners and funding sources, and resulted in protection and enhancement of one or more of the Pajaro Compass conservation goals.

Case study 1 – Gabilan Ranch Conservation Easement, Page 33

Case study 2 – Gonzales Farm Restoration, Page 34

Case study 3 – Hain Ranch Creek Stewardship, Page 35

Case study 4 – Livestock and Land Program, Page 36

Case study 5 – Pajaro River Bench Excavation, Page 37



Pajaro Compass Maps and Spatial Analysis Tools

To support decision making among stakeholders, maps and online spatial analysis tools were developed for the Pajaro Compass. Maps and online spatial analysis tools can be used to guide siting decisions for nature conservation and agriculture strategy implementation, to help identify potential partnerships and funding sources, and to effectively communicate a conservation vision. Pajaro Compass participants identified landscape features that represented themes corresponding to participant-identified goals: biodiversity, water resources, agriculture, carbon and soil health[1], recreation, and community. Participants ranked the importance of these features for representing the multiple resources of the Pajaro River watershed, and a small working group compiled primarily publicly-available spatial data to map these features.

The working group also collected information and mapped regional influences such as land protection, transportation, and potential development. While not meant to be used for planning at a parcel-level, nor for regulatory purposes, the maps are tools for Compass Network members and other stakeholders to better understand the landscape, identify and evaluate project opportunities, realize new partnerships, and communicate about the many resources of the Pajaro River watershed.

Participants also identified tool types and functionality that would best communicate their watershed vision. Based on their recommendations, the following spatial analysis tools were developed to help participants make strategic decisions in the Pajaro River watershed:

1) Pajaro Compass Webmap[2]: The Pajaro Compass Webmap allows the user to view data layers that represent the features on the landscape for each of the themes and other regional influences in the Pajaro River watershed, and what factors may influence them. Information on data layers can also be charted for an area of interest.

2) The following tools identify regions of high overlap of resources within and across conservation themes and can be used to site conservation engagements, build partnerships, or leverage funding.

    - **Aggregated Assessments:** There are six aggregated assessments each associated with a conservation theme. These assessments identify regions of high overlap of features in the landscape that represent each theme and can be used to site conservation engagements. The six aggregated assessments can be viewed in this document (see Figures 3-9) and in the Pajaro Compass Webmap.

[1] Although the identified conservation goals determined by the stakeholders included a goal around carbon and soil health, the spatial analysis only addresses carbon stock. Because carbon stock provides a direct link to Climate Change and Carbon Stock—a primary focus identified in the Pajaro Compass Network Survey—it was the sole focus of this theme in the maps and tools. The spatial analysis does not include data or metrics related to soil health. The carbon and soil health theme section discusses both.

[2] http://pajarocompass.org/resources/webmap/



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- **Integrated Assessments:** Integrated assessments identify overlap of resources across themes and can be used to build partnerships for conservation engagements and leverage funding to benefit multiple resources. Three examples of integrated assessments can be viewed in this document (see Figures 10-12) and in the Pajaro Compass Webmap.
- **Pajaro Compass Interactive Planner**[3]: The Pajaro Compass Interactive Planner tool allows users to adjust weights given to each theme to create a user-defined integrated assessment map that reflects that user's vision for the Pajaro River watershed. It may also be used to reveal areas for potential collaborations with partners whose organizations may focus on different themes, or reveal areas where funding for a given theme may be leveraged to achieve conservation of the features of other themes.

The Pajaro Compass Webmap can show where watershed values and regional influences intersect.

The maps and tools for the Pajaro Compass are intended to communicate the conservation vision of participants and to reveal the benefits of agriculture and open space lands in a format that can be utilized in making land use and infrastructure decisions. The online map tools can be updated as conditions change over time. Both tools are available online at www.PajaroCompass.org.

[3] http://pajarocompass.org/resources/interactive-planner/

Description of the Landscape and Regional Influences

Jurisdictional Complexity

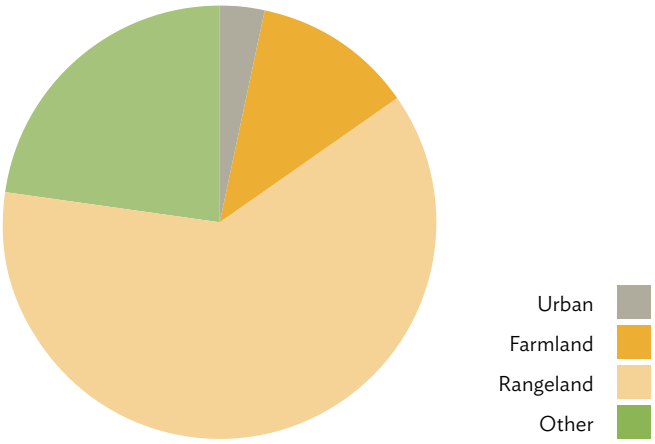
The Pajaro River watershed includes substantial portions of three counties (Santa Cruz: 62,983 acres, Santa Clara: 234,428 acres, and San Benito: 524,726 acres), and a smaller portion of Monterey County (9,784 acres). Land and water use is governed and regulated by eight county-level and subwatershed-level water districts; several municipalities including Gilroy, Hollister, Watsonville, and San Juan Bautista, among others; three major transportation agencies and districts, and multiple state and federal resource agency regions. As a consequence, coordination among agencies and other stakeholders has typically not followed Pajaro River watershed boundaries, and the benefits of watershed-scale management have not been fully quantified for the Pajaro River watershed and its communities. When it has been pursued, collaboration across jurisdictional boundaries using a watershed framework has been highly effective for achieving multiple benefits. An example is the Soap Lake Floodplain Prevention Project of the Pajaro Flood Prevention Authority which linked downstream flood prevention to $9M of funding for upstream land and water conservation.

Population Distribution, Land Ownership and Development

Gilroy (pop. 51,000) and Hollister (pop. 37,000) are the largest cities in the upper Pajaro River watershed, and Watsonville (pop. 52,400) is the largest municipality in the lower Pajaro River watershed. The northern end of the Pajaro River watershed, including half of the Upper Pajaro River floodplain, is within the political boundaries of the San Francisco Bay Area (pop. 7 million) and rapidly urbanizing edge of Silicon Valley (Santa Clara is the fastest growing county in the region) (SCOSA 2014). A few large tracts of agricultural land still exist, especially within floodplain zones, but low elevation land is, for the most part, highly parcelized and fragmented. In Santa Clara County, habitat loss and degradation has resulted in the listing of 24 species as threatened or endangered under the California or federal Endangered Species Acts.

The southern portion of the Pajaro River watershed, particularly within the upper San Benito River subwatershed, is almost the reverse in development terms: this area is dominated by large private ranches, has low population density, and is under relatively low development pressure. Projected population growth and large residential development and transportation infrastructure expansion proposals—such as the California High Speed Rail corridor and the Bolsa Study Area of the San Benito County General Plan Update—are concentrated in the central part of the Pajaro River watershed (i.e., in southern Santa Clara and northern San Benito County).

Figure 2. Land uses within the Pajaro River watershed.



Although conversion of agricultural land to residential and urban uses is most detrimental to natural resources and the services they provide to people, agricultural intensification can also have impacts on these resources and benefits. Conversion of land from low-intensity cattle grazing, for example, to row crops or vineyards, which continues to occur in some areas of the watershed such as the Upper Pajaro (Soap Lake) floodplain and San Benito River valley, can result in water quality and water availability impacts, loss of habitat for sensitive species, loss of wildlife and habitat connectivity, and release of soil carbon to the atmosphere.

These areas of potential development and agricultural intensification overlap with concentrated conservation values. Coordinated engagement by the Compass Network members could result in more beneficial and balanced outcomes for nature conservation, local communities, and regional economies.

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Infrastructure and Development

Roads and built infrastructure are concentrated in and around cities in the Pajaro River watershed. However, important transportation and water infrastructure is also found in less densely-populated areas of the Pajaro River watershed, and further development is planned.

Major road expansion and improvement projects are planned for Highways 152, 156, 25, and 101. In addition, the San Jose to Merced segment of the California High Speed Rail is expected to run along the 101 corridor to Gilroy, then turn east and bisect the Upper Pajaro (Soap Lake) floodplain and continue over Pacheco Pass. All of these projects could result in impacts to natural resources, wildlife and habitat connectivity, agricultural lands, and hydrologic function in the floodplain. They also present opportunities to leverage planning, mitigation, and restoration efforts to contribute to landscape-scale benefits for agricultural and open space lands.

New infrastructure projects can provide opportunities to engage with decision-makers to protect agricultural and open space lands.

Each water district has pumping and distribution infrastructure for water sourced from within the Pajaro River watershed. In addition, some districts have water pipelines from the Central Valley Project, via San Luis Reservoir, across the Upper Pajaro River (Soap Lake) floodplain between Gilroy and Hollister. The Santa Clara Valley Water District is currently developing a Water Supply and Infrastructure Master Plan for its jurisdiction; the San Benito Water District is considering groundwater and surface water projects; and the Pajaro Valley Water Management Agency recently completed a major water recycling and distribution system upgrade. In these and similar future projects, consideration of the Pajaro Compass goals could benefit multiple stakeholders.

There are no known major energy development plans in the Pajaro River watershed at this time, however, Pajaro Compass members may wish to track potential solar and wind development and new-generation oil and gas projects. Several large projects of this kind are moving through planning and approval processes in areas immediately adjacent to the Pajaro River watershed.

Climate change

Recent climate models predict that by mid-century the climate in the Pajaro River watershed region will experience average temperature increases between 3-10 degrees and effectively drier conditions (PRBO 2011). This could threaten water supply, lead to increased risk of catastrophic wildfire, and force plant and animal habitat shifts or population declines. Sea level rise will also increase the risk of floods and saltwater intrusion into coastal aquifers.

Conservation Plans and Restoration Projects

Multiple conservation plans and associated restoration projects have been undertaken in the Pajaro River watershed, on both open space and agricultural lands,

with the goal of protecting and enhancing terrestrial and aquatic species (including steelhead trout), wildlife and habitat connectivity, water quality and flows, and other ecosystem benefits. Recent notable reports and plans (regulatory and voluntary) include:

- The Nature Conservancy, Upper Pajaro Initial Assessment (2004)
- Pajaro River Watershed Flood Prevention Authority, Soap Lake Preservation Project (2005)
- Pajaro River Watershed Integrated Regional Water Management Plan (2007)
- The Nature Conservancy, Restoration Vision for the Pajaro River and Soap Lake (2008)
- South Santa Clara County Historical Ecology report, prepared by San Francisco Estuary Institute (2008)
- Bay Area Open Space Council's Critical Linkages: Bay Area and Beyond report (2011)
- Land Trust of Santa Cruz County, A Conservation Blueprint: An Assessment and Recommendations (2011)
- Bay Area Open Space Council Conservation Lands Network, San Francisco Bay Area Upland Habitat Goals Project Report (2011)
- California Department of Fish and Wildlife, Santa Cruz Mountains Linkages Conceptual Area Protection Plan (2012)
- Department of Fish and Wildlife, Santa Cruz Linkages Conservation Area Plan (internal report, 2012)
- National Marine Fisheries Service, South-Central California Steelhead Recovery Plan (2013)
- Santa Clara Valley Habitat Agency, Santa Clara Valley Habitat Plan (2013)
- Santa Clara Valley Open Space Authority, The Santa Clara Valley Greenprint (2014)

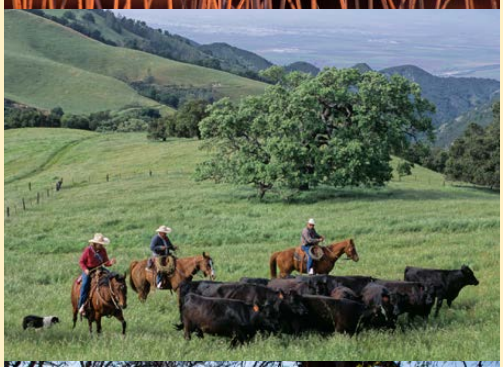
The federal Natural Resources Conservation Service and associated local Resource Conservation Districts have led or been involved in many of the private lands restoration activities that emerged from these plans, and funding (i.e., from the California Wildlife Conservation Board, U.S. Fish and Wildlife Service, and foundations) has been directed to lands and waters prioritized through these planning processes.

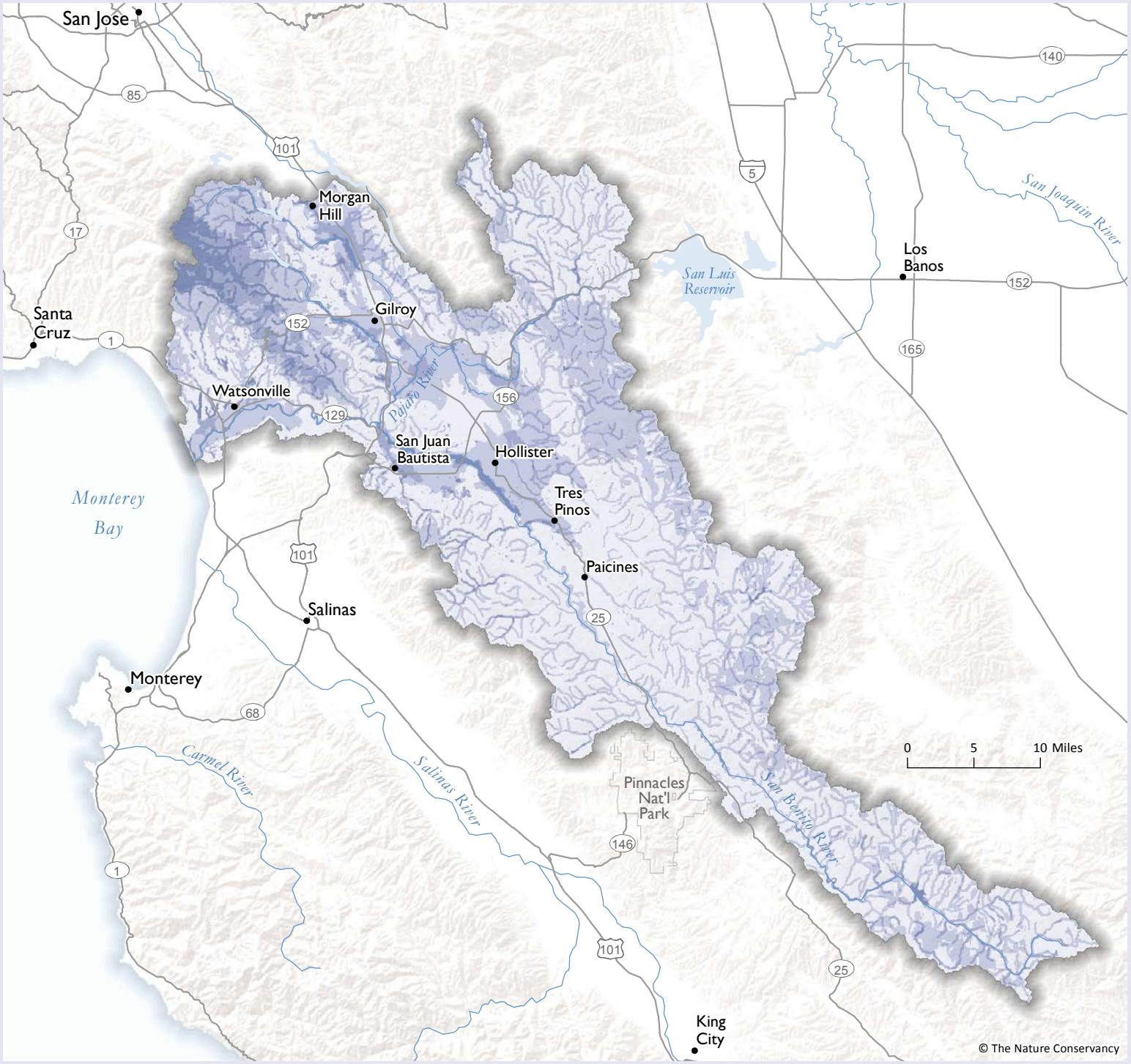
The jurisdictional complexity, distribution of population, types of land ownership, infrastructure, development and climate change, are regional influences that impact the Pajaro River watershed from beyond the boundaries of the watershed itself. In addition, current and future regional conservation plans and restoration projects have bearing within the watershed. Within the Pajaro River watershed specifically, the Pajaro Compass identified landscape features—called conservation themes—to represent and illustrate each conservation goal.

Conservation Themes, Goals, and Activities

Over a year-long meeting process, Pajaro Compass participants iteratively developed a set of goals for the Pajaro River watershed. Each conservation goal corresponds to a mapped theme. Participants identified landscape features that represented each theme and the working group focused on science and tools compiled primarily publicly-available spatial data to illustrate these features. The mapped themes that follow describe these landscape features. Because the spatial data on soil health conditions is limited mostly to soil carbon, the theme is referenced as carbon and soil health, and includes aboveground as well as belowground carbon stock. The data representing landscape features is available for further exploration in the Pajaro Compass Webmap.

Following is a summary of conditions in the Pajaro River watershed for each of the conservation themes, followed by an associated conservation goal that was developed through input from Pajaro Compass participants. For each goal, the Pajaro Compass outlines activities and points of engagement which were developed with input from participants, as well. Each activity can be implemented as appropriate for an organization's needs, goals, and scope.





Note: This map is a product of the Pajaro Compass, a group of stakeholders who support a collaborative conservation vision for working and natural lands in the Pajaro River Watershed. It has been assembled largely from publicly available data and is not regulatory.

Water Resources

Based on the weighted overlap of the following features: riparian corridors, wetlands, groundwater, water quality, floodplains, and runoff

- Most Overlap
- High
- Medium
- Low

Figure 3. Water resources in the Pajaro River watershed.

Each theme is made up of landscape features that were weighed based on stakeholder input. See Appendix B for data sources and Appendix C for methods. Sources: FEMA Flood Hazard Zones, USFWS NWI, EPA California Integrated Assessment of Watershed Health Active River Areas and Water Quality Index, NHDPlus Streams, USGS Basin Characterization Model for Recharge and Runoff, DWR Hydrogeologically Vulnerable Areas, NRCS SSURGO Flood Frequency.

Water Resources

Water resources refer to the rivers, lakes, wetlands, and other freshwater ecosystems that support and deliver services to people. As California has become one of the most productive agricultural and urban landscapes in the world, aquatic and wetland habitats have been reduced to a fraction of their historic extent. Surface water and groundwater are of utmost importance to people and nature, and in the Pajaro River watershed the majority of water use is for agriculture, almost all of which is supplied by groundwater.

Within the roughly 1,300 square mile watershed, the primary tributaries to the Pajaro River include the San Benito River, Pacheco Creek, Llagas and Uvas Creeks, which, together with the mainstem, comprise over 8,400 acres of active river area. The Pajaro River watershed contains two major floodplains.

The Upper Pajaro (Soap Lake) floodplain, located between Gilroy and Hollister, is a natural detention basin of approximately 5,700 acres (FEMA 10-year floodplain boundary). In its current condition, with primarily agricultural and natural land cover, the basin can provide up to 15,000 cubic feet per second reduction—enough water to fill up an Olympic-sized swimming pool every five seconds—in peak flows (RMC 2003) to the Lower Pajaro River, which protects communities in the lower floodplain, including Watsonville and Pajaro. The value of this natural flood risk mitigation is at least $60M (RMC 2003)—the minimum cost to harden infrastructure in the Lower Pajaro River and floodplain to convey those additional flood waters.

The Lower Pajaro floodplain is the focus of the Pajaro River Flood Risk Reduction Project, a federally-led effort to plan, redesign, and engineer a system of levees originally constructed in 1949 to protect the communities of Watsonville (Santa Cruz County) and Pajaro (Monterey County) from major flooding. The levees run along the lower Pajaro River (12 miles from the Pacific Ocean to Murphy's Crossing Road) and Corralitos/Salsipuedes Creeks in Santa Cruz County (8 miles), and offer partial protection to urban and agricultural areas of the Pajaro Valley. Santa Cruz and Monterey county governments, as non-federal project sponsors, are actively engaged in the planning effort which is scheduled to conclude in June 2018 with a final engineering report and EIS/EIR document. This levee redesign takes into account the flood risk reduction provided by the Upper Pajaro (Soap Lake) floodplain, and the supervising agency has funded conservation easements on agricultural properties in the Upper Pajaro (Soap Lake) floodplain with the understanding that agricultural operation benefits flood risk reduction goals.

The Pajaro River watershed contains two major groundwater sub-basins ranked as high priority under the California State Groundwater Management Act of 2014, totaling 38% of the watershed (100,981 acres, located primarily in Santa Clara and Santa Cruz Counties). An additional 52% (136,427 acres) of the watershed (mostly in San Benito County), is ranked as moderate priority. Those areas, which total 90% of the watershed, are mandated to complete sustainable groundwater management plans by 2022 and achieve groundwater sustainability by 2040. Areas that have relatively higher groundwater recharge rates are located in the Santa Cruz mountains (Santa Cruz and Santa Clara Counties), and the foothills of the Diablo range (Santa Clara and San Benito Counties), however



these areas are not necessarily connected through subsurface hydrology to the areas that are pumped to provide water for human consumption and irrigation. Areas with higher runoff rates are generally located in the higher elevation areas of the watershed, as well. The majority of the Pajaro River watershed—including large areas at lower elevation—has poorer surface water quality conditions and contains waterways listed as impaired under section 303(d) of the Federal Clean Water Act for nutrients and other pollutants (CWRCB 2010). These water quality impairments have historically been driven by soil disturbance and inputs from urban and agricultural uses, as well as steep topographic conditions and erosion-prone geologic conditions and soils in some areas.

Water Resources Conservation Goal: To conserve groundwater and surface water resources (including rivers, ponds, wetlands, and floodplains), thereby ensuring the long-term sustained benefits of these natural resources to local communities, economies, agriculture, and nature.

Clean water is a critical need for nature conservation, sustainability of agricultural lands, and the social well-being of the Pajaro River watershed. Even so, surface water quality is impacted by sediment, nutrients, and diminished streamflow in portions of the Pajaro River watershed. Groundwater basins in several areas are in a state of overdraft, and some basins are impacted by salts and nutrients. Floodplains provide important natural protection from flood risks, and can reduce costs of traditional flood control infrastructure projects. Voluntary activities that conserve groundwater and surface water resources may include:

- Identify priority riparian corridors that would benefit from enhancement and implementation of restoration or best management practices.
- Identify current or former wetlands—including floodplains—that would benefit from enhancement or protection; and protect, restore, and/or adjust water management in these priority areas, as appropriate and feasible.
- Seek water rights agreements with willing landowners to dedicate more water to instream use.
- Influence groundwater law implementation, fostering coordination between water districts and water management agencies to protect water supply and quantity for agricultural lands and groundwater-dependent ecosystems and species.
- Encourage conservation organizations to contribute to or actively participate in existing Integrated Regional Water Management planning efforts focused on the watershed.
- Develop advance mitigation strategies that will better facilitate actions that protect, enhance, and restore riparian corridors and wetlands.

Biodiversity

Biological diversity, or biodiversity, is the variety of organisms at all levels, from microbes to mammals. Habitat is the vegetation and other elements of the environment that support these organisms. Increasing biodiversity and habitat is associated with higher ecosystem functioning and benefits from nature such as pollination, pest management, water supply and quality, and soil nutrient cycling (MEA 2005).

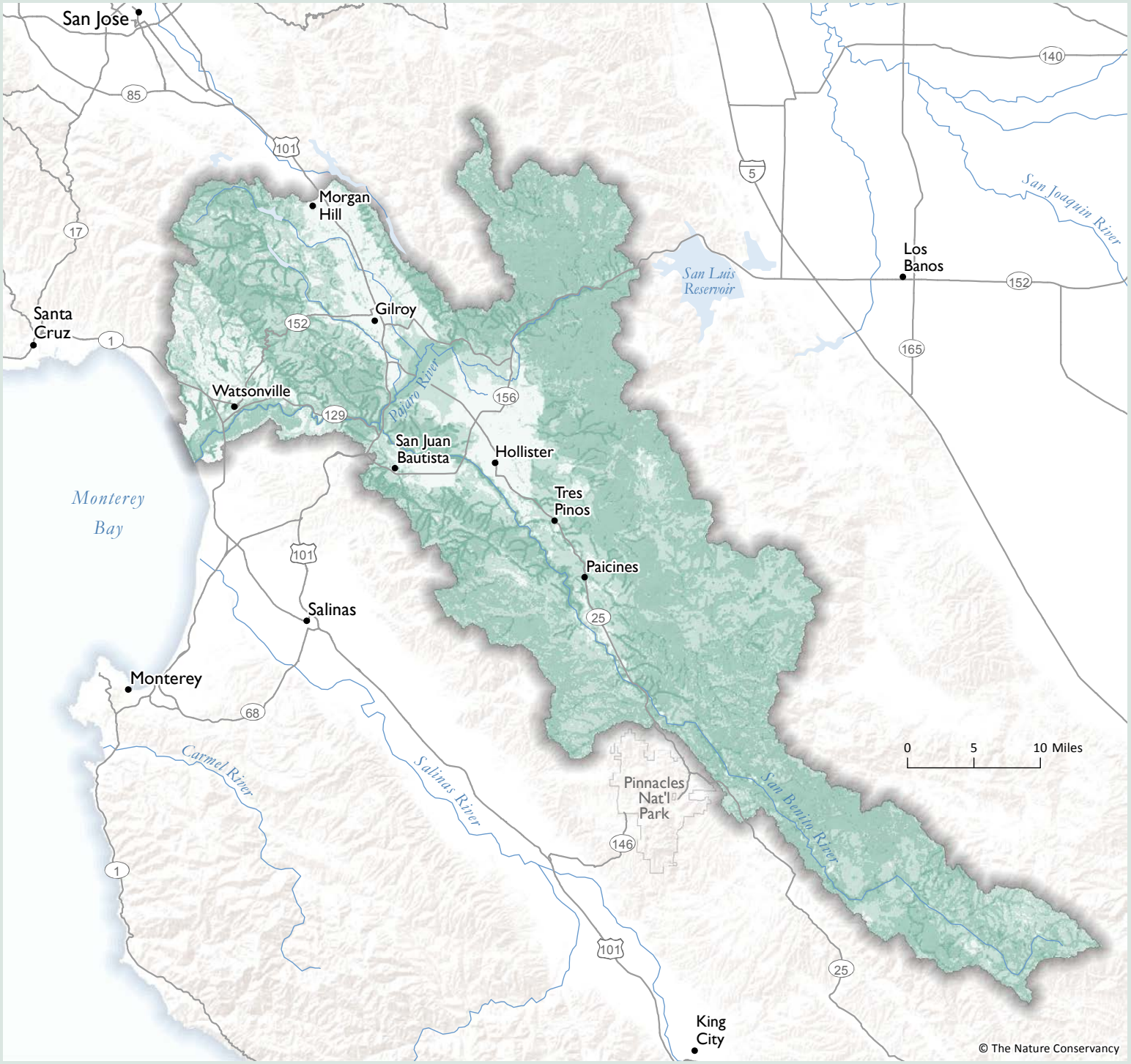
The Pajaro River watershed has a high degree of habitat and species diversity. It is located within the California Floristic Province, which is globally recognized as both a biodiversity hotspot and a region at extreme risk of biodiversity loss (Myer *et al.* 2000, Hoekstra *et al.* 2005). Fragmentation, land conversion and intensification, impacts from invasive species and changing climatic conditions are already impacting the biological resources within the Pajaro River watershed, despite the many valuable benefits these resources are able to provide to residents in the face of such pressures. To date, 31 species of plants and animals found within the watershed have been listed as threatened or endangered under the California or federal Endangered Species Acts. Over 100 Pajaro River watershed species have been identified through a global assessment as at-risk. Outside the urban areas and cultivated agriculture, most of the Pajaro River watershed is composed of grassland (~319,000 acres) and woodland and forested lands (~254,000 acres).

The Pajaro River watershed contains approximately 242 miles of perennial waterways, 1,719 miles of seasonal waterways and approximately 9,200 acres of surface water features. However, on average, close to 30% of aquatic species within each subwatershed are considered vulnerable to extinction. This can be due to water quality, habitat loss, or habitat change. For example, over 100 partial or full fish passage barriers exist along waterways in the Pajaro River watershed, limiting migration and reproduction for important and/or imperiled species like steelhead trout.

Although lands specifically managed for biological diversity such as parks and open space lands are critical for the maintenance of species and natural communities over time, agricultural lands also support much of the Pajaro River watershed's biodiversity. Rangelands in the region especially provide abundant high quality habitat for many species, and connectivity value.

The Pajaro River watershed provides regionally-critical movement pathways for wildlife. The upper Pajaro River watershed—which includes portions of the Santa Cruz, Diablo, and Gabilan ranges—primarily consists of working ranches and other low intensity land uses, which can provide core habitat and permeable move-through zones for a variety of species from carnivores to deer and birds. The valleys, floodplains, and foothill riparian corridors, are overall more intensively developed compared to the higher elevation portions of the Pajaro River watershed. However, the network of creeks, floodplain features, and other narrower connection points still provides corridors for animals to move and disperse among the larger blocks of habitat found in the upper Pajaro River watershed.

Significant connectivity planning efforts have been undertaken by stakeholders prior to the Pajaro Compass planning process, including California Department of Fish and Wildlife (CDFW 2012) and the Bay Area Open Space Council (BAOSC 2011). Connectivity-focused stewardship projects in the region have begun as well, such as on the Gonzales property currently owned by The Nature Conservancy near Gilroy (see Case Study 2). Examples of connectivity plans in other regions currently



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Biodiversity

Based on the weighted overlap of the following features: permeable lands, habitat, threatened and endangered species, species richness, aquatic diversity, rare species occurrences, serpentine soils

- Most Overlap
- High
- Medium
- Low

Figure 4. Biodiversity in the Pajaro River watershed.

Each theme is made up of landscape features that were weighed based on stakeholder input. See Appendix B for data sources and Appendix C for methods. Sources: CDFW NDDB, CDFW CWHR, Bay Area Open Space Council Critical Linkages, TNC Freshwater Assessment, Permeability, Habitat-suitability Weighted Richness, FRAP FVEG, USGS CGAP, NHDPlusV2 Seeps/Springs, USFWS NWI.

in advanced implementation phase that may be models for the Pajaro region include the Sonoma Valley Wildlife Corridor and the South Coast Missing Linkages project.

Connectivity—through both permeability and corridors—provides a critical ecological function. The ability to move and disperse maintains healthy populations of wildlife by allowing for genetic interchange. This is particularly essential for top predators which are considered keystone species because they stabilize food webs, in turn supporting resilience in natural communities. In addition, as precipitation patterns change and temperatures increase in the coming years and decades, plant communities and wildlife are expected to need to move accordingly, in order to survive. Habitat connectivity is therefore essential to climate adaptation for natural communities.

Roads and built infrastructure typically deter wildlife movement, but can be managed to support wildlife corridors, particularly along waterways that are natural pathways for many wide-ranging species. Protection and restoration of riparian areas can provide multiple benefits beyond wildlife movement, including water and air quality enhancement, pest control and pollination services for nearby farms, and carbon storage. Examples of transportation infrastructure engineering and management for wildlife movement include: building appropriately-sized culverts and crossing structures, elevating new infrastructure, regularly clearing vegetation adjacent to culverts, installing directional fencings on adjacent lands, and enhancing vegetation in drainages that feed into crossing areas.

Biodiversity Conservation Goal: To protect, steward, and restore natural communities and species, thereby ensuring the long-term health and resilience of the environment and preservation of California's unique natural heritage

With species and habitat unique to the region, the Pajaro River watershed's natural resources are important to protect and maintain into the future. Through stewardship and management, protection of important habitats and species, and restoration activities, natural areas can be restored and managed to allow species to

move safely and efficiently. Voluntary activities that protect, steward, and restore natural communities and species may include:

- Develop advance mitigation strategies for infrastructure projects occurring in the Pajaro River watershed including California's High Speed Rail, and road and highway improvements.
- Develop agreements that conserve or set aside lands from potential impacts.
- Maintain or build culverts and bridges for wildlife and habitat connectivity.
- Communicate wildlife needs and potential impacts at the outset of transportation projects to ensure that connectivity is maintained.
- Conduct bi-annual Pajaro River watershed meetings or workshops to develop working relationships, and provide an opportunity for information sharing, coordination, and presentations on topics of interest. Publicly-noticed meetings will be held to better develop working relationships, provide an opportunity for information sharing, coordination, and presentations on topics of interest. These meetings should be rotated geographically throughout the Pajaro River watershed.
- Foster coordination between private landowners, farmers, ranchers, land managers, conservation organizations, and government agencies.
- Act as a communications hub for conservation and land stewardship. For example, develop a website to contain mapping products that will contain news and other information regarding current opportunities, items of interest, and projects.

Agriculture

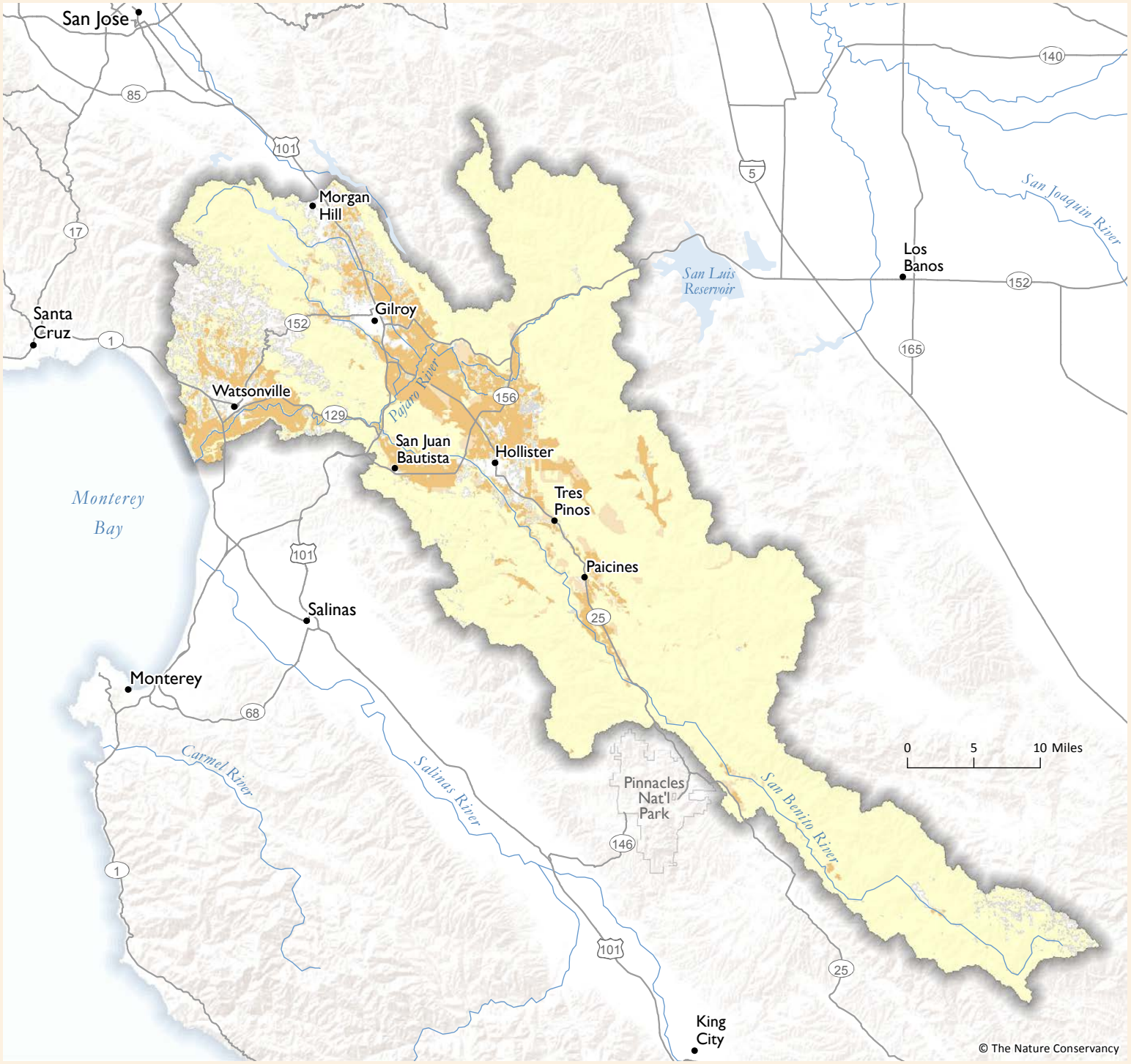
Agriculture provides significant benefits to a community, contributing to the economy and providing a way of life, food and fiber, and other benefits for people. In addition to food and specialty crops, agricultural lands can contribute to soil productivity, greenhouse gas mitigation, and aesthetic and open space value. In the Pajaro River watershed these lands comprise the majority of the area's landscapes. The loss or degradation of these productive agricultural lands from conversion to more intensive land uses could have negative impacts on important benefits provided to people from nature in the Pajaro River watershed like groundwater recharge and flood control.

The Pajaro River watershed has a long and storied history in agriculture. The Miller Canal, which bisects the Upper Pajaro floodplain, was completed in 1874, by which time cultivated agriculture was already a significant land use. Gilroy has long been synonymous with agriculture due to its famous garlic production. The area has more recently been a pioneer in development of bagged salad mixes, with San Benito County leading the Pajaro River watershed in production with $60M per year of leafy greens crop value. The agriculture industry in the area has also been a leader in organic farming and specialty crop production, contributing to the Bay Area's local food movement. The region has also been an innovator in warmer-climate berry production; for example, Santa Cruz County produces $197M worth of strawberries per year (NASS 2010). By area, agricultural lands continue to dominate the Pajaro River watershed. Fully 62% of the Pajaro River watershed is rangeland, primarily privately-owned ranches, some of which date back to Spanish land grants and have been in continuous family-held ownership for five generations or more. Row crop agriculture is also still a significant land use despite booming residential and urban development in nearby Silicon Valley and San Francisco Bay Area; crops are cultivated in the Gilroy and Hollister areas, the San Juan Valley along the San Benito River, and in the coastal floodplain around Watsonville. A total of 96,430 acres (12%) of the Pajaro River watershed contains 'Prime' or otherwise 'Important' agricultural soils (as defined by the USDA).

Across California and in this region, the most productive agricultural lands are being converted to residential and urban land uses more rapidly than steeper, less productive lands, partially due to the relative ease of development. The loss of row crop agriculture to development in this watershed would not only damage the agricultural industry, but also exacerbate flood risk concerns in the coastal cities. Agricultural lands and other open space provide significant benefits from nature to the region. Table 2 provides a per acre estimate of the value of some of these benefits.

Table 2. Estimated values of benefits from agriculture. Adapted from Santa Clara County Agricultural Commissioner's Office 2014 report (The Economic Contribution of Agriculture to the County of Santa Clara.)

Benefits	Low Value per acre ($)	High Value per acre ($)
Flood Control	40	85
Groundwater Recharge	55	70
Water Quality	25	30
Pollination	20	65
Biodiversity	20	30
Open Space	450	1,000



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Agriculture

Based on the weighted overlap of the following features: farmland, rangeland, undeveloped, previously farmed

- Farmland
- Rangeland, previously farmed
- Rangeland
- Undeveloped, previously farmed
- Non-Agriculture

Figure 5. Agriculture in the Pajaro River watershed.

Each theme is made up of landscape features that were weighed based on stakeholder input. See Appendix B for data sources and Appendix C for methods. Sources: CA Department of Conservation Farmland Mapping and Monitoring Project, FRAP FVEG.

Agriculture Conservation Goal: To support and enhance the economic productivity and environmental health of farms and ranches throughout the Pajaro River watershed and their continued use for agricultural production

Sustainable, economically viable agricultural lands are central to the health of the Pajaro River watershed. Agricultural lands in the Pajaro River watershed contribute to the local economy, provide food and fiber for export, as well as a suite of benefits from nature, and wildlife and habitat connectivity. Voluntary activities to support and enhance the economic productivity and conservation values of agricultural lands may include:

- Seek input from agricultural operators and landowners regarding how Pajaro Compass implementation activities may support their profitability and long-term stability.
- Create an outreach program that focuses on explaining the value, needs, and benefits of local agriculture to the conservation community, decision-making agencies, elected officials, and the general public.
- Build the capacity of technical service providers and non-governmental organizations and programs that support and provide assistance to farmers and ranchers. Examples include Resource Conservation Districts, University of California Cooperative Extension, Natural Resources Conservation Service, and others.
- Convene interested farmers, ranchers, land managers, private landowners, organizations, and associations (e.g., Resource Conservation Districts, Cattlemen's and Cattlewomen's Associations, California Farm Bureau) to identify common concerns, needs, and objectives, and prioritize and coordinate multi-benefit actions.
- Foster regular communication and help guide efforts related to watershed management, regulation, conservation planning, and resource support.
- Amplify the work of organizations and programs that provide technical assistance and funding to farmers and ranchers. Examples include Resource Conservation Districts, University of California Cooperative Extension, Natural Resources Conservation Service, agricultural land trusts, and others.
- Develop a permit streamlining/coordination program for conservation/restoration actions.
- Investigate and pursue opportunities for incentive-based agricultural programs (for example around water supply, flood protection, connectivity, and conservation).
- Prioritize conservation easements within agricultural areas adjacent to growing cities to maintain greenbelts, support agricultural land uses, and direct urban growth to incorporated areas.

Carbon and Soil Health

Carbon and soils are integral to ecosystems and agriculture as they provide vital services to sustaining life and supporting economies. Soil health is interpreted as the soil's ability to perform functions such as maintaining water and air quality, sustaining plant and animal productivity, and supporting human health. As belowground carbon storage is a key indicator of soil health and provides significant climate change mitigation, the amount of soil carbon is used as an indicator of soil health.

In the case of the Pajaro River watershed, soils serve to increase water infiltration and holding capacity, improve biodiversity, and play a role in climate change mitigation. Specifically, avoiding conversion of working rangeland—currently the dominant land use in the Pajaro River watershed—to more intensive agriculture or urban uses, also protects the atmosphere from releases of stored belowground carbon that would result from tilling or disturbance. Certain grazing management and on-farm practices may also enhance soil organic matter and carbon sequestration, resulting in greenhouse gas emissions mitigation.

In the Pajaro River watershed, aboveground carbon storage varies widely, but averages 12,200 lbs/acre (13.7 Mg/ha). High-biomass areas are primarily found in coastal and more mesic (moist) upland forest, woodland, and chaparral/shrub vegetation types throughout the Santa Cruz mountains and Gabilan mountains in San Benito County, and in some drainages in the Diablo range in the eastern part of the Pajaro River watershed. Belowground carbon storage within the top 30 cm of soil averages 3,273 lbs/acre (3.67 Mg/ha) on average. It is likely that significant soil carbon losses have occurred due to urban and/or agricultural development and associated release from the top layer of soil; some of this may be restorable through active management of soil resources for carbon sequestration. Soil carbon is high in the Santa Cruz mountains, but in general, is higher in lowlands and coastal areas in the Pajaro River watershed as compared to the mountains (see Figure 6).

Carbon and Soil Health Conservation Goal: To conserve and manage soils to enhance biological diversity and co-benefits including carbon storage, water infiltration and holding capacity, agricultural production, and positive influence on human health

Although the definition of "healthy soil" will vary depending on site-specific goals, land use history, and underlying conditions, healthy soils in the context of agriculture are often defined as soils that are high in soil organic matter, or soil carbon content. Soils high in organic content can provide multiple benefits, including nutrients for plants, increased water holding capacity, improved biodegradation of pollutants, carbon storage, higher crop yields in row-crop fields, and reduced erosion. Because development typically leads to soil degradation and carbon release, agricultural lands in the Pajaro River watershed (where most of the soil resources exist today) provide the best opportunities for enhancement.

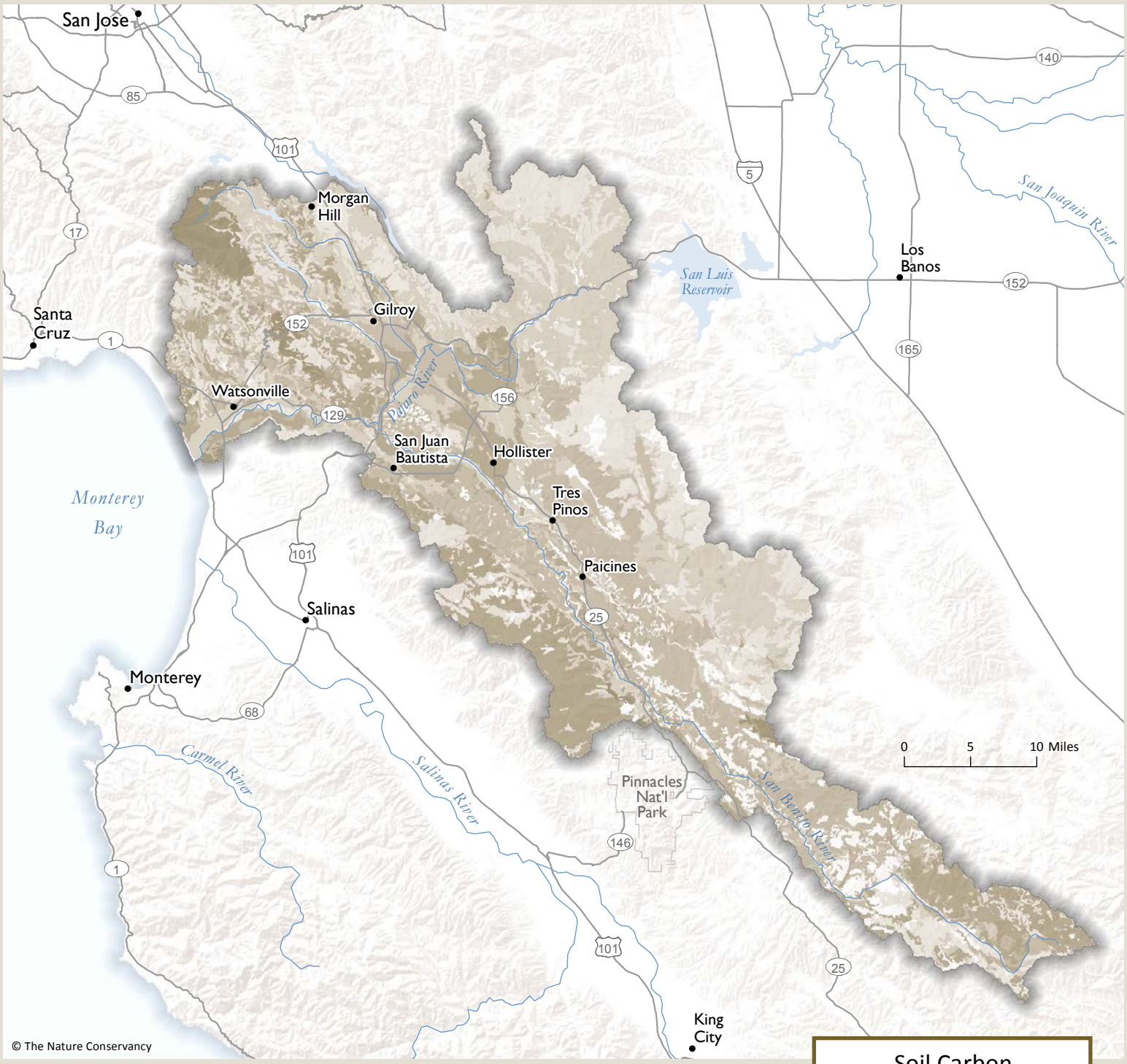

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Figure 6: Belowground carbon in the Pajaro River watershed.

Each theme is made up of landscape features that were weighed based on stakeholder input. See Appendix B for data sources and Appendix C for methods. Sources: NRCS gSSURGO Soil Organic Carbon 0-30cm

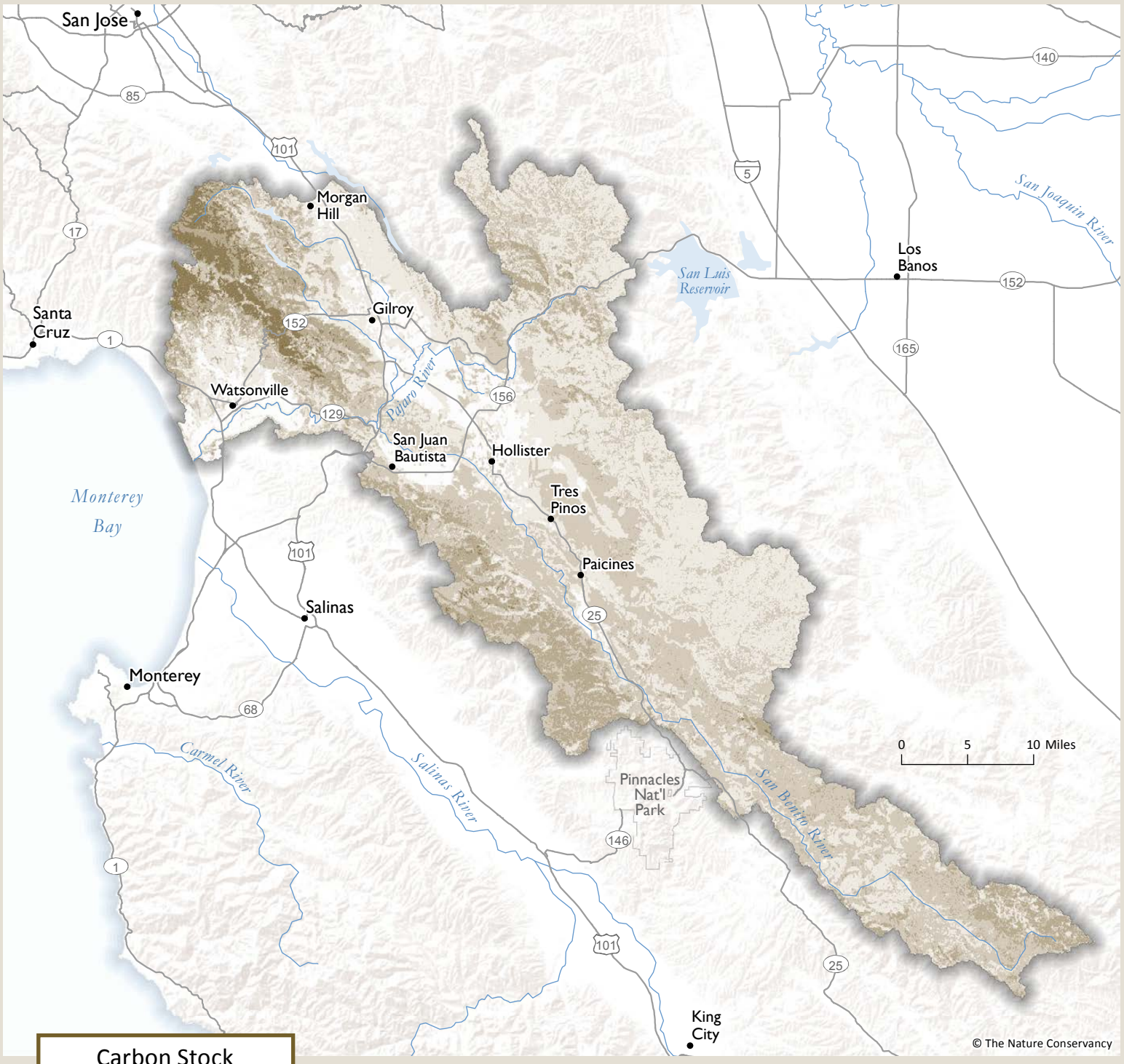

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Figure 7: Releasable carbon stock in the Pajaro River watershed.

Each theme is made up of landscape features that were weighed based on stakeholder input See Appendix B for data sources and Appendix C for methods. Sources: NRCS gSSURGO Soil Organic Carbon 0-30cm, Gonzalez Aboveground Carbon.




Voluntary activities to conserve and manage soil resources to protect and enhance their health including their ability to store carbon may include:

- Build the capacity of technical service providers and non-governmental organizations and programs that support and provide assistance to private landowners, farmers, ranchers, and land managers (e.g., Resource Conservation Districts, University of California Cooperative Extension, Natural Resources Conservation Service, California Department of Food and Agriculture, and others).
- Facilitate peer-to-peer network sharing and support implementation of demonstration projects.
- Investigate opportunities for incentive-based agricultural soils enhancement programs, such as the California Department of Food and Agriculture's Healthy Soils Initiative.
- Avoiding conversion of land to higher-intensity land uses as an important component of protecting soils.

Recreation

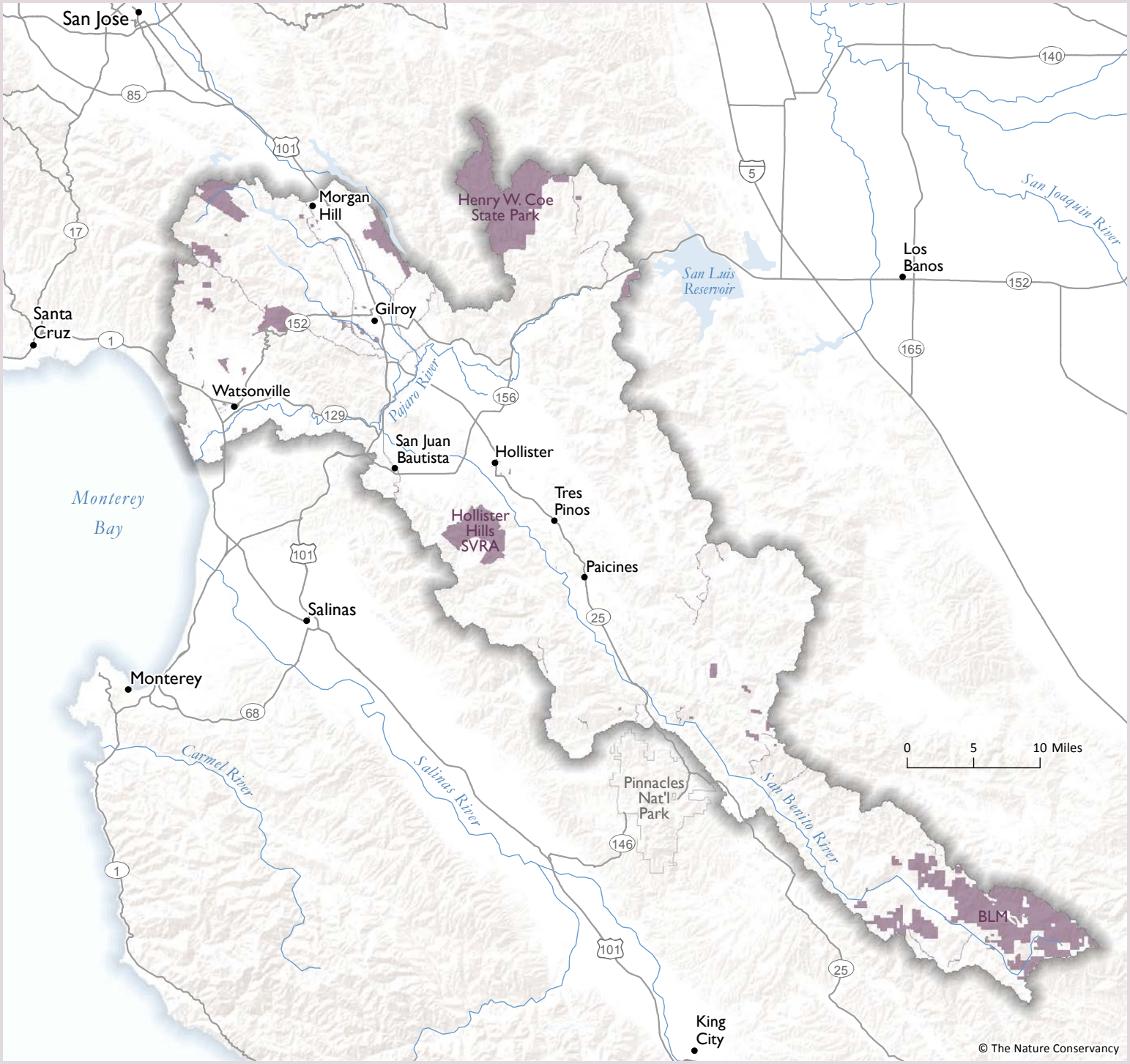
Recreation in public parks and open spaces is intrinsic to human health and well-being. In addition, parks and open spaces provide valuable benefits from nature such as clean air and water, and play a role in local and regional economies. Parks and open spaces also provide critical habitat for threatened and endangered species, and can include grazed lands that contribute to a community's agricultural economy and heritage.

Although the Pajaro River watershed is largely comprised of privately-owned lands, there are a number of parks, trails, and open spaces distributed throughout the watershed for residents. These include beaches along Monterey Bay, the Pajaro River canoe launch in Watsonville, small local parks available for a variety of public uses, especially in Santa Cruz and Santa Clara Counties, larger open space preserves such as those managed by the Santa Clara Open Space Authority, and large county parks including Joseph D. Grant in the Diablo range and adjacent Henry Coe State Park—which is the second largest in the California State Parks system at over 87,000 acres—and Bureau of Land Management lands, some of which are accessible to off-highway vehicles. Hollister Hills State Vehicular Recreation Area is a state park which draws thousands of visitors to San Benito County every year, and also has hiking, mountain-biking trails, and leases grazing land within the State Park. While outside the Pajaro River watershed boundary, Pinnacles National Park may be accessed via Hollister and the Pajaro River watershed. A map of publicly-accessible trails and parks can be found in Figure 8.

Recreation Conservation Goal: To ensure the long-term protection and management of a regional network of parks and open space lands and to connect residents and visitors to nature- and agriculture-based recreation and learning opportunities

Parks and open spaces provide critical habitat for threatened and endangered species and a suite of benefits from nature that sustain our local communities. Activities that ensure the long-term protection and management of a regional network of parks and open space lands may include:

- Encourage growth planning that maintains wildlife and habitat connectivity between open space areas.
- Communicate threats and values through maps and other digital information to better direct infrastructure improvements away from current or potential parks and open space areas.
- Develop advance mitigation or other programs that will better facilitate mitigation actions that protect, restore, and steward parks and open space areas.
- Recognize the role of grazing on open space lands as an important natural resource management technique and continue to build understanding between ranchers and open space managers.
- Engage local communities in the planning process to identify and prioritize areas for future parks that meet the needs of underserved communities and park-poor areas.



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Recreation

Based on the weighted overlap of the following features: public open space, trails

Public Open Space and Trails

Figure 8. Open-space recreation lands in the Pajaro River watershed.

Each theme is made up of landscape features that were weighed based on stakeholder input. See Appendix B for data sources and Appendix C for methods. Sources: GreenInfo Network CPAD and CCED, Greenbelt Alliance, National Geospatial Intelligence Agency.

Community

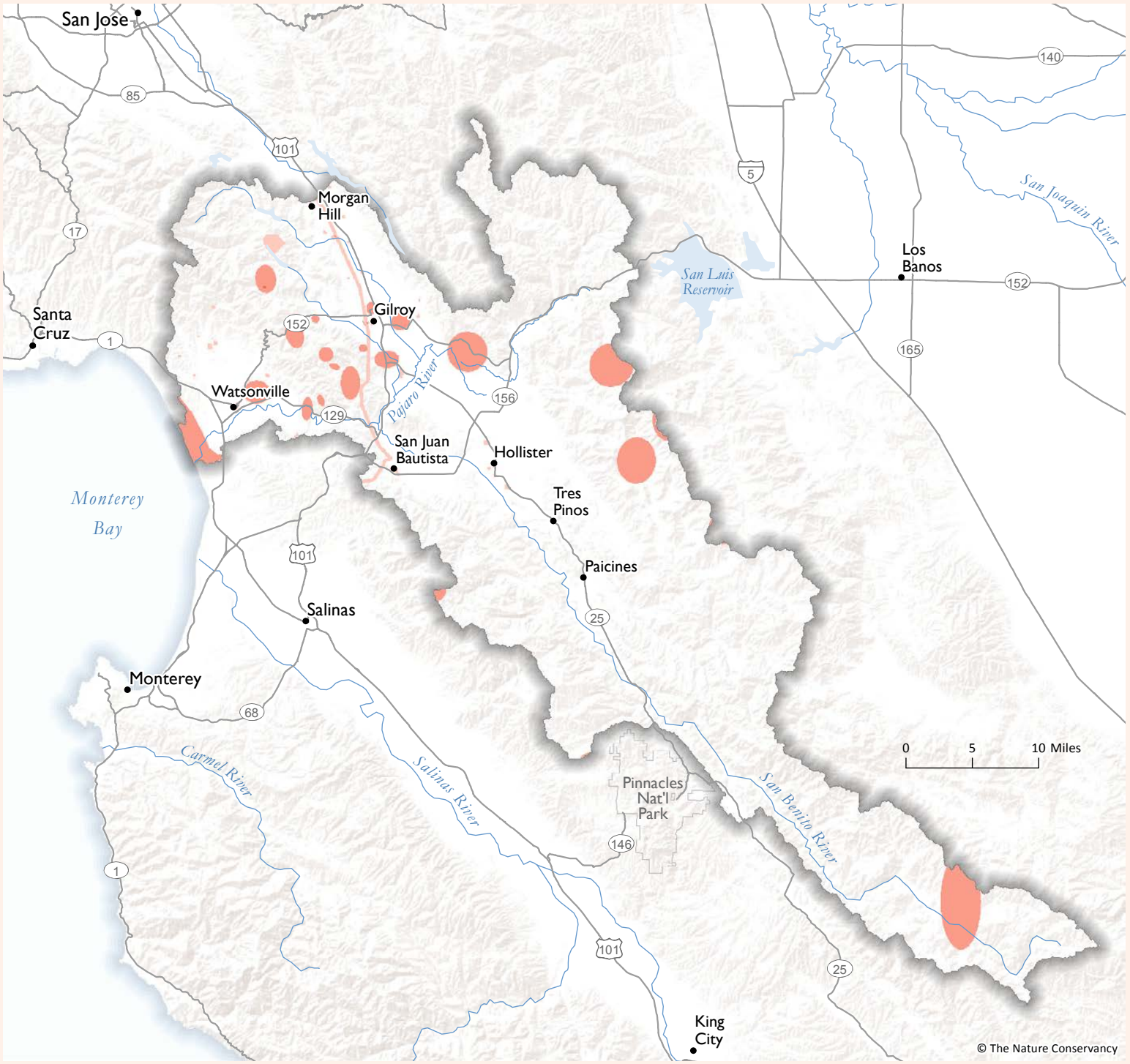
Community in the Pajaro River watershed includes the population of residents dwelling both in the area's cities, as well as other residents scattered in smaller towns, and in rural areas such as private ranches and farms. It also includes workers who commute from other regions to contribute to the local economy. Though consisting of a complex intersection of four counties, and numerous other local, state, and federal civic jurisdictions, the Pajaro River watershed's residents all share a stake in the long-term health of the Pajaro River watershed ecosystem. The area's native peoples, including the Amah Mutsun and Ohlone groups, have called the Pajaro River watershed home for millennia and left their mark on the culture and landscape. Cesar Chavez's farm worker movement also has deep roots in the area. Many current residents have built their livelihoods around the agricultural heritage of the region, which is reflected in the many farms with on-site markets in the area. The active ranching community participates in rodeos, horse shows, county fairs, and other cultural heritage events. In addition, the Pajaro River watershed includes the site of an early Spanish Mission (San Juan Bautista) and associated trade and travel route (El Camino Real), as well as at least one major battle around California's statehood, memorialized at John C. Fremont State Park. Historical and cultural sites can serve the community as reminders of a shared California heritage, as well as recreational places where residents gather to picnic, hike, watch the night sky, or camp.

The agricultural and open space areas within the Pajaro River watershed provide opportunities for the community members to experience and engage with the natural world, learning about the benefits it provides to people, the economy, plants, and animals. The cultural sites within cities, towns, and in open space and agricultural areas can be places to connect different segments of the community and build support for the many values of the Pajaro River watershed.

Community Conservation Goal: To engage with community members, identify common values related to conservation, invite participation, and together support projects, actions, and decisions that reflect community investment in place to ensure the long-term health and prosperity of the Pajaro River watershed

Conservation activities are varied throughout landscapes that support multiple habitats and species, agricultural-based economies and communities, water resources, and recreation. Clear communication and outreach is important for understanding the effect of this wide variety of conservation efforts on a landscape and its communities. Educational efforts focused on field workshops and restoration activities, current conservation topics, economics, case studies, technical topics, monitoring, and threat analysis all help to build a more informed community that can plan for a future that includes conservation priorities. Activities that engage community members in conservation actions may include:

- Develop communications materials based on this document.
- Facilitate dialogue among local officials, agricultural leaders, and others to spur opportunities for open space and agricultural conservation.
- Build education and research components into projects where appropriate, using Compass Network partners as resources for connections to local K-12 schools, universities, community colleges, 4-H clubs, Boy and Girl Scout troops, environmental education groups, and others.
- Support efforts by the region's tribal groups to restore and protect areas of historical importance and invite knowledge sharing when designing conservation actions that involve stewardship of natural communities.



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Community

Based on the weighted overlap of the following features: cultural resources, farms, historic trails and sites

- Cultural and Community Resources
- Cultural or Community Resources
- Community Resources
- No Overlap

Figure 9. Community resources in the Pajaro River watershed.

Each theme is made up of landscape features that were weighed based on stakeholder input. See Appendix B for data sources and Appendix C for methods. Sources: UC Agrotourism Directory, Amah Mutsun, National Historic Registry, CyArk.

Integrated Assessments

In addition to the influences and themes available in the Pajaro Compass Webmap, integrated assessments were created to highlight areas of overlap of important landscape features among the six themes. The themes were combined in different ways to create three examples:

- **Figure 10** shows all six themes, weighted by the primary focuses of the 2015-2016 Pajaro Compass participants,
- **Figure 11** shows biodiversity and water resources equally weighted, and
- **Figure 12** shows agriculture and carbon stock equally weighted.

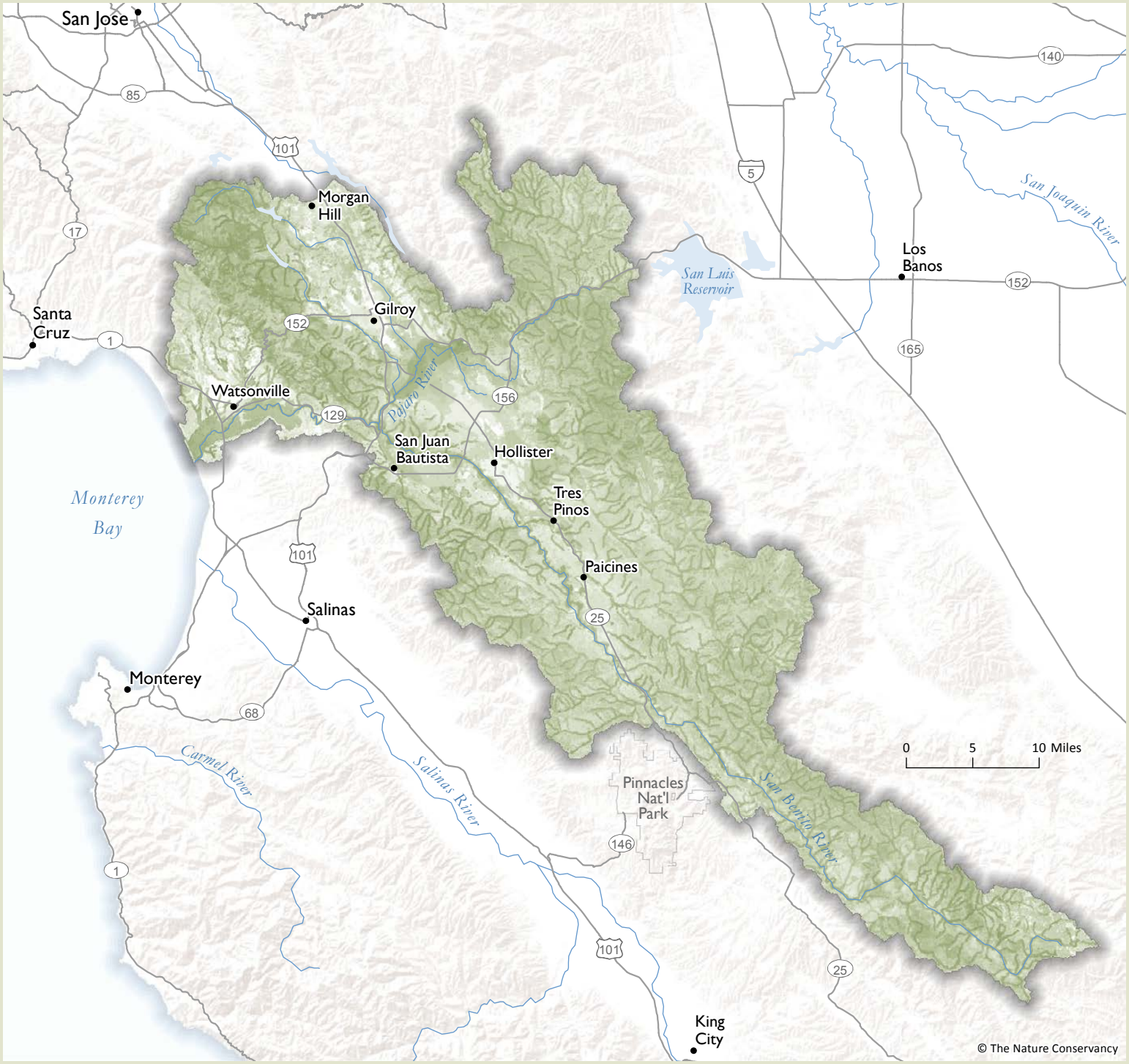
The first map highlights where there is high overlap in the data layers that represent the primary interests of the 2015-2016 participants, which were identified through the stakeholder survey (see Figure 10). It is most heavily weighted for biodiversity, water resources, and agriculture, reflecting current stakeholder interests. The overlap of these themes identifies the low-elevation region along the Santa Clara/San Benito county boundary. This area represents important farmland, the 10- and 100-year floodplains, important recharge areas for groundwater basins, and important wildlife connectivity corridors connecting habitat in adjacent mountain ranges. There is also extensive overlap in the Santa Cruz mountains. This area is important for groundwater recharge, stores high quantities of carbon stock, is important for wildlife movement both locally and regionally, and provides suitable habitat for a large number of birds and mammals. The mouth of the Pajaro River and the San Benito River also have extensive overlap. Here there are many observations of rare species, high aquatic species richness, and important riparian corridors and floodplains. The headwaters of the San Benito River in the southern portion of the watershed have high overlap because of the highly intact landscape important for wildlife movement and important rangelands and open space.

This primary-focus weighting map (see Figure 10) can be used to communicate the conservation vision of the Pajaro Compass participants and highlight the areas important for the natural resources identified by them as well, for example agricultural and groundwater conservation and wildlife connectivity near the Santa Clara/San Benito county line; and carbon, groundwater recharge, and habitat in the Santa Cruz mountains. We anticipate a dynamic group of partners as we grow and expand, and expect that the integrated assessment will be similarly dynamic to be reflective of the focuses of the changing Compass Network.

Figure 11 shows where biodiversity and water resources overlap, such as in the Pajaro River floodplain due to its water resources and wildlife movement, the Santa Cruz mountains and the Diablo range due to groundwater recharge, good water quality, and high habitat suitability, as well as riparian corridors such as the San Benito River and the mouth of the Pajaro River. This map is an example of how agencies or organizations with different mandates can use an integrated assessment to identify regions where their focuses overlap, and to identify potential project partnerships to leverage strengths and pool resources to accomplish collective objectives.

Figure 12 shows areas of overlap between agriculture and carbon stock. The Santa Cruz mountains and the Gabilan range have high quantities of releasable carbon and are also considered grazing lands in the Farmland Mapping and Monitoring Program. Avoided conversion in these areas (and others with high overlap) would likely have emission-reduction benefits, and therefore rangeland conservation in these regions may qualify for carbon-based incentives and rangeland protection funding. This map is an example of how overlap in aggregate themes can be used to identify areas where potential funding available for one resource can be leveraged to benefit the conservation of another.

An online Pajaro Compass Interactive Planner allows users to adjust weights given to each theme 1) to identify locations for strategies to be implemented based on the weight given to each of the themes, 2) to identify potential collaborations across Compass Network organizations who may focus on different themes or, 3) to reveal areas where funding for a given theme may be leveraged to achieve conservation of the values of other themes.



Note: This map is a product of the Pajaro Compass, a group of stakeholders who support a collaborative conservation vision for working and natural lands in the Pajaro River Watershed. It has been assembled largely from publicly available data and is not regulatory.

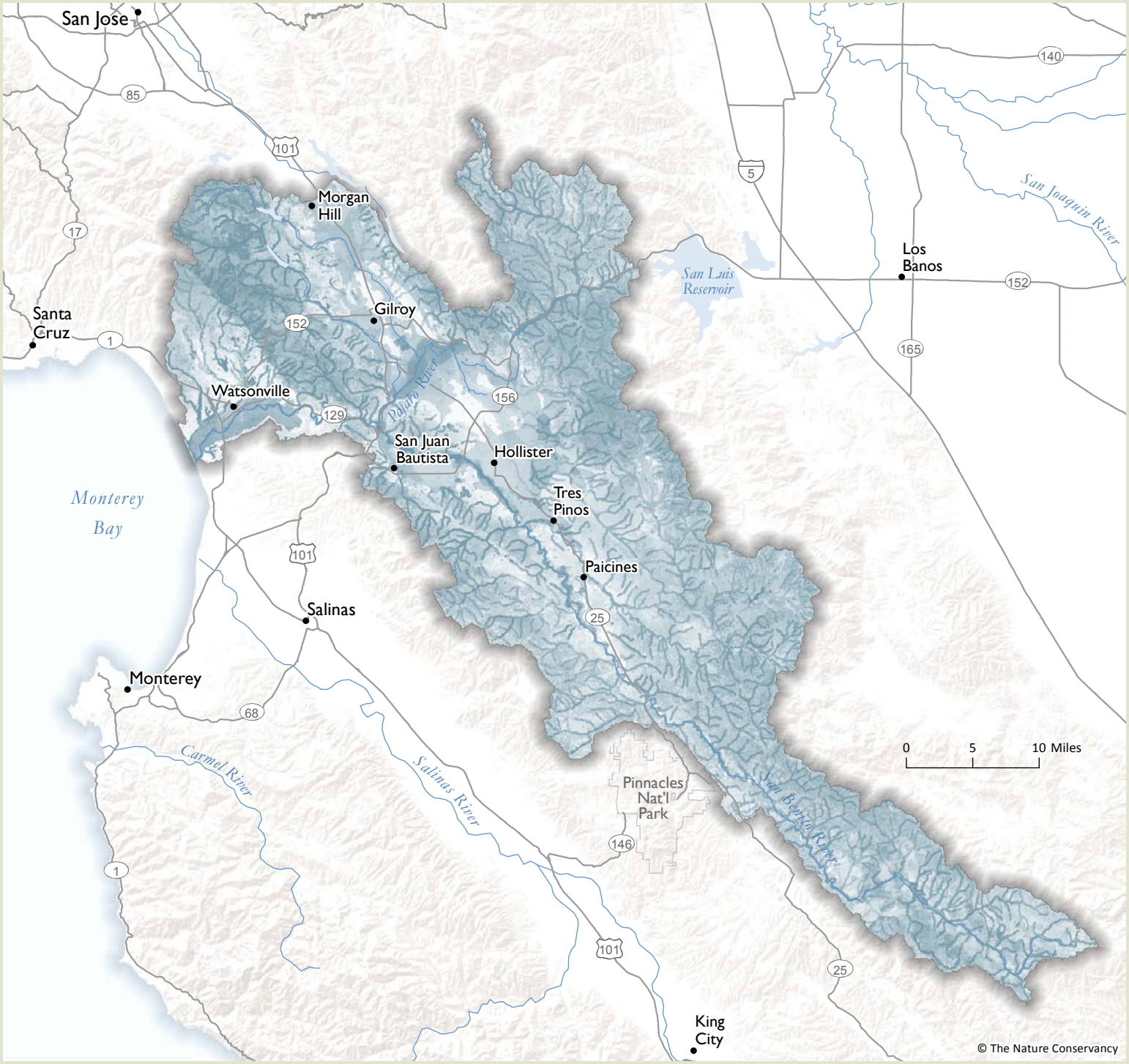
Primary Focus

Based on the weighted overlap of alll themes: water resources, biodiversity, agriculture, carbon stock, recreation and community

More Overlap

Less Overlap

Figure 10: Areas of overlap in the data layers that represent the primary focuses of the 2015-2016 Pajaro Compass participants. The integrated assessment is designed to be dynamic and can change to reflect evolving stakeholder focuses.



Note: This map is a product of the Pajaro Compass, a group of stakeholders who support a collaborative conservation vision for working and natural lands in the Pajaro River Watershed. It has been assembled largely from publicly available data and is not regulatory.

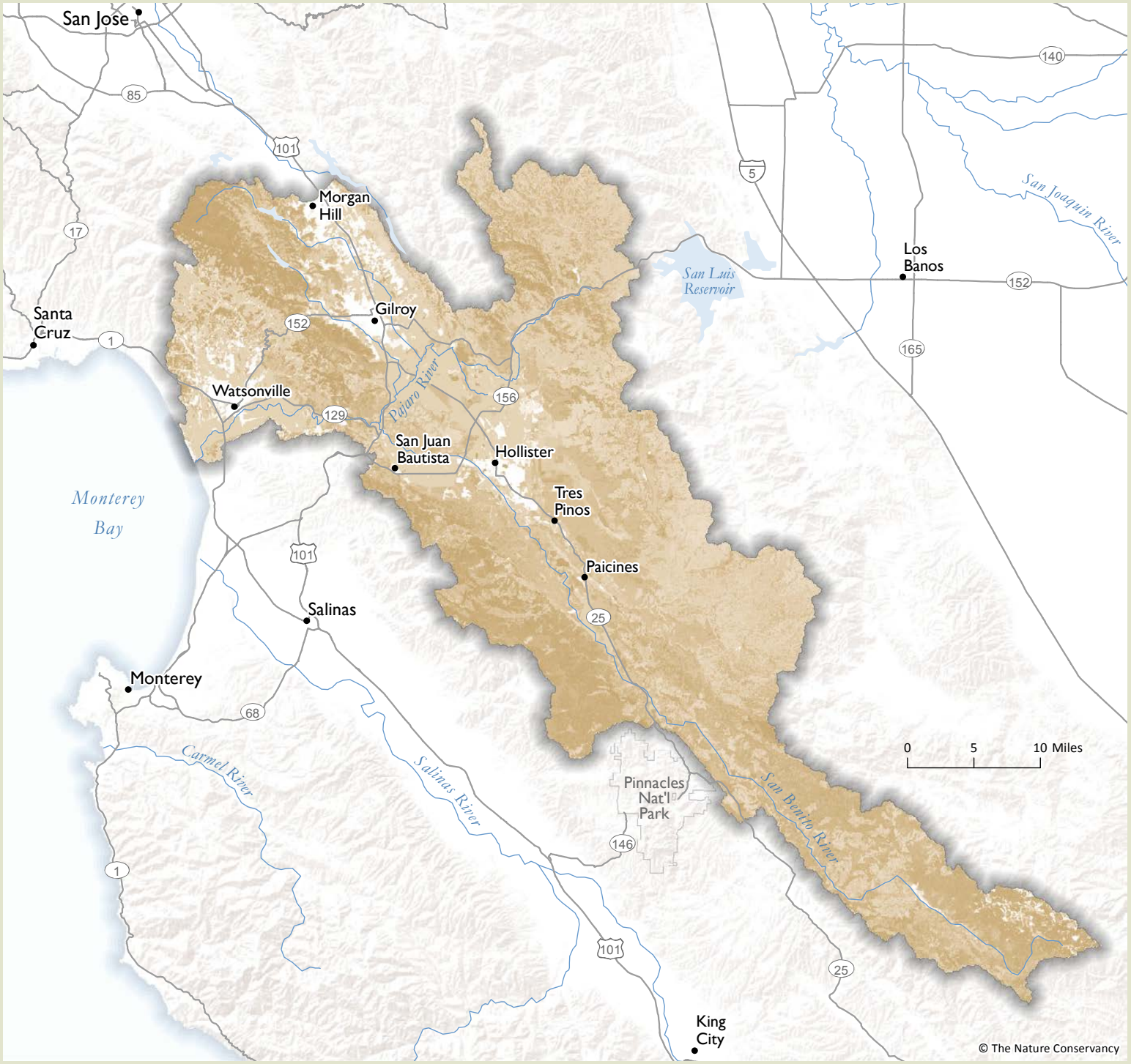
Biodiversity and Water Resources

Based on the weighted overlap of biodiversity and water resources

More Overlap

Less Overlap

Figure 11: Areas of overlap between biodiversity and water resources.



Note: This map is a product of the Pajaro Compass, a group of stakeholders who support a collaborative conservation vision for working and natural lands in the Pajaro River Watershed. It has been assembled largely from publicly available data and is not regulatory.

Agriculture and Carbon Stock

Based on the weighted overlap of agriculture and carbon stock

More Overlap

Less Overlap

Figure 12: Areas of overlap between agriculture and carbon.

Case Study 1 – **Gabilan Ranch Conservation Easement**

Geography: Western headwater of the Pajaro River

Compass Themes: Biodiversity, Agriculture, Carbon and Soil Health, Community

Partners: Gabilan Cattle Company, The Nature Conservancy (TNC)

Funding: Wildlife Conservation Board, Central Coast Opportunity Fund, private funding

Project description: Gabilan Ranch is an 11,190-acre working cattle ranch nestled in the Gabilan Mountain range in Monterey and San Benito Counties actively grazed by several hundred head of cattle. Wishing to keep the ranch whole and protect its conservation values, the owners—who have held the ranch since 1929—entered into a conservation easement with TNC in 2006. Under the easement, the owners must comply with some restrictions and also allow TNC to monitor the site for compliance once a year, including attention to the grazing intensity using a measure of residual dry matter (RDM) that remains on pastures at the end of the grazing season (September–October timeframe). The rangeland monitoring that is being conducted on the ranch is informing broader rangeland strategies for TNC and its partners across the state.

The ranch is critically located in the northern part of the Gabilan range, which is relatively un-fragmented and serves as an important connectivity area for wildlife like bobcats, mountain lions, and California tiger salamander. The range as a whole is an important ecological link between the coastal Santa Lucia and Santa Cruz mountains and the more arid interior Diablo ranges.

Like the larger range, Gabilan Ranch is dominated by chaparral and coastal scrub but also supports several ecosystem types and rare species—including the Gabilan manzanita—as a result of its isolation and unique geology. Due to its topography, location, and habitats, the ranch is used by a large number of raptors including golden eagles and California condors. The area's natural beauty and rural character, combined with its proximity to Silicon Valley sprawl and suitability for viticulture, have spurred a rapid increase in population and development. Consequently, the very qualities that draw people to the area are threatened as rural lands, including rangeland and prime agricultural lands, are converted to residential developments, vineyards, and other commercial uses. This puts a strain on natural resources and on residents' quality of life as demands for surface and groundwater supplies increase, transportation infrastructure becomes inadequate, and affordable housing becomes increasingly scarce.

Gabilan Ranch is an excellent example of how permanent conservation easements can preserve agricultural lands, conserve watersheds, and protect open space for the benefit of biodiversity and people and can help curb the undesired effects of the influences described above.

Jeffrey Mundell

Before and after picture of pasture at Gabilan Ranch showing results of managed grazing.

Case Study 2 –
Gonzales Farm Restoration

Geography: Upper Pajaro River floodplain

Compass Themes: Water Resources, Biodiversity, Agriculture, Community

Partners: Students and Teachers Restoring A Watershed (STRAW), local school children, rancher, U.S. Fish and Wildlife Service (USFWS), The Nature Conservancy (TNC)

Funding:

- Acquisition funders: Pajaro River Watershed Flood Prevention Authority, Santa Clara Valley Water District, Living Landscape Initiative, private funding
- Restoration funders: USFWS Partners Program, Silicon Valley Community Foundation, Wildlife Conservation Society, private funding

Project description: The Upper Pajaro River floodplain, about 30 miles south of San Jose, is a region rich in biodiversity due to its proximity to a variety of habitats throughout three coastal mountain ranges: the Santa Cruz, Diablo, and Gabilan ranges. Migrating birds use this floodplain as a resting point along the Pacific flyway, and mammals use the riparian corridors to disperse to critical habitat in the mountains and foothills. This floodplain contains some of California's most productive agricultural lands, and protection upstream ensures flood protection for communities in the lower floodplain including Pajaro, Watsonville, and local surrounding farms. TNC and other partners identified Gonzales Farm, a 165-acre parcel in the upper floodplain, as critical land to protect for its value as a working farm that occupies a key location along the historic corridor of the Pajaro River. When TNC purchased the property in 2012, the river corridor was highly degraded and lacked the vegetation needed to provide habitat for animals and birds. Furthermore, its infrastructure could not support a cattle operation or irrigated pasture. A local rancher who was leasing the property for cattle grazing provided design guidance, and then installed new water infrastructure and fencing that allow cattle to use the entire property, including the river corridor when conditions permit. These improvements help ensure that the property can function as an economically viable agricultural operation and also support an ongoing habitat restoration project along the river corridor. Gonzales Farm will continue to be protected under a conservation easement that enables ranchers to provide forage for grazing cattle, while also keeping invasive plant species in check and maintaining the agricultural way of life in Santa Clara and San Benito Counties. Between 2014 and 2017, local students and community members led by STRAW will plant more than 1,200 new plants along the river, including a dozen species of native trees, shrubs, and grasses. This work will create a corridor for wildlife to move between the Santa Cruz, Diablo, and Gabilan mountain ranges. Since 2014, this project has provided over 450 students with environmental education and hands-on habitat restoration opportunities in the Pajaro River watershed. Through their involvement, students and community volunteers learn from experience about how working landscapes and conservation can coexist, and how their individual contributions benefit the floodplain by making it more resilient to changing climate conditions.

Case Study 3 – **Hain Ranch Creek Stewardship**

Geography: Tres Pinos Creek

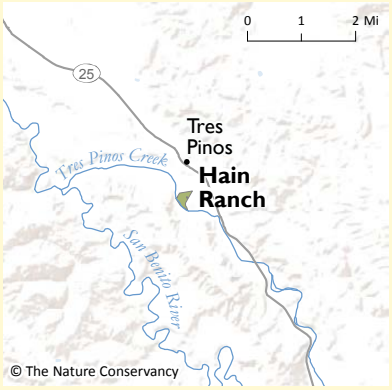
Compass Themes: Water Resources, Biodiversity, Agriculture, Community

Partners: Wild Farm Alliance (WFA), Pinnacles National Park, Naturalists at Large, Hollister Boy Scout Troop 436, Hedgerows Unlimited , San Benito Working Landscapes Group

Funding:

Wildlife Conservation Board

Project description: Stewardship of Tres Pinos Creek has been a decades-long pursuit for Paul and Leti Hain, third generation farmers in Hollister whose property runs adjacent to the creek. After the El Niño flood events of 1998 washed out four acres of their 30-acre organic walnut orchard, as well as the riparian species along the creek, they took it upon themselves to restore the waterway to protect their farm from future flooding. Using a bulldozer, Paul dragged the washed out vegetation—like cottonwoods and willows—back upstream and anchored them into the streambed to re-root. Within a year, all of the trees had sprouted and stabilized the creek bank.



Recently, the Hains decided to take their efforts to the next level, realizing the benefits that riparian restoration provided to their farm. Not only does it improve wildlife habitat, but it prevents streambank erosion and enhances natural pest control in the adjacent orchard. Also, removing thirsty non-native plants (like Giant Cane, or *Arundo*) helps keep more water in the stream for fish habitat and irrigation, and makes more room for natives. Partnering with WFA, Hedgerows Unlimited, and an army of volunteers from the Boy Scouts and the Naturalists at Large program, the Hains spearheaded riparian improvement projects on Tres Pinos Creek. WFA and Hedgerows Unlimited took great care in choosing over 450 drought-tolerant native plants for the project. Volunteers planted riparian species to prevent erosion along the creek bank, which will both protect the orchard and reduce sediment entering the creek during future flood events. They also planted trees and shrubs in gaps in the existing hedgerows that line the property. Plants were chosen based on the ability to attract insects that provide benefits to the farm like pollination of cover crops or predation of common orchard pests. The Hains no longer use pesticides, and their codling moths and husk fly counts are at an all-time low. The farm has been lauded as a refuge for insect species by the Xerces Society, in an area where their habitat has been greatly diminished.

The Hain family's efforts to activate resources and work with government agencies and nonprofit organizations pro-vides an excellent example of how local landowners can steward their land to balance the needs of agriculture as well as wildlife.

Case Study 4 – **Livestock and Land Program**

Geography: San Benito County

Compass Themes: Water Resources, Biodiversity, Agriculture, Community

Partners: Ecology Action, San Benito County Resource Conservation District, Loma Prieta Resource Conservation District, Natural Resources Conservation Service, J3 Excavations, Inc.

Funding:

State Water Resources Control Board from Propositions 40/50 awarded to Ecology Action and sub-granted to the Resource Conservation District

Project description: The Pajaro River watershed is home to many small livestock and equestrian facilities, which are an important part of the region's agricultural heritage and recreational offerings. Improperly managed livestock and equestrian facilities have the potential to cause significant damage to local waterways. Run-off from these facilities including nutrients, sediment, and pathogens, can greatly affect water quality; and grazing practices can also negatively impact upland areas and riparian habitat. The Livestock and Land Program was created in 2011 to address these issues and improve surface and ground water through implementation of Best Management Practices (BMPs) on equestrian and livestock facilities. The program focuses on public outreach and technical training and support for local partners to demonstrate BMPs on the ground. The voluntary program was designed to reach a broader audience and find a common ground for conservation considerations and facilities improvement, which would also benefit livestock health.

In San Juan Bautista a 1,000-acre horse, goat, and cattle facility enrolled as a Livestock and Land demonstration site. Challenges on the property included a lack of drainage on their barn structures and in their yard, causing water to flow through heavy-use areas and washing sediment and manure into the adjacent creek on their property (a tributary to the San Benito River). Through the Livestock and Land Program, the family installed roof gutters connected to subsurface drainage systems in order to divert runoff to two leach fields created to dissipate captured water. The existing paddocks and yard areas were regraded and covered with gravel in order to divert surface flows away from buildings. The runoff was directed through an area seeded with drought tolerant grasses that filter the water before it enters the creek. This grassy area has been fenced off to prevent over-grazing by cattle in the riparian area, thereby improving habitat and water quality. In addition to successfully implementing these BMPs as a result of their involvement in the program, the family is also championing these concepts to their peers, posting a "Watershed Steward Demonstration Site" sign outside their property and offer public tours of the operation. By making these practical updates to their facility, the family is able to maintain and improve their livestock operations while also stewarding the Pajaro River watershed.

Case Study 5 – **Pajaro River Bench Excavation**

Geography: Lower Pajaro River Watershed

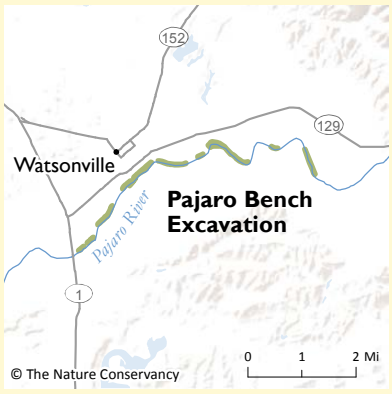
Compass Themes: Water Resources, Biodiversity, Agriculture, Community

Project sponsors: Santa Cruz County, Monterey County, Monterey County Water Resources Agency, Santa Cruz County Flood Control and Water Conservation District Zone 7

Partners: City of Watsonville, Army Corps of Engineers, Elkhorn Slough Foundation

Funding: Propositions 50 and 84 funding from California Department of Water Resources

Project description: Levees are designed to protect people, homes, and livelihoods from the effects of flooding. Stakeholders in the Pajaro River watershed have been working with the Army Corps for decades to develop a flood risk reduction project to improve upon the current levee system which is inadequate to withstand a major flood event. This was demonstrated in 1995, when the levee broke during a catastrophic flood event, leaving many people homeless and jobless. While delayed at the federal level, partners in the region mobilized to deliver a project in the interim to reduce the harmful effects that another flood could have in the Pajaro River floodplain. The Pajaro River Bench Excavation Project is designed to relieve the magnitude and severity of potential future flooding of the Pajaro River. The excavation removes excess sediment from the riverbed and creates benches to improve the flood carrying capacity of the levee system, and provide critical, low-flow habitat for fish, particularly steelhead trout. Bench excavation will eventually become self-maintaining and will help the river regain its natural ability to move sediment through the river channel system by natural geomorphic processes, as it did originally.



The project has had positive benefits outside of the immediate project area as well. Over 300,000 cubic yards of sediment was removed in the excavation process, which The Elkhorn Slough Foundation used to raise the elevation of over 100-acres of tidal marshland in Elkhorn Slough. This restored the slough to its original, shallow and properly-functioning depth to benefit the many animals that rely on this habitat, such as sea otters. Santa Cruz County Flood Control and Water Conservation District Zone 7 also used some of the sediment to improve a levee along Salsipuedes Creek.

The project provides many benefits to the Pajaro River watershed—the floodplain area in particular—including a lowered risk of flood inundation of agricultural fields and residential areas, improved habitat within the existing levee system, as well as improved habitat as a result of sediment relocation offsite.

Pajaro Compass Action Plan

During the meetings held between between June 2015 and February 2016, Pajaro Compass participants identified and assessed strategies and funding opportunities. The conservation strategies reflect complementary approaches that the Compass Network members can engage in across the Pajaro River watershed. The funding resources provide a list of resources for funding technical assistance, stewardship, restoration, and conservation activities in support of the Pajaro Compass.

Conservation Strategies

The following conservation strategies were developed by the 2015-2016 Pajaro Compass participants. The strategies are intended to provide Compass Network members with guidance for advancing the conservation goals and may apply to one or more goals. Each conservation strategy includes the following elements: a definition that describes the strategy in general terms; a statement of need focused on the influences or values within the Pajaro River watershed that might enable such a strategy to be implemented; a list of the types of organizations participating in the Compass Network that might be inclined to carry out the strategy; a description of how the strategy might be implemented or linked to the goals of the relevant local stakeholders; and finally, a chart showing an analytical process that might be undertaken, using the Pajaro Compass Webmap data layers, to determine where the strategy might be most relevantly applied within the Pajaro River watershed.

Advance Mitigation Planning

Definition: A comprehensive approach (i.e., employing the mitigation hierarchy of avoid, minimize, and offset) to mitigating potential impacts to all relevant Pajaro Compass themes (e.g., biodiversity, water resources, agriculture) caused by planned state and local agency infrastructure projects, such as roads, rail, and levees. This approach, called Advance Mitigation Planning, allows for natural resources to be protected or restored as compensatory mitigation before infrastructure projects are constructed, often years in advance. This approach can result in improved conservation outcomes and more efficient project delivery.

Need: High speed rail, road and highway improvements, new water provision and flood control infrastructure.

Who: State and local transportation agencies, water agencies and districts, federal and state wildlife agencies, land trusts, park and open space districts, flood control agencies and districts, landowners, Habitat Conservation Plan/Natural Communities Conservation Plan implementing entities.

How: Advance Mitigation Planning enables regional and local representatives from both infrastructure and natural resource agencies to come together to jointly evaluate potential environmental impacts from infrastructure projects proposed for a region, and at the same time ensure that planned mitigation for those impacts contributes to regional conservation priorities.

Coordinate with Compass Network members and other stakeholders to develop advance mitigation strategies for infrastructure projects including roads and rail.

Where: The table below provides a series of questions and associated spatial data resources that are available through the Pajaro Compass Webmap. This framework is intended to help participants identify locations where advance mitigation could be implemented with the greatest outcomes for the Pajaro Compass goals.

Consideration	Pajaro Compass Resource	Pajaro Compass Webmap Location
1. Where are the species and habitats that might require mitigation? (e.g. threatened and endangered species and/or wetlands)	Wetlands Threatened and Endangered Species Habitat Rare Species Observations	Water Resources → National Wetland Inventory Biodiversity → Species Richness → Habitat-Suitability Weighted Richness → Threatened and Endangered Species Biodiversity → Species Richness → Rare Species Occurrence Density
2. What is the condition of the occurrence or habitat?	Local Permeability (Proxy for Intactness of 3km neighborhood)	Biodiversity → Connectivity → Local Permeability
3. Where is restoration needed or feasible?	(See Land Stewardship strategy below)	
4. Where is protection needed or feasible?	(See Land Protection strategy below)	
5. Within or adjacent to these areas, are there additional natural resources that might increase opportunities for partnerships?	Integrated Assessments Aggregated Themes	Aggregated Themes and Integrated Assessments → Integrated Assessments Aggregated Themes and Integrated Assessments → Aggregated Themes
6. Within these areas, are there additional resources that might increase funding opportunities?	Integrated Assessments Aggregated Themes	Aggregated Themes and Integrated Assessments → Integrated Assessments Aggregated Themes and Integrated Assessments → Aggregated Themes

Growth Planning

Definition: Encourage development of compact and efficient communities through engagement in general plan and infrastructure planning processes. This could include discussions regarding urbanization and smart growth planning, engagement in general plan updates at the city and county level, investment in Priority Conservation Areas (as defined by Plan Bay Area) and driving development toward Priority Development Areas (and setting up similar areas in multi-county areas that have yet to develop such programs), and others. The overall strategy would be to use Pajaro Compass maps showing areas that have high overlap of values as areas for conservation investment and impact avoidance, and to drive growth and land use change in areas that show less overlap.

Need: The Pajaro River watershed should accommodate projected growth while remaining sensitive to the values of multi-benefit areas.

Who: City and county-level planning staff and boards of supervisors; local Metropolitan Planning Organizations, such as the Association of Bay Area Governments, the Metropolitan Transportation Commission, and Association of Monterey Bay Area Governments; and local smart growth advocates, such as Greenbelt Alliance and Committee for Green Foothills.

How: Stakeholders can discuss land use growth and change, and may benefit from early engagement in conversations regarding projected and planned land use changes. Compass Network members may decide to support smart growth initiatives, including urban boundaries, as a coalition or sub-coalition.

Where: The table below provides a series of questions and associated spatial data resources that are available through the Pajaro Compass Webmap. This framework is intended to help participants identify locations where growth planning could be implemented with the greatest outcomes for the Pajaro Compass goals.

Consideration	Pajaro Compass Resource	Pajaro Compass Webmap Location
1. Where is there low conflict with the multi-benefit resources identified by Pajaro Compass partners?		
- Low overlap of the six theme resources	Primary Focus 2015-2016 Integrated Assessment	Aggregated Themes and Integrated Assessments → Integrated Assessments → Primary Focus
- Degraded landscape condition (siting to avoid highly intact areas	Local Permeability (Proxy for Intactness of 3km neighborhood)	Biodiversity → Connectivity → Local Permeability
- Proximity to development (siting to minimize additional developed footprint)	Housing Density	Influences on Natural Resources → Community → Block Housing Density
	Population Density	Influences on Natural Resources → Community → Population Density
	Developed land	Influences on Natural Resources → Urban
	Wetlands	Water Resources → National Wetland Inventory
- Areas where resources that require mitigation are not present (e.g. wetlands, habitat for threatened and endangered species)	Threatened and Endangered Habitat	Biodiversity → Species Richness → Habitat-Suitability Weighted Richness → Threatened and Endangered Species
	Rare Species Occurrence Density	Biodiversity → Species Richness → Rare Species Occurrence Density
- Areas where critical habitat is not present	Critical Habitat	Influences on Natural Resources → Policy Protection → Critical Habitat
2. Outside of potential natural disaster zones (e.g. floodplain)	Floodplains	Water Resources → 100-year floodplain Water Resources → Soap Lake 10-year floodplain

Conservation Project Planning

Definition: Conservation projects can be complex and require multiple experts to develop comprehensive and successful outcomes. Voluntary conservation projects can involve grazing and agricultural practices, engineering, hydrology and drainage, soils, invasive species, endangered species, botany, and monitoring.

Need: The Pajaro River watershed includes important aquatic and terrestrial habitats and threatened and endangered species. These resources can benefit from proactive conservation projects to restore and enhance habitats and species.

Who: Resource Conservation Districts, Natural Resources Conservation Service, non-governmental organizations, water districts, flood districts, federal and state wildlife agencies, private landowners, farmers, ranchers, land managers, commodity organizations and Habitat Conservation Plan/Natural Community Conservation Plan implementing entities.

How: Project development and design, permit scoping, funding, project construction, and effectiveness monitoring.

Where: The table on the following page provides a series of questions and associated spatial data resources that are available through the Pajaro Compass Webmap. This framework is intended to help participants identify locations where conservation project planning could be implemented with the greatest outcomes for the Pajaro Compass goals.

Consideration	Pajaro Compass Resource	Pajaro Compass Webmap Location
1. What resources fit within the goals of your project?	For example, one conservation project may focus on threatened and endangered species and another conservation project may focus on grazing practices	
2. Where are those resources?	Aggregated theme (e.g. biodiversity, agriculture, water resources) Individual resource layers (e.g. rangelands or habitat suitability weighted richness of threatened and endangered species)	Aggregated Themes and Integrated Assessments → Aggregated Themes Agricultural Resources → Rangeland Biodiversity → Species Richness → Habitat-Suitability Weighted Richness → Threatened and Endangered Species
3. What is the condition of the land where these resources exist?	Local Permeability (Proxy for Intactness of 3km neighborhood)	
4. Where is restoration needed or feasible?	(See Land Stewardship strategy below)	
5. Where is protection needed or feasible?	(See Land Protection strategy below)	
6. Within or adjacent to these areas, are there additional natural resources that might increase opportunities for partnerships?	Integrated Assessments Aggregated Themes	Aggregated Themes and Integrated Assessments → Integrated Assessments Aggregated Themes and Integrated Assessments → Aggregated Themes
7. Within these areas, are there additional resources that might increase funding opportunities?	Integrated Assessments Aggregated Themes	Aggregated Themes and Integrated Assessments → Integrated Assessments Aggregated Themes and Integrated Assessments → Aggregated Themes
8. Within these areas, are there or could there be regional or local policies that could benefit these resources? (e.g. critical habitat, SGMA, zoning, urban growth boundaries)	Critical Habitat Groundwater Basins Disadvantaged Communities Zoning	Influences on Natural Resources → Policy Protection → Critical Habitat Water Resources → Groundwater Influences on Natural Resources → Community → Disadvantaged Communities Influences on Natural Resources → Zoning

Water Resource Project Planning

Definition: Water resource management is a key strategy to maintaining aquatic habitats and species, providing for sustainable water supplies, improving and sustaining good water quality, and providing effective floodplain management. When multiple partners engage in water resource planning, project impacts can be extensive and beneficial for multiple objectives.

Need: The Pajaro River watershed has compromised aquatic habitats and species. Currently, water supply, especially groundwater management, is a key focus of watershed efforts due to the historic drought. Water quality has been more consistently regulated, and will likely continue to be in the near future. Historic and future floods in the Pajaro River watershed have and will cause extensive damage to agricultural lands and communities.

Who: Resource Conservation Districts, Natural Resources Conservation Service, non-governmental organizations, water districts, flood districts, federal and state wildlife agencies, private landowners, farmers, ranchers, land managers.

How: Science-based diagnostics for water resource issues, plan development for solutions and priorities, projects to achieve multiple objectives, and partnerships for beneficial outcomes for multiple water resource issues.

Where: The table below provides a series of questions and associated spatial data resources that are available through the Pajaro Compass Webmap. This framework is intended to help participants identify locations where water resource project planning could be implemented with the greatest outcomes for the Pajaro Compass goals.

Consideration	Compass Resource	Pajaro Compass Webmap Location
1. What resources fit within the goals of your project?	For example, floodplain management or water quality improvement	
2. Where are those resources?	Water Resources Aggregated Theme Individual resource layers (e.g. floodplains or water quality)	Aggregated Themes and Integrated Assessments → Aggregated Themes → Water Resources Water Resources → 100-year floodplain Water Resources → Water Quality Index

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Consideration	Compass Resource	Pajaro Compass Webmap Location
3. What is the condition of the land where these resources exist?	Local Permeability (Proxy for Intactness of 3km neighborhood)	Biodiversity → Connectivity → Local Permeability
4. Are your goals affected by watershed context or location? (e.g. water quality impairments, watershed condition, groundwater basins)	Water Quality Sub-watersheds (Influences) Groundwater Recharge Groundwater Basins (Water Resources)	Water Resources → Water Quality Index Influences → HUC12 Water Resources → Groundwater Recharge Rate Water Resources → Groundwater Basins
5. Are there changes to operations and management that might benefit these resources? (e.g. flows/releases, pumping)	Technical analysis may be needed; current Pajaro Compass spatial resources are not available at this level of detail. Coordinate with local water resources and wildlife agency representatives.	
6. Where is restoration needed or feasible?	(See Land Stewardship strategy below)	
7. Where is land or water protection needed or feasible?	(See Land Protection strategy below)	
8. Within or adjacent to these areas, are there additional natural resources that might increase opportunities for partnerships?	Integrated Assessments Aggregated Themes	Aggregated Themes and Integrated Assessments → Integrated Assessments Aggregated Themes and Integrated Assessments → Aggregated Themes
9. Within these areas, are there additional resources that might increase funding opportunities? (e.g. carbon sequestration benefits funded through ARB)	Integrated Assessments Aggregated Themes	Aggregated Themes and Integrated Assessments → Integrated Assessments Aggregated Themes and Integrated Assessments → Aggregated Themes
10. Within these areas, are there or could there be regional or local policies that could benefit these resources? (e.g. critical habitat, SGMA, zoning, urban growth boundaries)	Critical Habitat Groundwater Basins Disadvantaged Communities Zoning	Influences on Natural Resources → Policy Protection → Critical Habitat Water Resources → Groundwater Influences on Natural Resources → Community → Disadvantaged Communities Influences on Natural Resources → Zoning

Education

Definition: Conservation activities are varied throughout landscapes that support multiple habitats and species, agricultural-based economies and communities, cultural resources, water resources, and recreation. Clear communication and outreach is important for understanding the effect of this wide variety of conservation efforts on a landscape and its communities. Educational efforts including field workshops and restoration activities, current conservation topics, economics, case studies, technical topics, monitoring, and threat analysis all help to build a more informed community that can plan for a future that includes conservation priorities.

Need: Education is often the most effective and least expensive way to begin to build community awareness of nature conservation and agriculture goals and objectives for a landscape.

Who: Resource Conservation Districts, Natural Resources Conservation Service, non-governmental organizations, tribal representatives, water districts, flood districts, private landowners, farmers, ranchers, land managers, schools, and community organizations.

How: Workshops, field tours, technical sessions and classes, hands-on volunteer fieldwork, symposiums, and conferences.

Where: The table below provides a series of questions and associated spatial data resources that are available through the Pajaro Compass Webmap. This framework is intended to help participants identify locations where education projects could be launched with the greatest outcomes for the Pajaro Compass goals.

Consideration	Pajaro Compass Resource	Pajaro Compass Webmap Location
Where are there restoration projects or recreation opportunities that could serve as outdoor learning locations for school groups, policy makers, or other audiences?	Distance to Schools Public Open Space & Trails Active Projects within the Partnership (Network Match Sheet)	Influences on Natural Resources → Community → Distance to Schools Aggregated Themes and Integrated Assessments → Aggregated Themes → Recreation

Land Protection

Definition: In In some instances, land protection makes sense for both the private landowner and the conservation partner. Land protection can be accomplished through a variety of techniques ranging from fee acquisition to conservation easements to land contracts such as the Williamson Act or term easements. These agreements can be structured to support open space and agricultural uses, as well as multi-benefit goals such as flood control and water resource protection or carbon resources on open space and agricultural lands. These multi-benefit agreements enable increased opportunities for funding and partnerships and help build understanding between constituencies.

Need: The step of permanently protecting land is a decision that rests with the private landowner and their goals for their property. Constructive partnerships within the Pajaro River watershed, developed through efforts such as the Pajaro Compass, can help landowners understand the objectives of conservation and inform possible options for permanent land protection.

Who: Private landowners, non-governmental organizations, land trusts, Resource Conservation Districts, state and federal agencies, flood protection agencies, and Habitat Conservation Plan/Natural Community Conservation Plan implementing entities.

How: Conservation easements, fee acquisition, term easements, and land and water contracts.

Where: The table below provides a series of questions and associated spatial data resources that are available through the Pajaro Compass Webmap. This framework is intended to help participants identify locations where land protection projects could be implemented with the greatest outcomes for the Pajaro Compass goals.

Consideration	Pajaro Compass Resource	Pajaro Compass Webmap Location
1. What resources are you trying to protect?	For example, biodiversity or agricultural resources	
2. Where are those resources?	Aggregated themes (e.g. biodiversity, agricultural resources)	Aggregated Themes and Integrated Assessments → Aggregated Themes
3. What is the condition of the land where these resources exist? (Site in highly intact landscapes)	Local Permeability (Proxy for Intactness of 3km neighborhood)	Biodiversity → Connectivity → Local Permeability
4. Where Are there public lands or lands protected from development through easements nearby? (Site near protected lands)	Protected Lands	Influences on Natural Resources → Permanently Protected Land
5. Within or adjacent to these areas, are there additional natural resources that might increase opportunities for partnerships?	Integrated Assessments Aggregated Themes	Aggregated Themes and Integrated Assessments → Integrated Assessments Aggregated Themes and Integrated Assessments → Aggregated Themes
6. Within these areas, are there additional resources that might increase funding opportunities?	Integrated Assessments Aggregated Themes	Aggregated Themes and Integrated Assessments → Integrated Assessments Aggregated Themes and Integrated Assessments → Aggregated Themes

For Ranchers, Farmers, and Other Private Land Managers

As a rancher, farmer, or other private land manager, you already understand the importance of nature and the benefits it provides. Are you looking for new ways to incorporate nature conservation into your operations; interested in exploring a partnership to help manage your property's water resources, fish and wildlife, invasive species, flood management, fencing, or restoration; or hoping to learn more about the watershed's natural resources? The Pajaro Compass can help you find funding, meet potential partners to develop projects together, and learn about the watershed.

Find funding for your land management

The Compass Network can help connect private landowners and land managers with technical and financial assistance for conservation and management projects. In the Pajaro Compass document Action Plan and from Case Studies, you can find out about management strategies that have helped farmers and ranchers achieve their goals for their property and how they were funded.

Get help with your project

The Pajaro Compass document contains goals and strategies relevant to the operation of private farms and ranches, and also lists organizations and agencies that are ready to help with:

- Conservation planning and projects
- Financial assistance
- Permitting assistance
- Technical assistance
- Water resource planning and projects
- Soil management
- Education and outreach

Learn why the watershed is an important place to conserve

You can use the Pajaro Compass Webmap to see the variety of conservation work in the watershed and where that work is being conducted. Plus, you can learn about areas of the watershed that support biodiversity and certain species, as well as important areas for water and soil conservation and management.

Land Stewardship

Definition: Restoration of aquatic and terrestrial habitats provides benefits to the landscape as a whole including water resources, species, soil health, land productivity and stability, and overall ecological value of land.

Need: Restoration is increasingly recognized as a proactive method to protect important values on a property including those identified above. Restoration can further benefit lands and waters offsite of an individual property and within a watershed. Restoration of habitats for key objectives such as migration, or to remove invasive species, provides resilience within a landscape for agriculture, species, and habitats. Restoration also provides opportunities for learning and outreach including participation in planting days and field visits to observe before and after conditions.

Who: Resource Conservation Districts, Natural Resources Conservation Service, non-governmental organizations, water districts, flood districts, federal and state wildlife agencies, and private landowners, farmers, ranchers, and land managers.

How: Restoration projects are identified through partnerships and often are accomplished with grant funding.

Where: The table below provides a series of questions and associated spatial data resources that are available through the Pajaro Compass Webmap. This framework is intended to help participants identify locations where land stewardship projects could be implemented with the greatest outcomes for the Pajaro Compass goals.

Consideration	Pajaro Compass Resource	Pajaro Compass Webmap Location
1. What resources are you trying to restore or manage?	For example, biodiversity or agricultural resources	
2. Where are those resources?	Aggregated themes (e.g. biodiversity, agricultural resources)	Aggregated Themes and Integrated Assessments → Aggregated Themes
3. What is the condition of the land or water where these resources exist? (Site in modified landscapes where restoration is still feasible and management can improve resource condition or health)	Local Permeability (Proxy for Intactness of 3km neighborhood) Water Quality (Water Resources)	Biodiversity → Connectivity → Local Permeability Water Resources → Water Quality Index
4. Are there public lands or lands protected from development through easements nearby? (Site near protected lands)	Protected Lands	Influences on Natural Resources → Permanently Protected Land
5. Within or adjacent to these areas, are there additional natural resources that might increase opportunities for partnerships?	Integrated Assessments Aggregated Themes	Aggregated Themes and Integrated Assessments → Integrated Assessments Aggregated Themes and Integrated Assessments → Aggregated Themes
6. Within these areas, are there additional resources that might increase funding opportunities?	Integrated Assessments Aggregated Themes	Aggregated Themes and Integrated Assessments → Integrated Assessments Aggregated Themes and Integrated Assessments → Aggregated Themes

Conservation Incentives: Streamlined Permitting

Definition: Permitting can be a daunting task for landowners and agencies and is often a major disincentive to taking steps towards land restoration or other activities. Permit streamlining programs can be helpful in organizing certain types of projects in specific habitats and with specific species so that projects can be designed to a set of criteria and constructed according to conditions already permitted. This approach assures outcomes for the restoration project, lowers costs for the landowner, and assists in getting more restoration done over the landscape.

Need: Permitting has been identified as a major barrier to proactive restoration in watersheds that support important habitats and species.

Who: Resource Conservation Districts, state and federal agencies, and private landowners.

How: Technical assistance, training, permit coordination, and streamline agreements.

Where: Streamlined permitting may be necessary for certain types of restoration and management projects (see land stewardship strategy framework). Contact the local RCD and/or NRCS office to identify if streamlined permits are available.

Funding Resources

A variety of funding opportunities exist to support the implementation of Pajaro Compass strategies. There is a need to build local capacity within Compass Network member organizations as well as to support the ongoing coordination of the Pajaro Compass process. The Pajaro Compass is also meant to facilitate investment in places and projects that embody its conservation goals as described in the sections above. Participants also appreciate the widespread importance of farms and ranches in the Pajaro River watershed and their contribution to local economies and the benefits they provide to people, and recognize the need for funding to incentivize conservation on private lands.

The intent of this section is not to provide details on specific opportunities as there are a number of excellent resources available for that type of information such as the California Financing Coordinating Committee. This section instead provides a list of resources for funding technical assistance, stewardship, restoration, and other conservation activities in support of the conservation goals.

Typical sources of funding applicable to the Pajaro Compass effort include voter-approved initiatives, use fees, impact fees, general funds, federal grants, private foundations, and locally imposed taxes. Table 3 lists state and federal sources of funding for a diverse suite of project types that address some of the strategies and activities identified through the Pajaro Compass process.

Table 3. Federal and California state sources of funding relevant to Pajaro Compass goals.

FUNDING SOURCE	TYPE OF PROJECTS FUNDED
California Wildlife Conservation Board	Rangeland conservation, habitat conservation, instream flow augmentation, habitat restoration
California Department of Fish and Wildlife	Species recovery, habitat restoration, water rights, wetland restoration, property acquisition
California Department of Water Resources	Water supply development, water conservation, irrigation efficiency, flood protection
California State Water Resources Control Board	Water quality improvement, water conservation, environmental enhancement
California Strategic Growth Council	Urban growth programs, transportation reduction of carbon, climate programs, sustainability plans
Natural Resources Conservation Service	Assistance to agricultural operators, erosion control, project design and engineering, cost-sharing for improvements on private lands
California Department of Conservation	Watershed coordinators, soils enhancement, farmland protection
California State Coastal Conservancy	Species recovery, habitat restoration, property acquisition, multi-benefit projects, climate change adaptation
California Natural Resources Agency	Multi-benefit projects, river parkways, habitat restoration, climate change adaptation
U.S. Fish and Wildlife Service	Species recovery, habitat restoration, conservation easements
NOAA Fisheries	Species recovery, habitat restoration
Santa Clara Valley Habitat Plan	Species recovery, habitat restoration, conservation easements, agricultural protection
Pajaro River Watershed Flood Prevention Authority Soap Lake Floodplain Preservation Project	Conservation easements and fee acquisitions of agricultural lands within the upper Pajaro River Floodplain (Soap Lake) area

Pajaro Compass Network

Participants in the 2015-2016 Pajaro Compass process identified a strong need for a communication and collaboration network to increase the pace and effectiveness of conservation in the Pajaro River watershed. During the meetings the steering committee proposed the concept of an informal information sharing network to meet the participants' goals. Participants also filled out surveys to identify areas of strength and need for each organization. Based on this work, the Compass Network internalizes survey results and includes a framework for network governance, communication, and information management.

How Network Members Share Information

The Compass Network provides a foundation for establishing cooperation among organizations and individuals by developing an environment of trust. The intention is for members of the Compass Network to share information through meetings and surveys, and seek opportunities to catalyze future projects based on that information. Collaborations may be organized based on geographic scope, common strategies, or in response to emerging opportunities or challenges.

Given this goal, and while respecting the importance of privacy and proprietary information, it was important for members to build understanding about other organizations and individuals working within the Pajaro River watershed. This was accomplished through the Pajaro Compass Network Survey, a structured method for sharing information that was supported by a majority of participants. Of the 2015-2016 participants, 31 organizations or individuals filled out the survey, and 28 opted to share that information with other Compass Network members. The organizations that contributed data to the survey included seven land trusts, three Resource Conservation Districts, three community and education organizations, two rangeland and agricultural practitioners and advocates, six federal and state-level wildlife and natural resources organizations, two independent special districts, four transportation agencies, three water districts and water resource managers, and one natural resource consultant.

Although members are not required to complete a survey or make survey responses available to other members, those who do and consent to have that information shared with other organizations receive a customized Network Match Sheet that connects an organization with a specific need to potential partners working within the Pajaro River watershed by identifying:

- Organizations that share your organization's primary focus
- Organizations that can partner on projects centered around your primary focus
- Organizations that may be able to help fund projects centered around your primary focus
- Organizations that have strengths where your organization has indicated a need, including within the following categories:

Landowner Outreach
Partner Outreach
Public Outreach
Local Communication
Statewide Communication
Communications: Other
Web-Development/Tools
Volunteer Organizing
Work with School Groups
Field Equipment/Tools
Restoration Work
Restoration Planning
Conservation Planning
GIS Spatial Analysis
Science/Biology
Field Surveys
Wildlife Monitoring
Water Quality Monitoring
Stewardship
Project Contracting
Project Oversight and Implementation
Grant Writing
Private Funding
Public Funding
Web-Based Meetings (e.g., WebEx, Slack)

Any new Compass Network members will be invited to fill out a survey upon joining the Compass Network, and the data will be periodically updated for all participants.

In addition to customized Network Match Sheets provided to participating members, the Pajaro Compass document also provides summary information about participants gathered from the survey data. These results, summarized here and available in complete form in Appendix D, provide insight into the areas of focus and responsibility identified by Pajaro Compass Network Survey respondents.

The survey requested each respondent to identify an area of focus, or multiple areas of focus if applicable. The following chart shows the primary areas of focus for respondents, with the largest number identifying a focus on water resources, biodiversity, and agriculture. Fewer organizations identified a primary focus on community, carbon stock/climate change (correlates to the carbon and soil health theme), or recreation. This information provides a starting point from which to conduct additional outreach to bring a diversity of partners to the Pajaro Compass in order to increase activity and impact in the Pajaro River watershed.

Figure 13. Organization Focus. Summary Data from Pajaro Compass Network Survey, 5/23/2016. Chart shows primary focus on Pajaro Compass themes of the survey respondents.

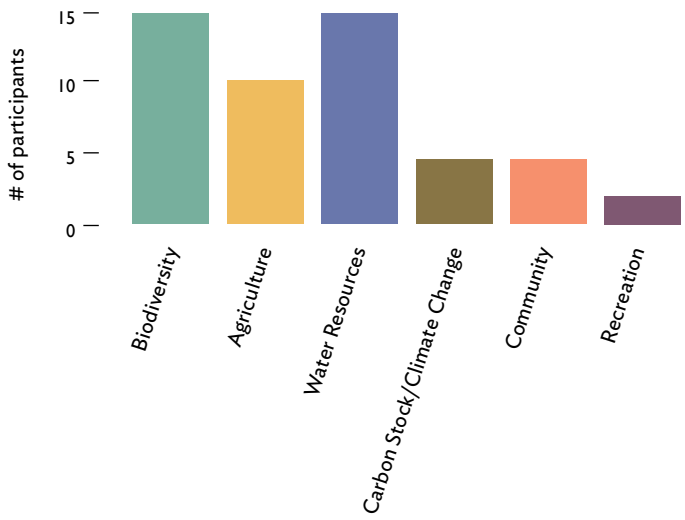
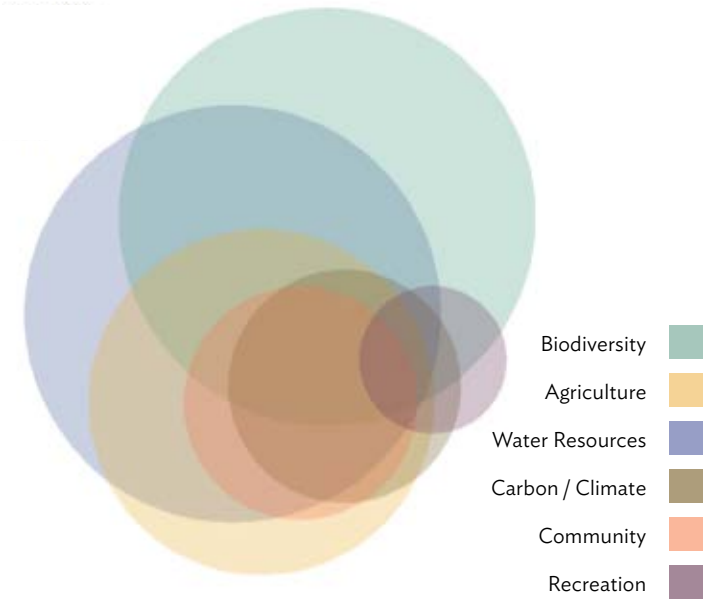


Figure 14. Overlapping Areas of Focus. Summary Data from Pajaro Compass Network Survey, 5/23/2016. Diagram showing how survey respondent areas of focus overlap, including organizations that identified multiple areas of focus.



Because organizations could prioritize multiple focal areas, the data also describe the overlap between areas of primary focus within organizations. Each circle in Figure 14 represents a focus area. The size of each circle indicates the number of organizations that listed that focus area as their primary focus.

Most organizations in the network focus on more than one conservation theme. The overlap of the conservation theme circles represents the multiple focuses that co-occur within organizations. The size of the overlap between circles indicates the proportion of organizations with the same subset of co-occurring primary focuses. This relational diagram shows the immediate potential for partner engagement in biodiversity and water resource projects for Compass Network members, as this relationship is quite strong and reaches across multiple focus areas and groups. However, according to the analysis, these areas could be better aligned with recreation for greater effectiveness.

Carbon stock/climate change, community and recreation are less of a focus for current participants. This highlights the need to engage with other entities

focused on these activities. An important component of the Pajaro Compass is encouraging additional partners to become involved, in order to address more fully the Pajaro Compass goals. Specific effort should be made to learn more about these groups and how they can be intentionally engaged.

Agriculture demonstrates a broad relationship with all focuses, but with especially strong relationships showing with carbon stock/climate change and community. This may point to a starting point for an engagement effort focused on the benefits that farms and grazing lands provide to the public in the near term for the Compass Network. As additional funding sources related to carbon stock become available, that may be an additional point of engagement with the agricultural community.

In addition to organization focus, the Pajaro Compass Network Survey collected information about participants' primary working strategy. The results are shown in the chart, reflecting the number of participants working on restoration, fee purchase, easements, outreach, policy, and stewardship.

According to the survey results the partners primarily use land stewardship, restoration, and outreach as their main strategies for work in the Pajaro River watershed. Land acquisitions (fee purchase or easements) are used by 13 of the survey respondents, and the fewest organizations used policy as a strategy.

Figure 15. Primary Working Strategy. Summary Data from Pajaro Compass Network Survey, 5/23/2016. Chart shows primary strategies of the survey respondents, including organizations that work in multiple areas.

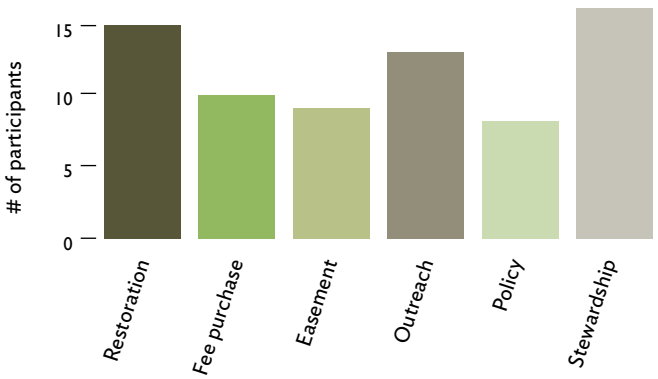
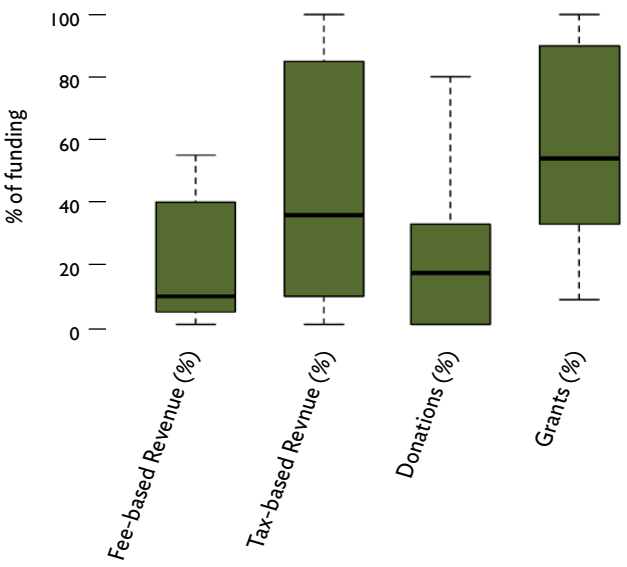


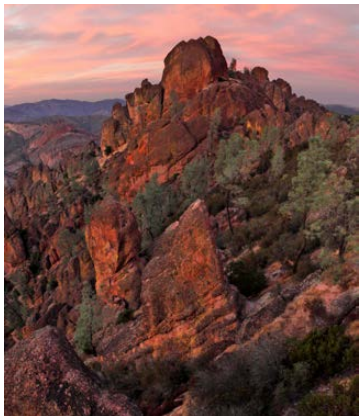
Figure 16. Current funding sources of Compass Network members.



The fact that most of the survey respondents indicate they conduct outreach, while the fewest focus on policy is of note, and should be a topic for Compass Network members to consider moving forward. Using the Compass Network as a place to tease out broader activities in the Pajaro River watershed is something for partners to explore.

The survey also requested information about each respondent's source of funding. Figure 16 shows box plots of these results. For organizations that receive some amount of funding from a given funding source, the box plots show the percentage of funding that that organization receives from that source. Within each box, solid black lines represent the median, boxes represent the 25th-75th percentile for the percent of funding organizations receive from that source and whiskers represent the minimum or maximum percentages from that source or 1.5 times the interquartile range whichever is less or greater, respectively. Organizations that receive no funds from a given funding source were not represented in the box plot for that source.

For additional information about the Pajaro Compass Network Survey please refer to Appendix D.


Paul G. Johnson

Opportunities for Network Members

Pajaro Compass Network members can benefit from and support implementation of the Pajaro Compass in a variety of ways. Compass Network meetings and communication channels, in combination with the Compass Network Match Sheets, will allow participants to seek out partners, funders, collaborators, and supporters. The Match Sheets can also increase the capacity of individual participants by providing insight into which organizations have strengths in a category another identifies as an area of need.

The Compass Network can also help strengthen projects and build support through a variety of pathways:

- **Project design and technical assistance:** By consulting with other members on project design and implementation, participants can strengthen their projects and find partners to fill gaps in capacity or knowledge. The Compass Network provides a ready-made group of experts to provide problem-solving and expertise on emerging projects and opportunities.
- **Strengthen funding prospects:** In some cases, Compass Network members can directly fund each other's projects (see Funding Resources for details). In many cases, members can provide letters of support for funding applications or join as co-applicants. A variety of project supporters often boosts rankings from funding sources looking for projects that demonstrate buy-in from relevant stakeholders.
- **Build understanding and plan better with data:** Participants may use the Pajaro Compass Webmap and underlying spatial data to understand how Pajaro River watershed values are connected and communicate that story to others. The theme maps and online map tools will also allow participants to identify opportunities to incorporate multiple Pajaro Compass themes into projects. This could both strengthen individual projects and lead to additional support.
- **Reach new audiences:** The Compass Network serves as a crucial space for building trust between organizations working in overlapping areas and expands the reach of individual organizations through connections that extend beyond the Compass Network itself. Members have the opportunity to reach out to new audiences through other members, either through introductions and connections to resources, or by expanding their programs to embody Pajaro Compass values that are related to their primary goals.



A Vision for Implementation

The full implementation of the Pajaro Compass vision necessitates a degree of collaboration between Compass Network members that can best be secured through a dedicated staff person located at a member organization. It is the steering committee's intent to obtain funding for a coordinator to manage ongoing information-sharing and guide members towards collaboration and resource-sharing.

In service of that collaboration and with a view toward implementation, beginning in June 2016 the Pajaro Compass Network will implement the following action items regarding communication, information management, and governance:

Network Communication

- In its first year, launch a series of regular Compass Network meetings, both in person, in the field, and using virtual meetings tools, open to the public and new members
- Facilitate ongoing communication between Compass Network members
- Match needs and capacities among Compass Network members using data from the survey and Match Sheets
- Using the meetings as a forum and relying on the Pajaro Compass action plan and strategies, identify outreach and project targets and find additional partners through Compass Network members

Network Information Management

- Continue to update online map tools with additional information and based on feedback from participants
- Use online map tools to portray where each organization works or seeks funding, its multiple values, and how strategies intersect with others
- Field queries and requests for spatial analysis data or maps from Compass Network members
- Provide Compass Network members with opportunity to update survey data each year

Network Governance

- Pajaro Compass steering committee will add two to three new members in June 2016 (current members include Resource Conservation District of Santa Cruz County, Santa Clara Valley Open Space Authority, and The Nature Conservancy)
- Pajaro Compass steering committee to pursue funding and hire a Compass coordinator to be based at a Network member organization, either as a new position or as a contractor

With the above Compass Network structure in place, members are positioned to accomplish the conservation goals envisioned for the Pajaro River watershed. If you would like to join the Compass Network, please visit www.PajaroCompass.org.

Pajaro Compass

Conclusion

Representing a diverse group of stakeholders, over 50 participants worked together through the Pajaro Compass to articulate a collective set of themes, goals and activities for the Pajaro River watershed. Over the course of a year, this effort created a framework for information sharing, developed an action plan, and identified the features of the landscape that together would illustrate the multiple values of the watershed and communicate a conservation vision.

The participants envisioned acting as a committed group of conservation partners who champion the many values of the Pajaro River watershed for people and nature and, through coordinated action, ensure that agricultural and open space lands support these values in balance with new opportunities.

Highlighting many opportunities for future partnerships, in its next phase the Compass Network aims to increase the pace and scale of conservation across the Pajaro River watershed through a variety of strategies and through implementation of an information-sharing network designed to build capacity for Pajaro Compass projects. The Compass Network welcomes the participation of any individual or organization with a vested interest in the future of the economic, natural, and cultural values that sustain the Pajaro River watershed.

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Appendices

The appendices are included in the pages that follow and are also available for viewing and download at: www.PajaroCompass.org

Appendix A: Pajaro Compass Product Development Methods

Appendix B: Pajaro Compass Spatial Data Sources

Appendix C: Pajaro Compass Conservation Theme Aggregate Assessment Methods

Appendix D: Pajaro Compass Network Survey Results

Appendix A. Compass Product Development Methods

It was essential that the products of the Pajaro Compass reflected the collaborative vision of the 2015-2016 Pajaro Compass participants who represented conservation, agriculture, transportation, and government stakeholder interests from across the Pajaro River watershed region. Therefore, we sought to make the Pajaro Compass development process transparent and to ensure that the data and final products met stakeholder needs and represented a collaborative vision.

METHODOLOGY

Input Data

The Pajaro Compass included six conservation themes vetted by the participants: water resources, biodiversity, agriculture, carbon and soil health[1], recreation, and community. The participants developed a list of elements that were perceived to represent critical processes or features within each resource theme. The participants then ranked these individual elements based on their perceived importance for representing the resources in the Pajaro River watershed (rankings of the input data layers and their corresponding themes are in Table A1). We then acquired data layers to represent these elements. Data sources and analysis details are in Appendix B and C, respectively. Documenting the relative importance of each data layer helped prioritize data collection needs and were foundational in the development of products. Note: later in the process, the participants identified a need to incorporate data that represented community values, including cultural resources. These layers are included in the final conservation assessment but are not reflected in stakeholder rankings because they were added after the input data survey, in response to feedback from the participants (see Table C1 for community values layers).

[1] Although the identified conservation goals determined by the stakeholders included a goal around carbon and soil health, the spatial analysis only addresses carbon stock. Because carbon stock provides a direct link to Climate Change and Carbon Stock—a primary focus identified in the Pajaro Compass Network survey—it was the sole focus of this theme in the maps and tools. The spatial analysis does not include data or metrics related to soil health. The carbon and soil health theme section discusses both.

Table A1. Input data scores reflect the weighted tally by 25 participants. Each layer was ranked as either Critical to Include (weight =2), Important to Include (weight =1), Indifferent (weight =0), or Do not include (weight=0).

Themes	Values	Score
Water Resources	Riparian corridors	45
Water Resources	Wetlands	42
Water Resources	Groundwater recharge	41
Biodiversity	Habitat Type - Biotic	40
Biodiversity	Connectivity	40
Water Resources	Floodplains	40
Biodiversity	Threatened and Endangered Species	39
Agriculture	Prime, important, unique farmland	37
Agriculture	Rangeland	37
Biodiversity	Rare species occurences	36
Biodiversity	Aquatic Biodiversity	33
Water Resources	Water Quality	33
Biodiversity	Species Richness	31
Biodiversity	Habitat Type - Abiotic	29
Water Resources	Ecosystem service value	29
Biodiversity	Migratory Birds	28
Water Resources	Runoff	28
Carbon	Storage	28
Recreation	Regional and local trails	27
Recreation	Open space	27
Water Resources	Flows	25
Water Resources	Water supply infrastructure	25
Carbon	Ecosystem service value	24
Agriculture	Ecosystem service value	23
Biodiversity	Historical ecology	16
Recreation	Opportunity for local parks	13
Recreation	Recreation use of water	12

Products

We convened a sub-group of participants (the Science and Tools working group) to ensure that the final map products would communicate the participants' vision and would be useful to decision-makers. This working group developed a 'menu' of map and tool options that ranged from simple to complex and had the capacity to reveal different types of information. Sixteen participants in two subsequent working sessions discussed which of the products from the menu would be most useful for their work and the work of their partners, or if they had concerns about any of the products (Table A2). Overall, the participants expressed that some tools would be useful to their work, but there was no clear indication of which particular tools or functions would be most useful.

Table A2. 'Menu' of data products and the number of participants to whom the product would be useful and to what degree it would be useful.

Description	Critical	Supports my work	Helps my partners	Not useful	I'm concerned about this product
Tool 1: Map of high priority areas	1	12			2
Tool 2: Map of high priority areas split out by strategy: protection, restoration, enhancement	2	10	1		3
Tool 3: Continuous Surface of Aggregated Values	3	11	1		
Tool 4a: Layered values **Tool 4b:** Layered values with custom reporting	1	13	1		
Tool 5: User-defined query of high priority	1	10	4		
Tool 6: Strategy based query	2	9	4		

These same participants also answered the following questions aimed to identify the most useful information that a Pajaro Compass tool could reveal, and concerns about products:

1. The Compass would be most useful if it answered the following questions:
2. The Compass would be most useful if it revealed the following information:
3. I am concerned that the Compass will:

The word cloud (Figure A1) displays the most requested type of information with the size of words reflecting the number of times they were a part of the response. The five most requested types of information from the Pajaro Compass were: priorities, stakeholders, conservation, values, and overlap. Using these top five responses, the Science and Tools working group assessed which tools in the 'menu' would be most suitable for meeting these needs and what data was needed in addition to Table A1. The Science and Tools working group then provided recommendations to the steering committee (Table A3) based on which products would most likely avoid stakeholder concerns while also delivering the most requested information. The steering committee followed these recommendations and chose to proceed with development of a web-based data viewer that allowed participants to view and query many of the thematic data elements and an integrated value assessment that highlighted areas of extensive overlap between conservation themes. The data gap we identified was information about where, how, and on what issues the participants work in the Pajaro River watershed. Therefore, we created a survey with both thematic and spatial components (described in the Pajaro Compass Network Roles section of the main document) to collect this information from the participants.

We created the Pajaro Compass Webmap that included all data layers that were used to represent each of the conservation themes and influences in the watershed. The user can interact with these data layers by clicking them on and off,

Figure A1. A word cloud showing the most requested type of information from a Pajaro Compass product. The size of the word indicates the number of times it was included in a response. Larger words indicate a greater number of times it was expressed by participants.

Table A3. Recommended actions for each tool based on participants concerns, current resources, and which products could best reveal the requested information from a stakeholder survey.

Description	Recommendations
Tool 1: Map of high priority areas	AVOID
Tool 2: Map of high priority areas split out by strategy: protection, restoration, enhancement	CAUTION
Tool 3: Continuous Surface of Aggregated Values	PROCEED
Tool 4a: Layered values	PROCEED
Tool 4b: Layered values with custom reporting	WISH LIST
Tool 5: User-defined query of high priority	WISH LIST
Tool 6: Strategy based query	WISH LIST

and by viewing simple charts of acreages for some of the layers within a user-defined area. Data layer descriptions and data sources are available in Appendix B and on the Pajaro Compass Webmap.

We also created integrated conservation assessments to indicate the degree of overlap between the six resource themes throughout the watershed (described in the Integrated Assessments section of the main document).

Integrated conservation assessments are composed of weighted combinations of the six thematic aggregate assessments. Each thematic assessment is composed of a weighted combination of that theme's individual input data layers (detailed methods in Appendix C). Weights of each layer within each theme were based on three factors: 1) stakeholder ranking and conservation importance, 2) data accuracy, and 3) data distributions (weights included in Appendix C). Therefore, the darker areas on the thematic assessment maps can be interpreted as areas of the greatest perceived value in the watershed for a given theme. However, some areas indicated to be of low value may be due to lack of data or data inaccuracy.

The integrated conservation assessments were used to reveal areas in the watershed with a high degree of thematic value overlap. To create integrated assessments, we binned each conservation theme's aggregated assessment into deciles, multiplied these decile values by weights if specified, and summed across the desired layers. To allow for user-defined weighting between themes, we developed an application so users can view priority areas based on weighted overlap of the themes they are most interested in or that would be most relevant to the strategies they are actively engaged in called, the Pajaro Compass Interactive Planner. To illustrate how different thematic combinations and weights can be used to advance conservation and build partnerships through integrated conservation assessments, we developed three different thematic combinations 1) all six themes, weighted by the primary focuses of the 2015-2016 Pajaro Compass participants, 2) biodiversity and water resources equally weighted, and 3) agriculture and carbon stock equally weighted.

Appendix B. Pajaro Compass Spatial Data Sources

We compiled data primarily from publicly available datasets and clipped the data to the Pajaro River watershed. We prioritized collection of data layers that were identified as critical or important to include by the partnership (Appendix A, Table A1). We collected data on resources in the watershed that together represent the six conservation themes: water resources, biodiversity, agriculture, carbon and soil health[1], recreation, and community. Finally, we collected data on current and planned land-use, climate, land status, policies, as well as projects that could either beneficially or detrimentally influence these resources. These data layers are all available in the Pajaro Compass Webmap.

Table B1. Spatial data sources used for Pajaro Compass themes.

Theme	Value	Source	Date	Details
Water	Floodplain	FEMA		100 year floodplain; 10 year floodplain.
Water	Riparian Corridor	EPA/TNC	2012	Active River Area as in the California Integrated Assessment of Watershed Health showing: material contribution areas, meander belt, floodplains, terraces, riparian wetlands.
		NHDPlus		Divided into perennial and intermittent using NHDPlus.
Water	Flood Frequency	NRCS SSURGO	2015	The annual probability of a flood event expressed as a class (dominant flood frequency class for the map unit, based on composition percentage of map unit components whose composition in the map unit is equal to or exceeds 15%)
Water	Groundwater Recharge Areas	DWR	2000	Hydrogeologically Vulnerable Areas compiled for Exec. Order D-5-99. Mapping of aquifer vulnerability.
Water	Groundwater Basins	DWR	2014	The CASGEM Groundwater Basin Prioritization (Basin Prioritization) is a statewide ranking of groundwater basin importance that incorporates groundwater reliance and focuses on basins producing greater than 90% of California's annual groundwater.
Water	Groundwater Recharge	Flint *et al.* USGS	2014	USGS BCM Model at 270m based on 30 year historic data summary.
Water	Runoff	Flint *et al.* USGS	2014	USGS BCM Model at 270m based on 30 year historic data summary.
Water	Wetlands	National Wetlands Inventory (NWI)	2014	US Fish and Wildlife Service maps of the extent, approximate location and type of wetlands.
Water	Water Quality Index	California Integrated Watershed Assessment (EPA)	2013	NHD Catchment level index, based on conductivity, turbidity, and nitrate concentration.

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[1] Although the identified conservation goals determined by the stakeholders included a goal around carbon and soil health, the spatial analysis only addresses carbon stock. Because carbon stock provides a direct link to Climate Change and Carbon Stock—a primary focus identified in the Pajaro Compass Network survey—it was the sole focus of this theme in the maps and tools. The spatial analysis does not include data or metrics related to soil health. The carbon and soil health theme section discusses both.

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Theme	Value	Source	Date	Details
Biodiversity	Connectivity	Bay Area Critical Linkages (SC Wildlands, BAOSC) Local Permeability (TNC)	2013 2015	Critical Linkages were modified by local permeability to only show areas with limited local permeability that are important in a regional connectivity context (0.7 threshold). Local permeability shows the proportion of a 3km neighborhood that is accessible based on resistance from transportation and energy infrastructure, housing density and land cover.
Biodiversity	Species Richness	Habitat suitability weighted richness (TNC)	2015	FVEG2015 vegetation types at 30m linked to CWHR (CDFG) 2015 species habitat relationships and CWHR range maps for ~700 species.
Biodiversity	Threatened and Endangered Species Richness	T&E Habitat suitability weighted richness (TNC)	2015	FVEG2015 vegetation types at 30m linked to CWHR (CDFG) 2015 species habitat relationships and CWHR range maps for a subset of threatened and endangered species.
Biodiversity	Rare Species	CNDDB Density (DFW,TNC)	2015	CNDDB filtered to recent higher quality occurrences and weighted by accuracy and rarity/status with richness calculated within 1km.
Biodiversity	Rare Vegetation	CGAP USGS	2008	18 vegetation types from CGAP identified as statewide rare vegetation by TNC.
Biodiversity	Aquatic Biodiversity	California Freshwater Assessment (TNC)	2014	Species Richness for all aquatic species and Imperiled Species Richness by HUC12 watershed.
Biodiversity	Historical Ecology	SFEI—Alomon *et al.* VTM—Kelley *et al.* Weislander 1945 hosted by California natural resources agency	2015 2005 2015	Combination of 3 data sources, where there was overlap, the data was used in the following priority order: 1) SFEI -Geospatial data describing the historical conditions of Santa Clara Valley 2) VTM 3) Digital version of the 1945 California Vegetation Type Maps by A. E. Wieslander of the U.S. Forest Service. Source scale of maps are 1:100,000.
Biodiversity	Habitat	FVEG CNDDB	2015 1997	Conifer or Deciduous Forest or Woodland. Grassland. Sycamore Alluvial Woodland.
Biodiversity	Abiotic Habitat	Serpentine Soils		
Biodiversity	Wetlands	National Wetlands Inventory (NWI)	2014	US Fish and Wildlife Service maps of the extent, approximate location and type of wetlands.
Biodiversity	Seeps and Springs	USGS, EPA (NHDPlus18)	2015	

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Theme	Value	Source	Date	Details
Agriculture	Farmland	Farmland Mapping and Monitoring Program (FMMP)	2012	FMMP is a combination of soil ratings and current land use.
Agriculture	Historically farmed land	Farmland Mapping and Monitoring Program (FMMP)	1986-2012	All farmland of state or local importance, and prime or unique farmland was identified from 1986-2012 and then screened for current farmland or urban development.
Agriculture	Rangeland	FMMP FVEG	2012 2015	Combined FMMP classified as Rangeland and FVEG CWHR classes as rangeland according to Cameron *et al.* 2006
Carbon	Above Ground Carbon	Gonzalez et al.	2010	30m. Carbon density for 2010 (Mg ha-1).
Carbon	Below Ground Carbon	gSSURGO Soil Carbon	2015	10m. Organic carbon stock estimate (SOC) measured for 0-30cm depth (C g/m-2).
Recreation	Public Access	CPAD/CCED	2014	Protected areas with public access.
Recreation	Trails	Greenbelt Alliance, National Geospatial-Intelligence Agency		Bay Ridge Trail, Juan Bautista de Anza National Historic Trail (Greenbelt) VMAP1 (NGA).
Community	Agricultural Tourism	UC Agrotourism Directory	2016	County Crossroads Farm Trail farms and vineyards with on-site stands and stores.
Community	Cultural Resources	Amah Mutsun	2016	Cultural resources
	National Historic Registry	National Historic Registry	Accessed 2016	Registered Historic Sites and Buildings.
	El Camino Real Historic Trail	CyArk	Accessed 2016	Historic road clipped to Pajaro River watershed.

Table B2. Spatial data sources used for Pajaro Compass regional influences.

Influences	Type	Source	Date	Details
Urban Expansion	Projected Urban Growth	Thorne - UPlan	2012	100m. Urban and rural growth projected to 2050—BAU scenario.
Urban Expansion	Current population	U.S. Census	2010	By census blocks.
Urban Expansion	Williamson act non-renewals	California Department of Conservation Division of Land Resource Protection (DLRP)	2012	Non-renewals of enrollment in voluntary restriction of land-use to agricultural uses.
Urban Expansion	Rangeland conversion to urban	Cameron *et al.*, TNC	2014	Change in FMMP rangeland from earliest FMMP to 2006-2008.
Community	Distance to schools		2000	Euclidean distance in meters (10m) to point location of schools.
Community	Disadvantaged communities	Department of Water Resources	2015	By census place, tract, and block group where the annual median household income (MHI) that is less than 80 % of the Statewide annual MHI.
Transportation development	Current transportation infrastructure	Tiger and THP	2015	Primary Roads, Secondary Roads, Paved Roads, Unpaved dirt trails requiring 4WD, highway ramps Railroads.
Transportation development	Planned infrastructure	CalTrans, VTA, High Speed Rail Authority	2015 2009	152 expansion 101 expansion High speed rail alignment
Energy Development	Planned energy development	Ventyx	2015	Planned or proposed energy development.
Energy Infrastructure	Oil Wells	California Division of Oil, Gas and Geothermal Resources	2013	Existing oil and gas wells.
Agricultural Intensification	Rangeland to Ag current	Cameron *et al.*, TNC	2014	Change in FMMP rangeland from earliest FMMP to 2006-2008.
Agricultural Intensification	Projected rangeland conversion	USGS	2015	The top quintile for probability of rangeland conversion which was calculated based on the annual average transition probabilities summed across 5 scenarios.
Climate Change	Exposure Stress	Klausmeyer *et al.* TNC CMIP5	2011	800m—combines an estimate of exposure from the projected regional climate changes and an estimate of the sensitivity of biodiversity in an area from a coping range derived from historical climate variability.
Conservation	Exiting protection/ easements	CPAD, CCED, BPAD, San Benito Parks	2014 2013	Protected areas (fee) and easements.

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Influences	Type	Source	Date	Details
Conservation	Critical Habitat	USFWS	2014-2016	Designated areas containing features essential for the conservation of endangered species—provides protection from federal activities.
Conservation	HCP/NCCP	CDFW	2015	Provides for the regional protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity.
Conservation	Williamson Act Enrollment	California Department of Conservation Division of Land Resource Protection (DLRP)	2012	Voluntary, temporary restriction of lands enrolled to agricultural uses.
Biodiversity	Invasive Vegetation	Calflora	2015	Cal-IPC listed plant species observations since 1980.
Biodiversity	Fish Passage Impediments	CalFish	2014	Inventory of known and potential barriers to anadromous fish in California from more than 200 data sources.

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Appendix C. Pajaro Compass Conservation Theme Aggregate Assessment Methods

Approach

We resampled all data to 90m grids using bilinear interpolation for continuous features and majority area for categorical features. Data layers representing landscape features were then aggregated within the six conservation themes of water resources, biodiversity, agriculture, carbon and soil health[1], recreation, and community, via the following steps:

1. Rescale: We rescaled all data layers to values between 0 and 1, with 0 being no value and 1 being the highest value for that resource.
2. Weight: We assigned weights to each data layer to account for distributional biases, data uncertainty, and the importance of that resource for representing a conservation theme and the conservation vision of the Pajaro Compass participants. We then multiplied the rescaled data layers by the assigned weights.
3. Combine: We combined all the data layers within a conservation theme by summing all of the rescaled, weighted data layers for a given conservation theme.

Data Types

Data layers that represent resources in the Pajaro River watershed consisted of either binary or continuous data. Data layers that displayed the location of a resource were binary and had a value of 1 in regions where the resource

Table C1. Data layers listed by conservation theme and data type.

Conservation Theme	Binary Data	Continuous Data
Water Resources	Floodplain—10 year Floodplain—100 year Perennial Stream Active River Area Ephemeral Stream Active River Area Groundwater Recharge Area Wetlands	Water Quality Index Groundwater Recharge Runoff
Biodiversity	Connectivity Grassland habitat Forest habitat Sycamore alluvial woodland Wetlands, seeps and springs Rare Vegetation Serpentine Soils	Permeability Species Richness Threatened and Endangered Species Aquatic Species Richness Vulnerable Aquatic Species Richness Rare Species Occurrence Density
Agriculture	Farmland Rangeland Previously-farmed land	
Carbon and Soil Health		Aboveground carbon stock Releasable soil carbon stock
Recreation	Public open space Trails	
Community	Farms with on-site markets Historic trails and sites Cultural resources	

[1] Although the identified conservation goals determined by the stakeholders included a goal around carbon and soil health, the spatial analysis only addresses carbon stock. Because carbon stock provides a direct link to Climate Change and Carbon Stock—a primary focus identified in the Pajaro Compass Network survey—it was the sole focus of this theme in the maps and tools. The spatial analysis does not include data or metrics related to soil health. The carbon and soil health theme section discusses both.

was present, and had a value of 0 where the resource was absent. Data layers that varied across the watershed in their contribution to a resource or in their condition of that resource, were represented with continuous data that ranged from 0 to 1 with some distribution of intermediate values. Table C1 displays data layers that together represent each conservation theme listed by binary or continuous data types.

Rescaling Data

Continuous data were rescaled so that the minimum values were 0 and the maximum values were 1. Rescaling the data to a common scale with common units allowed for eventual combination across the data layers, without overemphasizing data measured on a scale with a higher maximum value due simply to its unit of measurement. For example, the rare species occurrence density maximum was 7,642 weighted observations per square kilometer, and the threatened and endangered species habitat-suitability weighted richness index maximum was 8. Combining these layers without conversion to common units would have resulted in a nominal contribution from the threatened and endangered species richness to the aggregate conservation value.

However, the rescaling process still gave unintentional relative weights to the data layers. For example, the maximum aquatic species richness value was 137, rescaled to 1, and the maximum vulnerable aquatic species richness value was 36, rescaled to 1. These data layers were originally on the same scale (i.e. # of species) and a single unit (i.e. a species) had the same value regardless of the source data or vulnerability of that species. However, rescaling the data resulted in a single, vulnerable aquatic species having nearly four times the value of a common aquatic species. In general, after rescaling the data, data layers with larger data ranges resulted in lower per unit values, and data with smaller data ranges resulted in higher per unit values. Table C2 shows the maximum and minimum values of the raw continuous data for biodiversity resources. Often these unintentional weight implications from rescaling were justified in that features that were rarer received higher per unit weights, and therefore had a larger per unit influence on an aggregate theme, and ultimately where conservation action might be directed or development might be avoided. We evaluated the impact of these unintentional relative weights and applied intentional weights where necessary to adjust the relative influence that a data layer contributed within an aggregate conservation theme (see Weights section below).

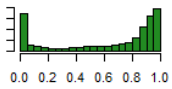
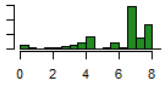
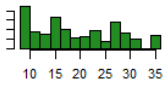
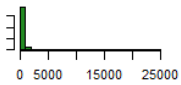
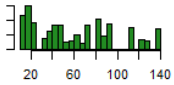
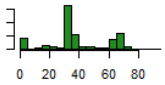
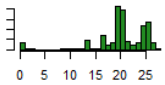
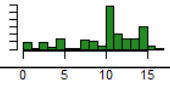
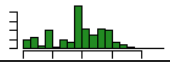
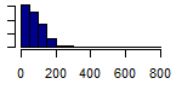
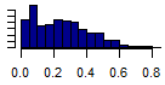
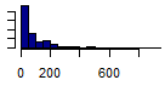
Table C2. The maximum and minimum values of continuous data layers for the biodiversity conservation theme.

Layer	Minimum Value	Maximum Value	Units
Permeability	0.0003	1	Proportion of 3km radius moving window accessible for general species movement
Threatened and Endangered Species	0	8	# of species discounted by habitat suitability
Vulnerable Aquatic Diversity	8	36	# of species
Rare Species Occurrences	0	24,009	weighted # of observations within a 1km radius moving window
Aquatic Biodiversity	13	137	# of species
Bird Richness	0	93	# of species discounted by habitat suitability
Mammal Richness	0	27	# of species discounted by habitat suitability
Reptile Richness	0	16	# of species discounted by habitat suitability
Amphibian Richness	0	9.5	# of species discounted by habitat suitability

Continuous data layers varied in the distributions of their data. Data layers had somewhat uniform distributions (e.g. permeability), negatively skewed distributions (e.g. threatened and endangered species habitat-suitability weighted richness), positively skewed distributions (e.g. vulnerable aquatic species richness), and bimodal distributions (e.g. bird habitat-suitability weighted richness). For most data layers, we rescaled the data so that the native distribution was maintained, but for a few data layers we modified the distribution during rescaling. We maintained the distribution when the relative difference between intermediate values corresponded with a real difference in the value of that resource. For example, 800mm/yr of groundwater recharge is four times as much recharge as 200mm/yr. Alternatively, a watershed with a water quality index of 0.8, normalized to the state, is not necessarily of four times better quality than a watershed with a water quality index of 0.2. For data layers in which differences between values were real, we maintained the native distribution and the relative differences between the values by normalizing the data using equation C1.

Equation C1. $$\frac{x-\min(x)}{\max(x)-\min(x)}$$

Table C3. Continuous data distributions and the method of rescaling applied.

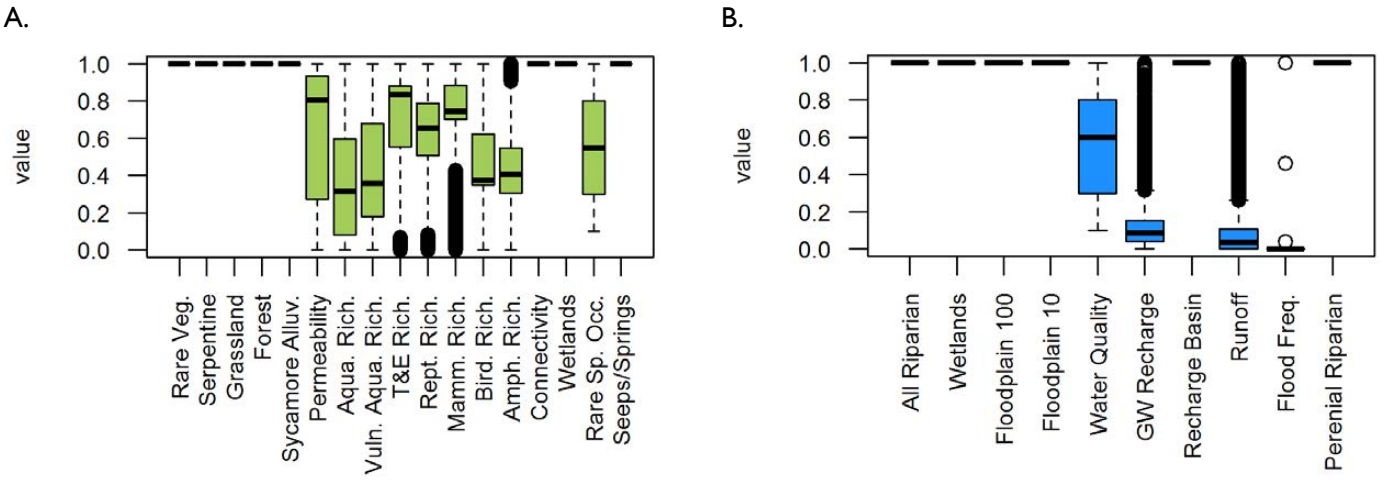
Layer	Distribution	Rescaling	Reason
Permeability		None	Raw data varies between 0 and 1; values are proportion of neighborhood accessible to focal cell and relative differences between values are real
Threatened and Endangered Species		Normalize	Differences between values are real
Vulnerable Aquatic Species Richness		Normalize	Differences between values are real
Rare Species Occurrences		Binned to deciles	Data has extreme observational bias; data includes subjective weights for rarity and discounts for spatial uncertainty; data is extremely negatively skewed
Aquatic Species Richness		Normalize	Differences between values are real
Bird Richness		Normalize	Differences between values are real
Mammal Richness		Normalize	Differences between values are real
Reptile Richness		Normalize	Differences between values are real
Amphibian Richness		Normalize	Differences between values are real
Groundwater recharge		Normalize	Differences between values are real
Water Quality Index		Binned to deciles	Statewide rescaled index combined from several factors; differences between values are relative to the rest of the state
Runoff		Normalize	Differences between values are real

For skewed distributions where the relative differences between values were the result of created indices (e.g. Water Quality Index) or biases in data collection (e.g. Rare Species Occurrences), we rescaled the data by binning the data into deciles. Table C3 displays the raw distribution of the data, the type of rescaling applied for continuous data layers, and our reasoning for the application of that rescaling method. The carbon theme only consisted of carbon stock aboveground and belowground, which can be measured in equivalent terms. Therefore, we did not rescale these layers before weight application and combination.

The distribution of the data also had an effect on the relative value that a data layer contributed to the aggregate conservation theme. Distributions with a skewed right tail had less influence on the aggregate theme than data

with a skewed left tail, and both had less of an influence on the aggregate theme than binary data layers in which all resources had a value of 1. For example, 75 percent of the watershed had rescaled groundwater recharge values less than 0.15 due to the strong right skew in the data, but 100 percent of the floodplains had a value of 1 because the data was binary. Therefore, in the base data (before weighting), floodplains unintentionally had a higher weight than groundwater recharge. Figure C1 displays the unintentional weights and relative influence of each data layer within a conservation theme for both biodiversity and water resources. A horizontal scan across these figures quickly highlights the differential influences of the data layers to the aggregate theme. Data layers where all or most of the data layers are closer to 1 have a greater influence on the aggregate conservation theme. We evaluated the impact of these unintentional weights and applied intentional weights where necessary to adjust the relative influence that a data layer had within an aggregate conservation theme (see Weights section below).

Figure C1. Boxes show the values of all data in each data layer illustrating the unintentional weights and differential influences of the data layers to the aggregate theme due to distributional differences within the biodiversity theme (A) and the water resources theme (B). Boxes represent the interquartile range, solid lines indicate medians, and dashed whiskers extend to the lowest and highest values within 1.5 times the interquartile range beyond the 25th and 75th percentiles. Circles indicate values that are more extreme than the dashed whiskers.



Weights

Distribution Weights

Rescaled data was multiplied by intentional weights to modify each data layer's relative influence in the aggregate conservation theme. The first type of weight that we applied was a distribution weight. This weight adjusted for the unintentional discounted value of data with right skewed distributions. We calculated adjustment factors for all data layers with rescaled median values that were less than 0.5, as the weight that could be multiplied by the median to increase the median value to 0.5. This adjustment factor was then applied as a weight to all values in the data layer. Table C4 shows the rescaled distribution, the quartiles, the adjustment factor, and the adjusted quartiles of data with applied distribution weights.

Table C4. The rescaled distributions, quartiles, adjustment factors, and adjusted quartiles of data with applied distribution weights

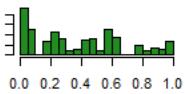
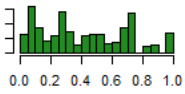
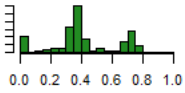
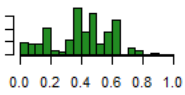
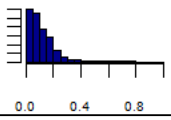
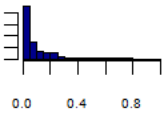
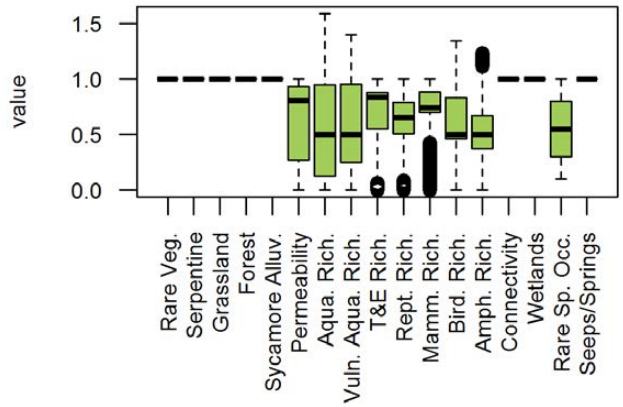
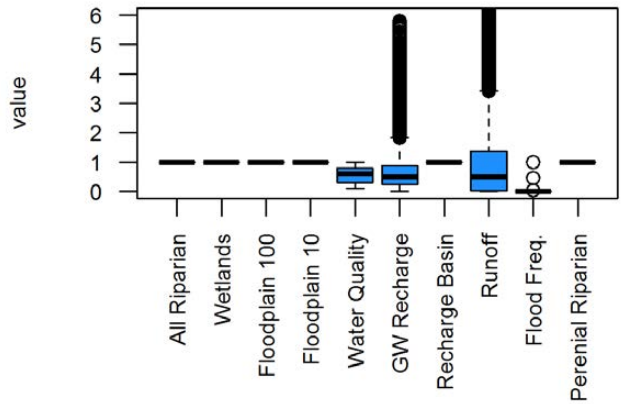
Layer	Rescaled Distribution	Rescale 25%	Rescale Median	Rescale 75%	Adjustment factor	Weight 25%	Weight Median	Weight 75%
Vulnerable Aquatic Species Richness		0.18	0.36	0.68	1.4	0.25	0.5	0.95
Aquatic Species Richness		0.08	0.32	0.60	1.59	0.13	0.5	0.95
Bird Richness		0.34	0.36	0.66	1.4	0.48	0.5	0.92
Amphibian Richness		0.31	0.41	0.56	1.23	0.38	0.5	0.7
Recharge		0.042	0.086	0.15	5.798	0.24	0.5	0.88
Runoff		0.003	0.039	0.11	12.95	0.03	0.5	1.38

Figure C2. Boxes show the values of all data in each data layer illustrating the differential influences of the data layers to the aggregate theme with weights applied to right skewed data layers in the biodiversity theme (A) and the water resources theme (B). Boxes represent the interquartile range, solid lines indicate medians, and dashed whiskers extend to the lowest and highest values within 1.5 times the interquartile range beyond the 25th and 75th percentiles. Circles indicate values that are more extreme than the dashed whiskers

A.



B.



The agriculture, recreation, and community themes consisted only of binary data. Therefore, none of the data layers from these themes received distribution adjustment weights. Although aboveground and belowground carbon stock varied in their distributions, these layers could be directly combined without rescaling due to their like units and so no distribution weighting was necessary.

Importance Weights

The second type of intentional weight that we applied was an importance weight. The importance weight reflects the participants' perceptions of the importance of the resource in representing conservation theme, the rarity or conservation significance of the resources, and also the quality of data and its ability to represent the resource it intends to represent.

We gave each layer an intentional weight based on the following three factors:

1. Participants' identification of a resource as critical or important for representing their conservation vision in the watershed (see Appendix A, Table A1).
2. Rarity or status and conservation importance of the data layer (e.g. threatened and endangered species, wetlands).
3. Confidence that the data and its spatial distribution accurately reflects the value and location of that resource in the watershed.

Figure C3. The importance weights that we applied to each of the data layers within a conservation theme for a) water resources, b) biodiversity c) agriculture, d) carbon, e) recreation and f) community.

A.

Feature	1	2	3
Riparian Corridors–Perenial	■	■	■
Wetlands	■	■	■
Riparian Corridors–Intermittent	■	■	
Groundwater Recharge	■	■	
Groundwater Basin–Recharge Area	■	■	■
Floodplain–100 year	■		
Floodplain–10 year	■		
Flood Frequency	■		
Water Quality	■	■	
Runoff	■		

B.

Data Layer	1	2	3
Unfragmented, permeable lands	■	■	
Contectivity	■	■	
Habitat–Grassland and Forest	■		
Habitat–Sycamore Alluvial Woodland	■	■	
Habitat–wetlands, springs, and seeps	■	■	
Threatened and endangered species Richness	■	■	
Vulnerable Aquatic Diversity	■	■	
Rare Species Occurences	■		
Rare Vegitation	■		
Aquatic Biodiversity	■		
Bird Richness	■		
Mammal Richness	■		
Reptile Richness	■		
Amphibian Ricness	■		
Serpentine	■		

C.

Data Layer	1	2	3
Farmland	■	■	
Rangeland	■	■	
Undeveloped, Previously Farmed Land	■		

D.

Data Layer	1	2	3
Aboveground Carbon Stock	■		
Releasable Belowground Carbon Stock	■		

E.

Data Layer	1	2	3
Open Space with Public Access	■		
Trails	■		

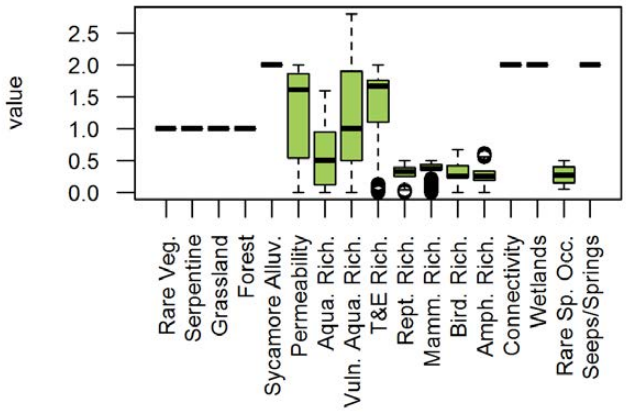
F.

Data Layer	1	2	3
Cultural Resources	■	■	
Farms with On-Site Markets	■		
Historic Trails and Sites	■		

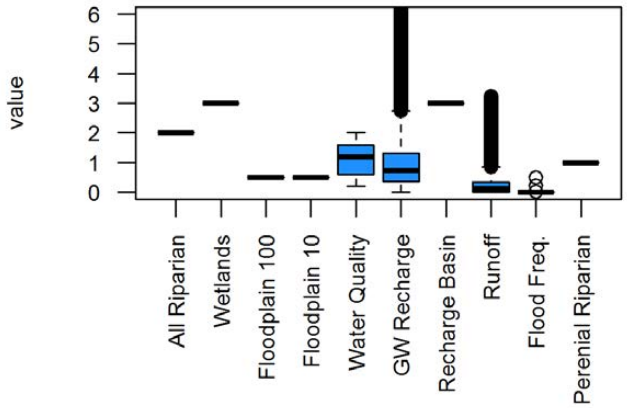
We multiplied importance weights and distribution weights by rescaled data to obtained standardized, weighted data layers within each theme. Figure C4 compares values across data layers that have been rescaled and weighted by distribution weights and/or importance weights, for biodiversity and water resources. A horizontal scan across these figures quickly highlights the differential influences of the data layers to the aggregate theme.

Figure C4. Boxes show the values of rescaled data, weighted by distribution weights and/or importance weights for biodiversity (A) and water resources (B). Boxes represent the interquartile range, solid lines indicate medians, and dashed whiskers extend to the lowest and highest values within 1.5 times the interquartile range beyond the 25th and 75th percentiles. Circles indicate values that are more extreme than the dashed whiskers.

A.



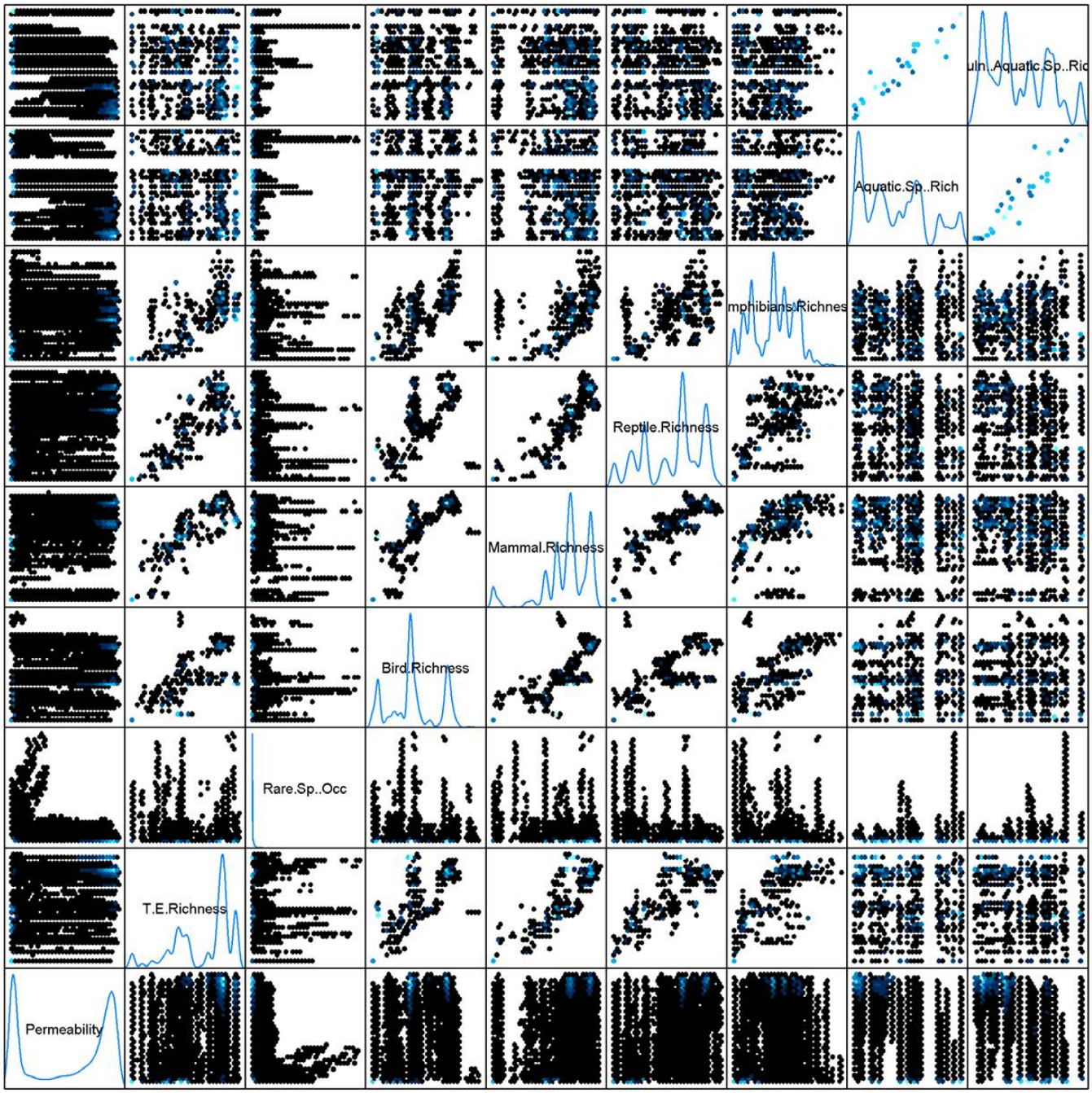
B.



Combination

Combining data layers via an additive benefit function assumes that data are independent. We evaluated the data to test for correlation between layers (Figures C5 and C6).

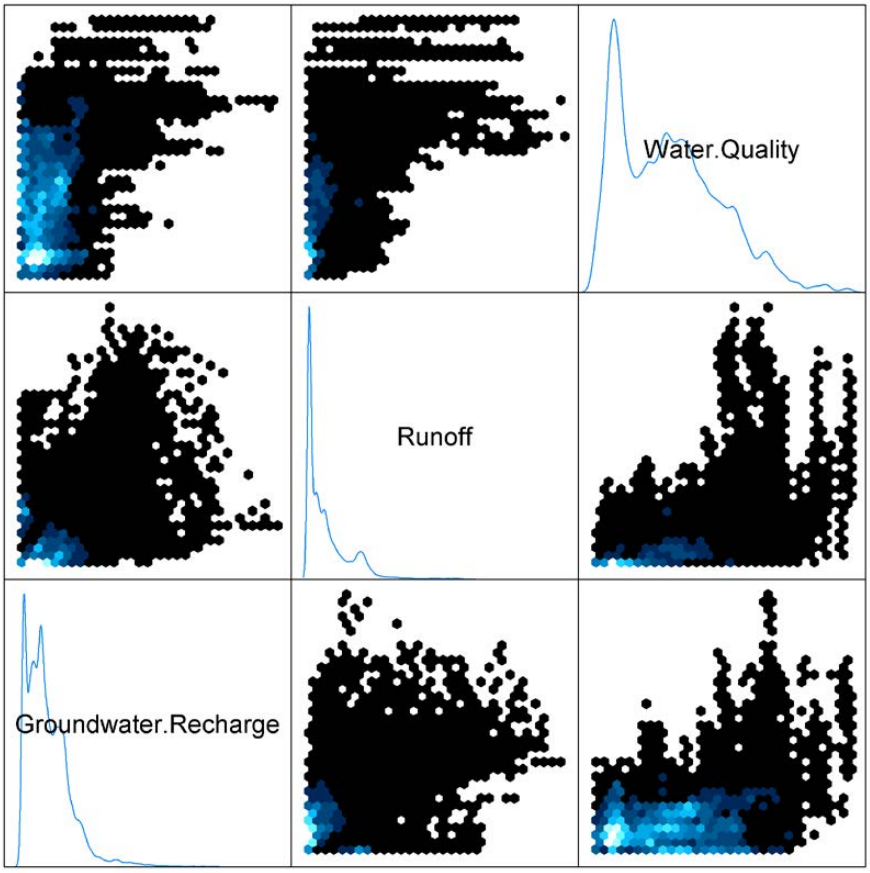
Figure C5. Scatterplots of data show the pairwise comparisons between data layers for the biodiversity conservation theme.



In general, datasets from independent data sources were not correlated and did not appear to violate the assumption of independence. However, some of the data layers were created by subsetting a single data layer. For example, vulnerable aquatic species richness was a subset of aquatic species richness. Including both of these datasets allows vulnerable species of importance for conservation and/or policy to provide an additional contribution to the aggregate conservation theme. Similarly, bird, mammal, reptile, amphibian and threatened and endangered species habitat-suitability weighted richness, were all derived from the same dataset. We subset this data to allow for equal contribution to the aggregate between classes regardless of quantity of species in a class, and to provide an additional influence of species with policy or conservation implications (i.e. threatened and endangered species) to the aggregate conservation theme.

We summed the rescaled, weighted data within each conservation theme to create aggregated conservation theme layers that show the weighted overlap of landscape features that represent the conservation theme (Figures 3, 4, 5, 7, 8, 9 in the main document).

Figure C6. Scatterplots of data show the pairwise comparisons between data layers for the water resources conservation theme.



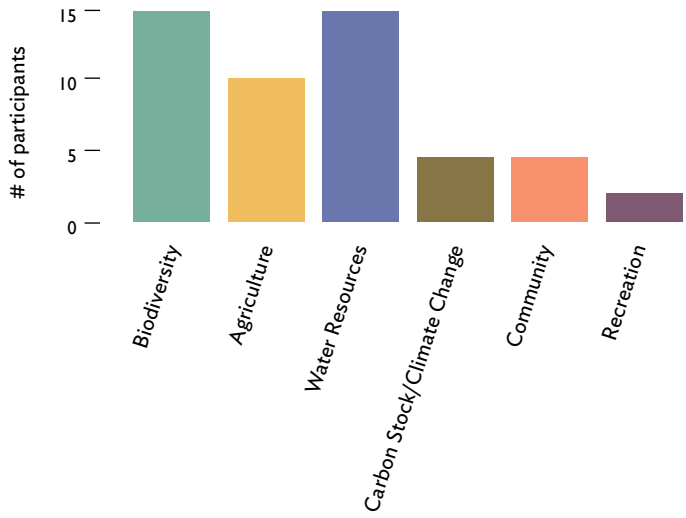
Appendix D.
Pajaro Compass Network Survey Results

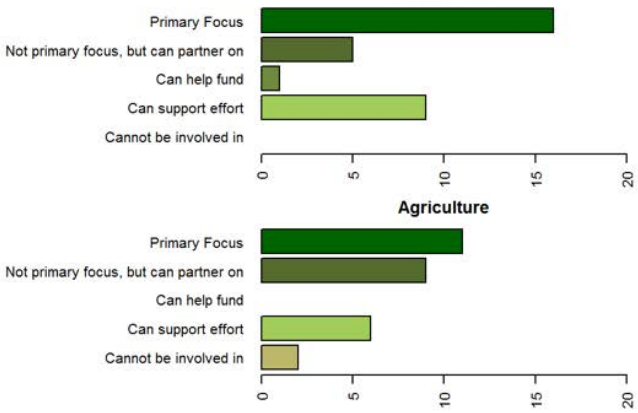
We collected information to help foster collaboration across sectors and jurisdictional boundaries to form a network for voluntary conservation in the Pajaro River watershed. The following information describes the organizations in the Compass Network.

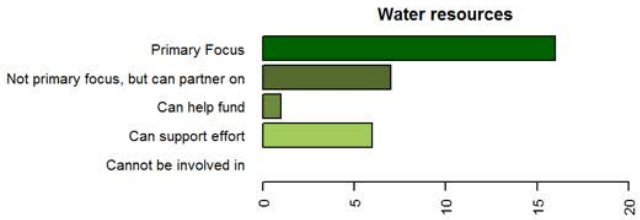
Organizational Focus

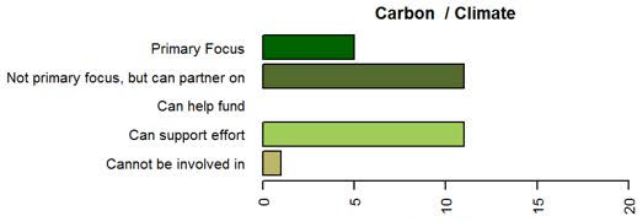
What do you work on?

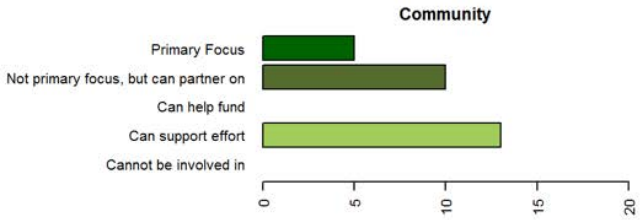
Primary focus of 2015-2016 participants

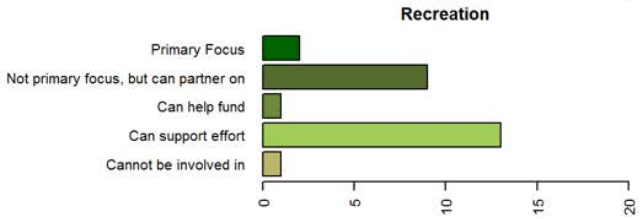








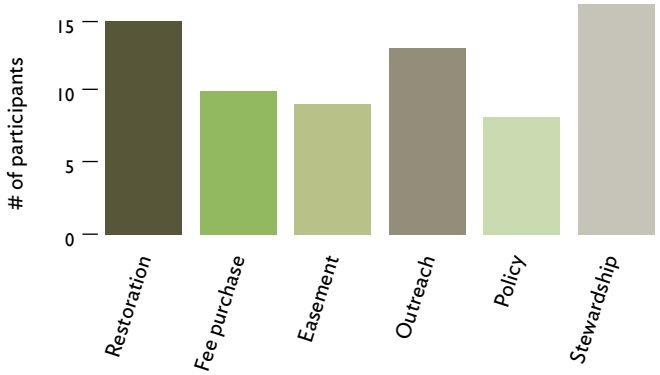


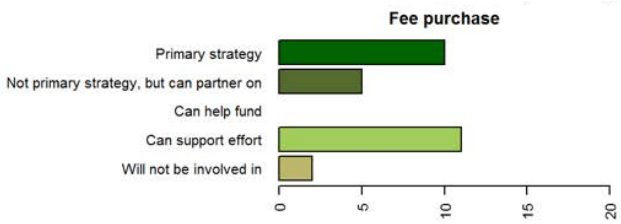


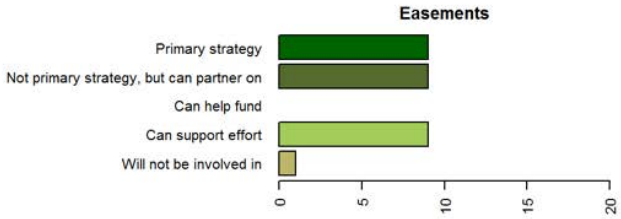
Strategy

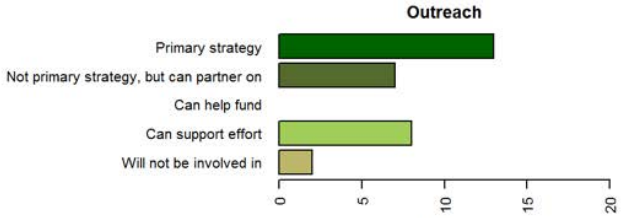
How do you work?

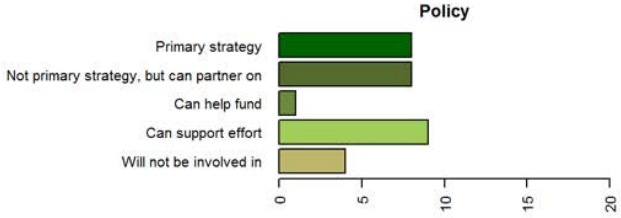
Primary focus of 2015-2016 participants

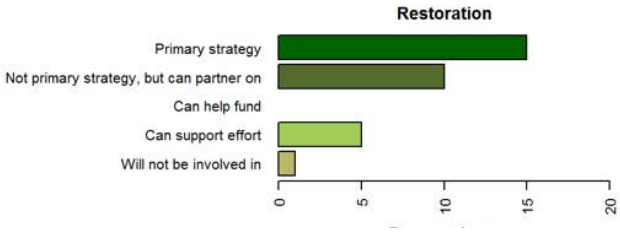


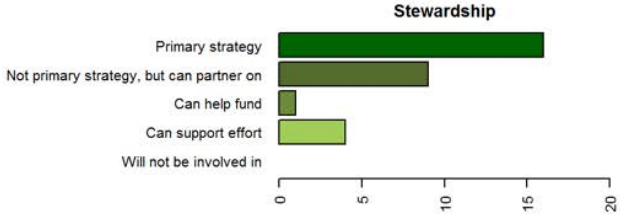




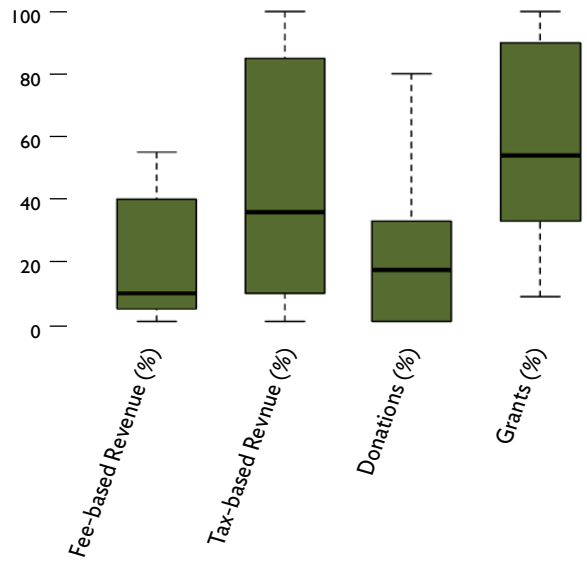




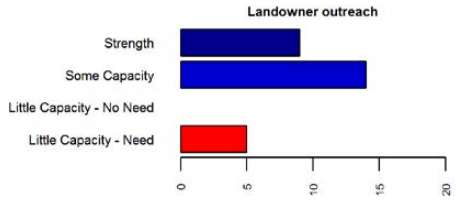


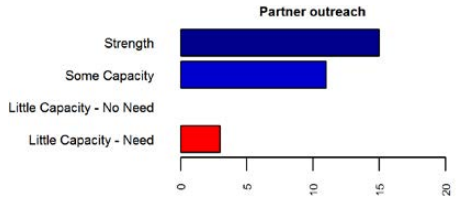


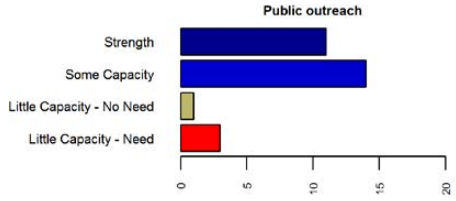
Funding Sources

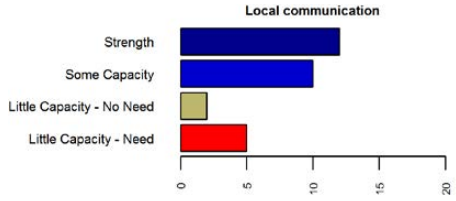


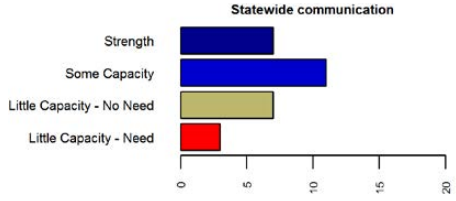
Strength or needs of organization

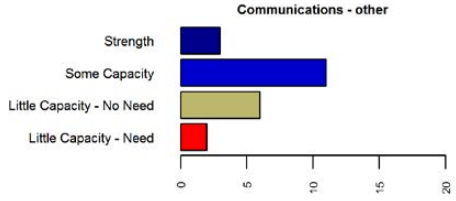


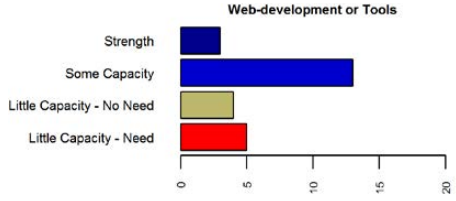


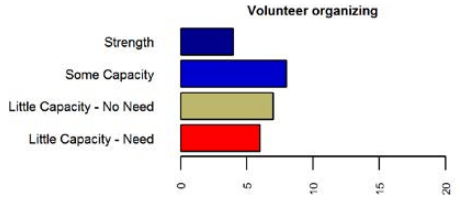


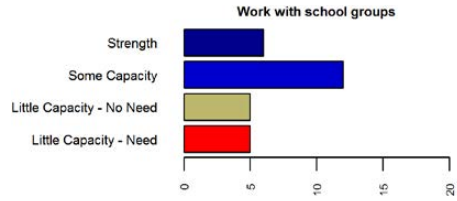


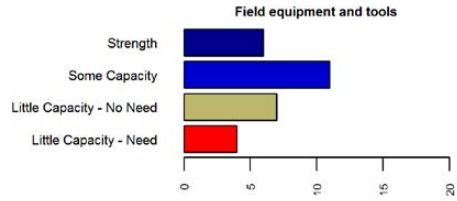


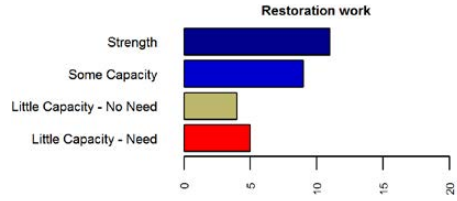


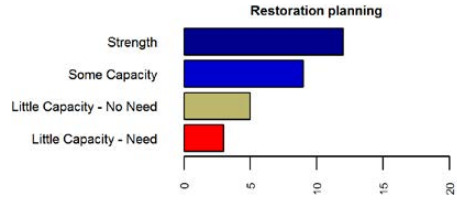


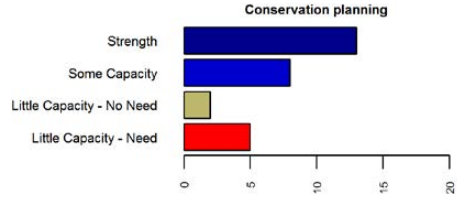


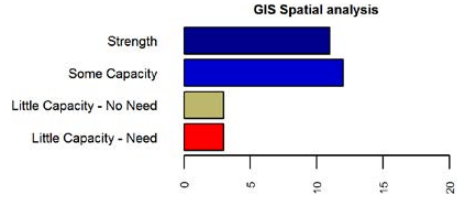


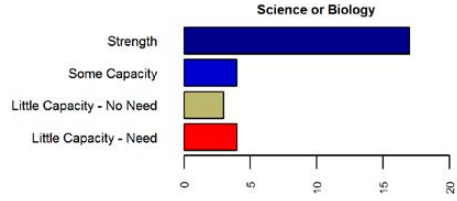


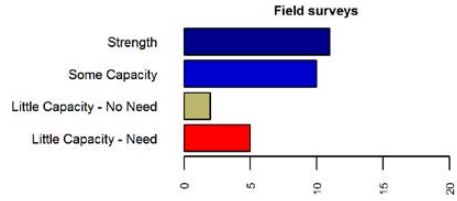












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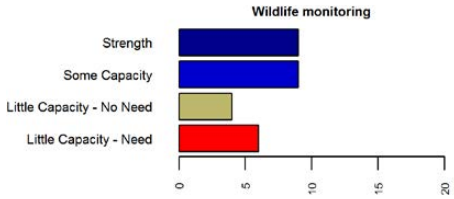

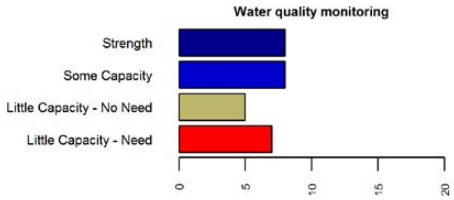

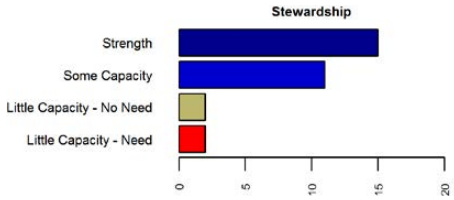

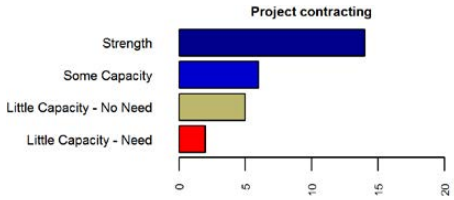

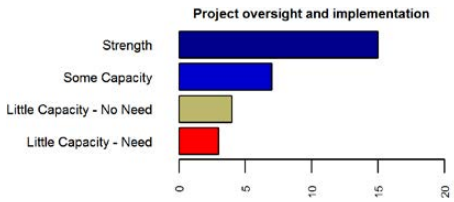

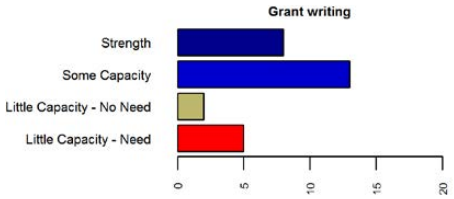

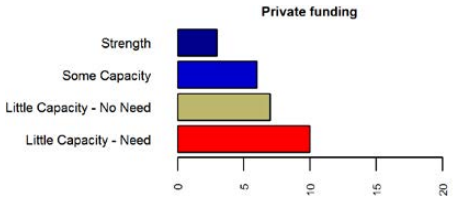

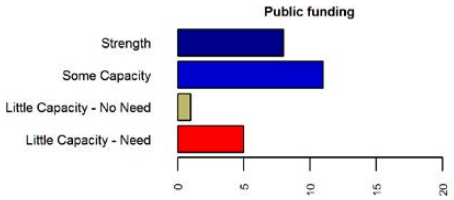

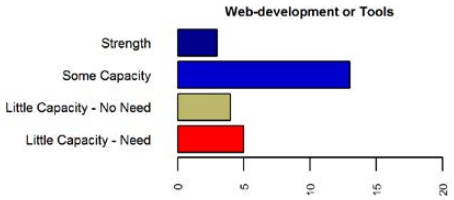

The Pajaro Compass helps people to connect, learn, and partner in the Pajaro River watershed.

www.PajaroCompass.org