UPPER PAJARO WATERSHED PLAN

An Integrated Approach to Water Resources Management

Final Report 2024

SANTA CLARA VALLEY WATERSHEDS: COYOTE | **PAJARO** | GUADALUPE | WEST VALLEY | LOWER PENINSULA

ONE WATER
Upper Pajaro Watershed Plan

Valley Water

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Valley Water, formerly the Santa Clara Valley Water District, manages an integrated water resources system that includes the supply of clean, safe water, flood protection, and stewardship of streams on behalf of Santa Clara County's 1.9 million residents.

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ONE WATER, ONE WATERSHED

Uvas Dam. Photo Valley Water

CHAPTER 1: ONE WATER, ONE WATERSHED

1.1 WHY A WATERSHED PLAN?

Valley Water has played a critical role in managing water resources in Santa Clara County since 1929, first overseeing the County's water supply, and later adding flood risk mitigation and environmental stewardship to its responsibilities. As the water resources infrastructure built over the last century ages, it has become clear that the cost of repairing and replacing critical infrastructure is very high, monetarily as well as environmentally. How can Valley Water learn from the past and incorporate the best of our current collective knowledge to build a better future for water resources management? The best approach is looking to watersheds.

Watersheds are, by nature, interconnected systems. The water within them must be managed in ways that acknowledge and respond to the local ecosystem, geology, and hydrology. It is within the context of a watershed that communities either have too much water, too little water, or poor-quality water. It is within the watershed context that communities must reconcile their water demands with the imperative to sustain the resource for future generations.

A watershed plan is a way to account for and address water resources and environmental needs holistically. One Water is Valley Water's framework for watershed management, intended to assess existing environmental and physical systems, identify areas needing improvement, and prioritize future actions to address deficiencies. As part of this process, One Water seeks to collaborate with many jurisdictions, agencies, and other stakeholders and firmly establish Valley Water's commitment to multi-benefit projects. One Water will create a Watershed Plan for each of the five watersheds in Santa Clara County. This Watershed Plan addresses the Upper Pajaro watershed.

UPPER PAJARO WATERSHED

360
Watershed area in square miles

353
Approximate total length in miles of all creeks in watershed

110
Approximate total length in miles of major creeks

83
Approximate total length of District-owned or easement creek

Watershed-level management brings together regional partners from within and beyond the water sector in joint planning and collaborative action to protect our water, the shared natural resource that is essential for health, agriculture, industry, ecosystems, recreation, and life itself. Planning on a watershed-level can be difficult, requiring engagement with a broad range of stakeholders with different proficiencies, priorities, and ways of working, but has the potential to yield highly beneficial outcomes. For that reason, Valley Water is committed to working with diverse communities to improve watershed health and water resources for present and future generations.

1.2 WHERE IS THE UPPER PAJARO RIVER WATERSHED?

The Pajaro River Watershed is a 1,300 square-mile catchment area draining portions of the Santa Cruz, Gabilan, and Diablo Mountain Ranges. The Pajaro River is approximately 30 miles long, originating near San Felipe Lake on the border of Santa Clara and San Benito counties, and flowing southwest into the Monterey Bay. The Pajaro River has five major tributaries that drain into it and hundreds of minor tributaries. Major tributaries include the San Benito River and Corralitos, Uvas, Llagas and Pacheco creeks. Figure 1-1 illustrates the location and extent of major hydrologic features found within the watershed.

The Pajaro watershed overlaps portions of four counties situated south of San Francisco Bay: Santa Cruz, Santa Clara, San Benito, and Monterey (see Figure 1-1).

WHY ONE WATER?

National Context

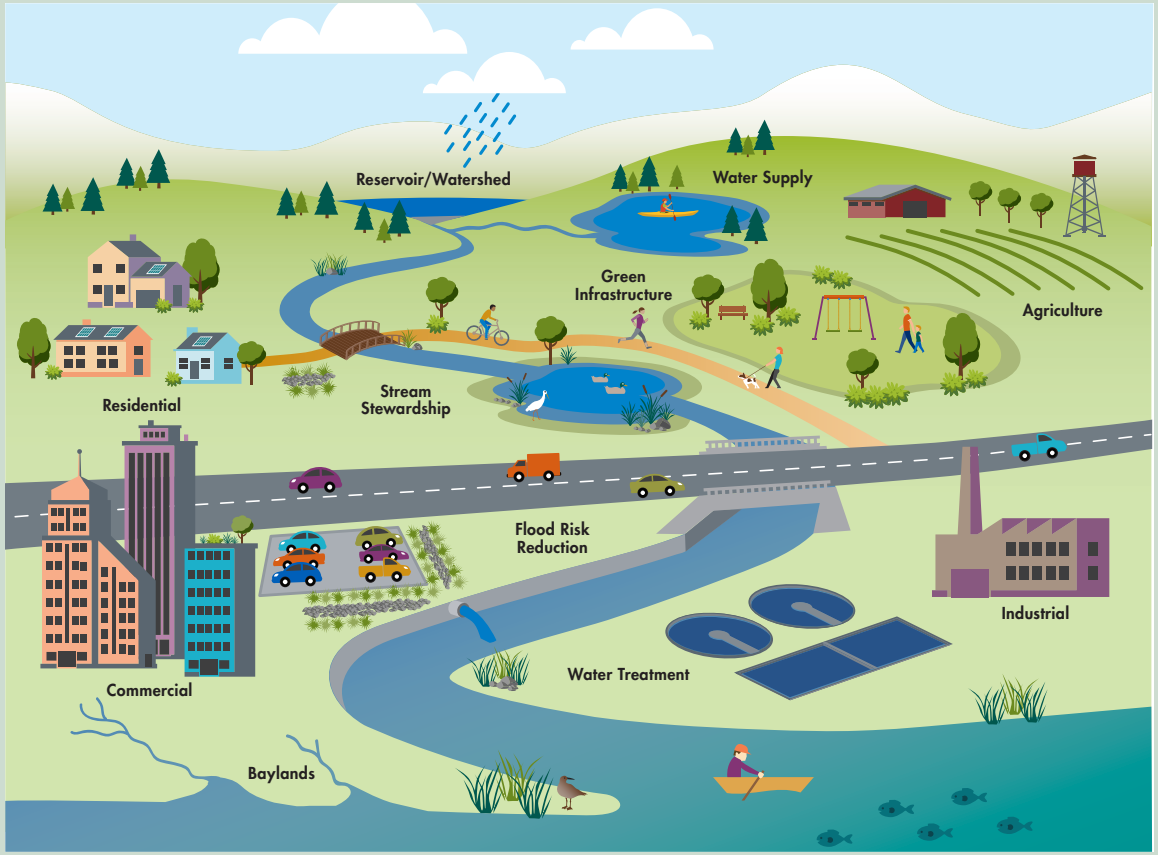
The US Water Alliance's One Water Council, a diverse group of water leaders nationwide, completed a roadmap in 2016. The roadmap reflects many key ideas and approaches relevant to Valley Water one water planning.

According to the roadmap, the hallmarks of One Water are:

1. The mindset that all water has value — from the water resources in our ecosystems to our drinking water, wastewater, and stormwater.
2. A focus on achieving multiple benefits, meaning that our water-related investments should provide economic, environmental, and societal returns.
3. Approaching decisions with a systems mindset that encompasses the full water cycle and larger infrastructure systems.
4. Utilizing watershed-scale thinking and action that respects and responds to the natural ecosystem, geology, and hydrology of an area.
5. Relying heavily on partnerships and inclusion, recognizing that real progress will only be made when all stakeholders have a seat at the table.

The One Water approach recognizes that water must be managed in ways that respect and respond to the natural flows of watersheds and the natural ecosystem, geology, and hydrology of an area. It is within the context of a watershed that communities either have too much water, too little water, or poor quality water. It is within the watershed context that communities must reconcile their water demands with the imperative to sustain the resource for future generations. Watershed-level management brings together regional partners from within and beyond the water sector in joint planning and collaborative action to protect the shared natural resource that is essential for health, agriculture, industry, aquatic species, forests, wildlife, recreation, and life itself.

In some cases, communities are reluctant to pursue watershed-level planning because it calls for engaging with a broad range of stakeholders who may have different expertise, priorities, and ways of working. It can be difficult to bring together all who influence water resources within a drainage basin—municipalities, water utilities, agricultural interests, businesses, social service organizations, consumer groups, and environmental advocates.



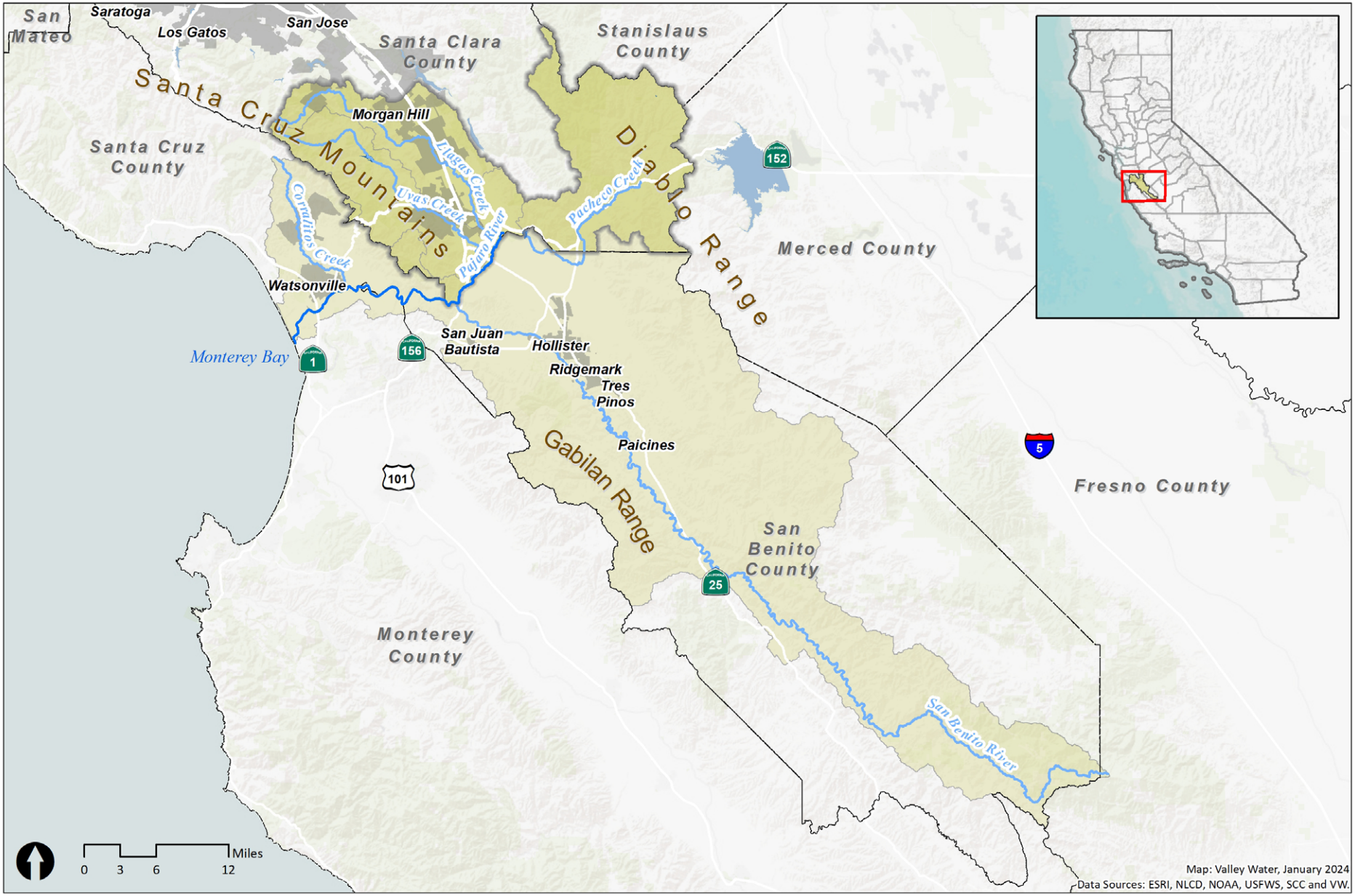


Figure 1-1: The Pajaro River Watershed

Major cities within the Pajaro River Watershed include, Morgan Hill, Gilroy, portions of southern San Jose, and the community of San Martin in Santa Clara County; Watsonville and the community of Corralitos in Santa Cruz County; and Hollister, San Juan Bautista, and the communities of Ridgemark, Tres Pinos, and Paicines in San Benito County. The Pajaro Watershed is home to a population of approximately 265,000 people (U.S. Census Bureau, 2019).

The scope of this Plan focuses on the portion of the Pajaro watershed within Santa Clara County, referred to as the Upper Pajaro watershed (also referred to as the Uvas/Llagas watershed at Valley Water). The Upper Pajaro watershed, with area limits highlighted in Figure 1-2, is located within Valley Water's service area.

The Upper Pajaro watershed is composed of five subwatersheds illustrated in Figure 1-3. The five subwatersheds, Pajaro River, Uvas Creek, Llagas Creek, Pacheco Creek, and Tequisquita Slough, are portions of the watershed further delineated into smaller hydrologic units. Approximately 5% of the Tequisquita Slough subwatershed is located within Santa Clara County with the remainder located in San Benito County. Accordingly, this area has been excluded from the Plan scope.

Uvas Creek Subwatershed

The Uvas Creek subwatershed drains the eastern slopes of the Santa Cruz Mountains in the southern areas of the County. Its primary drainage is Uvas Creek, a 29.5-mile stream originating on Loma Prieta and a confluence with the Pajaro River along the southern County boundary. The creek flows through Uvas Canyon County Park in its upper reaches and is impounded by Valley Water's Uvas Reservoir near San Martin. Uvas Dam and Reservoir are located about two miles upstream from the intersection of Watsonville and Uvas Roads. The reservoir's capacity is 9,688 acre-feet of water and it has a surface area of approximately 287 acres. Below Uvas Reservoir, Uvas Creek passes through the Uvas Creek Preserve and the Christmas Hill Park in Gilroy. Below Highway 101, the creek is known as Uvas-Carnadero Creek. Major tributaries to Uvas Creek include Little Uvas Creek, Little Arthur Creek, Bodfish Creek, Gavilan Creek, Tick Creek and Tar Creek.

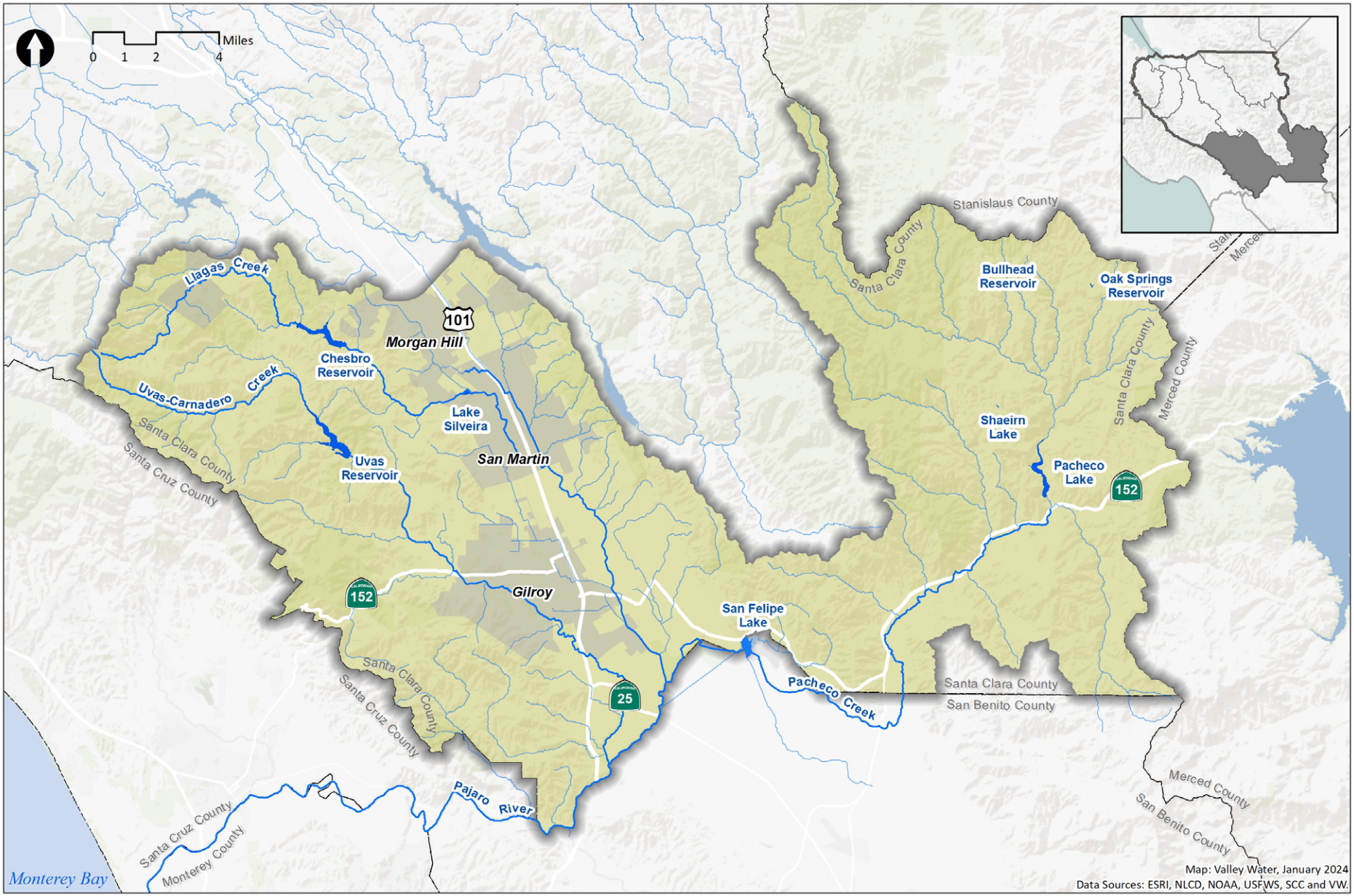
Llagas Creek Subwatershed

The Llagas Creek subwatershed drains a portion of the Santa Cruz Mountains, Morgan Hill, San Martin, and Gilroy via Llagas Creek, a perennial 31-mile stream tributary to Pajaro River. Llagas Creek's headwaters are on the eastern side of Crystal Peak near Loma Prieta and its confluence with the Pajaro River along the southern County boundary. Valley Water's Chesbro Dam and Reservoir impound Llagas Creek in the hills to the west of Morgan Hill. Chesbro Reservoir has a storage capacity of 7,967 acre-feet of water and a surface area of approximately 271 acres. Below Chesbro Reservoir, Llagas Creek passes by the Church Avenue Ponds in Gilroy, a system of off-stream groundwater recharge ponds that can be supplied with local water from a stream diversion on Llagas Creek. Major tributaries to Llagas Creek include West Little Llagas Creek, East Little Llagas Creek, and San Martin Creek.

Pacheco Creek and Pajaro River Subwatersheds

The Pacheco Creek subwatershed drains a portion of the Diablo Range in the southeastern portion of the County via Pacheco Creek, an 18-mile stream. To the north of Highway 152, the Pacheco Creek's north fork is impounded by the Pacheco Reservoir, which has an operational capacity of 5,500 acre-feet of water and an approximate surface area of 197 acres. The Pacheco Reservoir was created by the construction of the North Fork Dam in 1939 and is owned by the Pacheco Pass Water District. The North and South Forks of the Pacheco Creek converge to form the mainstem of Pacheco Creek below the Pacheco Reservoir, which flows alongside Highway 152 until reaching San Felipe Lake to the southeast of Gilroy in San Benito County. The Pajaro River's mainstem begins just west of San Felipe Lake and follows the southern County boundary through agricultural areas, ultimately continuing into Santa Cruz and Monterey Counties and draining into the Monterey Bay.

Bay Checkerspot. Photo: Valley Water



Water Bodies

Creeks

Cities/Communities

Upper Pajaro Watershed (Plan Scope)

Upper Pajaro Watershed

Plan Scope

Valley Water

Figure 1-2: The Upper Pajaro Watershed

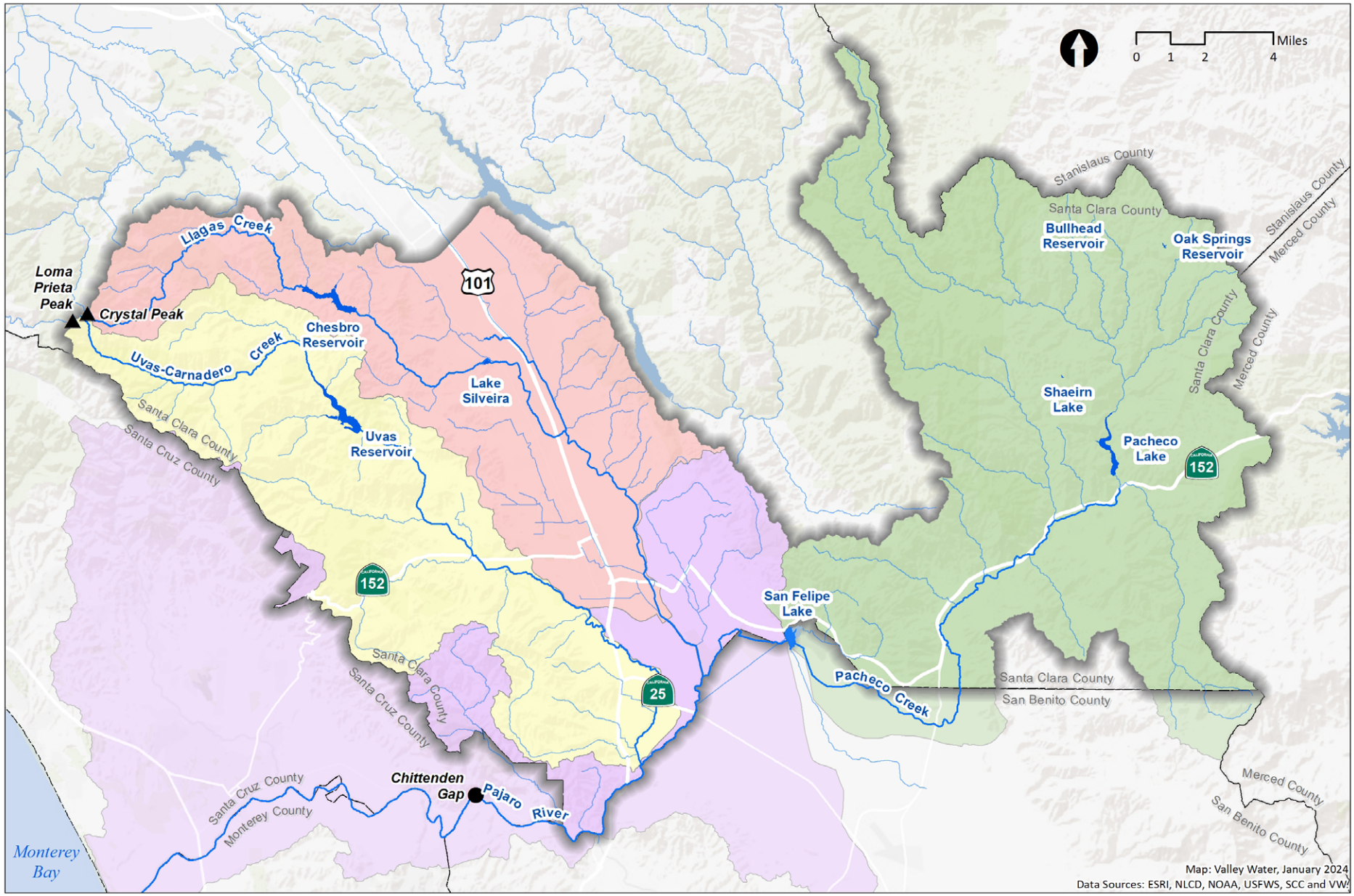


Figure 1-3: Upper Pajaro Subwatersheds

1.3 HOW IS THE PLAN ORGANIZED?

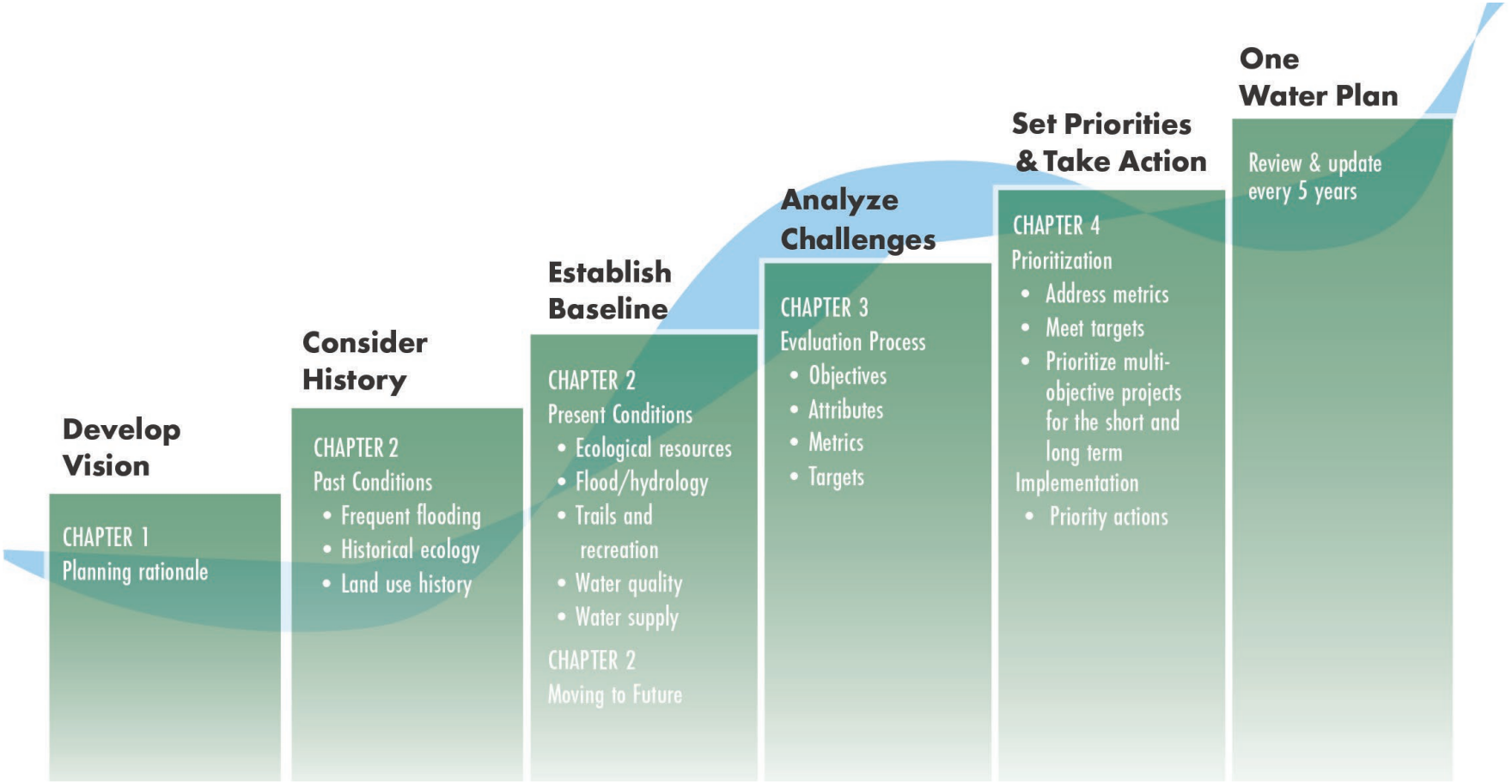
The One Water Upper Pajaro Watershed Plan (Plan) recognizes that only by acknowledging the past and evaluating the present can we plan for a better future with integrative water resources management.

Chapter 1 of this plan introduces the Upper Pajaro Watershed and describes the value of preparing a watershed plan. It also outlines Valley Water's One Water planning framework including a vision, three integrated goals, and five objectives. Finally, it offers a brief overview of the stakeholder engagement process that staff put into practice developing this plan.

Chapter 2 briefly describes past and present conditions in the Upper Pajaro River Watershed. The description of past conditions focuses on historical hydrology, ecology and human influences on the watershed. The description of present conditions includes both general geology, hydrology and land use, as well as more specific Valley Water management of ecological resources, flooding, recreation and trails, water quality, and water supply. At the end of this discussion, the chapter explores challenges and future opportunities.

Chapter 3 outlines Valley Water's framework of One Water objectives, metrics and targets for the Upper Pajaro River Watershed to identify potential areas of improvement.

Chapter 4 details Valley Water's process for identifying and evaluating priority actions developed for the Plan, lists and describes all priority actions, and addresses next steps for implementation.



1.4 WHAT IS THE VISION?

One Water's vision and goals were developed to support Valley Water's mission and Board governance policies, which call for integrated water resources services for the community.

One Water Vision: *One Water seeks to manage Santa Clara County water resources holistically and sustainably to benefit people and the environment in a way that is informed by community values.*

The vision, goals, and objectives make up a planning framework Valley Water can apply to countywide activities and policy considerations. This framework will also guide more detailed planning on watershed and subwatershed scales. One Water planning builds on mandates spelled out in Valley Water's authorizing legislation. It also reflects new thinking about how to integrate the multiple aspects of Valley Water's mission: to provide Silicon Valley safe, clean water for a healthy life, environment, and economy. In addition, it underscores the commitment of the Valley Water's Board of Directors to long-term planning. Board policy states that an integrated and balanced approach in managing a sustainable water supply, effective natural flood protection, and healthy watersheds is essential to prepare for the future.

Local communities support this commitment. The One Water Countywide Framework (Countywide Framework) is the product of several years of working with more than 80 stakeholders. This work led to three goals and five objectives that reflect the overarching vision for the One Water Plans (Valley Water, 2021).

Song Sparrow. Photo: Valley Water

1.5 WHAT ARE THE GOALS?

To reach the long term One Water vision, Valley Water developed three goals that transcend individual management disciplines and address all aspects of water resources management within its jurisdiction:

1. Reliable Water Supply

Valley Water seeks to ensure that it can provide a reliable water supply for people and the environment, even under uncertain conditions such as climate change, drought, and future legal and regulatory requirements. This means efficiently managing and securing diverse supplies and extensive infrastructure while continuing to implement Valley Water's water conservation program with the community to reduce demand.

2. Improved Flood Protection

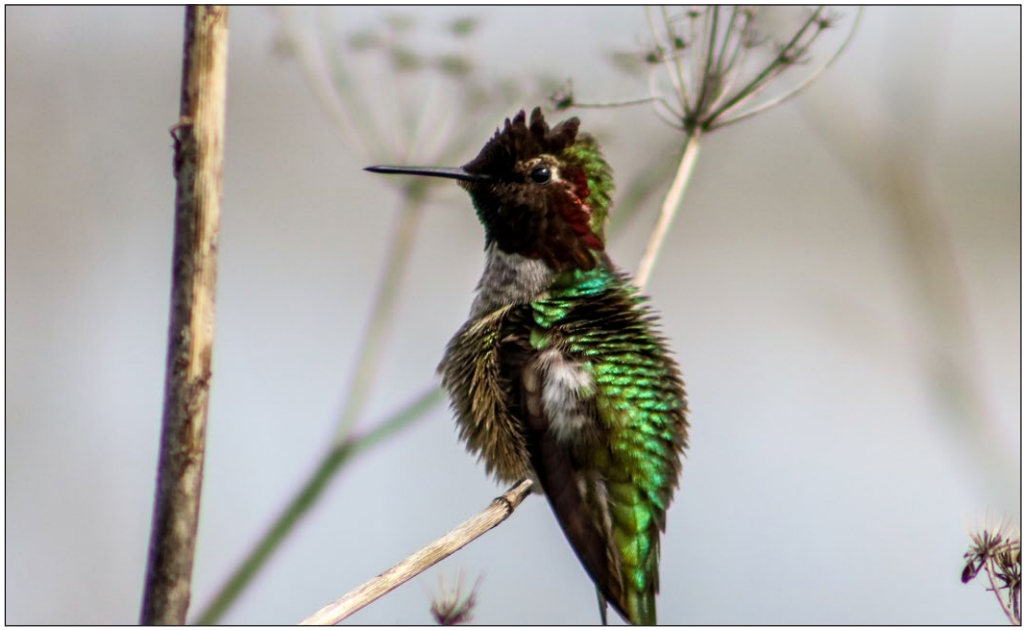
This goal aims to reduce flood risk to the community by working with nature to the greatest extent possible. For Valley Water, this means enhancing stream corridors to support the conveyance of flood flows while also providing benefits for natural ecosystems. This also includes maintaining existing facilities, reducing flood risk in vulnerable areas, and keeping the community informed and prepared for potential flood risks.

3. Healthy and Resilient Ecosystems

Valley Water recognizes the importance of healthy and resilient watersheds, riparian and tidal ecosystems, and the species that rely on these habitats to thrive. Making ecosystem health more salient in every management decision is a key concept in One Water planning.

DEFINITION OF RESILIENCE

Scientists define a resilient ecosystem or habitat as one that can withstand disturbance without changing self-organized processes and structure (Hodgson, McDonald, & Hosken, 2015). If applied to the Santa Clara Valley, a resilient landscape would have the ability to sustain native biodiversity, ecological functions, and critical physical processes over time in the face of climate change, urbanization, and other stressors (Beller, et al., 2019). The term can also be applied more broadly to social systems (such as emergency preparedness) as the capacity of individuals, communities, and systems to survive, adapt, and grow in the face of stress or shocks.



Hummingbird. Photo: Valley Water

1.6 WHAT ARE THE OBJECTIVES?

The One Water planning framework developed five objectives to achieve the One Water goals, each with individual metrics and targets to measure success (described in Chapter 3). Each objective aligns with the framework's vision, and are formulated to be SMART (specific, measurable, achievable, realistic, and time based) objectives.

A. Protect and Maintain Water Supplies

This objective aims to protect and maintain a reliable water supply that draws on a diverse mix of water sources — groundwater, surface water, imported water, and recycled and purified water— to supply diverse needs. It also acknowledges the need for expanding local supply, maintaining local groundwater levels, and encouraging water conservation to meet future urban, rural, agricultural, and environmental demands.

B. Protect and Improve Surface and Groundwater Quality

This objective recognizes the importance of maintaining high quality water in reservoirs, creeks, groundwater subbasins, and the Bay to protect public and ecological health. This will involve Valley Water meeting or surpassing applicable regulatory standards for drinking water, preventing pollution, and protecting source water (including groundwater). Meeting this objective will also require Valley Water to partner with other agencies to improve physical, chemical, and biological water quality parameters such as temperature, dissolved oxygen, turbidity, trash, and other pollutants of concern.

C. Reduce Flood Risk

This One Water objective seeks to engage in flood and floodplain management that integrates risk reduction with enhancement of natural creek corridors and floodplain functions. By promoting managed flooding and natural flood protection, Valley Water can also enhance natural riparian functions: increasing water infiltration, diversifying habitats, managing woody debris, providing life-cycle cues to sensitive species, and allowing gravel and fine sediment to move through the system. Creating an integrated flood risk management approach will also help creeks, communities, and shorelines adapt to climate change, extreme storms or heat, sea level rise, and increased urbanization.

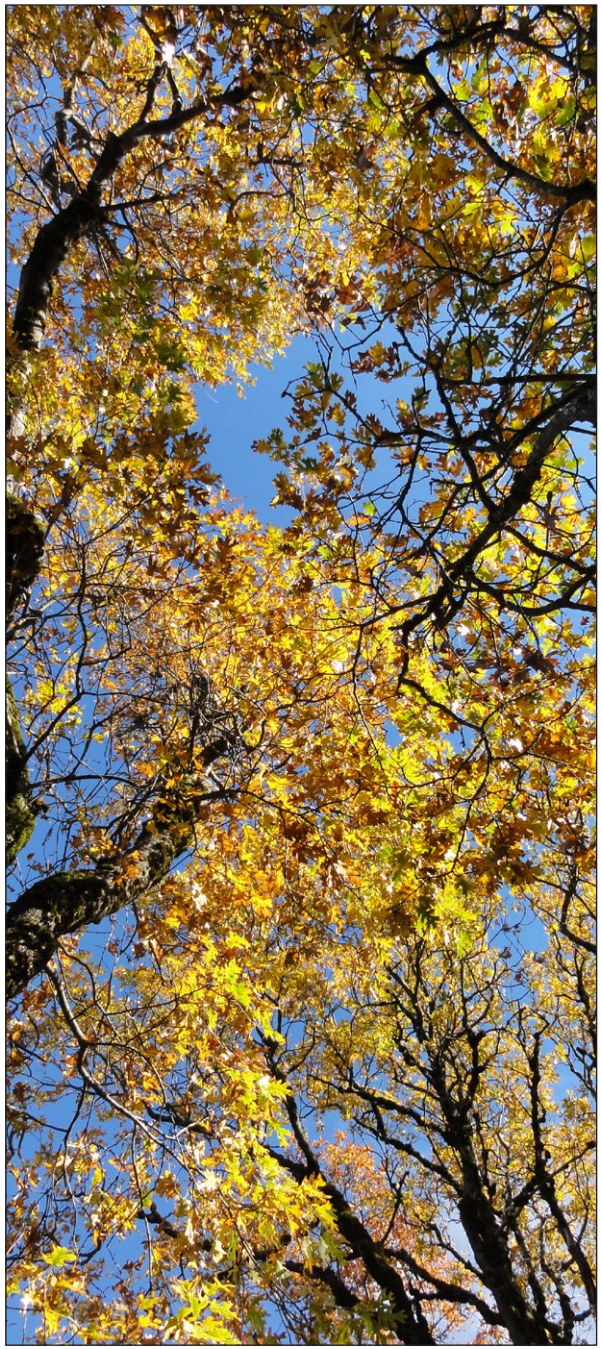
D. Protect, Enhance and Sustain the Natural Ecosystem

The One Water approach is designed to help Valley Water balance multiple objectives, including supporting healthy ecosystems, as well as water supply and flood protection objectives. This One Water objective intends to strengthen the resilience of natural environments and ecological resources so they can better withstand stresses and disturbances such as urbanization, drought, climate change, and sea level rise. More resilient environments will, in turn, provide the services that healthy communities depend on. Meeting this objective will involve building more connections between habitats throughout the watershed and conserving, expanding, and enhancing native habitats.

E. Mitigate and Adapt to Climate Change

This One Water objective is to prepare for and adapt to climate change effects that include temperature increases, precipitation changes, weather extremes, and sea level rise. These effects may increase water supply constraints and uncertainties, increase the severity or duration of droughts, flooding, and wildfire, and create added stress on native species and riparian and wetland ecosystems. Managing whole watersheds, while striving for One Water integration, will be critical in creating the kind of flexibility and resilience in water resources management necessary to mitigate and adapt to uncertainties and unforeseen impacts.

Restoration area sign. Photo: Valley Water



Oak Canopy. Photo: Amber Manfree

1.6 WHO WAS INVOLVED?

Valley Water provided multiple opportunities for community engagement in watershed planning throughout the development of the Plan, including outreach survey, virtual, and in-person meetings. Close coordination with existing plans and programs from Valley Water as well as other local agencies allows One Water to build on previous successful endeavors and incorporate relevant expertise. It also allows One Water and its vision to become integrated into corresponding planning and implementation efforts. The Public Participation Process Report (Appendix A) provides a detailed description of feedback received from stakeholders and how external feedback informed various aspects of the planning process and its outcomes.

Valley Water Subject Matter Experts

Valley Water engaged a group of internal staff subject matter experts to fully represent the five Objectives of One Water. This group provided significant input in all aspects of the Plan, including past and present information for each objective, data for each metric and target, and the Priority Actions.

One Water Steering Committee

The One Water team convened a steering committee to share the draft Priority Actions and discuss options for prioritization and implementation. The steering committee included Deputy-level officers from several Valley Water divisions. Steering Committee members are listed in the Public Participation Process Report.

External Stakeholder Engagement

Valley Water also engaged a large group of external stakeholders comprised of public agencies, local governments, non-profits, community groups, and neighborhood groups. The roster included over 200 individuals from 104 different agencies and organizations, with the intention of reaching a diverse representation of individuals that are invested in the Upper Pajaro watershed. Outreach to this group included an initial survey, as well as 11 virtual meetings with smaller stakeholder cohorts to facilitate an environment for discussion and feedback. These meetings informed participants about the Plan and its progress and allowed stakeholders to discuss challenges and opportunities for improvement within the watershed with Valley Water staff. Refer to the Public Participation Process Report (Appendix A) for additional information.

Board Committees and Advisory Committees

The One Water team met with the Board Policy and Planning Committee, Environmental and Water Resources Advisory Committee, and Agricultural Water Resources Advisory Committee to present the One Water planning process, the Flood Vulnerability Assessment and the draft Priority Actions for review and feedback.

2

SETTING

Chesbro Reservoir. Photo Valley Water

CHAPTER 2: SETTING

2.1 INTRODUCTION

This chapter summarizes past and existing conditions and identifies challenges and opportunities for the One Water Objectives and land use. Although land use is not a One Water Objective, patterns of land use significantly influence the characteristics and function of a watershed. More detailed information on the watershed setting, including past and present conditions is presented in the corresponding Upper Pajaro Watershed Setting Report.

2.2 LAND USE

2.2.1 *Past Conditions*

Many of the written records describing indigenous land use and management prior to Spanish occupation are derived from the accounts of Spanish explorers. These records indicate that the Ohlone people fished, hunted, and gathered within the Upper Watershed (Grossinger et al., 2008). Abundant evidence of fire management was also documented within the upper watershed, such as the use of controlled fires to manipulate vegetation patterns and maintain or increase plant productivity (Grossinger et al., 2008). Native land management declined rapidly in the early 19th century due to forced relocation of indigenous people, and a combined effect of disease and genocide brought about by the Spanish colonization (Grossinger et al., 2008).

Figure 2-1: Dunne Ranch, Gilroy (ca 1890). From Grossinger et al., 2008.

Spanish explorers first entered the vicinity of the Upper Pajaro watershed in 1769 and established the Mission San Juan Bautista in 1797 within a few miles of the Pajaro River (Grossinger et al., 2008). The Mission introduced livestock into the area, mainly cattle and sheep, which introduced ranching activities to the region and required a water source. Water for livestock was provided by the wet meadows and the low-lying areas in the south Santa Clara Valley. Ranching activities expanded into the 1800s as private land grants created vast ranchos where livestock were reared (Grossinger et al., 2008). The prevalence of ranching on the lands of the Upper Pajaro Watershed continues today.

Agriculture expanded in the second half of the 19th century throughout the Santa Clara Valley, with orchards and alfalfa coming into production. Artesian wells provided water for crop irrigation and the construction of railroads enabled agricultural products to reach regional markets (Grossinger et al., 2008). By 1869, a rail line was completed in Gilroy and the town was incorporated in 1870. Morgan Hill also received rail service in the late 1800s and was incorporated in 1906.

Historical records indicate that orchards comprised just 10% of the agricultural land in the Santa Clara Valley in 1890. By 1905, Gilroy was believed to have half of the United States' prune and apricot trees (Grossinger et al., 2008). By the 1930s, approximately 65% of the total cropland in the southern portion of the County was covered in orchards, mainly prunes. With the exception of poorly drained areas, such as Lower Llagas Creek, San Felipe Lake, and wetlands east of Gilroy which remained alfalfa, dairy farms and grazing land, the alluvial valley floor between Morgan Hill and Gilroy was densely planted with deciduous fruit trees and grapes.

Figure 2-2: Llagas Creek between Santa Teresa Boulevard and Monterey Road. (A: USDA 1939, courtesy of the Science & Engineering Library Map Room, UC Santa Cruz; B: USDA 2005, courtesy of NAIP). From Grossinger et al., 2008.

Moving forward in the 1900s, agriculture in the Upper Pajaro Watershed shifted from orchards to row crops, with crops such as tomatoes, mushrooms, garlic, and bell peppers continuing to dominate farmland production today. By the 1970s, the area began to shift towards being urban service-oriented with growing suburban communities in Gilroy and Morgan Hill. Population growth began to accelerate in the latter part of the 20th century as Santa Clara County transformed into the heart of Silicon Valley In the 1980s and 1990s, population growth in the southern Santa Clara Valley began to outpace growth in the north valley. Gilroy tripled in size between 1970 and 2000, reaching a population of approximately 41,000 (U.S. Census Bureau, 2001). Over the same period, Morgan Hill grew to six times its population, reaching a population of approximately 34,000 (U.S. Census Bureau, 2001).

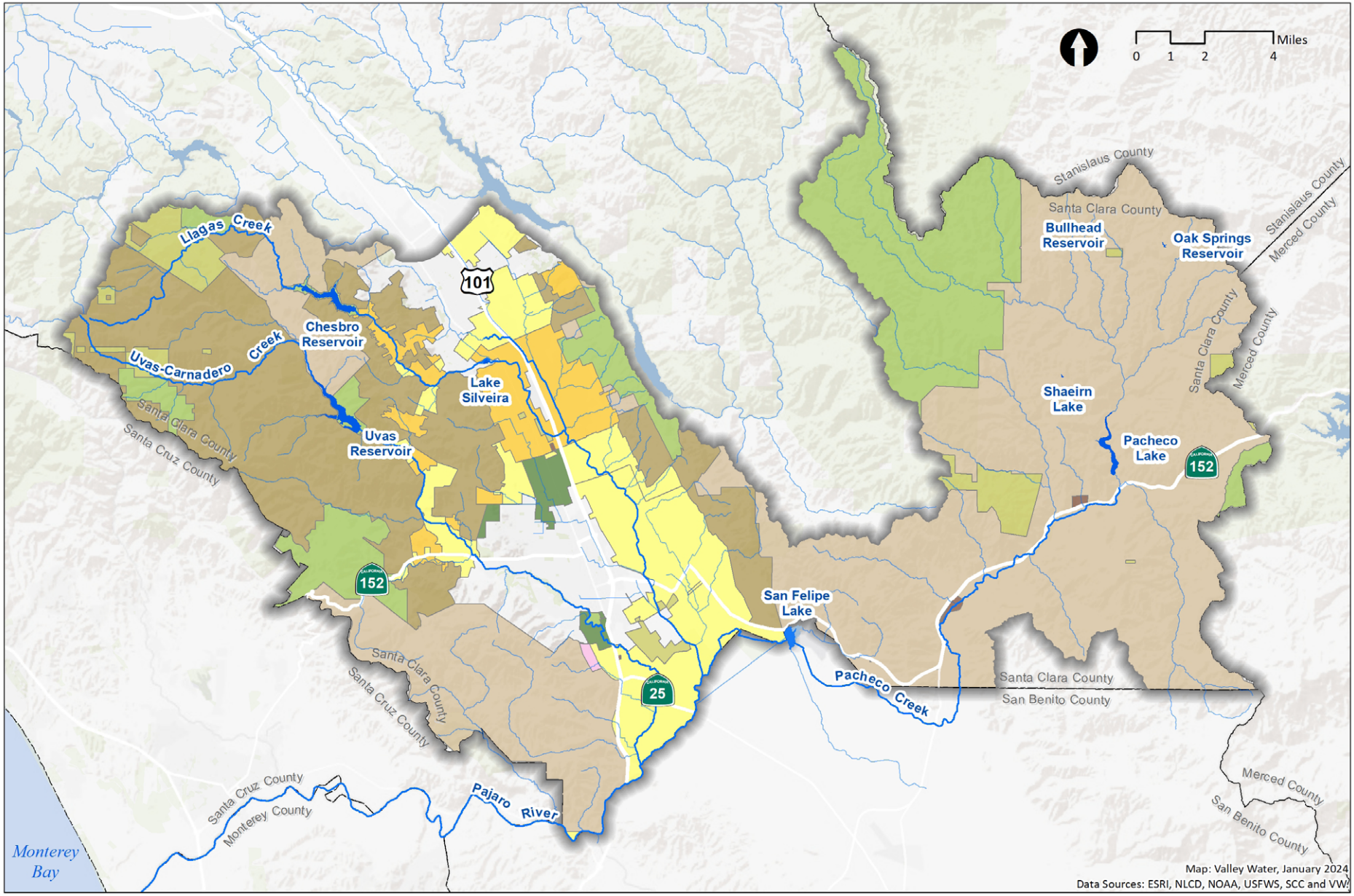


Figure 2-3: Non-Urban Land Use in the Upper Pajaro Watershed

2.2.2 Present Conditions

The type and distribution of land uses throughout a watershed has profound impacts on stream corridors, groundwater recharge, flooding, and water quality, among other aspects. Land use within the Upper Pajaro Watershed is a combination of urban and rural, with significant agricultural, ranchland and open space areas. Generally, urbanized areas are surrounded by less developed land on the valley floor and adjacent uplands dominated by ranches and open space. Figure 2-3 shows a map of Santa Clara County General Plan (General Plan) Land Use Designations (Santa Clara County Planning Office, 1994) in the watershed and Figure 2-4 breaks down land use types by percentage of total watershed area (Santa Clara County Planning Office, 2016).

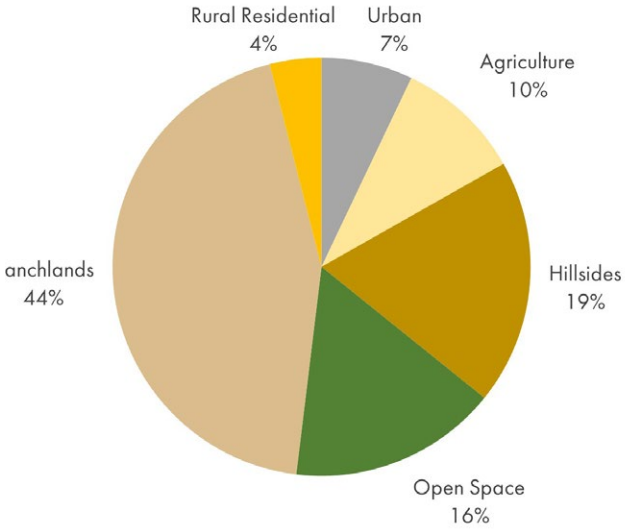


Figure 2-4: Upper Pajaro Watershed Land Use Designations by Percentage

Riparian Corridors

As shown in Figure 2-3, land uses along the watershed's major creeks and rivers vary considerably. In the northwestern portion of the watershed, Uvas-Carnadero Creek and Llagas Creek traverse open spaces and ranchlands in the Santa Cruz Mountains upstream of the Uvas and Chesbro reservoirs, respectively. Below the reservoirs, these creeks flow south into the Santa Clara Valley. Uvas-Carnadero Creek flows through residential areas in southern Gilroy and crosses Highway 101 near Bolsa Road, ultimately crossing agricultural fields and Highway 25 just before its confluence with the Pajaro River along the southern County boundary. Llagas Creek flows west of Morgan Hill before turning east to flow through residential and commercial land uses in southern Morgan Hill and San Martin. It crosses Highway 101 just north of Masten Avenue and travels through agricultural lands east of Gilroy, ultimately crossing Highway 152 before its confluence with the Pajaro River along the County boundary. Pacheco Creek, including its north fork above the Pacheco Reservoir and south fork, primarily flows through ranchlands and protected open space in the eastern portion of the watershed. The mainstem below the Pacheco Reservoir travels alongside Highway 152 and briefly crosses into San Benito County before reaching San Felipe Lake. The Pajaro River's mainstem begins just west of San Felipe Lake and follows the southern County boundary through agricultural areas, ultimately continuing into Santa Cruz and Monterey Counties.

Urban Areas

Urban landscapes and activities influence watersheds by virtue of creating impermeable surfaces, generating polluted runoff, and disturbing natural land covers, among other impacts. These types of impacts can be reduced or managed with a variety of strategies, such as urban greening, low impact development, and green stormwater infrastructure.

About 8% of the watershed's area is comprised of urban or suburban land uses, with rural, low-density residential occupying about 4%. The cities of Gilroy and Morgan Hill along with the unincorporated community of San Martin are entirely within the watershed. General Plans for the cities and County contain land use designations and zoning policies to regulate acceptable land uses. General plans also establish urban boundaries to limit sprawl and impacts of new development on existing city services while preserving open space, agriculture, and other natural resources. The cities of Gilroy and Morgan Hill have established urban service areas (USAs), which define the area within city limits where basic infrastructure and services for urban development are provided. Both cities are largely built out within their USAs. As of 2020, Gilroy reached a population of 59,520 and Morgan Hill reached a population of 45,483 (US Census Bureau QuickFacts, 2023a-b). Additional residential development may occur on their edges, especially on western and eastern edges along hillsides, to accommodate further population growth.

Transportation Infrastructure

Major roadways traverse north-south and east-west in the watershed, with roadways concentrated in and around Gilroy and Morgan Hill. Highway 101 is the major north-south route in the area that serves interregional traffic and provides local connections to Gilroy, San Martin, Morgan Hill, and other cities in the County. Highway 101 connects with other major transportation routes, including Highways 152 and 25. Highways 152 is an east-west route that traverses through the Santa Cruz Mountains, Gilroy, and Pacheco Pass within the watershed. The Santa Clara Valley Transportation Authority (VTA) provides local and regional bus services in Gilroy, Morgan Hill, and San Martin, and regional commuter rail service is provided by Caltrain (operated by the Peninsula Corridor Joint Powers Board) with stops at the Morgan Hill and Gilroy stations.

Agricultural Areas and Ranchlands

Agricultural fields and pastures are permeable and may contribute to groundwater recharge and absorption of flood waters. These working landscapes can also provide buffer habitats, migratory corridors, and ecosystem services that benefit the watershed. However, farmlands and ranchlands also disturb natural land cover and can be a source of pollutant runoff that impacts downstream areas.

Despite its urbanization, the watershed predominantly maintains a rural character marked by significant agricultural and ranching uses. Farmlands and ranchlands predominate the watershed, combining to span across approximately 54% of the Upper Watershed. Farmlands occupy approximately 9% of watershed land and are primarily located on the valley floor outside of Gilroy and Morgan Hill. An array of crops are grown on these farmlands, including nursery crops such as vegetable seedlings, fruit trees, and shrubs, mushrooms, lettuces, bell peppers, and tomatoes (Santa Clara County Department of Agriculture, 2023).

Ranchlands occupy vast portions of the watershed as shown on Figure 2-3, accounting for approximately 45% of its land area. According to the General Plan, ranchlands are lands predominantly used for livestock ranching in rural unincorporated areas of the county, remote from urbanized areas and generally less accessible than other mountain lands (Santa Clara County Planning Office, 1994). A large area of contiguous ranchlands is present in the eastern portion of the watershed, to the north and south of the Highway 152 corridor and surrounding Pacheco Reservoir. Other significant ranching areas include hillsides south of Gilroy and east of Highway 101 and west of Morgan Hill. In addition to serving as working lands, these ranchlands contain important ecological resources, as described in Section 2.3.

Open Space

Along ranchlands, open space is prevalent throughout the watershed. The General Plan classifies open spaces according to the following designations:

- Open Space Reserve (OSR) lands include rural unincorporated areas contiguous to a USAs for which no permanent land use designation has been applied pending future studies of desired long term land use patterns.
- The Regional Parks designation is applied to publicly accessible park lands of the County, cities, state, and federal agencies which serve a region-wide population.
- The Other Public Open Lands designation is applied to lands in Open Space which are owned by various public agencies for purposes other than public parks and general recreational use.
- The Hillsides designation is applied to mountainous lands and foothills unsuitable and/or unplanned for annexation and urban development.

Collectively, these open spaces comprise approximately 34% of the watershed's land area. As shown in Figure 2-3, lands designated as open space and hillsides are widely distributed. Major parks and open space areas in the watershed include portions of Henry Coe State Park, Coyote Lake County Park, Calero Reservoir County Park, and the entirety of Mount Madonna County Park, Uvas Reservoir County Park, Uvas Canyon County Park, Chesbro Reservoir County Park, Rancho Cañada del Oro Open Space Preserve, and Cañada de Los Osos Ecological Reserve.

Uvas Canyon County Park. Photo: Valley Water

2.2.3 Future Conditions, Challenges, and Opportunities

Challenges

Jurisdictional Complexity

Valley Water does not have authority over city or countywide land use and development patterns. The ability to directly regulate land use lies with individual cities and the County, which establish zoning and general plan designations and have the authority to approve development proposals. As such, Valley Water has little influence over land use. This represents a fundamental challenge to Valley Water's ability to provide flood protection and steward natural resources in the Upper Pajaro Watershed.

Access and Equity

A disadvantaged community is an area whose residents are disproportionately impacted by a combination of economic, health, and environmental burdens, such as poverty, high unemployment, environmental pollution, the presence of hazardous waste, or environmental degradation. These communities often are comprised of people who have suffered historical discrimination based on race, color, national origin, tribe, culture, income, immigration status, or English language proficiency. Disadvantaged communities in the Upper Pajaro Watershed, shown in Figure 2.5, are both a challenge and an opportunity for Valley Water, and are a focus of the Racial Equity Diversity and Inclusion (REDI) Office. Conducting meaningful outreach to engage disadvantaged communities in planning and decision- making processes and ultimately providing them with the resources and services they have historically lacked are critical Valley Water priorities.

Climate Change

Climate change is recognized as a threat multiplier for natural disasters like wildfire, drought, severe storms, and floods. These natural disasters historically occur in the Upper Pajaro River Watershed and climate change will continue to enhance their potential severity and frequency. As such, promoting land use planning that accounts for climate-related risks and development practices that promote climate adaptation should be central to land use decision-making moving forward.

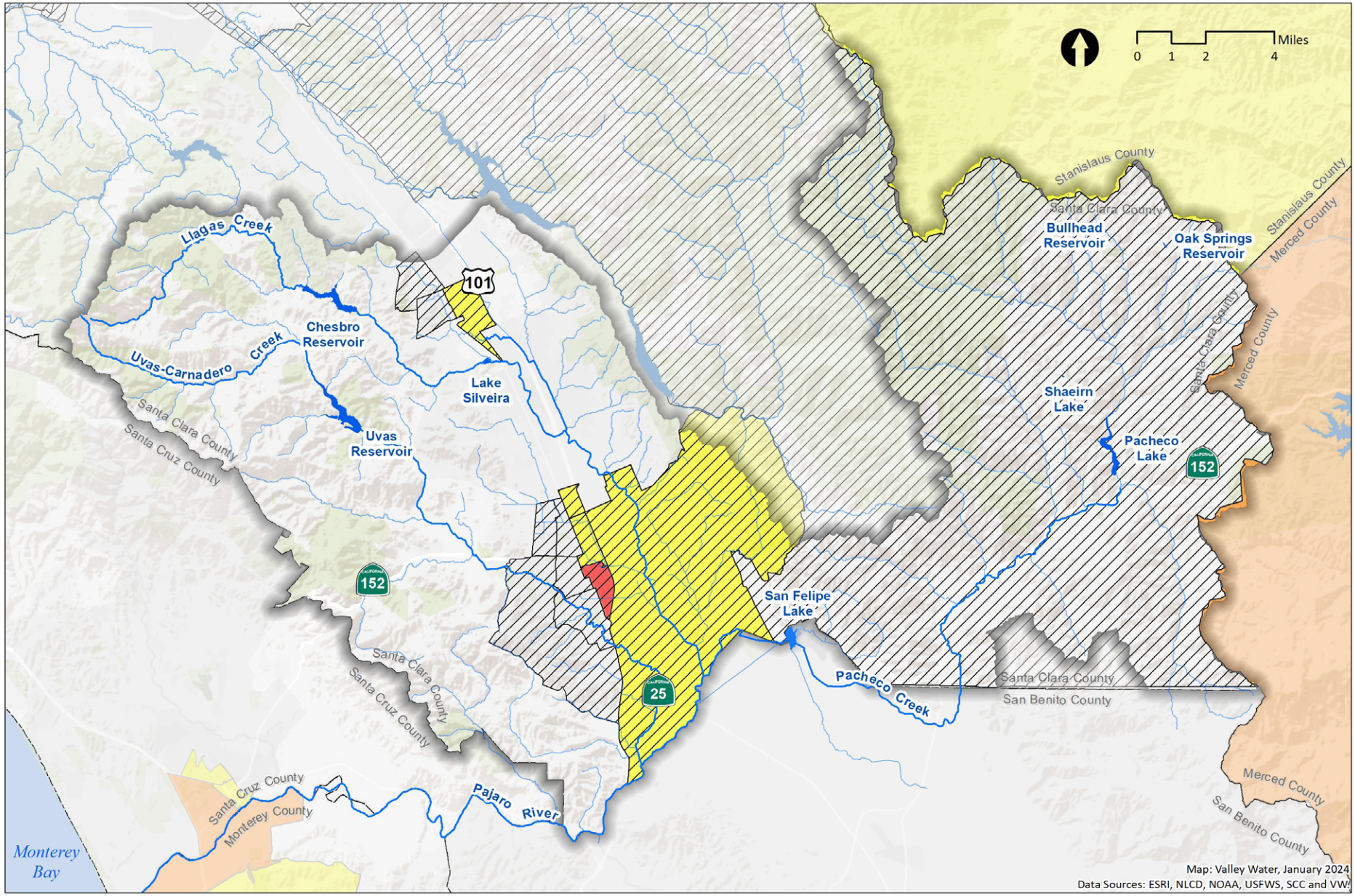
Opportunities

Land Use Coordination

By identifying linkages between One Water and the General Plans of Gilroy, Morgan Hill, and the County, Valley Water and its partners can work together to support mutual goals. Shared goals for the watershed include the protection of water supplies and quality, water conservation, promoting efficient water use and reuse in new developments by requiring water-efficient fixtures and appliances as well as drought tolerant landscaping, access to open space, riparian protection, and green stormwater infrastructure.

Increased Ecological Connections

Since much of the open spaces and recreational areas in the watershed are not owned by Valley Water, partnerships to enhance ecological connections are a critical piece to making progress. Prioritizing, protecting, and expanding linkages between habitats can benefit flood risk reduction and water quality as well as the environment. Similarly, acquiring land for use as open space or recreation in locations near waterways can provide opportunities to expand floodplains and enhance natural processes. Ecological connectivity is discussed in further detail in Section 2.3.



Water Bodies
Creeks

CalEnviroScreen (Percentile)
70 - 80
80 - 90
90 - 100

Low-Income Census Tracts
80% of AMI*

*AMI: Area Median Income

Upper Pajaro Watershed

Disadvantaged Communities

Valley Water

Figure 2-5: Upper Pajaro Watershed - Disadvantaged Communities Map

2.3 ECOLOGICAL RESOURCES

2.3.1 *Present Conditions*

The Upper Pajaro River watershed has a diversity of habitats and plant and wildlife species. Only 10% of the watershed, limited to the valley floor, has been intensely developed for residential and commercial land. Though over half of the watershed supports irrigated agriculture and pastures for grazing, these land uses – particularly grazing – still provide some value for wildlife and can be compatible with adjacent habitats and associated wildlife. Natural communities found in the upper Pajaro River watershed are mapped in Figure 2-6. Several of these natural communities, depending upon co-occurring species and habitat quality, are considered sensitive by California Department of Fish and Wildlife (CDFW 2018) and, as such, are required to be analyzed under the California Environmental Quality Act and serve as focal points for conservation and enhancement efforts that preserve biodiversity. The diversity and extent of natural communities of the Watershed support about 80 special-status wildlife and plant species. Descriptions of terrestrial natural communities and the special-status species they support are provided in the Upper Pajaro Watershed Setting Report.

Watershed Approach means an analytical process for evaluating the environmental affects of a proposed project and making decisions that support the sustainability or improvement of aquatic resources in a watershed (State Water Resources Control Board, 2021). The term is used by regulatory agencies with permitting authority over projects that involve waters under the jurisdiction of the United States and State, including the United States Army Corps and Regional Water Quality Control Boards.

Stream and Riparian Habitat

Creeks in the Upper Pajaro watershed include perennial, intermittent and ephemeral waterways. In normal rainfall years, perennial streams support year-round flow, intermittent streams have flows through the wet season (November-April) and are dry most or all of the dry season (May-October), and ephemeral streams typically carry water only during or immediately following a rainfall event, or until spring. The Santa Cruz mountains in the west have a rain shadow effect on the Diablo Range in the east contributing to very different hydrological processes across the watershed ranging from arid and intermittent in the east to more verdant and perennial in the west.

The presence and width of riparian vegetation around a creek channel influences the degree to which that vegetation can provide ecosystem services and other ecological functions. Function and services include sunning or shading of the channel, which moderates water temperature, stream bank stabilization, providing leaf litter and large woody debris that supports the aquatic ecosystem, sequestering and filtering stormwater runoff, and supporting fish and aquatic, semi-aquatic, and terrestrial wildlife.

Lower reaches of the Upper Pajaro watershed historically supported very wide riparian corridors, but these have been reduced by historical clearing for fuel supply and agriculture,, , urbanization, and levee building. More recently, food safety concerns within the agriculture industry have led to removal of riparian and other native vegetation communities that are near farmland, without documented improvements in food safety and in reversal of previous water quality and wildlife habitat conservation practices on farms (RCD of Monterey County 2007).

Nearly 30% of creek channel length in the Upper Pajaro watershed now supports little to no riparian vegetation (Lowe et al. 2016). Analysis of where narrow riparian corridors can be effectively widened and enhanced could provide targets or priorities to address the most degraded reaches. Valley Water's Carnadero Preserve, along lower Uvas-Carnadero Creek, is an example of efforts being made in the valley floor to expand riparian corridors while maintaining agricultural land uses, but more efforts are necessary to restore the watershed benefits of riparian corridors.

Pacheco Creek has one of the largest and highest quality strands of remaining sycamore alluvial woodland in the state, a CDFW-designated sensitive natural community. SAW is characterized by open canopy woodlands dominated by California sycamore. SAW cannot persist without the associated natural hydrology and channel forming flows and scour that historically characterized many of the creeks in the foothills of the watershed.

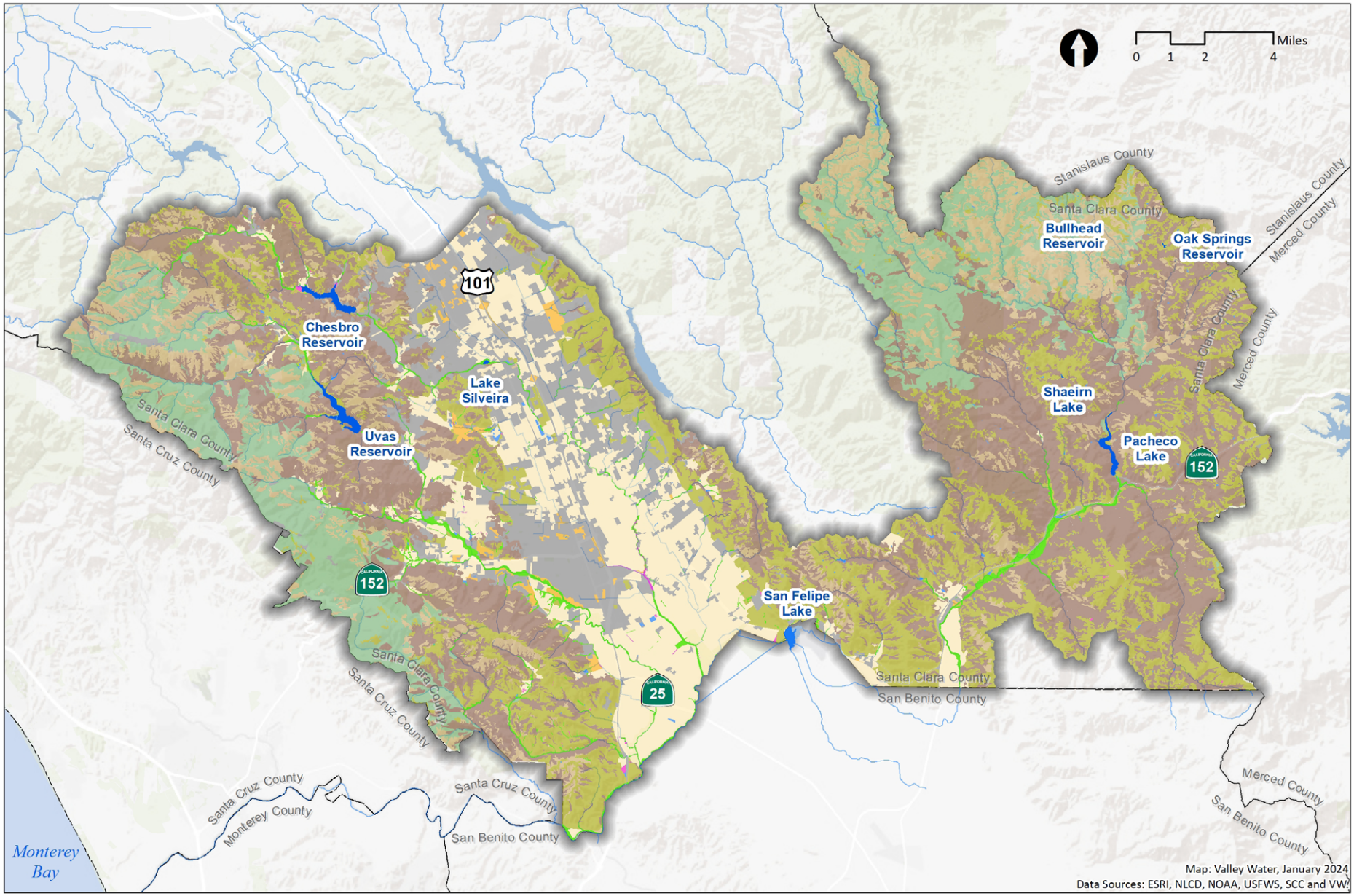


Figure 2-6: Natural Communities of the Upper Pajaro Watershed

The condition of upper Pajaro River watershed creeks was measured and assessed in 2015. California Rapid Assessment Method (CRAM) surveys were conducted at 80 sites representing the range of stream and land use patterns in the watershed (Lowe et al., 2016). Based on the resulting CRAM scores, more than half of the streams in the watershed are considered in fair ecological condition, about 40% are in good condition and only about 8% are in poor condition (Lowe et al., 2016). Figure 2-7 maps sites with poor condition riverine habitat on the valley floor by landownership, which may be appropriate to serve as targets or priorities for enhancement efforts, as well as sites with good condition that may be appropriate for conservation and maintenance.

CRAM is a standardized, cost-effective tool for assessing the overall health of wetlands, streams, and their riparian areas. CRAM surveys quantify buffer and landscape context; hydrologic connectivity; physical conditions in the channel; and vegetation in and around the channel. In addition to assessing ambient conditions at various spatial scale, CRAM can be used to plan and assess restoration and mitigation projects. Valley Water will reassess creek conditions in the watershed using CRAM surveys in 2025. For more information on CRAM:

http://www.cramwetlands.org.

Steelhead/Rainbow Trout Habitat Conditions

Recent surveys have documented nine native fish species in the Upper Pajaro River watershed. Three historical species - thicktail chub, tule perch and Sacramento perch – are now extirpated from the watershed (Moyle 2002). Steelhead, referred to as steelhead/rainbow trout in this plan, in Upper Pajaro River watershed are threatened under the federal endangered species action. Steelhead/rainbow trout are born in freshwater streams and migrate to the ocean to live as adults, in a life history strategy known as anadromy. Mature adults then return to their natal streams to spawn, and the process starts over again. The non-anadromous, or resident, form of this species is known as rainbow trout. Portions of the watershed are designated critical habitat for steelhead/rainbow trout and the species is a valuable indicator of overall aquatic habitat connectivity and health (Figures 2-8, 2-9. 2-10). As such, descriptions of fish habitat conditions in this plan are focused on steelhead/rainbow trout.

Steelhead. Photo: Valley Water

Barriers to passage, poor water quality (e.g., high stream temperatures, low dissolved oxygen, turbidity, nutrient impairment), lack of suitable habitat and food availability for different life stages, and nonnative species are primary challenges to the stream-based life stages of steelhead/rainbow trout in California. Sediment deposition, altered hydrology, grade control structures, dams and drop-structures, and culverts all contribute to challenging passage conditions. Conditions in the Upper Pajaro subwatersheds – Uvas, Llagas, and Pacheco Creeks - for steelhead/rainbow trout are summarized below. The subwatersheds have varying habitat conditions which reflect the degree of urbanization, providing opportunities for both preservation and restoration/enhancement. Additional analysis is needed to determine priority areas for enhancement in most subwatersheds; however, in the Uvas Creek subwatershed, restoration priorities have been identified (Balance Hydrologics, 2018) and implementation is underway. Valley Water is currently developing the Upper Pajaro Native Ecosystem Enhancement Tool to identify similar opportunities throughout the watershed. Additional information about the tool is presented in Chapter 4.

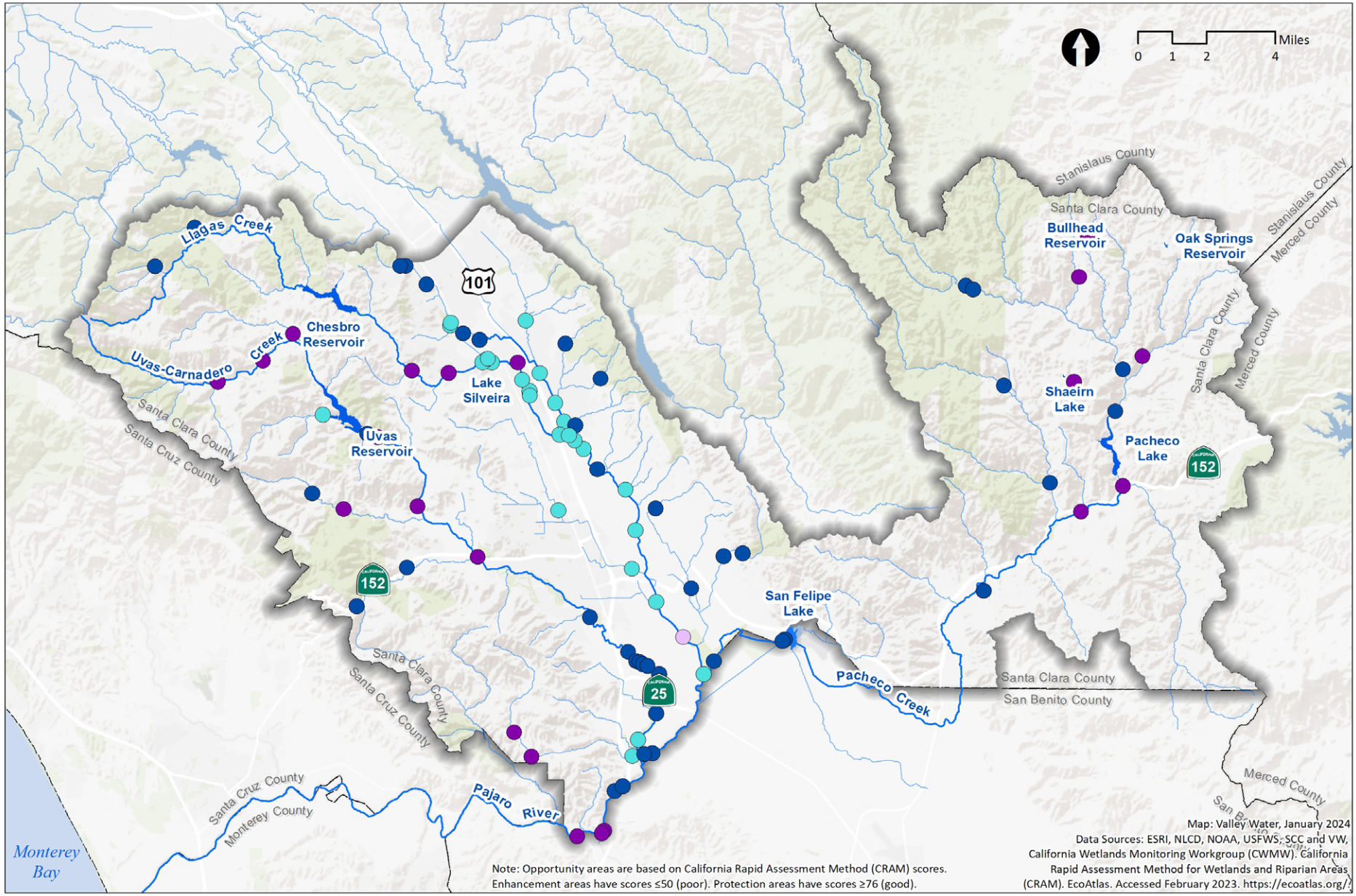


Figure 2-7: Opportunities to Project and Enhance Riverine and Riparian Habitat

Table 2-1: Summary of aquatic habitat conditions for steelhead/rainbow trout in Upper Pajaro subwatersheds

Condition	Uvas Creek	Llagas Creek	Pacheco Creek
Fish Passage Impediments[1]	· Complete barriers - Three dams on Little Arthur Creek · Partial impediment -flashboard dam on Bodfish Creek · Complete barrier - Sprig Lake Bodfish Creek · Partial impediments - two culverts on Tar Creek · Uvas Dam (end of anadromy)	· Partial impediment - Concrete ford with four culverts 600m downstream of Chesbro Dam · Chesbro Dam (end of anadromy)	· Partial impediment – decommissioned diversion dam at Barnheisel Rd. · Pacheco Dam (end of anadromy)
Water Quality Impairments[2]	· Turbidity · Dissolved oxygen · Water temperature · pH · Nutrients · Fecal Coliform	· Turbidity · Dissolved oxygen · Water temperature · pH · Sodium · Sedimentation/siltation · Pesticides (chlorpyrifos) · E. coli · Nutrients (nitrate) · Fecal coliform	· Turbidity · Dissolved oxygen · Fecal coliform · Nutrients
Other Habitat Conditions[3]	· Modified channels in developed areas · Little to no coarse sediment or woody debris supply to some reaches · Reduced summer streamflow on Little Arthur Creek due to diversions	· Modified channels in developed areas · Little to no coarse sediment or woody debris supply to some reaches · Impaired BMI community	· Lack of summer flow due to natural watershed conditions · Little to no coarse sediment or woody debris supply to some reaches · Impaired BMI community
Completed Enhancement Projects	· Passage impediment remediation at railroad crossing of Uvas Creek at Bolsa Road	· Llagas Creek restoration at Lake Silviera	· Pacheco Creek Restoration Project
Enhancement Priorities[3]	· Remediate passage impediment at Pickle Dam on Little Arthur Creek · Enhance summer streamflow in Little Arthur Creek · Remediate passage impediment at Sprig Lake on Bodfish Creek · Plan and implement gravel and large woody debris augmentation in priority locations[4]	· Plan and implement gravel and large woody debris augmentation in priority locations[5]	· Plan and implement gravel and large woody debris augmentation in priority locations[5]

[1] See Figures 2-8, 2-9, and 2-10 for locations. List excludes natural barriers. Sources: California Department of Fish and Wildlife, Passage Assessment Database, (August 2023).
[2] Source: California 2018 Integrated Report (Clean Water Act 303(d) List/305(b) Report). California State Water Resources Control Board. See Table 2-3 for all listed impairments for each water body.
[3] Sources: ESA 2001, Boughton et al. 2006, Casagrande 2018, Smith 2001, Smith 2002, Casagrande, pers. comm., 2023, Lowe et al. 2016, Rehn et al. 2015,
[4] Balance Hydrologics. 2018. Study of Santa Clara County Steelhead Streams to Identify Priority Locations for Gravel Augmentation and Large Woody Debris Placement. Santa Clara County, California.
[5] AECOM. 2024. Second Phase Study of Santa Clara County Steelhead Streams to Identify Priority Locations for Gravel Augmentation and Large Woody Debris Placement Project.

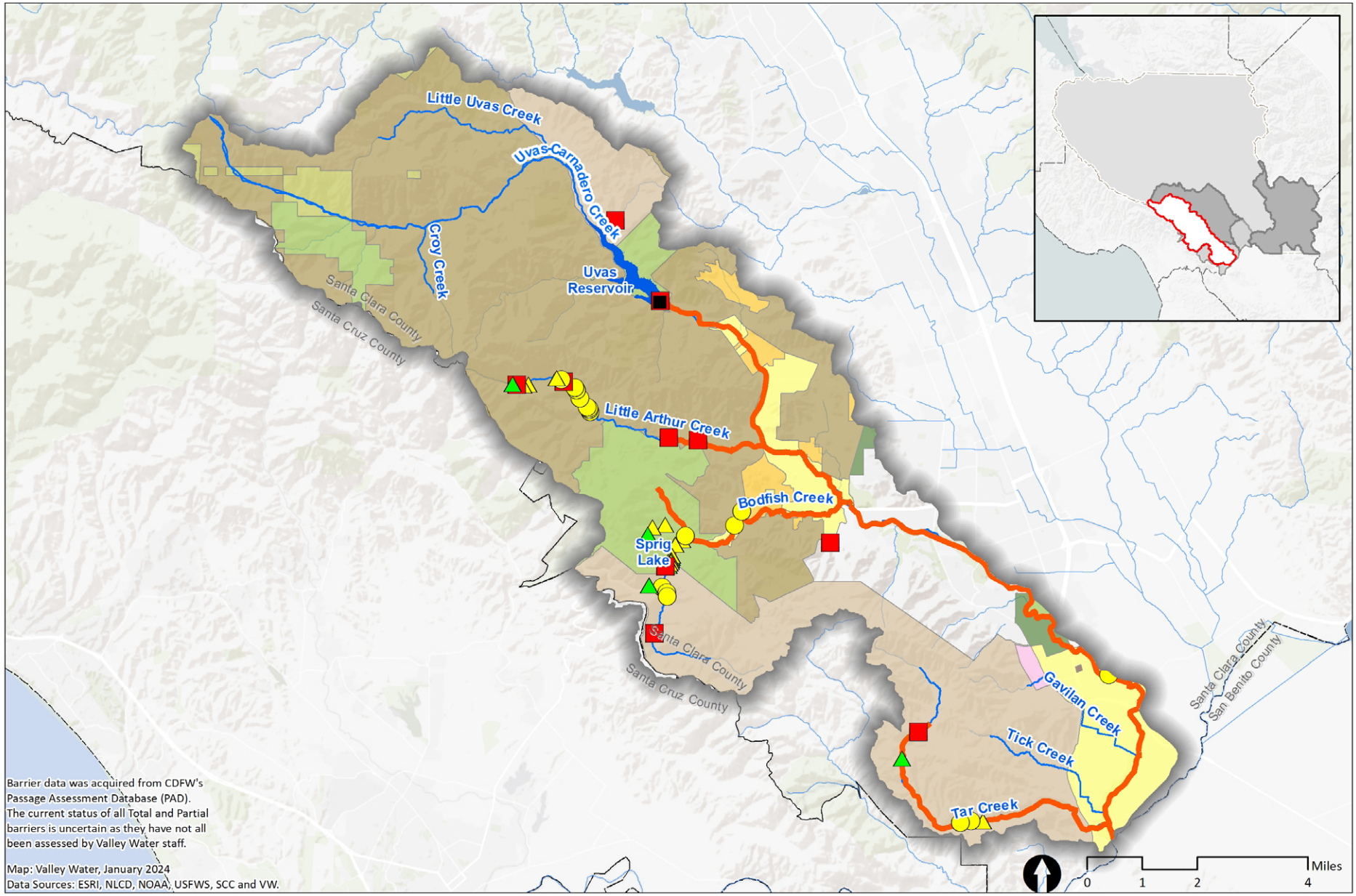


Figure 2-8: Steelhead critical habitat and passage impediments in the Uvas-Carnadero Creek subwatershed.

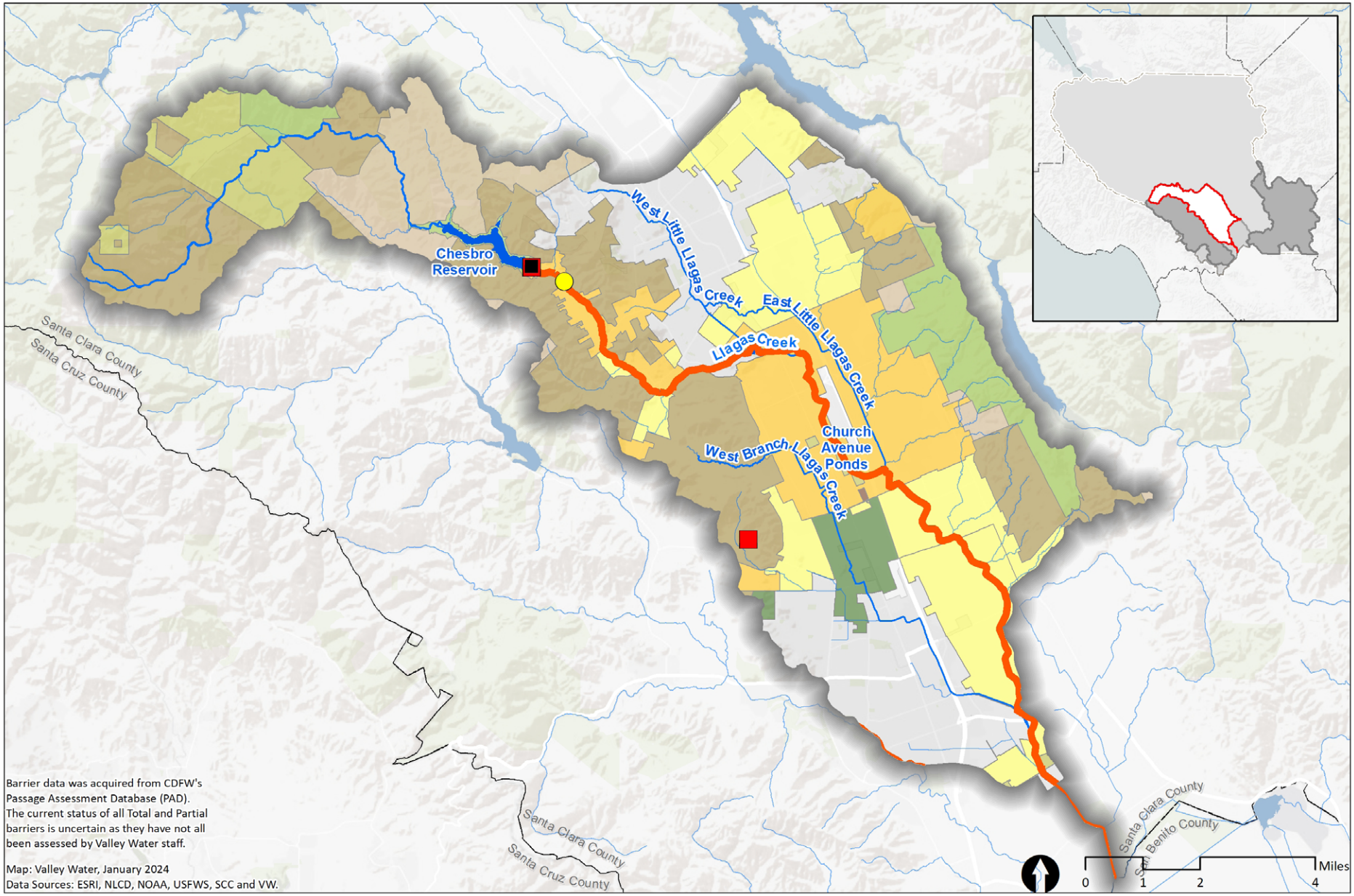


Figure 2-9: Steelhead critical habitat and passage impediments in the Llagas Creek subwatershed.

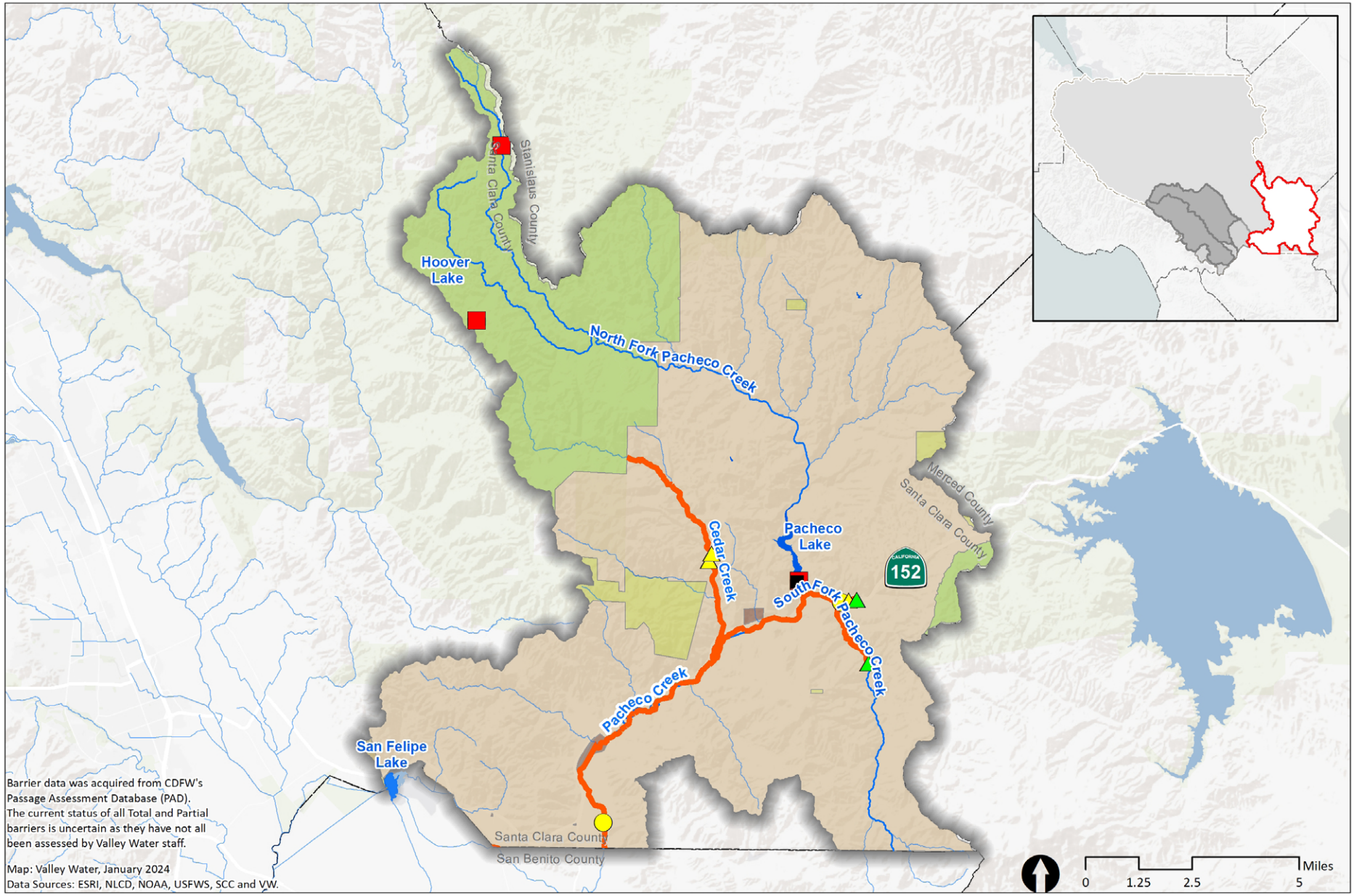


Figure 2-10: Steelhead critical habitat and passage impediments in the Pacheco Creek subwatershed.

Open Water and Wetlands

Open water areas in the upper Pajaro River watershed are human-made, with the exception of San Felipe Lake, a remnant of the "Bolsa" (Spanish for "pocket"). This low-lying area bridging the Santa Clara-San Benito County line was part of a 22,000-acre wetland complex prior to Euro-American drainage efforts. Also called San Felipe Sink (Milliken et al. 1993), the Pajaro Plains (Taylor 1850), and the Soap Lake floodplain (RMC 2005), multiple streams spread runoff and fine sediment from the hills over this flat lowland area, building and supporting extensive sloughs and seasonal wetlands. Due to the evaporation of seasonal ponds, the Bolsa soils were prone to high salinity. As a result, these soils had limited agricultural value, but did contribute to the areas cattle industry, providing late-summer pasture when the hills were dry. The small northeast remnant of the Soap Lake floodplain that retains seasonally lake-like conditions today is referred to as San Felipe Lake. Despite years of drainage, grazing, and crop production, there is remnant wetland with intact soil structure (fine clays) and depressional topography. As a result, Lowe et al. (2016) identified the San Felipe Lake area as having the "highest restoration potential for non-Bayland wetlands within Santa Clara County." Hydrological reconnection could restore habitat for shore birds, water birds, fish and could provide a "power growth" zone for out-migrating steelhead in Pacheco Creek, similar to the rice fields/Yolo Bypass in Sacramento.

Other notable open water areas in the upper Pajaro River watershed are the groundwater recharge ponds along lower Llagas Creek as well as the Madrone, Main Avenue, and San Pedro percolation ponds, which support little vegetation, and Lake Silveira (see box). Uvas, Chesbro, and Pacheco Reservoirs also occur in the watershed, which are described in the water supply section of the Watershed Setting Report. Reservoirs provide habitat for many bird and fish species, including most of the non-native fish documented in the watershed.

Lake Silviera was an approximately 8-acre artificial lake formed in the late 1970s when a berm separating Llagas Creek from an abandoned quarry was breeched. Llagas Creek flowed into and filled the quarry pit and 2,000 feet of Llagas Creek ran dry as a result. In 2020 Valley Water separated Lake Silviera from Llagas Creek as a part of the Upper Llagas Flood Protection Project, restoring the creek channel and replacing some of the lake habitat with more ecologically beneficial wetlands.

Pajaro Basin Wetland. Photo: Valley Water

Habitat Connectivity

Numerous separate state, regional, and local connectivity assessments and conservation plans recognize the importance of the Upper Pajaro River Watershed for habitat connectivity between the Santa Cruz Mountains and the Diablo and Gabilan ranges (Figure 2-11). In the upper watershed, the Santa Cruz Mountains and the Diablo Range support continuous natural habitats that have not experienced significant land conversions, and connectivity conservation efforts are focused on the permanent protection of these areas and improving connectivity within them. The ability for wildlife to safely cross SR-152 and the southern section of US-101, which are shown in Figure 2-11, are two of the top three priority barriers to habitat connectivity in the Bay Area and two out of the twelve top priority barriers statewide (CDFW 2022). The Pacheco Pass Wildlife Overpass Planning Project targets one of these barriers: together with its various partners, the Santa Clara Valley Habitat Agency is working to install a wildlife overpass in Pacheco Pass over SR-152.

What we mean when we say...

Connectivity:

Increasing ecological attention is toward habitat connectivity as a mechanism of maintaining biodiversity in the face of population growth and climate change (CDFW 2020). Connectivity is defined as "the degree to which the landscape facilitates or impedes movement" (Taylor, Fahrig, Henein, & Merriam, 1993).

Landscape Linkages:

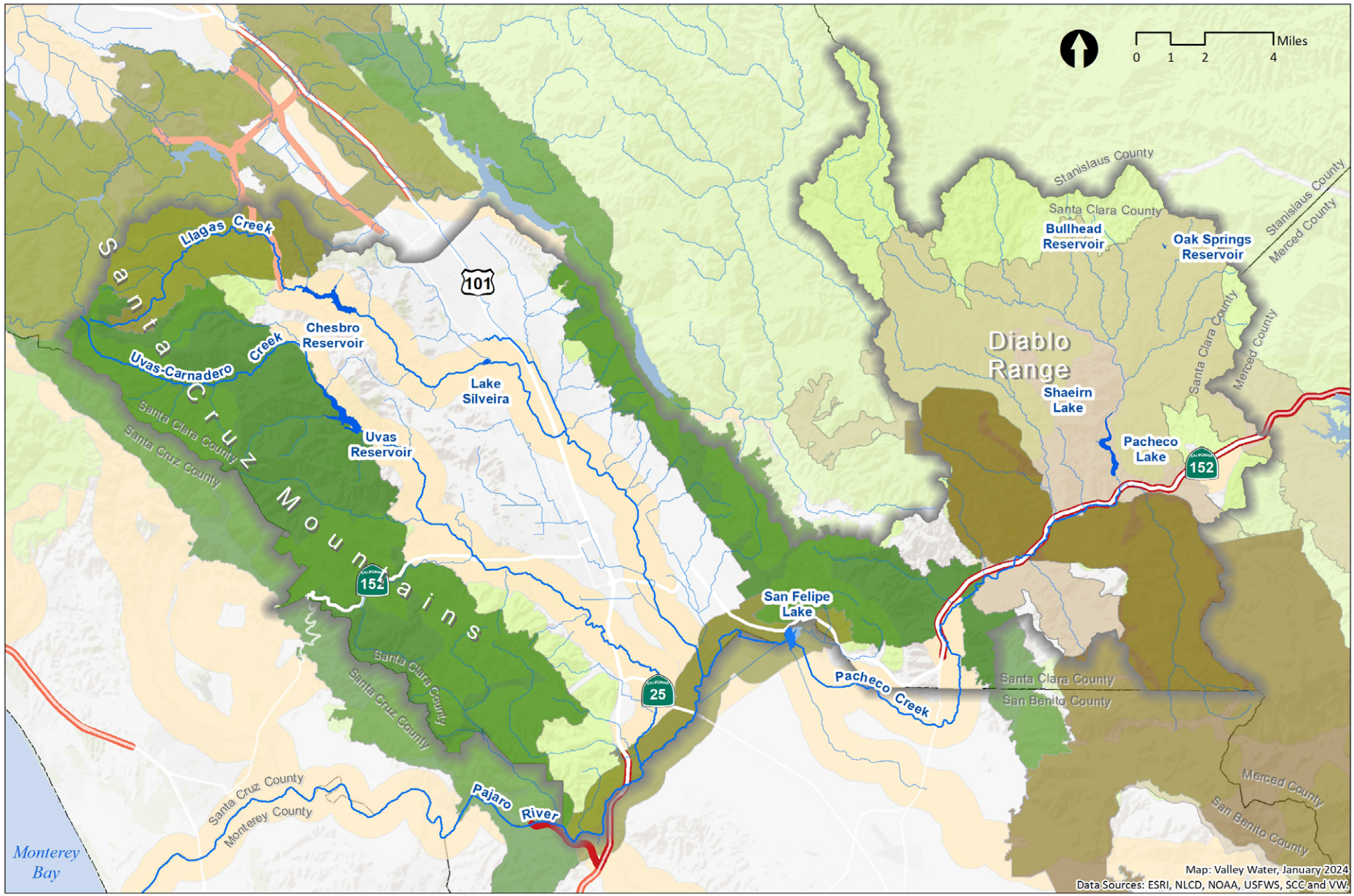
Landscape linkages refer to broad areas that allow for the movement of wildlife and plant species from one area of suitable habitat to another and that support ecological processes (Ament, et al., 2014).

Corridors:

Corridors are distinct linear features whose primary function is to connect two or more significant habitat areas (Beier & Loe, 1992).

Large Landscape Blocks:

Large Landscape Blocks are areas of high ecological integrity that build upon the existing conservation network of lands in the area (Penrod, et al., 2013). Also referred to as core habitats.



Wildlife Movement Barriers
- Top Priority Barrier
- Priority Barrier
- Barrier

Linkage Designs
- Diablo Range-Gabilan Range
- Diablo Range-Inner Coast Range
- Santa Cruz Mountains-Diablo Range
- Santa Cruz Mountains-Gabilan Range

- Large Landscape Blocks
- Riparian Buffer Zones
- Water Bodies
- Creeks

Upper Pajaro Watershed

Wildlife Movement Linkages

Valley Water

Figure 2-11: Critical Habitat Connectivity Linkages in the Upper Pajaro watershed.

2.3.2 Future Conditions, Challenges, and Opportunities

Vision for Future Conditions

One Water provides an opportunity to articulate an informed vision for the future conditions of ecological resources that accounts for past and current conditions, the challenges, and opportunities to improving those conditions, and the relevant visions and objectives of other programs and plans. Attainment of this vision provides the basis and justification for the recommended actions in Chapter 4. A vision for ecological resources in the Upper Pajaro River watershed informed by the present conditions and One Water metrics is articulated below. Elements of these vision statements are referred to as attributes in the One Water Countywide Framework and are directly tied to metrics and targets that are intended to track and document progress toward the vision. Secondary bullets in the list below are other ways of stating the vision or provide more specificity for the Upper Pajaro River watershed.

- Fish can travel freely in the watershed's rivers and streams
  - » There is unimpeded access to suitable habitat
- Wildlife can move freely in the watershed
  - » Natural lands and rangelands are conserved, expanded, enhanced, and connected to facilitate wildlife movement.
- Streams are healthy and can support aquatic life
  - » There is suitable spawning and rearing habitat for steelhead
  - » There should be suitable fish habitat in a variety of accessible reaches to help make fish populations more resilient to drought and climate change.
- Ecological conditions of streams are consistently improved
  - » Modified channels are enhanced to improve ecological condition and human communities
  - » The watershed's natural sources and transport of gravel and coarse sediment should be prioritized to build and maintain aquatic habitat.
- Riparian habitat is increasingly protected and improved
  - » Native vegetation communities around creeks are sufficient in width and structural complexity to filter runoff, stabilize banks, contribute to aquatic habitat, provide habitat, and facilitate wildlife movement.
  - » Unique natural communities such as alkali meadows, seasonal wetlands, and sycamore alluvial woodland are preserved and protected
- Fundamental to achieving these visions is the preservation, expansion, and protection of undeveloped buffers around creeks. Figure 2-12 depicts the protection status of creek channels in the watershed; those mapped as unprotected may be appropriate to serve as targets or priorities for protection and expansion of buffers.

The following plans complement One Water and should be used to inform and prioritize future ecological resource enhancement efforts:

The **Pajaro Compass** is a network for voluntary conservation that brings together land owners, public agencies, conservation organizations, elected officials and more to engage in efforts to maintain a healthy watershed. (https://pajarocompass.org/)

The **Santa Clara Valley Habitat Plan** provides a framework to protect natural resources and endangered species while streamlining permitting for covered projects. (https://scv-habitatagency.org/)

The **San Benito County HCP/NNCP** provides a framework to protect natural communities and species in San Benito County and helps provide more efficient and transparent guidance on permitting, mitigation, compensation and review for persons carrying out Covered Actions. (https://www.cosb.us/departments/resource-management-agency/planning-and-land-use-division/san-benito-county-conservation-plan-sbccp)

The **Santa Clara Valley Resource Conservation Investment Strategy** is the first of its kind and promotes the conservation of natural resources in Santa Clara County through the identification of actions and priorities that can help guide investments and/or identify high priority opportunities for mitigation. (https://www.openspaceauthority.org/our-work/current-projects/regional-conservation-investment-strategy.html)

The **State Wildlife Action Plan** is a statewide plan that assesses the health of the state's natural resources, identifies immediate and future challenges and outlines actions to be taken to address these challenges before species and habitats become too rare or costly to restore. (https://wildlife.ca.gov/SWAP)

The **South-Central California Steelhead Recovery Plan (NMFS)** is a guidance document that identifies recovery actions that contribute to the protection and recovery of SCCC steelhead throughout the DPS.

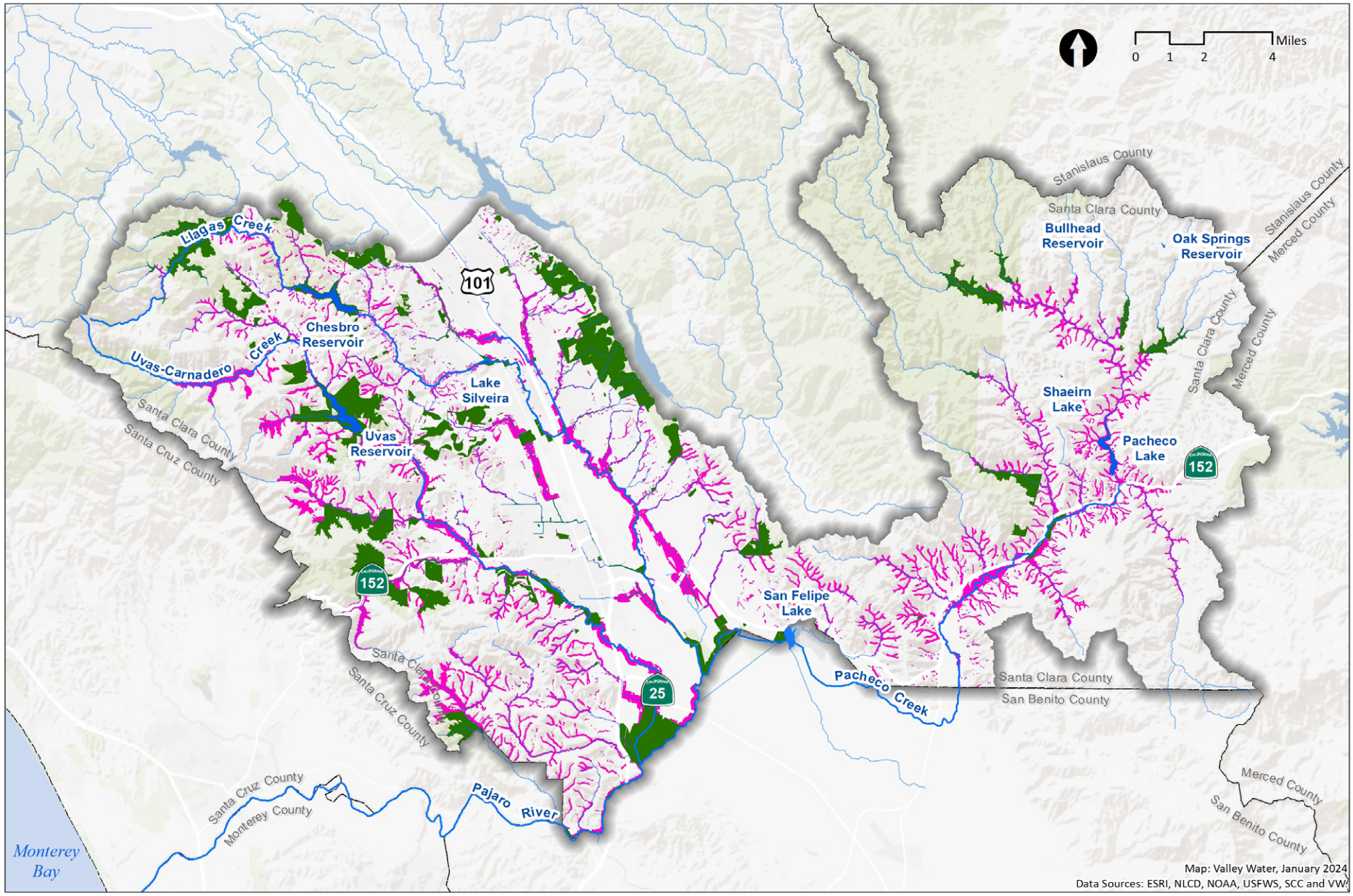


Figure 2-12: Protected and Unprotected Creek Channels in the Upper Pajaro Watershed.

Challenges

Invasive Species

Because of the more reliable water availability, riparian areas are prone to invasion by nonnative plants. Invasive plants tend to thrive and spread aggressively, negatively altering native vegetation distribution, Habitat suitability for wildlife, soil stability, and water quality, thus degrading habitat quality and the overall ecological value of a site. In addition, invasive plants can exacerbate flooding and fire danger, undermine structural assets, and obstruct access to roads, levees and trails. A few examples of invasive plants in the watershed include giant reed, Cape ivy, eucalyptus, and stinkwort. Figure 2-13 depicts occurrences of nonnative, invasive plant communities in the watershed that may be appropriate to serve as targets or priorities for removal efforts. These are certainly not the only occurrences of nonnative plants in the watershed, but where an invasive species is dominating the vegetation.

Unhoused Encampments

Llagas Creek and its riparian corridor within and around Gilroy has been significantly impacted by encampments and related uses of unhoused individuals. Valley Water and others in Santa Clara County have undertaken numerous and costly efforts to reduce the environmental harm of encampments. Until sufficient housing and health services are available to reduce the unhoused population along urban creek corridors, however, efforts to conserve and enhance riverine and riparian ecological conditions will be extremely limited, less successful, and more expensive.

Opportunities

Floodplain Restoration

Expanding and restoring floodplains provides multiple benefits: wider floodplains can store more high flow and reduce flood risk; wider and denser riparian corridors slow and filter stormwater runoff and improve water quality; together, these areas provide important wildlife habitat and safe corridors for wildlife movement. Expansion of habitat for wildlife or other ecosystem services has potential to offset greenhouse gas emissions. When management or infrastructure changes are being planned for one of these water management priorities, the others can be considered and included when feasible. The multiple benefits provided should be considered and quantified when evaluating costs.

Conservation Easements

Working rangelands support habitat and biodiversity, and keeping them in production is central to achieving regional habitat conservation goals. The voluntary sale or donation of property development rights through conservation easements by range and forest landowners can ensure their operational viability while the lands continue to support invaluable habitat and provide landscape connectivity and services.

Agricultural Preservation

In addition to providing food and jobs, the conservation of farmland in the valley floor helps control flood levels in the Pajaro River as far downstream as its mouth at the Pacific Ocean. Development of this farmland would displace the flood attenuation capacity of the land and create more impervious surface that would increase flows in creek channels. While drainage and development for agriculture has impacted ecological resources in numerous and severe ways in the watershed, it can be managed to support many ecosystem services and is a better neighbor to habitat and wildlife than commercial or residential land uses.

Landowner and Farmer Education and Incentives

Much of the valley floor and hills are the watershed are in private ownership and are actively grazed or farmed. When managed, these lands can provide numerous ecosystem services that benefit the environment and people. Providing opportunities to educate, engage, and incentive landowners and farmers to manage their lands in these ways is both a challenge and opportunity and, fortunately, a focus of Resource Conservation District, non-profit organizations, and State Water Resources Control Board effort.

Red-Tailed Hawk. Photo: Lisa Porcella

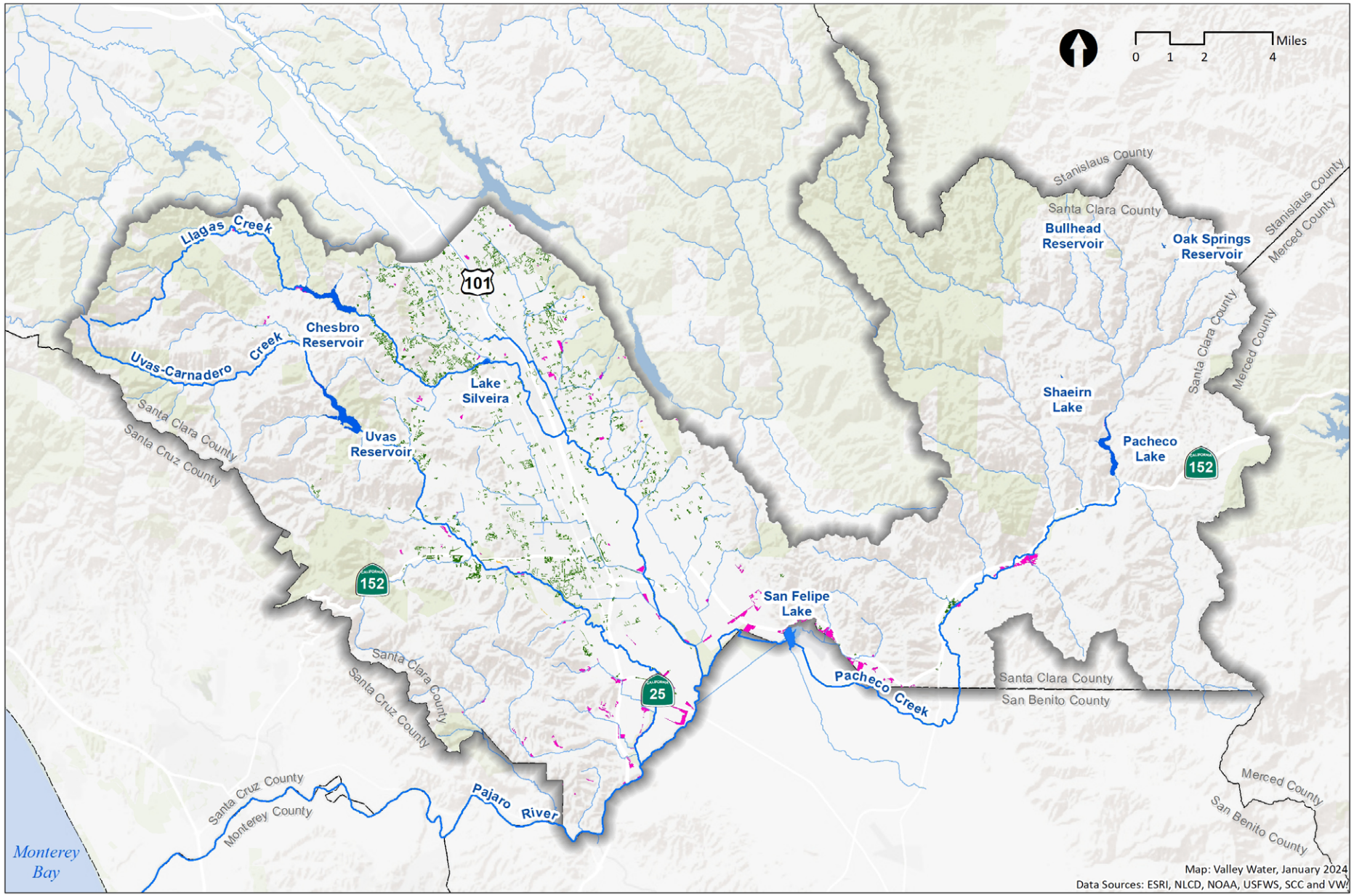


Figure 2-13: Non-Native Plant Communities in the Upper Pajaro Watershed

2.4 WATER SUPPLY

Ensuring a reliable source of safe, clean water for a healthy life, environment and economy is central to Valley Water's mission, and consequently, is integrated into the One Water Framework and this Plan. The following subsections present the history of water supply within the study area, current water supply conditions, and anticipated future water supply challenges and opportunities.

2.4.1 *Present Conditions*

Valley Water manages Santa Clara County's water supply using a variety of sources including local surface water, imported water conveyed from the Sacramento-San Joaquin Delta, and recycled water. These supplies are used to replenish local groundwater aquifers, treated at Valley Water's three drinking water treatment plants, sent directly to water users, and released to local creeks to meet environmental needs and regulations. Long-term water conservation and demand management efforts are another important component of the water supply portfolio. Valley Water's countywide water supply and distribution system includes reservoirs, canals, water supply diversions, groundwater recharge ponds, controlled in-stream recharge, raw and treated water pipelines, pumping stations, and water treatment plants. Figure 2-14 shows water supply infrastructure including major streams, reservoirs, groundwater recharge ponds, and pipelines within the Upper Pajaro Watershed.

UPPER PAJARO WATERSHED

17,655

Acre-feet of Valley Water reservoir capacity

21,900

Acre-feet per year of average natural recharge (Upper Pajaro watershed area of the Llagas Subbasin)[1]

2,100

Acre-feet of recycled water delivered to customers

[1] 10-yr average (2012 to 2021) of natural recharge in the Llagas Subbasin

In addition to Valley Water, the San Benito County Water District and Pacheco Pass Water District provide water supplies in portions of the Pajaro River Watershed. This section focuses on water supply infrastructure and operations located in the Upper Watershed that are managed by Valley Water.

The total water demand estimated within the Upper Watershed was approximated to be 45,000 acre-feet. This estimated water demand is distributed between municipal, industrial, and agricultural uses. The major source of water used within the upper watershed is groundwater, providing about 95% of water supply to the area with untreated surface water and recycled water sources making up the rest. Valley Water replenishes groundwater with local and imported surface water supplies.

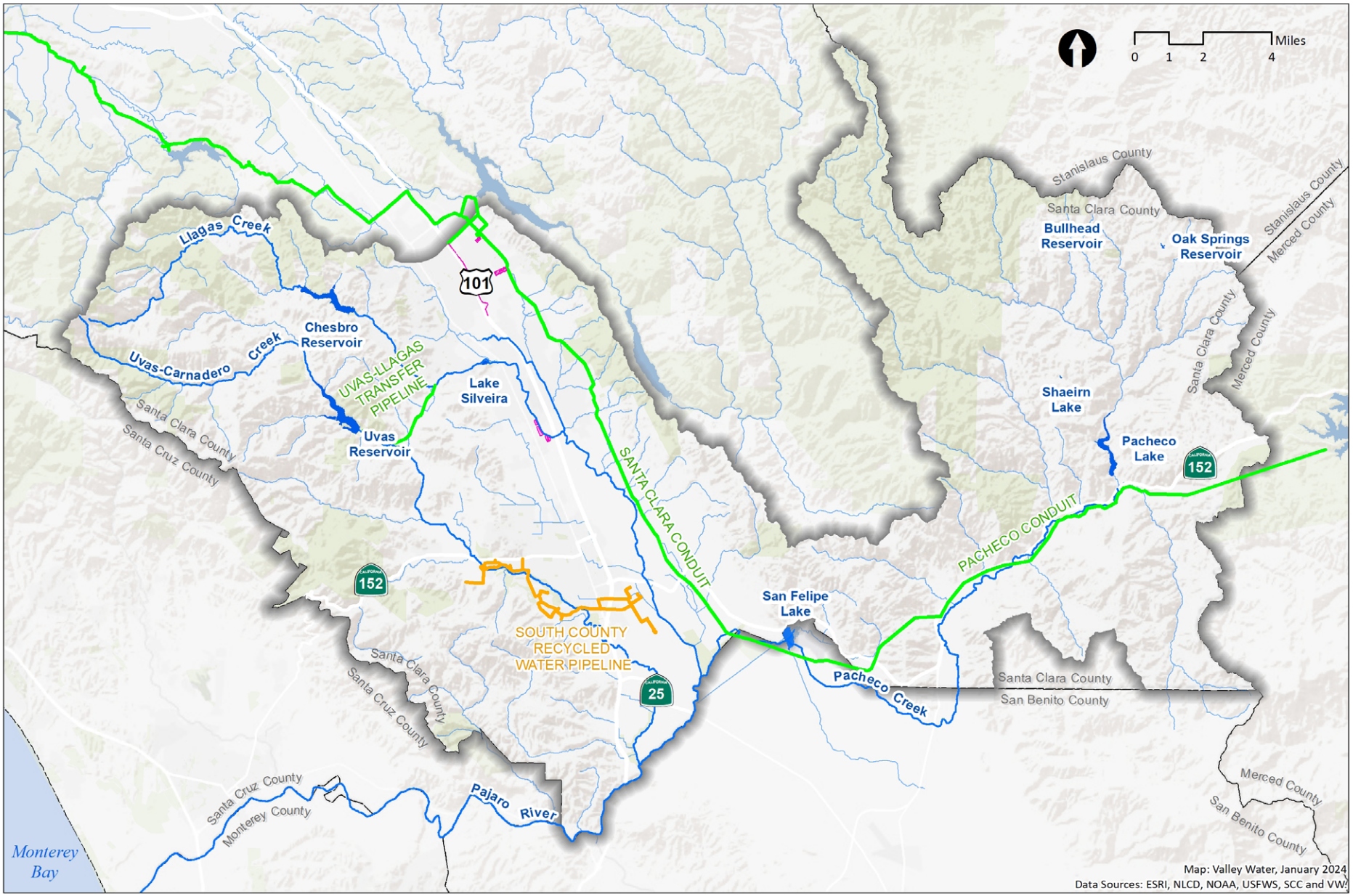
Groundwater

A groundwater basin is defined as an aquifer or a stacked series of aquifers with well-defined boundaries in a lateral direction and a definable bottom, based on features that, in general, impede groundwater flow. A groundwater subbasin refers to a subdivision of a groundwater basin based on geologic and hydrologic barriers or institutional boundaries (California Department of Water Resources, 2021). Based on the California Department of Water Resources, Bulletin 118 2020 update, which includes the official publication on the occurrence and nature of groundwater, there are ten groundwater basins partially or completely located within the boundary of the Pajaro River Watershed. Of these ten basins, two groundwater subbasins partially overlap with the Upper Watershed: the Gilroy-Hollister Valley Llagas Area subbasin (Llagas Subbasin) and Gilroy-Hollister Valley North San Benito subbasin (North San Benito Subbasin). As shown in Figure 2-15, the Llagas Subbasin underlies the floor of the Santa Clara Valley and the North San Benito Subbasin only overlaps with small portions of the Upper Pajaro watershed.

Table 2-2: Water Supply Management in the Upper Pajaro Watershed

Water Use (Average Acre-Feet per Year)	
Groundwater Pumping*	42,500
Groundwater Recharge Capacity (Acre-Feet per Year)	
Upper Llagas Recharge System	
Madrone Channel	8,055
East Little Llagas	1,100
Main Avenue Ponds	2,700
San Pedro Ponds	4,700
Lower Llagas Recharge System	
Uvas Creek	8,100
Llagas Creek	5,800
Church Ponds	7,300
Total Recharge Capacity	37,755

* Reported as the average annual from 2012 to 2021 from the Llagas Subbasin.
** Managed recharge systems in the Llagas Subbasin.



Pipelines

- Raw
- Recycled

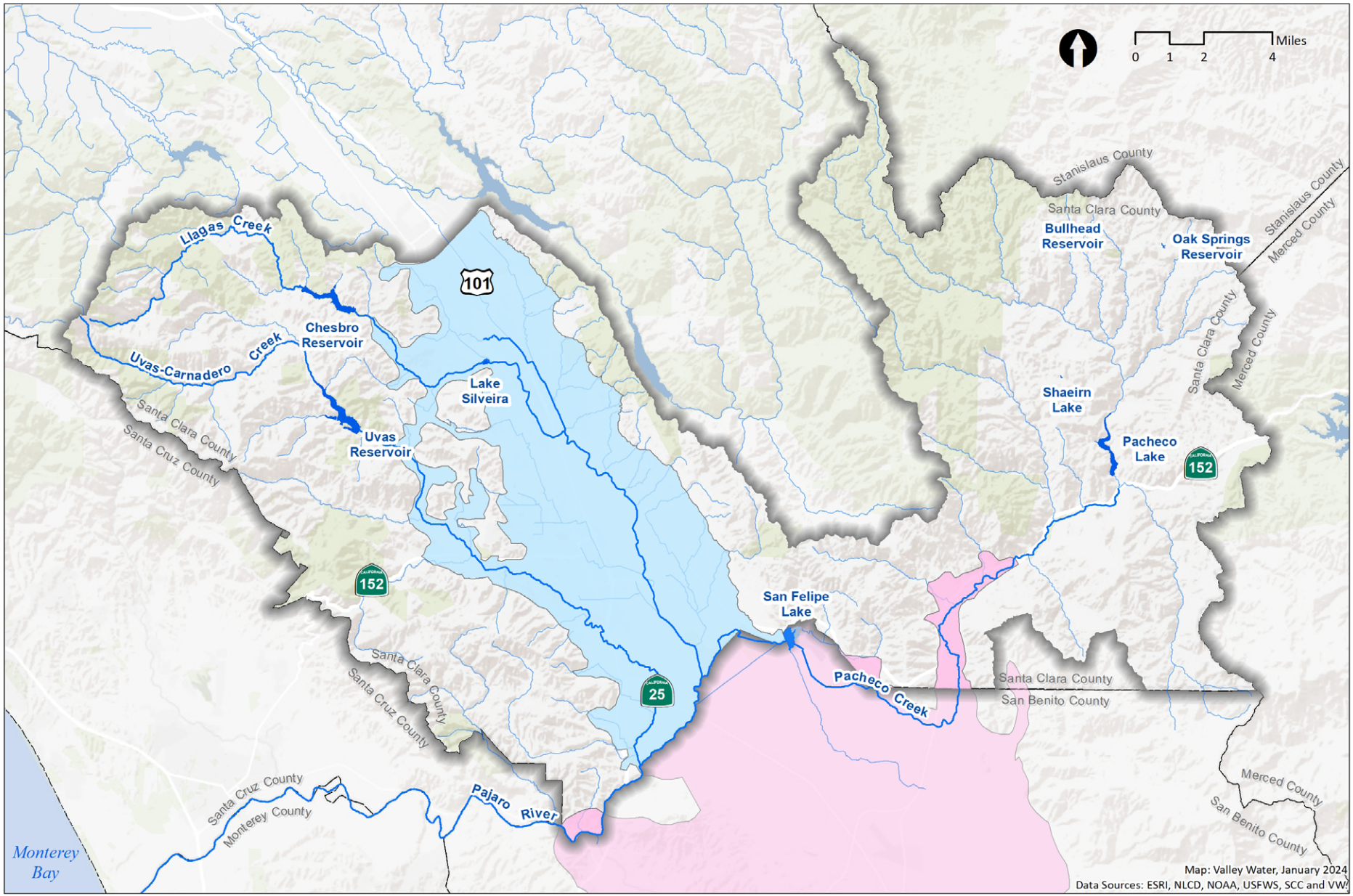
- Recharge Ponds
- Water Bodies
- Creeks

Upper Pajaro Watershed

Water Supply Infrastructure

Valley Water

Figure 2-14: Water Supply Infrastructure in the Upper Pajaro Watershed



Water Bodies
Creeks

Groundwater Subbasin

Gilroy-Hollister Valley - Llagas Area
Gilroy-Hollister Valley - North San Benito

Upper Pajaro Watershed

Groundwater Basins

Valley Water

Figure 2-15: Upper Pajaro Watershed Groundwater Basins

The Sustainable Groundwater Management Act (SGMA) of 2014 lists Valley Water as the exclusive Groundwater Sustainability Agency (GSA) within Santa Clara County, which includes all of the Llagas Subbasin and the small portions of the North San Benito Subbasin in the county. Because the North San Benito Subbasin is largely within San Benito County, San Benito County Water District (SBCWD) has led SGMA compliance for the basin, with support from Valley Water. Both GSAs have been compliant with SGMA, including submitting all required reports and periodic updates to the Department of Water Resources (DWR). As of 2019, Valley Water has a DWR approved an Alternative to a Groundwater Sustainability Plan (GSP), which includes the Llagas Subbasin. In 2021, Valley Water submitted the first period update to the Alternative, which is Valley Water's 2021 Groundwater Management Plan for the Santa Clara and Llagas Subbasins (Valley Water, 2021). In 2023, DWR approved the North San Benito GSP that was submitted by SBCWD and Valley Water. The 2021 Groundwater Management Plan and North San Benito GSP include detailed information about Valley Water and SBCWD's groundwater management programs and investments to ensure the long-term sustainability of these groundwater resources.

Llagas Subbasin

The Llagas Subbasin is located entirely within the boundary of the Upper Pajaro Watershed and is managed by Valley Water. The Llagas Subbasin covers an area of 56,000 acres and is bounded by the Santa Cruz Mountains to the west, the Diablo Range to the east, Cochrane Road near Morgan Hill to the north, and the Pajaro River to the south.

The Llagas Subbasin is recharged naturally and by Valley Water's managed recharge facilities and operations. Natural recharge includes the deep percolation of rainfall, septic system and/or irrigation return flows, and natural seepage through creeks. . Valley Water's managed recharge program uses both surface water runoff captured in local reservoirs and imported water delivered by the raw conveyance system. In the Llagas Subbasin, Valley Water operates the Upper Llagas Recharge System and Lower Llagas Recharge System (Table 2-1), which includes both instream and off-stream percolation pond facilities. . Natural and managed recharge quantities vary each year due many factors including hydrology, imported water allocations, water demand, groundwater conditions, and environmental needs. Total operational storage capacity for the Llagas Subbasin has been estimated to range between 152,000 and 165,000 acre-feet (Valley Water, 2021). The 10-year average groundwater pumping from the Llagas Subbasin is 42,500 acre-feet per year (Table 2-1). During 2022, total pumping within the Llagas Subbasin was 42,500 AF with agricultural use accounting for 57% (24,400 acre-feet), municipal and industrial use accounting for 39% (16,500 acre-feet), and domestic pumping accounting for approximately 4% (1,600 acre-feet).

The Llagas Subbasin is the main water source for public water systems like the cities of Morgan Hill and Gilroy, the San Martin County Water District, and the West San Martin Water Works. Thousands of privately owned wells used for domestic, agricultural, and industrial purposes also share the same groundwater basin.

Gilroy-Hollister Valley/North San Benito Subbasin

The Gilroy-Hollister Valley/North San Benito Subbasin (North San Benito Subbasin) is a consolidation of four subbasins: the Bolsa Area Subbasin, the Hollister Area Subbasin, the San Juan Bautista Subbasin, and the Tres Pinos Valley. The North San Benito Subbasin is 131,000 acres with approximately 97% of the subbasin located within San Benito County and the rest located within Santa Clara County. The portion of the subbasin located within San Benito County is managed by the San Benito County Water District while Valley Water is the GSA for the portion of the subbasin located within Santa Clara County (San Benito County Water District, 2021).

The North San Benito Subbasin is bounded in the north by Pajaro River and Pacheco Creek as well as part of the Santa Clara-San Benito County line, in the southwest by the San Andreas Fault and the Gabilan Range, and in the east by the Diablo Range (Bolsa Area Subbasin and Hollister Area Subbasin).

Local Surface Water

As described in Chapter 1, the Upper Pajaro Watershed is comprised primarily of the Llagas, Uvas, Pacheco, and Pajaro subwatersheds. These subwatersheds contain numerous small and unnamed creeks that flow into Llagas, Uvas, and Pacheco Creeks. These creeks ultimately drain to the Monterey Bay from the slopes of the Santa Cruz Mountains and Diablo Range via the Pajaro River. Major creek systems are shown by subwatershed in Figure 1-3.

Two reservoirs located in the watershed, Uvas and Chesbro, are operated by Valley Water and are designed to capture and store local rainfall runoff for downstream groundwater recharge. The Pacheco Reservoir, owned and operated by the Pacheco Pass Water District, impounds the Pacheco Creek's north fork and has an operational capacity of 5,500 acre-feet of water. San Felipe Lake is a natural lake located east of Gilroy in northern San Benito County near the border of Santa Clara County. San Felipe Lake is not used for water supply; however, it is an ecological asset important to the Upper Pajaro watershed and discussed further in Section 2.3.

RELATED PLANS

Urban Water Management Plan

The Urban Water Management Plan (UWMP) is a long-range planning document that is required by the California Department of Water Resources. The UWMP is essentially a state-mandated master plan that includes an agency's projected water supplies and demands over the next 25 years, as well as water shortage contingency planning and conservation efforts. The plan is required to be updated every five years, and failure to comply with this legal requirement will jeopardize an agency's eligibility for State funding. The plan was last updated in 2020 and the next update will be in 2025.

Water Supply Master Plan

The Water Supply Master Plan (WSMP) is Valley Water's guiding document for long-term water supply investments to ensure water supply reliability for Santa Clara County. Updated about every five years, this long-range plan assesses future county-wide demands and evaluates and recommends water supply and infrastructure projects to meet those demands to achieve Valley Water's level of service (LOS) goal through the planning horizon. Valley Water's LOS goal is "Meet 100 percent of annual water demand during non-drought years and at least 80 percent demand in drought years." The most recent plan, Water Supply Master Plan 2040, was adopted by the Valley Water Board of Directors (Board) in 2019. Valley Water is currently developing the WSMP 2050, which extends planning horizon to 2050 and is expected to be completed by the end of 2024.

Imported Water

The Upper Pajaro watershed receives imported water conveyed through the Delta from the federal Central Valley Project (CVP) via San Luis Reservoir. This water is used for managed recharge in Valley Water's Upper Llagas Recharge System.

Treated Water

The cities of Gilroy and Morgan Hill obtain municipal water supplies from groundwater well sources, most of which are within the Llagas Subbasin. The City of Gilroy currently operates nine groundwater wells, and the City of Morgan Hill operates 16 groundwater wells (City of Gilroy Water Department, 2022 and City of Morgan Hill, 2022). Water extracted from these wells is disinfected prior to delivery to residents, businesses, and other users. Valley Water does not supply treated water via its water supply system to the cities of Gilroy and Morgan Hill. However, Valley Water manages groundwater recharge as described above to support the reliability of safe, clean water supplies in the Upper Pajaro watershed.

Recycled Water

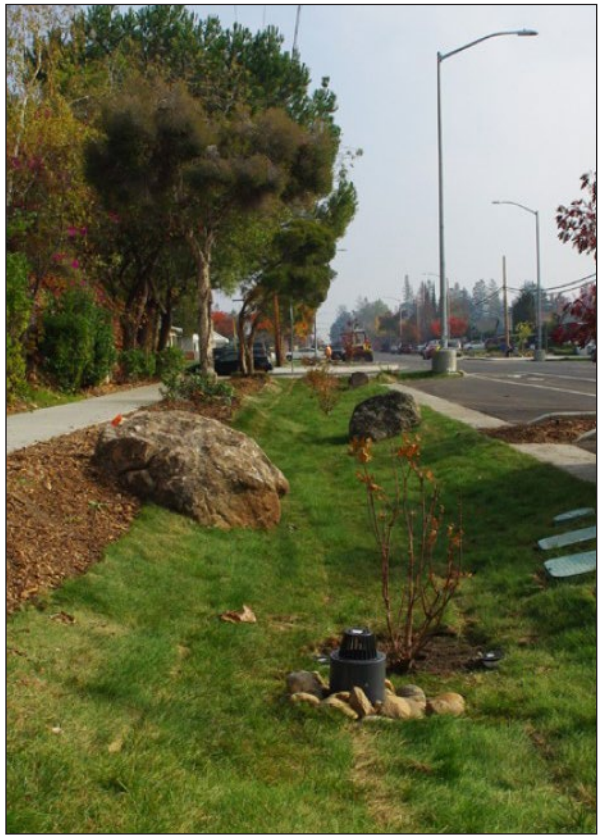
Recycled water is an important source of water for irrigation and industrial use in the Upper Pajaro watershed. In partnership with Valley Water, the South County Regional Wastewater Authority (SCRWA) produces recycled water distributed via a network of pipelines dedicated to recycled water in the southern portion of Gilroy. The South County Recycled Water Pipeline, which is a new component of this pipeline network, was completed in 2023 and will distribute recycled water for irrigation, industrial, and agricultural uses. Figure 2-14 shows the recycled water pipelines located in the Upper Pajaro watershed.

Water Conservation

Valley Water and all major retail water providers partner in regional implementation of a variety of water-use efficiency programs (water conservation programs) to permanently reduce water use in the county. Valley Water's long-term savings target is to achieve 99,000 acre-feet per year (AFY) in water savings by 2030 and 109,000 AFY by 2040 (110,000 AFY when including stormwater capture projects). The Water Supply Master Plan 2040's "No Regrets" package includes water conservation programs designed to achieve this ambitious water savings target, as well as stormwater capture/recharge programs. Work is underway to establish a new target for the Water Supply Master Plan 2050 to increase our community's water supply reliability.

To identify strategies to achieve both Valley Water's aggressive long-term targets and the State's "Making Conservation a California Way of Life" regulatory framework's objectives, Valley Water completed a Water Conservation Strategic Plan (Strategic Plan) in 2021 (Valley Water, 2021c). The Strategic Plan details specific recommendations and strategies for increasing participation rates in water conservation programs, addressing geographic or demographic disparities in participation trends, and considering the creation of new programs and conservation policies. Importantly, the Strategic Plan determined that the type and variety of programs Valley Water offers are sufficient to meet the long-term savings target if resources are invested to increase participation rates. Adoption of local conservation policies such as a Model Water-Efficient New Development Ordinance have the potential to meet the long-term savings target earlier and more cost effectively than without such policies.

As of FY 2023, Valley Water's Water Conservation Programs and policies have saved over 83,000 acre-feet per year. Valley Water implements more than 20 different ongoing water conservation programs including incentives and rebates, free device installation, free delivery of water-saving devices and educational resources, one-on-one home visits, site surveys, and educational outreach to reduce water consumption in homes, businesses and agriculture. These programs are designed to achieve sustainable, long-term water savings and are implemented regardless of water supply conditions. Without these programs and the savings generated from them, Valley Water would need to develop or import an equal supply every year.



Bioretention Basin. Photo: Valley Water

2.4.2 Future Conditions, Challenges, and Opportunities

Challenges

Climate Change

Climate change is predicted to bring impacts such as warming temperatures, shrinking snowpack, extreme weather, prolonged droughts, and wildfire. Some of these impacts are already being experienced across California and Santa Clara County. Future projections indicate that the Santa Clara Valley could experience a change in hydrologic patterns and an increase in rainfall averages, as well as an increase in the length and intensity of droughts. This means that the valley's extreme events (storms and droughts) could become even more extreme compared to historic conditions, changing the ways that Valley Water manages and utilizes its water supply. The reliability of local and imported water will become increasingly uncertain, and additional climate impacts such as increased wildfires could threaten water supply infrastructure and power supply. Collectively, climate-related impacts have the potential to compound and simultaneously impact multiple aspects of Valley Water's operations. Climate change will make it more challenging to balance priorities such as providing enough water supply to meet demand while maintaining stream flows and water quality amidst severe drought conditions.

Valley Water developed a Climate Change Action Plan (CCAP), which was adopted by the Board of Directors in July of 2021. The plan addresses Valley Water's climate vulnerabilities and provides actions to address them. The 2021 Groundwater Management Plan (Valley Water, 2021) presents a projected groundwater budget that incorporates future climate change and describes likely operational flexibility to compensate for changes in groundwater storage, and Valley Water's water supply planning team is evaluating how climate change could impact future local and imported water supplies.

Changes in Land Use and Water Demand

Changes in land use and new development can increase demand for water and, if not offset with new supplies or additional water conservation, can create water shortages. The uncertainties in water demand forecasting associated with climate change will make advanced planning for increased development even more challenging. It is important that planned water conservation savings (a One Water metric) are achieved in the Upper Pajaro watershed and throughout the County. However, effective One Water management will continue to require Valley Water's engagement with land use decisions in areas critical to supply and recharge.

Opportunities

Green Infrastructure

Stormwater runoff in the urban environment is the largest pathway of pollution and hydromodification to urban waterways, but there is opportunity to capture, treat, and use this resource through green stormwater infrastructure (GSI). GSI is a broad term used to describe stormwater management techniques that make the developed landscape behave more like the natural landscape with respect to infiltration and runoff. This can include small-scale on-site measures like green roofs, rain gardens, and rain barrels to collect, clean, and infiltrate rainwater, or store it for later irrigation needs. Larger impervious areas can be treated using features like streetside, parking lot, or regional bioretention features. These can be integrated with open space or park land. These techniques are being increasingly implemented in response to regulatory requirements and public demand as areas are developed or redeveloped. Over time, GSI can have an increasingly large beneficial effect on water quality, water supply, environmental health, and general public wellbeing in urban areas. Increasing the implementation of GSI presents an opportunity to realize several concurrent benefits.

Expanding Water Supplies

There are several strategies that have the potential to increase water supply in Santa Clara County, or to enhance reliability of those supplies. Many of these strategies are fully explained in more detail in the Valley Water's Water Supply Master Plan. One strategy is to increase the use of recycled water by expanding the current distribution system to reach more users, as well as constructing advanced water purification plants to support potable reuse.

Expanding Groundwater Recharge

Through the Water Supply Master Plan, Valley Water is evaluating several projects that would expand managed recharge at the Madrone Channel, Main Avenue Ponds, and San Pedro Ponds within the Llagas Subbasin. Flood-Managed Aquifer Recharge (Flood-MAR) is an additional way in which groundwater recharge could be expanded to increase water supply and potentially reduce stormwater runoff into urban areas. A pre-feasibility study identified that capturing hillside runoff onto open space before it reaches roads and storm sewers may be the most feasible approach to Flood-MAR in Santa Clara County. Valley Water is continuing studies to assess the feasibility of Flood-MAR in Santa Clara County. Unlike our existing managed aquifer recharge operations or the large-scale Flood-MAR being piloted in the Central Valley, Valley Water expects the amount of water captured to be relatively small. Portions of the Upper Pajaro watershed, including the Llagas subbasin, may have opportunities for Flood-MAR and/or expanded groundwater recharge. Valley Water presents updates on Flood-MAR feasibility in Santa Clara County to the Water Conservation and Demand Management Committee.

ADDITIONAL ONLINE RESOURCES

Groundwater Management Plan for the Santa Clara and Llagas Subbasins:

https://s3.us-west-1.amazonaws.com/valleywater.org.us-west-1/s3fs-public/2021_GWMP.pdf

Urban Water Management Plan:

https://www.valleywater.org/your-water/water-supply-planning/urban-water-management-plan

Water Supply Master Plan:

https://www.valleywater.org/your-water/water-supply-planning/water-supply-master-plan

Water Conservation Strategic Plan:

https://www.valleywater.org/watersavingsorg

Chesbro Reservoir. Photo: Tyler Methot

2.5 WATER QUALITY

This section discusses Valley Water's current water quality protection and management activities in the Upper Pajaro watershed. Using data from existing water quality monitoring and creek health assessments, this section summarizes current conditions, describes key pollutants, and outlines Valley Water management actions, as well as key challenges and opportunities ahead.

2.5.1 *Present Conditions*

In a well-functioning watershed, natural processes work to sustain good water quality — water in which native fish and other biota thrive and that humans can safely use. However, several land uses and land management practices inhibit this water quality. These include ranching, farming, urbanization, and construction of water management infrastructure, which have all altered the natural dynamics of many streams. In addition to changing natural hydrology, direct and indirect pollution from both human and natural sources undermines the quality of the water necessary for human and environmental use in Santa Clara County.

Water quality management is described as three types: source water (in reservoirs for eventual treatment for human use[2] or groundwater recharge or for ecological purposes), surface water (in creeks and urban runoff), and groundwater. In general, primary water quality issues in the Watershed include sediment, trash, pathogens, urban and agricultural runoff, and algal blooms. While Valley Water's overall water quality goal remains to protect the beneficial uses of these waters, new thinking about the relationships between water quality, natural flood protection, water supply, and watershed restoration informs One Water planning.

Groundwater Quality

Gilroy-Hollister Valley/Llagas Area Groundwater Subbasin

The Gilroy-Hollister Valley/Llagas Area groundwater subbasin (Llagas Subbasin), is located in south Santa Clara County, within the boundary of the Upper Pajaro Watershed and is managed by Valley Water.

Groundwater in the Llagas Subbasin is generally of good quality that does not need treatment beyond disinfection at public water supply wells. The main water quality impairment observed within the Llagas Subbasin is nitrate (Valley Water, 2021b). The presence of nitrate in groundwater is commonly associated with fertilizer use, septic systems, and livestock waste. Since the 1990s, Valley Water has implemented many nitrate management programs and has worked with other agencies to: define the extent and severity of nitrate contamination, identify potential nitrate sources, reduce nitrate loading to groundwater, and reduce customer exposure to elevated nitrate. Current Valley Water efforts include continued groundwater recharge (which helps to dilute nitrate), groundwater monitoring (including free basic water quality testing for eligible domestic wells), public outreach, and collaboration with other agencies. Valley Water also led efforts to develop regional salt and nutrient management plans. The presence of elevated nitrate in many wells (primarily domestic wells) is an ongoing groundwater protection challenge for Valley Water. However, the 2010 to 2019 median principal aquifer nitrate concentration was 5.3 milligrams per liter (mg/L) N (below the California Division of Drinking Water Maximum Contaminant Level of 10 mg/L) and the concentration trends in the Llagas Subbasin remain relatively stable or decreasing (Valley Water, 2021b). For example, 91% of wells tested in the principal aquifer of the Llagas Subbasin had stable or decreasing nitrate concentration trends between 2008 and 2022 (Valley Water, 2023).

An additional constituent of concern within the Llagas Subbasin, mainly for private water well owners, is perchlorate. Perchlorate is a chemical that affects the normal function of the thyroid gland if consumed by humans in sufficiently high doses. For this reason, the California Division of Drinking Water has established a Maximum Contaminant Level (MCL) of 6 parts per billion (ppb) for public water systems. Olin Corporation, a signal flare manufacturing company that operated a manufacturing facility located in south Morgan Hill until 1997, released perchlorate that leached into the subbasin, creating a plume. When the perchlorate contamination plume was first delineated, it was approximately 9.5 miles in length and perchlorate was detected in hundreds of wells within the Llagas Subbasin. In 2003, the responsible party implemented a replacement water program for persons affected by perchlorate impacted domestic wells in conjunction with Valley Water, with 188 impacted wells initially in the program. The responsible party completed onsite soil cleanup in 2006 through a combination of excavation with offsite disposal and bioremediation. The responsible party has implemented onsite and offsite groundwater capture and treatment via 6 extraction wells and an onsite perchlorate ion exchange filtration system. As of 2023, only four of the initial 188 domestic wells remain in the replacement water program owing to declining perchlorate concentrations in the Llagas subbasin resulting from active cleanup efforts and natural attenuation of perchlorate. Remediation is ongoing with Olin Corporation continuing a comprehensive well sampling program to monitor the perchlorate plume within the Llagas Subbasin (State Water Resources Control Board, 2024).

[2] Reservoirs in the Upper Pajaro watershed not currently used to directly supply drinking water.

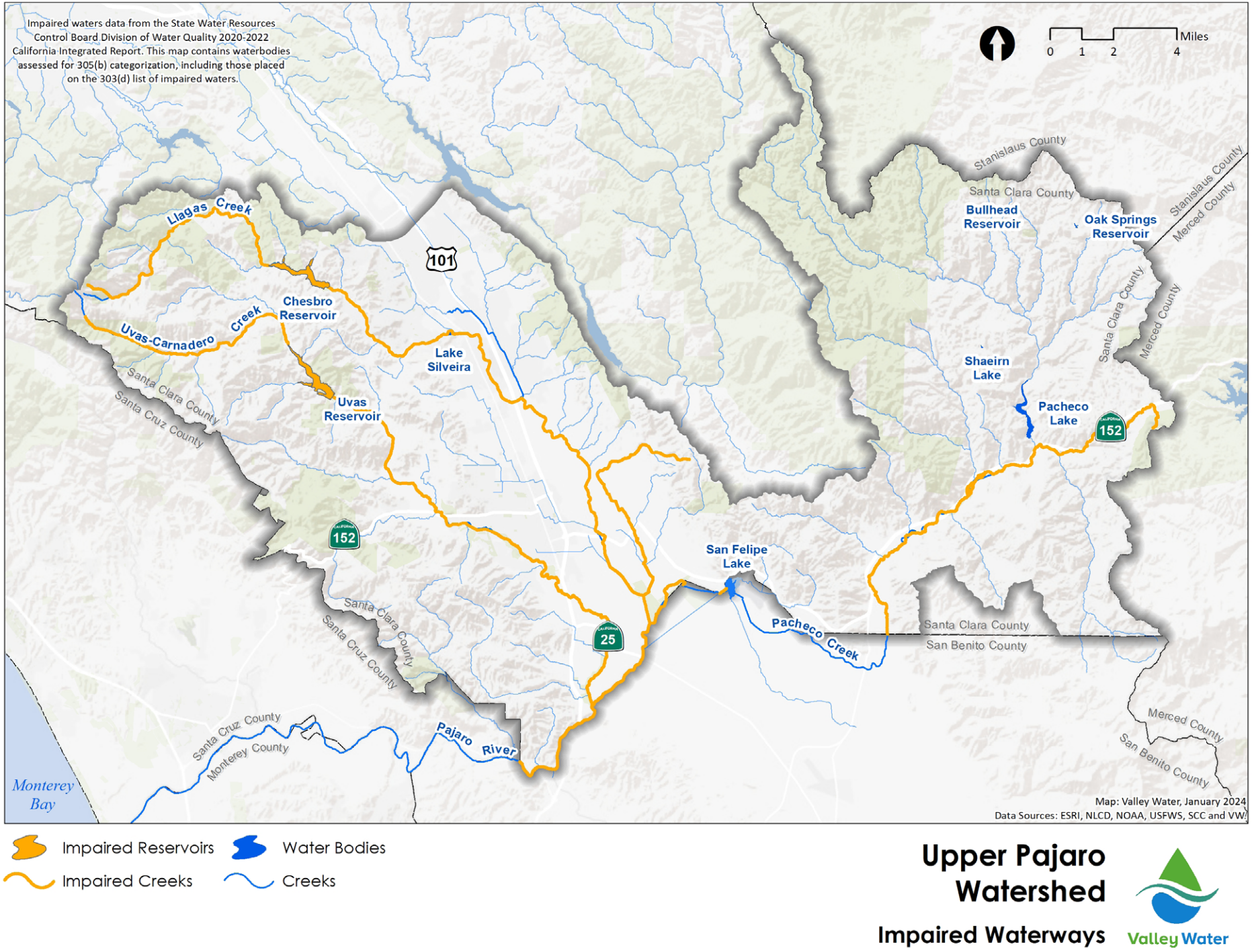


Figure 2-16: Impaired Waterways in the Upper Pajaro Watershed

Gilroy-Hollister Valley/North San Benito Subbasin

Groundwater in the North San Benito Subbasin is highly mineralized and of marginal water quality for drinking and agricultural purposes, which is typical of other Coast Range groundwater basins because of the geology (San Benito County Water District, 2021). Groundwater quality has also been impacted by human activities, including agricultural, urban, and industrial land uses (San Benito County Water District, 2021). Groundwater quality constituents of concern include total dissolved solids (TDS), nitrate, hardness, boron, perchlorate, and metals, including arsenic, chromium, iron, magnesium, and selenium (San Benito County Water District, 2021). The North San Benito GSP describes regional groundwater quality monitoring networks and other programs and activities focused on priority water quality issues.

Local Surface Water Quality

Section 303(d) of the 1972 Federal Clean Water Act requires states to identify water bodies that do not meet water quality objectives and are not supporting their designated beneficial uses. For the Upper Pajaro Watershed, several surface water bodies have been included on the State's 303(d) list as impaired. Impaired water bodies are shown in Figure 2-16 and their impairments are listed in Table 2-3. The sections below describe the currently impaired water bodies, their currently implemented water quality improvement programs through Total Maximum Daily Load (TMDL) requirements, and any additional challenges these surface water bodies face. The Upper Pajaro Watershed is largely agricultural with increasing urban land use. Contributors to impairments include agriculture, domestic animals/livestock, natural sources, collection system failure, urban runoff/storm sewers, grazing, habitat modification, highway/road/bridge construction, hydromodification, irrigated crop production, land development, logging road construction/maintenance, resource extraction, and silviculture. The impaired surface water bodies are organized by subwatershed and several may be included in a current TMDL for the entire watershed.

Table 2-3: Water Body Impairments in the Upper Pajaro Watershed

Water Body	Pollutants Listed		
Carnadero Creek (Uvas Creek below Bloomfield Road)	· Escherichia coli (E. coli) · Imidacloprid	· Nitrate · Oxygen, Dissolved	· Toxicity · Turbidity
Chesbro Reservoir	· DDT (Dichlorodiphenyl-trichloroethane)	· Mercury	
Furlong Creek	· E. coli · Fecal Coliform · Imidacloprid	· Nitrate · Selenium	· Toxicity · Turbidity
Llagas Creek (above Chesbro Reservoir)	· pH	· Temperature	
Llagas Creek (below Chesbro Reservoir	· Benthic Community Effects · Chloride · Chlorpyrifos · Copper · E. coli	· Manganese · Nitrate · Oxygen, Dissolved · Sedimentation/Siltation · Selenium	· Sodium · Specific Conductivity · Total Dissolved Solids · Toxicity · Turbidity
Millers Canal	· Arsenic · Chlorophyll-a · Nitrate	· Oxygen, Dissolved · pH · Selenium	· Temperature · Toxicity · Turbidity
Pacheco Creek	· Oxygen, dissolved	· Turbidity	
Pajaro River	· Benthic Community Effects · Boron · Chlordane · Chloride · Chlorpyrifos · Chromium · DDD (Dichlorodiphenyl-dichloroethane) · DDE (Dichlorodiphenyl-dichloroethylene)	· DDT · Dieldrin · Escherichia coli · Imidacloprid · Manganese · Nickel · Nitrate · Oxyfluorfen · Oxygen, Dissolved	· PCBs (Polychlorinated biphenyls) · pH · Sedimentation/Siltation · Selenium · Sodium · Toxicity · Turbidity
Uvas Creek (above Uvas Reservoir)	· pH	· Temperature	
Uvas Creek (below Uvas Reservoir)	· Oxygen, dissolved	· Turbidity	
Uvas Reservoir	· Mercury		

Pacheco Creek Subwatershed

Pacheco Creek is listed on the State's 303(d) list of impaired waterbodies as impaired by turbidity and low dissolved oxygen. No TMDL has yet been established for turbidity, but dissolved oxygen is included under the Pajaro River Watershed Nutrient TMDL for Pacheco Creek. Fecal coliform was originally listed as an impairment for Pacheco Creek but was delisted due to applicable water quality standards being attained through the Pajaro River Watershed Fecal Coliform TMDL and changes in water quality standards (State Water Resources Control Board, 2022).

Pajaro River Subwatershed

Pajaro River has several listed impairments and crosses through multiple jurisdictions land uses (State Water Resources Control Board, 2022). It is the main stem that receives water from upstream tributaries (Pacheco Creek, Llagas Creek, and Uvas-Carnadero subwatersheds) and discharges to Monterey Bay. This subwatershed is largely agricultural with increasing urban land use. Only five of the 23 listed impairments (chlorpyrifos, nitrate, low dissolved oxygen (DO), sedimentation/siltation, and toxicity) have a source analysis available. Four TMDLs have been created for the entirety of the Pajaro River Watershed to guide water quality improvement programs for the Pajaro River that will address the five listed impairments. The Pajaro River Watershed TMDLs include Chlorpyrifos & Diazinon, Nutrients, Sediment, and Fecal Coliform. The remaining impairments are scheduled to have specific TMDLs developed over the next several years (State Water Resources Control Board, 2022).

Llagas Creek Subwatershed

There are two 303(d)-listed creeks and one reservoir within the Llagas Creek subwatershed – Furlong Creek, Llagas Creek and Chesbro Reservoir (State Water Resources Control Board, 2022). Furlong Creek is a tributary that joins Llagas Creek before the Pajaro River confluence. It has several listed impairments including fecal coliform and nitrate. Furlong Creek and these two impairments are addressed under the Pajaro River Watershed Fecal Coliform and Nutrient TMDLs. Several of the other listed impairments are similar to the lower portion of Llagas Creek (State Water Resources Control Board, 2022).

The impairments for Llagas Creek are separated by the Chesbro Reservoir (above and below). The reach of Llagas Creek above Chesbro Reservoir is listed as impaired by temperature and pH, for which no TMDLs have been developed. Chesbro Reservoir is currently listed for Mercury in Largemouth Bass and is one of 131 mercury-impaired reservoirs that will be addressed by the Statewide mercury control program for mercury. The reservoir is also listed for DDT (Dichlorodiphenyltrichloroethane), but there is currently no TMDL for DDT since its manufacture and use has been banned for many years. Llagas Creek below Chesbro Reservoir has several impairment listings, six of which (chlorpyrifos, E. coli, nitrate, low DO, sedimentation/siltation, and toxicity) are covered by the four TMDLs within the Pajaro River Watershed (State Water Resources Control Board, 2022).

Uvas Canyon County Park. Photo: Valley Water

Uvas-Carnadero Creek Subwatershed

There are two 303(d) listed creeks and one reservoir within the Uvas-Carnadero subwatershed – Uvas Creek, Carnadero Creek, and Uvas Reservoir (State Water Resources Control Board, 2022). The impairments for Uvas Creek are separated by the Uvas Reservoir (above and below). The reach of Uvas Creek above Uvas Reservoir is listed for temperature and pH, with no currently developed TMDLs. Uvas Reservoir is listed for Mercury in Largemouth Bass and is also one of 131 mercury-impaired reservoirs that will be addressed by the Statewide mercury control program for mercury. As such, there is no individual TMDL developed for the mercury impairment in this reservoir. Uvas Creek below the reservoir is listed for two water quality impairments (low DO and turbidity). The low dissolved oxygen is covered under the Pajaro River Watershed Nutrient TMDL. There is no current TMDL for turbidity, but likely sources are agricultural practices in the more rural reaches and urban runoff in the more urban reaches. While Uvas Creek is not listed as impaired for fecal coliform, it is covered under the current Pajaro River Watershed Fecal Coliform TMDL because it feeds into Carnadero Creek (State Water Resources Control Board, 2022).

Carnadero Creek is fed from Uvas Creek upstream before the Pajaro River confluence. It is listed for several impairments, three of which (E. Coli, nitrate, and low DO) are covered by two Pajaro River Watershed TMDLs (State Water Resources Control Board, 2022). Uvas creek (below the reservoir) and Carnadero Creek share two impairments: low DO and turbidity. The associated Pajaro River Watershed TMDLs include Nutrients and Fecal Coliform. Carnadero Creek was delisted for fecal coliform impairment due to applicable WQS attainment through the TMDL and due to changes in the WQS. Responsible agencies listed in the TMDLs are required to implement water quality improvement programs to attain load allocations (State Water Resources Control Board, 2022).

Imported Water Quality

The water quality of water supplies sourced from the CVP is influenced by various natural and human factors, such as climate, hydrology, geology, land use, and water management. CVP water used for groundwater recharge in the Upper Pajaro Watershed comes from San Luis Reservoir, which has historically been a reliable, high quality water source. However, low water levels in the reservoir during drought conditions have resulted in raw water quality challenges in the past. Such low level events have been associated with elevated turbidity, taste and odor (T&O) compounds, algal toxins, and manganese.

2.5.2 *Future Conditions, Challenges, and Opportunities*

Challenges

Agricultural Runoff

Agricultural runoff is a persistent stressor on water quality in the Watershed. Valley Water's role in addressing agricultural runoff is limited; however, it can support efforts led by organizations such as the Resource Conservation Districts, Natural Resource Conservation Service, the Santa Clara County Division of Agriculture, and the Central Coast Regional Water Quality Control Board (Water Board) to reduce pollution from agricultural runoff. There are ongoing opportunities to educate and assist farmers and landowners in implementing land management practices to improve water quality and enhance natural resources. Several TMDLs (Nutrients, Sediment, Fecal Coliform) could potentially help meet this with partnership between municipal agencies and local farmlands.

Urban Runoff

Stormwater runoff is a key pathway contributing to pollutants in the Upper Pajaro River watershed. In particular, non-point source pollution from urban runoff can raise water temperatures, reduce biological conditions, scour channels, and mobilize various pollutants (e.g., trash, pesticides, sediment, PCBs, nutrients, pathogens, contaminants of emerging concern). Increasing temperatures due to climate change may increase the warming effects of urban runoff, reducing the potential for streams to support sensitive organisms such as steelhead. Continued sediment toxicity from new pesticides continues to be a challenge to control at the watershed level as regulation and use is controlled by the California Department of Pesticide Regulation (DPR). Hydrograph management also is a challenge for water quality in the urban reaches, especially related to sedimentation and erosion, however stormwater regulations have been adopted and implemented to minimize future effects.

Unsheltered Populations

Unhoused encampments are a challenge throughout the County and have a major impact on the amount of trash, erosion, and human pathogens entering waterways, including Uvas and Llagas Creeks. Joint agency homeless encampment cleanups and supportive services programs are expanding, but often cannot keep up with this significant societal issue.

Sediment Loads and Bacteria

Addressing erosion and sedimentation due to expanding areas of new urban development and agriculture is a continued challenge. However, there are potential opportunities to control erosion and sedimentation from urban development and potentially from agriculture lands through implementation of green stormwater infrastructure. Continued partnership with the Cities of Gilroy and Morgan Hill and Santa Clara County will also be necessary to identify opportunities and actions to reduce bacteria and sediment loads within Llagas and Uvas Creeks.

Imported Water Challenges

Climate change and future regulations are expected to pose significant challenges to the operations of the SWP and CVP. Climate change will impact water supply availability and water quality as droughts become more severe and as temperatures warm. Future regulations, such as those associated with the Bay Delta Plan, aim to improve the ecological health of the imported water watersheds. However, those regulations may also result in a decreased availability of imported supplies since more water will be released for environmental protection.

Opportunities

Water Quality Monitoring

Surface water quality metric assessments in this report are primarily reliant on the last 10 years of data from the State's Surface Water Ambient Monitoring Program (SWAMP). The SWAMP uses limited State resources to monitor water bodies throughout the state. Consequently, available water quality data for the watershed are limited and challenging to use at a programmatic level. Development of a more comprehensive water quality monitoring program is an opportunity to close critical data gaps and provide greater confidence in watershed or water body scale surface water quality assessments to track progress toward attainment of water quality standards. Monitoring activities could include quarterly surface and depth profiles for general water quality, seasonal sampling for algal toxins, and periodic fish monitoring for mercury and other contaminants (e.g., nutrients, metals, pesticides, etc.).

Rainbow Trout. Photo: Valley Water

Volunteer Trash Cleanup. Photo: Valley Water

Green Stormwater Infrastructure

Erosion, sedimentation, and bacterial contamination issues stemming from urban development and agricultural activities present a continual challenge in the Upper Pajaro watershed. There are opportunities to implement the South Santa Clara County Stormwater Resources Plan and include regional green stormwater infrastructure projects, which can support water quality improvements by treating stormwater before it enters waterways, in collaboration with local municipalities. Significant progress has been made in the past several years to implement green stormwater infrastructure in an individual project/parcel-based manner. Larger "regional" green infrastructure projects in partnership with municipalities could result in significantly more water quality and other benefits at a much lower overall project lifetime cost. Implementing such projects will likely involve cooperation between multiple agencies.

Trash and Illegal Dumping

There are numerous areas in creeks throughout the Watershed that experience recurring illegal dumping and accumulation of trash. Partnerships with the Cities of Gilroy and Morgan Hill and Santa Clara County represent an opportunity to reduce and prevent trash dumping. In urban areas, multi-benefit projects that incorporate trash capture devices offer promising solutions to address trash pollution.

2.6 FLOOD RISK

2.6.1 *Valley Water Flood Management*

As the primary agency with authority to provide flood protection in the County, Valley Water manages flood risk in partnership with local, state, and federal agencies. Valley Water manages this risk in three keyways: 1) communicating risk to the community through regular communications, preparedness, forecasting, and emergency action plans; 2) maintaining existing infrastructure; and 3) building new flood protection facilities to reduce flood risk.

Flood Communication and Preparedness

Valley Water partners with municipalities and the County to provide education and information to the public on the risks of flooding, to issue flood warnings, and to coordinate emergency responses during flood events. Valley Water has developed and continues to update a real time, web-based flood warning system for flooding hot-spots within Santa Clara County, including the Upper Pajaro Watershed. This system helps emergency managers understand immediate flood risks and it provides the public with flood prediction maps based on real time rainfall forecasting and radar data.

The Community Rating System (CRS) is a voluntary program created under the National Flood Insurance Program (NFIP) to reduce flood damages through nonstructural activities such as increasing public awareness and preparing for flood emergencies. CRS points earned by Valley Water can be used by any participating community in the County to lower flood insurance premiums via the CRS scoring and rating system. Currently, the communities within the Upper Pajaro Watershed that participate in the CRS program are the cities of Morgan Hill and Gilroy and each has a CRS rating of seven, allowing residents to receive a 15% discount on flood insurance (FEMA, 2023).

Maintaining Existing Flood Protection Infrastructure

Valley Water work crews maintain stream capacity across Santa Clara County to safely convey water during storm events. This critical flood protection work is primarily implemented through the Stream Maintenance Program (SMP). Valley Water is generally allowed to perform regular maintenance of the creeks in the Upper Pajaro watershed only along reaches that it owns or for which it has easements. The program focuses on streams that have been improved with engineered flood protection projects to provide continued flood protection for homes and businesses. SMP work performed on natural streams without a completed flood project is limited due to potential negative impacts to natural habitat.

There are several additional programs within Valley Water to manage its infrastructure and maintain the level of service originally intended: The Safe Clean Water and Natural Flood Protection F8 program (Sustainable Creek Infrastructure for Continued Public Safety) assesses and prioritizes existing creek and watershed infrastructure, prepares watershed asset management plans, and implements the recommendations provided in the asset management plans. The Watershed Asset Rehabilitation Program (WARP) provides stream maintenance work for projects outside the scope of SMP.

Figure 2-18 shows the existing flood protection infrastructure in the Upper Pajaro watershed, and distinguishes constructed channels with concrete structures and earthen channels. The earthen channels may be a reach where the natural channel is expanded, earthen trapezoidal shaped reach, or a reach with earthen levees. The map shows that the majority of Llagas Creek, East Little Llagas Creek, and West Little Llagas Creek have some kind of flood protection provided along the channel and Uvas Creek has levees built along a highly urbanized reach of the creek. There is not much flood protection infrastructure built along the rest of the channels in the watershed.

PAJARO RIVER WATERSHED FLOOD PREVENTION AUTHORITY

The Pajaro River Watershed Flood Prevention Authority (Authority) was established in July 2000 by State Assembly Bill 807 in order to "identify, evaluate, fund, and implement flood prevention and control strategies in the Pajaro River Watershed, on an intergovernmental basis. The Authority acts as a governing body through which each member organization can participate and contribute to finding a method to provide flood protection in the watershed and promote general watershed interests.

The Authority's Board is comprised of one representative from each of the eight following agencies:

- County of Monterey
- County of San Benito
- County of Santa Clara
- County of Santa Cruz
- Monterey County Water Resources Agency
- San Benito County Water District
- Santa Clara Valley Water District
- Santa Cruz County Flood Control and Water Conservation District, Zone 7

Information from https://pajaroriverwatershed.org/

2.6.2 Past Conditions: Historical Flooding & Existing Flood Protection Infrastructure

Between 1952 and 2023, there were 14 years with recorded flood events within the Pajaro Watershed[3]: 1952, 1955, 1958, 1963, 1980, 1982, 1983, 1993, 1995, 1997, 1998, 2009, 2017, and 2023. Figure 2-18 shows the footprint of all the documented historical flooding in the Upper Pajaro watershed since 1952. As discussed above, there have been flood protection projects built since the 1950s that have reduced the flood risk. Figure 2-17 shows photos of recent flooding in the watershed. The first is a photo of flooding in Downtown Morgan Hill due to the banks of West Little Llagas Creek overtopping during a storm in October 2009. Morgan Hill has flooded many times in the past and there is currently a project in construction to provide 100-year protection along West Branch Llagas Creek. The second photo is of flooding along Highway 101 in Gilroy stemming from Uvas-Carnadero Creek during a storm in March 2023.

Relative to other watersheds in the County, the Upper Pajaro watershed is less densely populated, with significant agricultural, ranching and open space areas. As such, fewer flood protection projects have been completed. Figure 2-18 also shows the existing flood protection infrastructure within the Pajaro Watershed. Although there has been some significant work (completed and ongoing) along much of Llagas Creek, the majority of flood protection is only provided to the 10-year event.

The ponding of flood waters that occurs during significant storm events in the lower portion of the Upper Pajaro Watershed is referred to as the Soap Lake floodplain (Soap Lake). The ponding is caused by the limited capacities of the channels around the confluences of Uvas-Carnadero and Llagas creeks with Pajaro River, as well as the flows from Pacheco Creek via San Felipe Lake. Soap Lake acts as a natural detention basin in the Upper Pajaro watershed, reducing peak flows that would otherwise increase flooding in the lower portion of the Pajaro River watershed in the counties of Santa Cruz and Monterey. There are also significant ecological benefit to the naturally occurring Soap Lake.

Construction of the Upper Llagas Creek Flood Protection Project began in 2022 and is scheduled to be completed in 2027. For the purposes of this watershed plan, the project is assumed to be completed and therefore post-project conditions are considered to be existing/present conditions. 100-year protection is being provided in the urban area of Morgan Hill with the project widening 3 miles of West Little Llagas Creek, from Watsonville Road to Llagas Road. A 1.5-mile-long bypass will also connect West Little Llagas Creek at Watsonville Road to Llagas Creek at Monterey Road. 10-year protection is being provided in the rural/agricultural areas of San Martin and Gilroy with channel modifications along 3.4 miles of East Little Llagas Creek, from Upper Llagas Creek to Corralitos Creek, and 5.8 miles of Upper Llagas Creek, from Buena Vista Avenue to Monterey Road.

The Pajaro River Watershed Flood Prevention Authority (PRWFPA) was established in 2000 in order to identify, evaluate, fund, and implement flood reduction strategies in the Pajaro River watershed. In addition to flood protection, other benefits PRWFPA works to provide include water supply, groundwater recharge, support of rare or endangered species, preservation of wildlife habitat, and water quality. PRWFPA is implementing the Soap Lake Floodplain Preservation Project with the goal to protect approximately 9,100 acres of agricultural lands, the approximate area inundated by the 100-year flood flows. The project is designed to preserve the natural floodplain characteristics and flood storage capacity through the acquisition of land and flood conservation easements.

https://www.pajaroriverwatershed.org/

In addition to the Upper Llagas Creek Flood Protection Project, levees were built along Uvas Creek, Lower Llagas Creek, and Lions Creek in the 1970s and 1980s. This includes 2.2 miles of levees along Uvas Creek from Santa Teresa Blvd. to downstream of Luchessa Avenue, 7 miles of levees along Lower Llagas Creek from the confluence with Pajaro River up to the West Branch Llagas confluence, 1 mile of levees along West Branch Llagas Creek from the confluence with Llagas Creek up to Highway 101, and 0.7 miles of levees along Lion Creek from the confluence with West Branch Llagas Creek to Kern Avenue.

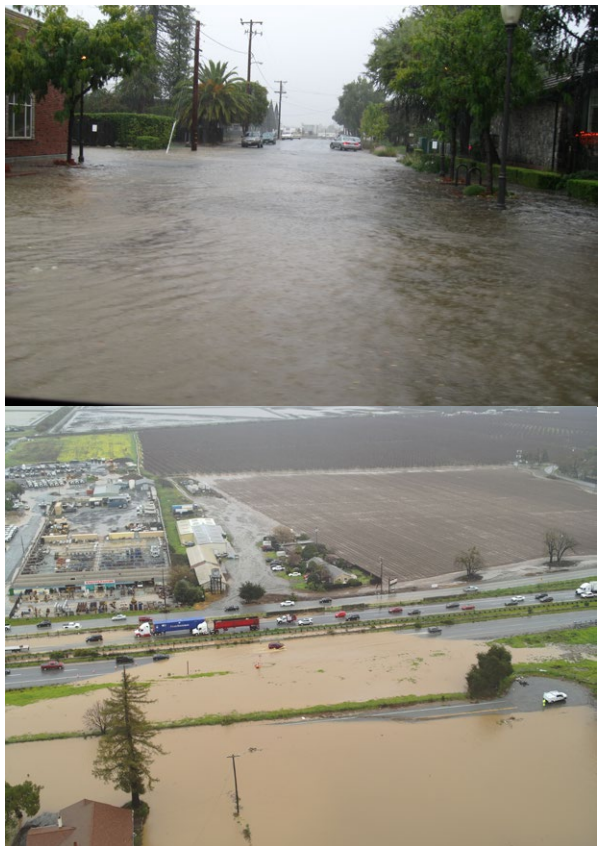
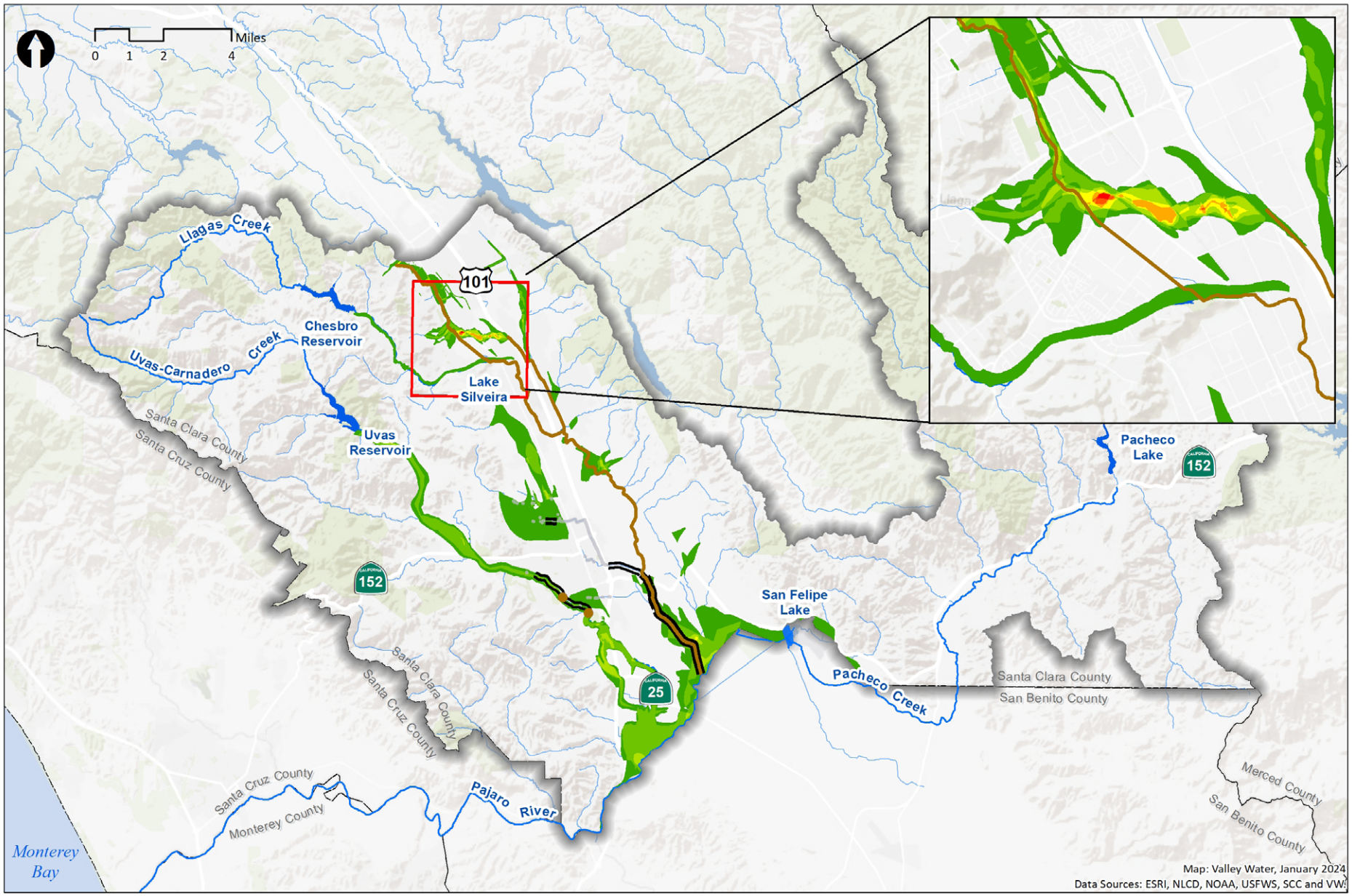


Figure 2-17: Flooding in Morgan Hill – October 2009 (above). Photo: Anthony Eulo, City of Morgan Hill

Uvas Creek Flooding at Highway 101 – March 2023 (below). Photo: Valley Water

[3] Historical flood reports available at https://www.valleywater.org/flooding-safety/flood-ready/historical-flood-reports



Number of Flood Events Mapped Since 1952

1 2 3 4 5 6 7

Flood Protection Channel Type

Concrete
Earthen
SMP Levees

Water Bodies
Creeks

Upper Pajaro Watershed
Historical Flooding and Existing Flood Protection Infrastructure

Valley Water

Figure 2-18: Upper Pajaro Watershed Flood Protection Infrastructure and Historical Flooding

2.6.3 *Present Conditions: Existing Flood Risk & Vulnerability*

The One Water Flood Vulnerability Assessment methodology focuses on health and safety during frequent flooding events, using the 25-year storm event as the basis for assessing flood risk. Figure 2-19 shows the extents of the estimated 25-year flooding in the Upper Pajaro watershed. Historically, there were an estimated 8,900 parcels in the 25-year floodplain, decreasing to approximately 6,000 parcels as a result of flood protection projects. There is a low-level countywide flood risk analysis with results shown in light blue; the vulnerability assessment is shown for the creeks with more detailed hydraulic and flood risk analysis: Upper Llagas Creek and Uvas-Carnadero Creek.

What we mean when we say...

25-year flood event (4% flood event): A flood that has a 4 percent chance of occurring in any given year.

100-year flood event (1% flood event): A flood that has a 1 percent chance of occurring in any given year.

Flood Vulnerability Assessment Results

There are an estimated 2,160 acres and 777 parcels within the 25-year floodplain of Upper Llagas, West Little Llagas, and East little Llagas Creeks and another 2,200 acres and 166 parcels within the Uvas-Carnadero 25-year floodplain. Figure 2-19 shows the flood vulnerability assessment results with low- to high-risk areas. Refer to the Watershed Setting Report for additional information about the Flood Vulnerability Assessment Results.

The following sections focus on Upper Llagas Creek and Uvas Creek, where detailed flood risk analysis for a 25-year storm event has been completed using the new methodology.

Llagas Creek Subwatershed

Under a 25-year flood event scenario and accounting for the post-project conditions of the Upper Llagas Creek Flood Protection Project, West Little Llagas Creek would flood along both banks west of Highway 101 from Watsonville Road to the confluence with Madrone Channel outside of Morgan Hill. These flood flows would travel south for about 3 miles along the floodplain between Upper Llagas Creek and Highway 101, eventually flowing into Upper Llagas Creek. There is a disadvantaged community adjacent to West Little Llagas Creek for whom the impacts of flooding would be greater. This is a rural community with mostly agricultural land and some residential and commercial buildings. East Little Llagas and Corralitos Creeks would flood on the eastside of Highway 101 north of San Martin Avenue causing some ponding of flood waters in that area.

Downstream of Masten Avenue, Upper Llagas Creek would overflow along both banks from Buena Vista Avenue up to the confluence with East Little Llagas Creek. The flooding to the east of Llagas Creek travels south adjacent to the creek channel, with flood flows re-entering the creek upstream of Buena Vista Avenue. The flooding on the west side of the channel would continue flowing south along the floodplain for about 4 miles between the creek and Highway 101. A significant portion of the modeled flood area lies in a disadvantaged community south of Buena Vista Avenue, although the area is primarily farmland with few buildings and structures.

Uvas-Carnadero Creek Subwatershed

Uvas-Carnadero Creek would flood in some areas from just downstream of Luchessa Avenue in Gilroy to the confluence with Pajaro River. The potential flooding from Luchessa Avenue to Highway 101 is the most impactful. The flooding to the east would flood over Highway 101, which closed in this area as recently as 2023 due to flooding from two high flow events, and continue east all the way to the banks of Lower Llagas Creek where ponding would occur. These flood flows would potentially impact the South County Regional Wastewater Authority (SCRWA) treatment plan. The estimated overtopping of the west side of the channel would travel south along the floodplain for about 3.5 miles, causing flooding of Highway 101 and State Route (SR) 25 and structures near the Highway 101/SR-25 intersection. There would be some minor flooding From Highway 101 to SR-25 along Uvas Creek. The capacity of the channel is limited downstream of SR-25 causing major flooding downstream to the Pajaro River confluence. This downstream flooding contributes to the flooding of the Soap Lake floodplain, as described in section 2.6.2. The majority of the potential flooding from Uvas Creek is within a disadvantaged community, primarily comprised of farmlands.

Flood Vulnerability Assessment

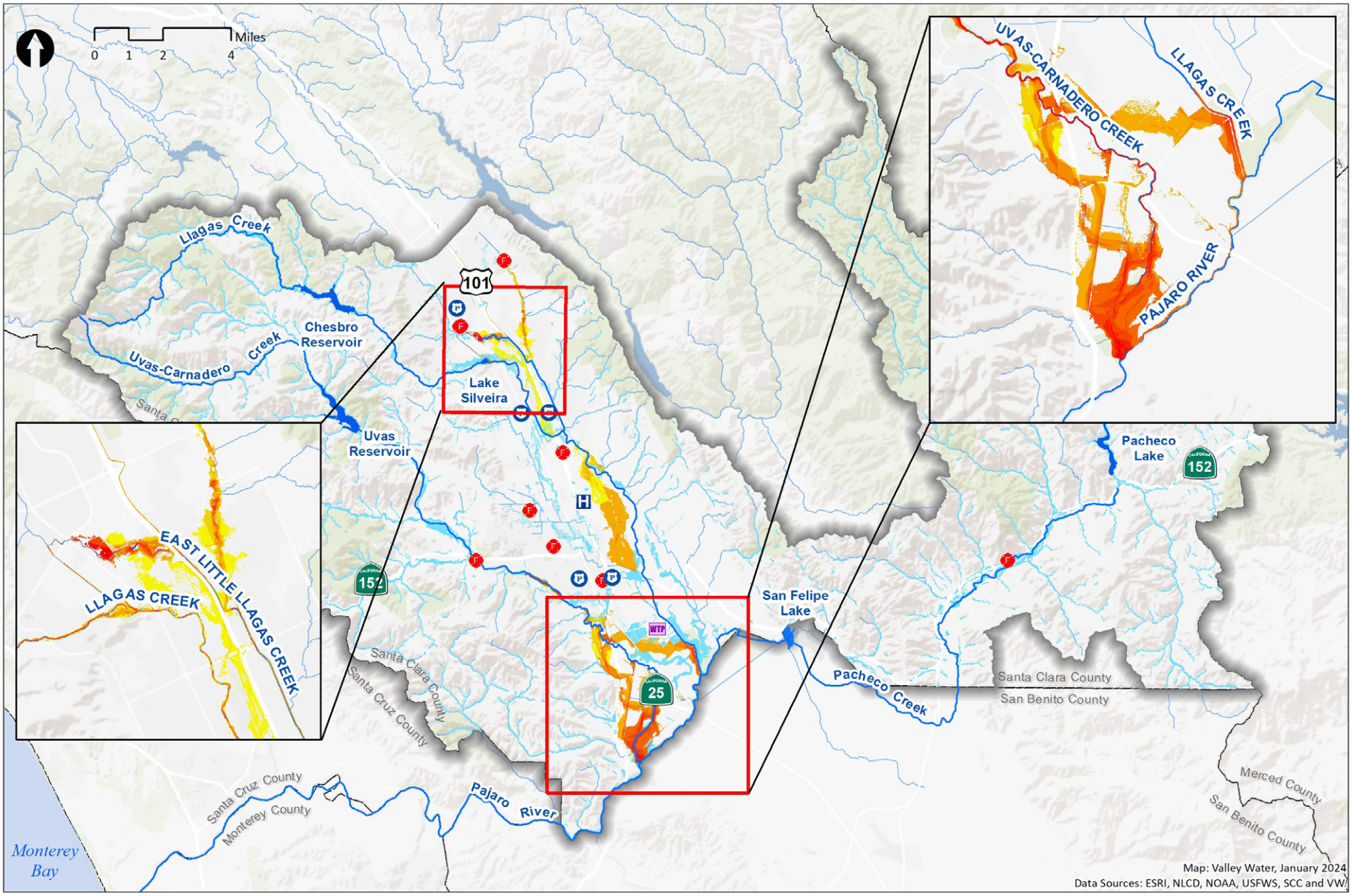
Traditionally, the goal of flood risk reduction has been to reduce the size of the FEMA 100-year floodplain and prioritized costs and economic damage, which would lead to emphasis on protecting affluent areas due to higher property values. With the new Flood Vulnerability Assessment, the focus is on more frequently occurring flood events (25-year), deep and/or fast-moving floodwaters, and social vulnerability where residents are more susceptible to flooding.

Valley Water's Flood Vulnerability Assessment combines physical and statistical hazards and considers socioeconomic conditions to create a holistic assessment of flood vulnerability in the County. Physical hazards in this analysis include flood depths and velocities and locations of critical facilities. Flood depths and velocities were modeled using the U.S. Army Corps of Engineers HEC-RAS software and combined to assess physical hazards to people and structures. Combined depth and velocity values were weighted on a scale based on severity. Critical facilities including hospitals, police stations, and fire stations, were also mapped.

This analysis also incorporated statistical hazards to address areas with continual flood issues. Statistical flood data included historic flood events since 1952 and known problem areas referred to as Flood Hot Spots by Valley Water's Flood Information Team.

Finally, socioeconomic conditions were included to account for an area's ability to access resources and recover from a flood event. The datasets for socioeconomic conditions were CalEnviroScreen 4.0, an environmental health mapping tool created by the Office of Environmental Health Hazard Assessment within the California Environmental Protection Agency, and Area Median Income. CalEnviroScreen incorporates data for various pollution sources, adverse health conditions, educational attainment, housing burden, and other characteristics to produce scores for all census tracts and identify disproportionately impacted communities. Locations with 80% or less of the Area Median Income were mapped as low income.

Physical hazards, statistical flooding, and socioeconomic conditions were given points and then combined to create a ranked hazard map. Areas with the most points contained the highest combined hazard physically, statistically, and socially. The hazard map then displays this ranking by color, with reds and dark oranges indicating a higher flood vulnerability and risk than light orange or yellow.



Critical Facilities
- Police Stations
- Hospitals
- Fire Stations
- Wastewater Treatment Plants

Water Bodies
Creeks

Risk/Vulnerability* High Risk – Low Risk

25-yr Flooding** Flood Limits

*Considering only Llagas and Uvas Creeks flooding
**Considering all channels in watershed (High Level Estimate)

Upper Pajaro Watershed

25 Year Flood Vulnerability Assessment

Valley Water

Figure 2-19: 25-year Flood Risk & Vulnerability Assessment

2.6.4 Future Conditions, Challenges, and Opportunities

Challenges

Data Gaps

Pajaro Watershed is the least studied watershed in Santa Clara County with regard to flood risk. Hydraulic and flood risk analyses are currently being prepared for West Branch Llagas Creek and its tributaries, as well as Lower Llagas Creek and Jones Creek. These results will be included in future updates to this plan and will provide a more complete assessment of flood risk throughout the Upper Pajaro Watershed. Other areas that need detailed hydraulic and flood risk analysis include Pacheco Creek and its tributaries, Uvas-Carnadero Creek (upstream of Santa Teresa Blvd) and its tributaries, Pajaro River, and a series of eastside tributaries leading from the foot of the Diablo Mountain range to Llagas Creek and East Little Llagas Creek.

Limited Creek Corridor Right of Way and Access

Valley Water has the right to maintain or modify reaches of creeks that it owns or for which it has an easement. Where Valley Water lacks ownership or easement, often staff cannot access these creeks to assess and maintain their capacity.

Historically, urbanization in the Pajaro Watershed led to the development of land within natural floodplains and in many cases, immediately adjacent to creek banks. These land use patterns physically confine creeks to a narrow corridor, separates the creek from its natural floodplain, and leaves little, if any, space to construct flood protection infrastructure. Re-establishing more natural hydrology and hydraulics in these areas would require expensive and logistically challenging real estate acquisitions, since the creek corridors are already narrow. This necessitates the consideration of alternative approaches to flood protection.

Climate Change

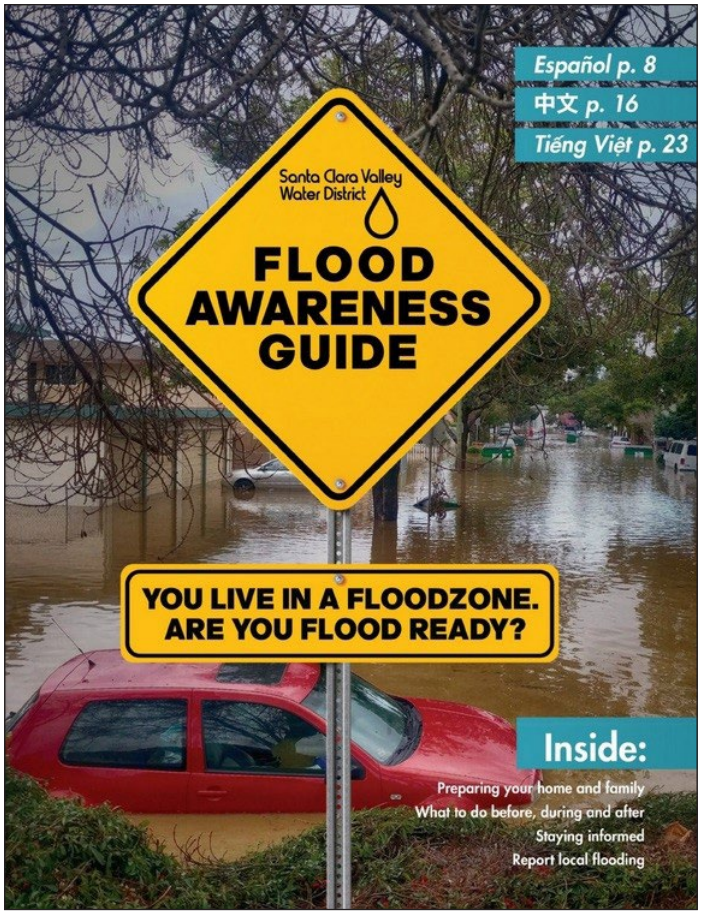
The future is likely to be quite different from the past because of climate change, with most models predicting more intense, but possibly less frequent, rainstorms in Santa Clara County. Climate change requires a new approach in planning for flood protection of the future. Additionally, if hydrologic conditions change from those assumed in design, previously constructed projects may not provide their specified level of protection.

Aging Infrastructure

Some of the flood protection infrastructure in the watershed is approaching its design life of 50+ years. Rehabilitation may become a significant need in the near-term due to higher probability of failure as the infrastructure ages and requires more frequent maintenance. The existing infrastructure that is of concern are the levees along Lower Llagas Creek and Uvas-Carnadero Creek.

Communication

Significant portions of Upper Pajaro Watershed support farmland and the workers that tend and harvest crops, some of which are migrant workers. Although Valley Water has existing programs to communicate flood risk to communities throughout Santa Clara County; language barriers, access to technology, and mobility present challenges to effectively communicate an impending flood threat.



Flood Awareness Guide. Photo: Valley Water

Opportunities

Promoting Environmentally Friendly Development

In looking at reducing flood risk holistically in the watershed, there is an opportunity to promote land development techniques, such as promoting building structures outside of the floodplain and Low Impact Development (LID), that support flood risk reduction. These techniques can reduce the flood risk while supporting improved water quality.

Asset Rehabilitation

Rehabilitation of capital projects can create opportunities to redesign older, hardscaped systems and replace them with more environmentally friendly systems. New and strategic partnerships could provide financial opportunities, ecological or geomorphic improvements, and increased community support. Rehabilitating hardscaped channels into systems that emulate natural conditions is consistent with Valley Water's overall goal to provide natural flood protection.

Flood Detention

Flood detention facilities could be used to expand flood storage capacity and reduce peak flows downstream by temporarily storing flood waters in basins of various types and sizes. In the absence of flood conditions, the detention basins would not be inundated and may serve as parks, recreational sports fields or even parking garages, depending on public interests and needs of the facility's landowner or managing agency. During the flood event, the basin would fill and gradually drain into a nearby creek before returning to its typical condition.

Agricultural Preservation

In addition to providing food and jobs, the conservation of farmland in the valley floor helps control flood levels in the Pajaro River as far downstream as its mouth in the Monterey Bay. Development of this farmland would displace the flood attenuation capacity of the land and create more impervious surface that would increase flows in creek channels. While drainage and development for agriculture has impacted ecological resources in numerous and severe ways in the watershed, it can be managed to support many ecosystem services and is a better neighbor to habitat and wildlife than commercial or residential land uses.

Flood-MAR

Flood-Managed Aquifer Recharge (Flood-MAR) may help reduce flood flows while promoting groundwater recharge and potentially reducing urban stormwater runoff. A Flood-MAR pre-feasibility study identified that capturing hillside runoff onto open space before it reaches roads and storm sewers may be the most feasible approach to Flood-MAR in southern Santa Clara County. Valley Water is continuing studies to assess the feasibility of Flood-MAR in all the watersheds in the county.

Planning Studies for Flood-Vulnerable Areas

The Flood Vulnerability Assessment identified high vulnerability under a 25-year flood event adjacent to Lower Llagas Creek near its confluence with Pajaro River, Uvas Creek in southern Gilroy and near its confluence with Pajaro River, and West Little Llagas Creek in Morgan Hill and San Martin (See Figure 2-19). Flood vulnerability associated with Lower Llagas Creek would be addressed by the Lower Llagas Capacity Restoration Project, which is a potential future Valley Water CIP project. Flood vulnerability associated with Uvas and West Little Llagas Creeks should be addressed by new planning studies to evaluate flood risk reduction alternatives and recommend a final project that can be designed and constructed.

Preservation of Soap Lake Floodplain

The ponding of flood waters in the lower portion of the Upper Pajaro watershed comprise the Soap Lake floodplain. Soap Lake acts as a natural flood detention basin reducing peak flows that would otherwise increase flooding downstream in Monterey and Santa Cruz counties. Due to this flood risk reduction benefit, as well as ecological and water supply benefits, it is important to maintain this natural flood detention. The Soap Lake Floodplain Preservation Project, led by the Pajaro River Watershed Flood Prevention Authority, is designed to preserve the natural floodplain characteristics and flood storage capacity of Soap Lake through the acquisition of land and flood conservation easements.

ADDITIONAL ONLINE RESOURCES

Valley Water Flood Reports:

https://www.valleywater.org/flooding-safety/flood-ready/historical-flood-reports

3

OBJECTIVES, METRICS AND TARGETS

Llagas Creek. Photo Valley Water

CHAPTER 3: OBJECTIVES AND METRICS

INTRODUCTION

The One Water Framework established direction for the five watershed plans that cover the majority of Santa Clara County, including the Upper Pajaro Watershed, the subject of this plan. Framework guidance included a vision, three goals, and five objectives, all aligned with Valley Water's governance policies set by its Board of Directors. This chapter focuses on the objectives, and how they were developed to be science-based, measurable and transparent.

Valley Water also developed and used these metrics to identify watershed resource needs, in terms of gaps in One Water management, and then to highlight priorities for future actions (Chapter 4).

Science-Based Metrics

One Water objectives were developed to be SMART (Specific, Measurable, Achievable, Relevant, Time-Based) wherever possible. This was done by developing attributes, which are key aspects of any one objective, and metrics for those attributes, a measurable component to show status and movement toward a target. Metrics were developed by subject matter experts at Valley Water in alignment with One Water objectives in the fields of water supply, water quality, flood risk reduction, environmental stewardship, and climate change.

Additional scientific expertise was solicited through a Science Advisory Hub in coordination with the San Francisco Estuary Institute/Aquatic Science Center (SFEI). This group included regional experts in hydrology and ecology, who provided input on types of metrics, how to use metrics as indicators of watershed health, and optimal ways to compile and represent data. Valley Water did not collect substantial new data in the field through the One Water planning process.

Transparent Metrics

The metrics chosen to support the five objectives were developed to clearly show current status (baseline) versus a desired end state (target). By establishing a realistic target, Valley Water strives to show how implementing a priority action may raise the bar from a current level toward the target condition. Actions may be implemented by Valley Water but also by anyone working in the watersheds. Therefore, it is important to share data on progress toward targets, and to collaborate with others to monitor and report results as priority actions are carried out. Valley Water is working with SFEI to utilize the EcoAtlas[4] website as a host for this data, which will be reported out by watershed with updates each time the watershed plan is updated.

Metrics to Identify Watershed Needs

A key use of the metrics data illustrated in this chapter is to determine where measurable objectives are not being met. For example, if baseline data showed that conditions are at 50% for one metric when the target is 100%, then there is still 50% of the way to go to meet the target and to see a large improvement in that watershed condition. If another condition showed 90% achievement of the target, then perhaps that area would require less resources at this time. While additional factors may be considered in prioritization of actions, such as readiness, cost, and vulnerability, the degree to which a project meets watershed needs is a key element.

The following pages describe the five One Water objectives, each with attributes, metrics and targets specific to the Upper Pajaro Watershed unless noted otherwise. In addition, a graphical depiction of the degree to which targets have been met to date is included to highlight areas that may need additional resources and/or partner support. Certain metrics that appear in the Countywide Framework have been excluded from this Plan because the Upper Pajaro watershed is not hydrologically connected to the San Francisco Bay and associated tidal wetland ecosystem. The complete list of metrics and targets can be found in the Countywide Framework (Valley Water, 2021).

[4] https://www.ecoatlas.org/

Objective A

Protect and Maintain Water Supplies

This One Water objective is to protect and maintain a reliable water supply that draws on a diverse mix of water sources — groundwater, local rainwater, imported water, and recycled water— to supply diverse needs. The objective also acknowledges an ongoing emphasis on expanding local supply, especially from recycled water and water conservation, as a means of meeting future demands and reducing reliance on imported water.

Objective A is tracked by two attributes and a total of five metrics:

ATTRIBUTES AND METRICS

A.1: Protect, maintain, and develop local surface and ground water supplies

- **A.1.1 - Operational capacity at Valley Water reservoirs.**

  Measures degree to which full operating capacity is restored to Anderson, Almaden, Calero, and Guadalupe Reservoirs[5] through seismic retrofits and other improvements; and reservoirs are safely maintained to ensure Valley Water can maximize its use of local water consistent with its water rights.

  Target: *100% capacity at all reservoirs by 2035.*

- **A.1.2 - Recycled water production.**

  Tracks production of recycled water, which is a local, drought-proof source that reduces demand on potable supplies and reliance on imported water.

  Target: *Recycled water makes up 10% of the county's water supply by 2025*.*

  **Target date will be updated per the Water Supply Master Plan.*

- **A.1.3 - Managed recharge capacity.**

  Measures sufficiency of managed recharge capacity to utilize existing local water rights and available imported supplies, and to ensure sustainable groundwater supplies.

  Target: *Managed recharge capacity of at least 143,500 acre-feet per year in locations supporting sustainable groundwater management objectives.*

- **A.1.4 - End of year groundwater storage.**

  Measures end-of-year groundwater storage, which helps meet annual water supply needs, manage shortages, and avoid undesirable results like subsidence.

  Target: *Total of 300,000 AF: 278,000 AF in the Santa Clara Plain; 5,000 AF in the Coyote Valley; and 17,000 AF in the Llagas Subbasin.*

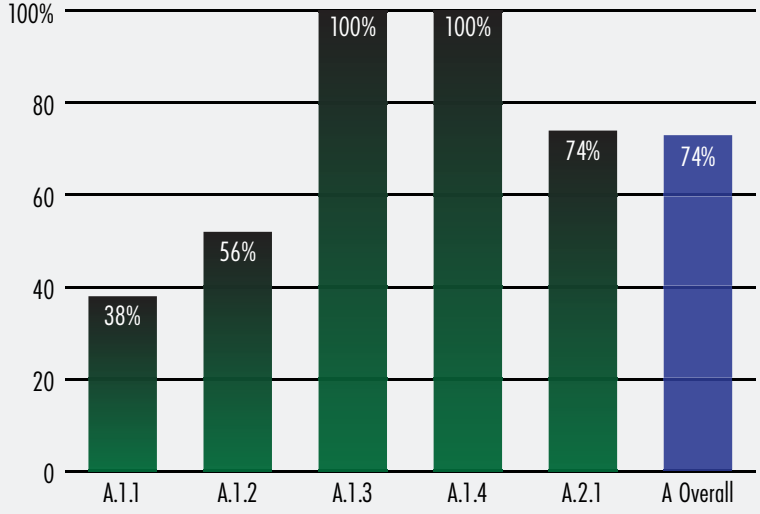
A.2: Support water supply demand management (water use efficiency, water conservation)

- **A.2.1 - Annual water conservation savings.**

  Calculates savings though Valley Water's water conservation efforts, which reduce the need for investments in additional water supplies and infrastructure, against an established baseline.

  Target: *109,000 acre-feet conserved annually by 2040.*

Objective A Metrics - PERCENT COMPLETE



Current degree to which Valley Water activities in the Upper Pajaro Watershed meet One Water metrics and targets (2023).

[5] These reservoirs are not located in the Upper Pajaro watershed and operational capacity is not currently restricted at Uvas or Chesbro Reservoirs. A portion of water supply from Anderson Reservoir is utilized for groundwater recharge in the Llagas subbasin.

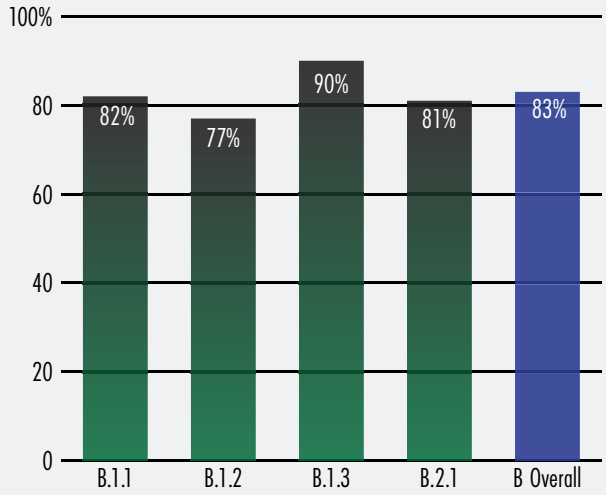
Objective B

Protect and Improve Surface and Ground Water Quality

This One Water objective is to maintain high quality water in creeks and groundwater subbasins. The county needs high quality surface water and groundwater to safeguard human and ecological health and to support many beneficial uses. Valley Water is involved in water quality protection at many scales, ranging from meeting or surpassing regulatory standards for drinking water to preventing pollution and protecting source water, including groundwater.

Objective B is tracked by two attributes and a total of four metrics:

Objective B Metrics - PERCENT COMPLETE



Current degree to which Valley Water activities in the Upper Pajaro Watershed meet One Water metrics and targets (2023).

ATTRIBUTES AND METRICS

B.1: Support high quality surface water in reservoirs for applicable human and aquatic life uses

- **B.1.1 - Chemical integrity (e.g. nutrients, pesticides).**

  Measures chemical integrity of surface waters in order to meet and maintain standards to support aquatic ecosystems and human use.

  Target: *Achievement of applicable water quality objectives and TMDL Targets 100% of the time.*

- **B.1.2 - Biological integrity (e.g. fecal coliform, Chlorophyll a).**

  Measures biological integrity of surface waters in order to meet and maintain standards to support aquatic ecosystems and human use.

  Target: *Achievement of applicable water quality objectives and TMDL Targets 100% of the time.*

- **B.1.3 - Physical integrity (e.g. temperature, pH, dissolved oxygen).**

  Measures physical integrity of surface waters in order to meet and maintain standards to support aquatic ecosystems and human use.

  Target: *Achievement of applicable water quality objectives and TMDL Targets 100% of the time.*

B.2: Protect groundwater from existing and potential contamination

- **B.2.1 - Trends in concentrations of nitrate, chloride and total dissolved solids (TDS) in index wells.**

  Evaluates long-term trends in groundwater quality for nitrate, chloride, and TDS on an annual basis using ten years of data from both water supply and dedicated monitoring wells.

  Target: *For Llagas Subbasin water supply wells, at least 95% meet primary drinking water standards, and at least 90% have stable or decreasing trends for total dissolved solids (TDS).*

The assessments included here contain notable absences of data and generalizations for the watershed were made. Surface water quality data available in the Pajaro River watershed is from various state and regional water quality monitoring programs such as the Surface Water Ambient Monitoring Program (SWAMP), and NPDES Phase II stormwater permit-required monitoring. These data are available through the California Environmental Data Exchange (CEDEN). CEDEN holds data of varying quality, quantity, and age. Programs such as SWAMP are resource-limited, and the data generated tends to be high quality but limited in quantity. Data from NPDES Permit programs tend to address very urban-specific problems, so do not provide a comprehensive picture of water quality either in terms of parameters or geography. In order to comprehensively assess surface water quality at a meaningfully repeating interval for the watershed, a more robust long-term sampling program would be needed.

Objective C
Reduce Flood Risk

This One Water objective is to practice, encourage, and support flood and floodplain management that integrates risk reduction with enhancement of natural creek corridors and floodplain functions. This work begins with maintaining existing facilities and then reducing additional areas with greater flood risk to the community. By promoting managed flooding and natural flood protection, Valley Water can also meet multiple objectives. One Water actions will be developed to not only enhance natural riparian functions, but also to increase infiltration, diversify habitats, manage woody debris, provide life-cycle cues to sensitive species, and move gravel and fine sediment through the system.

Objective C is tracked by three attributes and a total of ten metrics:

ATTRIBUTES AND METRICS

C.1: Maintain Flood Facilities

- **C.1.1.a - Flood protection facilities are inspected, assessed, and documented.**

  Tracks Valley Water facilities to ensure they are properly inspected and assessed based on identified levels of service.

  Target: *100% of levees are inspected and maintained annually.*

- **C.1.1.b - Flood protection facilities are inspected, assessed, and documented.**

  Tracks Valley Water facilities to ensure they are properly inspected and assessed based on identified levels of service - flood protection assets.

  Target: *50% of all flood protection assets are assessed and documented annually.*

- **C.1.2 - Flood protection facilities are maintained to defined levels of protection.**

  Tracks Valley Water facilities to ensure they are properly maintained and protected over time, starting with an identified level of service. This allows for appropriate flood conveyance capacity and structural integrity of stream banks, while minimizing impacts on the environment and protecting habitat values.

  Target: *100% of flood protection facilities have a probability of failure (POF) of 4 or less.*

C.2: Prepare and inform community of flood risks to improve safety and reduce damage

- **C.2.1 - Community Rating System (CRS) participation and rating of communities in Santa Clara County.**

  Maintains a National Flood Insurance Program CRS total point sum for Valley Water's contribution of at least 1500-1999 points, or a Class 7, which equates to a 15% discount in flood insurance rates.

  Target: *Maintains a National Flood Insurance Program CRS total point sum for Valley Water's contribution of at least 1500-1999 points (Class 7).*

- **C.2.2 - Create, maintain, and update Emergency Action Plans (EAPs) that include vulnerable and populations and anticipates higher severity and frequency of climate change impacts.**

  Complete flood management plans/procedures (e.g. EAPs and annexes) based on risk priorities to help inform and protect the community. Target is consistent with Valley Water's Safe, Clean Water Program.

  Target: *Complete 2 flood management plans/ procedures per year, selected by risk priority, for the next 15 years.*

- **C.2.3.a - Have available flood forecast locations on waterways to help predict immediate future flood risks.**

  Forecast points help inform possible future outcomes from storms on both streams and reservoirs. 35 points covers the majority of the most flood prone reaches and all reservoirs. The points should also be operational and not in testing.

  Target: *Achieve at least 35 total operational forecast points.*

- **C.2.3.b - Continuously improve upon weather and precipitation forecasts to more accurately predict possible future flooding impacts.**

  Precipitation forecasts feed into models that output forecasted river flows. An accurate precipitation forecast means an accurate river and reservoir forecast.

  Target: *Improved precipitation forecast skill every year for 15 years, as well as when compared to industry standards.*

- **C.2.4 - Public is informed of potential flood risk.**

  Measures how well the public is informed of potential flood risk in the community, based on community survey. The five-year average is based on an annual community survey conducted by a third party that measures the public's awareness of flood risk.

  Target: *An above-average percentage of members of the public living in a flood zone, compared to the five year average, aware of their flooding risk.*

C.3: Reduce risk of flooding from flows overtopping banks (creek and tidal)

- **C.3.1 - Number of parcels subject to frequent flooding (25-year flood event).**

  Accounts for the potential risk of flood damage to developed parcels, including critical facilities, from more frequent flood events.

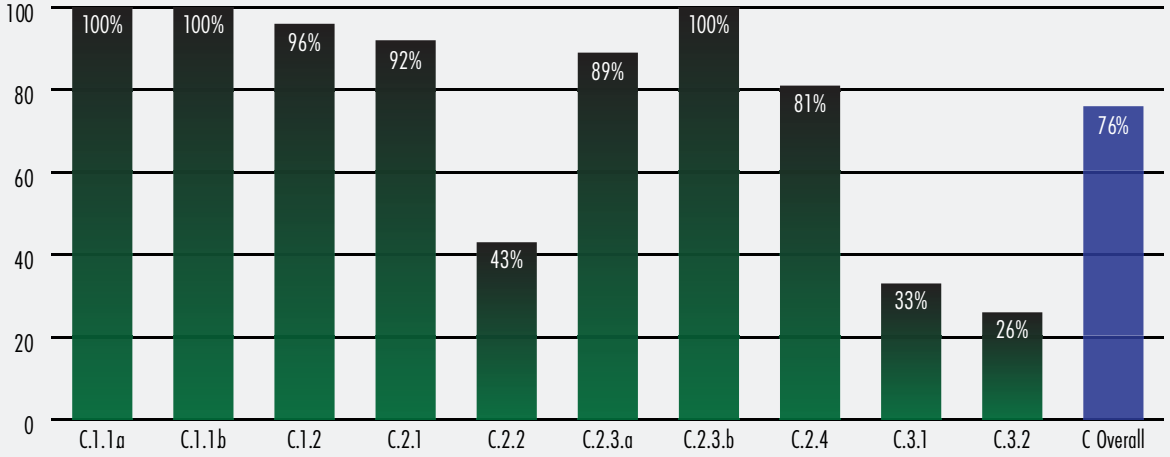
  Target: *Zero developed parcels, subject to flooding from 25-year or lesser flood events.*

- **C.3.2 - Number of parcels in an identified disadvantaged community protected from risk of frequent flooding.**

  Measures the number of parcels subject to frequent flooding, defined as the 25-year flood event, that fall within a disadvantaged community (DAC) designation.

  Target: *Target: Zero parcels located within the 25-year floodplain identified as disadvantaged community subject to frequent flooding.*

Objective C Metrics - PERCENT COMPLETE



Current degree to which Valley Water activities in the Upper Pajaro Watershed meet One Water metrics and targets (2023).

Objective D

Protect, Enhance and Sustain Natural Ecosystems

This One Water objective is to strengthen the resilience of natural environments and resources so they can better withstand the stresses and disturbances brought about by urbanization, drought, climate change, and sea level rise. From an integrated One Water perspective, resilient habitats may occupy the same spaces as areas used for other important water management functions, such as groundwater recharge, flood risk reduction, and water quality protection. Objective D is tracked by two attributes and twelve metrics. Most of the Objective D metrics are focused on the portion of the watershed below 1,000 feet elevation, also referred to as the valley or valley floor, as this is where impacts and stressors on ecological resources are typically most acute.

ATTRIBUTES AND METRICS

D.1: Maintain healthy watersheds

- **D.1.1.a - Miles of stream in good to excellent ecological condition at the watershed scale.**

  Measures the miles of streams that are in good to excellent ecological condition based on California Rapid Assessment Method (CRAM) index scores at the watershed scale using Valley Water's ambient stream condition surveys.

  Target: *Increase the proportion of stream miles that are in good ecological condition to at least 40% over the next 50 years.*

- **D.1.1.b - Miles of stream in good to excellent ecological condition on the Valley floor.**

  Measures the miles of streams below 1,000 ft NAVD88 that are in good to excellent ecological condition based on CRAM index scores using Valley Water's ambient stream condition surveys.

  Target: *Increase the proportion of stream miles that are in good ecological condition to at least 40% over the next 50 years.*

- **D.1.2 - Acres of buffer protected along rivers and their tributaries in the Valley**

  Measures efforts to prioritize, acquire, or otherwise protect near-water lands in the Valley (i.e., below 1,000 ft NAVD88).

  Target: *Achieve 19,300 acres of protected land for the mainstem and tributary channels in the Valley.*

- **D.1.3 - Number of terrestrial wildlife corridor enhancement efforts.**

  Measures the number of improvements for wildlife corridors, crossings and habitat linkages for wildlife movement that are implemented.

  Target: *100% of identified improvements are implemented.*

D.2: Enhance diverse, healthy riverine habitats

- **D.2.1 - Channel length with riparian habitat in the Valley.**

  Measures the miles of mainstem channels, tributary channels, and reservoirs below 1,000 feet elevation with high functioning, multiple benefit riparian corridors.

  Target: *Increase to 392 miles the length of channels and reservoir shorelines with continuous riparian habitat width > 10 m*

- **D.2.2 - Area of natural habitat in the Valley.**

  Indicates acres of natural habitat (wetland, riparian, grassland, woodland, and shrubland) that contributes to habitat connectivity, could be used for wildlife movement, and benefits communities.

  Target: *Achieve 47,000 acres of natural habitat in the Valley.*

- **D.2.3.a - Area of all key non-native and invasive plant communities in the Valley (non-native forest).**

  Indicates extent of non-native, invasive plant communities in the riparian zone along mainstem and tributary channels throughout the Valley.

  Target: *Control non-native forest to 950 acres or 10% of total riparian zone (whichever is lower).*

- **D.2.3.b - Area of non-native and invasive plant communities in the Valley (non-native shrub).**

  Indicates extent of non-native, invasive plant communities in the riparian zone along mainstem and tributary channels throughout the Valley.

  Target: *Control non-native shrubland to less than 1% of total riparian zone*

- **D.2.3.c - Area of non-native and invasive plant communities in the Valley (non-native herbaceous).**

  Indicates extent of non-native, invasive plant communities in the riparian zone along mainstem and tributary channels throughout the Valley.

  Target: *Control non-native herbaceous vegetation to less than 1% of total riparian zone.*

- **D.2.4 - Number of unnatural in-channel barriers that prevent or hinder salmonid movement.**

  Measures number of efforts undertaken to remove or ameliorate unnatural creek barriers that prevent or hinder salmonid migration, which can have a negative effect on their population.

  Target: *80% of identified passage barriers (excluding reservoir dams) are remediated over the next 50 years.*

- **D.2.5 - Instream: Benthic macro invertebrate (BMI) composition.**

  Uses indicator of integrated water quality health and availability of instream forage food.

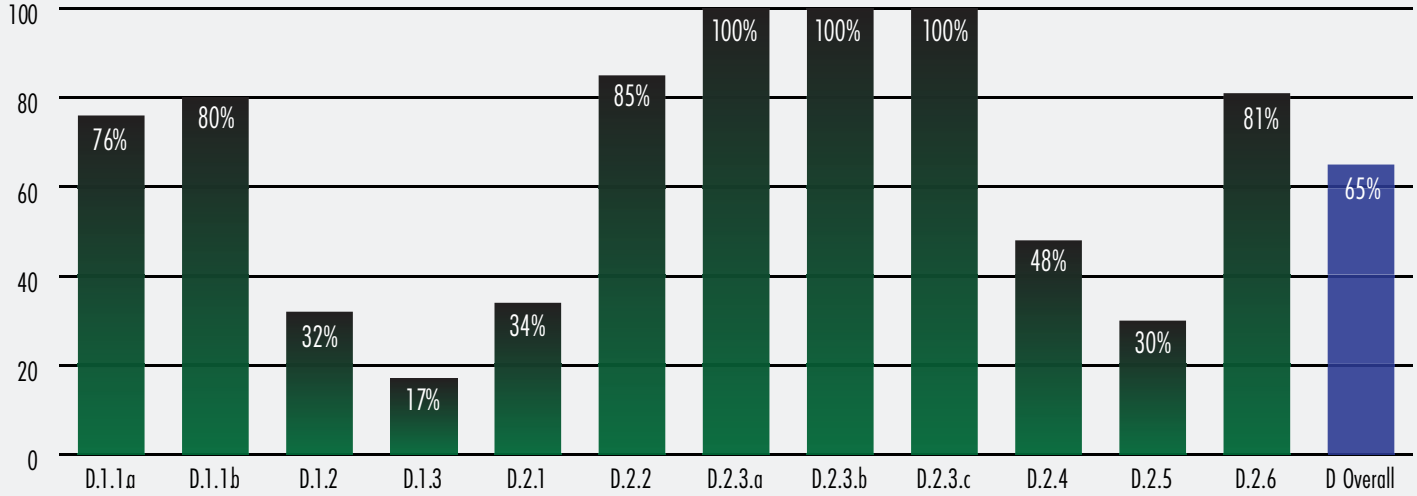
  Target: *Target: 100% of sites have CSCI scores higher than 0.795.*

- **D.2.6 - Stream corridor continuity, and abundance, width, and condition of stream buffer.**

  Uses CRAM sub-metrics to assess stream corridor continuity, breaks in the upstream and downstream riparian corridor and how those breaks might negatively affect the transmission of water and sediment, the shading of the channel, and the stability of the banks.

  Target: *Increase and/or maintain CRAM Buffer and Landscape Context Attribute scores in streams so that 75% of all CRAM assessments (at the site level) achieve Buffer and Landscape Context scores >75.00 over the next 50 years.*

Objective D Metrics - PERCENT COMPLETE



Current degree to which Valley Water activities in the Upper Pajaro Watershed meet One Water metrics and targets (2023).

Objective E

Mitigate and Adapt to Climate Change

This One Water objective is to prepare for and adapt to global warming and climate change effects that include temperature increases, precipitation changes, weather extremes, and sea level rise. These effects may increase water supply risks and uncertainty; increase the severity or duration of droughts, flooding, and wildfire; and create added stress on native species and riparian and wetland ecosystems.

Objective E is tracked by four attributes and a total of six metrics:

ATTRIBUTES AND METRICS

E.1: Mitigate Valley Water's contribution to climate change

- **E.1.1 - Net CO_2e emitted by Valley Water.**

  Measures net CO_2e emissions, which incorporate both direct and indirect emissions, along with potential sequestration from Valley Water projects. Direct emissions include emissions from Valley Water's vehicle fleet and other Valley Water-owned equipment, along with emission sources from Valley Water's properties and projects. Indirect sources include emissions from energy usage, employee commutes, emissions from waste produced by Valley Water, imported water, and construction. Reduction measures include prioritizing projects with lower emissions and those with sequestration potential, enhancing water conservation programs, and expanding waste reduction measures at Valley Water.

  Target: *Update the greenhouse gas accounting methodology and develop a Greenhouse Gas Reduction Plan with the goal to be carbon neutral by 2045.*

E.2: Build climate change resilient water supply resources

- **E.2.1 - Volume of water supply treated by green Infrastructure projects.**

  Tracks volume of stormwater passing through green infrastructure.

  Target: *1000-acre feet of stormwater capture by 2040.*

- **E.2.2 - Average annual water conservation savings.**

  Measures volume of water conserved annually relative to 1992 baseline.

  Target: *109,000 acre-feet conserved annually by 2040.*

E.3: Increase the resiliency of people, property, and ecosystems to increasing riverine and coastal flooding due to climate change

- **E.3.2 - Number of critical facilities subject to a 500-year flood event.**

  Accounts for the potential risk of structural damage to critical facilities from a 100 to 500-year flood event. Over the long-term, Valley Water aims to have zero critical subject to a 100 to 500-year flood event. Protection against larger storm events may take into consideration climate change impacts.

  Target: *Zero critical facilities subject to a 500-year flood event.*

E.4: Build climate change resilient watershed ecosystems

- **E.4.1 - Channel length with continuous riparian native habitat.**

  Indicates degree of high functioning riparian habitat around mainstem channels, tributary channels, and reservoirs. This target aims to keep existing continuous riparian habitat and establish functioning riparian habitat along channels and reservoir shores that currently have very narrow to no riparian habitat.

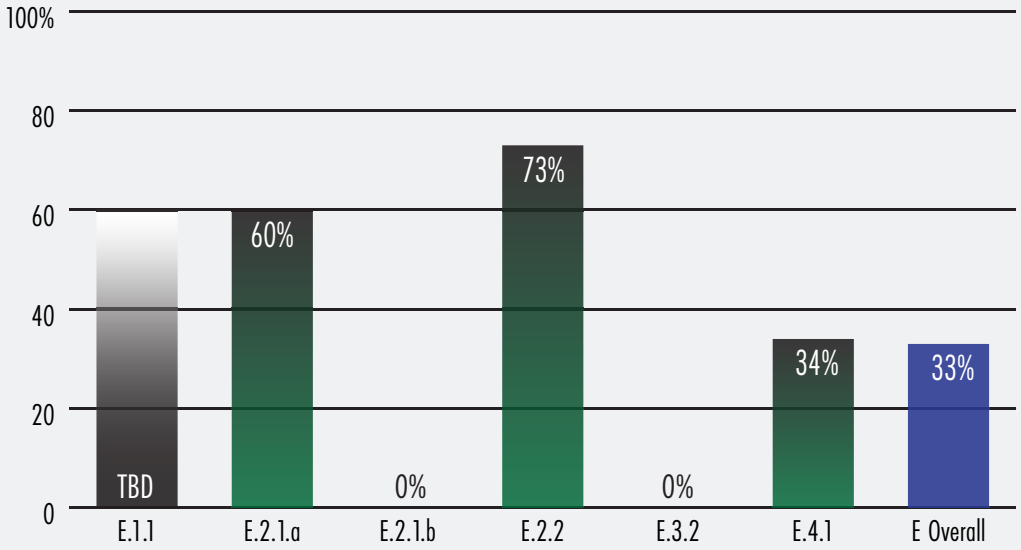
  Target: *Increase to 460 miles the length of channels and reservoir shorelines with continuous riparian habitat width > 10 m.*

ADDITIONAL ONLINE RESOURCES

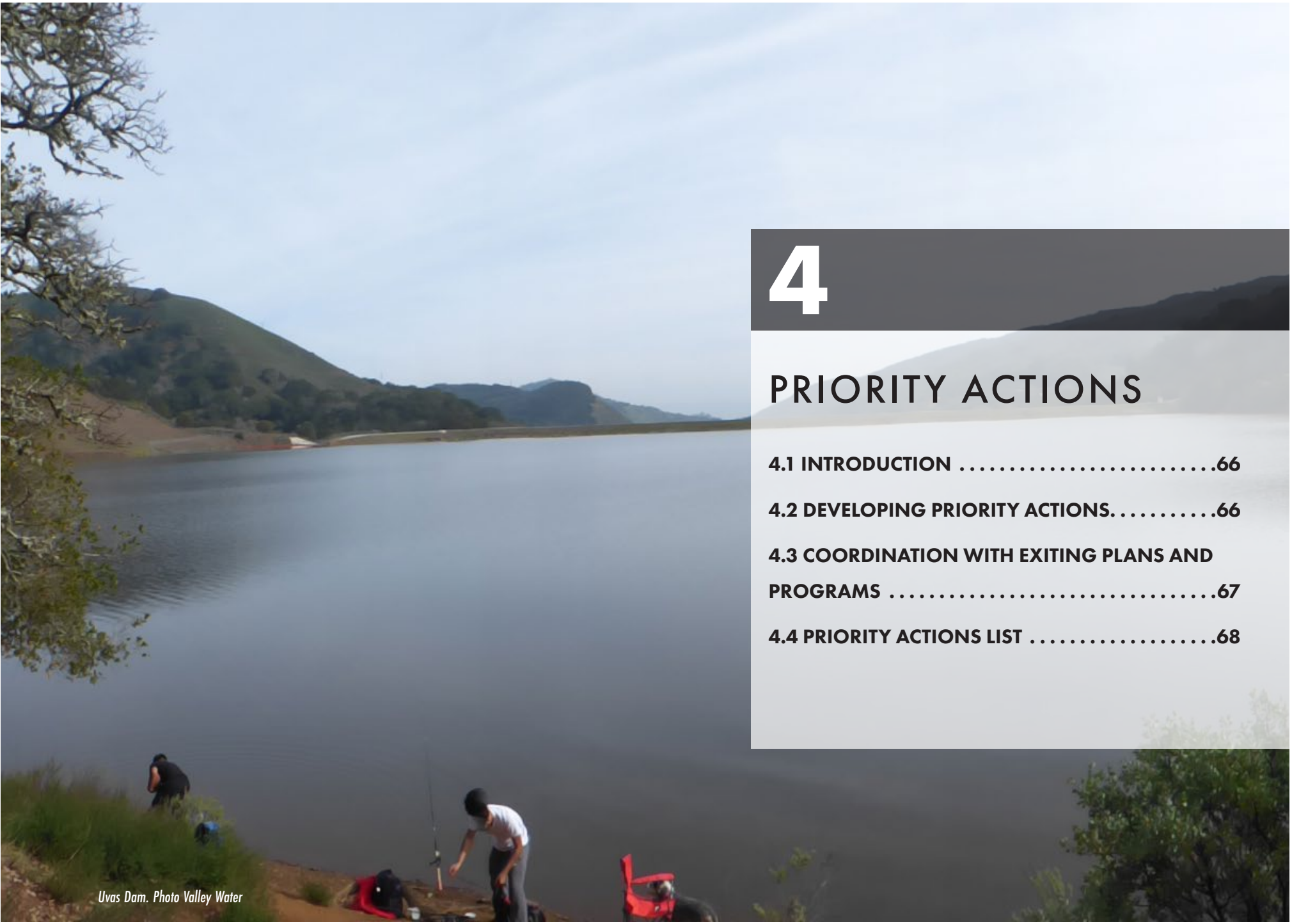
Eco Atlas:

https://ecoatlas.org/regions/ecoregion/statewide/?lp-onewater=1

Objective E Metrics - PERCENT COMPLETE



Current degree to which Valley Water activities in the Upper Pajaro Watershed meet One Water metrics and targets (2023). Empty bars refer to metrics for which a measurement method is yet to be determined.



4

PRIORITY ACTIONS

Uvas Dam. Photo Valley Water

CHAPTER 4: PRIORITY ACTIONS

4.1 INTRODUCTION

The Priority Actions are the key outcome of the One Water Planning Process, and reflect thorough research, evaluation, and outreach led by the One Water team. Chapter 4 describes the process for identifying and evaluating draft actions and shares the final list of Priority Actions for the Upper Pajaro Watershed.

4.2 DEVELOPING PRIORITY ACTIONS

Identifying Needs

All prior components of the One Water Planning Process informed and identified the watershed's needs and create a basis to develop Priority Actions. Chapter 2 provides the context of the watershed's setting relative to each One Water Objective, and describes challenges and opportunities that should be addressed or evaluated in the future for each of One Water's five objectives. Chapter 3 documents the metrics and targets that form a vision for the watershed and provide a measurable status of how certain Objectives are being achieved in the Upper Pajaro Watershed. This information illustrates areas needing improvement by providing a method to track existing conditions versus targets. If a specific metric scored low in comparison to other metrics in one objective or across objectives, it indicated need for improvement and potential action.

Identifying Actions

The One Water team began identifying draft actions by gathering a list of current and potential future watershed actions from staff and stakeholders based on One Water objectives. The team engaged staff throughout Valley Water, as well as the community, to determine interests and gather additional local and expert knowledge with respect to water resources. Over the course of this outreach, 72 potential actions, ranging from concepts and studies to specific construction projects, were identified for the Upper Pajaro Watershed.

Evaluating Draft Priority Actions

The One Water team began evaluating draft priority actions by consolidating similar actions condensing the list down to create specific actions that met watershed needs and identify discrete locations, where possible. Actions were screened for their alignment with the Objectives, such as a water quality improvement (Objective B), flood risk reduction (Objective C), habitat enhancement (Objective D), with some being multi-objective. This process reduced the list to 66 actions.

Finally, draft priority actions were further consolidated by identifying similar watershed aspects requiring additional study. For example, flood channels needing technical analysis of level of service, or having a high risk of failure, would have been recommended in an action that first required completion of a study. This consolidation also involved removing actions not under the jurisdiction of Valley Water, such as trail development and land use policies, from further consideration. This process reduced the list to 48 Priority Actions, which have been incorporated into this Plan.

Prioritizing Actions

By considering existing Valley Water projects and new concepts that align with One Water Objectives, staff generated a broad list of possible actions. As described above, the process to create the Priority Actions involved extensive review and consolidation with SMEs and informed by stakeholder input. By working through this process, priorities for the Upper Pajaro Watershed naturally arose from the interdisciplinary collaboration central to One Water. Recognizing this, Priority Actions presented in this plan are not sorted according to a point-based prioritization scheme. Rather, all Priority Actions are categorized using the following designations that will guide their implementation.

- **One Water Objective:** Each action has a primary One Water Objective that it corresponds to, though Priority Actions may support progress under more than one Objective.

ACTION DEVELOPMENT PROCESS

Step 1: Identify watershed needs based on the five One Water objectives using metrics and targets.

Step 2: Develop draft watershed actions that meet the identified needs.

Step 3: Consolidate and refine identified draft actions.

Step 4: Recommend priority actions for implementation.

- **Activity Type:** Priority Actions vary considerably in the types of activities they call for. The activity types are assessment/study, project, policy, program, and partnership.
- **Implementation Timeframe:** In creating a holistic watershed plan, staff identified priority actions to implement over ensuing decades. The implementation timeframes are short term (0-10 years to start of action), medium term (11-20 years to start of action), and long term (21-50 years to start of action).

In addition, involved Valley Water departments, partner agencies that may have a role in implementation, and an order of magnitude cost estimate are noted for all actions. Cost estimates are preliminary and reflect staff's best estimate for the total cost based on costs for similar activities and projects at the time that this plan was developed. Cost estimates correspond to the following maximum dollar values: $ = $100 thousand, $$ = 1 million, $$$ = 10 million, $$$$ = 100 million, $$$$$ = 100+ million. Order of magnitude costs for flood risk reduction and ecological resources actions that are not already included in the Valley Water Capital Improvement Program are

discussed below to provide a preliminary indication of costs for plan implementation.

The total order of magnitude cost of short-term (0-10 year start time) flood risk reduction actions within the Upper Pajaro Watershed is projected to be between $11.2 million and $110 million. These order of magnitude estimates are based on comparable recent projects and do not reflect a defined level of service, which is determined during the project definition and planning study phase.

PRIORITY WATERSHED ACTIONS

SHORT TERM ACTIONS

40

MEDIUM TERM ACTIONS

5

LONG TERM ACTIONS

3

The total order of magnitude cost of short-term water quality and ecological resource actions within the Upper Pajaro Watershed is projected to be between $2.5 million and $24.5 million. The range of costs includes partnerships; however, Valley Water's role and cost contributions are yet to be determined with specificity (e.g., technical expertise or cost sharing).

Funding of priority actions may be provided by various sources, including water rates, parcel taxes, the Safe, Clean Water and Natural Flood Protection special tax, and external grant funding. The source used to fund actions often depends on the nature of the action itself and limitations on the use of the source funds.

Collectively, the information associated with each action provides a basis for the order in which Priority Actions may be implemented. This Plan will become a key resource for Valley Water staff and its Board when selecting Priority Actions to implement. In this sense, the One Water Plans compliment and support existing Valley Water long range planning initiatives, such as the CIP, and provide a centralized process for developing conceptual elements of high priority flood risk reduction and ecological resource enhancement projects.

4.3 COORDINATION WITH EXISTING PLANS AND PROGRAMS

As the Upper Pajaro Watershed Plan is referenced and its Priority Actions considered for implementation, it bears mentioning the relationship with several Valley Water programs and plans, as well as a few partner plans. Related programs and plans with applicability to Upper Pajaro Watershed planning include but are not limited to:

Valley Water

- **Water Supply Master Plan** – Upper Pajaro Watershed includes priorities essential to water supply operations such as the Pacheco Reservoir Expansion Project and South County Recycled Water Pipeline.
- **Groundwater Management Plan** – Upper Pajaro Watershed includes priorities that may benefit or impact groundwater resources.
- **Asset Management Program** – Assets in Upper Pajaro Watershed are carefully considered when it comes to meeting level of service and reducing business risk exposure. Creek reaches that may require maintenance or new capital work are coordinated with this program.
- **Safe, Clean Water and Natural Flood Protection Program** – Upper Pajaro Watershed priorities help fulfill Measure S obligations for water quality, flood protection, and environmental stewardship. The watershed plan also provides priorities for grantees and partners to consider as they request funding from Valley Water. Measure S may provide the necessary funding to implement several watershed priorities.
- **Capital Improvement Program (CIP)** – Priorities identified across the Upper Pajaro Watershed may be recommended as future CIP projects.

Partner Agencies

- **Valley Habitat Plan (Valley Habitat Agency** – As an active partner in the Valley Habitat Plan, Valley Water may find options to use watershed plan priorities for future mitigation related to habitat improvements.
- **San Francisco Estuary Institute/Aquatic Science Center (SFEI-ASC)** – Through an established MOU with SFEI-ASC, Valley Water continues to improve its efforts in data collection, data representation and reporting, and long-range planning through creek visioning. One Water is using their EcoAtlas tool as a way to present our measurable metrics and targets for transparency with our stakeholders.

Watershed Action List

Table 4-1 lists all actions for the Upper Pajaro Watershed and includes the action number and name, description, activity type, partner agencies (if applicable), involved Valley Water department(s), implementation timeframe, and cost estimate.

Watershed Action Map

Many Priority Actions are specific to a particular location or stream reach, while others do not currently have a specific spatial component but may be refined to include one as they are implemented. Priority Actions listed in Table 4-1 that include a specific location in their description are presented in Figure 4-1. Priority Actions shown on these maps are grouped according to their implementation timeframe.

Table 4-1: Upper Pajaro Watershed Priority Actions

Number	Watershed Actions	Description	Activity Type	Potential Partner Agencies	Involved Valley Water Department	Implementation Timeframe (years)	Valley Water Cost Estimate*
Climate Change (CC) - Short Term Actions							
CC-01	Complete Reservoir Greenhouse Emission Study and evaluate results.	Valley Water is conducting a collaborative project with the University of California, Davis, to study greenhouse gas emissions from the surfaces of Almaden, Chesbro, Stevens Creek, and Uvas reservoirs. The primary goal of the study is to better estimate greenhouse gas emissions from all Valley Water reservoirs. Since January 2021, researchers have completed quarterly sampling to measure gas storage in reservoir sediments and greenhouse gas fluxes from reservoir surfaces in conjunction with monthly measurements of atmospheric and water quality data. Data collection will continue through 2023, and results will be synthesized in a final report. Valley Water will evaluate the inclusion of reservoir-related emissions into its agencywide greenhouse gas inventory and other potential next steps after the completion of this study.	Assessment/ Study; Partnership	UC Davis	Environmental Planning Unit	0-10	$$
Ecological Resources Actions (ECO) - Short Term Actions							
ECO-01	Partner with Santa Clara Valley Open Space Authority and other organizations to expand and enhance floodplain at Pajaro River Agricultural Preserve.	The VHA and OSA are planning ecosystem enhancements in collaboration with The Nature Conservancy at OSA's Pajaro River Agricultural Preserve that could increase jurisdictional water acres and contribute to multiple One Water metrics. Part of the planning area is on and adjacent to Valley Water property. Valley Water's Carnadero Preserve and Pajaro Freshwater Wetland are award-winning examples of habitat creation, enhancement, and farmland conservation that could serve to inform efforts on the Pajaro River Agricultural Preserve. This action is to support the planning, design, and implementation of this project through technical assistance and streamlined encroachment permitting for access to Valley Water property.	Project; Partnership	Pajaro River Watershed Flood Prevention Authority, VHA, OSA, RCDs, non-profit organizations, native tribes, San Benito County	Environmental Mitigation and Monitoring Unit, Community Projects Review Unit	0-10	$$
ECO-02	Partner with organizations in San Benito County to conserve and enhance San Felipe Lake.	San Felipe Lake is a critical wetland, rare plant, and wildlife resource that needs additional conservation and enhancement. Although it is in San Benito County, it receives water from and discharges into Santa Clara County via Pacheco Creek and Pajaro River, respectively. There is significant potential to allow to channels meander more, while restoring ecological function and increasing their capacity to slow, spread, and sink. Only parts of the lake are under conservation easement, and this easement may be restricted to an agricultural easement, but a land management conservation easement is important for maximizing habitat for rare species. The current management of natural areas surrounding San Felipe Lake is geared towards ranching and agriculture, and unnaturally-timed summer water releases, along with discing (for agriculture) and cattle trampling and compaction, negatively impact the fragile wetlands and adjacent alkaline grassland that fringe San Felipe Lake and its flood plain. This action includes planning, design and implementation.	Assessment/ Study; Project; Partnership	San Benito County, RCDs, native tribes, land trusts, other non-profit organizations	Environmental Mitigation and Monitoring Unit	0-10	$$$
ECO-03	Develop a program and best management practices to incorporate tribal involvement, traditional ecological knowledge, and cultural resource protection into Priority Actions.	Open space preservation and ecological enhancement actions provide opportunities to preserve and enhance tribal cultural resources. These opportunities can be most fully realized when tribes are engaged members of planning, implementing, and using such actions. Tribes can benefit from the reconnection with their ancestral homeland, and the land can benefit from their traditional management practices. This action includes planning and program development, led by Valley Water's Office of Racial Equity, Diversity, and Inclusion.	Partnership; Policy	Native tribes (Amah Mutsun, Tamien Nation)	Office of Racial Equity, Diversity, and Inclusion	0-10	$
ECO-04	Expand and enhance riparian and wetland habitat at the Carnadero Preserve.	Valley Water's 170-acre Carnadero Preserve is for habitat enhancement and compatible farming. Some riparian and wetland habitats have been successfully restored and created at the Preserve already. There are approximately 60 acres of farmland present within the Preserve that do not have a water supply or that frequently flood for prolonged periods in the winter. These areas are suitable for the creation and expansion of riparian and perennial and seasonal wetland habitat that can contribute to wildlife habitat and connectivity, help store high flows and reduce downstream flow magnitude, and buffer creeks from runoff and associated water quality impairment.	Project	VHA, Regional Board, USFWS, CDFW, native tribes	Environmental Mitigation and Monitoring Unit	0-10	$$

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Number	Watershed Actions	Description	Activity Type	Potential Partner Agencies	Involved Valley Water Department	Implementation Timeline (years)	Valley Water Cost Estimate*
ECO-05	Continue and expand the temperature monitoring program on Llagas, Uvas, and Pacheco Creeks and use results to inform future habitat enhancement actions.	Temperature monitoring is critical to understanding the steelhead life history stage(s) that creeks can support and making informed aquatic habitat enhancement decisions. Monitoring by Valley Water is ongoing along these creeks but will need to be continued, expanded, and analyzed to select appropriate enhancement actions and areas. Partners could play an important role in expanding the monitoring program, and applying the results to aquatic habitat enhancement plans. This action is a study and program.	Program; Partnership	NMFS, CDFW, non-profit organizations	Environmental Mitigation and Monitoring Unit, Environmental Planning Unit	0-10	$
ECO-06	Assess modified channels to identify strategies and priorities to enhance ecological conditions.	Straightened, trapezoidal channels, many of which are owned and/or maintained by Valley Water, reduce the ecological condition of riverine habitat in the watershed. The form and function of modified channels and other low scoring riverine/riparian reaches (based on CRAM scores) can be improved by expanding floodplains, adding aquatic habitat complexity, allowing for or planting more native vegetation, reducing the amount of invasive plants, and expanding and improving buffers around creeks. Valley Water can prioritize this work where it would also provide community benefits, such as trails, shade, and views of nature, and/or where channels or adjacent access roads are failing or at risk of doing so. This action includes planning and design.	Assessment/ Study	USACE, non-profit organizations, municipalities, native tribe	Environmental Mitigation and Monitoring Unit, Watershed Field Operations Unit	0-10	$$
ECO-07	Identify locations and strategies to remove non-native vegetation that has encroached upon and is stabilizing gravel bars.	Gravel bars are important features of suitable habitat for steelhead, but must be able to mobilize periodically to be usable and beneficial. Drought and other environmental conditions can contribute to the expansion of non-native riparian vegetation and the armoring of historically mobile stream features. Removal of such vegetation is a relatively low-effort way of enhancing aquatic habitat, and should be prioritized on gravel bars that are in accessible reaches and otherwise highly suitable habitat for various salmonid life-stages and where the encroaching vegetation is a non-native invasive species. This action is a study to identify these locations and plan for doing the work.	Assessment/ Study; Partnership	CDFW, NMFS, non-profit organizations	Environmental Mitigation and Monitoring Unit	0-10	$$
ECO-08	Protect and restore natural hydrologic and ecological processes for the recruitment, establishment, and management of Sycamore Alluvial Woodland on Pacheco Creek.	Pacheco Creek has one of the largest remaining and highest quality stands of SAW in California, which depend on periodic and episodic high pulse flow events (estimated to be a 10 to 20 year flood event at 9,000-12,000 cfs) to maximize sediment redistribution and scour, form coarse sediment bars and braided and cobbled-bedded channels, and to remove other woody vegetation that competes with sycamores. These conditions, coupled with natural summer dry backs, are necessary to create the substrate conditions and water availability for sycamore recruitment and establishment. Providing a natural hydroperiod for sycamore recruitment and maintenance of existing SAW stands, and the infrastructure necessary to manage both pulse flows and dry backs at the appropriate times, should be a critical part of Pacheco Creek flow management decisions, given the statewide importance of this occurrence. While other stands of SAW occur in Santa Clara County, the Pacheco Creek SAW occurrence is by far the most critical for conservation.	Assessment/ Study, Project, Program, Partnership	Santa Clara Valley Habitat Agency, The Nature Conservancy	Environmental Mitigation and Monitoring Unit, Watershed Field Operations Unit	0-10	$$$$
ECO-09	Participate in development of the Pacheco Pass Wildlife Overpass Planning Project by providing technical support to Santa Clara Valley Habitat Agency and other project partners.	The Santa Clara Valley Habitat Agency and partners including Valley Water are working to install a wildlife overpass of Hwy 152 at Pacheco Pass. This project will use past and future scientific studies, including roadkill monitoring and tracking of collared mountain lion and tule elk, to identify suitable locations for a wildlife overpass. Valley Water can support this effort through information sharing and technical support. VW staff are participating in the Pacheco Pass working group.	Partnership; Project	VHA, Caltrans, Valley Transportation Authority, CDFW, USFWS	Environmental Mitigation and Monitoring Unit	0-10	$$$$

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Number	Watershed Action	Description	Activity Type	Potential Partner Agencies	Involved Valley Water Department	Implementation Timeframe (years)	Valley Water Cost Estimate*
ECO-10	Assess fish passage barriers and impediments throughout watershed and prioritize their remediation.	Physical fish passage barriers have been inventoried and should be removed or remediated, generally from downstream to upstream. Passage impediments from water extraction should also be addressed, potentially through landowner education and technical support. Llagas Creek subwatershed has the most passage impediments; Uvas Creek subwatershed has the most valuable habitat for steelhead. Prioritization depends on landowner permission and funding availability. Valley Water should remediate those that they own and in partnership with public landowners, but should also support the efforts of partners to remediate those on private property. This action includes improvements to existing wet crossings on Uvas-Carnadero Creek, some of which Trout Unlimited has already developed plans for. Wet crossing improvements also have the potential to address sediment and water quality issues.	Assessment/ Study	NMFS, CDFW, VHA, County Parks, RCDs, native tribes, Trout Unlimited	Environmental Mitigation and Monitoring Unit	0-10	$$
ECO-11	Assess and prioritize opportunities to expand and connect riparian corridors around channels, particularly where they are missing or only very narrow.	Vegetated buffers around channels, typically referred to as riparian corridors, provide myriad ecosystem services, but have been removed or are only very narrow along many miles of channel. Forest, shrubland, grassland, and wetland communities can all be appropriate to establish, depending upon physical, groundwater, and land use conditions, and could be incorporated into multiple-benefit efforts for wildlife connectivity, groundwater recharge, and/ or flood risk reduction. Such efforts would need to be balanced with agricultural land uses and landowner needs, and farmland that floods frequently could be used to focus landowner outreach efforts. Valley Water should implement this action on its land and in association with other projects, but can also support the efforts of partners to implement this action on private property. This action includes planning, design, and implementation.	Assessment/ Study	VHA, OSA, RCDs, native tribes, POST, Point Blue, non-profit organizations	Environmental Mitigation and Monitoring Uni	0-10	$$
ECO-13	Partner to protect and conserve sensitive natural communities.	The Upper Pajaro River Watershed still supports relics of once expansive alkali meadows, seasonal wetlands, alkaline wetlands, SAW and other sensitive natural communities. They provide critical habitat for a variety of protected plant and animal species, wildlife connectivity, and other ecosystem services. These areas should be priorities for preservation, as well as protective buffers around them. Currently very few to none of these sensitive communities are protected and many are threatened by altered hydrology, ranching and farming. By identifying conservation partners and providing funding for conservation easements, land acquisition, or other measures, Valley Water can maintain and restore these fragile areas and their ecological relationships. Examples of conservation strategies include maintaining the natural hydrology and not diverting water for agricultural or other land use in the vicinity of fragile alkaline wetlands; timing of cattle grazing/ranching activities to avoid compaction, trampling or overgrazing of wetland and adjacent upland areas; and avoiding alkali meadows during agriculture and discing activities.	Partnership	VHA, County Parks, OSA, San Benito County, land trusts, native tribes, non-profit organizations	Environmental Mitigation and Monitoring Unit	0-10	$$$
ECO-14	Improve suitable spawning and rearing habitat for steelhead trout and salmon by adding coarse sediment and large wood to creeks where physically appropriate and most ecologically valuable in the Upper Pajaro Watershed.	The addition of gravel, other coarse sediment, large wood, pools >1.5 ft deep, and restoration of pool-riffle morphology would improve habitat conditions especially in the Uvas Creek subwatershed and mitigate the effects of Uvas Dam on sediment supply. The Study of Santa Clara County Steelhead Streams to Identify Priority Locations for Gravel Augmentation and Large Woody Debris Placement Santa Clara County, California (Balance Hydrologics, 2018) projects #UC1-1, UC4-3, and UC4-5 have already been identified as feasible and appropriate, but still require design and construction. Additional locations (such as UC4-1) will require planning, design, and construction.	Assessment/ Study; Partnership	NMFS, CDFW, Water Board, RCDs, native tribes, non-profit organizations	Environmental Mitigation and Monitoring Unit	0-10	$$
ECO-14.1	Design and construct Uvas Creek project UC1-1 from the Study of Santa Clara County Steelhead Streams to Identify Priority Locations for Gravel Augmentation and Large Woody Debris Placement.	The Study of Santa Clara County Steelhead Streams to Identify Locations for Gravel Augmentation and Large Woody Debris Placement (Balance Hydrologics, 2018) identified Uvas Creek project UC1-1 as feasible and appropriate to add both gravel and large woody debris to increase spawning habitat, sediment mobility, and channel complexity. A gravel injection project at this location still requires design and construction.	Project	NMFS, CDFW, Water Board, RCDs, native tribes, non-profit organizations	Environmental Mitigation and Monitoring Unit	0-10	$$

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Number	Watershed Actions	Description	Activity Type	Potential Partner Agencies	Involved Valley Water Department	Implementation Timeframe (years)	Valley Water Cost Estimate*
ECO-14.2	Design and construct Uvas Creek project UC4-3 from the Study of Santa Clara County Steelhead Streams to Identify Priority Locations for Gravel Augmentation and Large Woody Debris Placement.	The Study of Santa Clara County Steelhead Streams to Identify Locations for Gravel Augmentation and Large Woody Debris Placement (Balance Hydrologics, 2018) identified Uvas Creek project UC4-3 as a feasible and appropriate location to add both gravel and large woody debris to increase spawning habitat, sediment mobility, and channel complexity. Valley Water's Stream Maintenance Program completed Project #2 at UC4-3 (installation of large woody debris) in 2021 to increase channel cover and complexity. Downstream reaches may also benefit from gravel placement as gravel is transported. A gravel injection project at this location still requires design and construction.	Project	NMFS, CDFW, Water Board, RCDs, native tribes, non-profit organizations	Environmental Mitigation and Monitoring Unit	0-10	$$
ECO-14.3	Design and construct Uvas Creek project UC4-5 from the Study of Santa Clara County Steelhead Streams to Identify Priority Locations for Gravel Augmentation and Large Woody Debris Placement.	The Study of Santa Clara County Steelhead Streams to Identify Locations for Gravel Augmentation and Large Woody Debris Placement (Balance Hydrologics, 2018) identified Uvas Creek project UC4-5 as a feasible and appropriate location to add gravel and large woody debris to increase spawning habitat, sediment mobility, and channel complexity. Valley Water's Stream Maintenance Program completed Project #2 and Project #3 at UC4-5 (installation of large woody debris) in 2021 to increase channel cover and complexity. A gravel injection and/or gravel bar construction project at this location still requires design and construction.	Project	NMFS, CDFW, Water Board, RCDs, native tribes, non-profit organizations	Environmental Mitigation and Monitoring Unit	0-10	$$
ECO-14.4	Design and construct Llagas Creek Site 01 from the Second Phase Study of Santa Clara County Steelhead Streams to Identify Priority Locations for Gravel Augmentation and Large Woody Debris Placement Project.	The Second Phase Study of Santa Clara County Steelhead Streams to Identify Priority Locations for Gravel Augmentation and Large Woody Debris Placement Project (AECOM, 2024) identified Llagas Creek Site 01 as feasible and appropriate location to add gravel and large woody debris to increase instream shelter and complexity. The site is located immediately downstream of confluence of the channels flowing from the Chesbro Dam spillway and piped outlet pool. Habitat at the site includes a sequence of short runs, riffles and glides. Design includes removal of invasive Arundo donax, injection of a 12 cubic yard gravel pile, addition of 2 rootwad logs, and development of a permanent access path off the existing access road. Project still requires further design and construction prior to action implementation.	Project	NMFS, CDFW, Water Board, RCDs, native tribes, non-profit organization	Environmental Mitigation and Monitoring Uni	0-10	$$
ECO-14.5	Design and construct Pacheco Creek Site 01 from the Second Phase Study of Santa Clara County Steelhead Streams to Identify Priority Locations for Gravel Augmentation and Large Woody Debris Placement Project.	The Second Phase Study of Santa Clara County Steelhead Streams to Identify Priority Locations for Gravel Augmentation and Large Woody Debris Placement Project (AECOM, 2024) identified Pacheco Creek Site 01 as feasible and appropriate location to add gravel and large woody debris to improve spawning habitat, instream shelter, and complexity. Site is located immediately downstream of the Pacheco Dam spillway plunge pool. Habitat at the site includes a 91 foot long high gradient riffle and a 77 foot long glide. Design includes replenishable gravel injection pile at the head of the existing riffle and the addition of 2 rootwad logs. Project still requires further design and construction prior to action implementation.	Project	NMFS, CDFW, Water Board, RCDs, native tribes, non-profit organizations	Environmental Mitigation and Monitoring Unit	0-10	$$
ECO-15	Develop Upper Pajaro Native Ecosystem Enhancement Tool to coordinate and inform long term habitat conservation planning.	There are many opportunities for conservation and ecological enhancement that can safeguard against incompatible development, reduce flood risk, improve water quality and wildlife connectivity, among other benefits and that could be undertaken by a variety of organizations. A watershed-scale tool that provides more specific guidance on where different enhancement actions should be physically and ecologically appropriate, given land ownership and the value of agricultural land uses in the watershed, will be instrumental to coordinating, prioritizing, planning, and eventually implementing such actions. The Pajaro Compass is an important step in this direction, and the Coyote Creek Native Ecosystem Enhancement Tool is an example of such a resource that is publicly available, updated, and maintained. This action includes study and planning.	Assessment/ Study; Partnership	VHA, RCDs, CDFW, Water Board, NMFS, USFWS, non-profit organizations, County Parks, OSA, land trusts, native tribes	Environmental Mitigation and Monitoring Unit, Stream Maintenance Program	0-10	$$

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Number	Watershed Action	Description	Activity Type	Potential Partner Agencies	Involved Valley Water Department	Implementation Timeline (years)	Valley Water Cost Estimate*
ECO-16	Incorporate restoration of areas impacted by unhoused encampments into Stream Maintenance Program.	Existing creekside encampment locations are tracked and mapped by Valley Water staff. After working with partners to reduce the prevalence of encampments within waterways and provide new housing for unsheltered individuals, impacted areas must be remediated and restored by removing trash and pollutants and replanting disturbed vegetation. A program to restore impacted areas can be integrated into the Stream Maintenance Program. Restoration of areas impacted by encampments can be utilized as mitigation credit for other Valley Water activities.	Program	VW, municipalities, Santa Clara County, non-profit organizations	Unhoused Task Force	0-10	$
ECO-17	Develop and incorporate vegetation cover guidelines for use when developing project mitigation to decrease wildfire risk to native habitats.	Complying with permit requirements for vegetation cover can result in plant and canopy densities that exacerbate the risk and severity of wildlife in riparian habitats, which are typically more resistant to wildfire, and nearby residential and commercial areas. Technical information should be evaluated to identify vegetation cover goals that result in environmental benefits without significantly increasing wildfire risks. Permitting agencies should be involved in this evaluation so that there is trust when the guidance is used in mitigation and revegetation plans. This action is a study and plan/program.	Policy	N/A	Environmental Mitigation and Monitoring Unit, Vegetation Field Operations Unit	0-10	$
		Flood Risk Reduction (FRR) - Short Term Actions					
FRR-01	Identify and assess open space areas adjacent to creeks compatible with flood detention and environmental protection for incorporation into future flood protection projects.	The Pajaro Watershed does not drain into the San Francisco Bay as the other watersheds in Santa Clara County, but instead drains southwest to Santa Cruz and Watsonville where Pajaro River ultimately enters the Pacific Ocean. There is concern for potential induced flooding in those downstream areas with any flood protection measures in the Pajaro Watershed that increase the flows downstream. Flood detention measures reduce flows downstream and could provide flood risk reduction benefits for not only Santa Clara County but San Benito and Santa Cruz counties as well. Instead of raising floodwalls and/or levees, identifying and utilizing recreational areas for potential flood risk reduction projects (i.e., McKelvey Park Baseball detention basin), will resolve various issues such as higher construction, operations, and maintenance costs and reducing significant environmental impacts and mitigation costs. Feasibility and planning studies will need to be developed as well as coordinating support from city/county entities that may share right-of-way/land rights to determine appropriate maintenance operations post design and construction. Valley Water has begun coordinating with the Santa Clara Valley Open Space Authority to pursue this concept at the Pajaro River Agricultural Preserve (see ECO-1)	Assessment/ Study	Santa Clara County Parks and Recreation Department, City of Morgan Hill, City of Gilroy, OSA, Loma Prieta RCD, Farm Bureau, Santa Clara County Planning, PRWFPA	Watersheds Stewardship and Planning Division, Hydrology, Hydraulics, and Geomorphology Unit	0-10	$$
FRR-02	Complete planning and design and implement Lower Llagas Creek Capacity Restoration Project.	This project plans, designs, and constructs improvements on 7.15 miles of Lower Llagas Creek, from Buena Vista Avenue to Pajaro River, to accomplish the following objectives: 1. Evaluate the current flood risk in the area surrounding the project versus the design level flood risk 2. Develop options to provide flood protection for Lower Llagas Creek Reaches 2 and 3 in accordance with Federal Emergency Management Agency criteria where applicable 3. Identify feasible opportunities for environmental restoration and corridor preservation 4. Coordinate planning, design, and construction efforts with the South County Regional Wastewater Authority	Project	City of Gilroy	Business Planning and Analysis, Watersheds Design and Construction Unit 6	0-10	$$$$
FRR-03	Support Valley Transportation Authority's implementation of US 101/SR 25 Interchange Project - Phase 1	Valley Transportation Authority and Caltrans are working to resolve the traffic congestion issues at the intersection of Highway 101 and State Route 25. Phase 1 of the project will reconstruct the US 101/SR 25 interchange slightly north of the current interchange. Construction of culverts and detention basins are included in the project, which would alleviate recurrent flooding of Highway 101 in the vicinity. There is risk of flooding in this area from Gavilan Creek which crosses under Highway 101 near the intersection as well as from Uvas Creek further north. This project would reduce the flood risk coming from Gavilan Creek. Valley Water coordinated with Valley Transportation Authority during project planning and design. Project also includes wildlife passage improvements including fencing, jump-outs, median retrofits, and a new undercrossing to reduce roadkill. Construction is expected to begin in 2024 and finish in 2027.	Project; Partnership	VTA, CalTrans	Community Projects Review Unit	0-10	$

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Number	Watershed Actions	Description	Activity Type	Potential Partner Agencies	Involved Valley Water Department	Implementation Timeframe (years)	Valley Water Cost Estimate*
FRR-04	Analyze flood risk by completing hydraulic modeling for the Upper Pajaro Watershed.	The Pajaro watershed is the most outdated of the major watersheds when it comes to hydraulic modeling and determining the existing flood risk. There are many channels that have not been modeled and others with outdated flood risk data. Although much of the watershed is rural and agricultural, it is still necessary to have an understanding of the true flood risk. As well as structures, it is vital to protect our roadways (Highway 101 has flooding issues), critical facilities (there is a wastewater treatment plant within the Uvas Creek floodplain), and farmland from flood waters. Channels with outdated, minimal or no flood risk analysis include: the Soap Lake region with Pajaro River, Miller's Canal, some agricultural canals, and portions of Uvas Creek, Pacheco Creek, Tesquisquita Slough, and Ortega Creek; Pacheco Creek; Tesquisquita Slough; Jones Creek and its tributaries; Uvas Creek upstream of Santa Teresa Blvd.; Lower Miller Slough; Princevalle drain; and several Upper Llagas Creek tributaries in the eastern portion of the watershed. Once the flood risk has been analyzed and updated, the next step can be to remap the FEMA flood maps and update the flood zone designations where necessary. This work can be done by Valley Water under Safe, Clean Water Program Priority F3 and submitted to FEMA for potential updates to their flood mapping and Flood Insurance Studies (FIS).	Assessment/ Study	San Benito County, Pajaro River Watershed Flood Prevention Authority	Watersheds Stewardship and Planning Division, Hydrology, Hydraulics, and Geomorphology Unit	0-10	$$
FRR-05	Request updates to FEMA flood maps and flood zone designations upon completion of hydraulic modeling.	Once the flood risk has been analyzed and updated, the next step is to partner with cities and FEMA to update the flood zone designations as appropriate. Much of the watershed is designated as Zone D in the FEMA flood maps, which is used to designate areas with possible but undetermined flood hazards. By updating the hydraulic analysis in the watershed, Valley Water can provide a more accurate picture of what the existing flood risk is in the watershed, and better prepare and inform the public of this flood risk. This action can occur as progress is made on flood modeling called for in FRR-04.	Partnership	FEMA, Cities of Morgan Hill and Gilroy	Watersheds Stewardship and Planning Division, Hydrology, Hydraulics, and Geomorphology Unit	0-10	$$
FRR-06	Complete Upper Llagas Creek Flood Protection Project.	In April 2022, Valley Water completed Phase 1 construction. It included channel excavation, construction of the on-site compensatory mitigation, Lake Silveira wetlands, Masten Avenue Bridge concrete underpinning, Monterey Road Bridge concrete lining, installation of rock slope protection, storm drain outfall modifications, removal of concrete rubble, debris and legacy trash, and destruction of monitoring wells. It also included the installation of bat boxes, as well as removal of 12.5 acres of invasive blackberry at Lake Silveira and excavation to restore 2,000 linear feet of Llagas Creek from Lake Silveira towards Monterey Highway. Phase 2A construction began in June 2021 within a portion of Reach 8 in downtown City of Morgan Hill. Phase 2A includes approximately 2,300 linear feet of a horseshoe-shaped underground tunnel and approximately 1,600 linear feet of twin Reinforced Concrete Box Culverts (RCBs) upstream and downstream of the proposed tunnel to carry high water flows. Low flows will remain within the existing creek that winds through downtown Morgan Hill. Construction is expected to be completed in FY24. Phase 2B construction consists of approximately 1,900 linear feet of twin reinforced concrete box culverts, creek modifications and excavation by widening and deepening, installation of culverts at various street crossings, construction of an inlet basin weir split-flow structure and bridge underpinning work. It also includes installation of instream complexities, removal of plantings and non-native plantings, habitat enhancements, revegetation, utility relocations and coordination, outfall modifications, aggregate base maintenance roads, access ramps, and community outreach and coordination. Upon completion of Phases 1, 2A and Phase 2B, the project will provide flood protection to 1,100 homes, 500 businesses and 1,300 agricultural acres while improving stream habitat.	Project	USACE, City of Morgan Hill	Business Planning and Analysis, Watersheds Design and Construction Unit 3	0-10	$$$$$
FRR-10	Improve coordination for intercounty flood protection and by maintaining communication and information sharing with partner agencies.	The Pajaro Watershed is managed for many purposes at many scales by numerous agencies. Additional assessment of flood vulnerabilities and dynamics are required to comprehensively understand flood risks throughout the Pajaro Watershed and the downstream impacts of upstream actions. In addition to Valley Water, San Benito, Monterey and Santa Cruz counties are considering flood control actions along the Pajaro River and Pacheco Creek. Valley Water can improve coordination and ensure its projects are compatible by sharing information about its flood vulnerability analyses, communicating about its management of flood risk, and participating in Pajaro River Watershed Flood Prevention Authority meetings.	Partnership	Pajaro River Watershed Flood Prevention Authority, San Benito County, Santa Cruz County, Monterey County, Central Coast Regional Water Quality Control Board, Pajaro River Watershed Flood Prevention Authority	Watersheds Stewardship and Planning Division, Hydrology, Hydraulics, and Geomorphology Unit	0-10	$

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Number	Watershed Actions	Description	Activity Type	Potential Partner Agencies	Involved Valley Water Department	Implementation Timeframe (years)	Valley Water Cost Estimate*
FRR-11	Complete Planning Study for Uvas-Carnadero Creek from Luchessa Avenue to Highway 25.	This planning study would assess opportunities to construct flood risk reduction measures along approximately 4.5 miles of Uvas Creek from Highway 25 up to Luchessa Avenue. Portions of this reach have less than 10-year capacity and have frequently flooded Highway 101 just north of where Uvas Creek crosses under the highway. Highway 101 is the major throughway in this area and its flooding creates significant transportation challenges. There are approximately 400 acres and 5,466 parcels at risk of flooding from a 25-year flood event. The creek upstream of this reach has 100-year protection with levees up to Santa Teresa Blvd. The creek downstream of this reach floods but is actually a part of the San Felipe Lake flooding issues and should be considered as part of ECO-2. The cost estimate provided includes the cost to complete a planning study for the project.	Assessment/ Study	USACE	Hydrology, Hydraulics, and Geomorphology Unit; Design and Construction Unit 6	0-10	$$$
FRR-12	Complete Planning Study for East/West Little Llagas Creek from Watsonville Road to Highway 101.	This planning study would assess opportunities to construct flood risk reduction measures along approximately 1.5 miles of West Little Llagas Creek from Watsonville Road to Highway 101. Rural areas surrounding this portion of creek in San Martin and Morgan Hill experience recurrent flooding with approximately 460 acres and 180 parcels at risk of flooding from a 25-year flood event. The flooding area immediately adjacent to the creek is within a disadvantaged community and experiences recurrent flooding with high depths and velocities due to the limited capacity of the channel. The flood flows would continue traveling south during a 25-year flood event, becoming shallow sheet flow between Upper Llagas Creek and Highway 101.	Assessment/ Study	USACE	Hydrology, Hydraulics, and Geomorphology Unit; Design and Construction Unit 6	0-10	$$$
		Water Quality (WQ) - Short Term Actions					
WQ-01	Support efforts led by University of California Cooperative Extension, Resource Conservation Districts, Natural Resource Conservation Service, and Santa Clara County Division of Agriculture to educate and assist farmers and landowners in implementing land management practices to improve water quality and enhance natural resources.	Outreach and incentive programs (funding and technical assistance) can help private landowners and farmers manage their lands and incorporate practices that can benefit them and the environment. The focus of such efforts should include pesticide and nutrient management and mitigation; agricultural runoff and fine sediment control, such as furrow alignment and vegetated buffers; water conservation; vegetation management for habitat and wildlife movement; and rodenticide reduction. Valley Water can explore ways in which it can provide funding and technical assistance in partnership with RCDs, NRCS and the Santa Clara County Division of Agriculture to promote the adoption of practices such as those listed above.	Partnership	UC Cooperative Extension, RCDs, NRCS, Farm Bureaus, Water Board, non-profit organizations, municipalities	Environmental Planning Unit	0-10	$
WQ-02	Partner with Santa Clara County, cities, and other organizations to reach a functional zero number of unsheltered people residing on Valley Water lands along waterways.	Encampments within and adjacent to waterways and Valley Water facilities pose numerous human health, safety, operational, and environmental challenges. Valley Water can play an important role in assisting unsheltered individuals residing on its land and addressing the associated impacts to water quality, ecological resources, recreational facilities, and others. Staff are developing a framework to address these challenges, which may include enhancing services to remove trash and pollutants generated by encampments, participation in countywide collaboration to address the lack of housing and creekside encampments, utilizing Valley Water-owned property for housing development, and other efforts. This action will be implemented in a manner consistent with Board Ends Policy E-6 once it is approved.	Partnership	RCDs, Farm Bureaus, Water Board, non-profit organizations, municipalities	Watersheds Operations and Maintenance Unit	0-10	$$
WQ-03	Expand water quality monitoring program to close critical data gaps.	This action seeks to address existing gaps in water quality data identified by staff. In the Upper Pajaro River Watershed, including Chesbro and Uvas Reservoirs. Monitoring activities could include quarterly surface and depth profile measurements for general water quality, seasonal sampling for algal toxins, and annual or every other year fish monitoring for mercury and other contaminants.	Program	N/A	Environmental Mitigation and Monitoring Unit, Environmental Planning Unit	0-10	$$
WQ-04	Continue to partner with the Cities of Gilroy and Morgan Hill and Santa Clara County to identify opportunities and actions to reduce bacteria and sediment loads within the Llagas and Uvas Creeks.	Partner with Cities of Gilroy and Morgan Hill and Santa Clara County (South County) on special studies, structural, and non-structural actions to improve water quality in Llagas and Uvas Creeks. Building off past sampling events, a special study was recently completed at 15 sites to understand/ find the source of bacteria. This was sponsored by the South County agencies. The municipalities need additional resources to continue with future studies to help determine best solutions for bacteria and sediment in the Upper Pajaro River watershed.	Partnership	City of Morgan Hill, Santa Clara County	Environmental Planning Unit	0-10	$

**Cost estimates correspond to the following maximum dollar values: $ = $100 thousand, $$ = 1 million, $$$ = 10 million, $$$$ = 100 million, $$$$$ = 100+ million*

Number	Watershed Actions	Description	Activity Type	Potential Partner Agencies	Involved Valley Water Departments	Implementation Timeline (Years)	Valley Water Cost Estimate*
WQ-05	Partner with cities to reduce and prevent specific trash dumping areas.	Valley Water has recorded areas along Llagas Creek, Uvas-Carnadero Creek, West Branch Llagas Creek, and Jones Creek in the Pajaro Watershed that experience recurring trash dumping. Partner with cities to identify dumping areas (unrelated to encampments) and track hotspots to prevent dumping and contamination.	Partnership	Cities	Watershed Field Operations Unit	0-10	$
WQ-06	Partner to construct free span crossings at Carnadero Preserve to enhance water quality and fish passage conditions in Uvas-Carnadero Creek.	There are two wet ford crossings—one across Uvas-Carnadero Creek and another across Gavilan Ditch that drains to the creek—that connect farmland in and around Valley Water's Carnadero Preserve. At high flows and for much of the winter and spring, these crossings are unpassable, seasonally restricting farmers' access to certain portions of land. When they are passable, the crossings degrade water quality due to the release of fine sediment as farm equipment passes through the creek. In addition, the Uvas-Carnadero Creek crossing may impede fish passage. This action would construct free span crossings over Uvas-Carnadero Creek and Gavilan Ditch to allow year-round access to farmland and enhance aquatic habitat by improving water quality and remedying a fish passage impediment. Trout Unlimited, in cooperation with Valley Water and other affected landowners, prepared a design for a free span crossing of Uvas-Carnadero Creek, but the effort still requires permitting, coordination with multiple landowners, and construction funding.	Project	Trout Unlimited, CDFW, National Marine Fisheries Service, CHEER, Willoughby Farms, Dorado Leasing LLC	Environmental Mitigation and Monitoring Unit, Environmental Planning Unit	0-10	$$
Water Supply (WS) - Short Term Actions							
WS-01	Implement recommendations from pre-feasibility study on Flood Managed Aquifer Recharge (Flood-MAR).	Flood-MAR feasibility is being analyzed within the Santa Clara County context. Given the rural nature of the Upper Pajaro River Watershed, the majority of potential Flood-MAR sites are expected to be in this watershed in areas that overlie the Llagas Subbasin. A Pre-feasibility report is complete.	Assessment/ Study	Santa Clara County, California Department of Water Resources	Water Supply Planning and Conservation Unit, Groundwater Management Unit	0-10	$
WS-04	Assess areas within Llagas subbasin suitable for additional groundwater recharge projects.	Llagas Subbasin has the potential for additional groundwater recharge. This action evaluates additional locations with potential for managed recharge ponds or in-stream facilities as part of the Water Supply Master Plan with collaboration from Water Supply and Raw Water Operations teams. Identification includes assessment of existing facilities, groundwater data, and a feasibility studies. The San Pedro Ponds, an existing recharge facility in the Llagas Subbasin, were found to have potential for enhancement of recharge capacity in a feasibility study. Improvements may be implemented as part of a future capital improvement project.	Assessment/ Study	N/A	Raw Water Field Operations & Pipeline Maintenance Units, Groundwater Mangement Unit, Water Supply Planning and Conservation Unit	0-10	$$$$
WS-05	Continue design and environmental impact analysis for Pacheco Reservoir Expansion Project.	The Pacheco Reservoir Expansion Project would expand the storage capacity of the existing Pacheco Reservoir to 140,000 acre-feet through construction and operation of a new dam, conveyance facilities, and related appurtenant structures. Benefits of this project include a more reliable water source, improving fish habitat, and provide incidental flood risk reductions along Pacheco Creek. Action includes continuation of project planning, design, and environmental impact analysis.	Project	Pacheco Pass Water District	Business Planning and Analysis Unit, Pacheco Project Delivery Unit	0-10	$$$$$
Ecological Resources Actions (ECO) - Medium Term Actions							
ECO-12	Partner to support efforts to assess, enhance, and manage livestock ponds for habitat benefit.	Stock ponds are important not only for livestock but also can provide critical habitat for native wildlife that have come to depend on these reliable sources of water and wetland habitat. They help maintain biodiversity and can provide for important habitat areas if designed and managed for native species correctly. Valley Water does not own stock ponds, but can support this effort through information and cost sharing and technical support. Management techniques that can promote their use by special-status species may include periodic dredging of sediment filled ponds to increase their hydroperiods (i.e., how long they hold water), eradication of fish originally stocked by ranchers, control of nonnative American bullfrog, installation of basking structures, and fencing of the pond or a portion of the pond (depends on grazing pressures and which special-status species is being managed for).	Partnership	VHA, County Parks, State Parks, USFWS, CDFW, RCDs, native tribes	Environmental Mitigation and Monitoring Uni	11-20	$

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Number	Watershed Actions	Description	Activity Type	Potential Partner Agencies	Involved Valley Water Department	Implementation Timeframe (years)	Valley Water Cost Estimate*
Flood Risk Reduction (FRR) - Medium Term Actions							
FRR-07	Prepare Asset Management Plan for Uvas Creek.	Currently, Uvas Creek possesses creek assets in the moderate risk zone and should be monitored over time. The creek reaches between Highway 25 to Union Pacific Railroad, Babbs Canyon Creek Confluence to Miller Ave, Miller Ave to Santa Teresa Blvd, and Highway 25 to Bloomfield have the most inspection data and moderate risk assets. Fine sediment, erosion, and vegetation in and around the creek pose issues to creek capacity and flood control. Valley Water will create an asset management plan to provide a more proactive approach to managing infrastructure and projects.	Project	N/A	Business Support and Asset Management Unit	11-20	$$
FRR-08	Prepare Asset Management Plan for Lower Llagas Creek.	Lower Llagas Creek from Pajaro River to Buena Vista Ave has large quantities of in stream vegetation larger than Valley Water's Stream Maintenance Program can remove. This vegetation is contributing towards flood risk and the disappearance of access roads. Previous inspections of the creek have also found erosion due to rodent damage. Valley Water will create an asset management plan to provide a more proactive approach to managing infrastructure and projects.	Project	N/A	Business Support and Asset Management Unit	11-20	$$
FRR-09	Prepare Asset Management Plan for Upper Llagas Creek.	Upper Llagas Creek from Rucker Avenue to Monterey Road has conditions that lower creek capacity and should be monitored over time. Opportunities for improvements include bank stabilization, vegetation control, and sediment reduction to reduce flood risk. Valley Water will create an asset management plan to provide a more proactive approach to managing infrastructure and projects.	Project	N/A	Business Support and Asset Management Unit	11-20	$$
Water Supply (WS) - Medium Term Actions							
WS-03	Expand the production and use of recycled water in the South County watershed by studying projects identified in the 2021 Countywide Water Reuse Master Plan and the 2015 South County Recycled Water Master Plan Update.	The Upper Pajaro watershed relies on groundwater to meet its water supply needs and there is a need to diversify the water supply portfolio of this area. The 2021 Countywide Water Reuse Master Plan and the 2015 South County Recycled Water Master Plan update provide potential projects to increase the use of recycled and purified water, such as a raw water augmentation projects in Morgan Hill and expanding the South County Recycled Water system.	Project	City of Gilroy, Santa Clara County	Recycled Water Unit, Groundwater Management Unit	11-20	$$$
Water Supply (WS) - Long Term Actions							
WS-02	Complete Uvas-Llagas Transfer Pipeline condition assessment and implement recommendations.	The Uvas-Llagas Transfer Pipeline was installed in 1957. The corrugated metal pipe consists of a 39-inch diameter, 14,850-foot-long reach and a 27-inch diameter, 2,375-foot-long reach. It was last inspected in 2022, where 85% of the pipeline was inspected and found to be in good condition. It is recommended to install an additional 1-2 maintenance holes in the pipeline as the current distance between access points is too far. The pipeline is a critical facility that increases redundancy in the system and provides flexibility with regards to water supply sources.	Assessment/ Study; Project	N/A	Raw Water Operations Unit	21-50	$$$$
WS-06	Evaluate improvements to San Felipe Division Infrastructure and consider replacement projects for parts of the system.	This project implements a systematic approach to the renewal and replacement of infrastructure within the San Felipe Division, by designing and constructing improvements identified through Valley Water's 10-year Asset Management Program. Infrastructure within this project includes tunnels, large diameter pipelines, pumps, valves and other appurtenances, vaults, and associated support equipment. Reach 1 renewal and replacement activities are conducted in coordination and cooperation with San Felipe Division Reach 1 contractors and other agencies. Reaches 2 and 3 renewal and replacement are the sole responsibility of Valley Water, in coordination with USBR (as the owner of the facilities) and regulatory agencies.	Assessment/ Study; Project	San Benito County Water District, United States Bureau of Recclmation	Business Planning and Analysis Unit, Raw Water Operations Unit	21-50	$$$$$
WS-07	Implement the Pacheco/ Santa Clara Conduit Right of Way Acquisition.	Pacheco and Santa Clara Conduits provide raw water supply to Valley Water and San Benito County Water District. Regular access to pipeline vaults is needed by Valley Water for maintenance which requires crews and vehicles to go through private land. While verbal agreements have been established with local landowners, no formal easements are in place. This project plans, designs, and constructs improvements related to the acquisition of right-of-way along the South County pipelines to provide unlimited access to Valley Water-owned pipelines and reduce conflicts with local land owners to improve response time for emergency repairs or operations.	Partnership	San Benito County Water District	Business Planning and Analysis Unit, Pipelines Project Delivery Unit	21-50	$$$

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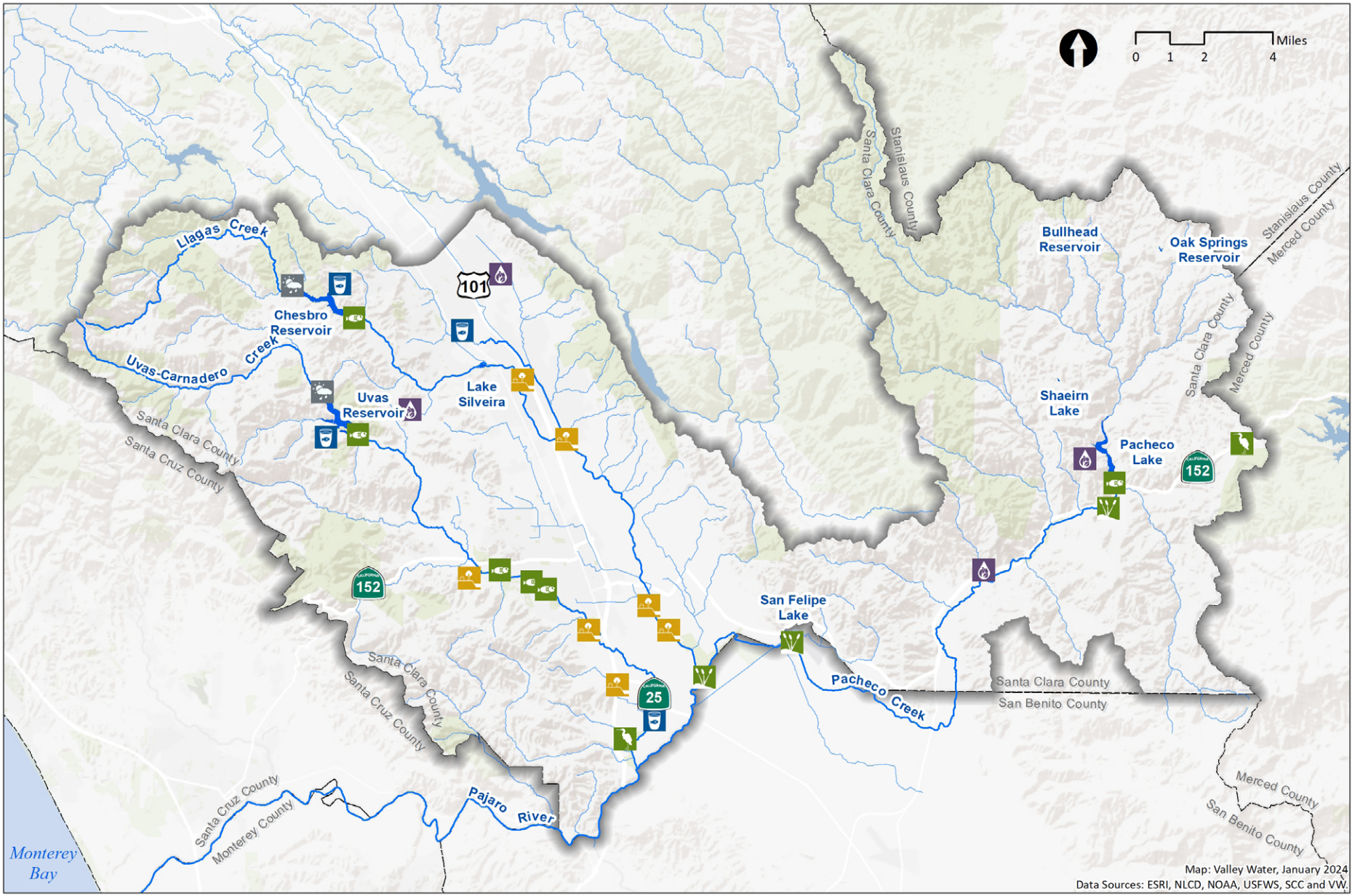

Figure 4-1: Upper Pajaro Watershed Priority Actions

NEXT STEPS

As a watershed master plan supporting long-range strategic planning for Valley Water, the One Water Upper Pajaro Watershed Plan now has a variety of purposes. First, this list of Priority Actions will be consulted for future capital and operations and maintenance activities, including incorporation into Valley Water's existing Capital Improvement Program process as appropriate. Second, actions will be considered for future grant funding opportunities from the state and federal government. Third, priorities will be considered for both enhancement and mitigation actions when working with regulatory agencies. And finally, priorities will be shared with grantees and partners seeking to work with Valley Water.

Though completed in 2024, the One Water Upper Pajaro Watershed Plan is a living document. Valley Water anticipates updating the Plan approximately every five years. These watershed plan updates will be able to incorporate the best available data and provide the latest recommendations to the Board and Valley Water's partner agencies. Once implemented, Valley Water will follow up on One Water actions to monitor and measure success.

ADDITIONAL ONLINE SUPPORTING DOCUMENTS

Upper Pajaro Watershed Setting Report

One Water Flood Vulnerability Assessment Technical Report

APPENDICES

Appendix A: Public Participation Process

Photo: Valley Water

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