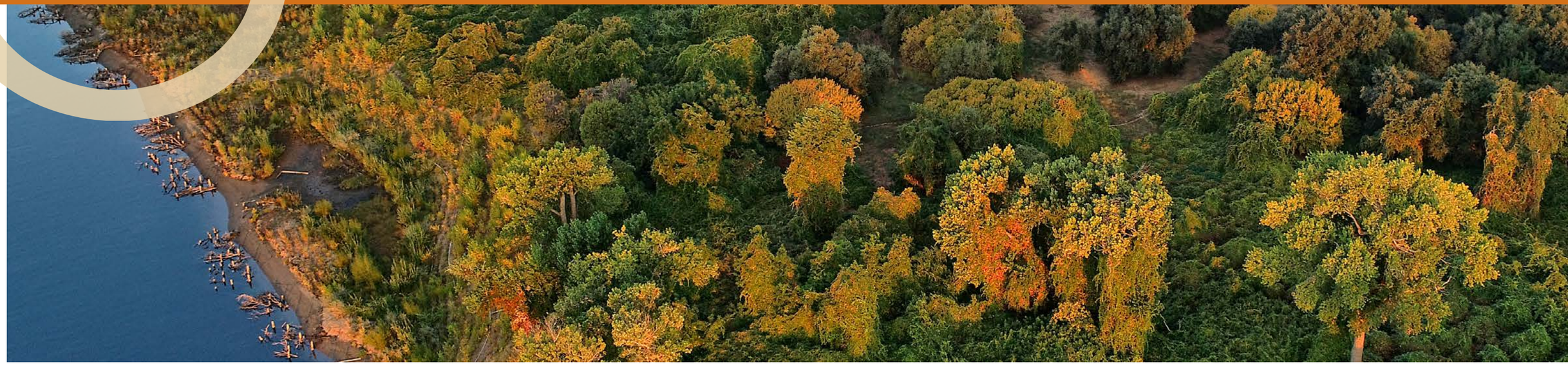
8 MANAGEMENT, IMPLEMENTATION AND MONITORING



CHAPTER 8

INTRODUCTION AND OVERVIEW

The NRMP applies an adaptive management framework that incorporates tools to address natural resource impacts. Adaptive management is based on the idea that flexible, iterative management allows decision makers to develop goals, objectives, and implementable actions informed by existing knowledge, technology, and research to address uncertainties in ecosystem and natural resource management planning (Stankey et al. 2005).

Using the adaptive management framework, natural resource managers develop hypotheses for specific actions to produce desired outcomes and then test those hypotheses, monitor the results, analyze the data, and compare the results to anticipated outcomes. These efforts inform future changes to natural resource management whereby parks managers can assess successes and failures and alter future management accordingly. Adaptive management links lessons learned with policy and implementation through a cyclical process that mimics the scientific method. It enables jurisdictions and agencies to be more responsive to knowledge gained from past management as well as through the scientific community and the public. Adaptive management is particularly useful when an agency's ability to conduct extensive studies and collect data prior to implementing management actions is limited by tight deadlines, budgets, staff resources, or other factors (Stankey et al. 2005).

The NRMP's adaptive management approach is dual-faceted. First, it will allow Regional Parks to adjust management decisions based on knowledge gained from monitoring previous management actions, as discussed above. Second, the system will allow Regional Parks to update its monitoring strategy (and management actions) to address unexpected modifications to the natural setting (e.g., climate change), the introduction of new species of concern (e.g., newly-listed threatened or endangered species), evolving understanding of resource processes and dynamics, and new resource management techniques and technology. The NRMP review and update process will involve partners, stakeholders, resource agencies, and the public to ensure the updated document is inclusive and considers knowledge and input acquired from a variety of sources. The NRMP formalizes this approach through the goals and objectives shown in Chapter 2. Additionally, the NRMP will undergo a formal comprehensive review five years after its adoption, and there are interim points for evaluation (specifically after two years). The NRMP categorizes the lands within the parkway into three area types: preservation, conservation, and naturalization. The area plan maps included in this chapter show how these areas are mapped throughout the Parkway. Another category, rehabilitation overlay, applies to areas in the Parkway that may be impacted by future disturbance.

Restoration site in the Discovery Park Area. Photo Credit: Regional Parks

This chapter first describes implementation and monitoring (Section 8.1) organized by Goal Area. The chapter introduces monitoring, but a full monitoring plan will be completed after he review of the public draft. Next, the chapter provides a description of the natural resource management categories (Section 8.2), followed by a discussion of how potential projects in the Parkway would be prioritized (Section 8.3). Section 8.4 identifies key potential funding sources, and Section 8.5 discusses potential mitigation areas and natural resources management. The final section (Section 8.6) describes area mapping, and shows the parkway-wide and reach-wide extents of key management indicators including land use, inundation, vegetation community, and level of alteration. Additionally, there are also paired maps that depict the location of key management indicators showing in the previous reach maps and potential management actions. These maps are key to guiding both management and implementation of the NRMP.

8.1 KEY INDICATORS USED FOR ANALYSIS

Four key indicators were used to help develop the natural resource management categories and guide potential future management actions. These include level of alteration, inundation, vegetation communities, and land use; these indicators are described below. Each indicator is accompanied by four maps showing the Parkway as a whole along with three hydrogeomorphically distinct reaches within the Parkway: lower, middle, and upper.

The levels of alteration were derived from a variety of sources including historic maps, historic aerial photographs, Regional Parks' records, studies and reports documenting American River resources, best available Google Earth aerial imagery, and field investigations. Inundation extents are derived from 2D and 3D hydrodynamic flood flow models (CBEC 2019). Vegetation communities are categorized by stand structure, growth form, floristic composition, and canopy coverage as determined by Regional Parks natural resource management staff, the River Corridor Management Plan (RCMP) (Jones & Stokes 2002), and the American River Parkway Floodway Vegetation Management Plan (FVMP) (EDAW 2009). Land uses reflect policy directives made to assess environmental condition, size, location, purpose, and other characteristics for areas within the Parkway (Sacramento County 2008a). The information regarding level of alteration, inundation, vegetation communities, and land use, was used to understand the existing conditions, anticipated trends, and future Parkway uses that will influence the implementation of management categories and potential management actions. The information was also used to identify those communities and/or areas that should be classified as preservation, conservation, or naturalization.

Goat grazing for fire fuel reduction. Photo Credit: Regional Parks

KEY INDICATOR 1

LEVEL OF ALTERATION

The level of alteration of a given area was identified as an important factor for planning purposes given that the history of an area often informs its current condition and what may influence its future condition. As described in Chapter 5.0, Physical Resources, there are geologic, hydrologic, and geomorphic conditions that greatly influence the overall physical conditions in the Parkway. But it also describes the many changes, or alterations, that have taken place which have had a lasting impact on the river channel and surrounding Parkway landscape. These include hydraulic mining in the upper watershed, dredger and aggregate mining within the Parkway, construction of Folsom and Nimbus dams, construction of levees, agricultural activity on the floodplain, and construction of infrastructure such as water intakes, electric transmission lines, and bridges. All of these activities, whether or not they are obvious to the casual observer today, have a strong influence on the physical condition of the Parkway and are important to informing the ongoing management of the Parkway's natural resources. Three categories were used:

- Intentionally Altered: Footprints of physical changes resulting from human actions (e.g., areas within the Parkway that were dredger mined for gold).

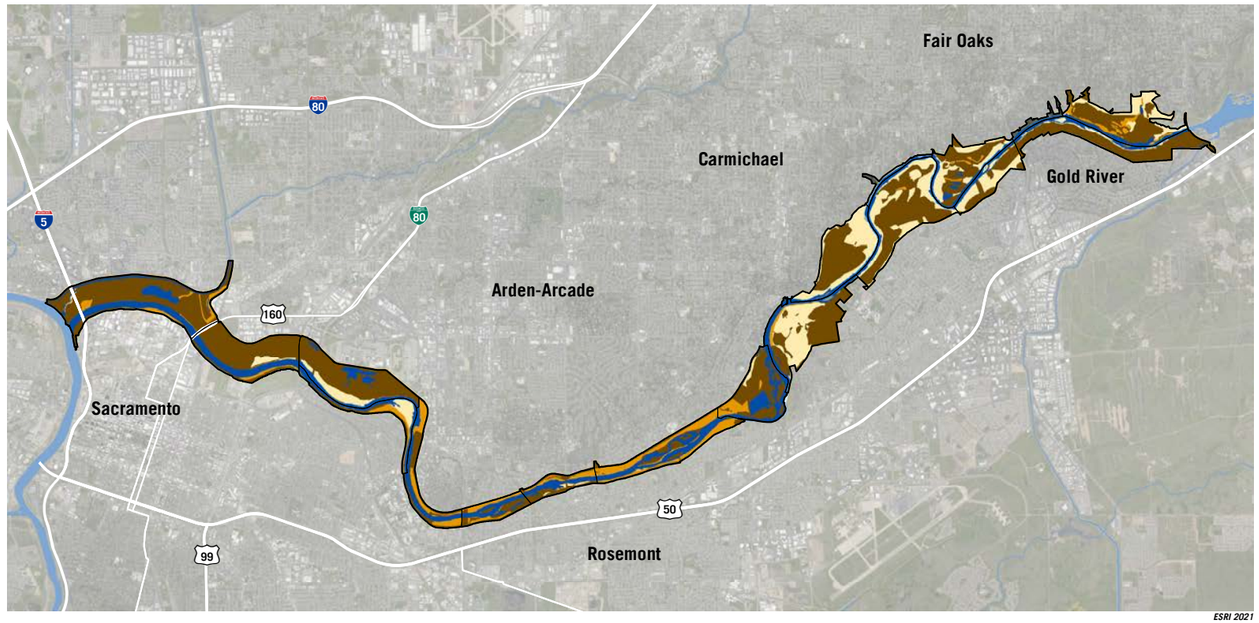


Figure 8-1
Parkway Alteration

- Unintentionally Altered: Areas affected by off-site human actions due to intentional alterations elsewhere (e.g., sediment flowing to a site as a result of hydraulic mining in the upper watershed).
- Unaltered: Areas without any definitive evidence of alteration from direct or indirect actions.

Following are additional examples of the types of conditions that led to intentionally altered, unintentionally altered, or unaltered classifications:

- Examples of areas that were identified as intentionally altered include those that were directly subject to: levee construction, bank protection, channel realignment, mining or mining materials handling and processing, construction of infrastructure, gravel augmentation, agriculture, developed recreation facilities, and formal mitigation sites.
- Examples of areas that were identified as unintentionally altered include those that were indirectly subject to: river channel aggradation or degradation as a result of upstream influences (e.g., Folsom Dam or mining activities changing sediment supply), additions of sediment upstream, induced bank erosion due to adjacent levees, changes in surface water inundation or drainage patterns, and changes in groundwater availability.
- Examples of areas that were identified as unaltered include those that are without any definitive evidence of direct or indirect physical alteration.
- Understanding an areas level of alteration can help explain a site's current topography, inundation regime, vegetation patterns, etc. It can also help to better understand ongoing trends and what might be expected in the future. The high floodplains in the lower reach of the river serve as a good example, in that the past inundation regime allowed for the natural regeneration of cottonwood trees. However, since the riverbed lowered as the hydraulic mining debris was flushed out, while the adjacent overbank areas remained high, the cottonwoods no longer naturally regenerate in several overbank areas. This has resulted in the transition of vegetation in these areas from willows and cottonwoods to species better suited for drier conditions, like oaks. This trend is expected to continue and is important to inform future management actions.

Figure 8-2
Lower Reach Alteration

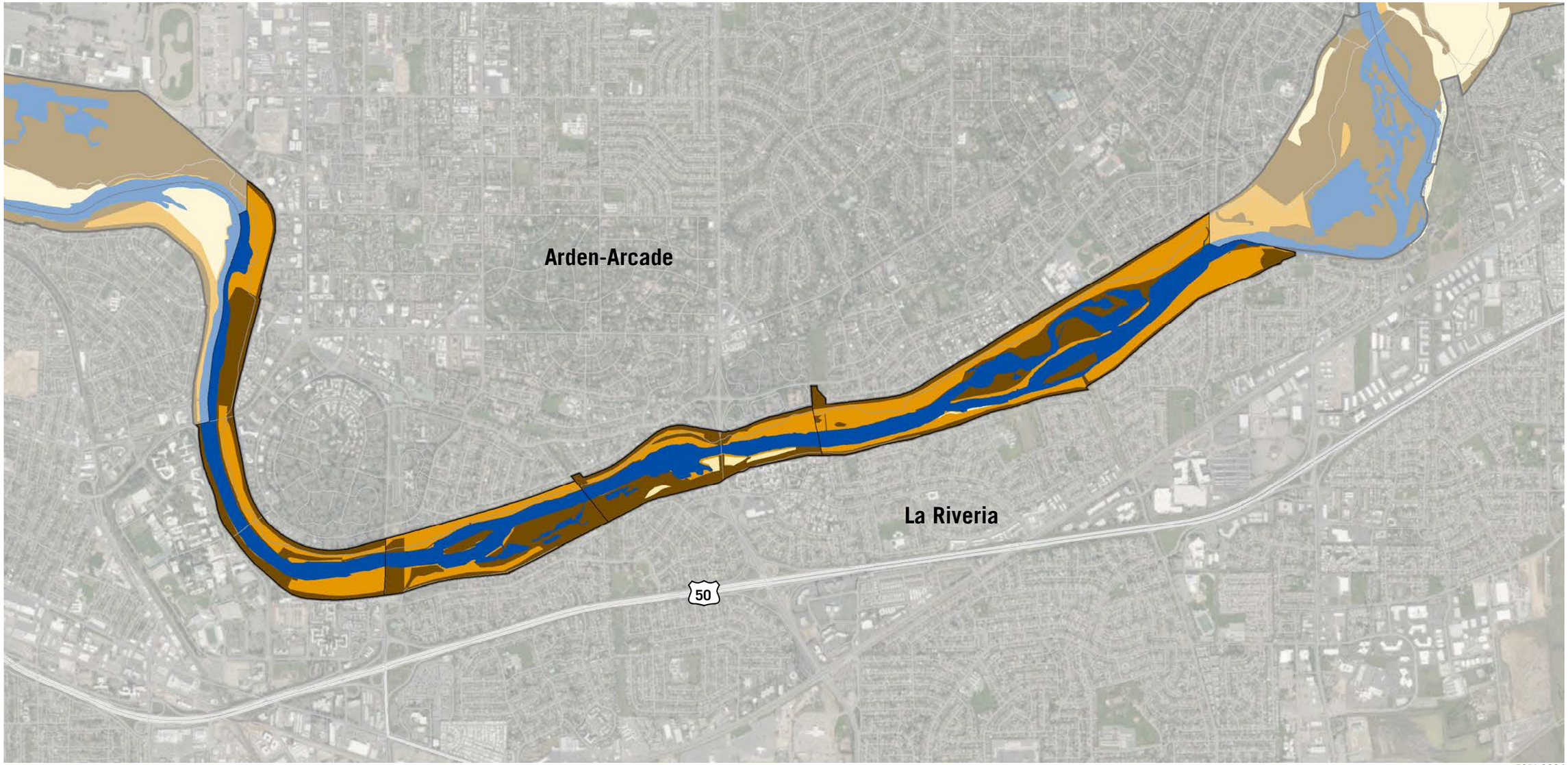
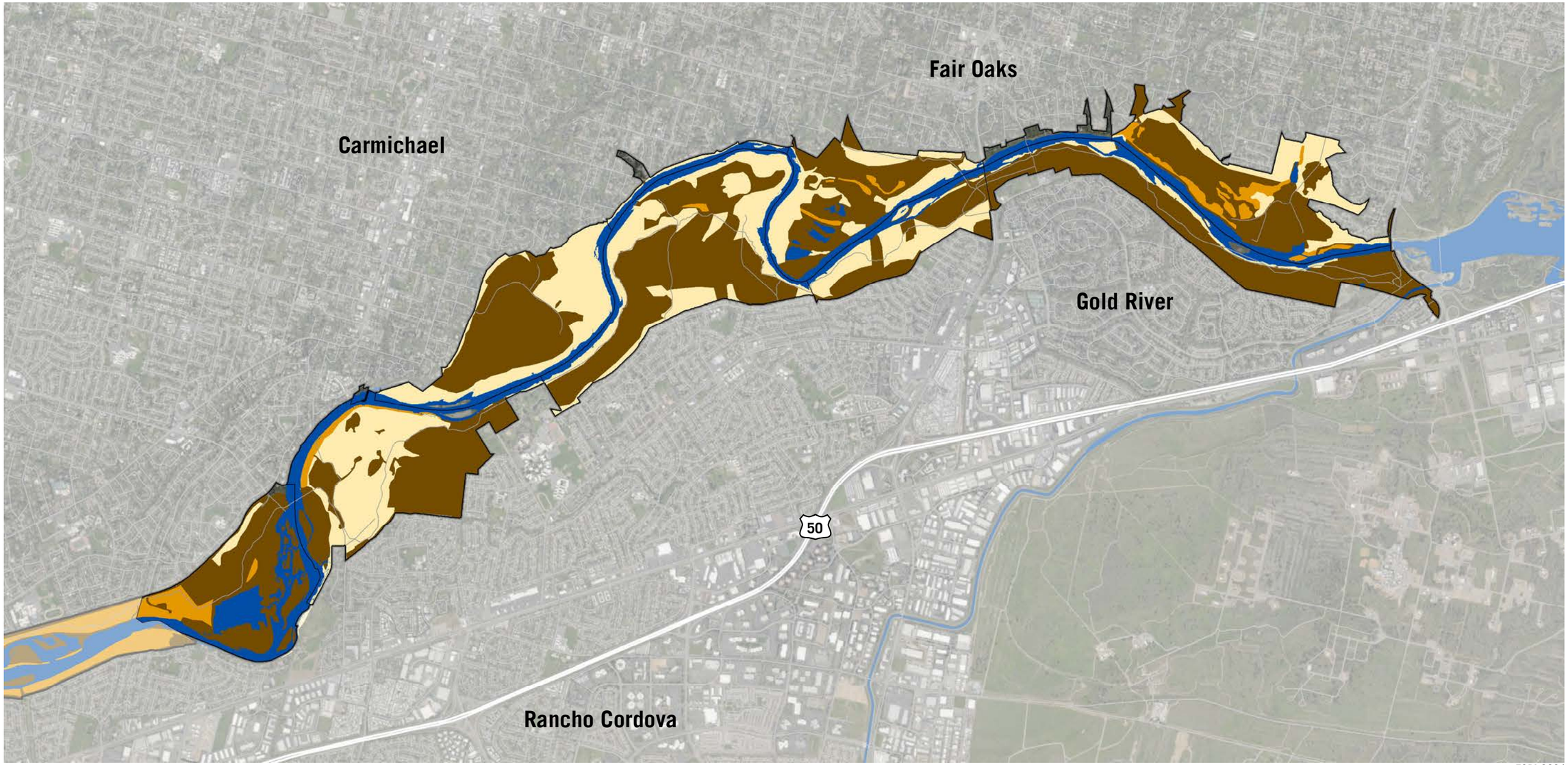


Figure 8-3
Middle Reach Alteration



ESRI 2021

Intentionally Altered
Unintentionally Altered
Unaltered

0 0.5 1 Miles

Figure 8-4
Upper Reach Alteration

KEY INDICATOR 2

INUNDATION

The distribution of Parkway land potentially suitable for various types of vegetation communities relates to the frequency and duration of inundation as a result of river hydrology. The inundation maps serve as a planning tool that highlights the relationship between a given land area and its probable surface and subsurface moisture conditions as they relate to river flows and periodic inundation. The inundation maps provide a few key flows that are relevant to different vegetation communities. For example, areas that are inundated under the 2-year recurrence interval typically support vegetation types that are tolerant of frequent inundation, periodic saturated soils, and potentially, high velocity flows. Examples of species suitable in these areas range from alder and willow riparian scrub to cottonwood and mixed riparian forest habitats. These habitats and species require periodic flooding for regeneration and maintenance.

Higher floodplain surfaces in the Parkway, represented on the maps by the 25-to-100-year recurrence intervals, are areas that are considered to be above most periodic flood events. Compatible vegetation types include valley oak riparian woodlands, mesic grasslands, and elderberry savanna. These types are tolerant of occasional or infrequent short-duration flooding and saturated or moist soils but do not require flooding for reproduction. Valley oak riparian woodlands, while tolerant of occasional flooding, consist of species that generally do not depend on flooding for regeneration.

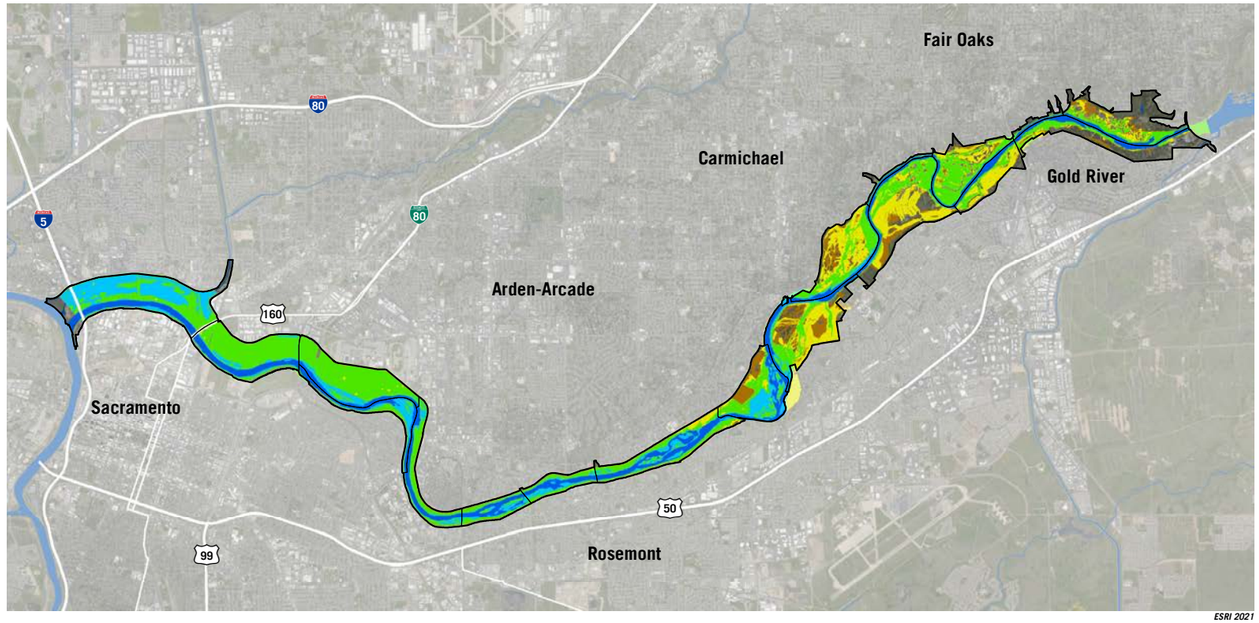


Figure 8-5
Parkway Inundation

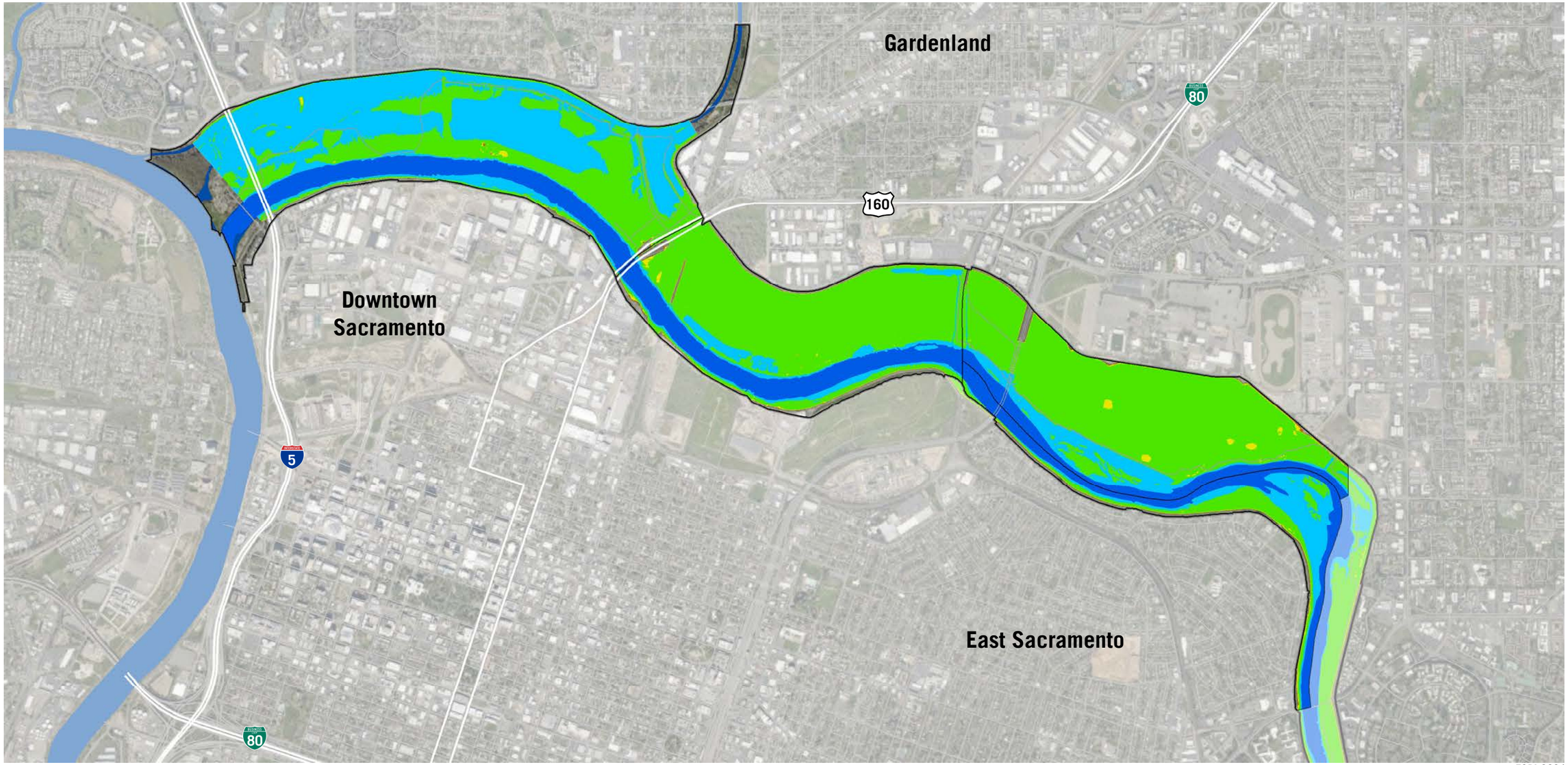


Figure 8-6
Lower Reach Inundation

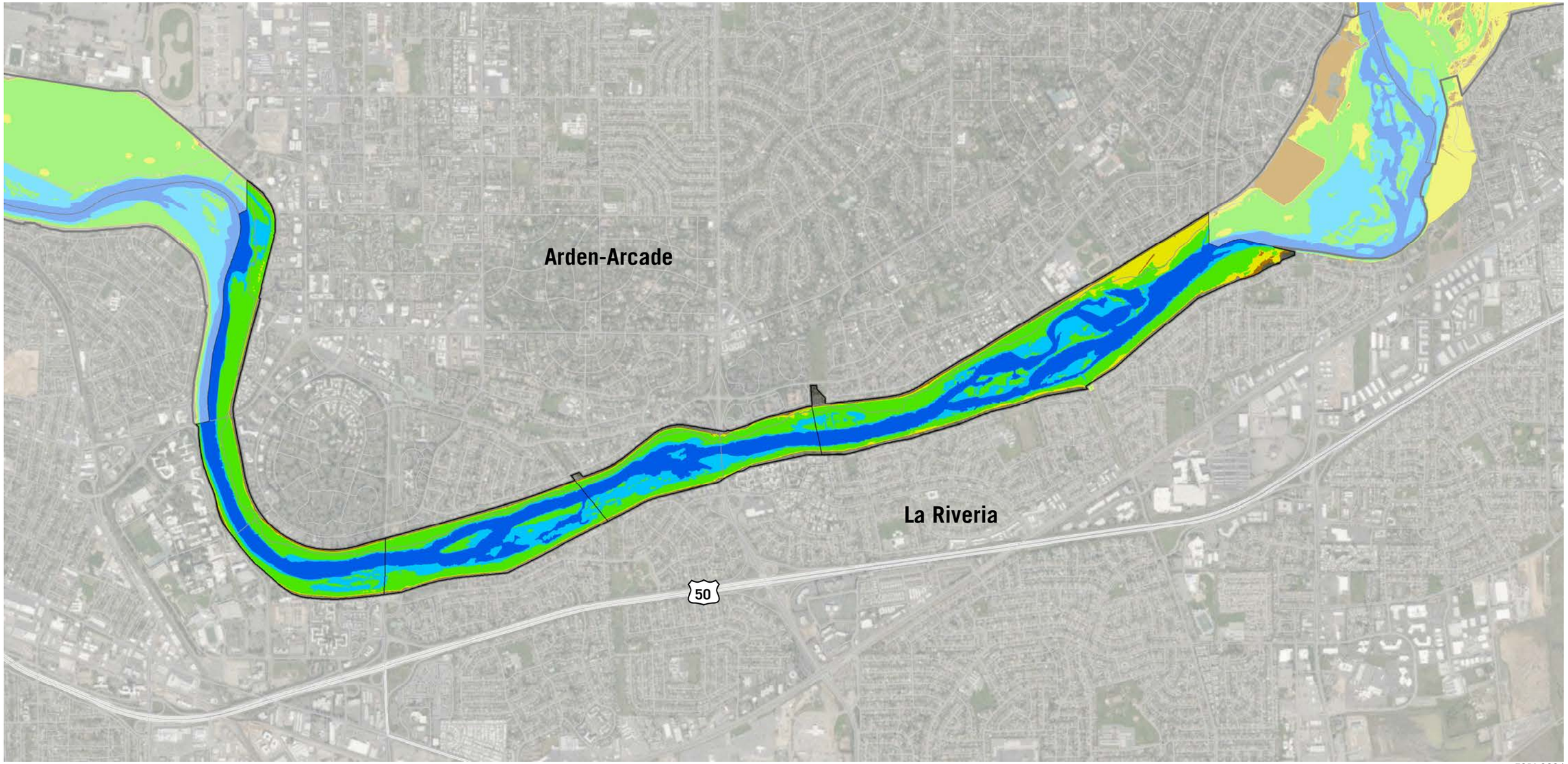


Figure 8-7
Middle Reach Inundation

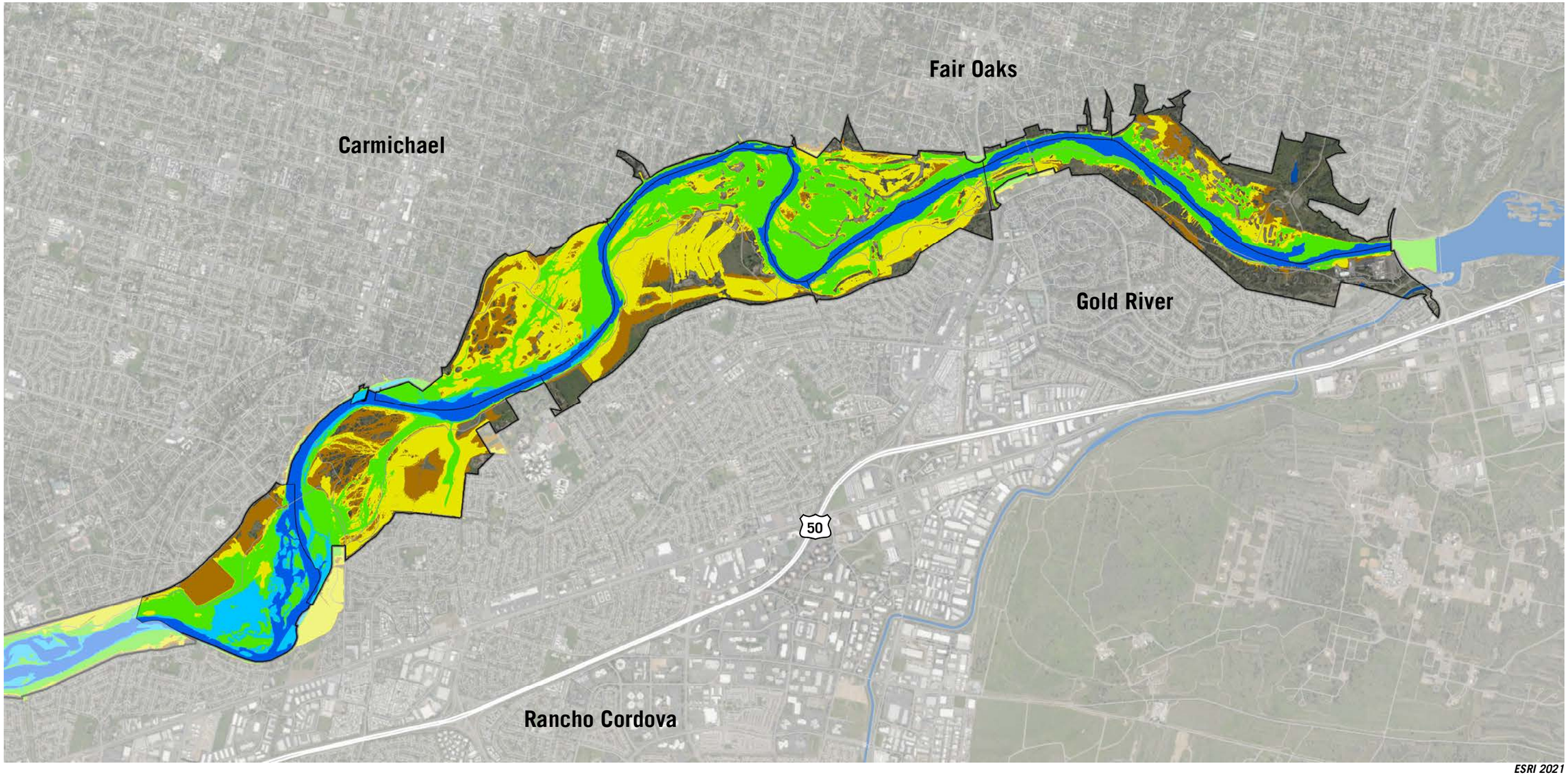


Figure 8-8
Upper Reach Inundation

KEY INDICATOR 3

VEGETATION COMMUNITIES

The vegetation community maps represent the most recent Parkway-wide GIS data. This information is important to understand existing conditions and how these vegetation communities are contributing to habitat values that meet the identified goals and objectives, or where changes should occur in order to better meet the goals and objectives. For example, areas with existing native riparian woodland or native grassland could be identified as vegetation communities to retain because of their value to desirable wildlife species. Opportunities to expand and/or connect disjunct patches of these habitat types could also be identified, as could areas that are not contributing to desirable habitat values and therefore should be managed differently (e.g., removal of nonnative invasive species).

The vegetation community data allows an assessment of conditions within each area plan, as well as within the Parkway as a whole. It is important to be able to assess habitat conditions at both spatial scales. For example, many raptors or other bird species require large trees or forests for nesting and roosting but open fields for foraging. These maps provide this varying scale of assessment to determine the overall suitability of conditions in relation to the goals and objectives, even if the desirable mix of habitats is not within an individual area plan.

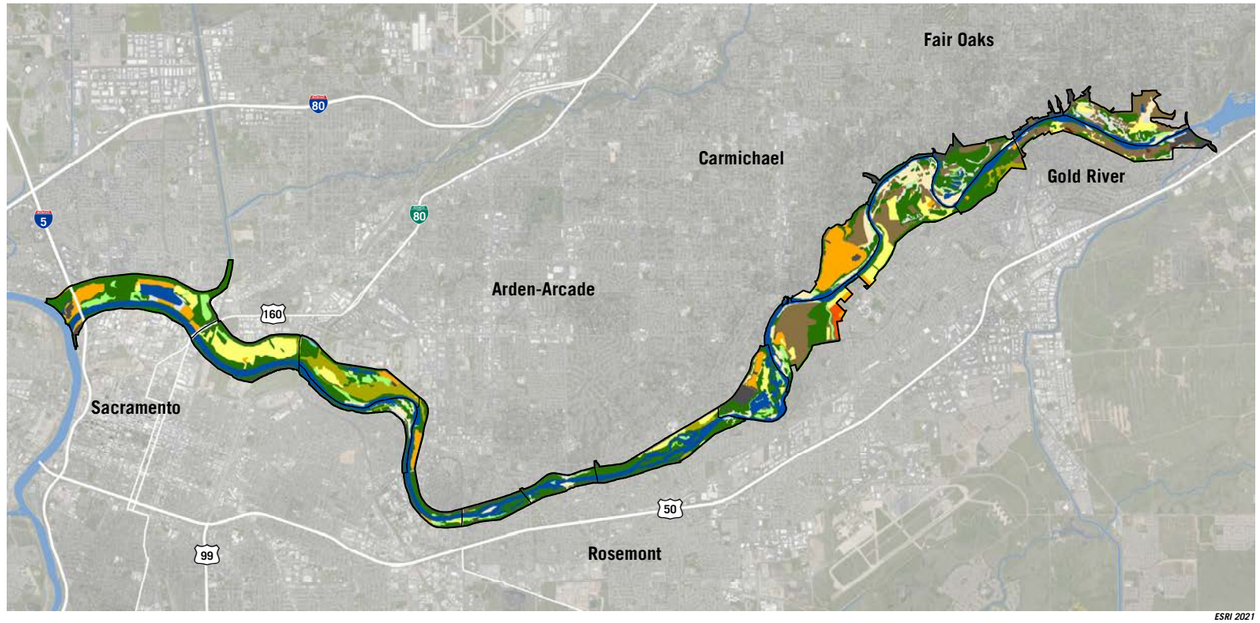


Figure 8-9
Parkway Vegetation Communities

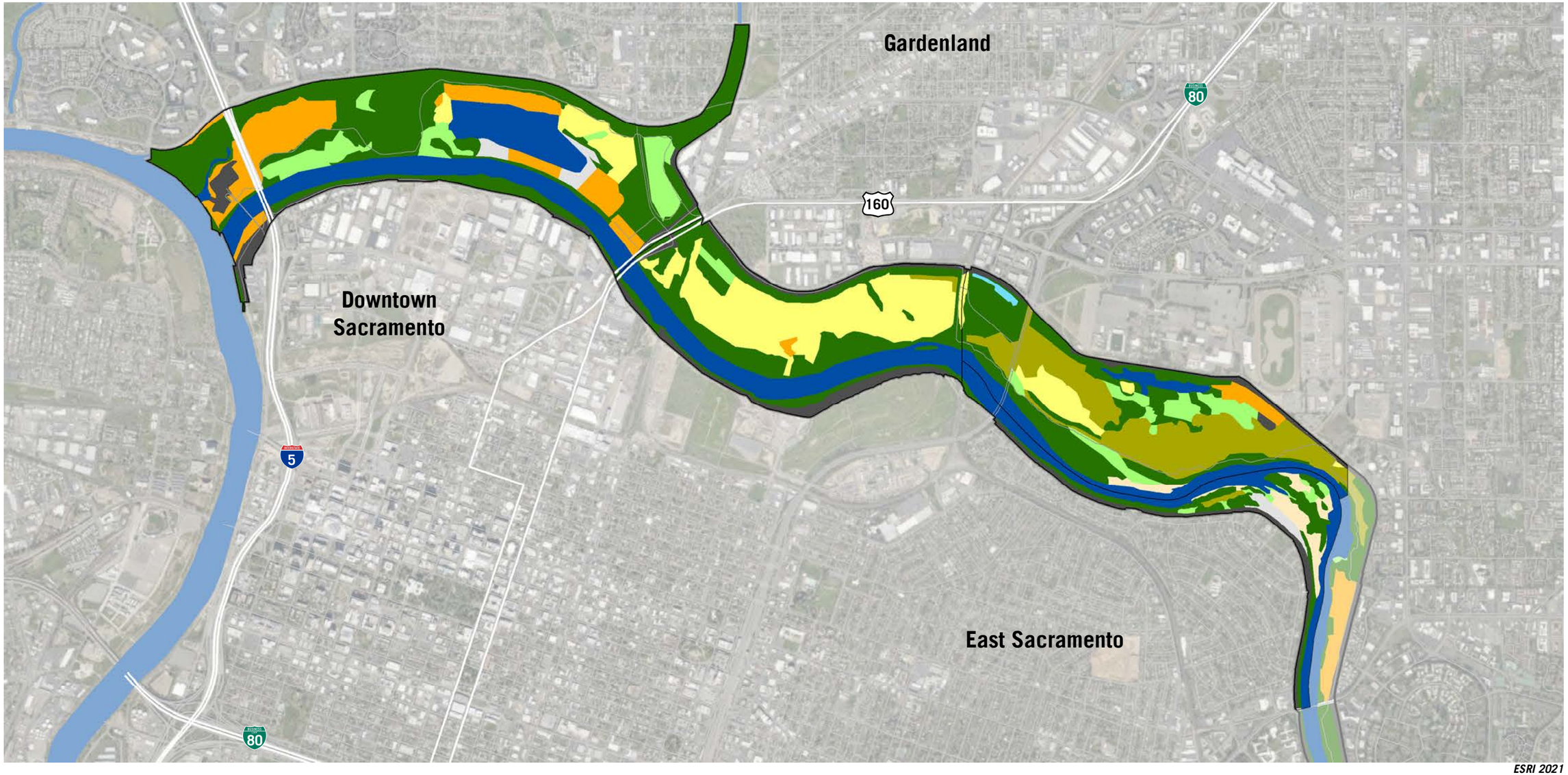
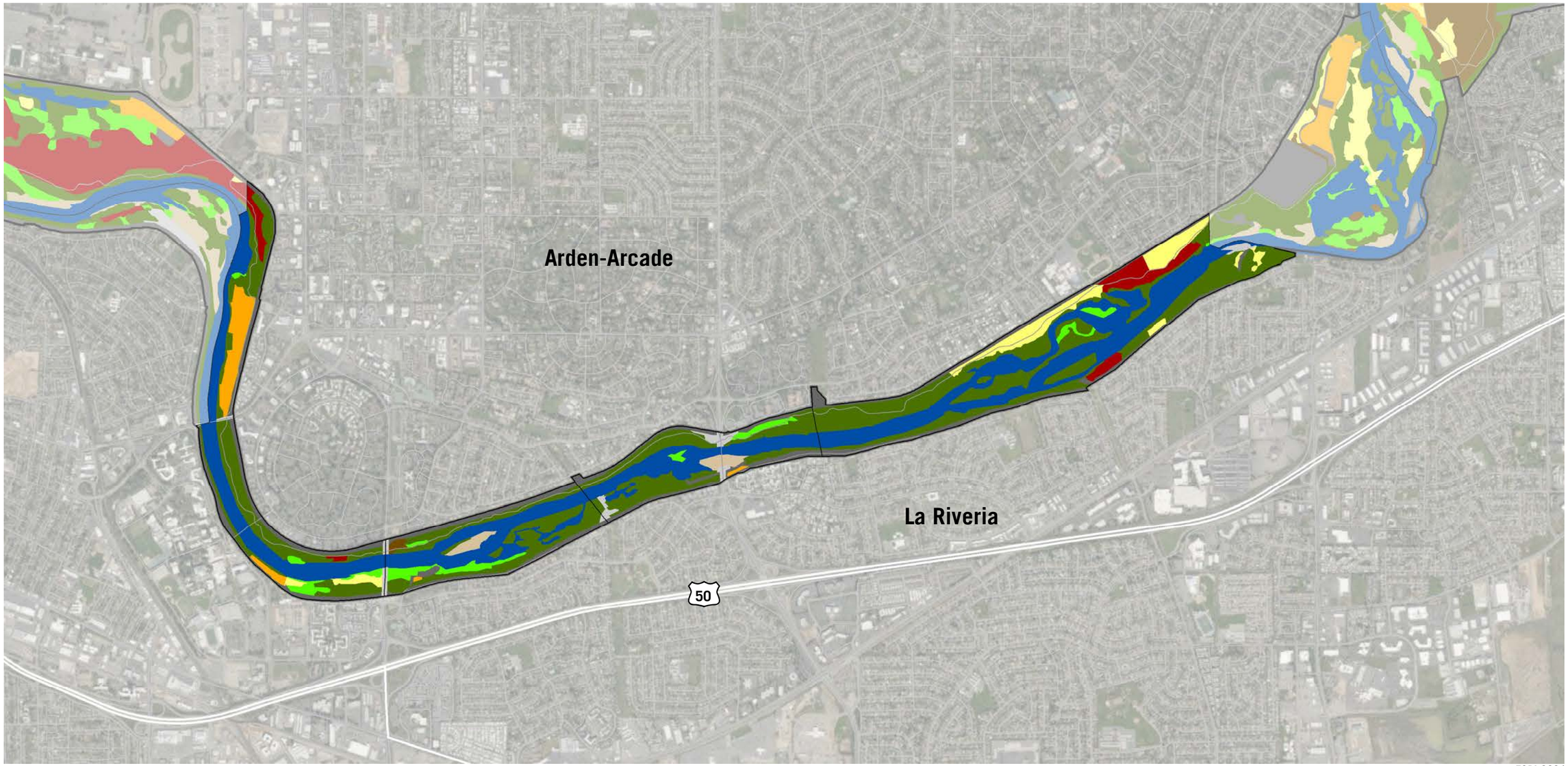


Figure 8-10
Lower Reach Vegetation Communities



ESRI 2021

Agriculture
Developed
Elderberry Savanna
Freshwater Emergent Wetland
Foothill Pine
Gravel Bar Chaparral
Open Water
Oak Woodland/Forest
Riparian Woodland/Forest
Riparian Scrub
Turf/Turf with Trees
Unvegetated
Valley Foothill Grassland

N

0 0.5 1 Miles

Figure 8-11
Middle Reach Vegetation Communities

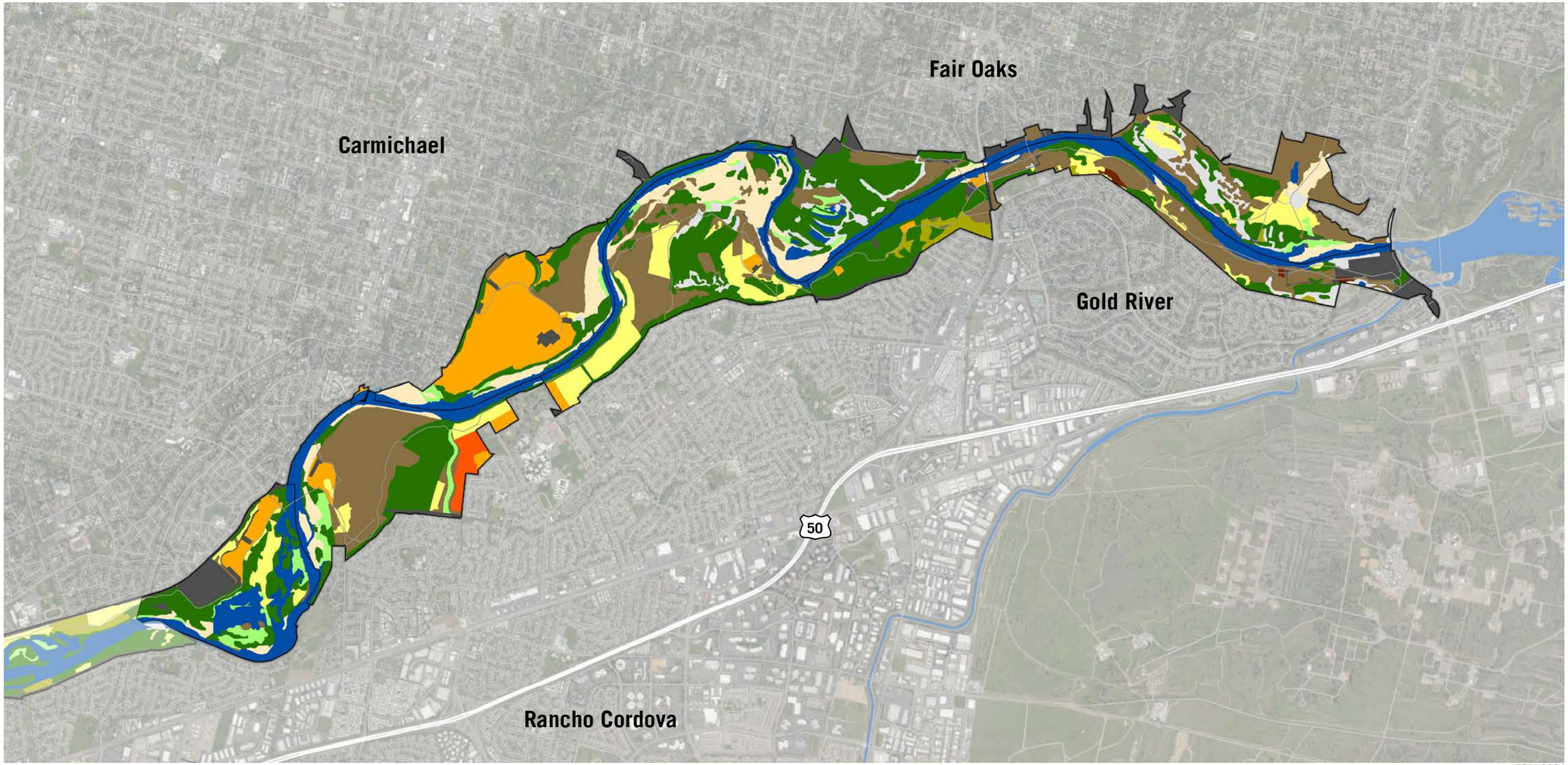


Figure 8-12
Upper Reach Vegetation Communities

KEY INDICATOR 4

LAND USE

There are several land use and infrastructure parameters that potentially influence natural resource management within the Parkway. These range from formal land use designations in the American River Parkway Plan to those associated with specific infrastructure, such as flood control levees, roads and bridges, and electric transmission lines. The land use maps included in the figures represent the formal land use designations in the American River Parkway Plan.

The purpose of the American River Parkway Plan is to provide a guide for land use decisions affecting the Parkway, and the Parkway Plan specifically addresses the preservation, use, development and administration of the Parkway. Knowledge and awareness of these land use designations is fundamental to planning for the management of natural resources in the Parkway. It is important to understand what uses are permissible within a given land use designation in order to understand their compatibility with specific natural resources and to plan accordingly for those existing or potential uses as consideration is given to meeting the goals and objectives of the NRMP.

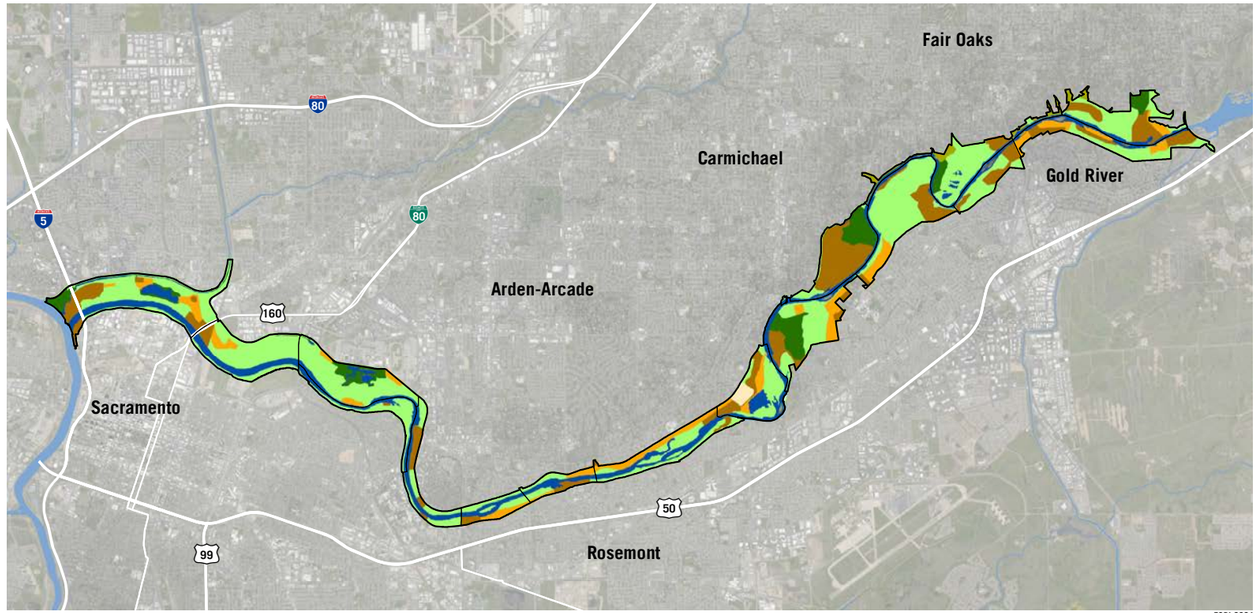


Figure 8-13
Parkway Land Use

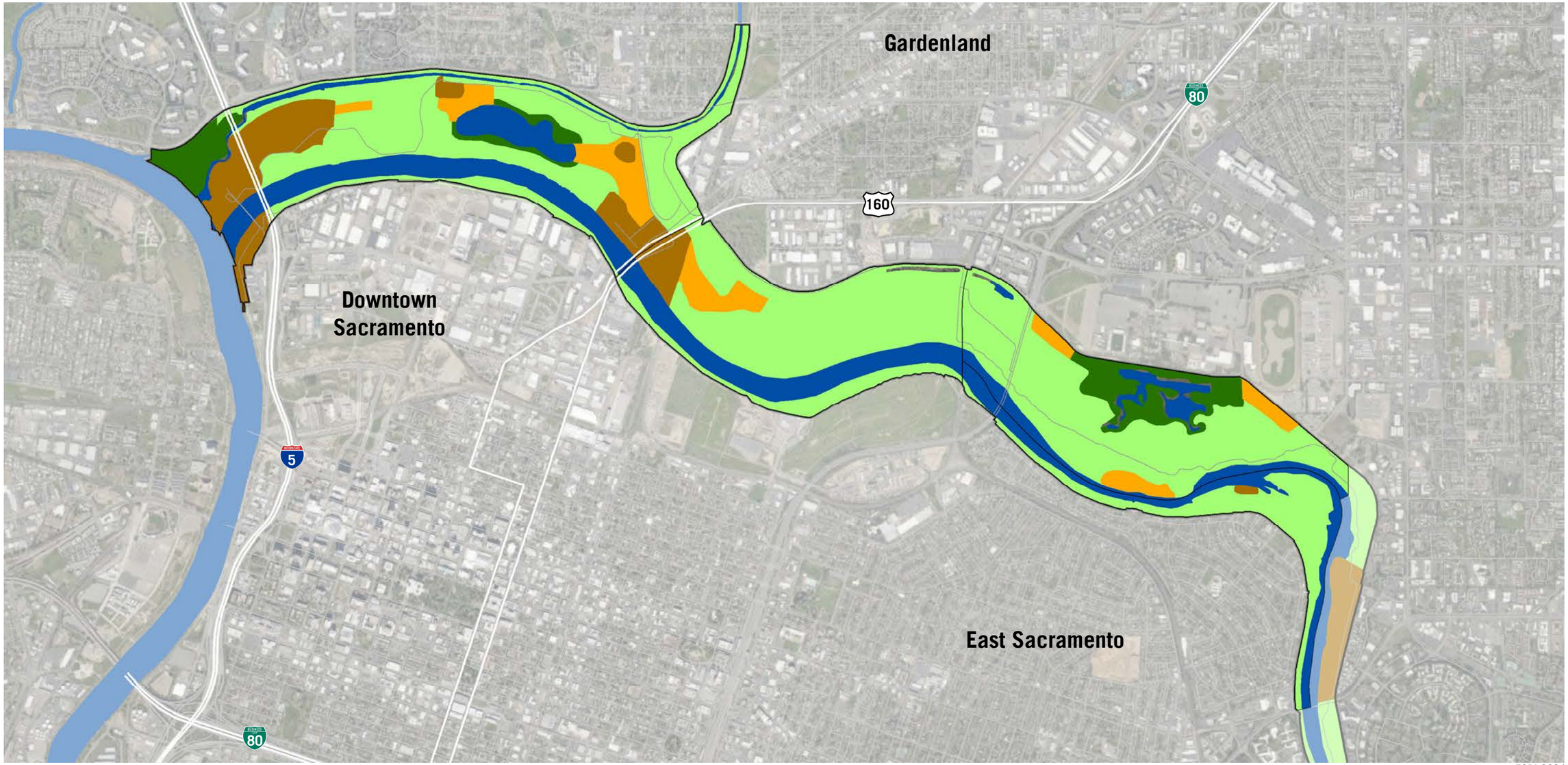
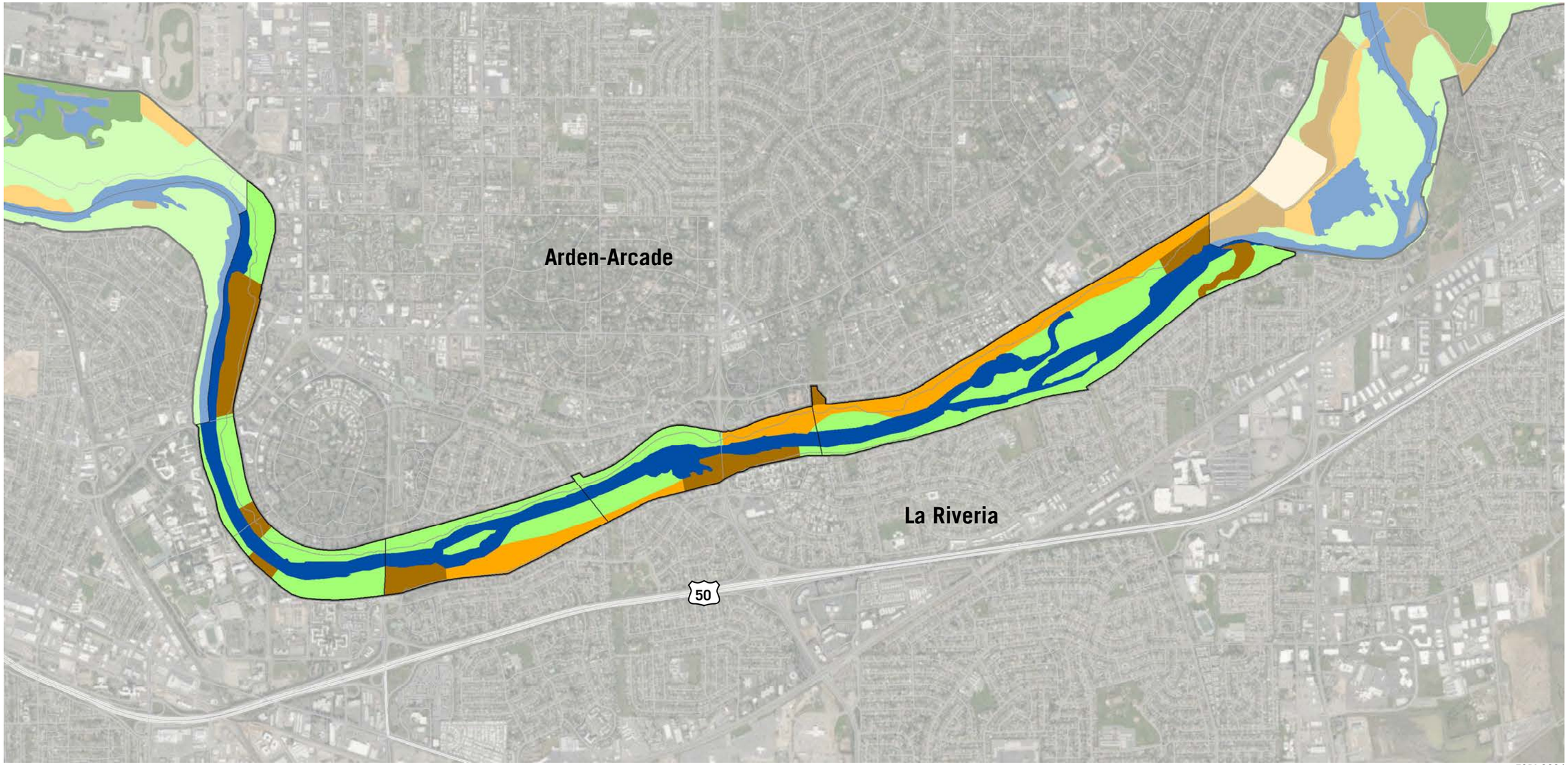


Figure 8-14
Lower Reach Land Use



ESRI 2021

- Nature Study Area
- Protected Area
- Open Space Preserve
- Recreation Reserve
- Limited Recreation Area
- Developed Recreation Area
- Other

0 0.5 1 Miles

Figure 8-15
Middle Reach Land Use

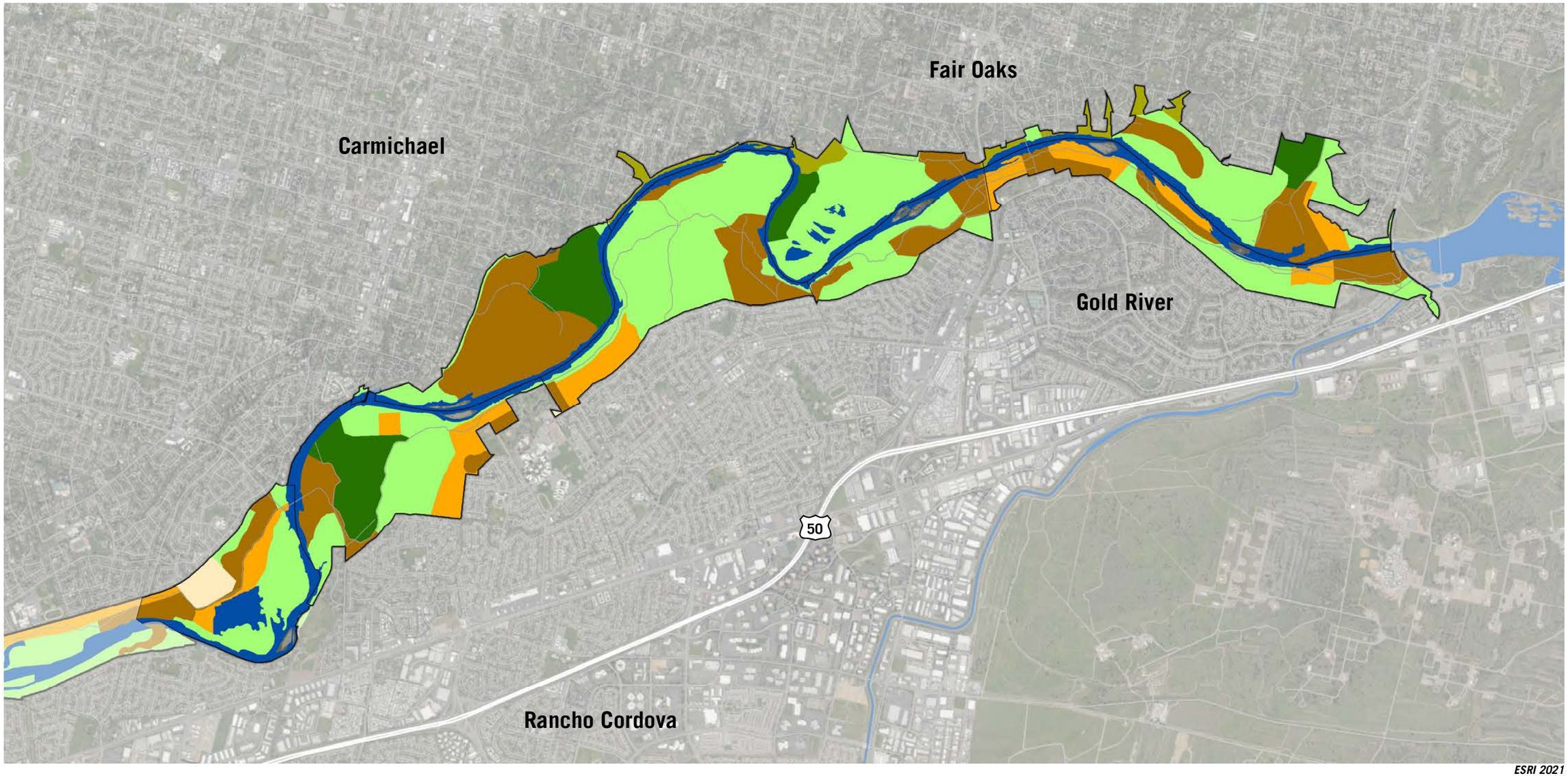


Figure 8-16
Upper Reach Land Use

8.2 NATURAL RESOURCES MANAGEMENT CATEGORIES

A key aspect of this NRMP is classifying areas in the Parkway by various management categories. The management categories guide management decisions throughout the Parkway. The management categories are shown in detail on the area plan maps. The management categories are described below:

- **PRESERVATION:** Existing mitigation sites that require protection in perpetuity.
  - **Examples of Management Actions:** Includes routine O&M activities such as:
    - » Weed management (e.g., mowing and herbicide application)
    - » Small-scale invasive plant removal (e.g., hand-pulling)
    - » Vegetation management for fire prevention
    - » Management of illegal camping sites consistent with County policies
  - **Example Project:** Protecting VELB mitigation sites at Cal Expo or SRA/riparian mitigation at various bank protection sites to ensure they continue to provide good quality habitat and meet regulatory commitments.
- **CONSERVATION:** Existing conditions are considered to generally meet desired conditions, but have been degraded to varying degrees (e.g., fire, illegal camping, social trails, degraded understory, etc.) and should be improved to meet goals. The need for ongoing rehabilitation of degraded areas is expected.
  - **Example Management Actions:** May include the activities above under Preservation, plus:
    - » Invasive plant removal
    - » Vegetation management for fire prevention
    - » Planting native vegetation
    - » Management of social trails
    - » Management of camp sites and associated debris
    - » Redesign or relocation of facilities
  - **Example Project:** Replanting areas that have recently burned at Discovery Park, repairing understory along Steelhead Creek damaged by camping, removing invasive plants that are intermixed with native plants at the Howe Avenue access point, consolidating social trails to reduce the overall number/footprint on the lower bank at Cal Expo, etc.

Signage directing proper trail use in the River Bend Park Area. Photo Credit: MIG

- **NATURALIZATION:** Modifying areas that were substantially altered in the past in order to improve existing natural resource conditions or otherwise modify to meet the management objectives of the ARPP, NRMP, and W&SR policies. This applies to areas previously altered and outcomes are generally native habitat types that would typically be expected to occur in the Parkway.

  Naturalization also includes converting areas that have not been altered by past actions (unaltered) to heighten, intensify, or improve highly valued resource functions that may have been lost or degraded over time. Generally, this entails conversion of land cover type.

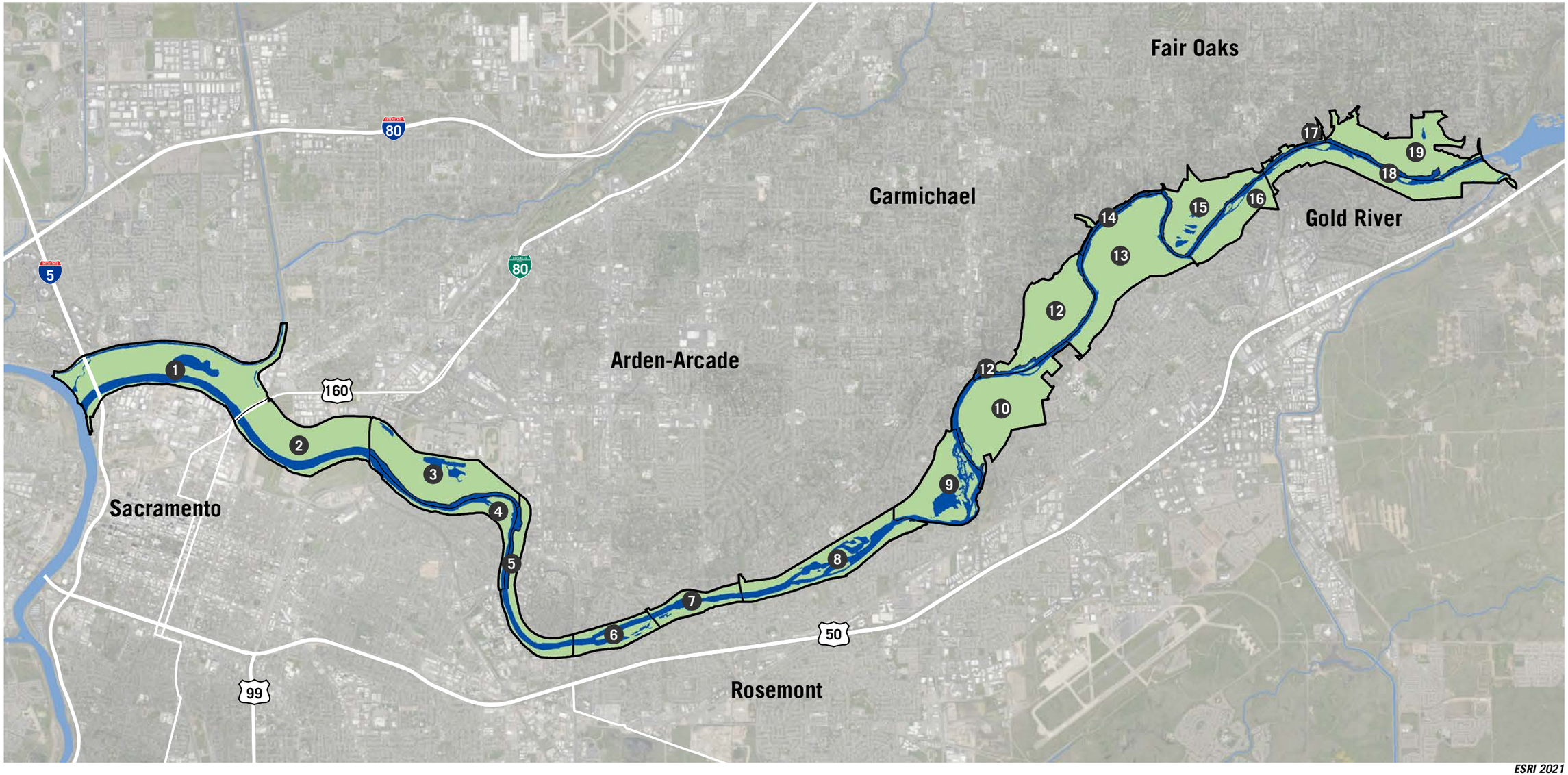
  - **Example Management Actions:** May include the activities above under Conservation, plus these types of actions in previously altered areas:
    - » Substantial earthwork to restore more natural hydrology and site features
    - » Material removal (e.g., cobble and dredge tailings)
    - » Replacement/amendment of substrate for planting
    - » Substantial earthwork to create a modified hydrology
    - » Material removal (e.g., channel bed and bank)
    - » Addition of material (e.g., gravel)
    - » Modification of substrate for planting
    - » Grading a high elevation floodplain or channel feature to a lower elevation to support seasonal aquatic habitat.
  - **Example Project:** Major modifications to areas previously altered in order to create more natural conditions, including potential projects at Discovery Park (Urrutia property), Woodlake and Cal Expo/Bushy Lake (Corps ecosystem restoration), Arden Bar, etc. Rearing habitat projects located in areas previously unaltered, typically lowering native surfaces to lower elevations [channel features or floodplain elevations] to make areas available to fish more often, creating side channels, etc.
- **REHABILITATION OVERLAY:** Applies to any of the aforementioned categories that are degraded or damaged in the future and require action to improve their condition. Rehabilitation is an overlay of all other categories and can happen anywhere in the Parkway, just as all areas in the Parkway are subject to degradation or damage.
  - **Example Management Actions:** Generally may include those activities necessary to bring the site back to conditions prior to recent damage, which may include:
    - » Temporarily limiting public access
    - » Debris removal
    - » Post-fire cleanup
    - » Minor surface grading to address damaged conditions
    - » Large-scale planting of appropriate native vegetation
    - » Large-scale invasive plant removal (e.g., with mechanized equipment)
  - **Example Project:** Applies to existing conditions or any of the projects in aforementioned categories that are degraded or damaged in the future and require action to improve their condition.

Vegetation management park closure signage.
Photo Credit: Regional Parks

8.3 AREA PLAN MAPPING

In order to present management actions in the Parkway, a two-sided 11x17 area plan map is provided for each of the 19 areas. On the first side, existing and desired conditions are provided for every area plan; side one also includes thumbnail maps of land use designations, the extent of flood inundation (including recurrence intervals for 2-year, 25-100 year, and 200 years), vegetation communities, and level of alteration (how much an area has been changed by human activity). Side two of each map set shows recommended management actions and management categories. A key aspect of guiding management action in the Parkway in the management categories shown in the 19 Area Plan maps. Each of the map sets is preceded by a write-up that describes each Area. The maps show the location of Water Forum projects designed to enhance fisheries in the LAR; some potential projects, a proposed by the Water Forum, have been removed from the Area Plan maps by Regional Parks for reasons of visitor health and safety. Figure 8-17 shows the Parkway as a whole with each Area Plan labeled numerically.

The Stanfield Marsh Boardwalk, an example of environmentally-friendly raised platform trail design. Photo Credit: MIG



ESRI 2021

0 1 2 Miles

AREAS							
1	Discovery Park	5	Campus Commons	10	River Bend Park	15	Sacramento Bar
2	Woodlake	6	Howe Avenue	11	Sarah Court Access	16	Lower Sunrise
3	Cal Expo	7	Watt Avenue	12	Ancil Hoffman County Park	17	Sunrise Bluffs
4	Paradise Beach	9	Arden Bar	13	Rossmorr Bar	18	Upper Sunrise
				14	San Juan Bluffs	19	Sailor Bar

Figure 8-17
American River Parkway

AREA PLAN 1

DISCOVERY PARK

8.5.1 Discovery Park Area Plan

Historic Physical and Biological Conditions

Well before the time of European settlement, the lower reach of the LAR featured a deep channel with a relatively steep gradient flanked by high floodplains to the north and south. A subsequent rise in the bed of the Sacramento River created a back-water condition at the confluence of the two rivers, flattening the gradient and introducing tidal conditions along the lower five miles of the LAR. Reduced gradients led to an outbreak flood pattern and distributary sloughs, resulting in a greater reduction of LAR channel capacities. This landscape supported a complex upland and riparian forest, with abundant wildlife.

Impact of European Settlement

The California Gold Rush of the mid-1800's brought miners, city dwellers and farmers to the American River and inaugurated a century and a half of changes to the landscape that greatly altered the lower reach of the LAR. Placer mining quickly ran its course, giving way to decades of hydraulic mining activity in the upper American River Basin that accelerated the aggradation of the historic LAR channel. In order to accommodate their new railyard, city dwellers moved the LAR northward, leaving the bed elevation of the LAR perched well above that of the Sacramento River and filling in the distributaries and its southern floodplain. Farmers cleared portions of the northern floodplain and the Natomas Consolidated Company, the region's biggest dredge mining operator, used its capital and equipment to encircle a majority of the American Basin with levees and connect the foothill tributaries north of the river to Bannon Slough, creating the modern-day Natomas Basin. Creation of the Natomas Basin greatly influenced the ability of high flows to spread across the floodplain. More levee construction along the north side of the river, followed by the construction of Folsom Dam, reversed the aggradation of the channel bed to long-term degradation in the lower reach of the river, which increased the separation of the channel from its remaining floodplains. The levees also contributed to greater flows and flow depths in the channel and remaining overbank areas for any given overbank LAR discharge.

All of Discovery Park was altered in some fashion as a result of these actions. Much of the riparian vegetation that had been established on top of the hydraulic mining debris was cleared to make way for agriculture, persisting into the mid-20th century. Other areas were utilized for recreational and industrial uses, including a camp facility, a mobile home park, and an open pit sand and gravel mine. Newly-installed electric transmission lines ran generally east-west through the area, with the vegetation underneath maintained in a manner that limited woody vegetation. Several roadways crossed the area as well, including Interstate 5, Highway 160, and Northgate and Del Paso Boulevards.

Present Conditions

As the river channel and overbank areas have adjusted to past modifications (including the northern overbank area rising 3 to 6 feet due to hydraulic mining debris), riparian vegetation has reestablished itself in much of the area. Except for localized erosion, the channel is presently stable and has a very low gradient with a sand bed. The steep bank on river right (RR) is a natural configuration driven by the relatively erosion-resistant older floodplain materials, while the bank on river left (RL) is composed of looser materials and protected by intermittent bank erosion protection features. The overbank area on RR is relatively wide, while there is very little overbank area on RL – the river channel almost abuts the flood control levee. The river channel is tidally influenced throughout this Area Plan, and near-channel vegetation is controlled by high-stage tidal prism elevations.

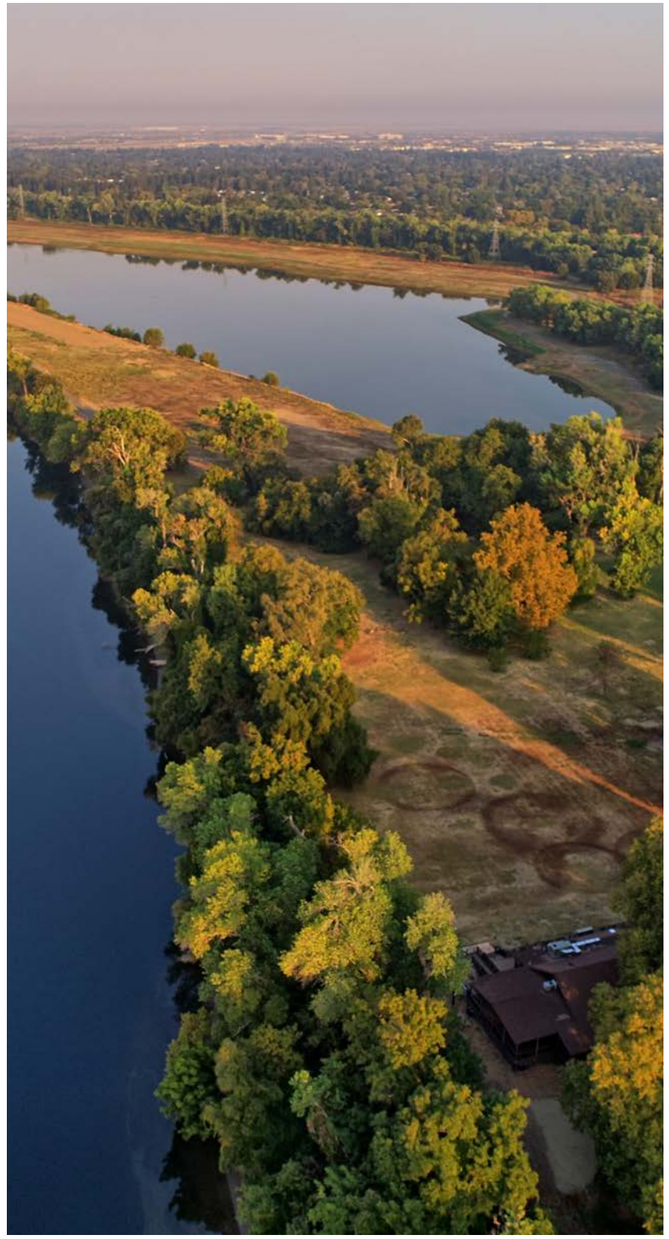
Vegetation has not reestablished around the open pit mine, and woody vegetation is heavily managed under electric transmission lines. Managed recreation areas support landscaped vegetation, and the dominant vegetation communities in the remaining areas include cottonwood and mixed riparian forest. There is limited regeneration

of cottonwood as a result of the artificially high overbank elevations. Projects designed to lower the floodplain and enhance cottonwood/riparian forest have been implemented in two locations along the RR bank and another east of Northgate Boulevard. The open pit mine (Urrutia Pond) provides a body of water that serves as habitat for various waterfowl, but also likely serves as a fish stranding issue for native fish species.

Like much of the American Parkway, Discovery Park is a birding "hotspot," with more than 130 bird species recorded over the last 5 years (2016 through 2021, as recorded on eBird). Discovery Park has several attributes that are uniquely important on the American River Parkway for avian wildlife. The tall landscape trees over the picnic and parking areas support the largest nesting population of Yellow-Billed Magpies in the Sacramento region (87 nesting pairs as counted in a 2020 survey). The large quarry pond in east Discovery Park hosts thousands of Canvasback ducks each winter, in addition to a variety of other waterfowl, along with the occasional Peregrine Falcon hunting the pond. American Kestrel, Swainson's Hawk, White-tailed Kite, Red-shouldered Hawk and Red-tailed Hawk have all been found nesting in this park. In addition to birds, dozens of feral cats live in Discovery Park.

Discovery Park is the first area to flood when river waters rise, and the floodplain site is defined by a classic Valley Riparian "grapevine jungle" of cottonwood, valley oak and box elder trees, with an almost tropical appearance. Discovery Park also contains the largest contiguous Cottonwood Riparian Forest on the Parkway. However, with increasing drought and wildfires, many of the tall cottonwood trees have died over the years. Furthermore, electrical utility companies—following court orders and state/federal mandates—are removing cottonwood trees and other vegetation near the power lines. These various factors are gradually, but continually, reducing the numbers of tall cottonwood trees and other tall overstory trees in Discovery Park, leaving the wild grape to drape over shorter trees and brush.

Homeless encampments are interspersed throughout much of the area, severely degrading the understory vegetation and likely deterring use by wildlife. Specific areas include the dense oak forests on "Bannon Island" north of the boat ramp across Bannon Slough, which provides good habitat but is currently degraded as a result of the encampments. Fires have burned valuable vegetation, including mature cottonwoods that are not expected to regenerate as a result of the high floodplains and subsequent conversion to more upland species like oak, causing the gradual loss of overstory tree canopy. Invasive plant species are also present throughout, including perennial pepperweed, burmudagrass, Himalayan blackberry, and poison hemlock. Overall, much of the vegetation in the area is in good to moderate condition, including past mitigation sites, but is subject to substantial and persistent degradation due to regular canopy fires and trampling, reducing its value as wildlife habitat. Activities leading to the degradation (e.g., encampments and wildfire) are also a deterrent to wildlife. Areas of recreation improvements (turfed areas) often have reduced habitat values but still provide important habitat for several target species. For example, the tall shade trees within the Discovery Park parking and picnic areas provide an important regional nesting area for the yellow-billed magpie.



Aerial view of Discovery Park with Camp Pollock (photo foreground) and the Urrutia mining pit (photo background). Photo Credit: Josh Hannon

Expected Future Trends

The river channel is expected to continue to be sand-bed dominated as upstream sources appear sufficient to supply sand for the foreseeable future. The two recent floodplain lowering projects on RR, which entailed the excavation and lowering of banks to provide improved settings for riparian species, could be altered by the existing sand load of the LAR as the sand and sediment settles out in these lowered areas and rebuilds higher surfaces to some extent. As the levees concentrate flows through the area, we can expect slow rates of RR bank retreat, along with a progressive loss of sand material on the looser RL bank. The ongoing erosion on the RL bank could lead the Corps to propose additional bank protection projects in the foreseeable future. The overall extent and types of vegetation are generally expected to remain constant. However, cottonwoods that were established during a period when the channel had aggraded and the overbank area was inundated more frequently are not expected to regenerate. These areas will likely transition to other riparian vegetation more tolerant of drier conditions.

While the ongoing rate of sea level rise is unknown, it is expected to increase in the foreseeable future, affecting the tidal prism in this Area Plan. The implications could include a change in near-channel plant distribution as a result of higher high tide elevations and a slight increase in overbank inundation. The channel bed itself is not expected to change as a result of sea level rise in the foreseeable future due to its artificially-perched elevation and the low likelihood that ongoing LAR channel processes could result in downcutting.

The greatest factors influencing future vegetation are encampments degrading the understory, fires destroying the tall overstory, and the spread of invasive species.

Desired Conditions

Desired conditions are based on maintaining general channel processes and accommodating expected foreseeable future trends and conditions. These would include limiting future bank and levee protection projects to those required for public safety, protection of property outside of the Parkway, and protection for existing substantial, unmovable non-Parkway infrastructure within the Parkway. Future infrastructure should be designed in a manner that does not necessitate additional bank protection. Conservation, naturalization, or transformation projects should be located and designed in a manner to avoid impediments to, and constraints on, appropriate future channel management actions that maybe necessary.

The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area. It is also important to accommodate mature non-native tall trees shading the parking and picnic areas that provide valuable habitat for target wildlife species. Wildfires should be reduced and controlled to limit loss of riparian tree overstory. Invasive species that are outcompeting native species or inhibiting the regeneration of native species should be reduced/controlled, with a focus on invasive species within woodland areas and grassland areas northeast of Urrutia Pond. It is also beneficial to naturalize areas that have been substantially altered in the past and could provide improved habitat for tall overstory trees and target wildlife species. Managing human use can help maintain a healthy understory and reduce the frequency of wildfires. It is also important to conserve and enhance open grassland areas as foraging habitat for pollinators and wildlife.

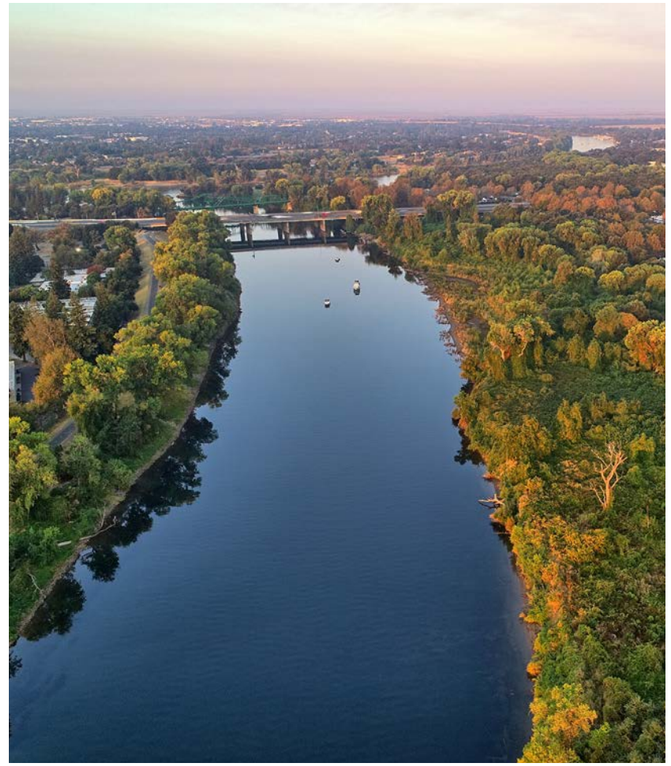
Site-Specific Potential Resource Management Actions (Figures 8-18 and 8-19)

1. **Rehabilitate homeless encampment impacts:** In accordance with and in support of regional and countywide efforts to reduce homelessness, as appropriate remove encampments in the Parkway and rehabilitate those areas where the understory has been damaged. Rehabilitation should include clean-up, soil aeration, and planting of appropriate native species.
2. **Establish low-growing native vegetation under powerlines:** Develop a formal vegetation management agreement with electrical utilities for transmission line Right of Ways, including establishment of appropriate and compatible forbs, grasses and shrubs to maximize potential habitat for wildlife (including pollinators) and/or to provide fuel breaks to protect adjacent valuable wildlife habitat.
3. **Purchase and naturalize Urrutia property:** Develop a Conceptual Naturalization Plan for the Urrutia Property if it is brought into public ownership.
4. **Establish native riparian species/remove non-natives:** Improve and expand riparian forest habitat along Steelhead Creek, including managing for growth and retention of tall overstory trees. Actions may include removal of nonnative invasive species, managing the density of wild grape, expanding the riparian corridor along the southern edge of Steelhead Creek where conditions allow, and enhancing the understory with appropriate native species. Particular attention should be given to the point where Steelhead Creek enters the Parkway, east of Northgate Boulevard; encampments and associated degradation are hampering wildlife connectivity to the substantial stream corridors and associated wildlife habitat to the north.

5. **Expand wildlife connectivity opportunities:** If future improvements are made to Northgate or Del Paso Boulevards, which pass through the eastern end of the Discovery Park area, identify opportunities to improve or accommodate wildlife movement.
6. **Address and minimize impacts associated with proposed bridge crossing:** Considering the likelihood of a future bridge crossing (referred to as the Downtown-Natomas-Airport [DNA] crossing) downstream of the Urrutia Property, anticipate potential vegetation impacts and locations for suitable mitigation. Ensure that wildlife connectivity issues are addressed during detailed design.
7. **Purchase and naturalize Riverdale mobile home park:** Identify appropriate use for the former Riverdale mobile home park if it is brought into public ownership.
8. **Improve habitat and public access at Camp Pollock:** Continue to coordinate with Camp Pollock land managers to further integrate native habitat improvements, interpretive designs, and public access.
9. **Remediate social trail impacts to promote native vegetation growth:** Manage social trails in a manner that consolidates trails and allows rehabilitation of vegetation understory.
10. **Remove urban rubble/redesign bank:** Remove urban rubble bank protection material on RR and replace with a new bank configuration compatible with appropriate bank design parameters, including the expected low rates of potential channel enlargement over a design life, the expected changes in the tidal prism elevations over the design life, and the expected sand aggradation on any lowered near-bank surface with the expected change in plant-site suitability.
11. **Maintain tall tree overstory in parking and picnic area for nesting birds:** Non-native mature trees within this area provide wildlife habitat value and should be maintained.
12. **Increase tall tree overstory in burned areas:** Develop a wildfire rehabilitation strategy for vulnerable mature vegetation to ensure a timely response for minimizing undesirable wildfire impacts.

General Area Plan Potential Resource Management Actions

- Encourage and sponsor an investigation of bank erosion and collaborate on a RL design solution and the implementation of an action which encourages, to the degree possible, bank deposition and accretion.
- If naturalization projects along the bank are deemed appropriate, design naturalization projects in a manner that considers both riverbanks. For example, potential naturalization projects on RR should include consideration and accommodation of the potential need for future bank protection on RL, including designs to induce RL bank deposition and accretion. Additionally, consider the expected changes in the tidal prism elevations over the design life and the expected sand aggradation on any lowered near-bank surface with the expected change in plant-site suitability. Designs should not constrain appropriate future channel management actions.
- Parkway-wide, determine the scope and design of desirable vegetation and habitat improvements on floodplain surfaces by using 2-D hydraulic modeling for x-sectional roughness values needed to maintain acceptable levee freeboard.
- Encourage the undergrounding of utility lines whenever feasible.
- Identify and designate appropriate fuel breaks and access routes for fire suppression activities.
- Identify opportunities to manage recreation improvement areas to protect or enhance wildlife habitat. This may include specifying types of vegetation and/or timing of maintenance activities.
- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.



Aerial view of the Discovery Park Area looking toward the confluence of the American River and Sacramento River. Photo Credit: Josh Hannon

Key Indicators

Feet 0 2,000 4,000

1. Alteration

- Intentionally Altered
- Unintentionally Altered
- Unaltered

2. Inundation Extent

- Main Channel
- Recurrence Interval - 2 years
- Recurrence Interval - 25-100 years
- Recurrence Interval - 200 years
- Upland/Behind Levee
- No Data

3. Vegetation Communities

- Developed
- Open Water
- Riparian Woodland/Forest
- Riparian Scrub
- Turf/Turf with Trees
- Unvegetated
- Valley Foothill Grassland

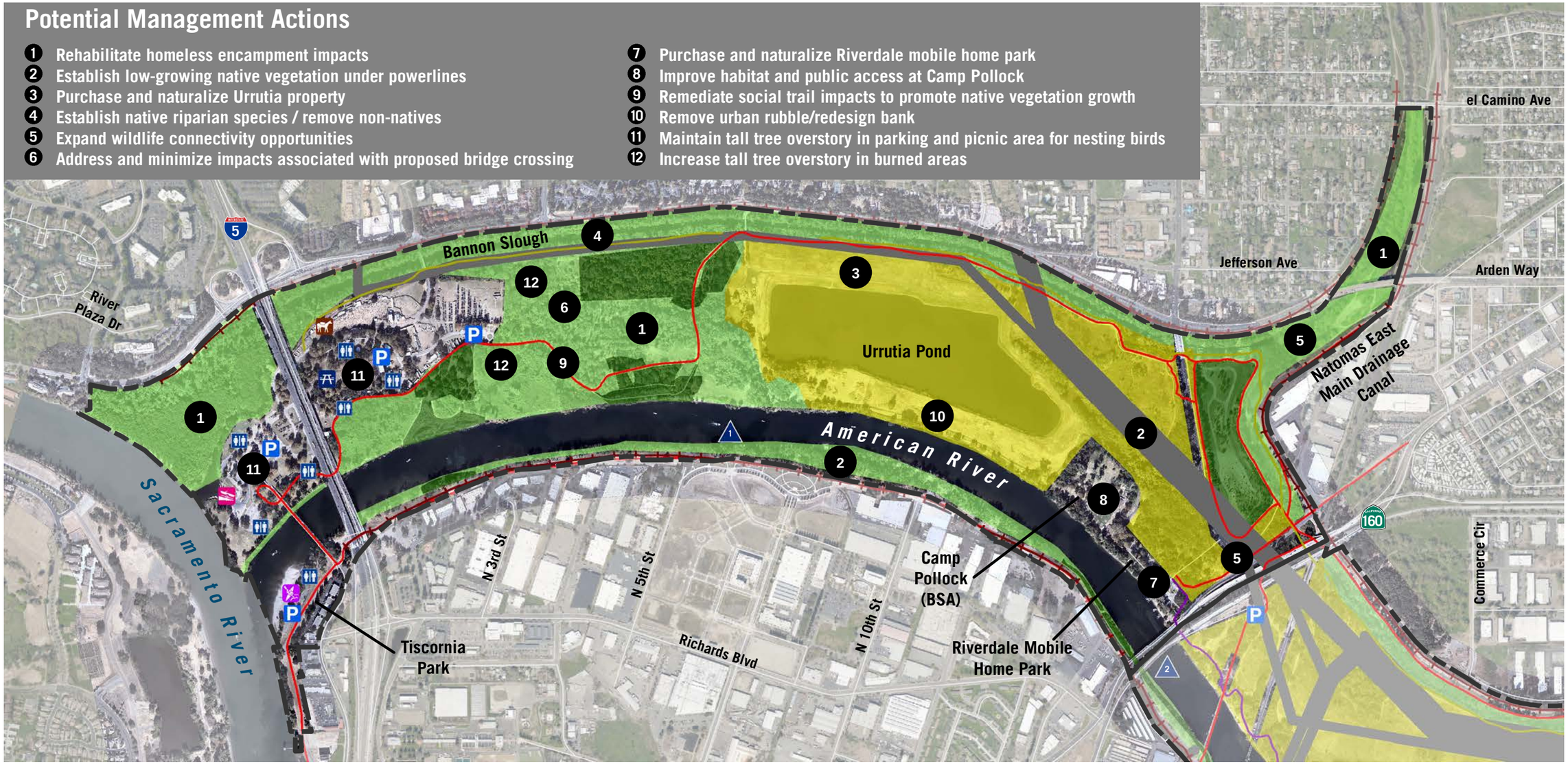
4. Land Use

- Nature Study Area
- Protected Area
- Limited Recreation Area
- Developed Recreation Area
- Other

Figure 8-18
Area Plan 1 Discovery Park A

Potential Management Actions

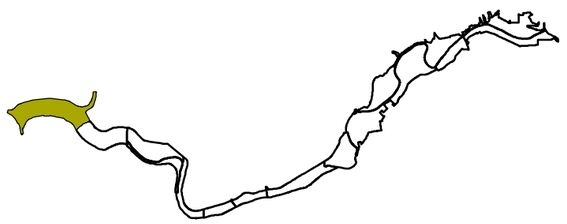
1. Rehabilitate homeless encampment impacts
2. Establish low-growing native vegetation under powerlines
3. Purchase and naturalize Urrutia property
4. Establish native riparian species / remove non-natives
5. Expand wildlife connectivity opportunities
6. Address and minimize impacts associated with proposed bridge crossing
7. Purchase and naturalize Riverdale mobile home park
8. Improve habitat and public access at Camp Pollock
9. Remediate social trail impacts to promote native vegetation growth
10. Remove urban rubble/redesign bank
11. Maintain tall tree overstory in parking and picnic area for nesting birds
12. Increase tall tree overstory in burned areas



Parkway Boundary
Powerline Easement
Bicycle/Pedestrian Trail
Equestrian/Hiking Trail
Pedestrian Trail
Levee

Boat ramp, Trailer boat
Picnic Area
Car Top Boat Launch
Equestrian Staging
Parking
Restroom
River Mile

Management Category
Preservation
Conservation
Naturalization



0 500 1,000 2,000 Feet

Figure 8-19
Area Plan 1 Discovery Park B

AREA PLAN 2

WOODLAKE

8.5.2 Woodlake Area Plan

Historic Physical and Biological Conditions

Similar to Discovery Park, well before European settlement, the lower reach of the LAR featured a deep channel with a relatively steep gradient flanked by high floodplains to the north and south. A subsequent rise in the bed of the Sacramento River created a back-water condition at the confluence of the two rivers, flattening the gradient and introducing tidal conditions along the lower five miles of the LAR. Reduced gradients led to an outbreak flood pattern and distributary sloughs which resulted in much-reduced LAR channel capacities. This landscape supported a complex upland and riparian forest with abundant wildlife.

Impact of European Settlement

The Gold Rush brought miners, city dwellers and farmers to the American River, inaugurating a century and a half of landscape changes that have greatly altered the lower reach of the LAR. Placer mining quickly ran its course, giving way to decades of hydraulic mining activity in the upper American River Basin that accelerated the aggradation of the historic LAR channel. Farmers cleared portions of the northern floodplain. Levee construction along the north side of the river, followed by the construction of Folsom Dam, reversed the aggradation of the channel bed and inaugurated a long-term process of channel degradation in the lower reach of the river. This channel lowering increased the separation of the river channel from its elevated floodplains. The levees also constricted flow, contributing to greater flows and flow depths for any given overbank LAR discharge.

All of Woodlake was altered in some fashion as described below. Agricultural operations, which persisted into the 1950's, cleared the riparian forest established on top of the hydraulic mining debris (elevated floodplain). The river channel (which once curved further through what is now known as Sutter's Landing Park) was realigned to its current more northerly location. Some areas on RR were dug out during overbank mining, leaving remnant pits on RR. The northern levee cut off tributary streams and drainage channels, redirecting the tributary waters into a constructed slough (the borrow source for the levee). This slough parallels the levee until it turns south at the eastern boundary of the Area Plan, where it empties into the river.

Woodlake has been impacted by significant infrastructure. A set of four electric transmission lines run mostly east-west through the area, with the vegetation underneath maintained to limit woody vegetation. In addition to transmission line towers, several radio towers also occur here, located in the center of the northern overbank area. Highway 160 crosses the river at the western boundary. Just upstream of Highway 160, an abandoned rail bridge (now serving as a pedestrian bridge) and an active rail bridge also cross the river. A fourth bridge, (another active rail bridge) crosses the river at the eastern boundary. On RL, a privately-owned aggregate and concrete recycling facility extends to the edge of the river channel. Sutter's Landing Park, located predominately on a former landfill, lies just upstream of the recycling facility, providing public access to the Parkway.

Present Conditions

The channel is presently stable, and has a very low gradient, with a sand bed that transitions in the upstream end to a coarse (gravel) material bed. The RL bank consists of stratified sands and silts that makes the RL bank susceptible to erosion. The steep bank on portions of RR is a natural configuration that comprises erosion-resistant older floodplain materials. The overbank area on RR is relatively wide, while the area on RL is narrow (where the river channel almost abuts the flood control levee leaving an overbank area), with room for only a narrow band of riparian vegetation. The river channel is tidally influenced throughout this Area Plan and near-channel vegetation is controlled by high-tide river elevations.

Riparian vegetation has reestablished in portions of the Woodlake area, including portions of the northern overbank

area that is now elevated 2 to 4 feet with hydraulic mining debris. Nonetheless, woody vegetation has not reestablished in much of the previously farmed areas and is heavily managed under the electric transmission lines. The dominant woody vegetation communities include cottonwood and mixed riparian forest, with some good quality patches of mature vegetation growing along the naturalized RB drainage canal and the narrow overbank area along the LB. There is limited regeneration of cottonwood (as a result of the artificially high overbank elevations,) except along the naturalized drainage canal. There is an area planted with Valley Elderberry Longhorn Beetle mitigation elderberry plants in the northwest corner of the Area Plan.

Encampments interspersed throughout much of the area severely degrade the understory vegetation, causing wildfires, and likely deterring use by wildlife. Other areas have experienced recent fires that burned mature cottonwoods that are not expected to regenerate. Invasive plant species are also present throughout, including dominant yellow star thistle and perennial pepperweed in the central, previously farmed portions. Overall, some of the vegetation in the area is in moderate to poor condition, and subject to substantial ongoing degradation. Degradation of the vegetation, the understory in particular, reduces its value as wildlife habitat. The activities leading to increased degradation (e.g., encampments, rampant social trails, etc.) are also a deterrent to wildlife. Off-paved trail bicycling has recently been approved on existing maintenance roads through the area.

The avian diversity at Woodlake area is best represented by birding surveys of Sutter's Landing Park (on the south bank) with 141 bird species recorded over the last 5 years (2016 through 2021 from eBird). The open grasslands on north

Aerial view of the Two Rivers Trail (photo left), LAR channel (photo center), and floodplain (photo right) of the Woodlake Area. Photo Credit: Josh Hannon

bank-Woodlake area, (although not as well-documented by local birders due to more difficult access) is an important foraging area for many raptors, including Swainson's Hawk, which also nests in this area.

UC Davis maintains a 40+ year butterfly monitoring transect dataset that runs among the western portion of Woodlake and extends into eastern Discovery Park.

Expected Future Trends

The river channel is expected to continue to be sand-bed dominated (as upstream sources appear sufficient to supply sand for the foreseeable future.) The erosion resistant RR bank is expected to have a slow rate of bank retreat. However, the looser RL is expected to progressively lose sandy material, potentially leading USACE to propose additional bank protection projects in the foreseeable future. Cottonwood trees are likely to continue to be lost to wildfire, and are not expected to regenerate, (these trees were established during a period when the channel had aggraded and the overbank area was inundated more frequently), and these areas will likely transition to oak-dominated woodlands. The other overall extent and types of vegetation are generally expected to remain constant.

While the ongoing rate of sea level rise is unknown, it is expected to increase in the foreseeable future, affecting the tidal prism in this Area Plan. The implications could include a retreat in near-channel plant distribution, as a result of the higher high tides (and a slight increase in overbank

inundation). The channel bed itself is not expected to change in the foreseeable future due to the artificially-perched channel elevation in downstream Discovery Park, and the low likelihood of channel downcutting.

The greatest factors influencing future vegetation are encampments degrading the understory, wildfires, and the spread of invasive species including yellow starthistle and perennial pepperweed.

Desired Conditions

Desired conditions are based on maintaining general channel processes and accommodating expected foreseeable future trends and conditions. This would include limiting future bank and levee protection projects to those required for public safety, protection of property outside of the Parkway, and protection for existing substantial, unmovable infrastructure within the Parkway. Future infrastructure should be designed in a manner to avoid the need for additional bank protection. Conservation and naturalization projects should be located and designed in a manner to avoid impediments to, and constraints on, appropriate future channel management actions that may be necessary.

The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area. Invasive species that are outcompeting native species or inhibiting the regeneration of native species should be reduced/controlled, with a focus on invasive species within woodland areas and grassland areas throughout the central portion of the RR overbank area that are dominated by yellow starthistle and perennial pepperweed. It is also desirable to naturalize areas that have been substantially altered in the past and could provide better habitat for target species following implementation. Managing for a healthy understory with limited degradation from human uses would improve habitat values.

While the area supports suitable roosting and foraging habitat for raptors, the former agriculture area (most recently used to grow hay) is now dominated by yellow starthistle and perennial pepperweed, which provide poor quality foraging habitat. This field, much of it within the transmission line easements, could be converted to better foraging habitat and, outside of the utility easement, planted with trees for oak woodland or oak savanna. Consistent with this desired condition, a conceptual ecosystem restoration concept was developed by USACE and its partners and approved by Congress in 2002. The conceptual restoration plan includes managing nonnative invasive plant species; grading to restore the hydrologic interaction between the river and portions of the floodplain; seeding to establish native grasslands; and planting some areas with riparian forest oak woodland and oak savanna plant species. This approach would improve conditions for foraging raptors and other wildlife.

Along the narrow RL overbank area, there are some opportunities to establish or rehabilitate riparian vegetation, particularly understory vegetation that has been degraded by camping or overuse. Given the potential for erosion of this narrow area, use of biotechnical treatments of other bank protection strategies to promote accretion of materials would be positive.

Site-Specific Potential Resource Management Actions (Figures 8-20 and 8-21)

1. **Lower Floodplain:** Develop a plan to lower the floodplain to increase inundation frequency and improve rearing habitat for target fish species.
2. **Implement USACE ecosystem restoration project:** Refine the existing USACE Ecosystem Restoration concept for Woodlake, which currently includes non-native invasive plant species eradication, planting grassland, grading to improve floodplain connectivity (including removal of a berm that would allow remnant mining pits to be inundated more often and provide positive drainage to the LAR, seasonal wetlands, and fish-rearing habitat), grading and planting riparian forest, planting oak savanna and planting oak woodland.
   The goal is to naturalize the site to provide habitat for target species, including forage habitat for raptors and other avian species that rely on grasslands. Specifically address the naturalized canal, identifying opportunities to improve and expand riparian forest and re-contouring portions of it including the leg running north-south. Consider methods to properly integrate the off-paved trail bicycle trails within the footprint of the ecosystem restoration concept.
3. **Establish low-growing native vegetation under powerlines:** Develop a formal vegetation management agreement with electrical utilities for transmission line Right of Ways, including establishment of appropriate and compatible forbs, grasses and shrubs to maximize potential habitat for wildlife (including pollinators) and/or to provide fuel breaks to protect adjacent valuable wildlife habitat.

4. **Rehabilitate homeless encampment impacts:** In accordance with and in support of regional and countywide efforts to reduce homelessness, as appropriate remove encampments in the Parkway and rehabilitate those areas where the understory has been damaged.
5. **Expand riparian corridor:** Beyond the footprint of the USACE Ecosystem Restoration concept, improve and expand riparian forest habitat along the western-most portion of the naturalized canal, including managing for growth and retention of tall overstory riparian trees. Actions may include removal of nonnative invasive species, expanding the riparian corridor toward the south where conditions allow, enhancing the understory with appropriate native species, and enhancing the canal itself to increase wildlife values. In addition, remove "natural" levee at the top of RR bank, resulting from elevated hydraulic mining debris aggradation, to re-connect a moderately large area of high value riparian forest.
6. **Expand wildlife connectivity opportunities:** If future improvements are made to Highway 160 or the railroad trestles, which pass through the west and east ends of the Woodlake area, identify opportunities to improve or accommodate wildlife movement. In addition, considering the likelihood of a future bridge widening (referred to as the Third Track Project) at the eastern/upstream end of the Area Plan, anticipate potential vegetation impacts and locations for suitable mitigation. Ensure that wildlife connectivity issues are addressed during detailed design. And considering the possibility of future developed recreation improvements at the western end of the Woodlake area, anticipate potential strategies for integration into the more natural areas. Ensure that wildlife connectivity issues are addressed during detailed design.
7. **Suppress fire in mature vegetation stands:** Identify and designate appropriate fuel breaks and access routes for fire suppression activities. Develop a wildfire rehabilitation strategy for vulnerable mature vegetation to ensure a timely response for minimizing undesirable wildfire impacts.
8. **Remediate social trail impacts to promote native vegetation growth:** Manage social trails in a manner that consolidates trails and allows rehabilitation of vegetation understory.
9. **Maintain flow through drainage slough:** Consistent with action #5, identify opportunities to maintain water flow through the drainage slough.

General Area Plan Potential Resource Management Actions

- Parkway-wide, Determine the scope and design of desirable vegetation and habitat improvements on floodplain surfaces by using 2-D hydraulic modeling for x-sectional roughness values needed to maintain acceptable levee freeboard.
- Design naturalization projects in a manner that considers both riverbanks. For example, potential naturalization projects on RR should include consideration and accommodation of the potential need for future bank protection on RL, including designs to induce RL bank deposition and accretion.
- Encourage the undergrounding of utility lines whenever feasible.
- Update the 2000 Parkway-wide Invasive Plant Management Plan (IPMP), including the invasive non-native plant inventory, management strategies, and target species for priority removals (Planning Phase Report for the American River Parkway Invasive Plant Management Plan, Eva Butler and Associates, 2000). The update should incorporate the success of Phase I and Phase II IPMP removals, changes to the Parkway plant communities, and new technologies for eradication and control measures.
- Identify a process to have old bridge debris removed as a part of future associated projects.
- Develop plan to remove abandoned piping just downstream of island on RR.
- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.

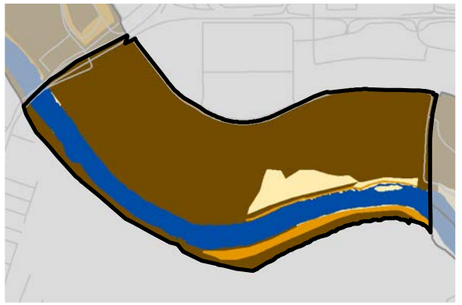
Powerline easement in the Woodlake Area. Photo Credit: Regional Parks

Key Indicators

Feet 0 1,000 2,000

1. Alteration

- Intentionally Altered
- Unintentionally Altered
- Unaltered



2. Inundation Extent

- Main Channel
- Recurrence Interval - 2 years
- Recurrence Interval - 25-100 years
- Recurrence Interval - 200 years
- Upland/Behind Levee
- No Data

3. Vegetation Communities

- Developed
- Open Water
- Riparian Woodland/Forest
- Riparian Scrub
- Turf/Turf with Trees
- Unvegetated
- Valley Foothill Grassland

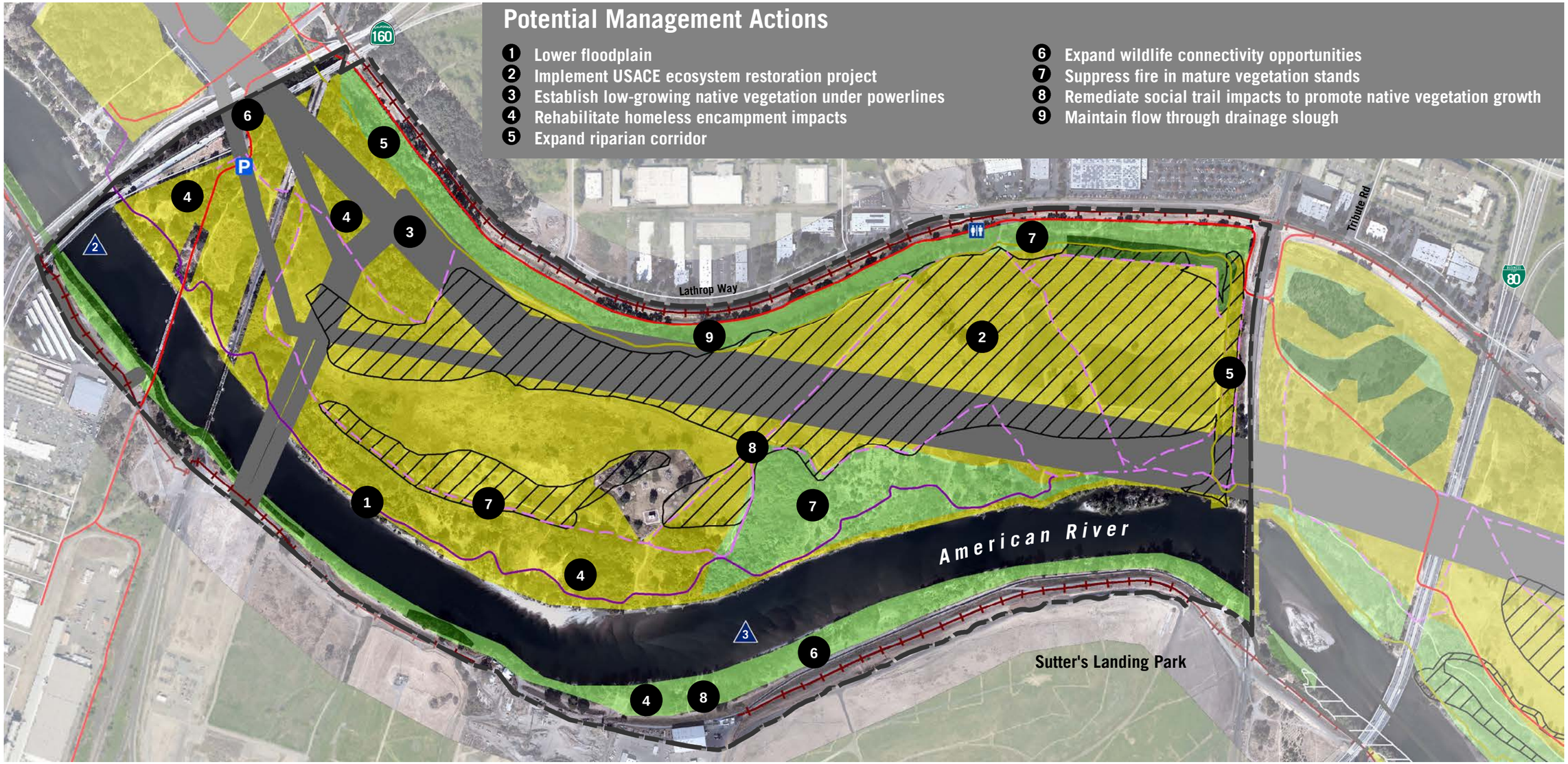
4. Land Use

- Protected Area
- Limited Recreation Area
- Developed Recreation Area

Figure 8-20
Area Plan 2 Woodlake A

Potential Management Actions

1. Lower floodplain
2. Implement USACE ecosystem restoration project
3. Establish low-growing native vegetation under powerlines
4. Rehabilitate homeless encampment impacts
5. Expand riparian corridor
6. Expand wildlife connectivity opportunities
7. Suppress fire in mature vegetation stands
8. Remediate social trail impacts to promote native vegetation growth
9. Maintain flow through drainage slough

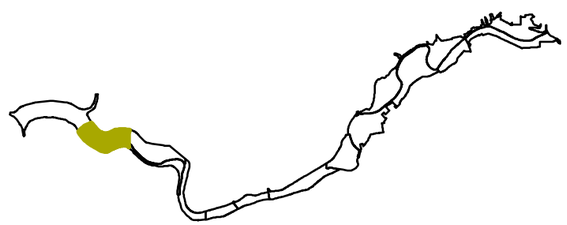


Parkway Boundary
Powerline Easement
Equestrian/Hiking Trail
Pedestrian Trail
Bicycle/Pedestrian Trail
Off Paved Bicycle Trail
Levee

Parking
Restroom
River Mile

Proposed USACE Bank Protection
Proposed USACE Ecosystem Restoration

Management Category
Preservation
Conservation
Naturalization



0 500 1,000 Feet

Figure 8-21
Area Plan 2 Woodlake B

AREA PLAN 3

CAL EXPO

8.5.3 Cal Expo Area Plan

Historic Physical and Biological Conditions

As described for Discovery Park, well before the arrival of European settlers, the lower reach of the LAR featured a deep channel with a relatively steep gradient flanked by high floodplains to the north and south. A subsequent rise in the bed of the Sacramento River created a back-water condition at the confluence of the two rivers, flattening the gradient and introducing tidal conditions along the lower five miles of the LAR. Reduced gradients led to an outbreak flood pattern and distributary sloughs which resulted in much-reduced LAR channel capacities. This landscape supported a complex upland and riparian forest and abundant wildlife.

Impact of European Settlement

The Gold Rush brought miners, city dwellers and farmers to the American River, inaugurating 150 years of landscape changes that greatly altered the lower reach of the LAR. Placer mining quickly ran its course, transitioning to decades of hydraulic mining activity in the upper American River Basin that accelerated the aggradation of the historic LAR channel. Farmers cleared portions of the northern floodplain. Levee construction along the north side of the river, followed eventually by the construction of Folsom Dam, reversed the aggradation of the channel bed and inaugurated a long-term process of channel degradation in the lower reach of the river which increased the separation of the channel from its remaining floodplains. New levees constricted flows and increased flow velocities and flow depths in the channel and remaining overbank areas. After hydraulic mining ceased, flows flushed away the channel sediments and by the 1960's degradation had fully exposed the native channel bed in this reach.

Levee construction constricted high flows from flooding large areas and restricted inflow from tributary streams. Prior to levee construction, high flows would leave the channel and flow north beyond the adjacent floodplain into the American Basin (what is today the Natomas area). Some flows also historically left the channel to the south, flowing toward downtown Sacramento. In addition to the river flowing out of the floodplain, local tributary streams entered the un-leveed river primarily from the north. These tributaries were channelized and consolidated to concrete storm drains after levee construction.

A majority of Cal Expo has been altered in some fashion as a result of farming, grading, and infrastructure. Farmers cleared the woody vegetation (that had established on top of the hydraulic mining debris) for agriculture, which persisted into the mid-20th century. Much of the area was later graded for a golf course (that was never completed), featuring a shallow, open water body that is now Bushy Lake, and several golf tee mounds. Electric transmission lines run generally east-west through the area, simplifying the vegetation underneath and limiting the growth of woody vegetation. Several bridges, including The Capital City Freeway (Business 80/State Route 51) and two railroad bridges, cross the downstream Cal Expo area.

Present Conditions

The river at Cal Expo is a gravel to sand transition zone: The upstream area is a gravel/cobble transport dominated regime, while the downstream is a sand/gravel transport dominated regime. The gradient of the river channel area is steeper than in either the upstream or downstream areas. Overall, the reach is in a long-term river bed aggradation regime, although this aggradation is limited by the rate of incoming course sediments. The channel is stable, and while the upstream bank slope is very steep (sometimes near vertical), it is composed of erosion-resistant older floodplain materials and erosion is not expected to progress noticeably.

Cal Expo and Paradise Beach are the farthest upstream areas of the tidally-influenced river channel, thus near-channel vegetation is controlled by river stage at high tide. Lower elevation overbank areas contain some high-quality early successional to mid-successional alder and willow

riparian scrub, as well as cottonwood and mixed riparian forest. There is limited regeneration of cottonwood on much of the overbank areas as a result of the lack of spring flooding and artificially high elevations above the river channel.

Higher elevation areas at Cal Expo have been elevated 2-4 feet with hydraulic mining debris, and are dominated by elderberry savannah, open fields, and riparian forest associated with Bushy Lake. The large fields with scattered elderberry are important in the Cal Expo area because they are habitat for the federally-listed VELB. Some of these shrubs west of the Capital City Freeway have been intentionally planted to mitigate for impacts to this habitat resulting from projects constructed elsewhere in the Parkway.

The 300-400 foot wide transmission line corridor is a major feature crossing east to west over Bushy Lake and through Cal Expo. Woody vegetation is heavily managed under these electric transmission lines, especially where they cross Bushy Lake and surrounding wetlands. There is limited regeneration of cottonwood on much of the overbank areas as a result of the artificially high elevations above the river channel.

The Cal Expo area has been impacted by several large wildfires since 2014, which has burned over much of the area, and many tall nesting trees have died in the burned areas. Post-fires, many oaks, willows, elderberry and other shrubby species and herbaceous species have survived; however, much of the cottonwood overstory, especially around Bushy Lake, has not recovered. In fact, prior to the 2014 wildfire, the vegetation along Bushy Lake was so thick it was nearly impossible to view this wetland; nowadays, the sparser regenerating vegetation (including a population of exotic elms) allows a much clearer view of this water body.

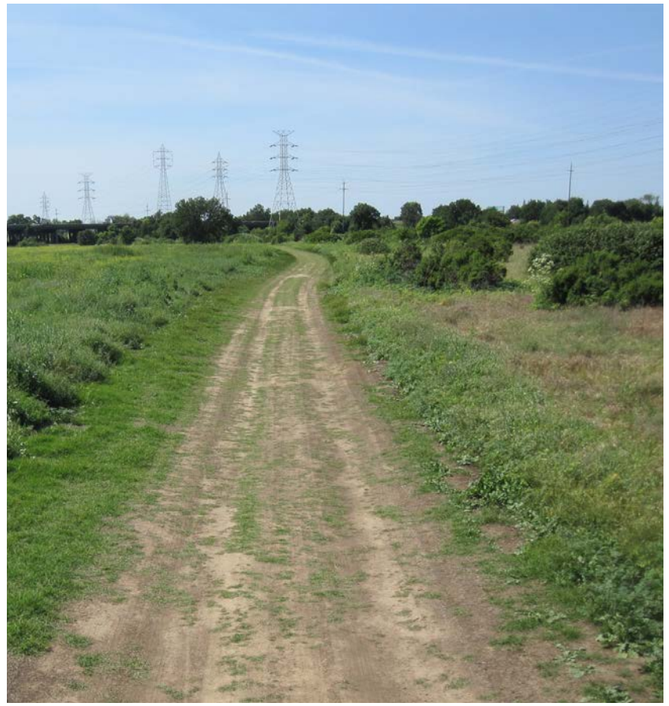
140 bird species have been documented from Cal Expo (2016 - 2021 as documented on eBird), including nesting Red-Tailed Hawks and Great Horned Owls.

The Cal Expo wildlife has three prominent wildlife areas, including the elderberry savannah, the lower river floodplain, and Bushy Lake. The elderberry savannah is an important raptor foraging area and is home to the Valley Elderberry Longhorn Beetle (which has also been documented in post-fire vegetation.) The lower floodplain is important due to its closer connection to the river, allowing natural river processes, and the lower floodplain contains some of the remaining unburned cottonwood trees. Some of the eroding banks in Cal Expo were formerly used by bank swallows (now extant), and these bank-nesting cavities are now occupied by Rough-Winged Swallows.

The Bushy Lake area is an important shallow water habitat and wetland for many species, including locally rare Western pond turtles, beaver, and river otters, as well as a variety of birds. CSUS (as part of the Bushy Lake Conceptual Restoration Plan) is conducting studies and designs for pond turtle population restoration, fire-resilient vegetation, and eco-cultural restoration at Bushy Lake. Water levels at Bushy Lake are maintained by Cal Expo through groundwater pumping, as dictated by the Bushy Lake Preservation Act. Additional water to the west of Bushy Lake is pumped in as part of the City of Sacramento storm drain system.

Encampments are interspersed through much of the area, severely degrading the understory vegetation and likely deterring use by wildlife. Much of this area has also burned in recent wildfires, killing mature cottonwoods which are not resilient to fire. Invasive plant species are also present throughout, including dominant yellow starthistle, vetch, and mustards in the open fields. Overall, much of the vegetation in the area is in moderate to fair condition, and subject to substantial ongoing degradation. Degradation of the vegetation, the understory in particular, reduces its value as wildlife habitat. And the activities leading to the degradation (e.g., encampments, rampant social trails) are also a deterrent to wildlife.

Chicken Ranch and Strong Ranch sloughs, which drain large urban watersheds to the north east, enter the Parkway at the upstream end of the Cal Expo area through a low flow channel and a bank of pumps used when the river is high. The concrete aprons at these outfalls are eroding as a result of their design.



Firebreak and maintenance road located in the Cal Expo Area. Photo Credit: Regional Parks

Expected Future Trends

Aggradation of the river channel in the Cal Expo Area Plan is likely to continue, albeit at a reduced rate compared to historic conditions (this trend reflects the effects of significant in-channel and channel margin aggregate mining in upstream reaches of the river which interrupted the natural coarse sediment transport regime that historically characterized this reach, thereby slowing but not reversing the deposition). As the levees concentrate flows through the area, significantly slow rates of RR bank retreat are to be expected. (The RL bank is not within the Cal Expo Area Plan and is therefore addressed separately in the Paradise Beach Area Plan.)

The overall extent and types of vegetation are generally expected to remain constant, with some notable exceptions. The remaining cottonwoods that were established during a period when the overbank area was inundated more frequently are not expected to regenerate except in low lying areas or areas near perennial surface water (e.g., Bushy Lake). Also, some vegetation in the higher areas will likely transition to oak-dominated woodlands.

While the future rate of sea level rise is unknown, it is expected to increase in the foreseeable future, affecting the tidal river elevation up to River Mile 4.8. The implications could include a change in near-channel plant distribution as a result of higher high tide elevations and a slight increase in overbank inundation. The channel bed itself is artificially perched downstream and not expected to change or downcut as a result of future sea level rise.

The greatest factors influencing future vegetation are encampments degrading the understory, fires destroying cottonwood overstory, and the spread of invasive species including yellow starthistle and milk thistle. Giant reed and red sesbania populations have been significantly reduced in this area due to the success of the IPMP. The pending widening of the Capital City Freeway will have some impacts to vegetation within its new footprint.

Desired Conditions

Desired conditions are based on maintaining general channel processes and accommodating expected foreseeable future trends and conditions. These processes include limiting future bank and levee protection projects to those required for public safety, protection of property outside of the Parkway, and protection for existing substantial, unmovable infrastructure within the Parkway. Future infrastructure should be designed in a manner to not necessitate additional bank protection. Conservation, naturalization, or transformation projects should be located and designed in a manner to avoid impediments to, and constraints on, appropriate future channel management actions that may be necessary.

The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area. Invasive species that are outcompeting native species or inhibiting the regeneration of native species should be reduced/controlled, with a focus on invasive species within woodland areas and grassland areas throughout that are dominated by yellow starthistle. These annual grassland/yellow starthistle areas, much of it within the transmission line easements, could be restored as grassland habitat and, outside of the utility easement, to oak woodland or oak savanna. Consistent with this desired condition, a conceptual ecosystem restoration concept was developed by USACE and its partners and approved by Congress in 2002. The conceptual restoration plan includes controlling non-native invasive plant species, grading and planting riparian forest, constructing a side channel, grading to create seasonal wetlands, terracing steep banks and planting riparian vegetation, restoring emergent wetlands, and planting oak savanna. (The current concept also includes pumping water from Chicken and Strong Ranch sloughs into a treatment wetland. However, given several complexities associated with the pumping and treatment wetland elements, they are not likely to be advanced for implementation.) The overall goal is to naturalize the site to provide habitat for target species, including conservation of Bushy Lake and its associated habitats. Refinement of the USACE Ecosystem Restoration concept should be closely coordinated with efforts being undertaken by CSU Sacramento and the Wildlife Conservation Board to develop a Bushy Lake Conceptual Restoration Plan, as the efforts overlap and are generally consistent with one another. This approach would improve conditions for pollinators, foraging raptors, western pond turtle, and other wildlife. Managing for a healthy understory with limited degradation from human uses would improve habitat values.

Site-Specific Potential Resource Management Actions (Figures 8-22 and 8-23)

1. **Lower floodplain:** Develop a plan to lower the floodplain to increase inundation frequency and improve rearing habitat for target fish species.
2. **Establish low-growing native vegetation under powerlines:** Develop a formal vegetation management agreement with electrical utilities for transmission line Right of Ways, including establishment of appropriate and compatible forbs, grasses and shrubs to maximize potential habitat for wildlife (including pollinators) and/or to provide fuel breaks to protect adjacent valuable wildlife habitat. Encourage the undergrounding of utility lines whenever feasible.

3. **Rehabilitate homeless encampment impacts:** In accordance with and in support of regional and countywide efforts to reduce homelessness, as appropriate remove encampments in the Parkway and rehabilitate those areas where the understory has been damaged. Rehabilitation should include clean-up, soil aeration, and planting of appropriate native species.
4. **Implement USACE ecosystem restoration project:** Refine the existing USACE Ecosystem Restoration concept for Cal Expo/Bushy Lake, which currently includes non-native invasive plant species eradication, grading and planting riparian forest, constructing a side channel, grading to create seasonal wetlands, terracing steep banks and planting riparian vegetation, restoring emergent wetlands, and planting oak savanna. The current concept also includes routing water from Chicken and Strong Ranch sloughs via pump into a treatment wetland. However, given several complexities associated with the pumping and treatment wetland elements, they are not likely to be advanced for implementation. The overall goal is to naturalize the site to provide habitat for target species, including conservation of Bushy Lake and its associated habitats.
5. **Remediate social trail impacts to promote native vegetation growth:** Beyond the footprint of the USACE Ecosystem Restoration concept, improve existing habitats. Actions may include removal of non-native invasive species, improving grasslands, managing social trails, improving the riparian vegetation along the lower berm, improving the understory with appropriate native species, and improving wildlife habitat for target species including western pond turtle. Manage social trails in a manner that consolidates trails and allows rehabilitation of vegetation understory. Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.
6. **Manage invasive vegetation:** Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species.
7. **Improve wildlife connectivity opportunities:** As future improvements are made to State Route 51/Capital City Freeway or the railroad trestle, which pass through the western end of the Cal Expo area, identify opportunities to improve or accommodate wildlife movement.
8. **Suppress fire in mature vegetation stands:** Develop a wildfire rehabilitation strategy for vulnerable mature vegetation to ensure a timely response for minimizing undesirable wildfire impacts.
9. **Continue CSUS research and habitat development:** Refinement of the USACE Ecosystem Restoration concept should be closely coordinated with efforts being undertaken by CSU Sacramento and the Wildlife Conservation Board to develop a Bushy Lake Conceptual Restoration Plan, as the efforts overlap and are generally consistent with one another. Consider methods to properly integrate the off-paved trail bicycle trails within the footprint of the ecosystem restoration concept.
10. **Increase tall tree overstory in burned areas:** Develop a wildfire rehabilitation strategy for vulnerable mature vegetation to ensure a timely response for minimizing undesirable wildfire impacts.

General Area Plan Potential Resource Management Actions

- Determine the scope and design of desirable vegetation and habitat improvements on floodplain surfaces by using 2-D hydraulic modeling for x-sectional roughness values needed to maintain acceptable levee freeboard.
- Identify a process to have old bridge debris removed as a part of future associated projects.
- Develop a plan to re-construct the engineered concrete drainage outfall aprons for Chicken Ranch and Strong Ranch sloughs to protect against ongoing and progressive bank erosion due to undercutting using a design approach and materials that can adjust to bank line changes without aggravating bank erosion; suggest removing the broken and undercut concrete members and replacing with large angular rock.
- Identify and designate appropriate fuel breaks and access routes for fire suppression activities. Integrate this effort with the off-paved trail bicycle trails and maintenance routes.
- Update the 2000 Parkway-wide Invasive Plant Management Plan (IPMP), including the invasive non-native plant inventory, management strategies, and target species for priori-ty removals (Planning Phase Report for the American River Parkway Invasive Plant Management Plan, Eva Butler and Associates, 2000). The update should incorporate the success of Phase I and Phase II IPMP removals, changes to the Parkway plant communities, and new technologies for eradication and control measures.

Key Indicators

Feet 0 1,000 2,000

1. Alteration

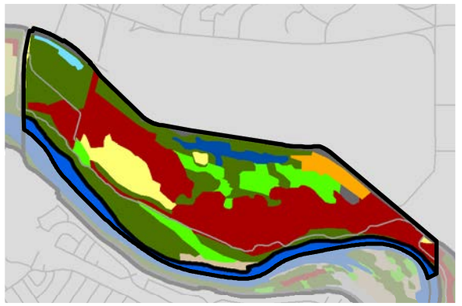
- Intentionally Altered
- Unintentionally Altered
- Unaltered

2. Inundation Extent

- Main Channel
- Recurrence Interval - 2 years
- Recurrence Interval - 25-100 years
- Recurrence Interval - 200 years
- Upland/Behind Levee
- No Data

3. Vegetation Communities

- Developed
- Open Water
- Riparian Woodland/Forest
- Riparian Scrub
- Turf/Turf with Trees
- Unvegetated
- Valley Foothill Grassland



4. Land Use

- Nature Study Area
- Protected Area
- Limited Recreation Area
- Developed Recreation Area
- Other

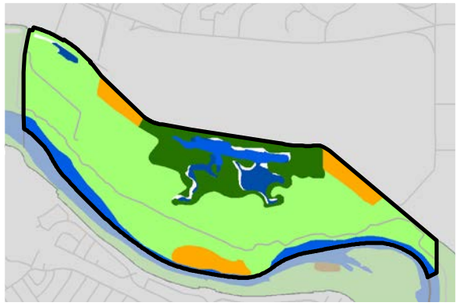
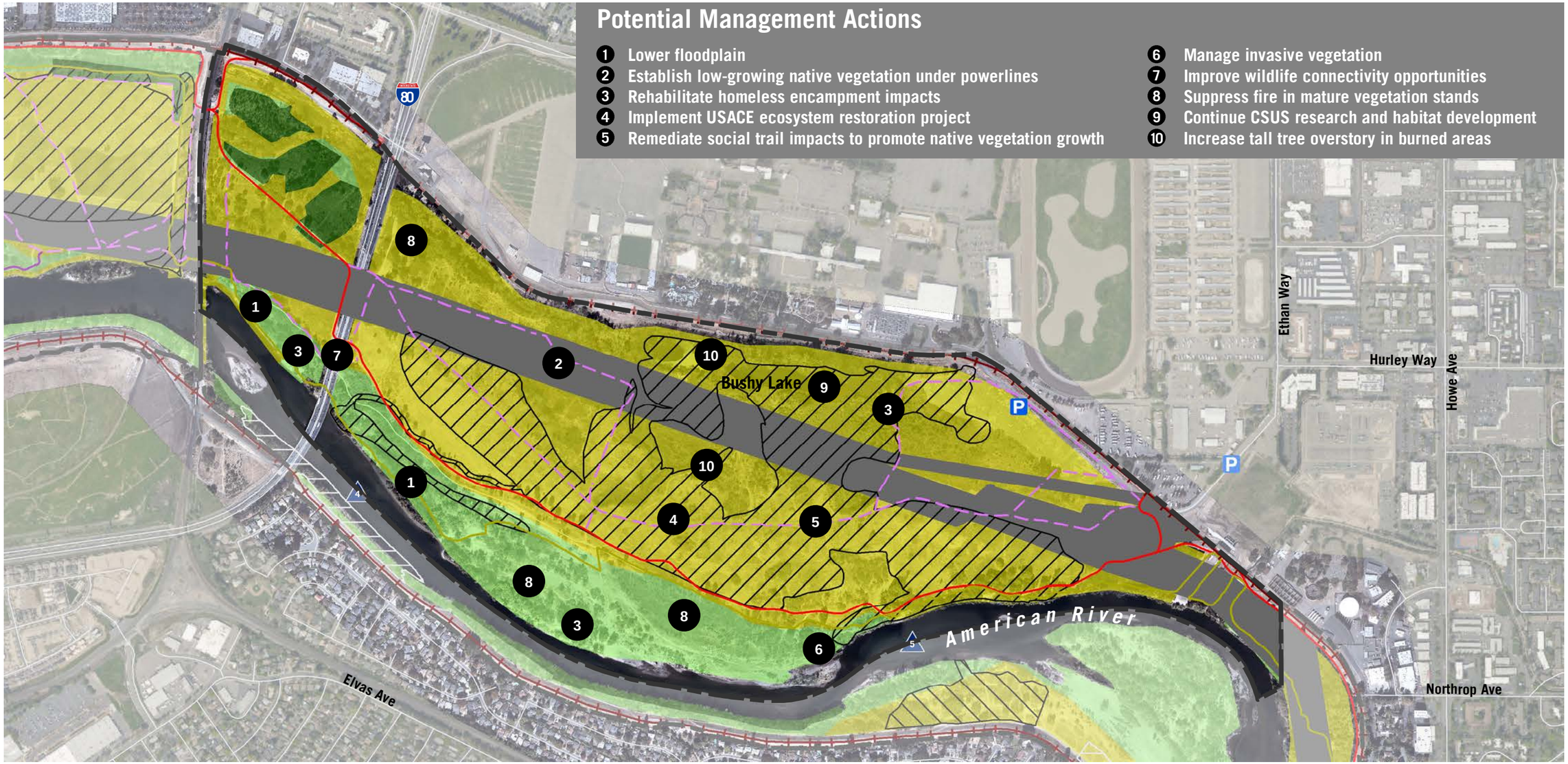


Figure 8-22
Area Plan 3 Cal Expo A

Potential Management Actions

1. Lower floodplain
2. Establish low-growing native vegetation under powerlines
3. Rehabilitate homeless encampment impacts
4. Implement USACE ecosystem restoration project
5. Remediate social trail impacts to promote native vegetation growth
6. Manage invasive vegetation
7. Improve wildlife connectivity opportunities
8. Suppress fire in mature vegetation stands
9. Continue CSUS research and habitat development
10. Increase tall tree overstory in burned areas

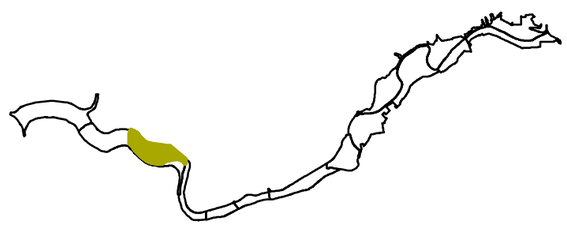


Parkway Boundary
Powerline Easement
Equestrian/Hiking Trail
Pedestrian Trail
Bicycle/Pedestrian Trail
Off Paved Bicycle Trail
Levee

Parking
River Mile

Proposed USACE Bank Protection Mitigation
Proposed USACE Bank Protection
Proposed USACE Ecosystem Restoration

Management Category
Preservation
Conservation
Naturalization



0 1,000 2,000 Feet

Figure 8-23
Area Plan 3 Cal Expo B

AREA PLAN 4

PARADISE BEACH

8.5.4 Paradise Beach Area Plan

Historic Physical and Biological Conditions

Well before European settlement, the lower reach of the LAR featured a deep channel with a relatively steep gradient flanked by high floodplains to the north and south. A subsequent rise in the bed of the Sacramento River created a back-water condition at the confluence of the two rivers, flattening the gradient and introducing tidal conditions along the lower five miles of the LAR. These conditions led to an outbreak flood pattern and distributary sloughs which resulted in much-reduced LAR channel capacities. This landscape supported a complex upland and riparian forest and abundant wildlife. The Paradise Beach Area Plan consists solely of the RL area, with the prominent Paradise Beach itself in the middle of the area.

As a result of long-term and ongoing sea level rise and channel backstepping process responses, Paradise Beach became a gravel-sand transition zone, where a notable change in gradient resulted in a change from an upstream gravel transport dominated regime, to a downstream sand transport dominated regime, with a flood chute as a natural feature of the aggradational bed form. The gradient is steeper than reaches both upstream and downstream, and the active bed material size distribution ranges from gravel and cobble upstream to sand and gravel downstream. The reach is in a long-term bed aggradation regime, limited by the rate of incoming course material.

Impact of European Settlement

The Gold Rush brought miners, city dwellers and farmers to the American River inaugurating a century and a half of landscape changes that have greatly altered the lower reach of the LAR. Placer mining quickly ran its course giving way to decades of hydraulic mining activity in the upper American River Basin that accelerated the aggradation of the historic LAR channel. Farmers cleared portions of the southern floodplain, but it was disconnected from the river channel by levee construction near the channel edge. Levee construction was followed by the construction of Folsom Dam, reversing the aggradation of the channel bed to long-term degradation in the lower reach of the river, which increased the separation of the channel from its remaining floodplains. By 1940s, the river had flushed enough mining debris to expose the pre-mining channel. The levees also created greater flows and flow depths for any given overbank LAR discharge. The southern levee along RL blocked high flows from leaving the channel and concentrated flows south toward downtown.

Portions of Paradise Beach were altered as a result of the influx of Sierra Nevada hydraulic mining debris. The height of mining debris aggradation occurred around 1900 when and the entire area of the present flood chute was buried by 15-20 feet of mining debris, confining the channel to its present low flow alignment. By the late 1940's (following the cessation of Sierra Nevada hydraulic mining), the river had washed out much of the mobile sand mining debris from the channels exposing the flood chute across the bar once again. Ongoing erosion of the mining debris continued on RL.

Levee construction concentrated flows by eliminating the outbreak flood pattern upstream of Paradise Beach, and confined LAR flows to a narrow floodplain area. These concentrated flows increased erosion potential, especially in areas with already erosive soils. Nonetheless, the present channel alignment has remained stable but continues to aggrade at a reduced rate because upstream mining activities have captured much of the material before it makes it to the Paradise Beach area.) While hydraulic scouring processes have controlled the distribution and character of riparian vegetation, reliable higher summer-season flows have recently experienced enhanced vegetation vigor in protected areas. Infrastructure includes the Capital City Freeway (Business 80/State Route 51) crossing at the downstream end, and the H Street Bridge crossing at the upstream end.

Aerial view of the Paradise Beach Area, looking upstream. Photo credit: Josh Hannon

Present Conditions

The Paradise Beach Area Plan can be best understood as being composed of a relatively narrow upstream portion, followed by a transitional wide floodplain middle portion with a relatively wide active channel, and a downstream portion with a wide floodplain on RR (in the Cal Expo Area Plan) but a very narrow RL overbank area and a narrow active channel. The upstream portion of the Paradise Beach area (from the H Street Bridge downstream to Paradise Beach itself) is characterized as a narrow, gravel-cobble bed channel with a narrow overbank. The mid-channel island and downstream bars are naturally occurring features and are slowly aggrading.

The river channel is tidally influenced to about midway through the Paradise Beach area, where the tidal changes can affect vegetation growth. The overall hydraulic regime of the narrow upper portion of the Paradise Beach area is characterized by periodic concentrated high velocity flows – some of the highest in the LAR. While the RL bank is narrow and contains erosive soils, only some of this bank has rocked bank protection, and much of RL is either un-rocked or is inadequately protected with existing rock. In order to protect the levee from further bank erosion, a bank protection project is being planned that will install additional rock revetments along the edge of the channel and incorporate riparian vegetation into the re-constructed river bank.

The wide middle portion of Paradise Beach contains an overbank flood chute, which flows through when dam releases are 15,000 cfs or higher, bisecting Paradise Beach and uprooting naturally sparse vegetation in the chute, which will re-sprout. Downstream of Paradise Beach proper, the RL overbank area narrows again and is protected by modern bank protection including a riparian planting bench supporting a dense assemblage of mature riparian vegetation. An extension of this bank protection is planned to extend under the Capital City Freeway.

Paradise Beach is a heavily used recreation area with many social trails. There are some opportunities for naturalization in areas where the Sierra Nevada hydraulic mining debris persists.

Like much of the American Parkway, Paradise Beach it is a local birding “hotspot” with 146 bird species recorded over the last 5 years (2016 through 2021, as recorded on eBird). Paradise Beach features a cottonwood forest, open gravel bar, and a backwater area, as well as a long river frontage. In years past tall cottonwood trees along the narrow downstream end served as rookery for black crowned night herons, until abandoned during extended levee strengthening and bank protection projects in the early 2000’s. A portion of the beach area contains a large stand of mature non-native black locust trees that are slated for removal and replacement with native trees as part of an off-site mitigation for USACE bank protection projects.

Paradise Beach often contains some encampments, which degrade the understory vegetation and likely deter wildlife. Overall, much of the vegetation in the area is in good to moderate condition, but subject to substantial ongoing degradation. Degradation of the vegetation, the understory in particular, reduces its value as wildlife habitat. And the activities leading to the degradation (e.g., wildfire, encampments, rampant social trails) are also a deterrent to wildlife.

Expected Future Trends

Paradise Beach should have a reduced rate of bed aggradation over the foreseeable future. However, as the levee system continues to concentrate flows through the area, bank protection will need to be expanded throughout the narrow overbank areas of Paradise Beach and riparian vegetation will persist as planted design elements of these projects. Paradise Beach itself is expected to aggrade very slowly, but the residual bodies of elevated Sierra Nevada mining debris are expected to be gradually lost due to ongoing material loss by lateral erosion. Vegetation at Paradise Beach is expected to continue to persist through a scour and sprout regime.

While the future rate of sea level rise is unknown, it is expected to increase in the foreseeable future, affecting the tidal prism in the downstream portion of this Area Plan up to River Mile 4.8. However, the existing bank protection and associated riparian bench will likely limit any influence from tidal changes on near-channel plant distribution. The channel bed itself is not expected to change as a result of sea level rise in the foreseeable future (due to the artificially perched elevation of the downstream channel and the very low likelihood that ongoing LAR channel processes in the downstream reaches could result in downcutting.) The greatest factors influencing future vegetation are wildfire, encampments degrading the understory, and the spread of invasive species.

Desired Conditions

Desired conditions are based on maintaining general channel processes and accommodating expected foreseeable future trends and conditions. This would include limiting future bank and levee protection projects

to those required for public safety, protection of property outside of the Parkway, and protection for existing substantial, unmovable infrastructure within the Parkway. Future infrastructure should be designed in a manner to not necessitate additional bank protection beyond that already existing or planned. Conservation or naturalization projects should be located and designed in a manner to avoid impediments to, and constraints on, appropriate future channel management actions that may be necessary.

The flood chute at Paradise Beach, in its current configuration, does not serve as the main channel and is only inundated under moderate to high flows, which is the desired condition. However, continued deposition in the main channel may slowly change this balance to have more flow pass through the flood chute. Therefore, it would be risky to proactively modifying the configuration of the flood chute because it could result in the river cutting through Paradise Beach for a more efficient flow path, resulting in increased hydraulic pressure on the RL levee and changed recreational opportunities as a result of the modified landform.

The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area. Invasive species that are outcompeting native species or inhibiting the regeneration of native species should be reduced/controlled, with a focus on invasive species within woodland areas. It is also desired to naturalize areas that have been substantially altered in the past and could provide better habitat for target species following implementation. Managing for a healthy understory with limited degradation from human uses would improve habitat values.

Site-Specific Potential Resource Management Actions (Figures 8-24 and 8-25)

1. **Lower floodplain:** Develop a plan to lower the floodplain to increase inundation frequency and improve rearing habitat for target fish species.
2. **Rehabilitate homeless encampment impacts:** In accordance with and in support of regional and countywide efforts to reduce homelessness, as appropriate remove encampments in the Parkway and rehabilitate those areas where the understory has been damaged. Rehabilitation should include clean-up, soil aeration, and planting of appropriate native species.
3. **Remediate social trail impacts to promote native vegetation growth:** Manage social trails in a manner that consolidates trails and allows rehabilitation of vegetation understory.
4. **Suppress fires in mature vegetation:** Develop a wildfire rehabilitation strategy for vulnerable mature vegetation to ensure a timely response for minimizing undesirable wildfire impacts.
5. **Manage invasive vegetation:** Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species.

General Area Plan Potential Resource Management Actions

- Determine the scope and design of desirable vegetation and habitat improvements on floodplain surfaces by using 2-D hydraulic modeling for x-sectional roughness values needed to maintain acceptable levee freeboard.
- Develop a naturalization plan for the area of Paradise Beach adjacent to the levee. The naturalization plan may include elements to improve and expand riparian forest habitat in the area between the levee and river channel.
- As future improvements are made to State Route 51/ Capital City Freeway or the railroad trestle, which pass through the western end of the Cal Expo area, identify opportunities to improve or accommodate wildlife movement.
- As the remainder of the Two Rivers Trail is implemented, identify opportunities for onsite planting to the extent consistent with flood control considerations and hydraulic limitations.
- Identify a process to have old bridge debris removed as a part of future associated projects.
- Update the 2000 Parkway-wide Invasive Plant Management Plan (IPMP), including the invasive non-native plant inventory, management strategies, and target species for priority removals (Planning Phase Report for the American River Parkway Invasive Plant Management Plan, Eva Butler and Associates, 2000). The update should incorporate the success of Phase I and Phase II IPMP removals, changes to the Parkway plant communities, and new technologies for eradication and control measures.
- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.

Key Indicators

Feet 0 1,500 3,000

1. Alteration

- Intentionally Altered
- Unintentionally Altered
- Unaltered

2. Inundation Extent

- Main Channel
- Recurrence Interval - 2 years
- Recurrence Interval - 25-100 years
- Recurrence Interval - 200 years
- Upland/Behind Levee
- No Data

3. Vegetation Communities

- Developed
- Open Water
- Riparian Woodland/Forest
- Riparian Scrub
- Turf/Turf with Trees
- Unvegetated
- Valley Foothill Grassland

4. Land Use

- Nature Study Area
- Protected Area
- Limited Recreation Area
- Developed Recreation Area
- Other

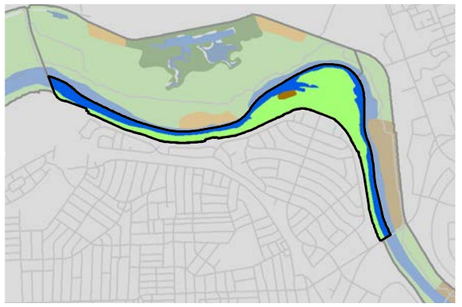


Figure 8-24
Area Plan 4 Paradise Beach A

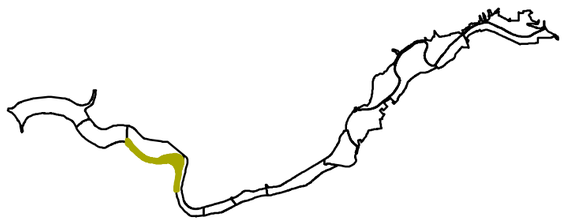
Potential Management Actions

1. Lower floodplain
2. Rehabilitate homeless encampment impacts
3. Remediate social trail impacts to promote native vegetation growth
4. Suppress fires in mature vegetation
5. Manage invasive vegetation

- Parkway Boundary
- Powerline Easement
- Bicycle/Pedestrian Trail
- Equestrian/Hiking Trail
- Levee
- River Mile
- Proposed USACE Bank Protection Mitigation
- Proposed USACE Bank Protection
- Proposed USACE Ecosystem Restoration

Management Category

- Preservation
- Conservation
- Naturalization



0 1,000 2,000 Feet

Figure 8-25
Area Plan 4 Paradise Beach B

AREA PLAN 5

CAMPUS COMMONS

8.5.5 Campus Commons Area Plan

Historic Physical and Biological Conditions

Well before European settlement the lower reach of the LAR featured a deep channel with a relatively steep gradient flanked by high floodplains to the north and south. A subsequent rise in the bed of the Sacramento River created a back-water condition at the confluence of the two rivers, flattening the gradient and introducing tidal conditions along the lower five miles of the LAR. Reduced gradients led to an outbreak flood pattern and distributary sloughs which resulted in much reduced LAR channel capacities. This landscape supported a complex upland and riparian forest and abundant wildlife.

Impact of European Settlement

The Gold Rush brought miners, city dwellers and farmers to the American River, inaugurating a century and a half of landscape changes that have greatly altered the lower reach of the LAR. Placer mining quickly ran its course, giving way to decades of hydraulic mining activity in the upper American River Basin that accelerated the aggradation of the historic LAR channel. Farmers cleared portions of the northern and southern floodplains, and both the north and south floodplains were disconnected from the river channel by levee construction. The RL levee was built first, near the channel edge. After construction of the Folsom Dam, the RR levee was built, slightly farther away from the river channel than its RL counterpart. After the hydraulic mining era, the aggraded channel bed in the lower reach of the river reverted to long-term degradation (lowering), which increased the separation of the channel from its remaining higher floodplains. Levees on both sides of the river contained the high flows (that once were able to leave the channel and occupy the floodplain on the north or flow south) into a narrow space as they flowed toward downtown Sacramento. These levees increased flows and flow depths in the channel and narrowed floodplains, resulting in some of the highest river velocities compared to anywhere else along the LAR.

The gravel-to-sand channel bed transition begins downstream of the H Street Bridge with a notable change in gradient. The channel gradient here is steeper than in other areas upstream or downstream. The upstream gravel transport-dominated regime changes to a downstream sand transport-dominated regime. The active bed material size distribution ranges from gravel and cobble upstream to sand and gravel downstream.

Upstream of H Street, the channel is a bank-attached scour pool, characterized by the resistant bed material of the Fair Oaks formation on RL. This reach had been gravel and cobble-bedded, but these gravels and cobbles have been washed out by high flows and not replenished due to upstream areas capturing available material. The RL overbank area just downstream of Howe Avenue supports a mix of riparian vegetation on its modest width, along with a natural depressional feature that is seasonally wet. Downstream of the City of Sacramento's Fairbairn Water Intake Structure, the RL bank supports a narrow band of mature riparian vegetation planted within existing bank protection. The RR overbank area is characterized by steep banks composed of a combination of erosion resistant materials and hydraulic mining debris that supports patches of riparian vegetation and oak savanna.

The Campus Commons area extends below the H Street Bridge on RR only, where the Campus Commons Golf Course is located. Similar to upstream, the golf course is bordered by steep banks along the channel with a mid-channel bar. Downstream of the golf course, the vegetation becomes denser and the overbank area topography is altered by the Chicken Ranch Slough and Strong Ranch Slough outfall structures at its downstream end. This raised feature created an area of ponding at the downstream end of the Campus Commons area during higher flows. Electric transmission lines pass through this same area, with the maintenance of these line limiting woody vegetation

beneath. There is some gravel bed just downstream of Howe Ave, but it too could wash out because of a lack of gravel input from upstream.

Present Conditions

The Campus Commons river channel and overbank areas are approximately 3 feet higher on the northern overbank area due to hydraulic mining and the subsequent import of material for golf course construction. As a result, riparian vegetation has reestablished in portions of the area. The RL overbank area is somewhat narrow upstream of the Fairbairn intake, transitioning to a very narrow bank with existing bank protection downstream of the intake. The wider portion is eroding very slowly, but this erosion does not appear to threaten the stability of the adjacent levee. There is an outfall structure that extends out into the channel as a result of this erosion and there is also an old, graded road along the overbank that causes ponding.

The moderately wide overbank along RR is subject to a variety of influencing conditions. Beginning upstream near Howe Avenue, there are signs of bank failure (sloughing) and a bank protection design is underway. The bank transitions to an area of past erosion and subsequent protection associated with an abandoned sewer line crossing. The remaining overbank area extending to the downstream extent of the golf course can be characterized by high and steep banks subject to an uncertain extent and rate of erosion, given the amalgamation of erosion-resistant materials and hydraulic mining debris. A sewer force main is located within this overbank area and running parallel to the levee with limited vegetation along its route. In combination with the design of bank protection for the opposite bank (RL), a design is underway for RR to lay back the steep slope to a more stable slope, incorporate buried rock groins to

Aerial view of the Campus Commons Area, including the Campus Commons Golf Course. Photo Credit: Josh Hannon

protect against future erosion, and revegetate the area with riparian vegetation. The concept is intended to protect against the high velocities experienced in this reach so that the existing overbank is not lost in future episodic erosion events, while also providing for some hydraulic relief and allowing for a somewhat dynamic channel edge ultimately held in place by the buried rock groins.

This narrow, levee-bounded area of Campus Commons is heavily impacted by infrastructure. Paved multi-use trails run the length of both RL and RR. Vehicle bridges flank both the upstream and downstream borders, with the Guy West pedestrian bridge bisecting roughly through the middle. The Fairbairn Water Intake structure and the developed Alumni Grove are located on RL adjacent to the CSUS campus (with its tall buildings overlooking the river). The somewhat wider overbank section in downstream RL contains both a nine-hole golf course and an adjacent, mined (and naturally revegetated) area with a 300-foot-wide electrical transmission line corridor overhead. Ongoing maintenance of both the golf course and the transmission lines limit woody vegetation on this somewhat wider overbank area. Two parallel sewer force mains run along much of the RR area, entering the park at the golf course, and crossing the river upstream (and out of the Parkway) near the Fairbairn Water Intake structure.

Most wildlife viewing in the Campus Commons area is focused on the transmission line corridor area downstream of the golf course (Spanos Court access). 129 bird species have been documented from this area from 2016 to 2021 (eBird). A population of locally rare broomrape has also been

Aerial view of the E.A. Fairbairn Water Intake Station and Guy West Bridge in the Campus Commons Area. Photo Credit: Regional Parks

documented near the Spanos Court access, likely parasitic on the elderberry plants growing in this area, but this elusive species has not been seen in recent years. Although there are portions of areas that have vegetated naturally, much of the woody vegetation in the upland Campus Commons area has been planted as part of projects.

Encampments interspersed through portions of the area (e.g., near Howe Avenue and downstream of the golf course) severely degrade the understory vegetation in those areas, likely deter use by wildlife, and have caused wildfires. Invasive plant species have been reduced, but some are still present. Overall, much of the vegetation in the area is in good to moderate condition, but is subject to substantial ongoing degradation. Degradation of the vegetation, the understory in particular, reduces its value as wildlife habitat. The activities leading to the degradation (e.g., encampments, rampant social trails, etc.) are also a deterrent to wildlife.

Expected Future Trends

The river channel is expected to continue to be gravel-bed dominated, with gravel declining in the upstream reach as it is washed away with minimal upstream replenishment. Downstream of H Street, the river channel is expected to slowly aggrade as available materials settle out in this gravel-to-sand transition zone. Planned bank protection projects on the remaining riverbank areas that are currently not hardened will help protect levees and preserve remaining overbank areas. The overall extent and types of vegetation are generally expected to remain constant.

However, some vegetation will be temporarily lost as a result of bank protection projects, to be replaced onsite to the extent feasible, with the remainder being mitigated offsite but within the Parkway. The RR project that will lay the steep bank back to a gentler slope is being designed to provide for substantial willow and cottonwood forest.

The greatest factors influencing future vegetation are the bank protection projects, encampments degrading the understory, fires destroying woodlands, and the spread of invasive species. Invasive species are expected to be most successful in areas degraded as a result of human activity (e.g., camping or fire) and then not rehabilitated in a timely manner. Bank protection projects will incorporate native vegetation into the design and/or provide offsite mitigation within the Parkway.

Desired Conditions

Desired conditions are based on maintaining general channel processes and accommodating expected foreseeable future trends and conditions. This would include limiting future bank and levee protection projects to those required for public safety, protection of property outside of the Parkway, and protection for existing substantial, unmovable non-Parkway infrastructure within the Parkway. Future infrastructure should be designed in a manner to not necessitate additional bank protection. Conservation, naturalization, or transformation projects should be located and designed in a manner to avoid impediments to, and constraints on, appropriate future channel management actions that maybe necessary.

The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area and to replace, and improve where feasible, vegetation impacted by bank protection projects. Maintaining habitat

for wildlife through this relatively narrow reach is also a desired condition. Invasive species that are outcompeting native species or inhibiting the regeneration of native species should be reduced/controlled, with a focus on invasive species within woodland areas. It is also desired to naturalize areas that have been substantially altered in the past and could provide better habitat for target species following implementation. Managing for a healthy understory with limited degradation from human uses would improve habitat values, as would conserving some area of open grassland suitable for raptor foraging, pollinators, and other wildlife.

Site-Specific Potential Resource Management Actions (Figures 8-26 and 8-27)

1. **Lower floodplain:** Develop a plan to lower the floodplain to increase inundation frequency and improve rearing habitat for target fish species.
2. **Rehabilitate homeless encampment impacts:** In accordance with and in support of regional and countywide efforts to reduce homelessness, as appropriate remove encampments in the Parkway and rehabilitate those areas where the understory has been damaged. Rehabilitation should include clean-up, soil aeration, and planting of appropriate native species.
3. **Establish low-growing native vegetation under powerlines:** Develop a formal vegetation management agreement with electrical utilities for transmission line Right of Ways, including establishment of appropriate and compatible forbs, grasses, and shrubs to maximize potential habitat for wildlife (including pollinators) and/or to provide fuel breaks to protect adjacent valuable wildlife habitat. Encourage the undergrounding of utility lines whenever feasible.
4. **Improve floodplain connectivity to reduce fish stranding:** Develop a plan to improve floodplain connectivity and minimize fish stranding at the downstream end of the plan area.
5. **Manage invasive vegetation:** Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with ap-propriate native species.
6. **Suppress fire in mature vegetation stands:** Develop a wildfire rehabilitation strategy for vulnerable mature vegetation to ensure a timely response for minimizing undesirable wildfire impacts.
7. **Remediate social trail impacts to promote native vegetation growth:** Manage social trails in a manner that consolidates trails and allows rehabilitation of vegetation understory. Replace declining black locust trees at Alumni Grove with native trees, such as Valley oak or California Sycamore.

General Area Plan Potential Resource Management Actions

- Determine the scope and design of desirable vegetation and habitat improvements on floodplain surfaces by using 2-D hydraulic modeling for x-sectional roughness values needed to maintain acceptable levee freeboard.
- Identify opportunities to manage recreation improvement areas to protect or enhance wildlife habitat. This may include specifying types of vegetation and/or timing of maintenance activities.
- Update the 2000 Parkway-wide Invasive Plant Management Plan (IPMP), including the invasive non-native plant inventory, management strategies, and target species for priori-ty removals (Planning Phase Report for the American River Parkway Invasive Plant Management Plan, Eva Butler and Associates, 2000). The update should incorporate the success of Phase I and Phase II IPMP removals, changes to the Parkway plant communities, and new technologies for eradication and control measures.
- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.

An outfall emptying runoff from the California State University, Sacramento campus into to the LAR channel in the Campus Commons Area. Photo Credit: Regional Parks

Key Indicators

Feet 0 2,000 4,000

1. Alteration

- Intentionally Altered
- Unintentionally Altered
- Unaltered

2. Inundation Extent

- Main Channel
- Recurrence Interval - 2 years
- Recurrence Interval - 25-100 years
- Recurrence Interval - 200 years
- Upland/Behind Levee
- No Data

3. Vegetation Communities

- Developed
- Open Water
- Riparian Woodland/Forest
- Riparian Scrub
- Turf/Turf with Trees
- Unvegetated
- Valley Foothill Grassland

4. Land Use

- Protected Area
- Limited Recreation Area
- Developed Recreation Area
- Other

Figure 8-26
Area Plan 5 Campus Commons A

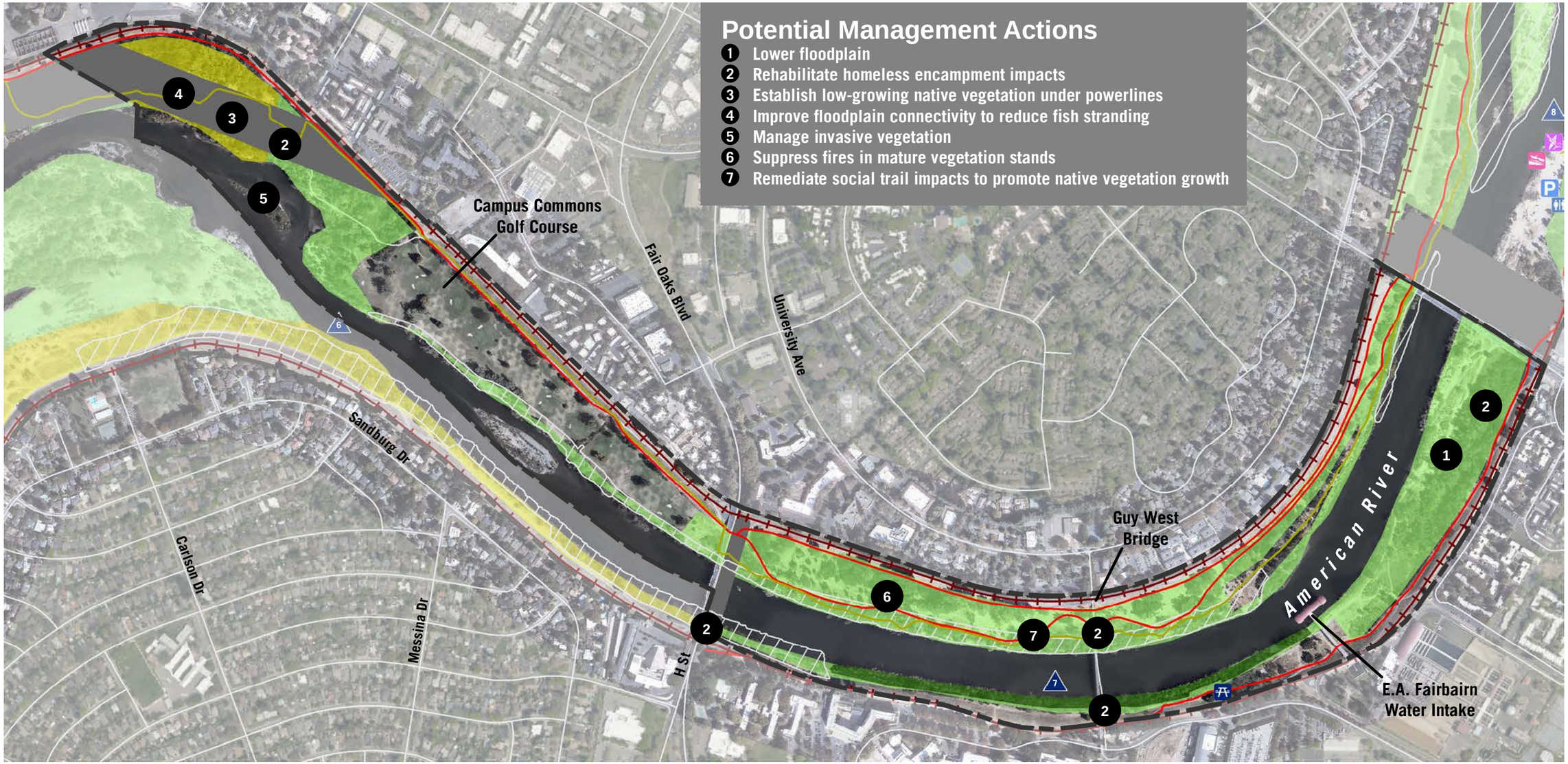


Figure 8-27
Area Plan 5 Campus Commons B

AREA PLAN 6

HOWE AVENUE

8.5.6 Howe Avenue Area Plan

Historic Physical and Biological Conditions

Well before European settlement, the Howe Avenue area featured a semi-confined, relatively steep channel limited by steep banks on RR and RL. The channel bed was composed of gravel and cobble, while the banks consisted of relatively erosion-resistant materials of varying degrees. Portions of the channel and overbank areas were composed of the very resistant Fair Oaks formation, overlain by more recent overbank deposition. The area's steep banks either resisted erosion or experienced cycles of erosion, retreat, deposition and accretion. Seasonal low-flows were in the 200-400 cfs range for protracted periods in the summer and fall. These conditions produced a scour and sprout vegetation regime which likely narrowed the riparian canopy to the toe of the bank and its lower slopes and created few areas of Shaded Riverine Aquatic (SRA) habitat in summer and fall.

Impact of European Settlement

The hydraulic mining activity affecting other areas downstream also affected the Howe Avenue area. The channel and overbank areas both aggraded equally and stayed connected. However, post-Sierra Nevada hydraulic mining river flows flushed the excess material out of the river channel but left hydraulic mining deposits on the overbank floodplains. This process resulted in a net increase of several feet in overbank and floodplain elevation relative to the channel bed.

Farmers cleared vegetation almost to the river's edge for a variety of agricultural needs beginning in the late 1800s. Remaining riparian vegetation occupied a narrow band along the channel margin, likely replicating pre-settlement conditions.

Construction of levees along both banks blocked outbreak flooding that previously allowed peak flows to escape the channel. This change concentrated flows to the space between the levees, increasing flow velocities and depths and encouraging channel enlargement and bank erosion.

From the late 1950s to early 1970s the Howe Area was intensively mined in the channel and on the channel-margins. In-channel mining significantly deepened channel sections and substantially lowered "native" bed elevations, resulting in substantial channel flattening (e.g., reducing the gradient of the channel). Channel-margin mining widened the channel by up to several hundred feet in places and resulted in off-channel ponds on RL that were intermittently connected to the main channel. In the late 1960s, flood flows breached the separation berm in the area just south of the existing island and captured the mining pond. This captured mining pond on RL became the main river channel, moving the river to the south of the island, through the captured mining pond.

Farther upstream on RL, the channel margin mining has left a series of backwater ponds and channels that are interconnected at moderate flows and are surrounded by dense riparian vegetation.

This reach is gravel bedded and could aggrade due to its over-deepened condition from mining, but any aggradation will be very slow due to upstream areas capturing available material (e.g., mining pits and overwidened channels) before they can reach the Howe area. However, loads of sand are also present in the channel as it runs through the Howe Avenue area, which could aggrade the backwater areas. Although most of this sand is temporarily stored on the channel bed before being conveyed downstream, some sand goes into long-term storage in the off-channel ponds and overbank area.

These channel and channel-margin conditions have enlarged the extent of riparian habitat in area, and on RL have expanded aquatic and channel edge habitat complexity. However, the channel configuration on RL may be contributing to degraded salmonid water temperature

conditions and may provide suitable conditions for predator fish species.

The RR overbank area is characterized by steep banks composed of a combination of erosion-resistant materials and hydraulic mining debris that supports patches of riparian vegetation and oak savanna. A bank protection project was installed on the RR bank in the early 2000s to protect the levee from erosion. Electric transmission lines cross the Parkway immediately upstream of Howe Avenue, with the maintenance of these lines limiting woody vegetation beneath.

Present Conditions

All of the Howe Avenue area was either intentionally or unintentionally altered by the previously described mining and agricultural activities. These activities removed much of the riparian vegetation throughout the area. In recent decades, however, riparian vegetation has regenerated.

The river channel remains over-deepened from past mining activities, and the upstream areas retain most incoming sediment. During over-bank flows the RL channel-margin mining pit area, sand deposition causes ongoing surface aggradation. Ongoing sand deposition contributes to the shallowing of backwater areas and developing emergent habitat conditions, which will expand the vegetation growth on the overbank area, limit hydraulic efficiency of the area, and eventually concentrate flows into the main channel, exacerbating erosional pressures on the RR bank.

The RR overbank area varies in width but is quite narrow upstream, widening somewhat just upstream of Howe Avenue. Bank protection is planned for all areas on RR that do not have existing bank protection, given the risk that very high velocity flows could destabilize the area's steep banks and threaten erosion into the levee. The bank protection design includes moving the existing island and a portion of the RL overbank to widen the narrowest portion of the RR overbank area and planting native riparian vegetation.

Aerial view of the Howe Avenue Area. Photo Credit: Josh Hannon

Vegetation on the overbank areas is in good condition, reflecting a mix of species dominated by oaks with some grassland understory on RR and a dense mix of riparian species on RL. Much of the area has relatively high-quality wildlife habitat, especially the dense willow riparian scrub and cottonwood and mixed riparian forests along the banks and abandoned mining pits. Where trees overhang the water surface, they provide good cover for aquatic species and perch and roost sites for bird species. The captured gravel pits create slow-moving warm-water habitat under some conditions that can favor nonnative fish that prey on rearing juvenile salmon. Invasive nonnative plants are a management issue throughout.

The Howe Access has had 120 bird species recorded over the past 5 years (as documented in eBird). This is a relatively narrow section of the parkway, with tall cottonwoods, oaks and some non-native black locust with willow brush, a native understory, and flooded backwaters. The Howe Bridge is used for nesting cliff swallows and a green heron rookery occurs adjacent to, just outside of the Howe Area.

Interspersed through portions of the area (e.g. near Howe Avenue, the island, and along the RL overbank) are encampments, which are severely degrading the understory vegetation in those areas and likely deterring use by wildlife. Invasive plant species are also present throughout. Overall,

Levee roads in the Howe Avenue Area. Photo Credit: Regional Parks

much of the vegetation in the area is in good condition, but subject to substantial ongoing degradation. Degradation of the vegetation, the understory in particular, reduces its value as wildlife habitat. And the activities leading to the degradation (e.g., encampments, rampant social trails) are also a deterrent to wildlife.

Expected Future Trends

The river channel is expected to continue to be gravel-bed dominated with the upstream portion slowly aggrading due to its over-deepened condition, and the downstream end continuing to degrade as available gravel moves through. As the levees concentrate high velocity flows through the area, the continued threat of erosion (primarily on RR) is expected on unprotected bank areas. Planned bank protection projects on RR are intended to halt erosion while preserving remaining overbank areas. The RL channel margin surface is expected to slowly increase in elevation with ongoing sand deposition, slowly filling in the ponds and channels. The overall extent and types of vegetation are generally expected to remain constant. However, some will be lost as a result of bank protection projects, to be replaced onsite to the extent feasible with the remainder being mitigated offsite but within the Parkway. In addition to protecting the flood control levee, the RR project is intended to conserve the existing overbank area and the existing vegetation it supports.

The greatest factors influencing future vegetation are bank protection projects, illegal camping degrading the understory, wildfire, and the spread of invasive species. Bank protection projects will incorporate native vegetation into the design and/or provide offsite mitigation within the Parkway.

Desired Conditions

Desired conditions are based on maintaining general channel processes and accommodating expected foreseeable future trends and conditions. This would include limiting future bank and levee protection projects to those required for public safety, protection of property outside of the Parkway, and protection for existing substantial, unmovable non-Parkway infrastructure within the Parkway. Future infrastructure should be designed in a manner to not necessitate additional bank protection. Conservation and naturalization projects should be located and designed in a manner to avoid impediments to, and constraints on, appropriate future channel management actions that maybe necessary.

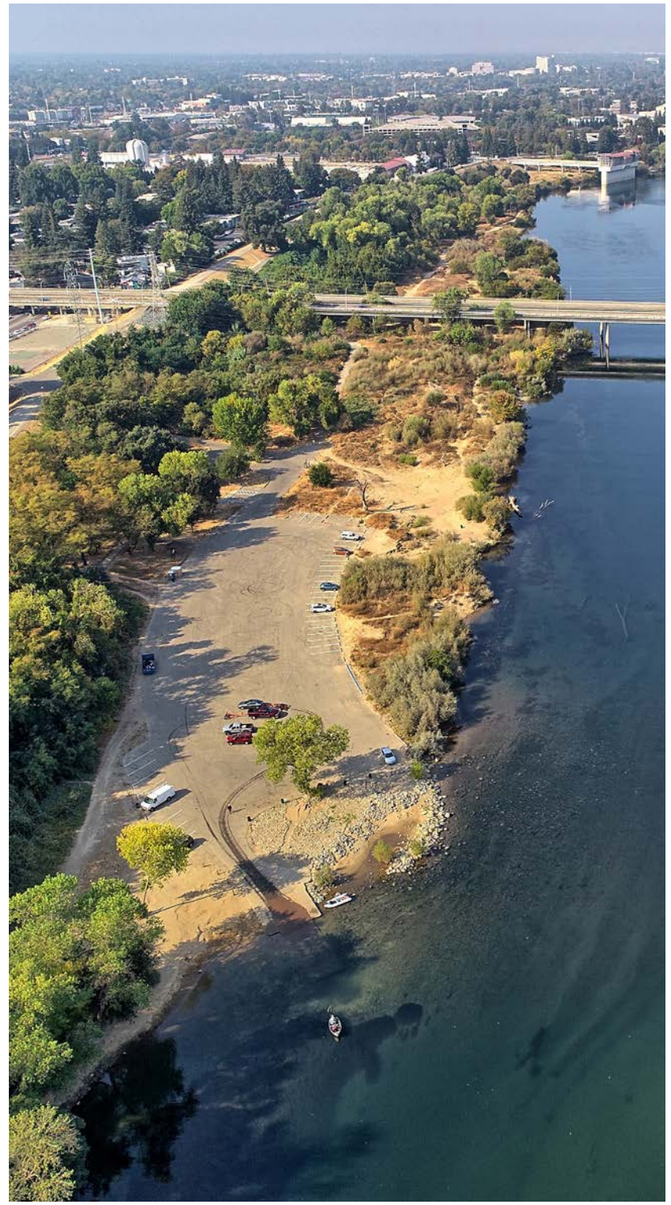
The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area and to replace, and improve where feasible, vegetation impacted by bank protection projects. Maintaining habitat for wildlife through this relatively narrow reach is also a desired condition. Invasive species that are outcompeting native species or inhibiting the regeneration of native species should be reduced/controlled, with a focus on invasive species within woodland areas. It is also desirable to naturalize areas that have been substantially altered in the past and could provide better habitat for target species following implementation, in a manner consistent with ongoing processes. Managing for a healthy understory with limited degradation from human uses would improve habitat values.

Site-Specific Potential Resource Management Actions (Figures 8-28 and 8-29)

1. **Lower floodplain:** Develop a plan to lower the floodplain to increase inundation frequency and improve rearing habitat for target fish species.
2. **Rehabilitate homeless encampment impacts:** In accordance with and in support of regional and countywide efforts to reduce homelessness, as appropriate remove encampments in the Parkway and rehabilitate those areas where the understory has been damaged. Rehabilitation should include clean-up, soil aeration, and planting of appropriate native species.
3. **Establish low-growing native vegetation under powerlines:** Develop a formal vegetation management agreement with electrical utilities for transmission line Right of Ways, including establishment of appropriate and compatible forbs, grasses and shrubs to maximize potential habitat for wildlife (including pollinators) and/or to provide fuel breaks to protect adjacent valuable wildlife habitat. Encourage the undergrounding of utility lines whenever feasible.
4. **Suppress fire in mature vegetation stands:** Develop a wildfire rehabilitation strategy for vulnerable mature vegetation to ensure a timely response for minimizing undesirable wildfire impacts.
5. **Remediate social trail impacts to promote native vegetation growth:** Manage social trails in a manner that consolidates trails and allows rehabilitation of vegetation understory.
6. **Manage invasive vegetation:** Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species.

General Area Plan Potential Resource Management Actions

- Determine the scope and design of desirable vegetation and habitat improvements on floodplain surfaces by using 2-D hydraulic modeling for x-sectional roughness values needed to maintain acceptable levee freeboard.
- Identify opportunities to manage recreation improvement areas to protect or enhance wildlife habitat. This may include specifying types of vegetation and/or timing of maintenance activities.
- Update the 2000 Parkway-wide Invasive Plant Management Plan (IPMP), including the invasive non-native plant inventory, management strategies, and target species for priori-ty removals (Planning Phase Report for the American River Parkway Invasive Plant Management Plan, Eva Butler and Associates, 2000). The update should incorporate the success of Phase I and Phase II IPMP removals, changes to the Parkway plant communities, and new technologies for eradication and control measures.
- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.



Aerial view of a parking lot and the Howe Avenue Bridge in the Howe Avenue Area. Photo Credit: Josh Hannon

Figure 8-28
Area Plan 6 Howe Avenue A

Potential Management Actions

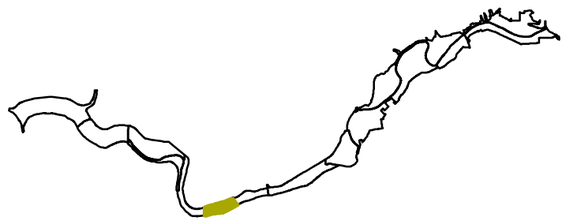
1. Lower floodplain
2. Rehabilitate homeless encampment impacts
3. Establish low-growing native vegetation under powerlines
4. Suppress fires in mature vegetation stands
5. Remediate social trail impacts to promote native vegetation growth
6. Manage invasive vegetation

Parkway Boundary
Powerline Easement
Bicycle/Pedestrian Trail
Equestrian/Hiking Trail
Levee

Boat ramp, Trailer boat
Car Top Boat Launch
Parking
Restroom
River Mile

Proposed USACE Bank Protection

Management Category
Preservation
Conservation



0 500 1,000 Feet

Figure 8-29
Area Plan 6 Howe Avenue B

AREA PLAN 7

WATT AVENUE

8.5.7 Watt Avenue Area Plan

Historic Physical and Biological Conditions

Well before European settlement, the reach of the LAR that includes Watt Avenue featured a semi-confined relatively steep channel limited by steep banks on RR and RL. The channel bed was composed of gravel and cobble while the banks consisted of relatively erosion-resistant materials of varying degrees. Portions of the channel and overbank areas were composed of the very resistant Fair Oaks formation, overlain by more recent overbank deposition. The area's steep banks either resisted erosion or experienced cycles of erosion, retreat, deposition and accretion. Summer and fall low-flows were in the 200-400 cfs range for protracted periods. These conditions produced a scour and sprout vegetation regime which likely narrowed the riparian canopy to a thin band from the toe of the bank and its lower slopes and created limited areas of Shaded Riverine Aquatic (SRA) habitat in summer and fall.

Impact of European Settlement

The hydraulic mining activity affecting other Area Plans downstream also affected the Watt Avenue area. While the hydraulic mining debris caused substantial aggradation of the river channel, the floodplain only aggraded several feet. After the hydraulic mining era, the post-mining river flows washed out the excess material from the LAR channel, but not from the overbank floodplain. This process resulted in a net increase in overbank and floodplain elevation relative to the channel bed of several feet. In other words, the distance from the river channel to the overbank area was now several feet higher than it was pre-settlement.

Agricultural operations begun in the late 1800's cleared riparian vegetation from the river floodplain, extending almost to the river's edge. The remaining riparian vegetation only existed as a narrow band along the channel margin.

Construction of levees along both banks stopped the outbreak flooding that previously occurred in this area when peak flows escaped the channel. This change narrowed the effective width of floodplain inundation during overbank flows, increasing flow velocities and depths in the levee confined floodway and encouraging channel enlargement and bank erosion.

From the late 1950s to early 1970s, intensive in-channel and channel-margin mining in the Watt Avenue area overly deepened channel sections and substantially lowered "native" bed elevations, resulting in substantial channel flattening. The portion of the channel bed upstream of Watt Avenue Bridge was stripped of material that could be mobilized, a condition that subsequently persisted and is not expected to change. Downstream of Watt Avenue Bridge, channel-margin mining has widened the channel by up to several hundred feet, leaving behind a gravel bed area that captures sediments flowing into it. However, due to the limited sediment supply flowing into this area (most having already been captured upstream by similarly over-widened channels and abandoned mining pits) the area downstream of the Watt Avenue Bridge is aggrading at a much slower rate.

A mid-channel bar located just downstream of the bridge consists of gravels captured in this area. This "island" formation is stable under most flows, but its presence increases erosional pressure on the RR bank. The channel also moves sand through the Watt Avenue area. Most sand flowing into the Watt area is temporarily stored on the channel bed before being conveyed downstream. But some sand stays in long-term storage in the off-channel ponds and overbank floodplain. The gravel mining and sand deposition resulted in larger stands of riparian habitat in area, especially on RL where the mining expanded aquatic and channel edge habitat complexity. The resulting mined channel conditions may be detrimental to salmonids due to warmer water temperatures and suitable conditions for predator fish species.

At the downstream end of the Watt Avenue area, electric transmission lines cross the Parkway, with the maintenance of these lines limiting woody vegetation beneath.

Present Conditions

Much of the Watt Avenue area was either intentionally or unintentionally altered by the previously described mining and agricultural activity. However, there are some areas on both banks considered unaltered (RR overbank areas and RL overbank area upstream of the bridge and extending just downstream of the bridge). Although much of the vegetation had been removed in altered areas, substantial riparian regeneration has occurred over the decades. The river channel remains over-deepened from past mining activities and most incoming sediment is retained in the areas upstream of Watt Avenue. The backwater mining pits on RL are gradually filling up with sand deposition during over-bank floods, causing this backwater area to become increasingly shallow and filling in and allowing for emergent and riparian vegetation growth. This progressive vegetation growth on both RR and RL may limit the hydraulic efficiency of the area and concentrate flows into the main channel. At the same time, the riverbank is vulnerable to erosional forces downstream of the bridge on RR and upstream of the bridge on RL.

Bank protection is planned in two locations in the Watt Avenue area to protect the high risk bank erosion areas comprising a mix of erosion resistant materials and hydraulic mining debris. The RR bank protection area begins downstream of the island and continues into the Howe Avenue area with rock protection along the channel toe and extending up the bank. The RL bank protection area begins upstream of the bridge and continues upstream into the SARA Park area with a rock trench outside of the low flow river channel along the toe of the flood control levee. Both project areas will be revegetated, to some extent, with riparian vegetation.

Levee and Parkway-adjacent office use in the Watt Avenue Area. Photo Credit: Regional Parks

Vegetation on the overbank areas is in good condition, reflecting a mix of species dominated by mixed riparian forests and oaks on RR and a dense mix of riparian species on RL. Much of the area has relatively high-quality wildlife habitat, especially the dense willow riparian scrub and cottonwood and mixed riparian forests along the banks and abandoned mining pit. Where trees overhang the water surface, they provide good cover for aquatic species and perch and roost sites for bird species. The captured gravel pit creates a slow-moving warm-water habitat under some conditions that can favor nonnative fish, such as striped bass, that prey on rearing juvenile salmon. Invasive nonnative plants, such as black locust trees and red sesbania, are a management issue throughout.

Like much of the American Parkway, Watt access is a birding “hotspot” with 119 bird species recorded over the last 5 years (2016 through 2021, as recorded on eBird). It is similar to the Howe Access, with flooded backwaters on the south side, but features a much wider north bank area, with cottonwoods and valley oaks dominating the overstory. A backwater area just upstream of the Watt bridge on the south bank contains the rare Sanford’s arrowhead plant. Many of the larger oak trees in the thin band of south bank vegetation downstream of Watt Bridge are slated for removal for a USACE levee protection project.

Access gate and paved path in the Watt Avenue Area. Photo Credit: Regional Parks

Encampments interspersed through portions of the area are severely degrading the understory vegetation in those areas and likely deterring use by wildlife, and are sometimes responsible for wildfires. Overall, much of the vegetation in the area is in good to moderate condition, but subject to substantial ongoing degradation. Degradation of the vegetation, the understory in particular, reduces its value as wildlife habitat.

Expected Future Trends

The river channel is expected to continue to be gravel and cobble bed dominated, but any continued aggradation downstream of the bridge will be very slow as there is minimal available supply upstream. As the levees and expanding riparian vegetation concentrate high velocity flows through the area, the threat of erosion to the identified sites is expected to continue unless hardened with bank protection. The planned bank protection project on RR is intended to halt erosion while preserving remaining overbank areas, and the bank protection project on RL is intended to protect the levee if erosion reaches the rock trench, conserving the existing overbank area and the existing vegetation it supports, but ultimately not protecting the overbank area from erosion. Sand deposition will slowly fill in the ponds and channels on RL downstream of the bridge, allowing riparian forest to expand. RL bank retreat may occur slowly, but the bank material is resistant enough that the rate of retreat is not expected to be an issue. The overall extent and types of vegetation are generally expected to remain constant, although some vegetation will be lost as a result of bank protection projects and replaced onsite to the extent feasible with the remainder being mitigated offsite but within the Parkway. Many of the tall overstory trees between RL Watt bridge and upstream to the Mayhew drain are expected to be lost and not replanted due to the bank protection project. Deposition will continue in the RL embayment just downstream of the bridge, possibly creating an off-channel pond as sediment accumulates on the channel edge.

The greatest factors influencing future vegetation are bank protection projects, encampments degrading the understory, wildfires that can kill overstory cottonwoods and weaken other overstory trees, and the spread of invasive species.

Desired Conditions

Desired conditions are based on maintaining general channel processes and accommodating expected foreseeable future trends and conditions. This would include limiting future bank and levee protection projects to those required for public safety, protection of property outside of the Parkway, and protection for existing substantial, unmovable infrastructure within the Parkway. Future infrastructure should be designed in a manner to not necessitate additional bank protection. Conservation, naturalization, or transformation projects should be located and designed in a manner to avoid impediments to, and constraints on, appropriate future channel management actions that maybe necessary.

The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area. It is also desirable to naturalize areas that have been substantially altered in the past and could provide better habitat for target species following implementation.

Site-Specific Potential Resource Management Actions (Figures 8-30 and 8-31)

1. **Lower floodplain:** Develop a plan to lower the floodplain to increase inundation frequency and improve rearing habitat for target fish species.
2. **Rehabilitate homeless encampment impacts:** In accordance with and in support of regional and countywide efforts to reduce homelessness, as appropriate remove encampments in the Parkway and rehabilitate those areas where the understory has been damaged.
3. **Establish low-growing vegetation under powerlines:** Develop a formal vegetation management agreement with electrical utilities for transmission line Right of Ways, including establishment of appropriate and compatible forbs, grasses and shrubs to maximize potential habitat for wildlife (including pollinators) and/or to provide fuel breaks to protect adjacent valuable wildlife habitat. Encourage the undergrounding of utility lines whenever feasible.
4. **Manage invasive vegetation:** Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species.
5. **Suppress fires in mature vegetation stands:** Develop a wildfire rehabilitation strategy for vulnerable mature vegetation to ensure a timely response for minimizing undesirable wildfire impacts.
6. **Remediate social trail impacts and promote native vegetation growth:** Manage social trails in a manner that consolidates trails and allows rehabilitation of vegetation understory.

General Area Plan Potential Resource Management Actions

- Develop a Conceptual Naturalization Plan for the area impacted by past channel-margin mining activity that:
  - Identifies naturalization opportunities within the context of ongoing and potential future channel adjustment trends, levee configuration issues, and sustainability issues (likely duration and maintenance requirements),
  - Outlines a strategy for naturalization actions which lays out a preferred sequencing, materials acquisition or disposal issue constraints, etc., and
  - Assesses the net long-term resource value changes.
- Determine the scope and design of desirable vegetation and habitat improvements on floodplain surfaces by using 2-D hydraulic modeling for x-sectional roughness values needed to maintain acceptable levee freeboard.
- Identify opportunities to manage recreation improvement areas to protect or enhance wildlife habitat. This may include specifying types of vegetation and/or timing of maintenance activities.
- Update the 2000 Parkway-wide Invasive Plant Management Plan (IPMP), including the invasive non-native plant inventory, management strategies, and target species for priori-ty removals (Planning Phase Report for the American River Parkway Invasive Plant Management Plan, Eva Butler and Associates, 2000). The update should incorporate the success of Phase I and Phase II IPMP removals, changes to the Parkway plant communities, and new technologies for eradication and control measures.
- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.

Flood waters near the Watt Avenue Bridge during the 2017 flood. Photo Credit: Scott Webb

Key Indicators

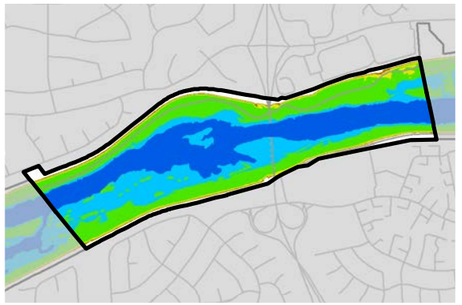
Feet 0 1,000 2,000

1. Alteration

- Intentionally Altered
- Unintentionally Altered
- Unaltered

2. Inundation Extent

- Main Channel
- Recurrence Interval - 2 years
- Recurrence Interval - 25-100 years
- Recurrence Interval - 200 years
- Upland/Behind Levee
- No Data



3. Vegetation Communities

- Developed
- Open Water
- Riparian Woodland/Forest
- Riparian Scrub
- Turf/Turf with Trees
- Unvegetated
- Valley Foothill Grassland

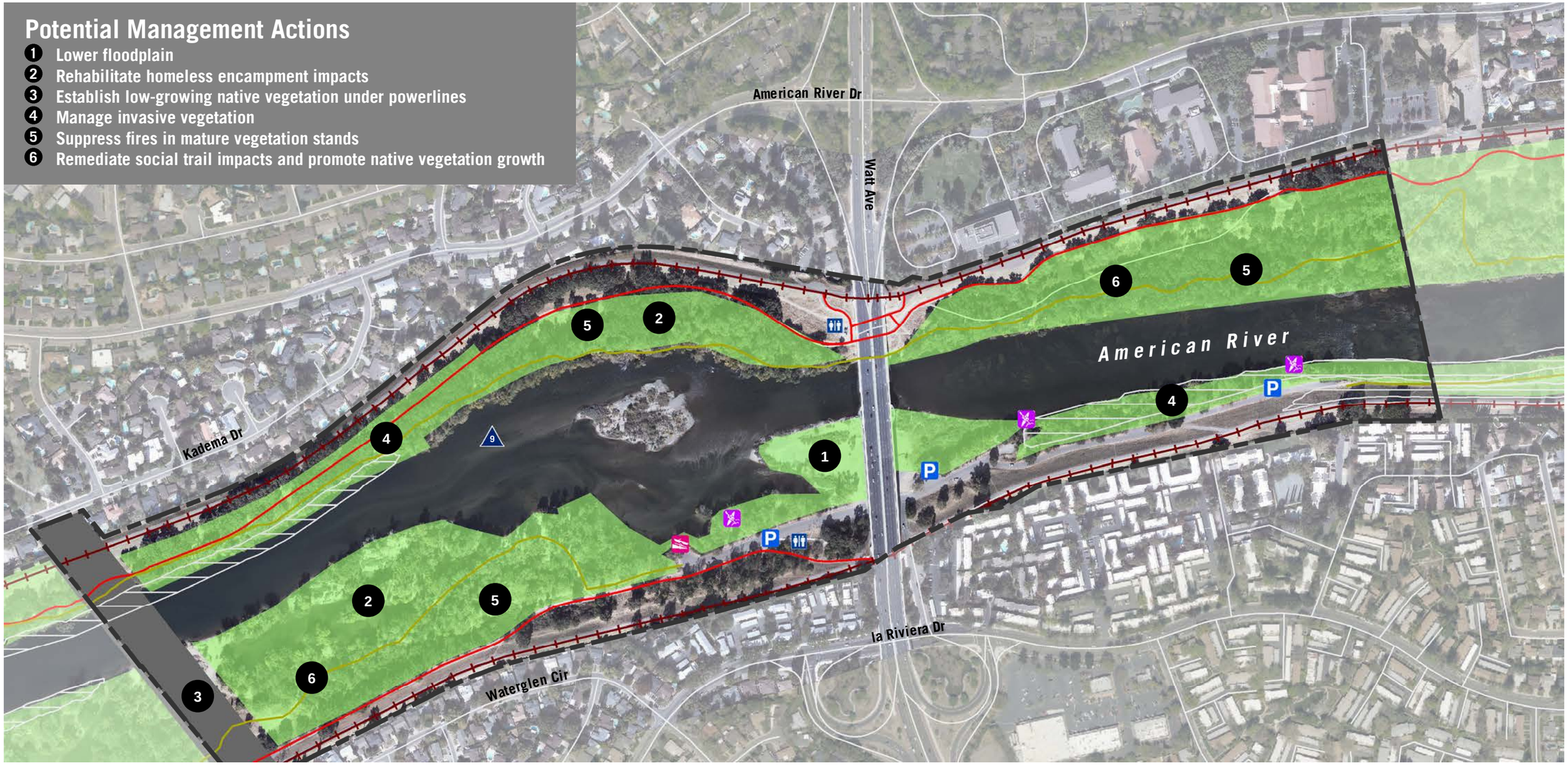
4. Land Use

- Protected Area
- Limited Recreation Area
- Developed Recreation Area

Figure 8-30
Area Plan 7 Watt Avenue A

Potential Management Actions

1. Lower floodplain
2. Rehabilitate homeless encampment impacts
3. Establish low-growing native vegetation under powerlines
4. Manage invasive vegetation
5. Suppress fires in mature vegetation stands
6. Remediate social trail impacts and promote native vegetation growth

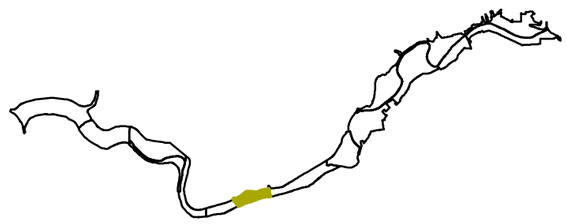


Parkway Boundary
Powerline Easement
Bicycle/Pedestrian Trail
Equestrian/Hiking Trail
Levee

Boat ramp, Trailer boat
Car Top Boat Launch
Parking
Restroom
River Mile

Proposed USACE Bank Protection

Management Category
Preservation
Conservation



0 500 1,000 Feet

Figure 8-31
Area Plan 7 Watt Avenue B

AREA PLAN 8

SARA PARK

8.5.8 SARA Park Area Plan

Historic Physical and Biological Conditions

Well before European settlement, the reach of the LAR that includes SARA Park featured a semi-confined, relatively steep channel, limited by steep banks on RR and RL. The channel bed was composed of gravel and cobble while the banks consisted of relatively erosion-resistant materials, including portions with the very resistant Fair Oaks formation, overlain by more recent overbank deposition. The area's steep banks either resisted erosion or experienced cycles of erosion, retreat, deposition and accretion. Given these conditions, the riparian dynamic was a scour and sprout regime with the riparian canopy occupying the toe edge of the bank and lower bank slopes. The width of the historic riparian forest in this location is unknown.

Seasonal low-flows were in the 200-400 cfs range for protracted periods in the summer and fall. This flow regime limited the interface of riparian vegetation with the river and there were likely few areas of Shaded Riverine Aquatic (SRA) habitat in summer and fall seasons.

Impact of European Settlement

The hydraulic mining activity (affecting other Area Plans downstream of about RM 10) also affected SARA Park Area Plan. While the hydraulic mining debris caused substantial aggradation of the river channel, the floodplain only aggraded several feet. However, after the hydraulic mining era, the post-mining river flows washed out the excess material from the LAR channel, but not from the overbank floodplain. This process resulted in a net increase in overbank and floodplain elevation relative to the channel bed of several feet. In other words, the distance from the river channel to the overbank area was now several feet higher than it was pre-settlement.

Agricultural operation begun in the late 1800's cleared the riparian vegetation from the river floodplain, extending almost to the river's edge. The remaining riparian vegetation only existed as a narrow band along the channel margin.

Levee construction along both banks blocked the outbreak flooding that previously exported portions of peak flows from the LAR both north and south. This levee blockage narrowed the effective width of floodplain during overbank flows, increasing river flow velocities and depths while increasing rates of channel widening and bank erosion in SARA Park.

From the late 1950s to the early 1970s, intensive gravel mining in the river and on the banks of SARA Park overly deepened portions of the river channel and substantially lowered "native" bed elevations, resulting in substantial channel flattening (e.g., decreasing the gradient of the channel bed from upstream to downstream). Channel-margin mining widened the channel by up to several hundred feet and left ponds isolated from the main channel by a narrow separation berm (the residual RR bankline). By the late 1960s, flood flows had breached the separation berm at several locations, allowing the LAR to capture these ponds. Sand deposition and subsequent flood flow greatly enlarged the remaining separation berms, and turned them into long sand islands, standing about 8 feet above the area's low flow water surface elevations, supporting the growth of well-developed riparian communities.

During the gravel mining era, the overall channel width increased from approximately 300 feet to as much as ~1200 feet, further reducing the capacity of this already over-flattened waterway to convey sediment through the reach to downstream areas. Eventually, all of the course sediment entering this area goes into long-term storage in the form of river bed aggradation in the upstream reach; it appears that only the smallest material, such as sand and small gravels, may pass through to downstream areas. Most sand is likely conveyed downstream, but some goes into long-term storage in the off-channel ponds and overbank areas, while the sand in the channel bed is only in transient storage. These gravel-mined conditions have greatly

enlarged and expanded opportunities for riparian habitat and have increased the complexity of aquatic and channel edge habitat. However, the channel configuration may also have contributed to warmer water temperatures that are less suitable for salmonids and may have also provided enhanced conditions for predator fish species, such as striped bass.

In areas where mining has not widened the channel, ongoing bank erosion has resulted in several bank protection projects on the RL bank to protect public safety. These projects have diminished bankline resources such as riparian communities and recreational opportunities and over time could contribute to further bank erosion at the upstream and downstream ends of the existing protection.

Present Conditions

All of SARA Park is either intentionally or unintentionally altered by the previously described actions. However, riparian vegetation has regenerated over much of the previously cleared areas. The river channel remains over-deepened from past mining activities, retaining almost all incoming sediment that has not already been retained in the upstream Arden Bar Area Plan. River islands are aggrading from sand deposition during over-bank flow events. At the same time, the edges of existing banklines (particularly the north bank abutting the captured ponds) are eroding, with up to 6 feet of bank retreat over the past 10 years. Sand eroding from the islands and upstream sources is shallowing backwater areas and developing emergent wetlands. The RL overbank berm is narrow and vulnerable to bank erosion at the downstream end. Growing and expanding riparian vegetation on the overbank area may reduce the area's hydraulic efficiency and concentrate flows back into the main channel.

The LAR at high flow in the SARA Park Area. Photo Credit: Wildlife Conservation Board

Vegetation on the overbank areas is in good condition, reflecting mix of species dominated by oaks with some grasslands. Much of the area has relatively high-quality wildlife habitat, especially the dense willow riparian scrub and cottonwood and mixed riparian forests along the banks and abandoned mining pits as well as some planted elderberry shrubs. Trees overhanging the water surface provide excellent cover for aquatic species and perch and roost sites for bird species.

The captured gravel pits create slow-moving warm-water habitat under some conditions that can favor nonnative predator fish that prey on juvenile salmon. Invasive nonnative plants, such as Chinese tallow tree and red sesbania, are a management issue throughout. The parkway road to the Harrington Access is vulnerable to ongoing headcutting erosion from the nearby drainage outfall, most susceptible under high flow conditions which would eventually damage the access road.

SARA Park, like most of the American River Parkway, is a local birding favorite with 160 species recorded in eBird over the last 5 years (2016 to 2021). Several locations are well-documented including the river islands, the Gristmill area, the north bank, with the highest bird counts noted on the south bank near the Mayhew Drain tributary. The Gristmill area includes many locally maintained nesting boxes, occupied each year by Wood Ducks, Screech Owls, and other cavity nesting birds. Many species of warblers nest in the large non-native black locust trees in the Gristmill area. Open grassland areas are used for raptor foraging and sometimes

Aerial view of the SARA Park Area. Photo credit: Regional Parks

ground nesting birds. The rare Sanford's arrowhead plant can be found on the river islands.

Expected Future Trends

Over an extended period, it is expected that the channel will progressively reconfigure back toward pre-mining conditions. Upstream sand and coarse sediments will gradually refill the captured mining pit area, recreating a single thread channel through the area. In the foreseeable future, the rate of aggradation will depend on the sequence of high flows capable of transporting sediments and the availability of transportable sediment from upstream areas. Riparian habitats are expected to progressively transition from island edges to open water, from open water to emergent vegetation, and from emergent vegetation to riparian terrestrial habitat. Higher elevation overbank areas are expected to continue to support oak woodlands, and lower elevation areas will continue to support a mix of riparian species. The channel is expected to remain a coarse sediment sink, interrupting the transport of coarse sediment, such as gravels, to downstream reaches.

Desired Conditions

Desired Conditions provide for and accommodate expected foreseeable future natural processes and channel adjustment trends to past human actions. This would include limiting future bank and levee protection projects to those required for public safety and protection of property outside of the Parkway. Future infrastructure, if any, should be designed in a manner that does not necessitate additional bank protection. Conservation and naturalization projects should be located and designed in a manner compatible with ongoing processes and have an expected durability to provide long-term benefits.

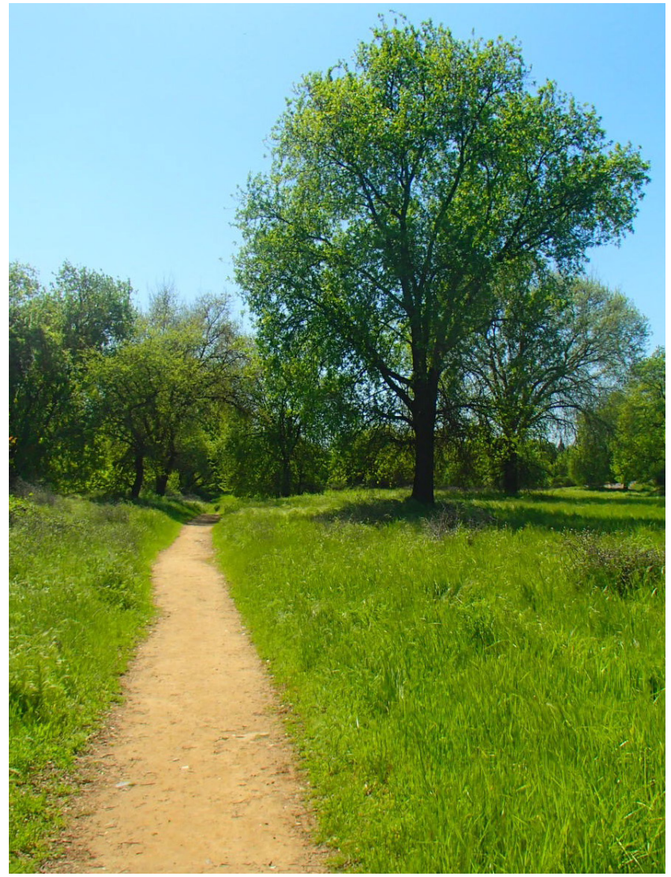
The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area. It is also acceptable to accommodate mature non-native vegetation, such as the mature black locust trees at the Gristmill area that provides valuable habitat for target wildlife species and can be controlled from further spread. Invasive non-native species that are outcompeting native species or inhibiting the regeneration of native species should be reduced and/or controlled. There are opportunities on the RR overbank, where the channel has been over-widened, to expand woodland and elderberry habitat. Managing for a healthy understory with limited degradation from human uses would improve habitat values, as would providing a diversity of habitats to the extent possible.

Site-Specific Potential Resource Management Actions (Figures 8-32 and 8-33)

1. **Lower floodplain:** Develop a plan to lower the floodplain to increase inundation frequency and improve rearing habitat for target fish species.
2. **Rehabilitate homeless encampment impacts:** In accordance with and in support of regional and countywide efforts to reduce homelessness, remove encampments in the Parkway and rehabilitate those areas where the understory has been damaged. Rehabilitation should include clean-up, soil aeration, and planting of appropriate native species.
3. **Manage invasive vegetation:** Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species.
4. **Establish valley oak riparian woodland:** Expand target habitats on the right bank upper berm by establishing valley oak riparian woodland and elderberry.
5. **Maintain flow through the drainage slough:** Consistent with action #3, identify opportunities to maintain water flow through the drainage slough.
6. **Suppress fire in mature vegetation stands:** Develop a wildfire rehabilitation strategy for vulnerable mature vegetation to ensure a timely response for minimizing undesirable wildfire impacts.
7. **Remediate social trail impacts to promote native vegetation growth:** Manage social trails in a manner that consolidates trails and allows rehabilitation of vegetation understory.

General Area Plan Potential Resource Management Actions

- Develop a Conceptual Naturalization Plan for the area impacted by past channel-margin activities to; 1) identify naturalization opportunities within the context of ongoing and potential future channel adjustment trends, levee configuration issues, and sustainability issues (likely duration and maintenance requirements), 2) develop a strategy for naturalization actions which lays out a preferred sequencing, materials acquisition or disposal issues constraints, etc., and 3) assess the net long-term resource value changes.
- Consider reconfiguring the drain outfall at RM 11.4 RR by extending the pipe to a position near the channel edge and to cover the existing drainage channel with fill material suitable for re-vegetation to reduce the potential for headcutting into the Harrington Access road during future high floodflow events.
- In areas identified for Conservation, conserve existing habitats. Actions may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species. Hydraulic considerations are of high importance in this area plan.
- Update the 2000 Parkway-wide Invasive Plant Management Plan (IPMP), including the invasive non-native plant inventory, management strategies, and target species for priori-ty removals (Planning Phase Report for the American River Parkway Invasive Plant Management Plan, Eva Butler and Associates, 2000). The update should incorporate the success of Phase I and Phase II IPMP removals, changes to the Parkway plant communities, and new technologies for eradication and control measures.
- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.



Foot trail through oak woodland in the SARA Park Area. Photo Credit: Wildlife Conservation Board

Figure 8-32
Area Plan 8 SARA Park A

Key Indicators

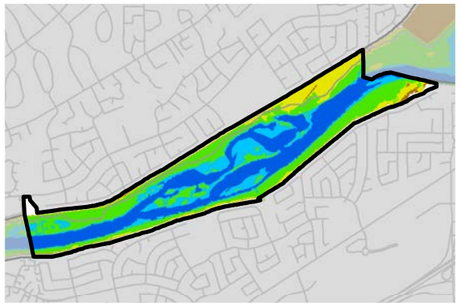
Feet 0 2,000 4,000

1. Alteration

- Intentionally Altered
- Unintentionally Altered
- Unaltered

2. Inundation Extent

- Main Channel
- Recurrence Interval - 2 years
- Recurrence Interval - 25-100 years
- Recurrence Interval - 200 years
- Upland/Behind Levee
- No Data



3. Vegetation Communities

- Developed
- Open Water
- Riparian Woodland/Forest
- Riparian Scrub
- Turf/Turf with Trees
- Unvegetated
- Valley Foothill Grassland

4. Land Use

- Protected Area
- Recreation Reserve
- Limited Recreation Area
- Developed Recreation Area

Potential Management Actions

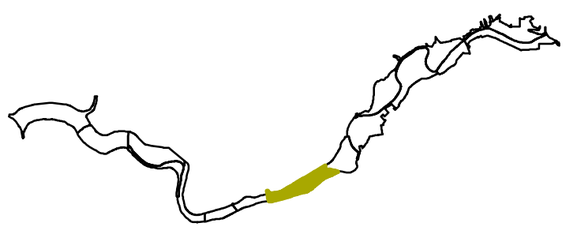
1. Lower floodplain
2. Rehabilitate homeless encampment impacts
3. Manage invasive vegetation
4. Establish valley oak riparian woodland
5. Maintain flow through drainage slough
6. Suppress fire in mature vegetation stands
7. Remediate social trail impacts to promote native vegetation growth

Parkway Boundary
Powerline Easement
Bicycle/Pedestrian Trail
Equestrian/Hiking Trail
Levee

Car Top Boat Launch
Parking
Restroom
River Mile

Proposed USACE Bank Protection
Proposed USACE Bank Protection Mitigation

Management Category
Preservation
Conservation
Naturalization



0 1,000 2,000 Feet

Figure 8-33
Area Plan 8 SARA Park B

AREA PLAN 9

ARDEN BAR

8.5.9 Arden Bar Area Plan

Historic Physical and Biological Conditions

Well before European settlement, the reach of the LAR that includes Arden Bar featured a cobble bedded channel confined by steep erosion resistant banks on RL and by a high stable bar on RR. Similar to the modern-day River Bend area, this configuration featured an efficient single threaded channel and a high-flow bypass channel capable of conveying sand and gravel downstream under a wide range of flows.

Overbank areas consisted of a variety of surfaces formed over geologic time, resulting in areas of variable overbank deposition ocassionally underlain by the impermeable erosion-resistant Fair Oaks formation. In most higher elevation areas, this impermeable material isolated surfaces from river-fed shallow groundwater, thereby limiting the amount of groundwater available to vegetation and significantly influencing the types and amounts of vegetation able to survive. Vegetation cover near the channel was likely limited by a scour and sprout regime that transitioned to more dense and mature vegetation farther from the channel.

Impact of European Settlement

Most of Arden bar, including the park, riverbanks, and river channel, was substantially altered by gravel mining operation. The mining stripped vegetation and soil from much of the area, excavated an area that is now a large pond, and left an island complex in the river. The river islands were formed when mining pits along the river's edge were ultimately captured by the river (and are now a coarse sediment sink). These mining pits capture coarse sediments so effectively that essentially all but the finest gravels flowing into this reach go into long term storage, creating bars and closing secondary channels. A portion of the sand load that is captured by these vegetating bars has led to increased bar stability. Mining activities also left wide-haul roads and material handling areas on the bar, which blocked the pre-existing bypass channel along the northern edge of the bar, leaving high, dry, un-vegetated areas. Channel excavation also steepened the gradient of the main river channel within this reach and the downstream reach.

The construction and operation of Folsom Dam and Nimbus Dam changed the flow regime and sediment regime in the LAR but there is no known evidence that this has changed the channel configuration in the Arden Bar area. However, the change in seasonal flows such as higher flows in the low-flow period, may have contributed to some enhanced riparian vegetation extent and vigor and increased the extent of SRA habitat at this location under these flow circumstances. In particular, well-developed riparian communities have established within the island complex resulting from the mining activity.

The northern portion of Arden Bar is separated from the park by a secondary levee and was once a wastewater treatment facility, which has since been decommissioned. There are also highly popular developed recreation areas with mowed turf and picnic facilities.

Construction of levees, continuously along the north bank and only where there is low ground on the south bank, have stopped the overbank flooding that historically may have occurred in this area, exporting portions of peak flows from the LAR both north and south. This change narrowed the effective width of floodplain inundation during overbank flows, increasing flow velocities and depths in the lower portion of Arden Bar and downstream.

Present Conditions

Almost all of Arden Bar was either intentionally or unintentionally altered by the previously described actions, with one small area along the northeast edge that is considered unaltered. These actions resulted in the removal of any existing upland or riparian vegetation. In recent decades, substantial riparian regeneration has occurred in some locations where there was enough soil remaining from the mining. There are other areas where regeneration was severely limited due to lack of soil in the post-mining landscape. The river channel remains over-widened and over-steepened from past mining activities, creating a sediment deposition zone that effectively retains all coarse sediment entering the area. In the captured channel-margin mining pit area, which essentially functions as a multi-threaded channel at this time, the bars experience ongoing surface aggradation by sand deposition during over-bank flow events, and some portions support riparian vegetation. These bars serve as important wildlife habitat including a heron rookery. Ongoing additional sediment influx from upstream sources, both naturally occurring and as a result of gravel augmentation projects, is resulting in the shallowing and closing of secondary channels and backwater areas.

Low to moderate flows remain in the main channel, but the Arden Pond feature receives flows over the bar and through the pond during most flow events. The pond is a popular recreation spot and provides habitat for wildlife and waterfowl that prefer still or slow-moving water. The connection with the main channel at the downstream end of the pond is slowly degrading as flows continue to pass through.

Vegetation on some of the overbank areas is in good condition, but much of the area remains scarred by mining. The area with the best relatively high-quality wildlife habitat is within the multi-threaded channel area and at

Gazebo and picnic tables in the Arden Bar Area. Photo Credit: MIG

the outermost tip of the bar (behind the pond), comprised of dense willow riparian scrub and cottonwood and mixed riparian forests. The Arden Bar area has been the site of the highest concentrations of red sesbania on the river and has been successfully managed as part of the IPMP. Trees overhanging the water surface provide excellent cover for aquatic species and perch and roost sites for bird species. USACE is proposing a mitigation project at Arden Bar, including a portion of Arden Pond, that will grade the area to create a bypass channel intended to provide SRA and rearing habitat for anadromous fish species following establishment of planted riparian vegetation.

Arden Bar is a birding “hotspot” (second only to Sailor Bar for avian diversity) on the American River Parkway with 189 species recorded in eBird over the last 5 years (2016 to 2021). Of particular importance is a large heron/egret rookery (16 nests counted in 2020) in a cottonwood grove, currently isolated, (and somewhat protected) on a river island. Cottonwoods and other tall trees in Arden Bar (including eucalyptus) have served as nests sites for White tailed kites, red tailed hawks and red shouldered hawks. The fishing pond (former mining pit) attracts a variety of diving ducks and other waterfowl. The pond features two large islands that are dominated in the spring and summer by nesting Canada Geese. Botanically, Arden Bar has areas with established native bunchgrasses (planted), naturally occurring deer weed, and the pungent vinegar weed on bare soil of mined areas.

Pond in the Arden Bar Area. Photo Credit: Regional Parks

Expected Future Trends

Over an extended period, it is expected that the channel will gradually reconfigure back toward pre-mining conditions and a single threaded channel with a lower gradient. In the foreseeable future, the rate of aggradation will depend on the sequence of high flows capable of transporting material and the availability of transportable material in upstream areas. Habitats are expected to progressively change, including ongoing transition of open water to emergent, and of emergent to riparian vegetation. Higher overbank areas are expected to continue to support oak woodland habitats and lower areas to support a mix of riparian species. The channel is expected to remain a coarse sediment sink, interrupting coarse sediment to downstream reaches.

Desired Conditions

Provide for and accommodate expected foreseeable future natural processes and channel adjustment trends to past human actions. This would include limiting future bank and levee protection projects to those required for public safety and protection of property outside of the Parkway. Future infrastructure, if any, should be designed in a manner that does not necessitate additional bank protection. Conservation and naturalization projects should be located and designed in a manner compatible with ongoing processes and have an expected durability and provide long-term benefits.

The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area.

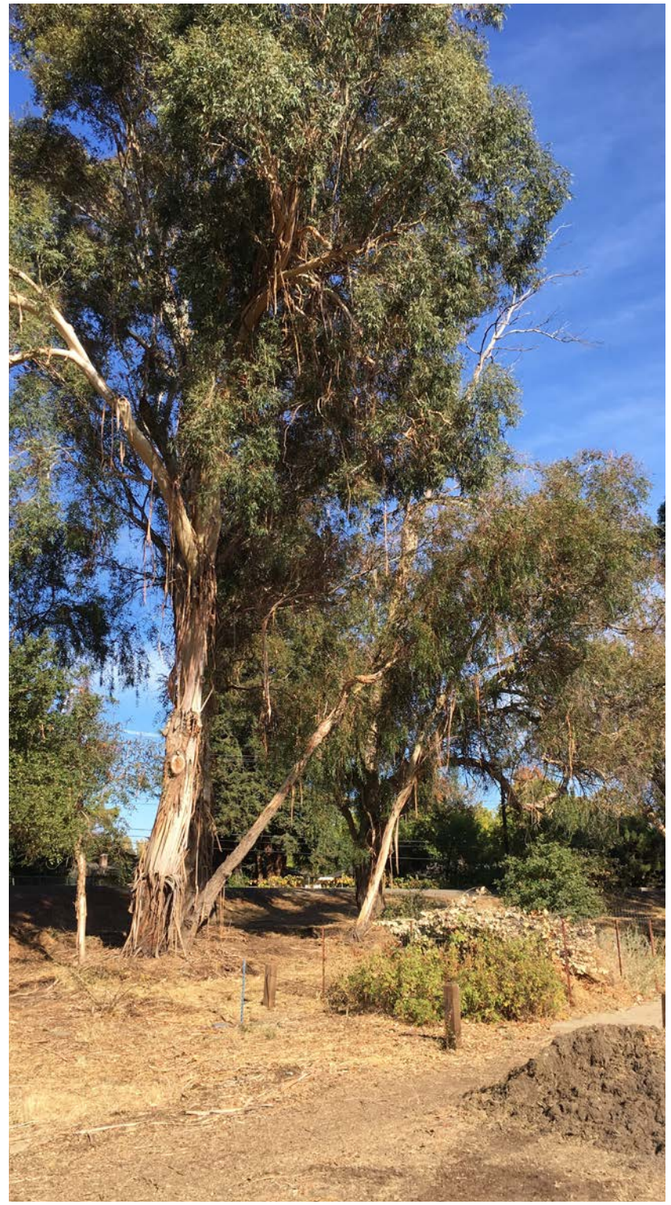
Areas that currently do not support native vegetation due to past mining activities or are in a degraded condition should be considered for naturalization to improve habitat values. Invasive non-native species, particularly red sesbania at Arden Bar, that are capable of outcompeting native species or inhibiting the regeneration of native species should be reduced/controlled.

Site-Specific Potential Resource Management Actions (Figures 8-34 and 8-35)

1. **Lower floodplain:** Develop a plan to lower the floodplain to increase inundation frequency and improve rearing habitat for target fish species.
2. **Maintain spawning riffle:** Previously constructed gravel augmentation site will be periodically replenished with additional gravel to maintain suitable habitat for salmonids.
3. **Manage invasive vegetation:** Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species.
4. **Develop naturalization plan for Arden Pond:** Implement USACE plan for Arden Pond which includes SRA and rearing habitat for salmonids.
5. **Improve native riparian and oak woodland communities:** In other areas identified for Naturalization, develop concepts for increasing oak riparian woodland, live oak/blue oak woodland, or where feasible grading areas to support willow riparian scrub/forest.
6. **Remediate social trail impacts to promote native vegetation growth:** Manage social trails in a manner that consolidates trails and allows rehabilitation of vegetation understory.

General Area Plan Potential Resource Management Actions

- In accordance with and in support of regional and countywide efforts to reduce homelessness, remove encampments in the Parkway and rehabilitate those areas where the understory has been damaged. Rehabilitation should include clean-up, soil aeration, and planting of appropriate native species.
- Develop a wildfire rehabilitation strategy for vulnerable mature vegetation to ensure a timely response for minimizing undesirable wildfire impacts.
- Update the 2000 Parkway-wide Invasive Plant Management Plan (IPMP), including the invasive non-native plant inventory, management strategies, and target species for priori-ty removals (Planning Phase Report for the American River Parkway Invasive Plant Management Plan, Eva Butler and Associates, 2000). The update should incorporate the success of Phase I and Phase II IPMP removals, changes to the Parkway plant communities, and new technologies for eradication and control measures.
- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.



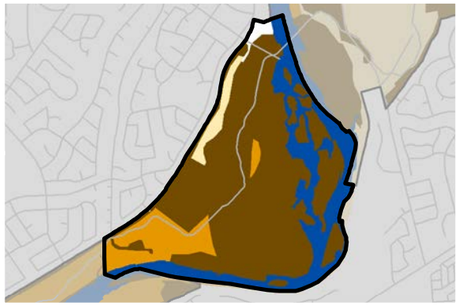
Eucalyptus trees in the Arden Bar Area. Photo Credit: Scott Webb

Key Indicators

Feet 0 1,000 2,000

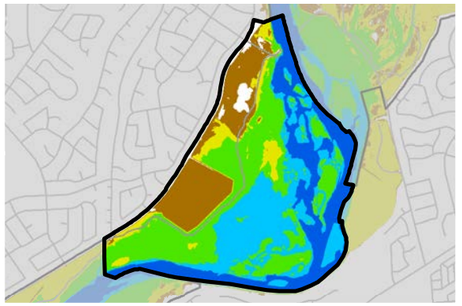
1. Alteration

- Intentionally Altered
- Unintentionally Altered
- Unaltered



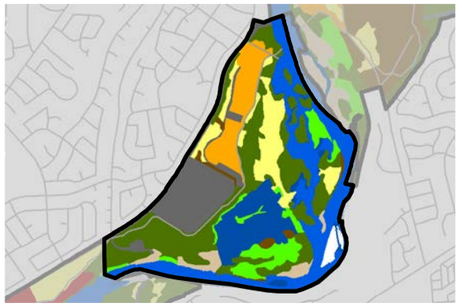
2. Inundation Extent

- Main Channel
- Recurrence Interval - 2 years
- Recurrence Interval - 25-100 years
- Recurrence Interval - 200 years
- Upland/Behind Levee
- No Data



3. Vegetation Communities

- Developed
- Open Water
- Riparian Woodland/Forest
- Riparian Scrub
- Turf/Turf with Trees
- Unvegetated
- Valley Foothill Grassland



4. Land Use

- Nature Study Area
- Protected Area
- Recreation Reserve
- Limited Recreation Area
- Developed Recreation Area

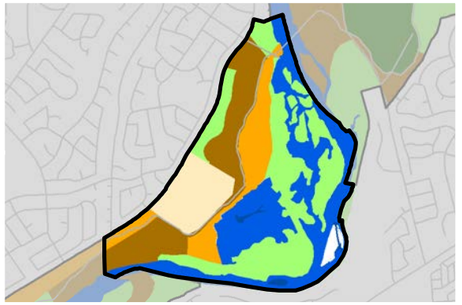
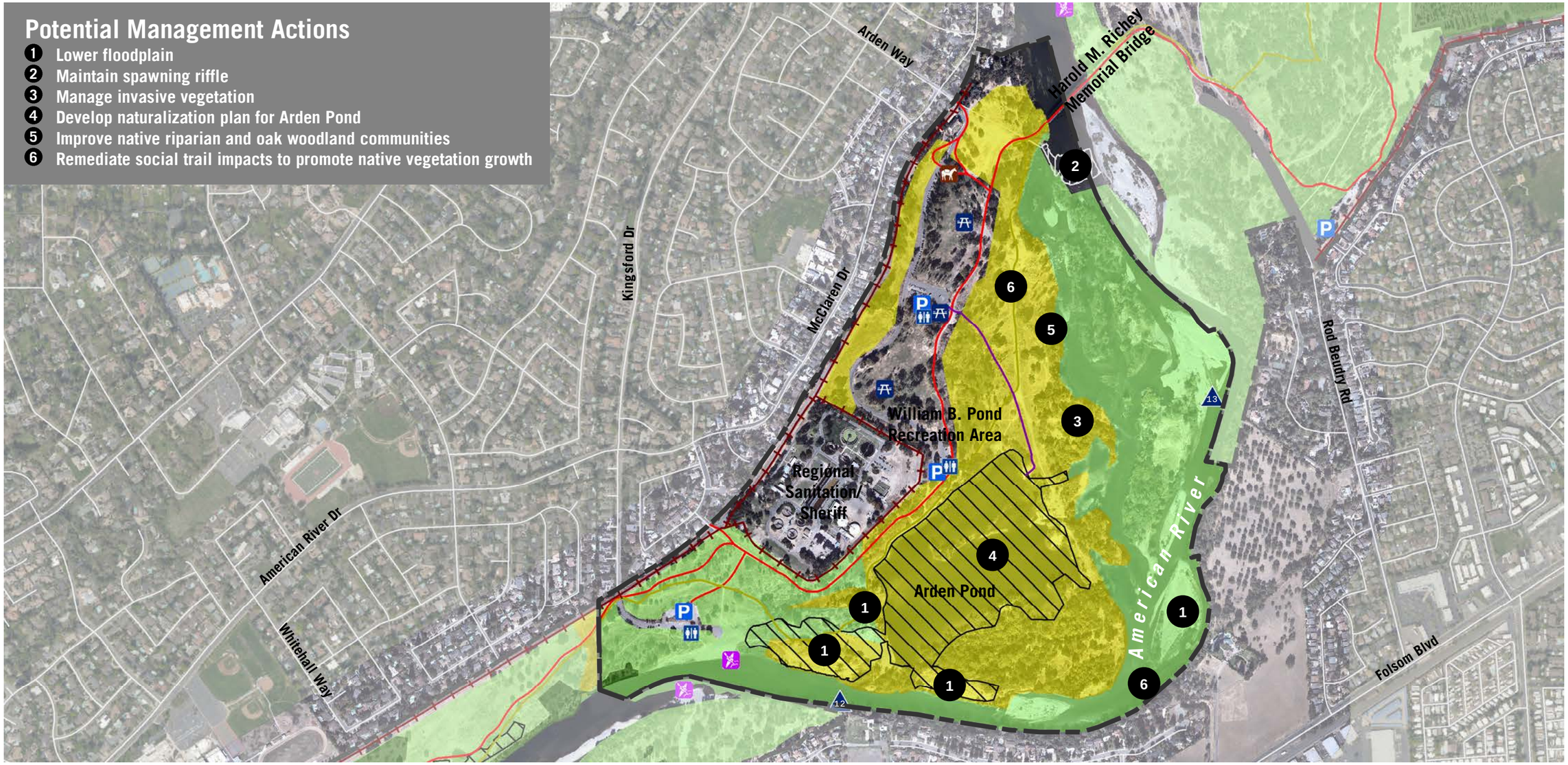


Figure 8-34
Area Plan 9 Arden Bar A

Potential Management Actions

1. Lower floodplain
2. Maintain spawning riffle
3. Manage invasive vegetation
4. Develop naturalization plan for Arden Pond
5. Improve native riparian and oak woodland communities
6. Remediate social trail impacts to promote native vegetation growth

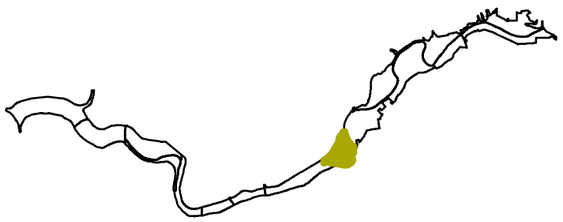


Parkway Boundary
Powerline Easement
Bicycle/Pedestrian Trail
Equestrian/Hiking Trail
Pedestrian Trail
Levee

Picnic Area
Car Top Boat Launch
Equestrian Staging
Parking
Restroom
River Mile

Exisiting Gravel Augmentation
Proposed USACE Bank Protection Mitigation

Management Category
Preservation
Conservation
Naturalization



0 1,000 2,000 Feet

Figure 8-35
Area Plan 9 Arden Bar B

AREA PLAN 10

RIVER BEND PARK

8.5.10 River Bend Area Plan

Historic Physical and Biological Conditions

Well before European settlement, the LAR channel in the River Bend area cut through older floodplain material and into the erosion-resistant Fair Oaks formation materials as it migrated north into the Carmichael Bluffs. Along the way it deposited the floodplain materials comprising River Bend. The river channel was largely single-threaded except for a small mid-channel bar that grew smaller or larger with sequences of flood flow scouring and sediment transport events. Riparian vegetation along the channel was driven by a scour and sprout dynamic, with vegetated areas being periodically scoured during higher flows and then reestablishing by root and stem sprouts, with irrigation stress during summer and fall low flows. What is now known as Cordova Creek ran westward along the backside of the River Bend area and joined the LAR at the downstream end of the River Bend area.

Overbank areas consisted of a variety of surfaces formed over geologic time resulting in areas with and without overbank deposition and variably underlain by the impermeable erosion-resistant Fair Oaks formation. In most higher elevation areas, this impermeable material isolated surfaces from river-fed shallow groundwater, thereby limiting the amount of groundwater available to vegetation and significantly influencing the types and amounts of vegetation able to survive. A major bypass channel carried flows out of the main channel and through River Bend at moderate to high flows, further defining the landscape (which can still be seen today). Bypass channel flows cut across the southern edge of the bar After entering this bypass channel at the upstream end of River Bend and reentering the main channel at the downstream end.

Impact of European Settlement

Although much of River Bend has been unaltered, large areas have been cleared for agriculture. Neighborhoods grew up around the area, and a concrete-lined stormwater runoff channel, which has recently been naturalized as Cordova Creek, was cut though the agricultural fields.

The channel and near-channel areas were altered during a series of flood flows in the mid-1960's that triggered upstream erosion and deposited a substantial amount of coarse material in this area. Since then the channel has undergone progressive internal adjustments, including development of a mid-channel bar/island. Later erosion control, including rocked bank protection and rock groins, were installed at the upstream end of the channel.

The downstream portion of the channel adjacent to the Arden Bar area was mined for gravel, as part of the gravel mining operation at Arden Bar. Capture of the channel margin mining pits on RR created the modern multi-threaded channel as described in the Arden Bar area plan. On RL, in Arden Bar, the mining pits filled in with sediment, creating the bar feature that exists now. More recently, this area has been improved for salmonids with augmented gravel and a side channel project cutting through the existing bar. Some mining also occurred in the upland areas, leaving behind cleared low areas and elevated mounds of mine tailings with limited soil and barren of high-quality vegetation communities.

While large areas of River Bend were generally left unaltered, in-channel and channel-margin aggregate mining activities in the western portion, small areas of excavation mining in the central portion, and agricultural activities in the southeastern portion significantly altered the landscape in these areas of River Bend. The mining removed the sparse vegetation that may have been present in those locations and altered the topography and composition of the surface, leaving behind lowered and modified surfaces. The areas south of the historic bypass channel were cleared of vegetation, and some were leveled, for agricultural use.

Present Conditions

River Bend Park area today contains the largest patch of contiguous forest or woodland anywhere in the Parkway. This live oak woodland area provides excellent wildlife habitat, with substantial portions of interior habitat.

Most of the former agricultural areas have been planted with VELB habitat mitigation to offset impacts elsewhere on the Parkway. Additionally, the former concrete lined canal known as Cordova Creek has been naturalized into a meandering willow-lined creek surrounded by native plant communities in the uplands. Soil Born Farms leases the American River Ranch for organic farming and community education.

The most upstream portion of River Bend is extremely narrow and may pose a limitation for wildlife passage.

The river channel within the upstream portion of River Bend continues to undergo progressive adjustments and higher flows impact the erosive RL bank. As the channel continues its sweeping arc around River Bend, the channel is relatively stable but with erosive pressure along the outside bend. The downstream multi-threaded channel continues to be depositional, retaining material that enters from upstream.

A scour and sprout riparian vegetation regime has persisted along channel margins, evidenced by some areas presently bare of well-developed riparian vegetation. This is considered a result of ongoing scour during flood flow events and in balance with the present LAR streamflow dynamics.

River Bend Park, like most of the American River Parkway, is a birding “hot-spot”, with 141 recorded species over the last 5 years (eBird 2016 to 2021). River Bend’s birds are attracted by the largest contiguous live oak forest in the Parkway, the riverfront, and the open grassy areas, as well as the recently

Equestrians crossing bridge in the River Bend Park Area. Photo Credit: MIG

naturalized Cordova Creek tributary. Soil Born Farms also incorporates hedgerows and other habitat friendly features into its organic farming operations. Red-tailed Hawks, Red-shouldered hawks, Great Horned Owls, and American Kestrels are known to nest in the larger trees within this park, including the eucalyptus trees. The naturalized Cordova Creek has attracted more wildlife as it matures, including California king snakes (and their prey, the western rattlesnake), kingbirds, Coopers Hawks and nesting red-winged blackbirds. A series of about 25 nest-boxes installed on the nearby VELB mitigation sites are filled each year with nesting bluebirds, tree swallows, and the occasional Ash-throated Flycatcher.

Botanically, River Bend Park contains many interesting plants. The interior live oak forest hosts the only population of hoptree on the ARP, as well as a large specimen of the locally California bay laurel, along with more common Dutchman Pipevine (host to the pipevine swallowtail butterfly) and the occasional clematis vine. The overflow channel contains with a variety of scattered locally rare chaparral species such as chamise, buckwheats, yerba santa, foothill penstemon, and coyote mint.

An unimproved parking facility is located near the park entrance and adjacent to the picnic areas. There is another unimproved parking facility located near the day and overnight group camping area. River Bend Park consists of two distinct areas, the western portion, which is heavily vegetated, and the area to the east, which is presently being leased for agricultural uses. The two areas are divided by the existing bicycle trail. A variety of activities take place in the

View of the LAR channel over a field over yellow starthistle in the River Bend Park Area. Photo Credit: MIG

western portion of the park, including picnicking, day camps and overnight group camping, fishing and equestrian use. In addition, the area is a popular take-out point for rafters.

The Camp Fire Day Camp Area is located at the northern end of the park and has a layout for day and overnight camping programs. All of the structures on the property shall be made of natural materials, natural-looking materials, or painted to blend with the surrounding environment, consistent with the Parkway Plan's visual intrusion policies. Improvements shall have a small footprint on the property to preserve the pristine character of the site.

Soil Born Farms leases American River Ranch, which includes a native plant nursery and demonstration farm using organic farming methods. The demonstration farm encourages organic farming to protect the habitat and waters of the American River. The purpose of the native plant nursery is to provide a supply of native plants for the Parkway, which are grown in climate and conditions equivalent to that of their final planting site. These facilities provide a site for school age children and adults throughout the region to learn the techniques of plant cultivation and care, tree pruning, organic farming and other horticultural techniques.

Expected Future Trends

Physical changes in the River Bend landform and river channel should not change substantially in the foreseeable future, although it is possible that the effects of Folsom Dam on LAR hydrology and sediment supply could eventually lead to physical channel changes in the River Bend reach. This conforms with observed rates of change on other gravel-bed rivers.

Ongoing channel processes and adjustments indicate several potential trends, starting with slow erosion in the upstream due to natural channel entrenchment patterns in the narrow portion of the Parkway. In the middle reaches, bank erosion during high flows (e.g., greater than 100,000 cfs) would likely result in slope relaxation rather than channel migration. Ongoing deposition will occur on the attached and mid-channel bar in the downstream reaches due to the over-widened channel condition. Finally, RL bank erosion may take place in the downstream reaches due to the growth of midchannel bars as a result of deposition. Ongoing channel processes will influence the ability of riparian vegetation to take hold, following the existing scour and sprout regime.

Vegetation beyond the channel margins is expected to persist in its current types and configurations. However, the patterns and composition are subject to threats from invasive non-native species, fires, off-trail hiking and biking activity that has produced extensive social trails. Existing mitigation areas consisting of primarily oak woodlands and elderberry shrubs are expected to mature and provide increasingly valuable wildlife habitat. Additional mitigation/naturalization is being contemplated and has the potential to improve habitat connectivity throughout the area.

Desired Conditions

Maintain ongoing channel processes and accommodate expected foreseeable natural process adjustments in channel conditions. This calls for limiting future bank protection projects to those required for public safety, protection of property outside of the Parkway, and

protection for substantial, unmovable infrastructure within the Parkway. There is no need for such projects now or in the foreseeable future. New infrastructure that may be placed in the area should be designed to anticipate ongoing channel processes so as not to necessitate additional bank protection. Similarly, conservation, naturalization, or transformation projects should be located and designed to accommodate these processes.

The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area. Invasive non-native species that are outcompeting native species or inhibiting the regeneration of native species should be reduced/controlled, with a focus on invasive species within woodland areas, and grassland areas being infiltrated by yellow star thistle. It is also desirable to naturalize areas that have been substantially altered in the past and could provide better habitat for target species following implementation. Managing for a healthy understory with limited degradation from human uses (e.g., social trails and unauthorized off-trail cycling) would improve habitat values, as would conserving some area of open grassland suitable for pollinators and wildlife.

Site-Specific Potential Resource Management Actions (Figures 8-36 and 8-37)

1. **Lower floodplain:** Develop a plan to lower the floodplain to increase inundation frequency and improve rearing habitat for target fish species.
2. **Improve spawning riffle:** Construct gravel augmentation site to create suitable spawning habitat for salmonids.
3. **Manage invasive vegetation:** Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species.
4. **Develop conceptual naturalization plan:** Develop a Conceptual Naturalization Plan for the areas identified for Naturalization. The central areas should be considered for additional plantings, whether it be woodland savanna or enhancement of existing grasses and forbs. The upstream area adjacent to Hagan Park, should be considered for improved grasslands and maintaining the narrow connection with upstream areas and expanding it if opportunities arise.
5. **Remediate social trail impacts to promote native vegetation growth:** Manage social trails in a manner that consolidates trails and allows rehabilitation of vegetation understory. Specific consideration should be given to the issue of off-trail bicycling, which is currently contributing to measurable disturbance of the landscape.

General Area Plan Potential Resource Management Actions

- Allow for ongoing channel reconfiguration in the upstream reach as the channel progressively and naturally adjusts to long-term channel trends.
- When considering proposals to transform channel conditions in the middle reach, consider ongoing natural processes and the effects of ongoing scour as a result of natural processes.
- In areas identified as Preservation, protect vegetation from threats.
- In accordance with and in support of regional and countywide efforts to reduce homelessness, remove encampments in the Parkway and rehabilitate those areas where the understory has been damaged. Rehabilitation should include clean-up, soil aeration, and planting of appropriate native species.
- Update the 2000 Parkway-wide Invasive Plant Management Plan (IPMP), including the invasive non-native plant inventory, management strategies, and target species for priori-ty removals (Planning Phase Report for the American River Parkway Invasive Plant Management Plan, Eva Butler and Associates, 2000). The update should incorporate the success of Phase I and Phase II IPMP removals, changes to the Parkway plant communities, and new technologies for eradication and control measures.
- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.

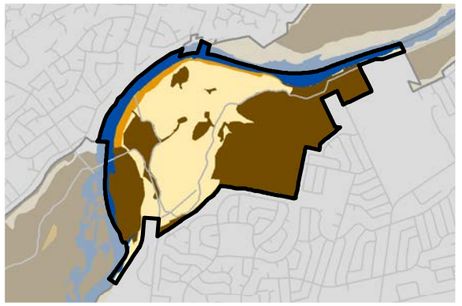
On-the-ground view of the restored Cordova Creek in the River Bend Park Area. Photo Credit: MIG

Key Indicators

Feet 0 1,250 2,500

1. Alteration

- Intentionally Altered
- Unintentionally Altered
- Unaltered

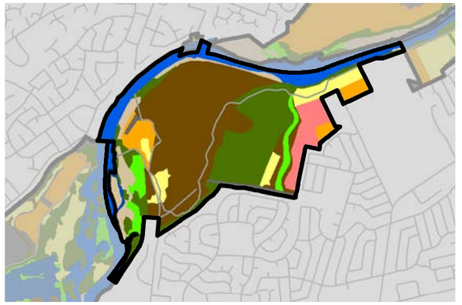


2. Inundation Extent

- Main Channel
- Recurrence Interval - 2 years
- Recurrence Interval - 25-100 years
- Recurrence Interval - 200 years
- Upland/Behind Levee
- No Data

3. Vegetation Communities

- Developed
- Open Water
- Riparian Woodland/Forest
- Riparian Scrub
- Turf/Turf with Trees
- Unvegetated
- Valley Foothill Grassland



4. Land Use

- Nature Study Area
- Protected Area
- Recreation Reserve
- Limited Recreation Area
- Developed Recreation Area
- Other

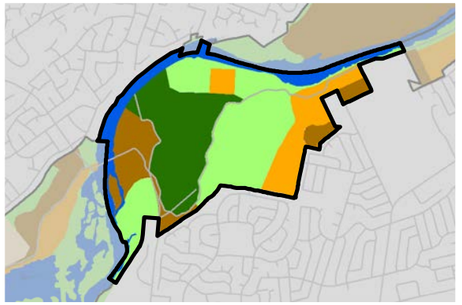
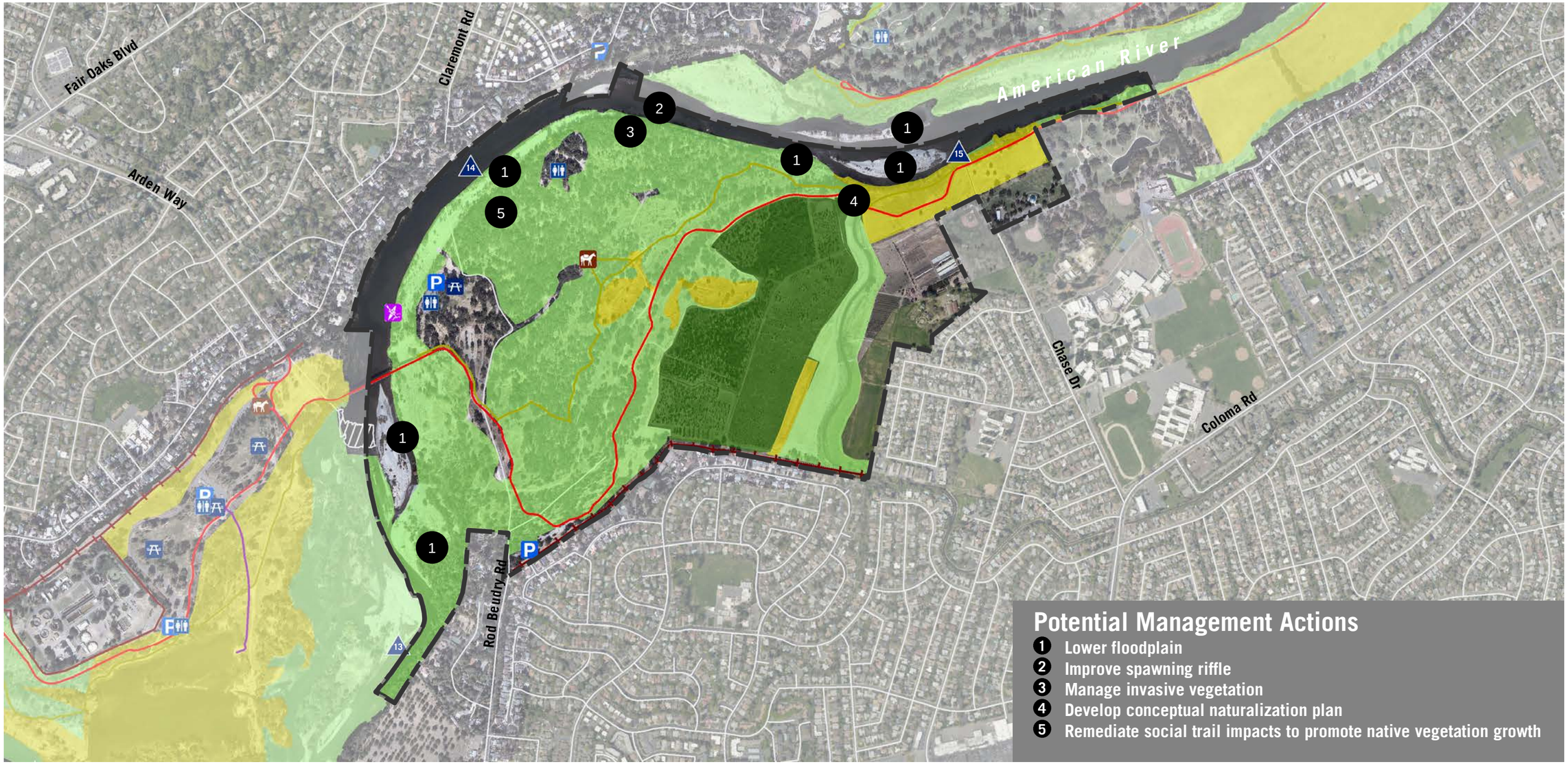


Figure 8-36
Area Plan 10 River Bend Park A



Potential Management Actions

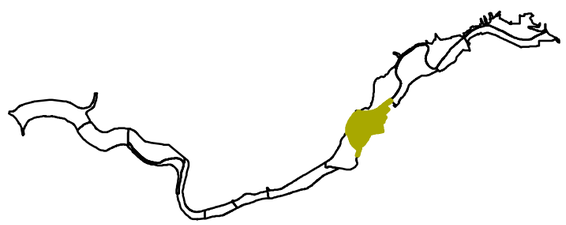
1. Lower floodplain
2. Improve spawning riffle
3. Manage invasive vegetation
4. Develop conceptual naturalization plan
5. Remediate social trail impacts to promote native vegetation growth

Parkway Boundary
Bicycle/Pedestrian Trail
Equestrian/Hiking Trail
Pedestrian Trail
Levee

Picnic Area
Car Top Boat Launch
Equestrian Staging
Parking
Restroom
River Mile

Exisiting Gravel Augmentation

Management Category
Preservation
Conservation
Naturalization



0 1,000 2,000 Feet

Figure 8-37
Area Plan 10 River Bend Park B

AREA PLAN 11

SARAH COURT ACCESS

8.5.11 Sarah Court Access Area Plan

Historic Physical and Biological Conditions

Well before European settlement, the LAR channel in the Sarah Court Area Plan cut through older floodplain material and into the erosion-resistant Fair Oaks formation materials as it migrated north into the Carmichael Bluffs. The river channel was largely single-threaded, and the resistant geology along the RR bank confined the channel. Riparian vegetation along the channel was limited by the Fair Oaks formation, but where present was driven by a scour and sprout dynamic, with vegetated areas being periodically scoured during higher flows and then reestablishing by root and stem sprouts.

Overbank areas consisted of a variety of surfaces formed over a geologic timescale resulting in areas with and without overbank deposition and variably underlain by the impermeable erosion-resistant Fair Oaks formation.

Impact of European Settlement

The river channel at Sarah Court has not been mined, and although the river channel has been altered as described in the Ancil Hoffman Area Plan, the area's erosion resistant bank line is geologically unchanged.

Present Conditions

Sarah Court is small (about the size of a residential lot) and is bordered upstream and downstream by a residential neighborhood. The river channel is relatively stable but with erosive pressure along the outside bend; the bank's resistant geology holds the channel in place. There is mowed turf, non-native landscape trees, a parking lot and picnic tables, and an access ramp leading down to the river channel where oak trees grow over clay banks.

Expected Future Trends

Conditions at Sarah Court are expected to remain stable, and vegetation beyond the channel margins is expected to persist in its current types and configurations.

Desired Conditions

The desired condition is to conserve existing native vegetation that occurs in the area and maintain recreation facilities in a manner that supports good habitat for wildlife.

Site-Specific Potential Resource Management Actions (Figures 8-38 and 8-39)

1. **Improve degraded riparian habitats:** Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species.

General Area Plan Potential Resource Management Actions

- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.

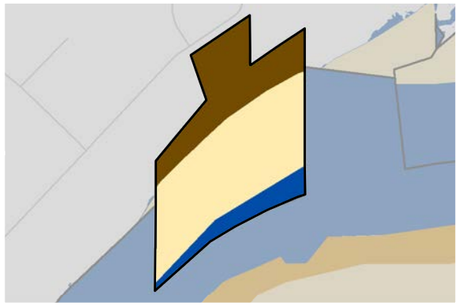
Clay banks and in-channel gravel bars in the Sarah Court Access Area. Photo credit: Regional Parks

Key Indicators

Feet 0 200 400

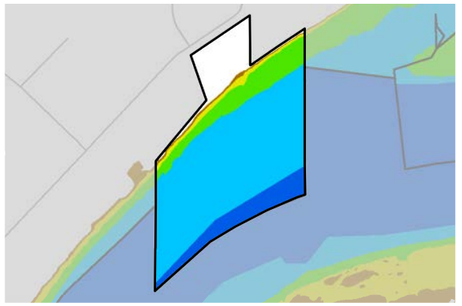
1. Alteration

- Intentionally Altered
- Unintentionally Altered
- Unaltered



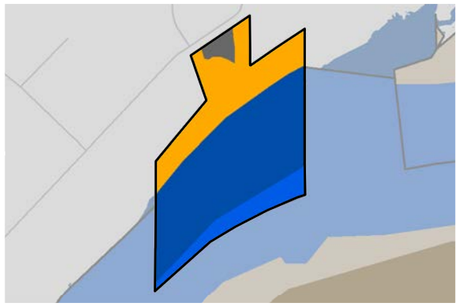
2. Inundation Extent

- Main Channel
- Recurrence Interval - 2 years
- Recurrence Interval - 25-100 years
- Recurrence Interval - 200 years
- Upland/Behind Levee
- No Data



3. Vegetation Communities

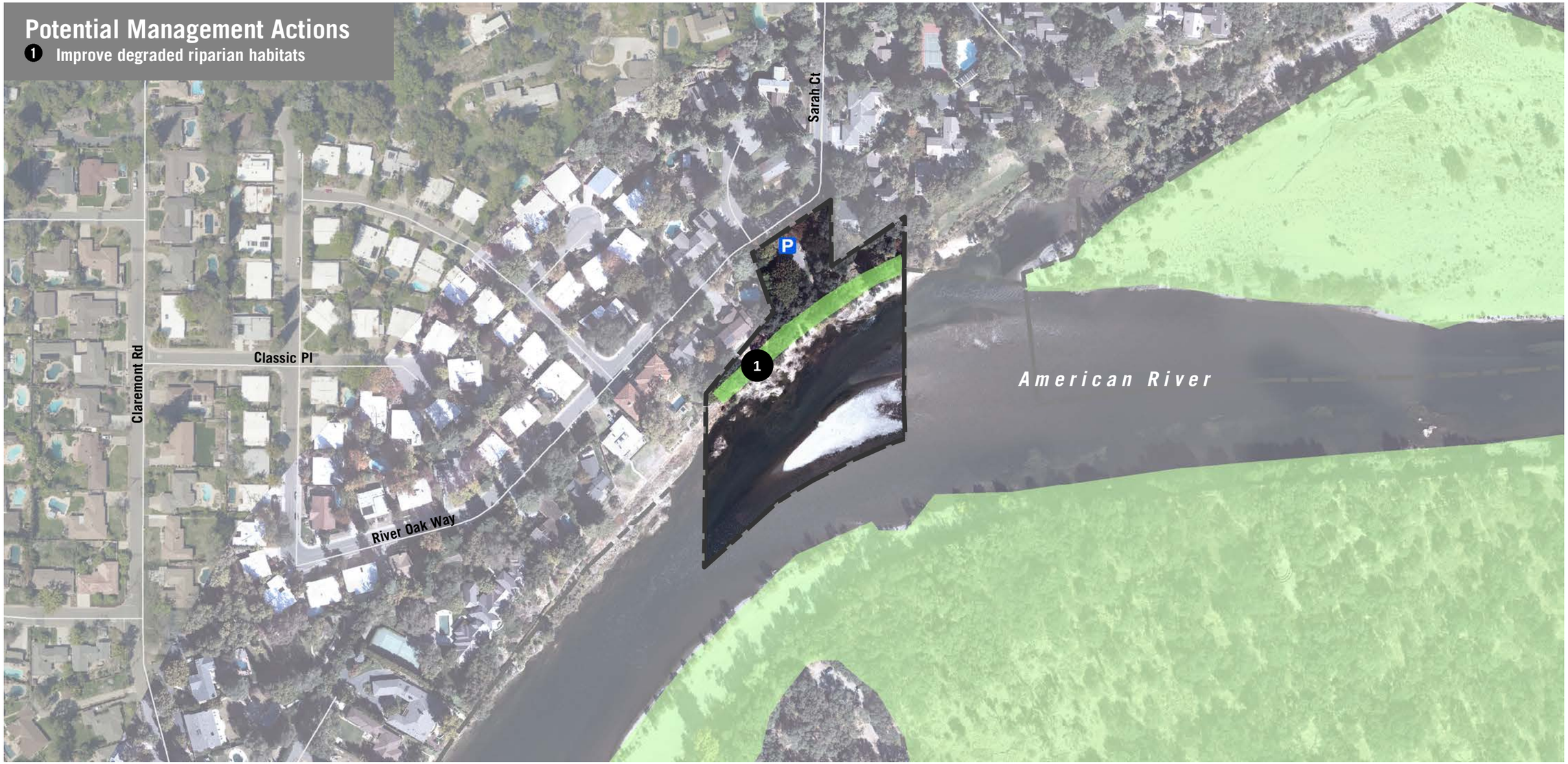
- Developed
- Open Water
- Riparian Woodland/Forest
- Riparian Scrub
- Turf/Turf with Trees
- Unvegetated
- Valley Foothill Grassland



4. Land Use

- Protected Area

Figure 8-38
Area Plan 11 Sarah Court Access A



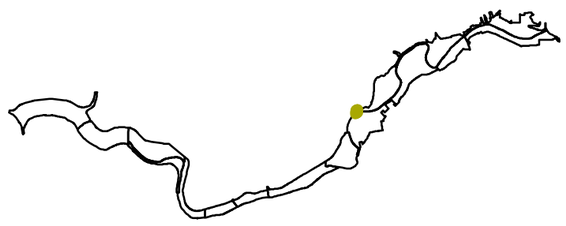


Figure 8-39
Area Plan 11 Sarah Court Access B

AREA PLAN 12

ANCIL HOFFMAN COUNTY PARK

8.5.12 Ancil Hoffman County Park Area Plan

Historic Physical and Biological Conditions

Well before European settlement, the LAR channel in the Ancil Hoffman Area Plan cut through older floodplain material and into the erosion-resistant Fair Oaks formation as it migrated south into the older Modesto formation and along the way deposited the floodplain materials that composed Ancil Hoffman Park. The river channel was single-threaded, and riparian vegetation along the channel was driven by a scour and sprout dynamic, with vegetated areas being periodically scoured during higher flows and then reestablishing by root and stem sprouts, with irrigation stress during lower flows in summer and fall.

Overbank areas consisted of a variety of surfaces formed over a geologic timescale resulting in areas with and without overbank deposition and variably underlain by the impermeable erosion-resistant Fair Oaks formation. In most higher elevation areas, this impermeable material isolated surfaces from river fed shallow groundwater, significantly influencing vegetation patterns.

Impact of European Settlement

The river channel along Ancil Hoffman has not been mined, leaving its channel features and processes intact. However, a mid-1960's flood event deposited a substantial volume of coarse material in the downstream area of Ancil Hoffman, enlarging and reconfiguring the area's downstream gravel bar. Since then, the downstream channel has formed a mid-channel bar (due to progressive internal adjustments via natural river processes).

Unlike some other areas, Ancil Hoffman and its river channel has not been mined. However, large areas, predominantly in the northwestern portion, were cleared for agricultural activities. Most of this farmed area was converted into a golf course, game fields, and picnic grounds. Carmichael Creek, which likely ran across the bar in a southwest direction, was rerouted and shortened to run southeast along the eastern edge of the golf course. Channel margin features in the upstream portion, including attached bars, are in place and support sparse riparian vegetation subject to a scour and sprout regime.

The construction and operation of Folsom Dam and Nimbus Dam have changed the flow regime and sediment regime in the LAR but there is no known evidence that this has changed the channel configuration in the Ancil Hoffman area. However, the change in seasonal flows, such as higher flows from dam releases during the summer and fall, may have contributed to some enhanced amounts of riparian vegetation and SRA habitat along the banks.

Present Conditions

The river channel is currently unstable and adjusting at three locations. On the upstream end, the large gravel bar is growing as materials deposit during high flows, pushing the channel toward RL and causing bank erosion in the Rossmoor Bar area. Secondly, the long gravel bar adjacent to the golf course and downstream of the abandoned water tower is the result of substantial deposition of sand and gravel during the mid-1960's when an area at the upstream end of River Bend eroded and caused a channel shift to RL and deposition of sand and gravel on RR. Lastly, the downstream gravel bar, which was once separated from the bank, is actively aggrading and becoming fully attached to the base of the bluffs.

A scour and sprout riparian vegetation regime has persisted in many of these active areas, leaving most of the gravel bar areas with well-spaced low growing shrubs. This gravel bar vegetation is considered a result of ongoing scour during flood-flow events and in balance with the present LAR streamflow dynamics.

The golf course and picnic areas are primarily landscaped with turf grass and ornamental shade trees. All roadways and parking areas are lined with street lights. An area adjacent to the park entrance was previously cleared for a caretakers residence (now removed) and is currently maintained as an unirrigated mowed field.

Carmichael Creek is channelized for much of its course parallel to the roadways through the area, eventually emptying into a seasonal pond. It only reaches the river channel during high flow creek events, usually during winter storms. Two interpretive water features are maintained by municipal water supplies.

A narrow band of native vegetation along the northern bluffs contains declining mature blue oak trees and other upland vegetation. The Effie Yeaw Nature Center in the northeast corner includes a large area of primarily live oak woodland. This area contains many snags and declining valley oak trees among the healthier live oak canopy.

Ancil Hoffman Park is a well-documented local wildlife viewing favorite with 178 bird species (documented in eBird from 2016 to 2021), including a variety of songbirds, waterfowl, and raptors seen each year. Popular birding areas include the woodlands near the Effie Yeaw Nature Center, featuring raucous flocks of its iconic Acorn Woodpeckers that are attracted to the many valley oak snags for acorn storage and nesting holes. Large populations of Black-tailed deer, Wild turkeys, and yellow-billed magpies are attracted to this park for its oak forests adjacent to irrigated turfed picnic and golf course areas. The larger oaks are commonly used by nesting Red-shouldered Hawks, Great Horned Owls, and Screech Owls. The nature study pond is sheltered with cattails and tules, for more secretive waterfowl such as Wood Ducks.

Fremont cottonwood trees in the Ancil Hoffman County Park Area. Photo Credit: Regional Parks

Botanically, Ancil Hoffman features one of the two known large populations of showy milkweed on the Parkway, along with scattered populations of the more common narrow-leaved milkweed. The area is also known for Dutchman's pipevine in the live oak understory, which attracts many Pipevine swallow-tail butterflies each spring. A large specimen of one of the only California bay laurels grows near the picnic area.

Expected Future Trends

Physical changes in the Ancil Hoffman landform and river channel should not change substantially in the foreseeable future although it is possible that the effects of Folsom Dam on LAR hydrology and sediment supply could eventually lead to physical channel changes in the Ancil Hoffman reach. This conforms with observed rates of change on other gravel-bed rivers. The recent upstream gravel augmentation projects to improve salmonid spawning are also unlikely to affect the channel in this reach given apparent slow rates of downstream gravel migration. Additional gravel augmentation projects are planned, including channel locations within the Ancil Hoffman area.

Turf field in the Ancil Hoffman County Park Area. Photo Credit: MIG

Ongoing channel processes and adjustments indicate several potential trends as described in Present Conditions. These include a growing upstream gravel bar, river channel incision and entrenchment, enlarging channel banks in the mid-section, and an enlarging downstream gravel bar.

The oak woodlands in Ancil Hoffman have been gradually losing mature valley oaks and blue oaks, leaving many areas, particularly near the Effie Yeaw Nature Center, with large snags that eventually fall down. Vegetation beyond the channel margins is expected to persist in its current types and configurations. The once abundant Spanish Broom has been removed and is currently being maintained as part of the IPMP, leaving a variety of native gravel bar shrubs. However, conditions in the Nature Study Area are well monitored and maintained in association with the Effie Yeaw Nature Center.

Desired Conditions

Maintain ongoing channel processes and accommodate expected foreseeable natural process adjustments in channel conditions. Conservation, naturalization, or transformation projects should be located and designed to accommodate these processes.

The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area. Invasive non-native species that are outcompeting native species or inhibiting the regeneration of native species should be reduced/controlled. It is also desirable to naturalize areas that have been substantially altered in the past and could provide better habitat for target species following implementation. Managing for a healthy understory with limited degradation from human uses (e.g., social trails) would improve habitat values, as would conserving some area of open grassland suitable for pollinators and wildlife.

Site-Specific Potential Resource Management Actions (Figures 8-40 and 8-41)

1. **Lower floodplain:** Develop a plan to lower the floodplain to increase inundation frequency and improve rearing habitat for target fish species.
2. **Improve spawning riffle:** Construct gravel augmentation site to create suitable spawning habitat for salmonids.
3. **Enhance native woodlands and grasslands:** The area adjacent to the entrance should be considered for additional plantings, whether it be woodland savanna or enhancement of existing grasses and forbs.
4. **Improve habitat values on Carmichael Creek:** Consideration should be given to naturalizing and realigning Carmichael Creek if a modified alignment is feasible and would provide additional habitat values beyond what is possible within the current alignment.
5. **Support interpretive uses at Effie Yeaw Nature Center:** Specific consideration should be given to conservation actions that support and balance ongoing interpretive uses at Effie Yeaw nature center.
6. **Manage invasive vegetation:** Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species.
7. **Remediate social trail impacts to promote native vegetation growth:** Manage social trails in a manner that consolidates trails and allows rehabilitation of vegetation understory.
8. **Improve degraded riparian habitats:** When considering proposals to transform channel conditions in this area, consider ongoing natural processes and the durability of proposed designs in light of natural processes.

General Area Plan Potential Resource Management Actions

- Develop a Conceptual Naturalization Plan for the areas identified for Naturalization.
- Update the 2000 Parkway-wide Invasive Plant Management Plan (IPMP), including the invasive non-native plant inventory, management strategies, and target species for priori-ty removals (Planning Phase Report for the American River Parkway Invasive Plant Management Plan, Eva Butler and Associates, 2000). The update should incorporate the success of Phase I and Phase II IPMP removals, changes to the Parkway plant communities, and new technologies for eradication and control measures.
- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.

Valley oaks trees and grapevine in the Ancil Hoffman County Park Area. Photo Credit: Regional Parks

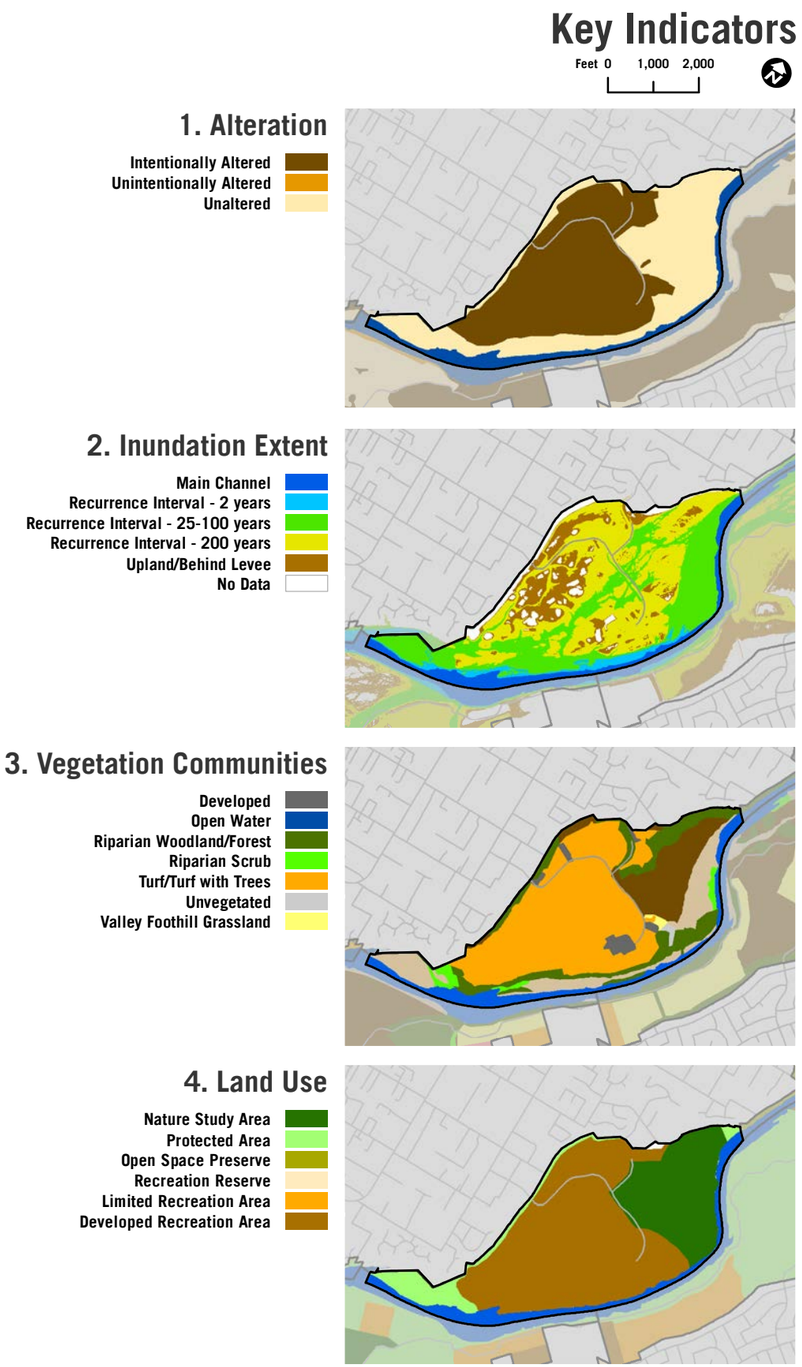
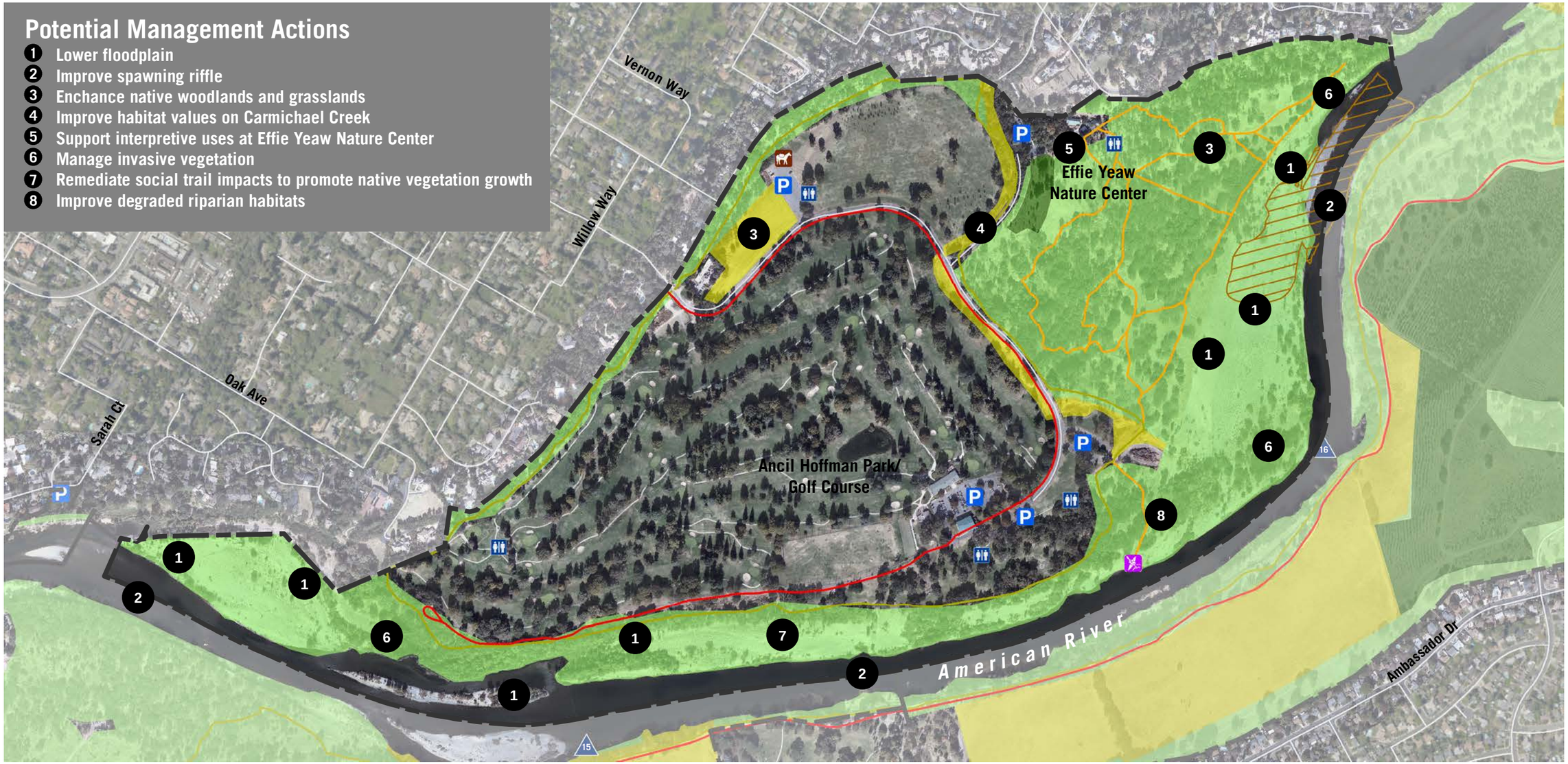


Figure 8-40
Area Plan 12 Ancil Hoffman County Park A

Potential Management Actions

1. Lower floodplain
2. Improve spawning riffle
3. Enchance native woodlands and grasslands
4. Improve habitat values on Carmichael Creek
5. Support interpretive uses at Effie Yeaw Nature Center
6. Manage invasive vegetation
7. Remediate social trail impacts to promote native vegetation growth
8. Improve degraded riparian habitats

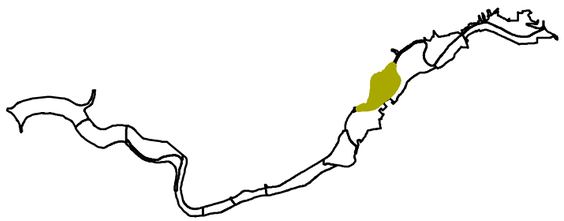


Parkway Boundary
Bicycle/Pedestrian Trail
Equestrian/Hiking Trail
Unimproved Hiking Trail

Car Top Boat Launch
Equestrian Staging
Parking
Restroom
River Mile

Proposed Spawning Riffle Improvement

Management Category
Preservation
Conservation
Naturalization



0 500 1,000 Feet

Figure 8-41
Area Plan 12 Ancil Hoffman County Park B

AREA PLAN 13

ROSSMOOR BAR

8.5.13 Rossmoor Bar Area Plan

Historic Physical and Biological Conditions

Rossmoor Bar was formed well before European settlement, as the LAR channel cut through older floodplain material and into the erosion-resistant Fair Oaks formation materials (as it migrated north into the San Juan Bluffs) and deposited along the way the floodplain materials comprising Rossmoor Bar. The river channel was largely single-threaded except for a mid-channel bar. Riparian vegetation along the channel was driven by a scour and sprout dynamic, with vegetated areas being periodically scoured during higher flows and then reestablishing by root and stem sprouts during seasonally lower flows.

Overbank areas consisted of a variety of surfaces formed over geologic time, resulting in areas with and without overbank deposition and variably underlain by the impermeable erosion-resistant Fair Oaks formation. In most higher elevation areas, this impermeable material isolated surfaces from river fed shallow groundwater, thereby limiting the amount of groundwater available to vegetation and significantly influencing the types and amounts of vegetation able to survive. There were many bypass channels that carried flows out of the main channel and through Rossmoor Bar at moderate to high flows, further defining the landscape.

Impact of European Settlement

Substantial mining activities, both dredger gold mining and subsequent aggregate mining of the dredger tailing piles, significantly altered the landscape of much of Rossmoor Bar. The dredger mining removed any vegetation present and altered the topography and composition of the surface, leaving behind large piles of un-vegetated cobble material (dredger tailing piles). Gravel mining of the tailing piles lowered the land surface often much lower than the original ground surface and, in many locations, allowing shallow groundwater to support off-channel mixed riparian forests. Dredger mine tailing piles persist and are often without soil or high-quality vegetation communities. The mining activities also disrupted many of the pre-existing bypass channels that carried water only at very high flows and created a new large and low bypass channel that now captures and strands coarse sediment in transport during high flows.

The construction and operation of Folsom Dam and Nimbus Dam have changed the flow regime and sediment regime in the LAR, but there is no known evidence that this has changed the channel configuration in the Rossmoor Bar area. However, the dams did change seasonal flows, such as releasing higher flows in the summer and fall, which may have contributed to the enhanced extent and vigor of some riparian vegetation, and increased the extent of SRA habitat.

Some areas at Rossmoor bar were graded for agricultural activities. Infrastructure, such as concrete lined channels, were added to improve drainage. These changes aggravated bank erosion at the canal's outfall into the river.

Present Conditions

The river channel is presently quite stable but subject to ongoing scour during higher flows. The resulting landscape (as modified by mining and agriculture) provides some areas of high-quality vegetation and habitat, while others are highly disturbed and are of only modest value. Some of the areas lowered during aggregate mining support well-developed mixed riparian communities, although located well back from the channel. These "pocket forests" are often surrounded by dredger mine tailings that support very little vegetation.

A scour and sprout riparian vegetation regime has persisted, evidenced by some near channel areas presently bare of well-developed riparian vegetation. This is considered a result of ongoing scour during high flow events and in balance with the present LAR streamflow dynamics.

Many of the gold dredge and gravel mined areas remain unchanged from their post-mining condition. The pre-mining bypass channels continue to be disconnected under most flows and the large and low elevation artificial bypass channel remains, capturing coarse material in transit during

high flows. Some of the near-channel flood chutes in the north east portion of Rossmoor Bar are slowly reforming to pre-mining conditions. Vegetation in areas disturbed by mining and agriculture has been able to grow where a soil substrate is present but remains bare where there is no soil. Similarly, wildlife habitat is mixed, with some areas providing good habitat and others consisting of very degraded quality. The vegetation includes valley oak and live oak woodland patches. Invasive Tree of Heaven is common in the mine tailing areas, and Rossmoor Bar contains the highest concentrations of Tree of Heaven populations on the Parkway. The Invasive Plant Management Plan has successfully reduced Spanish Broom cover on the gravel bars and will require annual maintenance for continued success. The remnant mining depressions (pocket forests) support small patches of alder and willow riparian scrub and cottonwood and mixed riparian forest.

Large areas previously used for agriculture (primarily hay and alfalfa) have been planted with oak trees and other native vegetation, often for mitigation purposes, and are in varying stages of establishment. Areas previously farmed and left fallow currently support annual grasses and/or non-native invasives such as yellow starthistle.

120 species of birds have been recorded from Rossmoor Bar over the past 5 years (documented in eBird from 2016 to 2021). Of particular note is a now extant Bank Swallow colony from an eroding bank of the river, and these nesting holes are now occupied by Northern Rough-winged Swallows. The large cottonwood trees (that occur in the low mined areas among the tailing piles) are known for nesting raptors. Although some of the former agricultural fields have been planted with trees for habitat mitigation, Rossmoor Bar contains several areas of open field that are used by foraging raptors and other bird species that frequent grasslands.

Fremont cottonwood trees on riverbank in the Rossmoor Bar Area. Photo Credit: Regional Parks

Botanically, Rossmoor Bar features some locally rare wildflowers. One of these fields (west of the El Manto Access road) contains locally rare narrow-leaved mules ears, and many native geophytes, such as brodeias and soaproot. In addition to these locally uncommon species, the gravel bar contains a large population of foothill penstemon, plus other interesting botanical finds such as coyote mint, and several buckwheats including the only known populations of both Wright's buckwheat and (one) sulfur buckwheat. In the springtime, the northern overflow channels flow purple with blooming sky lupine.

Rossmoor Bar is also the site of a 40+ year butterfly monitoring transect dataset maintained by UC Davis, where 15 declining butterfly species have been recorded (15 of the 23 butterfly species monitored within all the UC Davis monitoring locations are found at Rossmoor Bar).

Expected Future Trends

While it is possible that the effects of Folsom Dam on LAR hydrology and sediment supply could eventually lead to physical channel changes in the Rossmoor Bar reach, current information does not indicate tendencies toward substantial change in the foreseeable future. This conforms with observed rates of change on other gravel-bed rivers. Additionally, the recent addition of gravel to upstream areas to improve salmon spawning is unlikely to result in demonstrable channel changes in this reach given apparent slow rates of downstream migration. Ongoing bank erosion is expected to continue at the upstream end which

Fremont cottonwood trees in the Rossmoor Bar Area. Photo Credit: Regional Parks

may encroach on an existing outfall structure, and at the downstream end where ongoing channel processes and the localized influence of two outfall structures are causing channel adjustments. Moderate to high flows will likely continue to cause deposition and aggradation along the channel margins in the northern portions of Rossmoor Bar, as well as further reestablishment of the flood chutes on the northeast point bar. Additional coarse material is expected to deposit in the artificial bypass channel during high flow events. These channel processes will influence the ability of riparian vegetation to take hold, following the existing scour and sprout regime.

Vegetation beyond the channel margins is expected to persist in its current types and configurations. However, the patterns and composition are subject to threats from invasive non-native species, fires, and undesirable off-trail hiking and biking activity that has produced extensive social trails and bike paths. Existing mitigation areas consisting of primarily oak woodlands are expected to mature and provide increasingly valuable wildlife habitat. Additional mitigation/naturalization is being contemplated and has the potential to improve habitat connectivity throughout the area.

Desired Conditions

Maintain ongoing channel processes and accommodate expected foreseeable natural process adjustments in channel conditions. This calls for limiting future bank protection projects to those required for public safety, protection of property outside of the Parkway, and protection for substantial, unmovable non-Parkway infrastructure within the Parkway. There is no need for such projects now or in the foreseeable future. New infrastructure that may be placed in the area should be designed to anticipate ongoing channel processes so as not to necessitate additional bank protection. Similarly, conservation, naturalization, or transformation projects should be located and designed to accommodate these processes.

The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area. Invasive non-native species that are outcompeting native species or inhibiting the regeneration of native species should be reduced/controlled, with a focus on controlling Tree of heaven, and maintaining Spanish broom, invasive species within woodland areas, and grassland areas being infiltrated by yellow star thistle. It is also desirable to naturalize areas that have been substantially altered in the past and could provide better habitat for target species following implementation. Managing for a healthy understory with limited degradation from human uses (e.g., social trails and off-trail bicycling) would improve habitat values, as would conserving some area of open grassland suitable for raptor foraging, pollinators and other wildlife.

Site-Specific Potential Resource Management Actions (Figures 8-42 and 8-43)

1. **Improve spawning riffle:** Construct gravel augmentation site to create suitable spawning habitat for salmonids.
2. **Protect recently planted vegetation:** In areas identified as Preservation, protect vegetation from threats.
3. **Manage invasive vegetation:** Invasive Plant Management in the Rossmoor Bar area should specifically maintain Spanish Broom removal efforts and identify measures for reducing Tree of Heaven. Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species.
4. **Improve degraded riparian habitats:** Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species.
5. **Enhance woodland savanna and/or grasslands:** The areas in the southeast (along El Manto Drive) should be considered for additional plantings, whether it be woodland savanna or enhancement of existing grasses and forbs.
6. **Maintain historic mine tailings for interpretive purposes:** The central area consists of historic mine tailings and was identified in the ARPP as a location to maintain for interpretive purposes.
7. **Recontour and improve substrate to support woody vegetation:** Develop a Conceptual Naturalization Plan to address piles of aggregate material and lack of topsoil in a manner that would support native woody vegetation.
8. **Improve fallow agricultural area fields with woodland savanna or grassland:** Develop a Conceptual Naturalization Plan for the graded agricultural area in the RM 15.1—15.65 reach which incorporates native vegetation that is suited to the soils and geology in this reach.
9. **Remediate social trail impacts and promote native vegetation growth:** Manage social trails in a manner that consolidates trails and allows rehabilitation of vegetation understory.

General Area Plan Potential Resource Management Actions

- Allow for ongoing bank erosion and bank retreat in the RM 15.0—16.2 reach as the channel progressively and naturally adjusts to long-term channel entrenching trends in this reach and plan for potential facility relocation options for the bike trail and high-bank drain outfalls.
- Re-construct the engineered concrete drainage outfall apron at about RM 18.25 to protect against ongoing and progressive bank erosion due to undercutting using a design approach and materials that can adjust to bankline changes without aggravating bank erosion; suggest removing the broken concrete members and replacing with large angular rock infilled with fine coarse material.
- In conjunction with the Lower Sunrise and Upper Sunrise Area Plans, explore the feasibility and resource value of relocating the lower engineered reaches of Buffalo Creek from its engineered outfall at RM 19.5, reconnecting it to its pre-altered course at about RM 18.7, and a newly constructed confluence in the vicinity of RM 18.3 or in conjunction with a re-engineered drain outfall at RM 18.25.
- When considering proposals to transform channel conditions in the reach between RM 15.9 – 17.2, consider ongoing natural processes and the value of the flood chutes in this reach that are being re-constructed and developed by natural processes.
- Develop a Conceptual Naturalization Plan for the mined area north of the bike trail in the graded agricultural area in the RM 16.0—16.65 reach which preserves identified high resource values and re-establishes connected higher bypass channels and fills the artificial bypass channel that is removing coarse bed material from the main channel.
- In accordance with and in support of regional and countywide efforts to reduce homelessness, remove encampments in the Parkway and rehabilitate those areas where the understory has been damaged. Rehabilitation should include clean-up, soil aeration, and planting of appropriate native species.
- Develop a Conceptual Naturalization Plan for the areas identified for Naturalization.
- Update the 2000 Parkway-wide Invasive Plant Management Plan (IPMP), including the invasive non-native plant inventory, management strategies, and target species for priori-ty removals (Planning Phase Report for the American River Parkway Invasive Plant Management Plan, Eva Butler and Associates, 2000). The update should incorporate the success of Phase I and Phase II IPMP removals, changes to the Parkway plant communities, and new technologies for eradication and control measures.
- Continue current level of efforts for fire fuel reduction and prevention, including protections for established mitigation areas.
- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.

Key Indicators

Feet 0 1,000 2,000

1. Alteration

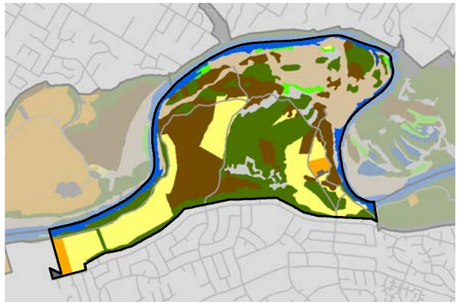
- Intentionally Altered
- Unintentionally Altered
- Unaltered

2. Inundation Extent

- Main Channel
- Recurrence Interval - 2 years
- Recurrence Interval - 25-100 years
- Recurrence Interval - 200 years
- Upland/Behind Levee
- No Data

3. Vegetation Communities

- Developed
- Open Water
- Riparian Woodland/Forest
- Riparian Scrub
- Turf/Turf with Trees
- Unvegetated
- Valley Foothill Grassland



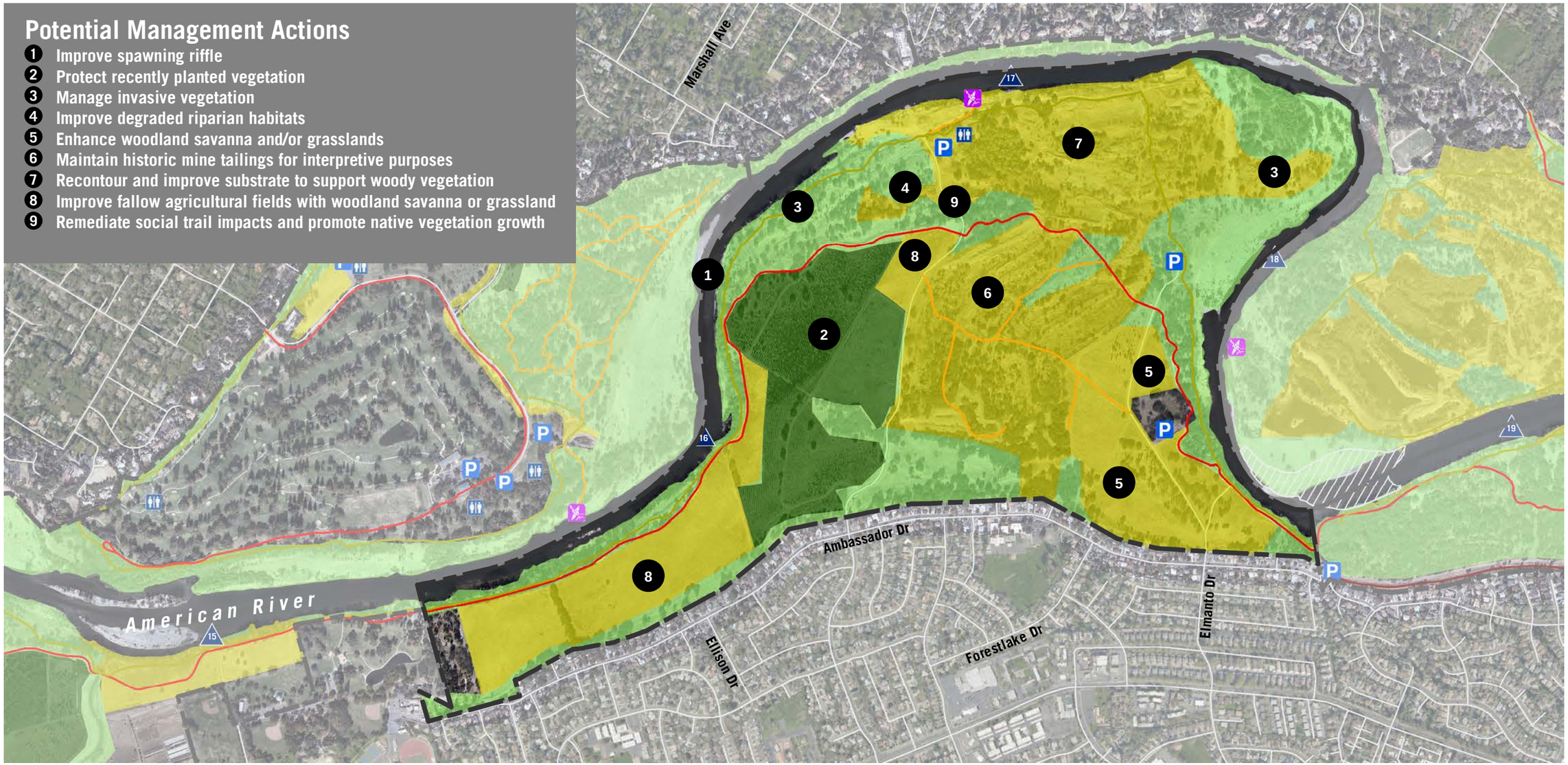
4. Land Use

- Nature Study Area
- Protected Area
- Open Space Preserve
- Recreation Reserve
- Limited Recreation Area
- Developed Recreation Area

Figure 8-42
Area Plan 13 Rossmoor Bar A

Potential Management Actions

1. Improve spawning riffle
2. Protect recently planted vegetation
3. Manage invasive vegetation
4. Improve degraded riparian habitats
5. Enhance woodland savanna and/or grasslands
6. Maintain historic mine tailings for interpretive purposes
7. Recontour and improve substrate to support woody vegetation
8. Improve fallow agricultural fields with woodland savanna or grassland
9. Remediate social trail impacts and promote native vegetation growth

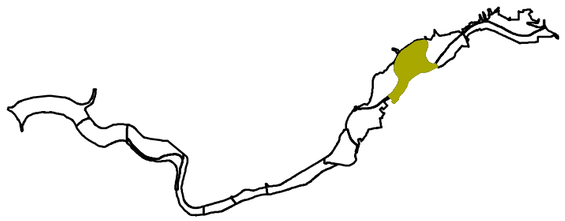


Parkway Boundary
Bicycle/Pedestrian Trail
Equestrian/Hiking Trail
Unimproved Hiking Trail
Levee

Car Top Boat Launch
Equestrian Staging
Parking
Restroom
River Mile

Existing Gravel Augmentation

Management Category
Preservation
Conservation
Naturalization



0 1,000 2,000 Feet

Figure 8-43
Area Plan 13 Rossmoor Bar B

AREA PLAN 14

SAN JUAN BLUFFS

8.5.14 San Juan Bluffs Area Plan

Historic Physical and Biological Conditions

Well before European settlement, the LAR channel in the San Juan Bluffs Area Plan cut through older floodplain material and into the erosion-resistant Fair Oaks formation. This process created the steep San Juan Bluffs which confined the channel on RR and produced a scour pool. The bluffs supported a narrow band of patchy riparian vegetation intermixed with areas of exposed soil.

Impact of European Settlement

The overbank above the bluffs initially housed agricultural activities before being converted to residential development. Bluff protection has been installed along the upper bank at a few private residences and at a Carmichael Water District facility. There is also a drainage outfall along the bluffs.

The construction and operation of Folsom Dam and Nimbus Dam have changed the flow regime and sediment regime in the LAR. This change in seasonal flows, such as higher flows from dam releases during the summer, may have contributed to enhanced amounts of riparian vegetation and SRA habitat in this area.

Present Conditions

The river channel is presently quite stable but subject to ongoing scour during higher flows, and there is no evidence that dam operations have changed the channel configuration. The bluffs range in height from approximately 20 feet to 75 feet above the low flow water surface. There is a relatively continuous band of riparian vegetation, with areas of steep, exposed soil throughout. Although there is ongoing erosion in places, it is very slow due to the erosion resistant geology. Invasive species are present throughout the area.

Expected Future Trends

The existing channel configuration is expected to persist, including slow erosion of some bluff areas. Some episodic sloughing and installation of remedial residential bluff protection are possible. Vegetation is expected to persist in its current types and configurations, although non-native plant species could expand their presence in the area if not managed.

Desired Conditions

Maintain ongoing channel processes and accommodate expected foreseeable natural process adjustments in channel conditions. This calls for limiting future bank protection projects to those required for public safety, protection of property outside of the Parkway, and protection for substantial, unmovable infrastructure within the Parkway. Bluff protection projects should be kept to a minimum. The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area. Invasive non-native species should be controlled.

Site-Specific Potential Resource Management Actions (Figures 8-44 and 8-45)

1. **Manage invasive vegetation:** Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species.
2. **Monitor bluff erosion:** Conduct periodic monitoring of bluff faces to assess any erosion.

General Area Plan Potential Resource Management Actions

- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.

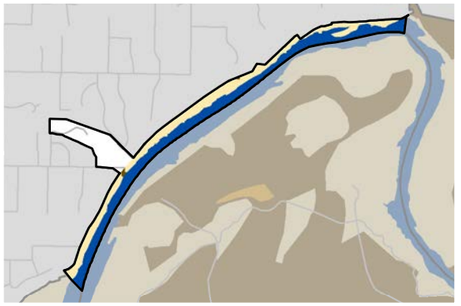
Homes on the San Juan bluffs. Photo Credit: MIG

Key Indicators

Feet 0 1,000 2,000

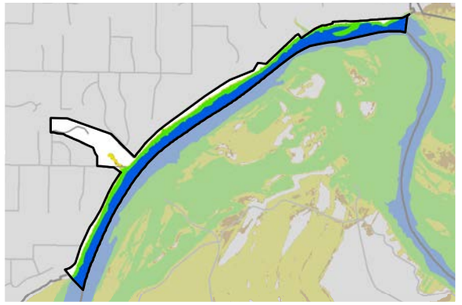
1. Alteration

- Intentionally Altered
- Unintentionally Altered
- Unaltered



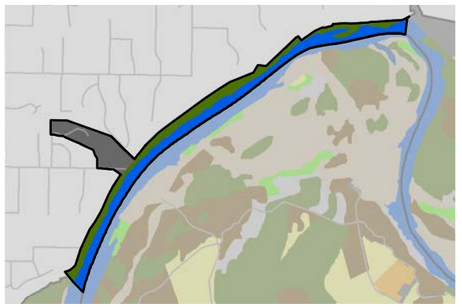
2. Inundation Extent

- Main Channel
- Recurrence Interval - 25-100 years
- Recurrence Interval - 200 years
- Upland/Behind Levee



3. Vegetation Communities

- Developed
- Open Water
- Riparian Woodland/Forest
- Riparian Scrub
- Turf/Turf with Trees
- Unvegetated
- Valley Foothill Grassland



4. Land Use

- Nature Study Area
- Protected Area
- Open Space Preserve
- Developed Recreation Area

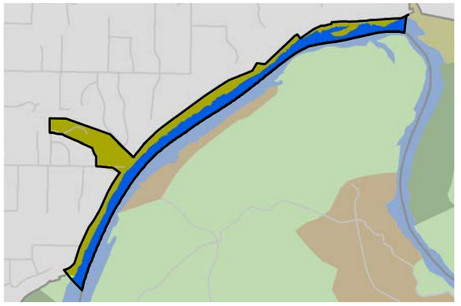
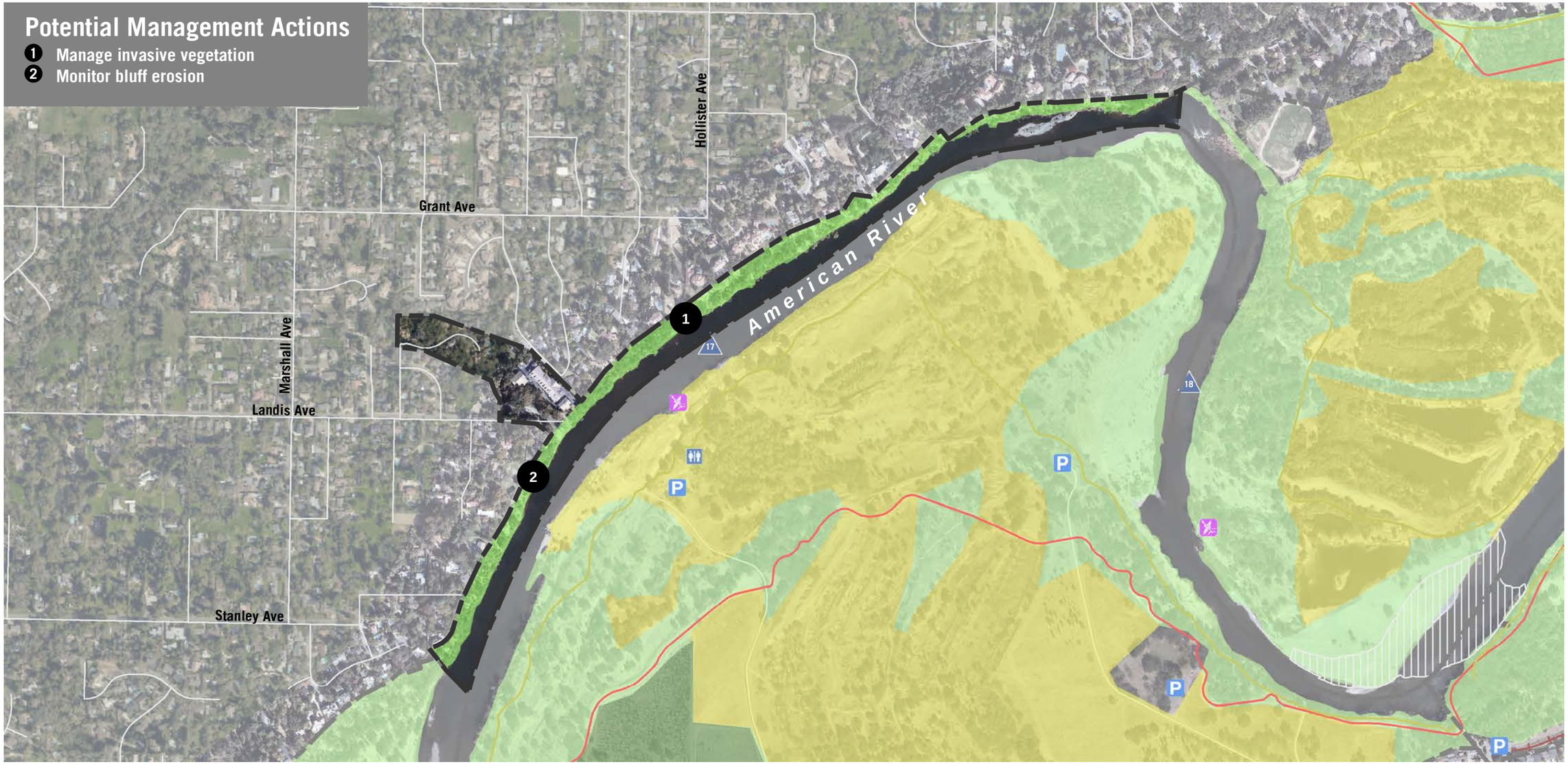


Figure 8-44
Area Plan 14 San Juan Bluffs A

Potential Management Actions

1. Manage invasive vegetation
2. Monitor bluff erosion

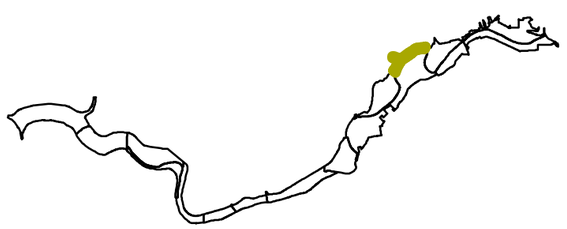


Parkway Boundary
Bicycle/Pedestrian Trail
Equestrian/Hiking Trail
Levee

Car Top Boat Launch
Parking
Restroom
River Mile

Existing Gravel Augmentation

Management Category
Preservation
Conservation
Naturalization



0 500 1,000 Feet

Figure 8-45
Area Plan 14 San Juan Bluffs B

AREA PLAN 15

SACRAMENTO BAR

8.5.15 Sacramento Bar Area Plan

Historic Physical and Biological Conditions

Well before European settlement, the LAR channel in the Sacramento Bar area cut through older floodplain material and into the erosion-resistant Fair Oaks formation materials as it migrated south, along the way depositing the floodplain materials comprising Sacramento Bar. The river channel was largely single-threaded save for two mid-channel bars, both of which varied in size and one which varied in persistence based on sequences of flood-flow scouring and sediment transport. Riparian vegetation along the channel was shaped by a scour and sprout regime featuring periodic thinning during flood flows followed by post-flood root and stem sprouting and growth limited by irrigation stress during seasonally low flows.

Overbank areas on Sacramento Bar consisted of a variety of surfaces formed over geologic time with deposition overlaying the impermeable erosion-resistant Fair Oaks formation except in the San Juan rapids area. The extent and types of vegetation supported by this deposition were likely influenced by the height of the bar above the river channel. The present distribution of plant communities in areas that were not mined suggests that pre-mining depositional areas were high enough and banks were steep enough that vegetation was dominated by upland species including live oak and valley oak except along the channel margins. There were many bypass channels that carried flows out of the main channel and through Sacramento Bar at moderate to high flows, and active flood chutes across the point bar at the sharp RR turn, further defining the landscape of this area.

Impact of European Settlement

Substantial mining activities, both dredger gold mining and subsequent aggregate mining of the dredger mine tailings, significantly altered the landscape of much of Sacramento Bar. The dredger mining focused on the higher central areas of the bar, removing any vegetation present and altering the topography and composition of the surface. The dredger mining activity left the bypass channels essentially intact but separated from the river channel and created large mounds of unvegetated mine tailings at various locations across the bar. These piles of cobble supported a subsequent round of aggregate mining that lowered land surfaces to elevations often much lower than the original ground, and in some locations created deep pits and areas where shallow groundwater could support off-channel mixed riparian forests. The point bar feature at the southernmost end of Sacramento Bar was scraped for aggregate material, substantially lowering the surface and effectively widening the channel. Remnant mounds of dredger mine tailings remain scattered across the bar marked by limited soil and essentially barren of high-quality vegetation. High ground created to support access roads and keep mining areas dry still exist along the eastern edge of the bar.

Overly deep conditions in the channel between the mid-channel bar and point bar indicate the area may have been mined during dredger mining operations.

The construction and operation of Folsom Dam and Nimbus Dam have changed the flow regime and sediment regime in the LAR but there is no known evidence that this has so far changed the channel configuration in the Sacramento Bar area. Consistent with conditions observed in other gravel bedded rivers, this reflects a very slow structural response to dam related changes in flow and sediment regimes. On the other hand, reservoir-related changes in seasonal flows such as higher flows in the low-flow period, may have contributed to increasing the overall extent of riparian vegetation and SRA habitat at Sacramento Bar.

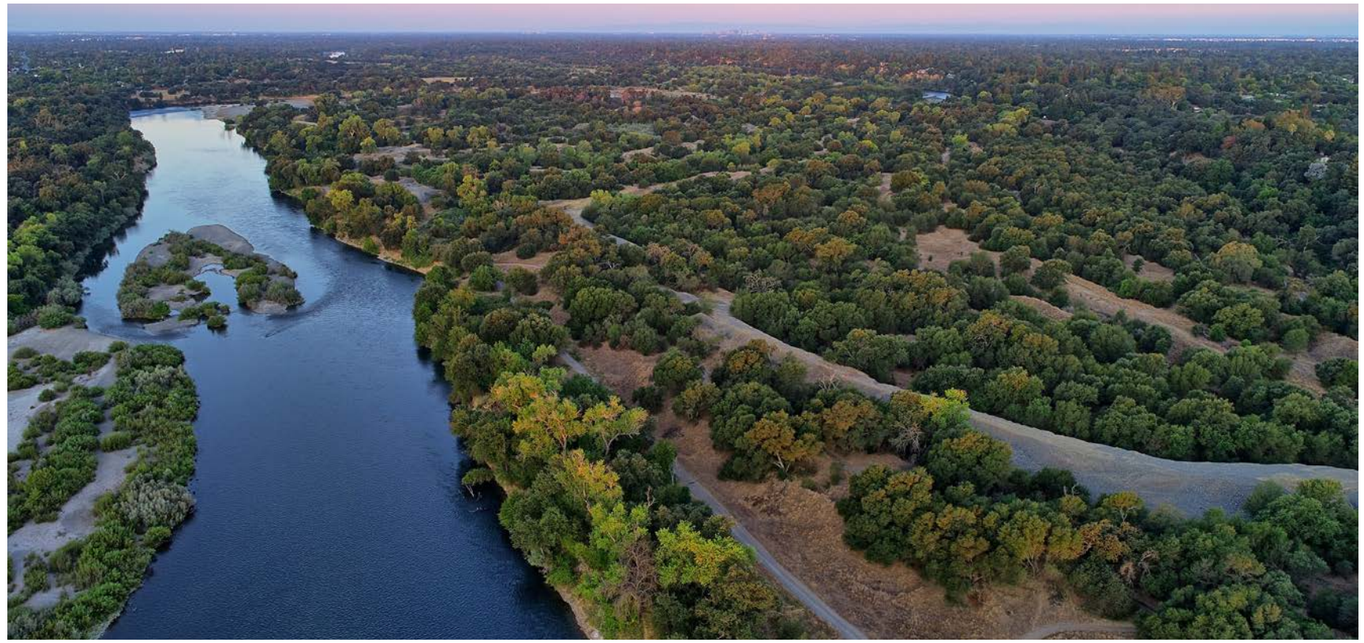
A recent fish habitat enhancement project was implemented at the point bar, including excavation of coarse material from the gravel bar and the creation of a side channel. Excavated material was used to augment spawning gravels in the channel immediately upstream. Subsequent moderate flows (e.g., 80,000 cfs) resulted in re-deposition of the gravel in the

excavated area, filling of the side channel, and the loss of the in-channel augmented gravel.

Present Conditions

As described, the majority of Sacramento Bar was both intentionally and unintentionally altered. However, there are some unaltered areas, primarily along the northern boundary, the northeastern boundary, and the Nature Study Area on the western boundary. Oak woodlands and riparian forest persist in these unaltered areas. Areas that were previously mined provide some high-quality vegetation and habitat, such as the ponds and “pocket forests”, while others are highly disturbed and of only modest value. Some of the areas lowered during aggregate mining support a range of mixed riparian communities of varying quality and composition, although located well back from the channel. These areas are often surrounded by remnant mounds of dredger mine tailings that support very little vegetation. Minnesota Creek enters the area in the northwest corner and supports a lush riparian corridor.

Due to both long-term geologic processes and ongoing adjustments to human actions, the channel and banks in this area are dynamic. In the upstream reaches the channel appears overloaded with transportable coarse bed material, and continued aggradation is possible. The persistent mid-channel bar (in the Lower Sunrise Area Plan) has been a site of ongoing aggradation and enlargement resulting in about 50-250 feet of RR bank erosion and retreat since the late 1950s, with the loss of considerable low elevation riparian habitat area. Between the mid-channel bar and the riffle at the point bar, the channel appears artificially over-deepened (possibly due to gold era dredger mining activities), and a majority of easily transportable material (sands and gravels) appears to flush through this reach to downstream areas.



Aerial view of the Sacramento Bar Area. Photo Credit: Josh Hannon

The location of the point bar is within an artificially enlarged channel area as a result of past mining, and the point bar and nearest pond collect the smaller coarse sediment that passes through as flows slow in this widened area. Downstream of the point bar on RR, the channel continues to migrate toward RR, causing bank erosion in scattered locations, totaling approximately 75-175 feet of bank retreat since the late 1950s. A scour and sprout riparian vegetation regime has persisted along the channel edges, evidenced by some near channel areas presently bare of well-developed riparian vegetation. This is considered a result of ongoing scour during flood flow events and is in balance with the present LAR streamflow dynamics.

Many of the gold dredge and aggregate mined areas remain unchanged from their post-mining condition. The pre-mining bypass channels continue to be disconnected as a result of the artificially high ground that separates their upstream ends from the main channel. Vegetation in areas disturbed by mining has been able to grow where a soil substrate is present but remains nearly bare where there is no soil. Live oak woodland and other native vegetation can be found in patches throughout the upland areas. Substantial efforts have been taken to control Spanish Broom. The interior of the bar features five large seasonal ponds and several smaller seasonal ponds. Many of these topographic depressions resulting from aggregate mining are low enough to be watered at times by shallow streamflow related groundwater. Informal measurements indicate their depths range from 6 – 16 feet when the river is at a flow of 4,000 cfs. The pond nearest the point bar has progressively filled

Mine tailings in the Sacramento Bar Area. Photo Credit: Regional Parks

in with deposition, cutting off the surface connection it once had with the river channel. It was substantially filled with an influx of material during the high flow event of 1986. When these depressions are seasonally watered, they support a wide variety of waterfowl and wildlife. Some support a fringe of cottonwood mixed riparian vegetation, but some areas are wetted too often to permit vegetation growth. In general, wildlife habitat at Sacramento Bar is mixed, with some areas providing good habitat and others of a very degraded quality.

Expected Future Trends

Physical changes in the Sacramento Bar landform and river channel should not change substantially in the foreseeable future although it is possible that the effects of Folsom Dam on LAR hydrology and sediment supply could eventually lead to physical channel changes in the Sacramento Bar reach. This conforms with observed rates of change on other gravel-bed rivers. Additionally, the ongoing salmonid gravel augmentation projects in upstream areas is unlikely to result in demonstrable channel changes in this reach (given apparent slow rates of downstream gravel migration.) However, it is possible that the additional gravel could contribute to the ongoing growth of the mid-channel bar and RR bank erosion and retreat. Moderate to high flows will likely continue to cause deposition and aggradation along the southern point bar given the substantially lowered bar surface and over-widened channel cross-section. These channel processes will influence the ability of riparian vegetation to take hold.

There are several notable expected channel and bank trends. First, ongoing aggradation and growth of the existing mid-channel bar and subsequent RR bank erosion and retreat. Second, ongoing aggradation of smaller coarse material at the point bar and the progressive filling of the nearest pond - a trend that could ultimately result in the reestablishment of altered flood chutes across the point bar. And finally, ongoing RR bank erosion and retreat in areas downstream of the point bar as the LAR continues to migrate.

Vegetation beyond the channel margins is expected to persist in its current types and configurations. However, the patterns and composition are subject to threats from invasive non-native species and fires. Naturalization projects have the potential to improve aquatic pond habitat as well as riparian habitat connectivity throughout the area.

Desired Conditions

The desired condition for the channel is to maintain the ongoing processes described above and accommodate expected foreseeable natural process adjustments in channel conditions. Conservation and naturalization projects should be located and designed to accommodate these processes.

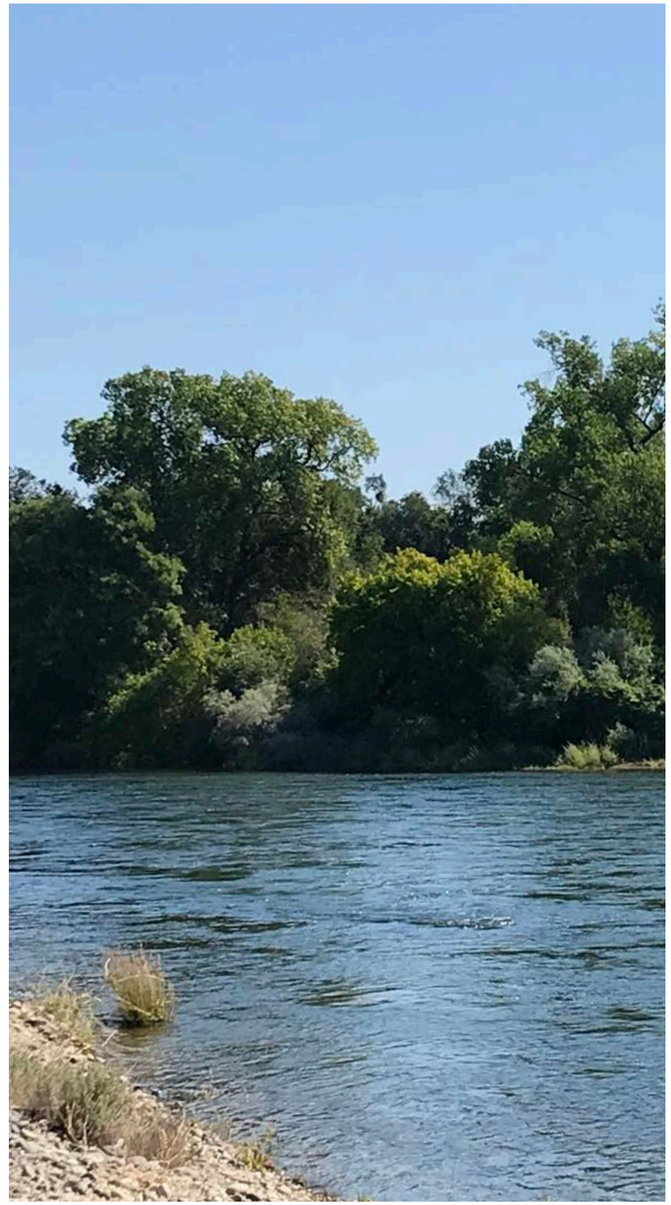
The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area. Invasive non-native species that are outcompeting native species or inhibiting the regeneration of native species should be reduced/controlled. It is also desirable to naturalize areas that have been substantially altered in the past and could provide better habitat for target species following implementation. Managing for a healthy understory with limited degradation from human uses (e.g., social trails and off-trail bicycling) would improve habitat values, as would conserving some open canopy areas with understory grasses suitable for pollinators and wildlife.

Site-Specific Potential Resource Management Actions (Figures 8-46 and 8-47)

1. **Lower floodplain:** Develop a plan to lower the floodplain to increase inundation frequency and improve rearing habitat for target fish species.
2. **Improve spawning riffle:** Construct gravel augmentation site to create suitable spawning habitat for salmonids.
3. **Maintain spawning riffle:** Previously constructed gravel augmentation site will be periodically replenished with additional gravel to maintain suitable habitat for salmonids.
4. **Maintain lowered floodplain:** Conduct routine maintenance of existing floodplain project.
5. **Remediate social trail impacts and promote native vegetation growth:** Manage social trails in a manner that consolidates trails and allows rehabilitation of vegetation understory.
6. **Improve degraded riparian habitats:** When considering proposals to transform channel conditions in the Sacramento Bar area, consider ongoing natural processes and the widened channel and its propensity toward deposition of materials as they are transported into the area during high flows.
7. **Manage invasive vegetation:** Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species.
8. **Develop conceptual naturalization plan for open mining pits/ponds:** Develop a Conceptual Naturalization Plan for the areas identified for Naturalization. A substantial portion of Sacramento Bar was highly altered for mining purposes. The remnant topography includes several open water pits, high ground created for mining access routes, and severing of high flow bypass channels. The naturalization plan should develop a concept that naturalizes these large areas in a manner that brings these elements together while improving habitat value. Material could be used to fill some ponds (e.g., the pond closest to the river channel which naturally wants to fill) while regrading and enhancing others. Recontouring and enhancing the substrate in mined areas would also provide areas to expand riparian and woodland habitats.

General Area Plan Potential Resource Management Actions

- Update the 2000 Parkway-wide Invasive Plant Management Plan (IPMP), including the invasive non-native plant inventory, management strategies, and target species for priori-ty removals (Planning Phase Report for the American River Parkway Invasive Plant Management Plan, Eva Butler and Associates, 2000). The update should incorporate the success of Phase I and Phase II IPMP removals, changes to the Parkway plant communities, and new technologies for eradication and control measures.
- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.



Fremont cottonwood in the Sacramento Bar Area.
Photo Credit: Regional Parks

Key Indicators

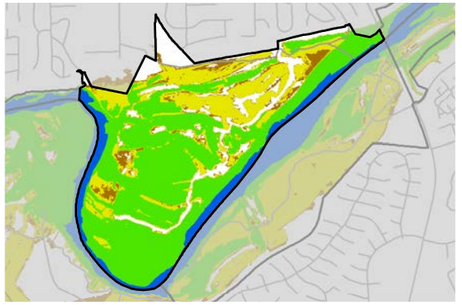
Feet 0 1,000 2,000

1. Alteration

- Intentionally Altered
- Unintentionally Altered
- Unaltered

2. Inundation Extent

- Main Channel
- Recurrence Interval - 25-100 years
- Recurrence Interval - 200 years
- Upland/Behind Levee



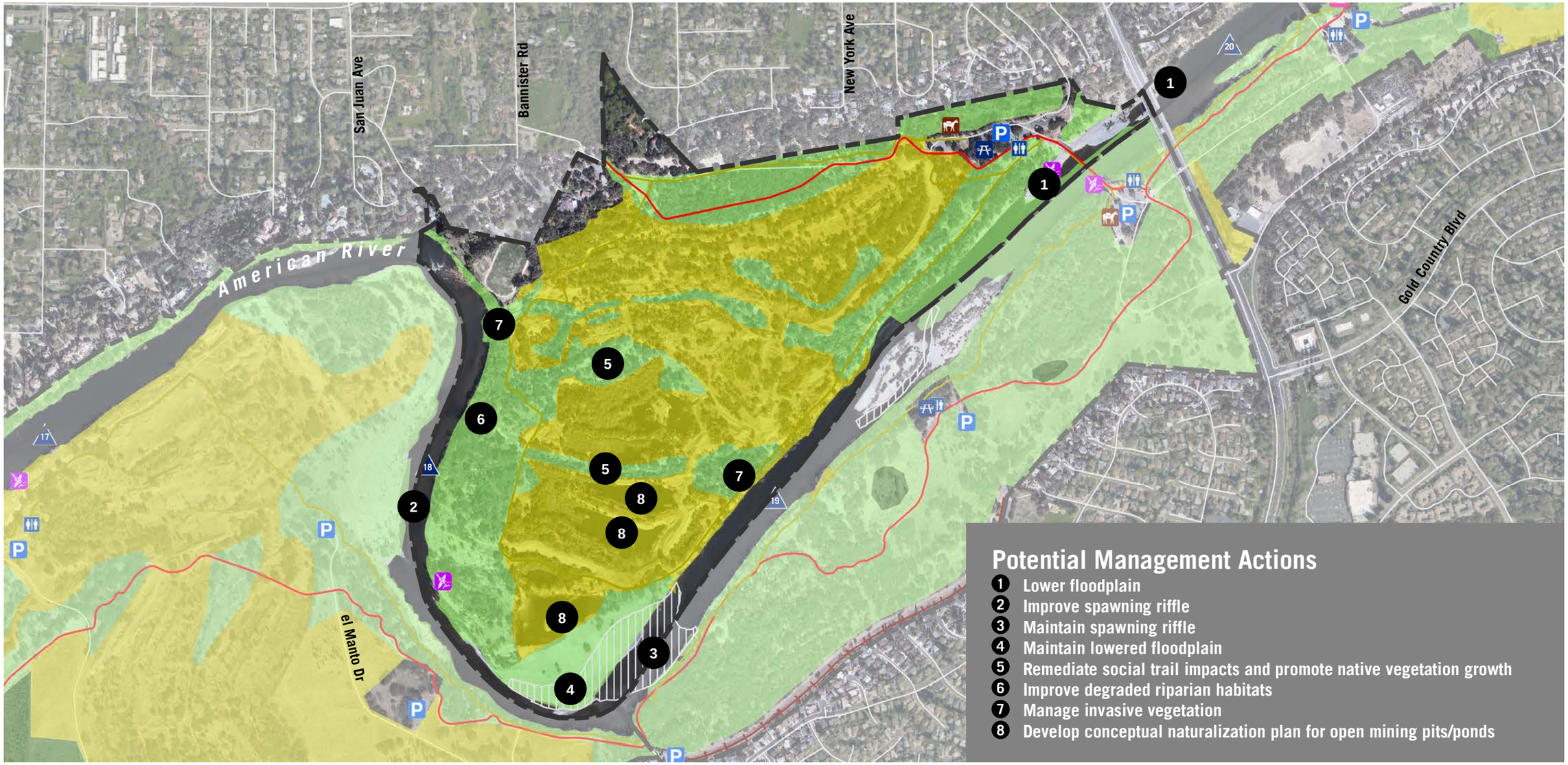
3. Vegetation Communities

- Developed
- Open Water
- Riparian Woodland/Forest
- Riparian Scrub
- Turf/Turf with Trees
- Unvegetated
- Valley Foothill Grassland

4. Land Use

- Nature Study Area
- Protected Area
- Open Space Preserve
- Limited Recreation Area
- Developed Recreation Area

Figure 8-46
Area Plan 15 Sacramento Bar A



Potential Management Actions

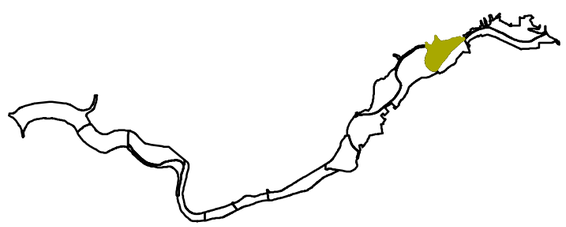
1. Lower floodplain
2. Improve spawning riffle
3. Maintain spawning riffle
4. Maintain lowered floodplain
5. Remediate social trail impacts and promote native vegetation growth
6. Improve degraded riparian habitats
7. Manage invasive vegetation
8. Develop conceptual naturalization plan for open mining pits/ponds

Parkway Boundary
Bicycle/Pedestrian Trail
Equestrian/Hiking Trail
Levee

Boat ramp, Trailer boat
Picnic Area
Car Top Boat Launch
Equestrian Staging
Parking
Restroom
River Mile

Existing Gravel Augmentation

Management Category
Preservation
Conservation
Naturalization



0 1,000 2,000 Feet

Figure 8-47
Area Plan 15 Sacramento Bar B

AREA PLAN 16

LOWER SUNRISE

8.5.16 Lower Sunrise Area Plan

Historic Physical and Biological Conditions

Well before European settlement, the LAR channel in the Lower Sunrise Area Plan cut through older floodplain material and into the erosion-resistant Fair Oaks formation materials as it migrated south into the Lower Sunrise area. The river channel was largely single-threaded except for two mid-channel bars – one persistent and the other variably present - which changed in size based on sequences of flood flow scouring and sediment transport. The non-resistant material along RL bank eroded very slowly. Riparian vegetation along the channel was driven by a scour and sprout dynamic with vegetated areas subject to periodic scour during higher flows followed by root and stem sprout re-establishment. Vegetation growth was limited by irrigation stress during seasonally lower flows.

Overbank areas consisted of a variety of surfaces formed over geologic time, resulting in areas with and without overbank deposition and variably underlain by the impermeable erosion-resistant Fair Oaks formation. In most higher elevation areas, this impermeable material isolated surfaces from river fed shallow groundwater, thereby limiting the amount of groundwater available to vegetation and significantly influencing the types and amounts of vegetation able to survive. Buffalo Creek, a tributary to the LAR, followed a course beginning farther upstream and entered the river channel at the downstream end of the Lower Sunrise area.

Impact of European Settlement

Substantial mining activities, both dredger gold mining and some subsequent aggregate mining of the dredger mine tailings, altered large areas of Lower Sunrise—little less than half of the land area. Dredger mining removed existing vegetation and altered the topography, leaving behind large mounds of unvegetated cobble material. Where subsequent aggregate mining occurred, the land surface was lowered to elevations close to the original ground elevation. Few elevated dredger mine tailing piles persist. Dredging equipment crossed the river between Lower Sunrise and Sacramento Bar. While the extent of in-channel mining in this area is unknown, overly deep conditions in the channel between the mid-channel bar and point bar indicate this area may have deepened during dredger mining.

The construction and operation of Folsom Dam and Nimbus Dam have changed the flow regime and sediment regime in the LAR but not the channel configuration in the Lower Sunrise area, consistent with observations of other gravel bedded rivers which show slow responses to dam-related changes in flow and sediment regimes. However, higher flows during the summer and fall may have contributed to increasing the extent of riparian vegetation and SRA habitat in this area. A side channel through the mid-channel bar with gravel augmentation at the downstream end was built recently to improve conditions for anadromous fish.

Present Conditions

Approximately half of Lower Sunrise was intentionally altered, and the other half is unaltered. However, even in mined areas, a majority of the area supports valley oak riparian woodland and live oak woodland. Patches of annual grassland occur throughout the oak woodlands, and small areas of riparian scrub occur along the river channel. Overall, the area provides high-quality vegetation and habitat.

Buffalo Creek, which used to run the full length of Lower Sunrise, no longer runs within the area; its new outfall is just upstream of Sunrise Boulevard. However, another storm drain empties into the middle of the lower Sunrise area, maintaining a dense willow thicket.

The Lower Sunrise Area has 129 bird species recorded from eBird over the last 5 years (2016 to 2021). Of interest are the many acorn woodpeckers (among other woodpeckers) and their acorn cache trees in this area's rapidly declining large valley oak trees. Botanically, Lower Sunrise contains one of the two large populations of showy milkweed (the other being at Ancil Hoffman Park) on the Parkway.

Due to both long-term geologic processes and ongoing adjustments to human actions, the channel and banks in this area are dynamic. In the upstream reaches the channel appears overloaded with transportable coarse bed material and continued aggradation is possible. The persistent mid-channel bar has been a site of ongoing aggradation and enlargement, resulting in about 50-250 feet of RR bank erosion and retreat since the late 1950s and the loss of considerable low elevation riparian habitat area. Between the mid-channel bar and the riffle at the point bar, the channel appears artificially over-deepened (possibly due to gold era dredger mining activities), and a majority of easily transportable material appears to flush through this reach to downstream areas. The point bar area has an artificially enlarged channel area and the point bar and nearest excavation pond on RR (Sacramento Bar area) collect the smaller coarse sediment that passes through.

Valley oak trees and field of yellow starthistle in the Lower Sunrise Area. Photo credit: Regional Parks

Expected Future Trends

Substantial changes in channel configuration within the Lower Sunrise Area are unlikely in the foreseeable future (conforming with observed rates of change on other gravel-bed rivers). Additionally, slow rates of downstream gravel migration indicate that recent gravel augmentation projects in upstream areas are unlikely to result in demonstrable changes to the channel in this reach. However, this additional gravel could contribute to ongoing processes such as the growth of the mid-channel bar and RR bank erosion and retreat. Moderate to high flows will likely continue to cause deposition and aggradation along the southern point bar (Sacramento Bar area at downstream end) given the substantially lowered bar surface and over-widened channel cross-section.

There are two notable expected channel and bank trends. The first trend is the ongoing aggradation and growth of the existing mid-channel bar and subsequent RR bank erosion and retreat. The second trend is the ongoing aggradation of smaller coarse material at the point bar on the opposite bank and the progressive filling of the nearest pond, which could ultimately result in the reestablishment of altered flood chutes across the point bar (at Sacramento Bar).

Vegetation beyond the channel margins is expected to persist in its current types and configurations. However, the patterns and composition are subject to threats from invasive non-native species and wildfires. Naturalization projects have the potential to improve habitat conditions in the limited areas where naturalization is needed.

Desired Conditions

The desired condition for the channel is to maintain ongoing channel processes and accommodate expected foreseeable natural process adjustments in channel conditions. Conservation and naturalization projects should be located and designed to accommodate these processes.

The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area. Invasive non-native species that are outcompeting native species or inhibiting the regeneration of native species should be reduced/controlled. It is also desirable to naturalize areas that have been substantially altered in the past and could provide better habitat for target species following implementation, understanding that there is limited

Valley oak trees and egret resting on in-channel island in the Lower Sunrise Area. Photo credit: Regional Parks

need for improvement in this area. Managing for a healthy understory with limited degradation from human uses (e.g., social trails and off-trail bicycling) would improve habitat values, as would conserving some area of open grassland suitable for pollinators and wildlife.

Site-Specific Potential Resource Management Actions (Figures 8-48 and 8-49)

1. **Lower floodplain:** Develop a plan to lower the floodplain to increase inundation frequency and improve rearing habitat for target fish species.
2. **Maintain spawning riffle:** Previously constructed gravel augmentation site will be periodically replenished with additional gravel to maintain suitable habitat for salmonids.
3. **Maintain lowered floodplain:** Conduct routine maintenance of existing floodplain project.
4. **Manage invasive vegetation:** Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species.
5. **Enhance woodland savanna and/or grasslands:** Augment degraded native communities with plantings of woodland and grassland species to enhance habitat value.

General Area Plan Potential Resource Management Actions

- When considering proposals to transform channel conditions in the Lower Sunrise area, consider ongoing natural processes and the widened channel and its propensity toward deposition of materials as they are transported into the area during high flows.
- Specific consideration should be given to the issue of off-trail bicycling, which is currently contributing to measurable disturbance of the landscape.
- Develop a Conceptual Naturalization Plan for the areas identified for Naturalization, including improvements to riparian forest.
- Update the 2000 Parkway-wide Invasive Plant Management Plan (IPMP), including the invasive non-native plant inventory, management strategies, and target species for priority removals (Planning Phase Report for the American River Parkway Invasive Plant Management Plan, Eva Butler and Associates, 2000). The update should incorporate the success of Phase I and Phase II IPMP removals, changes to the Parkway plant communities, and new technologies for eradication and control measures.
- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.

Aerial view of the Jim Jones Bridge, Sunrise Boulevard Bridge, Fair Oaks Bridge, and the Sunrise Access Parking Lot in the Lower Sunrise Area. Photo Credit: Josh Hannon

Key Indicators

Feet 0 1,000 2,000

1. Alteration

- Intentionally Altered
- Unintentionally Altered
- Unaltered

2. Inundation Extent

- Main Channel
- Recurrence Interval - 25-100 years
- Recurrence Interval - 200 years
- Upland/Behind Levee

3. Vegetation Communities

- Developed
- Open Water
- Riparian Woodland/Forest
- Riparian Scrub
- Turf/Turf with Trees
- Unvegetated
- Valley Foothill Grassland

4. Land Use

- Nature Study Area
- Protected Area
- Open Space Preserve
- Limited Recreation Area
- Developed Recreation Area

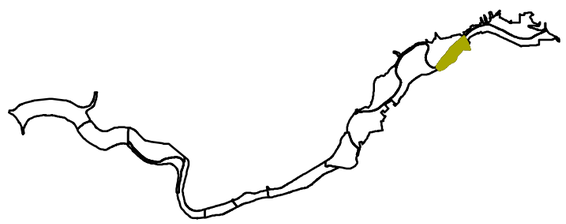
Figure 8-48
Area Plan 16 Lower Sunrise A

Parkway Boundary
Bicycle/Pedestrian Trail
Equestrian/Hiking Trail
Levee

Picnic Area
Car Top Boat Launch
Equestrian Staging
Parking
Restroom
River Mile

Existing Gravel Augmentation

Management Category
Preservation
Conservation
Naturalization



0 1,000 2,000 Feet

Figure 8-49
Area Plan 16 Lower Sunrise B

AREA PLAN 17

SUNRISE BLUFFS

8.5.17 Sunrise Bluffs Area Plan

Historic Physical and Biological Conditions

Well before European settlement, the LAR channel in the Sunrise Bluffs Area Plan cut through older floodplain material and into the erosion-resistant Fair Oaks formation materials. This process created the steep Sunrise Bluffs which confined the channel on RR and produced a scour pool. The bluffs supported a narrow band of patchy riparian vegetation intermixed with areas of exposed soil.

Impact of European Settlement

Agricultural activities on portions of the overbank above the bluff eventually transitioned to residential development.

The construction and operation of Folsom Dam and Nimbus Dam changed the flow regime and sediment regime in the LAR, but there is no evidence that this has changed the channel configuration in the Sunrise Bluffs area. However, the change in seasonal flows, such as higher flows in the summer low-flow period, may have contributed to some enhanced riparian vegetation extent and vigor and increased the extent of SRA habitat in this area.

Present Conditions

Most of this area is privately owned; however, Fair Oaks Bluff is publicly-owned Parkway land, immediately upstream of the Old Fair Oaks Bridge.

The river channel is presently quite stable but subject to ongoing scour during higher flows. The bluffs range in height from approximately 60 to 100 feet above the low flow water surface, with a relatively continuous band of riparian vegetation with areas of steep, exposed soil throughout. Ongoing erosion in locations is very slow as a result of the erosion resistant geology. Invasive species, such as pampas grass and Spanish broom, are present throughout the area. The Parkway parcel at the bridge is predominantly oak woodland and annual grasses.

Expected Future Trends

The present condition is expected to persist, with a relatively stable channel and very slow erosion of some bluff areas. Some episodic losses of material and remedial residential bluff protection are possible. Vegetation is expected to persist in its current types and configurations, with the possibility that non-native plant species could expand their presence in the area.

Desired Conditions

Maintain ongoing channel processes and accommodate expected foreseeable natural process adjustments in channel conditions. This calls for limiting future bank protection projects to those required for public safety, protection of property outside of the Parkway, and protection for substantial, unmovable infrastructure within the Parkway. Bluff protection projects should be kept to a minimum. The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area. Invasive non-native species should be controlled.

Aerial view of the Sunrise Bluffs Area (photo right). Photo Credit: Josh Hannon

Site-Specific Potential Resource Management Actions (Figures 8-50 and 8-51)

1. **Lower floodplain:** Develop a plan to lower the floodplain to increase inundation frequency and improve rearing habitat for target fish species.
2. **Improve spawning riffle:** Construct gravel augmentation site to create suitable spawning habitat for salmonids.
3. **Manage invasive vegetation:** Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species.
4. **Improve degraded riparian habitat:** Augment degraded native communities with plantings of riparian species to enhance habitat value.
5. **Monitor bluff erosion:** Specific consideration should be given to managing invasive plants and monitoring bluff erosion.

General Area Plan Potential Resource Management Actions

- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.

Key Indicators

Feet 0 500 1,000

1. Alteration

- Intentionally Altered
- Unintentionally Altered
- Unaltered

2. Inundation Extent

- Main Channel
- Recurrence Interval - 25-100 years
- Recurrence Interval - 200 years
- Upland/Behind Levee

3. Vegetation Communities

- Developed
- Open Water
- Riparian Woodland/Forest
- Riparian Scrub
- Turf/Turf with Trees
- Unvegetated
- Valley Foothill Grassland

4. Land Use

- Protected Area
- Open Space Preserve
- Limited Recreation Area
- Developed Recreation Area

Figure 8-50
Area Plan 17 Sunrise Bluffs A

Potential Management Actions

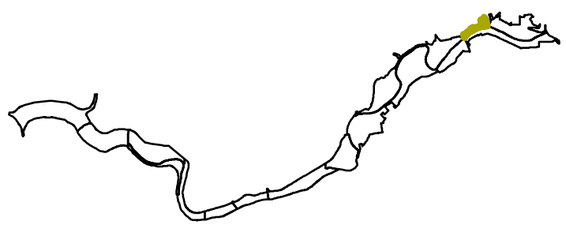
1. Lower floodplain
2. Improve spawning riffle
3. Manage invasive vegetation
4. Improve degraded riparian habitat
5. Monitor bluff erosion

Parkway Boundary
Bicycle/Pedestrian Trail
Equestrian/Hiking Trail
River Mile

Boat ramp, Trailer boat
Car Top Boat Launch
Equestrian Staging
Parking
Restroom

Existing Gravel Augmentation

Management Category
Preservation
Conservation
Naturalization



0 500 1,000 Feet

Figure 8-51
Area Plan 17 Sunrise Bluffs B

AREA PLAN 18

UPPER SUNRISE

8.5.18 Upper Sunrise Area Plan

Historic Physical and Biological Conditions

Well before European settlement, the LAR channel in the Upper Sunrise Area Plan cut through older floodplain material and into the erosion-resistant Fair Oaks formation materials as it migrated between relatively erosion-resistant bank materials on each side of the channel. The river channel was largely single-threaded, except for a single persistent mid-channel bar (and probably several transient mid-channel bars) which changed in size based on sequences of flood flow scouring and sediment transport. The RL bank was erosion resistant in its upstream portion, and somewhat more erodible, but still relatively stable, in its downstream portion. The channel was relatively straight and stable, similar to a bedrock confined channel. The bed comprised mobile material likely ranging from gravel/cobble to small boulders for some depth before reaching underlying bedrock. Riparian vegetation along the channel edge was driven by a scour and sprout dynamic, shedding mass during periodic higher flows and re-sprouting despite irrigation stress during seasonally lower flows.

Overbank areas consisted of a variety of surfaces formed over geologic time resulting in areas with and without overbank deposition and variably underlain by the impermeable erosion-resistant Mehrten, River Bank, and Modesto formations. In most higher elevation areas, this impermeable material isolated surfaces from river fed shallow groundwater, significantly influencing vegetation growth patterns.

Impact of European Settlement

The land area of Upper Sunrise has been heavily impacted by the several phases of mining conducted in the upper portion of the Parkway, including Placer mining which dominated in the latter half of the 19th Century; dredger mining which was carried out in the first half of the 20th Century; and aggregate mining which occurred in the last half of the 20th Century. Each of these modes of extraction left their mark on the Upper Sunrise area. Placer mining was conducted by hand cutting sluices into the natural hard surfaces of the area. While this activity left the landscape completely barren of vegetation, the resulting lowered land surface elevation may have facilitated the subsequent accumulation over 150 years of fines from various sources that in turn supported the development of a complex of high quality oak woodland communities and wildlife habitat. The areas of dredger mining left elevated tailing mounds of cobble which have remained essentially unvegetated. Some of these mounds were significantly altered or removed by aggregate mining, creating opportunities for revegetation. However, the most notable accomplishment of the aggregate mining era in the Upper Sunrise area was the conversion of an early gold processing site near the Old Fair Oaks Bridge into a large aggregate processing plant.

The construction and operation of Folsom Dam and Nimbus Dam changed the flow regime and sediment regime in the LAR, and there is evidence that channel impacts of these changes are present in portions of the Upper Sunrise area, particularly in the upstream half. At the upstream end and adjacent to the hatchery complex (which narrowed the channel and hardened the RL bank) there is evidence that the channel bed has lowered six to nine feet, largely due to both the interruption of coarse sediment influx from the closure of Folsom and Nimbus Dams and the channel narrowing and bank hardening. It appears that flows of 100,000 cfs or greater are the primary cause of these changes. High flows have also altered non-resistant bank features in some upstream locations and caused the development of channel margin and mid-channel bars in others. The result has been a general channel widening and bed flattening in the reach below the hatchery extending down to the midpoint of Upper Sunrise. Conversely, in the downstream half there is little evidence of channel alteration due to the flow and sediment regimes inaugurated by Folsom and Nimbus Dams. This lower reach shows evidence of recent deposition and aggradation at some locations.

Additionally, changes in seasonal flows such as higher flows in the low-flow period, may have contributed to increasing the extent of riparian vegetation and SRA habitat in this area.

Recent efforts to improve conditions for anadromous fish have involved gravel augmentation at the upstream and middle portions, adding about 44 acre-feet of material to the channel. Some of the placed gravel has mobilized and rearranged locally. Side channels have also been cut at three locations including the enlargement and lowering of the naturally-occurring RL secondary channel on the persistent mid-channel bar in the downstream half of the reach.

Present Conditions

As noted, almost all of Upper Sunrise was intentionally altered by mining and materials handling activities. Despite this substantial alteration, a majority of the area supports valley oak riparian woodland and live oak woodland. Patches of annual grassland occur throughout the oak woodlands, and small areas of riparian scrub occur along the river channel. Overall, the area provides a substantial corridor of high-quality vegetation and habitat.

Due to both long-term geologic processes and ongoing adjustments to human actions, the channel and banks in this area are dynamic. The most upstream area near the hatchery is scoured and over-deepened, followed by a steep and somewhat confined channel down to the Sailor Bar boat ramp. Continuing downstream, the channel is over-widened as high flows from the dams have eroded bank features. This reach is quite shallow; as the channel extends beyond the influence of the dams it becomes relatively narrow and remains shallow, possibly due to gravel augmentation. The persistent mid-channel bar is causing erosion on the RL bank, followed by a generally stable section with signs of net deposition, likely contributed to by erosion and transported gravel augmentation. A scour and sprout riparian vegetation regime persists along the channel edges, evidenced by some near channel areas presently bare of well-developed riparian vegetation. This is considered a result of ongoing scour during flood flow events and in balance with the present LAR streamflow dynamics.

The Nimbus Fish Hatchery in the Upper Sunrise Area. Photo Credit: MIG

Upper Sunrise (across the river from avian-rich Sailor Bar), has very high bird diversity, with 167 species recorded on Ebird over the last 5 years (2016 to 2021). The Nimbus Fish Hatchery, and proximity to Lake Natoma likely boost the avian diversity to this area, however, the vegetation in the Upper Sunrise is also transitioning to a foothills type vegetation, which likely also adds to birding diversity. The Hazel bridge provides nesting habitat for White-throated Swifts in the drain holes under the bridge, while Cliff swallows build mud nests on the bridge's side.

As mentioned above, the Upper Sunrise area vegetation is transitioning to a more foothills community, with more toyon, gray pine, and California buckeye scattered among the oaks, making it one of the most botanically interesting and diverse areas on the Parkway. Local rarities, such as buckbrush, styrax, mock orange, mountain mahogany, holly leaved redberry, keckellia, and several locally rare wildflower species are all found in Upper Sunrise. Bush monkey flower is common in the open areas. Some of the previously mined areas of Upper Sunrise have naturalized into "fern canyons" dotted with the only population of California styrax found on the Parkway as well as several fern species.

The Jedediah Smith Memorial Trail in the Upper Sunrise Area. Photo Credit: MIG

Expected Future Trends

The effects of Folsom Dam on LAR hydrology and sediment supply, resulting in a lack of sediment supply and areas of scour, are expected to continue. Depending on the incidence and duration of future flood flow events (approximately greater than 100,000 cfs), foreseeable future trends may include the progressive extension of the bed scour zone at the hatchery complex downstream toward the area of the Sailor Bar boat ramp. The erosional loss of bank attached bars and channel apron features, leading to channel widening in the area downstream of the Sailor Bar boat ramp is also likely. Given the apparent slow pace of change in the reach above the mid-channel bar as a result of dam-related changes, the lower portion is likely to remain unaltered by dam influence over a reasonable management timeframe. However, based on the observed apparent slow rate of spawning augmentation gravel export from this reach, it is expected that future augmentation efforts will contribute additional bed material and contribute to the shallow channel conditions. Finally, due to ongoing aggradation of the persistent mid-channel bar in the downstream reach, ongoing RL bank erosion and retreat is expected with the eventual loss of a short portion of the paved bike trail.

Vegetation beyond the channel margins is expected to persist in its current types and configurations. However, the patterns and composition are subject to threats from invasive non-native species and fires. Naturalization projects have the potential to improve habitat conditions in the limited areas where naturalization is needed.

Desired Conditions

The desired condition for the channel is to maintain ongoing processes and accommodate expected foreseeable adjustments in channel conditions. Conservation and naturalization projects should be located and designed to accommodate these processes.

The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area. Invasive non-native species that are outcompeting native species or inhibiting the regeneration of native species should be reduced/controlled. It is also desirable to naturalize areas that have been substantially altered in the past and could provide better habitat for target species following implementation, understanding that there is limited

need for improvement in this area. Managing for a healthy understory with limited degradation from human uses (e.g., social trails and off-trail bicycling) would improve habitat values, as would conserving some area of open grassland suitable for pollinators and wildlife.

Site-Specific Potential Resource Management Actions (Figures 8-52 and 8-53)

1. **Lower floodplain:** Develop a plan to lower the floodplain to increase inundation frequency and improve rearing habitat for target fish species.
2. **Improve spawning riffle:** Construct gravel augmentation site to create suitable spawning habitat for salmonids.
3. **Maintain spawning riffle:** Previously constructed gravel augmentation site will be periodically replenished with additional gravel to maintain suitable habitat for salmonids.
4. **Maintain lowered floodplain:** Conduct routine maintenance of existing floodplain project.
5. **Manage invasive vegetation:** Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species.
6. **Remediate social trail impacts and promote native vegetation growth:** Manage social trails in a manner that consolidates trails and allows rehabilitation of vegetation understory.
7. **Develop conceptual naturalization plan for areas altered by mining:** Develop a Conceptual Naturalization Plan for the area identified for Naturalization. The area has been scraped clean in some manner and soils need to be assessed. These areas could ultimately support oak woodland/savanna or grassland with proper preparation.

General Area Plan Potential Resource Management Actions

- In connection with proposals to naturalize channel conditions in the Upper Sunrise area, consider ongoing natural processes and the propensity of the widened channel to capture materials as they are transported through the area during high flows.
- Update the 2000 Parkway-wide Invasive Plant Management Plan (IPMP), including the invasive non-native plant inventory, management strategies, and target species for priority removals (Planning Phase Report for the American River Parkway Invasive Plant Management Plan, Eva Butler and Associates, 2000). The update should incorporate the success of Phase I and Phase II IPMP removals, changes to the Parkway plant communities, and new technologies for eradication and control measures.
- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.

Riverbank in the Upper Sunrise Area. Photo Credit: MIG

Key Indicators

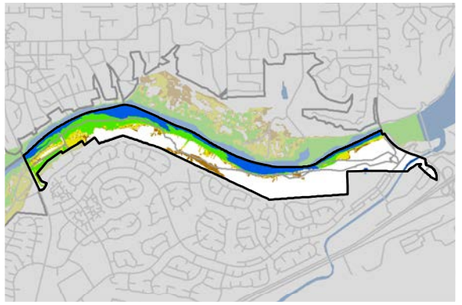
Feet 0 2,000 4,000

1. Alteration

- Intentionally Altered
- Unintentionally Altered
- Unaltered

2. Inundation Extent

- Main Channel
- Recurrence Interval - 25-100 years
- Recurrence Interval - 200 years
- Upland/Behind Levee



3. Vegetation Communities

- Developed
- Open Water
- Riparian Woodland/Forest
- Riparian Scrub
- Turf/Turf with Trees
- Unvegetated
- Valley Foothill Grassland

4. Land Use

- Nature Study Area
- Protected Area
- Open Space Preserve
- Limited Recreation Area
- Developed Recreation Area

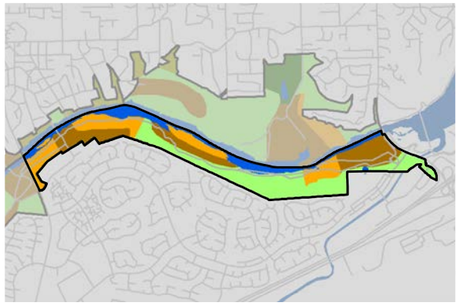


Figure 8-52
Area Plan 18 Upper Sunrise A

Potential Management Actions

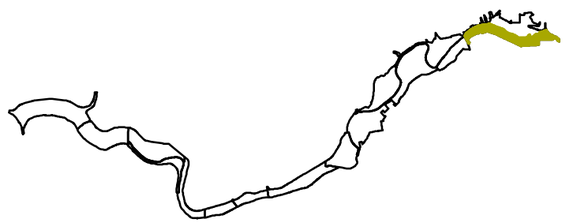
1. Lower floodplain
2. Improve spawning riffle
3. Maintain spawning riffle
4. Maintain lowered floodplain
5. Manage invasive vegetation
6. Remediate social trail impacts and promote native vegetation growth
7. Develop conceptual naturalization plan for areas altered by mining

Parkway Boundary
Bicycle/Pedestrian Trail
Equestrian/Hiking Trail
Pedestrian Trail

Boat ramp, Trailer boat
Car Top Boat Launch
Equestrian Staging
Parking
Restroom
River Mile

Existing Gravel Augmentation

Management Category
Preservation
Conservation
Naturalization



0 1,000 2,000 Feet

Figure 8-53
Area Plan 18 Upper Sunrise B

AREA PLAN 19

SAILOR BAR

8.5.19 Sailor Bar Area Plan

Historic Physical and Biological Conditions

Well before European settlement, the LAR channel in the Upper Sailor Bar Area Plan cut through older floodplain material and into the erosion-resistant Fair Oaks formation materials as it migrated between relatively erosion-resistant bank materials on each side of the channel. The river channel was largely single-threaded except for a single persistent mid-channel bar (and probably several transient mid-channel bars) which changed in size based on sequences of flood flow scouring and sediment transport. The relatively stable RR bank comprises coarse and relatively erosion resistant floodplain material and is underlain by exposures of the erosion resistant Fair Oaks formation material. The channel through the area has remained relatively straight and stable. Similar to a bedrock confined channel, the channel bed was composed of mobile material ranging from gravel/cobble to small boulders for some depth before reaching bedrock. Riparian vegetation along the channel was driven by a scour and sprout dynamic, with vegetated areas being periodically scoured during higher flows and then reestablishing by root and stem sprouts with limited irrigation during seasonally lower flows.

Overbank areas consisting of a variety of surfaces formed over geologic time, resulting in areas with and without overbank deposition and variably underlain by the impermeable erosion-resistant Fair Oaks formation. Vegetation was likely patchy in much of the area due to hardpan conditions. Some of the bank slopes are relatively steep as they move north away from the river channel. Soil conditions across these slopes and the area's high elevation depositional bar likely limited vegetation to grasslands and scattered oaks. Several creeks flow into the area, most notably "Illinois Creek" near the upstream end which originally dissected the high bar as it flowed down to the river channel.

Impact of European Settlement

Substantial mining activities, primarily dredger gold mining, covered a majority of the land area and significantly altered much of Sailor Bar. The dredger mining removed any existing vegetation and altered the topography and composition of the surface, leaving behind large piles of unvegetated cobble material. However, some of the surfaces that appear lower are natural surfaces supporting "pocket forests". Elevated mounds of dredger mine tailings persist in areas scattered throughout. Areas that were used for material handling but not mined are less damaged.

A small earthen dam was constructed on "Illinois Creek", creating a pond that exists today. A large concrete-lined wading pool feature was constructed at the downstream end of the area, but is not functional.

As described for Upper Sunrise, the construction and operation of Folsom Dam and Nimbus Dam have changed the flow regime and sediment regime in the LAR and there is evidence that channel impacts of these changes are present in portions of the Sailor Bar area, particularly in the upstream portion. At the upstream end and adjacent to the hatchery complex (which narrowed the channel and hardened the RL bank) there is evidence that the channel bed has lowered six to nine feet, largely due to both the interruption of coarse sediment influx from the closure of Folsom and Nimbus dams and the channel narrowing and bank hardening. It appears that flows 100,000 cfs or greater are the primary cause of this channel lowering. High flows have also contributed to other channel changes, such as erosion or loss of bank features in some locations and development of channel margin and mid-channel bars in others. The result has been a general channel widening and bed flattening in the reach below the hatchery extending down to the lower third of Sailor Bar. Conversely in the downstream portion, there is little evidence of channel alteration due to the flow

and sediment regimes associated with the operation of Folsom and Nimbus Dams. This lower reach shows evidence of recent deposition and aggradation at some locations. Additionally, higher flows in the summer and fall, may have contributed to increasing the extent of riparian vegetation and SRA habitat in this area.

Recent efforts to improve conditions for anadromous fish have involved gravel augmentation in several locations throughout the Sailor Bar area, adding about 44 acre-feet of material to the river channel. Some of the placed gravel has mobilized and rearranged locally. Side channels have also been cut at two locations.

Present Conditions

A majority of Sailor Bar was intentionally altered by dredger mining and materials handling activities. There are some unaltered areas along the channel margin and along the northern boundary, where riparian vegetation and oak woodlands persist. The post-mining landscape provides areas of high-quality vegetation and habitat, while others are highly disturbed and of only modest value. Pockets of unaltered areas with high-quality vegetation are likely part of the original “Illinois Creek” channel. Some of the areas lowered during aggregate extraction support patches of mixed riparian communities and oak woodland, although located well back from the channel. These areas are often surrounded by dredger mine tailings that support very little vegetation. The areas likely used for materials handling are somewhat less degraded but still support limited vegetation. The upper slopes that remain unaltered support oak woodlands with a grass understory. Overall, the area provides some valuable habitat but there are several opportunities for improvement.

Aerial view of the Sailor Bar Area, including mine tailings (photo foreground). Photo Credit: Josh Hannon

Due to both long-term geologic processes and ongoing adjustments to human actions, the channel and banks in this area are dynamic. The most upstream area near the hatchery is scoured and over-deepened, followed by a steep and somewhat confined channel down to the Sailor Bar boat ramp. Continuing downstream, the channel is over-widened as high flows from the dams have eroded bank features. This reach is also quite shallow, possibly due to gravel augmentation. As the channel extends beyond the influence of the dams it becomes relatively narrow and remains shallow – again, possibly due to gravel augmentation. A scour and sprout riparian vegetation regime has persisted along the channel edges, evidenced by some near channel areas presently bare of well-developed riparian vegetation. This is considered a result of ongoing scour during flood flow events and in balance with the present LAR streamflow dynamics.

Sailor Bar has the highest recorded bird diversity on the American Parkway with 197 species recorded in eBird over the last 5 years (2016 to 2021). This park features bluffs, a pond, mine tailings (with “pocket forests” within the tailings), as well as river frontage, and is in close proximity to the Nimbus Fish Hatchery and Lake Natoma. Many intermittent creeks from the surrounding neighborhoods drain into Sailor Bar, forming damp brushy areas that further add to its habitat diversity.

Although blue oaks occur elsewhere on the Parkway, Sailor Bar has the only example of a blue oak dominated forest on the American River Parkway. Sailor Bars’ northern

Aerial view of the boat ramp in the Sailor Bar Area. Photo Credit: Josh Hannon

meadow and the open grassland areas east of the Illinois access road, support native bunchgrasses, geophytes (such as soaproot, brodeaias, and calorchortus), and summer blooming virgate tarweed. Much of the central mined area is fragrant with elegant Madia during the summer months. The gravel bars near the river showcase frying pan poppies in the spring. The northern portion of Sailor Bar has the largest populations of California maidenhair fern found on the Parkway as well as a ravine with many redbuds.

Expected Future Trends

The effects of Folsom Dam on LAR hydrology and sediment supply, resulting in a lack of sediment supply and areas of scour, are expected to continue. Depending on the incidence and duration of future flood flow events (approximately greater than 100,000 cfs) foreseeable future trends may include the progressive extension of the bed scour zone at the hatchery complex downstream toward the area of the Sailor Bar boat ramp. The erosional loss of bank attached bars and channel apron features, leading to channel widening in the area downstream of the Sailor Bar boat ramp is also likely.

Vegetation beyond the channel margins is expected to persist in its current types and configurations. However, the patterns and composition are subject to threats from invasive non-native species and fires. Naturalization projects have the potential to improve habitat conditions in the limited areas where naturalization is needed.

Desired Conditions

The desired condition for the channel is to maintain ongoing processes and accommodate expected foreseeable natural adjustments in channel conditions. Conservation and naturalization projects should be located and designed to accommodate these processes.

The desired condition for vegetation is to conserve existing native vegetation that occurs throughout much of the area. Invasive non-native species that are outcompeting native species or inhibiting the regeneration of native species should be reduced/controlled. It is also desirable to naturalize areas that have been substantially altered in the past and could provide better habitat for target species following implementation. Managing for a healthy understory

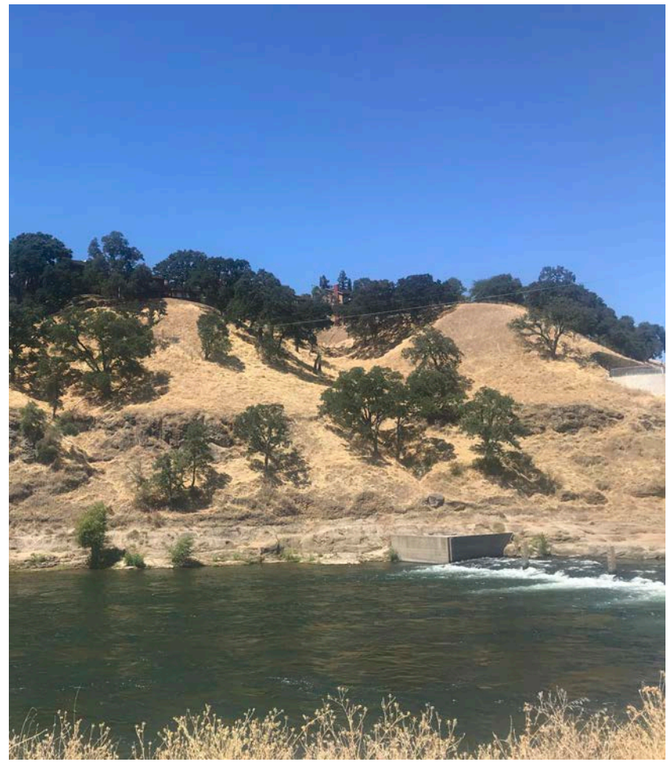
with limited degradation from human uses (e.g., social trails) would improve habitat values, as would conserving some area of open grassland suitable for pollinators and wildlife.

Site-Specific Potential Resource Management Actions (Figures 8-54 and 8-55)

1. **Lower floodplain:** Develop a plan to lower the floodplain to increase inundation frequency and improve rearing habitat for target fish species.
2. **Maintain spawning riffle:** Previously constructed gravel augmentation site will be periodically replenished with additional gravel to maintain suitable habitat for salmonids.
3. **Maintain lowered floodplain:** Conduct routine maintenance of existing floodplain project.
4. **Manage invasive vegetation:** Conserve existing habitats in areas identified for Conservation. Conservation may include removal of non-native invasive species, managing social trails, improving riparian vegetation in areas where it has been degraded, and improving the understory with appropriate native species.
5. **Maintain water levels at Sailor Bar Pond for wildlife habitat:** Manage pond water levels to support native wildlife species and reduce risk of non-native species colonization.
6. **Improve degraded riparian habitats:** In connection with proposals to naturalize channel conditions in the Sailor Bar area, consider ongoing natural processes and the widened channel and its propensity toward deposition of materials as they are transported through the area during high flows.
7. **Expand oak habitats in conservation and naturalization areas:** Augment degraded native communities with plantings of oak woodland species to enhance habitat value.
8. **Recontour mined areas to support oak habitats:** Areas identified for naturalization have been highly disturbed from mining. Substantial effort is likely needed to grade, recontour, and supplement soils in order to support oak woodland and/or savanna. Specific consideration should be given to increasing woodland in the eastern end, not to high density, but could support more oaks. Areas recently used for gravel augmentation projects should be considered for further grading, contouring, and soil amendment prior to planting.
9. **Naturalize relict pools/remove gunite:** The former "pool" in the northwest corner could be naturalized into some type of lower elevation feature, but its low elevation doesn't seem to help retain moisture. Consideration should be given to removal of bentonite/gunite layer.
10. **Remediate social trail impacts and promote native vegetation growth:** Manage social trails in a manner that consolidates trails and allows rehabilitation of vegetation understory.

General Area Plan Potential Resource Management Actions

- Develop a Conceptual Naturalization Plan for the areas identified for Naturalization. Consider opportunities to naturalize Illinois Creek.
- Update the 2000 Parkway-wide Invasive Plant Management Plan (IPMP), including the invasive non-native plant inventory, management strategies, and target species for priority removals (Planning Phase Report for the American River Parkway Invasive Plant Management Plan, Eva Butler and Associates, 2000). The update should incorporate the success of Phase I and Phase II IPMP removals, changes to the Parkway plant communities, and new technologies for eradication and control measures.
- Parkway-wide, map the multi-use trail and trail spurs, equestrian/hiking trail, pedestrian trail, maintenance roads and current social trails. After mapping is complete, determine which social trails should be actively closed and restored vs. active monitoring.



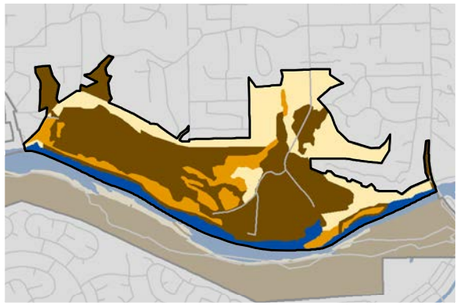
Bluffs in the Sailor Bar Area. Photo Credit: MIG

Key Indicators

Feet 0 1,000 2,000

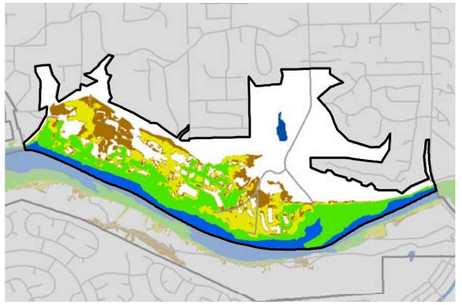
1. Alteration

- Intentionally Altered
- Unintentionally Altered
- Unaltered



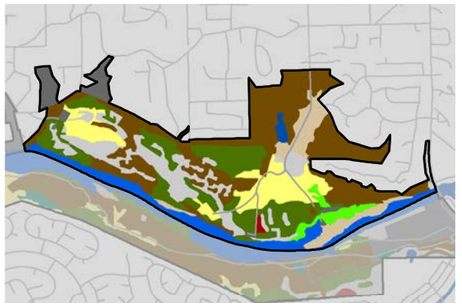
2. Inundation Extent

- Main Channel
- Recurrence Interval - 25-100 years
- Recurrence Interval - 200 years
- Upland/Behind Levee



3. Vegetation Communities

- Developed
- Open Water
- Riparian Woodland/Forest
- Riparian Scrub
- Turf/Turf with Trees
- Unvegetated
- Valley Foothill Grassland



4. Land Use

- Nature Study Area
- Protected Area
- Open Space Preserve
- Limited Recreation Area
- Developed Recreation Area

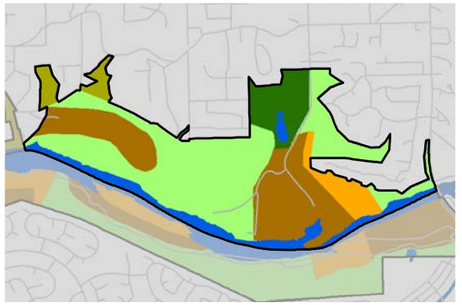
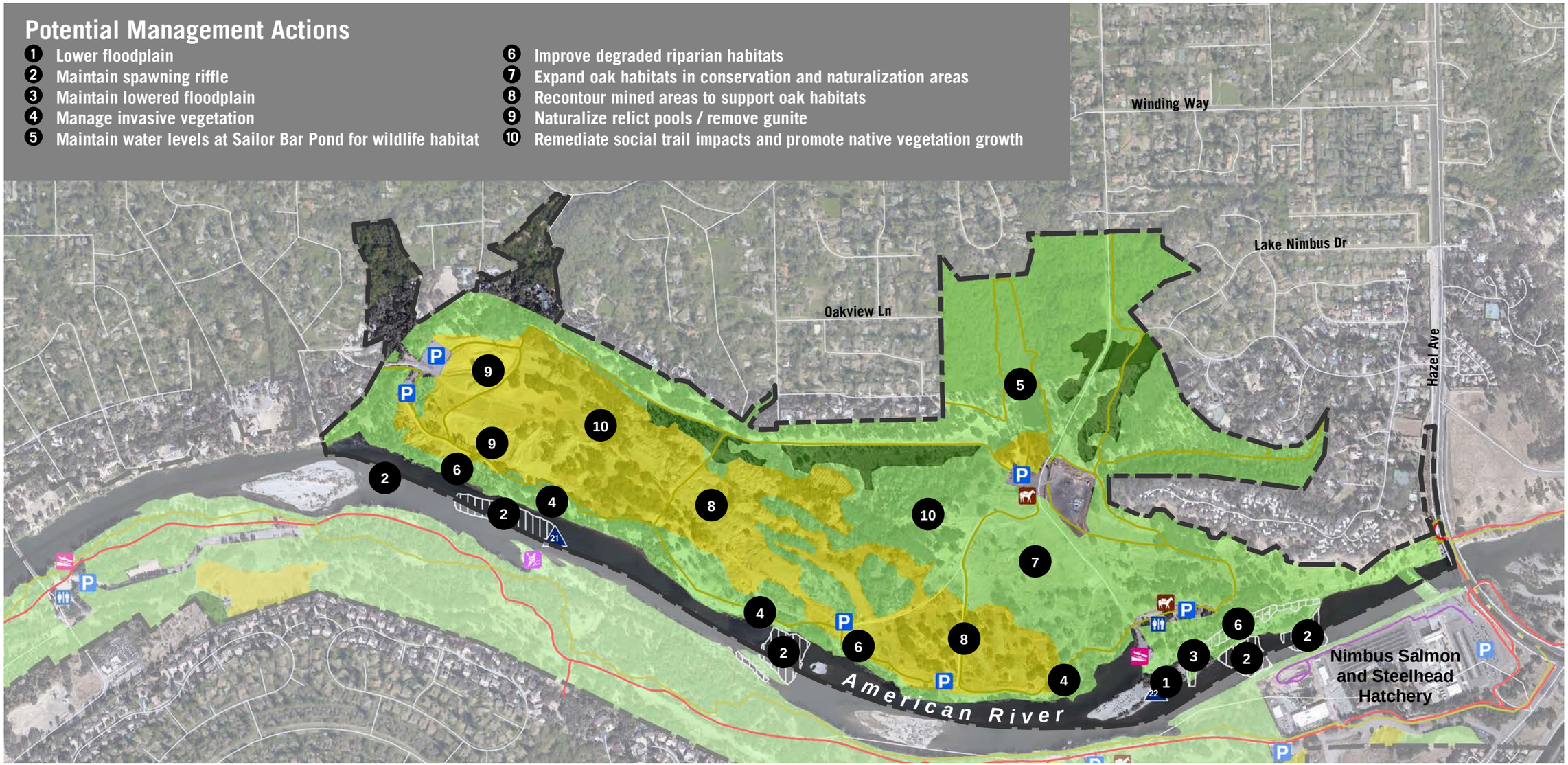


Figure 8-54
Area Plan 19 Sailor Bar A

Potential Management Actions

1. Lower floodplain
2. Maintain spawning riffle
3. Maintain lowered floodplain
4. Manage invasive vegetation
5. Maintain water levels at Sailor Bar Pond for wildlife habitat
6. Improve degraded riparian habitats
7. Expand oak habitats in conservation and naturalization areas
8. Recontour mined areas to support oak habitats
9. Naturalize relict pools / remove gunite
10. Remediate social trail impacts and promote native vegetation growth

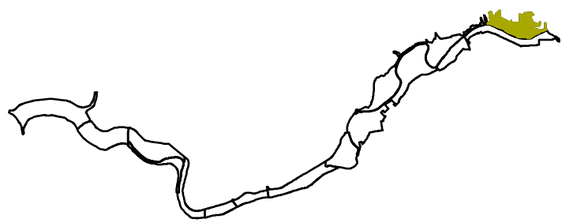


Parkway Boundary
Bicycle/Pedestrian Trail
Equestrian/Hiking Trail
Pedestrian Trail

Boat ramp, Trailer boat
Car Top Boat Launch
Equestrian Staging
Parking
Restroom
River Mile

Existing Gravel Augmentation
Proposed USACE Bank Protection
Proposed USACE Bank Protection Mitigation
Proposed USACE Ecosystem Restoration

Management Category
Preservation
Conservation
Naturalization



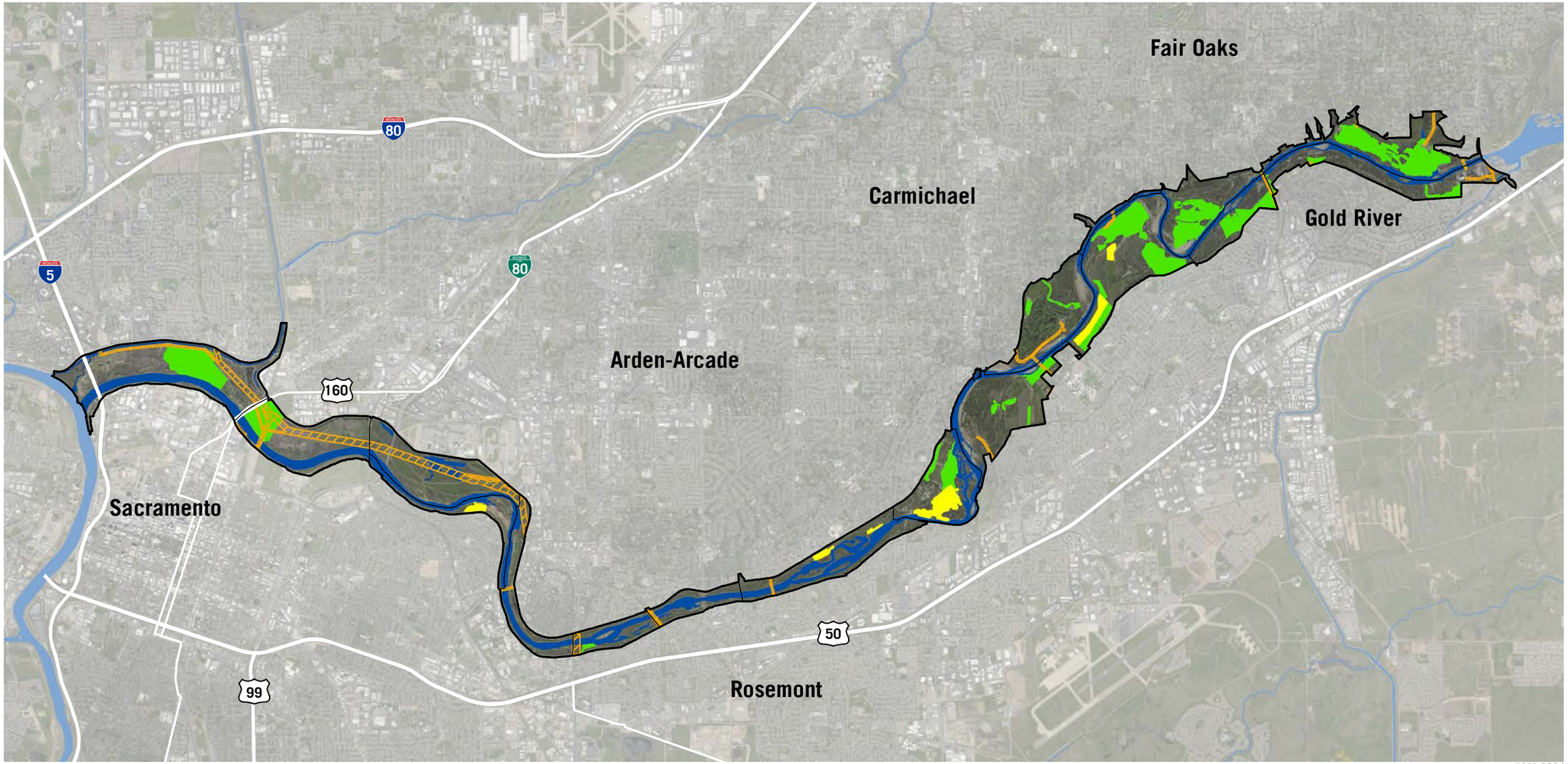
0 1,000 2,000 Feet

Figure 8-55
Area Plan 19 Sailor Bar B

8.4 MITIGATION AREAS

There are several past and future projects within the Parkway that require mitigation for their impacts to various Parkway resources. Example projects include flood control/bank protection projects, transportation/bridge projects, and utilities such as electric transmission and sewer. The aforementioned factors, including land use designations, level of alteration, frequency of inundation, existing vegetation communities, and wildlife habitat values, in combination with the assigned natural resource management categories (e.g., preservation, conservation, and naturalization) provide a framework for identifying locations in the Parkway that are likely suitable for mitigation purposes. Figures 8-56 through 8-59 show the parkway-wide and by-reach locations of potential mitigation areas. These areas and associated mitigation projects will require site-specific planning by project proponents and evaluation by Regional Parks. Additionally, other entities have previously identified several fish rearing habitat improvement projects that could potentially serve as mitigation projects. These projects involve actions such as lowering floodplains and increasing riparian vegetation, and will require site-specific planning by project proponents and evaluation by Regional Parks and are shown in the Area Plan maps.

View of in-channel island in the SARA Park Area. Photo Credit: Regional Parks

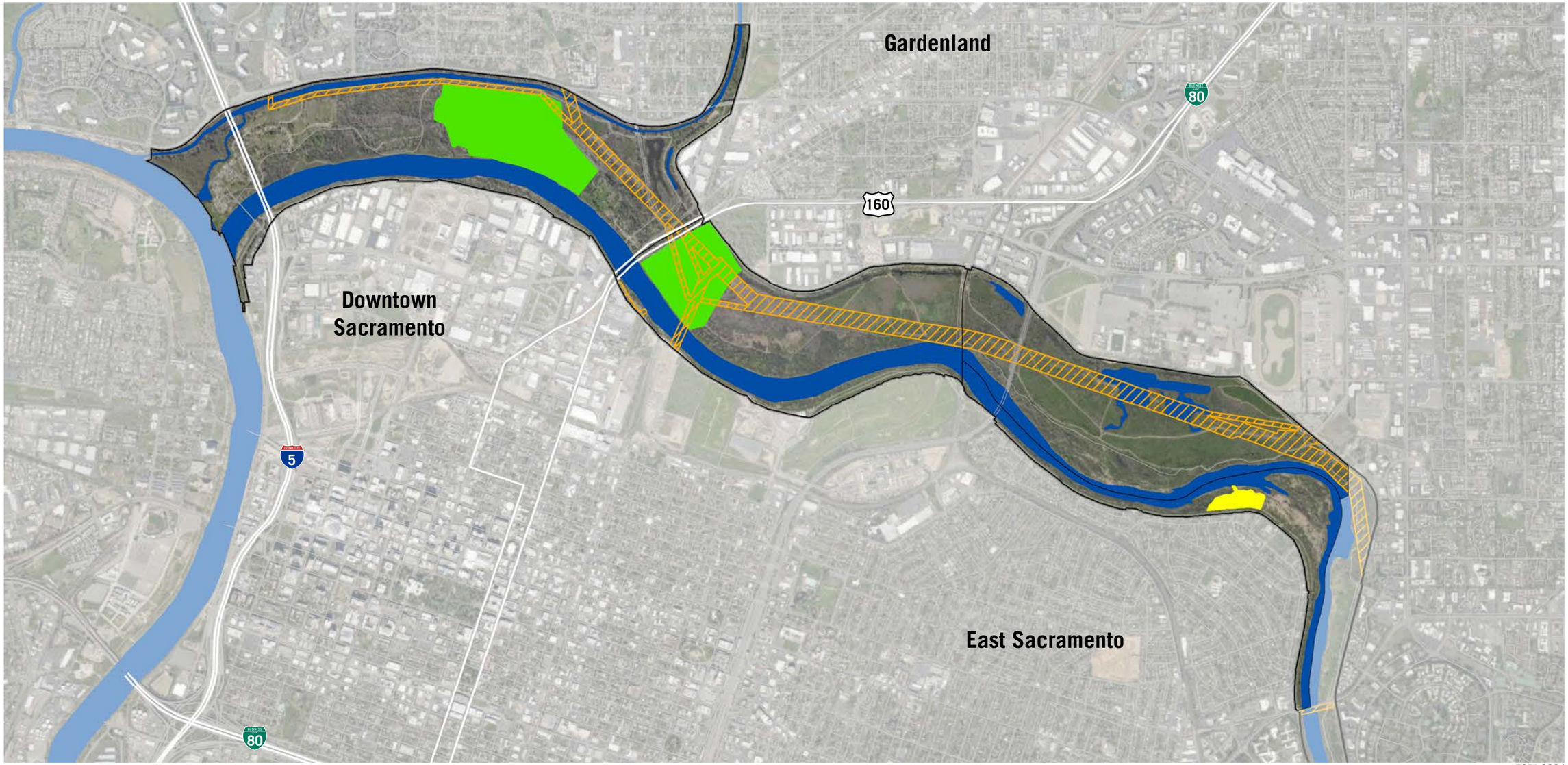


Powerline Easement
Proposed USACE Bank Protection Mitigation
Potential Mitigation Area

ESRI 2021

0 1 2 Miles

Figure 8-56
Parkway Potential Mitigation Areas



Powerline Easement
Proposed USACE Bank Protection Mitigation
Potential Mitigation Area

ESRI 2021

0 0.5 1 Miles

Figure 8-57
Lower Reach Potential Mitigation Areas

ESRI 2021

Powerline Easement
Proposed USACE Bank Protection Mitigation
Potential Mitigation Area

0 0.5 1 Miles

Figure 8-58
Middle Reach Potential Mitigation Areas

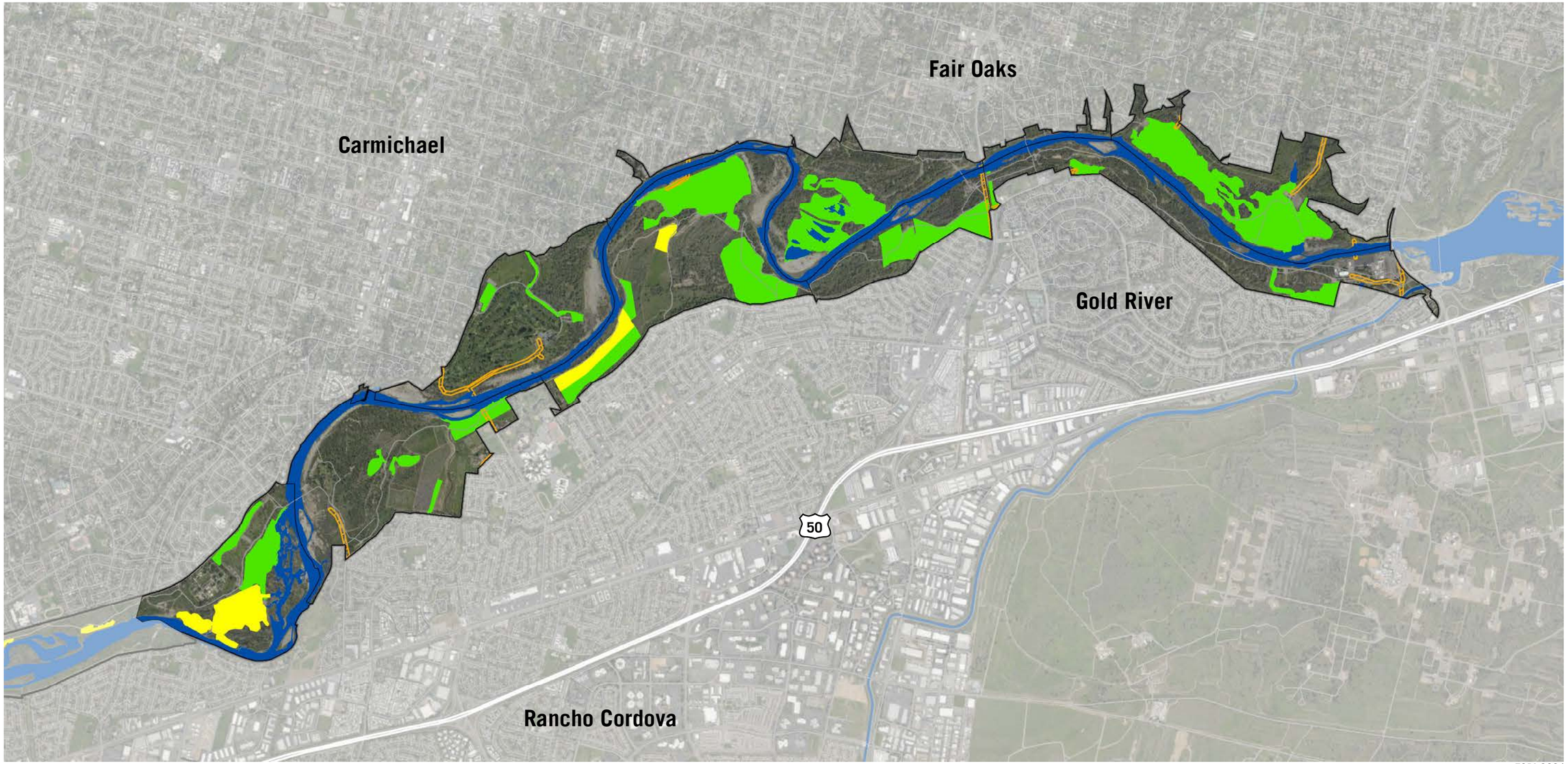


Figure 8-59
Upper Reach Potential Mitigation Areas

8.5 EVALUATION OF POTENTIAL PROJECTS

Projects varying in level of detail and refinement have been proposed for the Parkway, and future projects are anticipated. Regional Parks will need to make decisions about the acceptability of these projects for implementation. The following criteria are intended to assist Regional Parks in this effort. Similarly, project proponents can use these criteria to self-evaluate their projects and document their process and results for inclusion in their submittal to Regional Parks.

The level of detail required varies depending on the circumstances of the project. The degree of required evaluation varies depending on the previously defined management categories and level of prior landscape/channel alteration assigned to a given area. Regional Parks will consider this information in evaluating proposed projects. A determination will be made as to whether the project will:

- Contribute to meeting American River Parkway Plan and NRMP goals and objectives without unacceptable indirect or unintended adverse effects.
- Achieve specific goals and objectives stated in the American River Parkway Plan and NRMP.
- Resolve any potential indirect or unintended adverse effects.
- Be readily achieved and sustainable.
- Set reasonable expectations for success for the short- and long-term.
- Result in values substantially better than the values that would exist without the project, post construction, and 3 years and 5 years later.

Toward that end, project proponents should consider the following criteria:

- **NEED:** Describe and justify the need for the conditions intended by the proposed project.
- **EFFECTS:** Describe how the proposed project would affect ongoing Parkway uses and channel processes and trends.
- **DURABILITY:** Describe how the proposed project is resistant to change from expected Parkway uses and hydraulic forces and/or channel processes. If the proposed project is not intended to be durable, describe why that is acceptable.
- **DEMONSTRATED COST VERSUS BENEFIT:** Describe the expected net long-term resource value changes considering a) pre-project conditions, b) post-project conditions, c) installation resource impacts, and d) the realistic durability of the proposed project given the dynamic nature of the Parkway and river channel.
- **ALTERNATIVE SITES:** Describe alternative sites that have been considered and if they are more or less suitable given the above considerations.

After approval of the NRMP, a high priority is placed on projects that assist in the implementation of the NRMP. These potential projects are reflected either from the goals and objectives and/or the area plan maps:

- Update vegetation community map;
- Development of shaded riverine aquatic habitat map;
- Mapping of trails (including social trails) in the Parkway;
- Systematic survey of sensitive species;
- Invasive species surveys and production of Invasive Species Management Plan Update;
- Map and evaluate all areas damaged or degraded by wildfire or encampments annually;
- Identification of areas in the Parkway impacted by excessive ambient light;
- Development and implementation of a plan for wildfire prevention, response, and recovery.
- Development of a tracking system for wildfires in the Parkway.
- Development of an Interpretation Plan for the Parkway; and
- Development of a citizen science program.

Plant palette under transmission lines at the West San Gabriel River Parkway Nature Trail in Lakewood, CA. Photo Credit: MIG

8.6 POTENTIAL FUNDING SOURCES

There are numerous potential funding sources to implement various aspects of the NRMP. Primary among these sources is the County's General Fund. However, these sources are often limited and are subject to variability due to year-to-year differences in tax receipts. Other sources come from partner agencies that are active in the Parkway including WCB, the flood management agencies including USACE and SAFCA, and the Water Forum.

Sacramento County General Fund

The Sacramento County General Fund collects incoming revenue from property taxes, sales and other taxes, federal and state monies, fees, and other funds to support the majority of County services. Regional Parks, as a County department, receives a portion of its fiscal year budget from General Fund allocations. Historically, the Regional Parks budget receives revenues from General Fund Allocations, User Fees, Leases, and Reimbursements.

Wildlife Conservation Board (WCB) Lower American River Conservancy Program (LARCP)

The LARCP provides a state partner to work cooperatively with local agencies to fund projects and provides grants to benefit public access to the Parkway's natural, recreational, educational, and cultural resources. WCB administers the LACRP, and the 12-member Lower American River Conservancy Program Advisory Committee either denies or recommends for funding projects that have passed WCB Administrative Review and Sacramento County Review. The LARCP obtains monies from the Lower American River Conservancy Fund, and these funds are available for capital improvements, land acquisition, support for LACRP operations, and other purposes consistent with the LARCP's Enabling Statute. WCB may also fund riparian zone restoration, land acquisition, and climate adaptation programs.

WCB awards grants for the following project purposes, per the Lower American River Conservancy Program Guidelines (2018):

- The acquisition, restoration, enhancement, and maintenance of fish and wildlife habitat and other natural resources, including resources impacted by wildfire, within and adjacent to the American River Parkway.
- The improvement and expansion of public access, recreational areas, and recreational facilities, including trails.
- The enhancement of interpretive and educational facilities related to the American River Parkway and its natural, cultural, and historic resources.
- The control and removal of invasive species and the propagation of native species.
- Improve and enhance lands within and adjacent to the American River Parkway. Projects funded on adjacent lands shall contribute to the advancement of American River Parkway values.
- Design, implement, and provide grants for stormwater capture and treatment projects to improve the quality of water that flows within and into the American River Parkway and to increase habitat for fish and wildlife. Stormwater projects may include lands within and adjacent to the American River Parkway and its tributaries downstream of the Nimbus Dam and within Sacramento County.

U.S. Army Corps of Engineers (USACE) and Sacramento Area Flood Control Agency (SAFCA) Mitigation Funds

USACE and SAFCA fund off-site, in-kind mitigation projects that address the environmental impacts of levee improvement and bank protection projects through the replacement of affected habitats.

The Water Forum

As part of the Habitat Management Element (HME) of the Water Forum Agreement, the Water Forum leverages funding from the City of Sacramento, Sacramento County, the San Juan Water District, the City of Roseville, the City of Folsom, Placer County Water Agency SMUD, El Dorado County Water Agency, and Golden State Water company to implement ecosystem management efforts along the Lower American River. The HME addresses flow, temperature, physical habitat, and recreation issues. The Water Forum has funded (wholly or in part) multiple projects along the LAR, including gravel restoration projects, side channel restoration, the Cordova Creek Naturalization project, LARTF and FISH Working Group planning efforts, invasive plant removal, the Soil Born Farms Education Program, and Effie Yeaw Nature Center opportunities.

8.7 IMPLEMENTATION AND MONITORING PLAN

Monitoring is essential to natural resource management as it allows management staff to accurately determine the effectiveness of programs and to determine if Parkway goals have been met. Additionally, monitoring provides information on environmental and social changes over time (for example, an increase in the prevalence of invasive species, or the presence of a new recreation activity that may impact natural resources). Monitoring typically involves the collection of quantitative and qualitative data on the physical characteristics of a resource or area, but may also involve social characteristics, including observing whether design choices, signage, and other factors influence visitor behavior (Marion 2016). Regular and robust monitoring activities can help adjust and/or adapt management actions to inform the management framework of a protected natural area and achieve desired results. For example, analysis of monitoring data collected from restoration sites over a multi-year period may show that a specific restoration technique is not working as anticipated. This may convince management staff to alter or discontinue the use of that technique. In addition, monitoring is important because it provides the evidence needed to demonstrate the success of a management strategy or restoration project to decision-makers, grantors, and the public. Monitoring also refers to regular testing or screening for certain resource impacts. The implementation of the NRMP is guided by the goals and objectives shown in Chapter 2. As such, this section is organized by goal area. Public input was incorporated into the NRMP and many of the items are reflected in the area plans and/or area plan write-ups at the end of this chapter.

Mitigation site for the Valley elderberry longhorn beetle in the Ancil Hoffman County Park Area. Photo Credit: Regional Parks

A monitoring report will be finalized during Summer 2021. The monitoring report will be completed in concert with the project's data management system. The data management system will allow Regional Parks and their partners to access the data used in the Plan for projects and/or monitoring. In this section, potential monitoring methods are discussed, while the monitoring plan that will be produced this summer will formalize the monitoring approach.

The monitoring plan will include the following components:

- Adaptive management principles
- Target species for observation
- Monitoring interval and process
- Data collection protocol, storage, and access
- Accommodation for citizen science
- Responsible parties and partners
- Funding
- Success criteria
- Reporting requirements

Consistent with California environmental regulations, the NRMP will undergo CEQA review. It is anticipated that a Supplemental EIR (based on the Parkway Plan EIR) would be completed to comply with these requirements. It is important to note that Regional Parks would not be the lead agency on all of the projects highlighted in this chapter; additionally, some projects would undergo a separate environmental review.

8.1.1 Biological Resources

The Parkway contains a diverse range of habitats and ecosystems that provide resources for both plant and wildlife species. In order to maintain a healthy, functioning ecosystem, there need to be varying levels of habitat protection activities in place throughout the Parkway. Habitat protection is a key management strategy used to protect, conserve, and restore habitats to prevent habitat loss or fragmentation and species extinction (CDFW 2020). Habitat loss occurs when natural environments are destroyed, divided, or degraded, usually due to human activities (EC 2014). Within the Parkway, there are many opportunities for habitat protection through enhancement and restoration, with a priority being the enhancement of key habitat areas, including sensitive riparian vegetation. Maintaining, managing, and protecting habitats throughout the Parkway will help provide diverse resources to a biodiverse range of species. In an active Parkway with multiple land uses occurring simultaneously, habitat protection and adaptive management strategies are vital to ensure a naturally balanced ecosystem.

Information gained through regular monitoring can indicate when adaptive management measures should be taken, so those measures can be reflected in updates to the Parkway Plan to help ensure its success. Monitoring will compare future conditions against baseline data gathered early in the project to demonstrate the progress toward Plan goals. Monitoring provides quantitative and qualitative documentation that objectives are being met, particularly for biological resources. In some cases, monitoring will involve simple documentation that a task was completed, such as the completion and updating of resource maps. In other cases, it will involve the quantitative and/or qualitative assessment of field conditions.

Some monitoring methods will allow measurement of more than one goal area with the same data sampling. For example, vegetation samples in any given area can include species types addressed by multiple objectives and performance measures. Potential monitoring methods to quantify acreages stated in the goals include the following:

- GIS mapping via air photo, with ground-truthing.
- Drone mapping of vegetation types and post processing in GIS
- Field sampling of species type and percent cover present via:
  - Transect (line or wandering)
  - Quadrat
  - Random Sample
- Qualitative assessments in the field; the eyeball assessment of percent cover, the overall sense of whether goals are met or underway

Monitoring for species, erosion, and water quality may include:

- Species-specific surveys
- Visual monitoring of erosion
- Cross-sections
- Gravel bar assessment
- Measurements of water quality and temperature

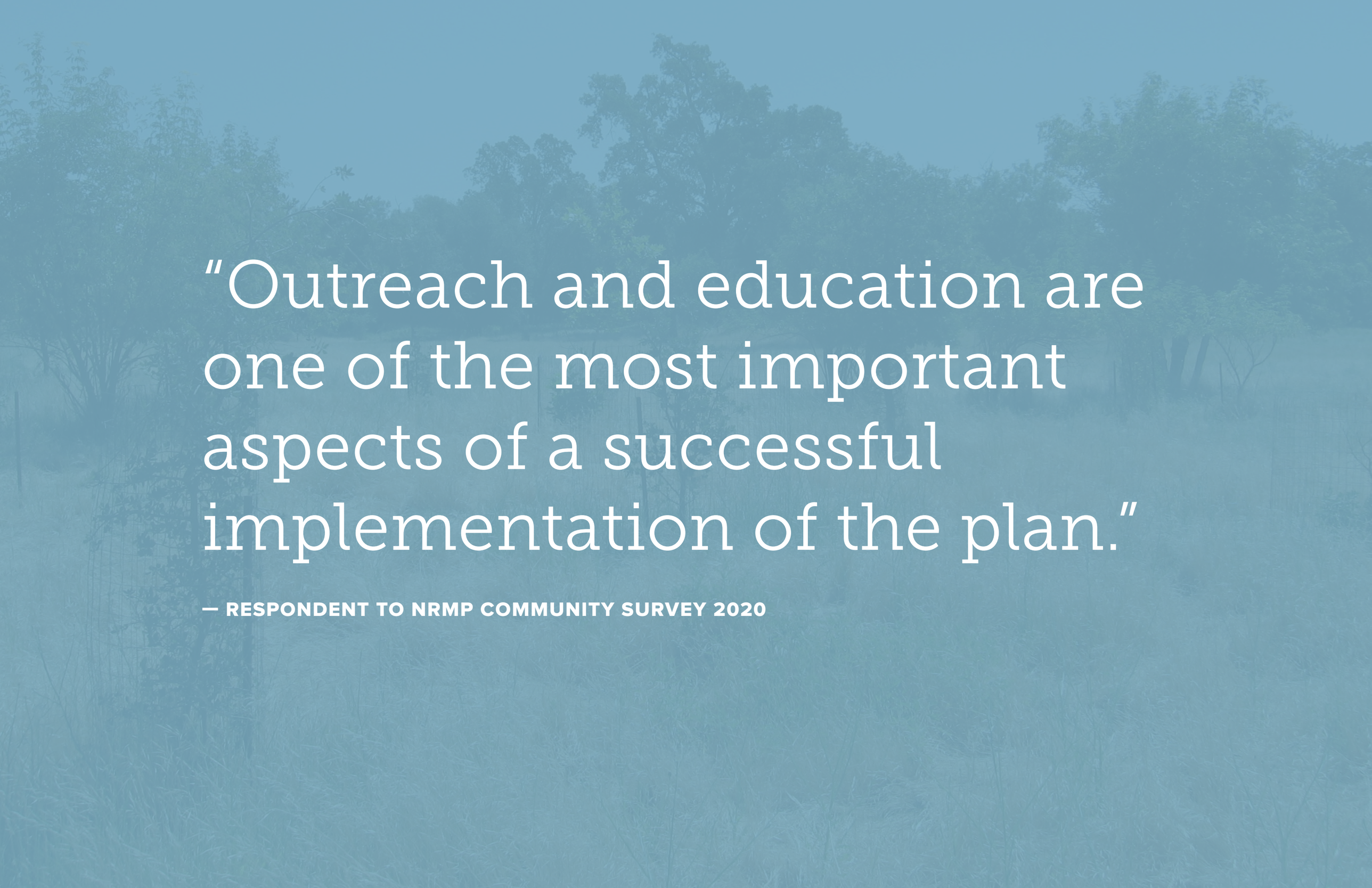
Other monitoring methods may include an inventory of efforts made to resolve impacts from encampments, and a list of fire or other impactful events with a statement about how they were resolved or could best be resolved in the future.

There are numerous biological resources activities associated with the implementation of the NRMP that both will help guide management and monitoring. These activities related to biological resources include the following:

- Completion of periodic updates to vegetation community maps.
- Completion of shaded riverine aquatic habitat map.
- Completion of systematic sensitive species and invasive species surveys. This also includes the production of an Invasive Species Management Plan.
- Completion of periodic updates to wildfire and homeless encampment maps.

8.1.2 Physical Resources

Physical resources, or abiotic characteristics, within the LAR impact every biological function within it. Globally, highly altered riparian systems have vastly impaired their ecological functions. Channelized regions have greatly increased flow speed, leading to the destruction of shaded and vegetated banks that provide protection to growing salmon smolts. Erosion forces also affect the sediment regime of the river, carving highly nutrient-rich floodplain materials from a geographic region and depositing them far downstream within the watershed. Additionally, less shaded reaches of rivers increase water temperature, making the reach less hospitable to native species adapted to cooler, slower reaches of riparian habitat and increasing the likelihood of generalist invasive species' colonization. Combined with the urban runoff and other pollutants common within the Parkway, habitat quality may become diminished. However, the long reach of the LAR within the Parkway also presents many opportunities to combat these physical resource challenges.



"Outreach and education are one of the most important aspects of a successful implementation of the plan."

— RESPONDENT TO NRMP COMMUNITY SURVEY 2020

The California Indian Cultural Demonstration Area at the Effie Yeaw Center. Photo Credit: MIG

Nonnative plant removal and subsequent plantings of natives will stabilize bank conditions throughout the Parkway. Stabilized banks will promote the colonization of shading vegetation that will reduce the overall temperature of the banks and create more protective habitat for salmonids and other aquatic wildlife. A stable bank will also increase the likelihood of natural flooding patterns, increasing habitat for wetland and/or side channel plant and wildlife species. Bank stabilization generally improves water quality through percolation of runoff. However, combating runoff, trash debris, fecal contamination, and other common urban river issues requires a more comprehensive plan aimed around education.

8.1.3 Cultural Resources

The Parkway encompasses an area rich with remnants of prehistoric, historic, and industrial activity. Cultural resources are important not only as evidence of prehistoric and historic activities, but also as tools for educating the public and also as a form of recreation. Balancing the multiple roles of cultural resources in the Parkway requires careful, strategic management. Cultural resources are valuable to indigenous successors and critical in informing our knowledge of historical peoples and events. Furthermore, identification of cultural resources instills in the public recognition of the Parkway as an epicenter of its rich cultural history. Interpretive areas and cultural centers attract users who enjoy forming a connection with the Parkway's history.

As a result, cultural interpretive activities are and should remain centered on the creation of demonstration areas and strategically-placed signage that disseminates information on and provides replicas of target resources. In addition, strategic ecological resources management can contribute to the preservation of cultural resources. The designation of sensitive habitat areas that either contain a cultural resource or act as a buffer between a cultural resource and more heavily used areas is an ecological resource management tool that also works to preserve cultural resources.

CEQA review also plays a part in protecting cultural resources. When a project is proposed that could have significant impacts of natural resources, the lead local or state agency prepares an environmental document including project details, potential environmental impacts, and, if applicable, measures to avoid or reduce potential impacts. The environmental document includes a review of both cultural resources and tribal cultural resources. California legislation AB 52 established that "a [project] with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment" and requires a lead agency to notify California Native American tribes traditionally and culturally affiliated with an area early on in the CEQA environmental review process that it received a proposal for a project that may impact a tribal cultural resource. Following notification, a California Native American tribe may request consultation under AB 52. Consultation must occur prior to the public release of a negative declaration, mitigated negative declaration, or environment impact report for a project (OPR 2017). SB18 incorporates the protection of California traditional tribal cultural places into land use planning for cities, counties, and agencies by establishing responsibilities for local

governments to contact, refer plans to, and consult with California Native American tribes as part of the adoption or amendment of any general plan. SB18 requires public notice to be sent to tribes listed on the Native American Heritage Commission's SB18 Tribal Consultation list within the geographical areas affected by the proposed changes. Tribes must respond to a local government notice within 90 days (unless a shorter time frame has been agreed upon by the tribe), indicating whether or not they want to consult with the local government. Consultations are for the purpose of preserving or mitigating impacts to places, features, and objects described in Sections 5097.9 and 5097.993 of the Public Resources Code that may be affected by the proposed adoption or amendment to a general or specific plan. Monitoring of cultural resources includes confidential mapping that is including in the data management set. It is important to protect these areas from human uses while maintaining the confidentiality of these sites. Additionally, any projects proposed in the Parkway that may be ground disturbing will require environmental review and appropriate mitigation strategies, as required by state and federal regulations. In order to best manage tribal cultural resources in the Parkway, Regional Parks will set annual meetings to discuss issues important to the tribal governments that have an interest in the Parkway.

Encampment cleanup. Photo Credit: Regional Parks

8.1.4 Human Use Impact Reduction

Marion (2016) advises managers to implement a "management toolbox" to maintain the balance between human uses and protection of natural resources. The concept of employing a toolbox of various natural resource management actions and strategies applies to protected natural areas of all kinds. Management is most effective when it concentrates on avoiding or minimizing the impacts in the Parkway, addresses how context plays into creating impacts, and comprises multiple strategies or actions.

In the context of the NRMP, visitor management strategies focus on persuading or compelling visitors to behave in a manner that prevents or minimizes adverse natural resource impacts. An example of a desirable behavior would be a visitor staying on designated trails to minimize their impact on natural resources. Strategies may include decommissioning duplicative social trails or using interpreting and educational strategies. These actions may include use of signage, media, and interpretive programming to communicate rules and educate visitors, often with the underlying goals of promoting environmentally responsible social behavior. These educational and interpretation strategies may be more desirable as they are often less expensive than enforcement and/or site management. As such, interpretation is an important activity to help manage Parkway natural resources.

Interpretation informs and educates the public about natural resources and also serves as an indirect management tool. Roggunbuck (1992) notes that persuasion through messaging may be used to influence visitors to behave in a manner that limits their impact on the natural environment. Azjen (1992) notes, "Persuasive communication involves the use of verbal messages to influence attitudes and behaviors…the verbal message must be designed to sway the hearts and minds of the receivers… Through a process of reasoning, the message

BEFORE *Clear cut transmission corridor at the West San Gabriel River Parkway in Lakewood, CA. Photo Credit: MIG*

AFTER *Replanted transmission corridor at the West San Gabriel River Parkway Nature Trail in Lakewood, CA. Photo Credit: MIG*

exerts its influence by the force of its contained arguments" (p. 2). Research on non-compliant behavior has indicated that the most persuasive, effective messages are positive and encouraging. The messages: (1) advise visitors of what they should not do rather than what they should do; (2) highlight how compliance benefits visitors; (3) focus on conveying a few pieces of information at a time; and (4) persuade the visitor into believing most visitors act in accordance with established environmental and social norms (Hammitt et al. 2015, Johnson and Vande Kamp 1996). These ideas will be considered when developing an interpretation plan in the first two years of the project. Additionally, interpretive elements will be incorporated along with large mitigation projects in the Parkway.

Site management can also be useful as an interim strategy. Research at Acadia National Park has shown an effective practice is converting some social trails into designated trails while decommissioning others. Social trails that were more resistant to impacts and highly used by visitors were converted into designated trails. Park management staff then closed, using signage and other means, and actively restored the remaining social trails with positive results (Marion 2016).

The following summarizes some of the key implementation activities related to human use impact reduction:

- When recreation infrastructure, including trails, campsites, day use areas, and stock areas, are sustainably designed they are more resistant to human use impacts. As a result, natural resource impacts and maintenance costs are reduced in the long run (Marion 2016). As such, it is important to design potential future recreational facilities in a sustainable manner as to reduce human use impacts. When recreation developments are considered, these should be placed 100 feet away from a waterway (when feasible); this would not be feasible for a boat ramp, for example. However, the planning and design of future recreational terrestrial facilities should be planned with this buffer.
- Regional Parks will also map the location of trails (including user-defined social trails) in the Parkway. The mapping and documentation effort will allow for

the targeting and removal of duplicative trails to allow for vegetation recovery in these areas. A technique for measuring and classifying social trails has been developed by Regional Parks staff; it is recommended that this approach be used to document the existing social trails in the Parkway.

- Managing the homeless population is a challenge and can be seen as multi-tiered. Actions, by partner agencies, that may reduce the homeless population would have obvious benefits. However, these actions are outside the realm on Regional Parks. Regional Parks actions will include continued enforcement and management of the impacts associated with homelessness. This includes mitigating impacts from: 1) accumulated debris; (2) environmental degradation (3) health and public safety issues including degradation of public infrastructure such as levees.
- In order to minimize the impacts of special events, Regional Parks will continue to permit these events in developed recreation areas. These areas contain developed features that allow for additional recreation use while minimizing impacts; also, containing special events in these areas protects other areas that have sensitive natural and cultural resources.
- Regional Parks will collaborate with the electrical utilities to develop environmental beneficial opportunities. These include the potential for pollinator species. It is understood that these areas are under strict regulations due to wildfire risk; this will be taken into account when developing this plan. Regional Parks with consult with the utilities on a case-by-case basis for potential vegetation enhancement projects within utility right of ways.
- Regional Parks will determine areas in the Parkway where there is excessive ambient light. Regional Parks will work to reduce the amount of light in the identified areas, if any.

8.1.5 Agency and Community Coordination and Collaboration

A key aspect of managing natural resources in the Parkway is coordinating and overseeing activities of other agencies and/or partners that perform activities that may have impacts on natural resources. There are numerous agencies and partners whose operations impact natural resources in the Parkway. Regional Parks coordinates with these organizations to track and mitigate impacts, where possible. Table 8-1 shows Regional Park's partners in implementing the NRMP.

Coordination and oversight activities may include any or all of the following: (1) regular or periodic meetings; (2) data and/or report requirements; (3) regulatory document review; (4) permitting operations and adding conditions of approval; (5) requiring data reports and receiving data from other partner agencies/organizations; and (6) overseeing other agencies/organizations that may impact natural resources in the Parkway. These activities are an important aspect of managing natural resources in the Parkway given the number of agencies and organizations that engage in activities that impact the Parkway's natural resources.

The following summarizes the implementation activities related to coordination and collaboration:

- Regional Parks will develop a group to oversee the development of the NRMP. The group will be a subcommittee within the American River Parkway Advisory Committee. The group will meet, at least, one time per year to track the progress of the NRMP.
- Regional Parks will work with fire departments and agencies, along with adjacent landowners, to develop a wildfire prevention, response and recovery plan. Additionally, Regional Parks with develop a tracking system for wildfire starts in the Parkway.
- Regional Parks will formalize a partnership with regional universities and college to assist with scientific research, which may include monitoring. Additionally, Regional Parks will set up a citizen science program to assist with management, including monitoring.
- Regional Parks will develop a robust monitoring plan. The Monitoring Plan will be implemented immediately upon adoption of this Plan.
- Regional Parks will continue outreach to educational institutions. After the adoption of the Plan, Regional Parks will work to develop one educational partnership per year to increase local and regional knowledge about the natural resources in the Parkway.

Volunteers assisting with planting activities at Cordova Creek. Photo Credit: Kat Perkins

TABLE 8-1 NRMP PARTNERS

AGENCY/ORGANIZATION	GOAL AREAS				
	GOAL AREA 1 Biological Resources	**GOAL AREA 2** Physical Resources	**GOAL AREA 3** Cultural Resources	**GOAL AREA 4** Human Use Impact Reduction	**GOAL AREA 5** Agency and Community Coordination and Collaboration
American River Natural History Association				✓	✓
American River Parkway Advisory Committee	✓	✓	✓	✓	✓
American River Parkway Foundation	✓			✓	✓
Cal Expo	✓				
California Native Plant Society	✓				
California State University, Sacramento	✓				✓
City of Sacramento		✓		✓	
City of Rancho Cordova		✓		✓	
Department of Water Resources		✓			
Lower American River Conservancy					✓
Pacific Gas & Electric Company				✓	
Reclamation Districts		✓			
Recreation and Park Commission	✓	✓	✓	✓	✓
Sacramento Area Flood Control Agency	✓	✓			✓
Sacramento City Fire				✓	✓
Sacramento County Department of Health and Human Services				✓	
Sacramento County Office of Education				✓	✓
Sacramento Metro Fire				✓	✓
Sacramento Municipal Utility District				✓	
Soil Born Farms				✓	✓
State Lands Commission	✓				
State Water Resources Control Board		✓			
University of California, Davis					✓
U.S. Army Corps of Engineers	✓	✓			✓
U.S. Bureau of Reclamation	✓				
Utility Arborist Association				✓	
The Water Forum	✓				✓
Tribal Governments			✓		
Western Area Power Administration				✓	
Wildlife Conservation Board	✓	✓	✓		

APPENDICES

Available under separate cover

APPENDIX A: PUBLIC OUTREACH REPORT

- Maptionnaire Results summary
- NRMP Public Workshops Summary Report
- ARPAC NRMP Workshop Summary Report
- RPC NRMP Workshop Summary Report
- ARP Terrestrial Stakeholders Meetings Summary Report
- ARP Fisheries Stakeholders Meeting Summary Report

APPENDIX B: PHYSICAL RESOURCES REPORT

ACRONYMS AND ABBREVIATIONS

Acronyms

AB – Assembly Bill
ACE – Areas of Conservation Emphasis
ACHP – Advisory Council on Historic Preservation
ARCF – American River Common Features
ARFCD – American River Flood Control District
ARNHA – American River Natural History Association
ARP – American River Parkway
ARPAC – American River Parkway Advisory Committee
ARPF – American River Parkway Foundation
ARPP – American River Parkway Plan
BMP – best management practice
BPA – bisphenol A
CAL-IPC – California Invasive Plant Council
CASWRB – California State Water Rights Board
CCR – California Code of Regulations
CDFA – California Department of Food and Agriculture
CDFW – California Department of Fish and Wildlife
CEHC – California Essential Habitat Connectivity
CEQA – California Environmental Quality Act
CESA – California Endangered Species Act
cfs – cubic feet per second
CFP – California Fully Protected
CHRIS – California Historical Resources Inventory System
CNDDB – California Natural Diversity Database
CNPS – California Native Plant Society
CPAD – California Protected Areas Database
CRHR – California Register of Historical Resources
CS – Conservation Strategy
CSUS – California State University, Sacramento
CVFPB – Central Valley Flood Protection Board
CVP – Central Valley Project
CVPIA – Central Valley Project Improvement Act
CWA – Clean Water Act
CWWP – Community Wildfire Protection Plan
DNA – Downtown-Natomas-Airport
DPS – Distinct Population Segment
DWR – California Department of Water Resources
EFH – Essential Fish Habitat
EIR – environmental impact report
EPA – Environmental Protection Agency
ESA – Endangered Species Act
ESU – Evolutionary Significant Unit
FEMA – Federal Emergency Management Agency
FESA – Federal Endangered Species Act
FISH – Fisheries and Instream Habitat
FRI – fire return interval
FVMP – Floodway Vegetation Management Plan
GAP – Gap Analysis Program
GRR – General Reevaluation Report
GIS – geographic information system
HCP – habitat conservation plan
HFRA – Healthy Forest Restoration Act
HME – Habitat Management Element
HRI – Historical Resource Inventory
IPMP – Invasive Plant Management Plan
KEA – Key Ecological Attributes
LAR – Lower American River
LARC – Lower American River Conservancy
LARCP – Lower American River Conservancy Program
LARTF – Lower American River Task Force
LSA – Lake and Streambed Alteration
MCV – Manual of California Vegetation
MND – mitigated negative declaration
MS4 – municipal separate storm sewer system
NAHC – Native American Heritage Commission
NAS – Nonindigenous Aquatic Species
NASA – National Aeronautics and Space Administration
NCCP – Natural Community Conservation Plan
NCIC – North Central Information Center
ND – negative declaration
NGO – non-governmental organization
NEPA – National Environmental Policy Act
NFWF – National Fish and Wildlife Foundation
NHO – Native Hawaiian Organizations
NHPA – National Historic Preservation Act
NMFS -- National Marine Fisheries Service
NOAA – National Oceanic and Atmospheric Association
NPDES – National Pollutant Discharge Elimination System
NPO – non-profit organization
NPS – National Park Service
NRHP – National Register of Historic Places
NRMP – Natural Resources Management Plan
NSNF – northern Sierra Nevada foothills
ORVs – outstandingly remarkable values
OPR – Governor's Office of Planning and Research
O&M – operations & maintenance
PC – Parkway Corridor
PG&E – Pacific Gas & Electric Company
PIT – point-in-time
PM – performance measure
PMF – probable maximum flood
PRC – Public Resources Code
PSTD – post-traumatic stress disorder
PVC – polyvinyl chloride
RCMP – River Corridor Management Plan
RL – river left
RM – river mile
RR – river right
RPC – Recreation and Park Commission
ROW – right-of-way
RWQCB – Regional Water Quality Control Board
SAFCA – Sacramento Area Flood Control Agency
SARA – Save the American River Association
SASD – Sacramento Area Sewer District
SCOE – Sacramento County Office of Education
SCRP – Sacramento County Regional Parks
SHPO – State Historic Preservation Officer
SLF – Sacred Lands File
SMART – Specific, Measurable, Attainable, Relevant, Time Oriented
SMUD – Sacramento Municipal Utility District
SOD – sudden oak death
SPRR – Southern Pacific Railroad
SRA – shaded riverine aquatic
SSC – Species of Special Concern
SVC – Sacramento Valley Conservancy
SWAP – California State Wildlife Action Plan
SWRCB – State Water Resources Control Board
THPO – Tribal Historic Preservation Officer
TMDL – total maximum daily load
USACE – U.S. Army Corps of Engineers
USBLM – Bureau of Land Management
USBR – U.S. Bureau of Reclamation
U.S.C. – United States Code
USFWS – United States Fish & Wildlife Service
USFS - United States Forest Service
USGS – United States Geological Survey
VELB – Valley Elderberry Longhorn Beetle
WAPA – Western Area Power Administration
WBWG – Western Bat Working Group
WCB – Wildlife Conservation Board
WSRA – Wild and Scenic Rivers Act
WUI – wildland urban interface
W&SR – Wild and Scenic River

Abbreviations

Cal Expo – California Exposition and State Fair
CAL FIRE / Cal Fire – California Department of Forestry and Fire
Protection
Caltrans – California Department of Transportation
CSU, Sacramento – California State University, Sacramento
NRMP – Natural Resources Management Plan
Magnus-Stevens Act – Magnus-Stevens Fishery Conservation and
Management Act
Metro Fire – Sacramento Metropolitan Fire District
Parkway – American River Parkway
Parkway Plan – American River Parkway Plan
Regional San – Sacramento Regional County Sanitation District
Regional Parks – Sacramento County Department of Regional Parks
Sacramento City Fire – City of Sacramento Fire Department
Task Force – NRMP Task Force

REFERENCES

References

Advisory Council on Historic Preservation (ACHP). 2020. National Historic Preservation Act. Available at: https://www.achp.gov/protecting-historic-properties [Accessed March 2020].

Agee, J. K. 2006. *Fire in California's Ecosystems* (SUGIHARA N., VAN WAGTENDONK J., SHAFFER K., FITES-KAUFMAN J., & THODE A., Eds.). University of California Press. Available at: www.jstor.org/stable/10.1525/j.ctt1pnb25 [Accessed January 2020].

Ajzen, I. 1992. Persuasive Communication Theory in Social Psychology: A Historical Perspective. In M. J. Manfredo (Ed.), *Influencing human behavior: Theory and applications in recreation, tourism, and natural resources management* (pp. 29–50). Champaign, Illinois: Sagamore Publishing, Inc.

A.L. Bancroft & Company, publisher. 1886. The Works of Hubert Howe Bancroft (Vol. 21), History of California (Vol. 4): 131. Retrieved from: https://books.google.com/books?id=ltM1AAAAIAAJ&printsec=frontcover#v=onepage&q&f=false [Accessed January 2020].

American River Parkway Foundation (ARPF). 2019. "American River Parkway Foundation." Available at: http://arpf.org/newsletter/11November_2017/newsletter.html [Accessed October 2019].

———. 2019. "River Bend." Available at: https://arpf.org/what-we-do/programs/campfire-outdoor-educational-site/ [Accessed September 2019].

Anderson, M.K, and M. J. Moratto, M.J. 1996. *Native American Land Use Practices and Ecological Impacts*. Aspen Bibliography, Paper 1815. Available at: https://digitalcommons.usu.edu/aspen_bib/1815/ [Accessed December 2019].

Ascent Environmental, Inc. 2017. Climate Change Vulnerability Assessment for the Sacramento County Climate Action Plan: Communitywide Greenhouse Gas Reduction and Climate Change Adaptation. Available at: https://planning.saccounty.net/PlansandProjectsIn-Progress/Documents/Climate%20Action%20Plan/Climate%20Change%20Vulnerability%20Assessment.pdf [Accessed October 2019].

Aubury, L. E. 1910. *Gold Dredging in California*. Bulletin 57. California State Mining Bureau, Ferry Building, San Francisco, CA.

Ayers. 1997. Final Report, American and Sacramento River, California Project. Available at: http://www.safca.org/protection/NR_Documents/BPWG_Library_1997_Ayres_Geomorphic_Sediment_Engineering_Channel_Stability.pdf [Accessed October 2019].

———. 2004. Lower American River, Erosion Susceptibility Analysis for Infrequent Flood Events. Available at: http://www.safca.org/Protection/NR_Documents/BPWG_Library_2004_Ayres__Report.pdf. [Accessed October 2019].

Baiocchi, A., Wolf, J. P., Hodson, K., Barker, D.C., and M. Foy. 2017. "Homelessness in Sacramento County: Results from the 2017 Point-in-Time Count." Institute for Social Research and Sacramento Steps Forward, Sacramento, CA.

Baiocchi, A., Curry, S., Williams, S., Argüello, T., Wolf, J. P., and Morris, J. 2019. "Homelessness in Sacramento County: Results from the 2019 Point-in-Time Count." Institute for Social Research and Sacramento Steps Forward, Sacramento, CA.

Bartell, J. 2019. Forbidden Ruins of Folsom's Past. June 24, 2019. Updated June 25, 2019. Available at: https://www.abc10.com/article/entertainment/television/programs/backroads/forbidden-ruins-of-folsoms-past-bartells-backroads/103-968c108f-294c-4f26-bac0-f517fd09875e [Accessed November 2019].

Beals, R. L. 1933. Ethnology of the Nisenan. *University of California Publications in American Archaeology and Ethnology* 31(6): 335-414. Berkeley.

Bean. 2012. Physical and geochemical characteristics of the Lower Sailor Bar 2012, Upper Sunrise 2010/2011, Upper Sailor Bar 2009, and Upper Sailor Bar 2008 gravel additions. Available at: https://www.csus.edu/indiv/h/hornert/ [Accessed October 2019].

Begon, M., Townsend, C. R., and J. L. 2006. *Ecology: From Individuals to Ecosystems*. 4th edition. Blackwell Publishing, Malden, MA.

Bell, D. A. 2020. "The Folsom Powerhouse." California Department of Parks and Recreation. Available at: https://www.parks.ca.gov/?page_id=22909 [Accessed January 2020].

Berg, E., and E. Martinez. 2006. American River Parkway Use Survey 2005, Final Technical Report. Institute for Social Research at California State University, Sacramento. http://www.csus.edu/isr/reports.stm.

Bugwood, W. 2012. Species Included in Invasipedia. Available at: https://wiki.bugwood.org/Invasipedia. [Accessed February 2019].

California Department of Finance. 2019. "Projections: Total Population by County." Available at: http://dof.ca.gov/forecasting/demographics/Projections/ [Accessed July 2019].

California Department of Fish and Game (CDFG). 2005. Wildlife Habitat - California Wildlife Habitat Relationships System. Available at: https://www.wildlife.ca.gov/Data/CWHR/Wildlife-Habitats.

California Department of Fish and Wildlife California Natural Diversity Database (CDFW CNDDB). 2018. Special Animals List: November 2018. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406 [Accessed February 2019].

California Department of Fish and Wildlife (CDFW). 2010. California Essential Habitat Connectivity Project, A Strategy for Conserving a Connected California. Available at: https://wildlife.ca.gov/Conservation/Planning/Connectivity/CEHC [Accessed November 2019].

———. 2012. Northern Sierra Nevada foothills wildlife connectivity model. Available at: https://wildlife.ca.gov/Data/Analysis/Connectivity [Accessed November 2019].

———. 2015. California State Wildlife Action Plan 2015 Update, A Conservation Legacy for Californians, Volume I: Plan Update.

———. 2019. Sensitive Element Record Search for the Sacramento West, Sacramento East, Carmichael, Citrus Heights, and Folsom USGS Quadrangles. California Department of Fish and Wildlife. Sacramento, California. [Accessed November 2019].

———. 2019. History of Nimbus Hatchery. Available at: https://www.wildlife.ca.gov/Fishing/Hatcheries/Nimbus/History [Accessed November 2019].

———. 2019. American Peregrine Falcons in California. Available at: https://www.wildlife.ca.gov/Conservation/Birds/Peregrine-Falcon [Accessed March 2019].

———. 2019. Bald Eagles in California. Available at: https://www.wildlife.ca.gov/Conservation/Birds/Bald-Eagle [Accessed March 2019].

———. 2020. "Threatened and Endangered Species Protected Under the California Endangered Species Act." Available at: https://wildlife.ca.gov/Conservation/CESA [Accessed January 2020].

———. Habitat Conservation Planning Branch. 2020. "Habitat Conservation". Available at: https://wildlife.ca.gov/Explore/Organization/HCPB [Accessed February 2020].

———. 2020. Nutria Detection Map. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=155064&inline [Accessed January 2021].

———. 2021a. California's Invaders: Mute Swan. Available at: https://wildlife.ca.gov/Conservation/Invasives/Species/Mute-Swan [Accessed January 2021].

———. 2021b. California's Invaders: Brown-Headed Cowbird. Available at: https://wildlife.ca.gov/Conservation/Invasives/Species/Cowbird [Accessed January 2021].

———. 2021c. California's Invaders: Nutria. Available at: https://wildlife.ca.gov/Conservation/Invasives/Species/Nutria [Accessed January 2021].

———. 2021d. California's Invaders: Southern Watersnake. Available at: https://wildlife.ca.gov/Conservation/Invasives/Species/Southern-Watersnake [Accessed January 2021].

———. 2021e. California's Invaders: Northern Watersnake. Available at: https://wildlife.ca.gov/Conservation/Invasives/Species/Northern-Watersnake [Accessed January 2021].

California Department of Forestry and Fire Protection (CALFIRE). "Stats and Events." Available at: https://www.fire.ca.gov/stats-events/ [Accessed August 2019].

California Department of Parks and Recreation (State Parks). 2013. *Outdoor Recreation in California's Regions 2013: Issues, Strategies, Actions, and Supporting Research*. Available at: https://www.parks.ca.gov/?page_id=27894 [Accessed July 2019].

———. 2019. “Folsom Dam.” Available at: https://www.parks.ca.gov/?page_id=882 [Accessed October 2019].
———. 2019. “The First Folsom Dam.” Available at: https://www.parks.ca.gov/?page_id=1341 [Accessed November 2019].
California Department of Water Resources (DWR). 2020. Designated Floodway and Regulated Streams. Available at: https://gis.bam.water.ca.gov/bam/ [Accessed March 2020].
Cal Herps. 2019. A Guide to the Amphibians and Reptiles of California. Available at: www.californiaherps.com [Accessed March 2019].
California Invasive Plant Council (CAL IPC). 2004. The Weed Workers’ Handbook: A Guide to Techniques for Removing Bay Area Invasive Plants. Available at: https://www.cal-ipc.org/docs/ip/management/wwh/pdf/18601.pdf [Accessed December 2019].
———. 2020a. “IPCW Plant Report, *Arundo donax*.”Available at: https://www.cal-ipc.org/resources/library/publications/ipcw/report8/ [Accessed January 2020].
———. 2020b. “IPCW Plant Report, *Cortaderia selloana*.”Available at: https://www.cal-ipc.org/resources/library/publications/ipcw/report35/ [Accessed January 2020].
California State Water Resources Board (CASWRB). 1958. Decision No. D 893. Available at: https://www.waterboards.ca.gov/waterrights/board_decisions/adopted_orders/decisions/d0850_d0899/wrd893.pdf [Accessed October 2019].
Campaign Against Climate Change (CACC). 2019. “Climate change: An introduction.” Available at: https://www.campaigncc.org/climate_change/introduction [Accessed June 2019].
CBEC. 2018. LAR Current Condition DEM and 2D Model Development Project. [Accessed October 2019.
CBEC. 2019. LAR Current Condition DEM and 2D Model Development Project Flood Flow Hydrodynamic Modeling Report. March 2019.
Central Valley Bird Club. 2019. Sacramento County Breeding Bird Atlas. Available at: http://www.cvbirds.org/birding-resources/sacramento-county-breeding-bird-atlas/ [Accessed December 2019].
Central Valley Regional Water Quality Control Board (Central Valley RWQCB). 2019. Order R5-2015-0023, NPDES NO. CAS082597. Available at: https://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/sacramento/r5-2015-0023.pdf [Accessed October 2019].
Chapman, C. E. 1923. *A History of California: The Spanish Period*. MacMillan Company, New York.
Cilimburg, A., Monz, C., and S. Kehoe. 2000. Wildland Recreation and Human Waste: A Review of Problems, Practice, and Concerns. *Environmental Management* 25(6): 587-598.
City of Sacramento. 2008. Mitigated Negative Declaration for the Urrutia Site Restoration and Enhancement Project.
———. 2018. History. Available at https://www.cityofsacramento.org/Fire/About/History [Accessed November 2019].
City of Sacramento Fire Department (Sacramento City Fire). 2017. “2017 Annual Report.” Available at: https://www.cityofsacramento.org/-/media/Fire/Sacramento-Fire-2017-Annual-Report.pdf?la=en [Accessed January 2020].
Clark, W. B. 1980. *Gold Districts of California*. Bulletin 193. California Division of Mines and Geology, Sacramento.
Cole, D. N. 2013. Long-Term Effectiveness of Restoration Treatments on Closed Wilderness Campsites. *Environmental Management* 51: 642-650.
Cook, S. F. 1976. *The Conflict Between the Califomia Indian and White Civilization*. University of California Press, Berkeley.
Cordell, K. H.; Betz, C.; Bowker, M. J.; English, D. B.K.; Mou, S. H.; Bergstrom, J. C.; Teasley, J. R.; Tarrant, M. A.; Loomis, J. 1999. Outdoor recreation in American life: a national assessment of demand and supply trends. Champaign, IL: Sagamore Publishing. xii, 449 p.
Cornell Lab of Ornithology. 2019. Birds of North America: Burrowing Owl. Available at: https://birdsna.org/Species-Account/bna/species/burowl/introduction?login [Accessed December 2019].
———. 2019. Bell’s Vireo. Available at: https://birdsna.org/Species-Account/bna/species/belvir/introduction [Accessed February 2019].
Congressional Research Service (CRS). 2006. Sacramento Flood Control and Folsom Dam: Recent Action and Current Issues. Available at: https://www.everycrsreport.com/files/20061006_RL33682_9c2bb046697fd7128dccd788c4a1243f64b6fbcf.pdf [Accessed October 2019].
Crain, P.K. and P. B. Moyle. 2011. Biology, History, Status and Conservation of Sacramento Perch, *Archoplites interruptus*. San Francisco Estuary and Watershed Science, 9(1).
Dames & Moore .1995. Archaeological Inventory Report Lower American River Locality. American River Watershed Investigation for the U.S. Army Corps of Engineers, Sacramento District, Sacramento, California.
The Dangermond Group. 2006. American River Parkway 2006 Financial Needs Study Update. Available at: https://regionalparks.saccounty.net/Parks/Documents/Parks/ARP-Financial-Needs-Study-Update-2006.pdf [Accessed January 2020].
Dettling M. D., Seavy N. E., Howell C. A., and T. Gardali. 2015. Current Status of Western Yellow-Billed Cuckoo along the Sacramento and Feather Rivers, California. PLOS ONE 10(4): e0125198. https://doi.org/10.1371/journal.pone.0125198 [Accessed February 2019].
Dillinger, W. C., ed. 1991. *A History of the Lower American River*. Rev. ed. American River Natural History Association, Sacramento. Originally published 1977 by Lucinda Woodward and Jesse M. Smith (editors).
Doane, M. 2019. Personal Communication. Sacramento County Department of Regional Parks (Regional Parks).
Dolesh, R.J. 2017. “Climate Change Is Changing the Face of Outdoor Recreation”. Available at: https://www.nrpa.org/parks-recreation-magazine/2017/october/climate-change-is-changing-the-face-of-outdoor-recreation/ [Accessed June 2019].
Dudek and ICF. 2012. Mammals: Western Mastiff Bat (*Eumops perotis*). Available at: https://www.drecp.org/documents/docs/baseline_biology_report/10_Appendix_B_Species_Profiles/10d_Mammal/Western%20Mastiff%20Bat.pdf [Accessed February 2019].
Duerksen, C. J., Elliott, D.L, Hobbs, N. T., Johnson, E., and J. R. Miller. 1997. Habitat Protection Planning: Where the Wild Things Are. *American Planning Association*.
eBird. 2019. Explore Species Map: Loggerhead Shrike. Available at: https://ebird.org/map/logshr?neg=true&env.minX=121.64691698948474&env.minY=38.40914777607951&env.maxX=120.85452807346911&env.maxY=38.73875558767793&zh=true&gp=false&ev=Z&mr=112&bmo=1&emo=12&yr=all&byr=1900&eyr=2019 [Accessed February 2019].
———. 2019. Explore Species Map: Northern Harrier. Available at: https://ebird.org/map/norhar2?env.minX=-178.2033694246 71&env.minY=3.13636909372268&env.maxX=175.73285251842&env.maxY=76.8918586145078 [Accessed February 2019].
———. 2019. Explore Species Map: Redhead. Available at: https://ebird.org/map/redhea?neg=true&env.minX=-121.56972500443771&env.minY=38.50238677640204&env.maxX=121.1735305464299&env.maxY=38.66716623391095&zh=true&gp=false&ev=Z&mr=1-12&bmo=1&emo=12&yr=all&byr=1900&eyr=2019 [Accessed February 2019].
———. 2019. Explore Species Map: Song Sparrow. Available at: https://ebird.org/map/sonspa?neg=true&env.minX=121.7147723336546&env.minY=38.40873348569485&env.maxX=120.922383417638 97&env.maxY=38.73834319373387&zh=true&gp=false&ev=Z&mr=112&bmo=1&emo=12&yr=all&byr=1900&eyr=2019 [Accessed February 2019].
———. 2019. Explore Species Map: Vesper Sparrow. Available at: https://ebird.org/map/vesspa?neg=true&env.minX=121.7147723336546&env.minY=38.40873348569485&env.maxX=120.922383417638 97&env.maxY=38.73834319373387&zh=true&gp=false&ev=Z&mr=112&bmo=1&emo=12&yr=all&byr=1900&eyr=2019 [Accessed February 2019].
EDAW. 2009. American River Parkway Floodway Management Plan.
EDDMapS. 2021. Early Detection & Distribution Mapping System: red-eared slider. Available at: https://www.eddmaps.org/distribution/viewmap.cfm?sub=72004 [Accessed January 2021].
Engler, R. E. 2012. “The Complex Interaction between Marine Debris and Toxic Chemicals in the Ocean.” *Marine Pollution Bulletin*, (46)22, pp. 12302-12315.

ESA. 2018. Lower American River Subreach 2 Draft Final Resource Assessment. Prepared for Sacramento Area Flood Control Agency. November 2018.

Everything Connects (EC). 2014. Habitat Loss. Available at: https://www.everythingconnects.org/habitat-loss.html [Accessed February 2020].

Fairman, D. 2007. A Gravel Budget for the Lower American River. Available at: https://www.csus.edu/indiv/h/hornert/Dave%20Fairman%20thesis%20gravel%20budget%20American%20River.pdf [Accessed October 2019].

Federal Geographic Data Committee. 2008. National Vegetation Classification Standard (Version 2). Document # FGDC-STD-005. http://www.fgdc.gov/standards/projects/FGDC-standards-projects/vegetation. Accessed August 9, 2019.

Federal Emergency Management Agency (FEMA). 2016. Flood Insurance Study Sacramento County, California and incorporated areas. Flood Insurance Study Number 06067CV001C. [Accessed October 2019].

Federal Emergency Management Agency (FEMA). 2018. Federal Emergency Management Agency. Federal Regulations. Available athttps://www.fema.gov/media-library-data/20130726-1541-20490-8375/lv_section6510_0408.pdf. Accessed October 2019.

FISH Working Group (FWG). 2001. Initial Fisheries and In-stream Habitat Management and Restoration Plan for the Lower American River. Available at: http://www.waterforum.org/wp-content/uploads/2015/09/Flsh-Plan_Executive-Summary.pdf [Accessed October 2019].

Folsom Historic Photos. 2019. Available at http://www.myfolsom.com/resident-guide/folsom-history/folsom-historical-photos/ [Accessed November 2019].

Forstall, R. L., ed. 1996. “Population of States and Counties of the United States: 1790 – 1990.” U.S. Department of Commerce, Bureau of the Census.

Fugro Consultants, Inc. (Fugro). 2012. Lower American River Stratigraphic and Geomorphic Mapping Report River Common Features, Sacramento County, California. September 2012.

Gaston, K. J., Visser, Marcel E., and H. Franz. 2015. The biological impacts of artificial light at night: the research challenge. Philosophical Transactions of the Royal Society. Available at: http://doi.org/10.1098/rstb.2014.0133.

Gilbert, G. K. 1917. Hydraulic-Mining Debris in the Sierra Nevada. Available at: https://pubs.er.usgs.gov/publication/pp105 [Accessed October 2019].

Governor’s Office of Planning and Research (OPR). 2017. “Technical Advisory: AB 52 and Tribal Cultural Resources in CEQA.”

———. 2020. “CEQA: The California Environmental Quality Act.” Available at https://wildlife.ca.gov/Conservation/CESA: http://opr.ca.gov/ceqa/ [Accessed January 2020].

Haas, G. 2001. Conserving Recreation Diversity: Collaborating Across Boundaries. *The George Wright Forum*, 18(3), 112-123.

Hammit, W. E., Cole, D. N., and C. A. Monz. 2015. *Wildland Recreation: Ecology and Management*. 3rd edition. Wiley Blackwell Publishing, Hoboken, NJ.

Haufler, J. B., Mehl, C. A., and Roloff, G. J. 1999. Using a coarse-filter approach with species assessment for ecosystem management. *Wildlife Society Bulletin* 1996, 24(2): 200-208.

Heisem, S. 2017. The History Behind the Walls of Folsom State Prison. 2017. Available at: https://www.kcra.com/article/the-history-behind-the-granite-walls-of-folsom-state-prison-1/13135305#. [Accessed November 2019].

Helley, H. 1985. Geologic Map of the Late Cenozoic Deposits of the Sacramento Valley and Northern Sierran Foothills, California. Available at: https://www.csus.edu/indiv/h/hornert/Geologic%20maps%20and%20references/Helley%20and%20Harwood%201985%20maps/AR-M550U_20071026_141512.pdf [Accessed October 2019].

Hoover, M. B., Rensch, H. E., and E. G. Rensch. 1953. *Historic Spots in California*. Stanford University Press, Stanford.

Houlton, Benjamin Z. 2018. “State of Science: Role of Climate Change in California’s Wildfires.” Available at: http://www.nationalacademies.org/hmd/~/media/Files/Boards/HSP/MedPrep%20Forum/Houlton.pdf [Accessed January 2020].

iNaturalist. 2021a. Mute Swan (*Cygnus olor*). Available at: https://www.inaturalist.org/observations/35415666 [Accessed January 2021].

———. 2021b. Explore: red-eared slider. Available at: https://www.inaturalist.org/observations?place_id=any&taxon_id=51271 [Accessed January 2021].

———. 2021c. Explore: American bullfrog. Available at: https://www.inaturalist.org/observations?place_id=any&taxon_id=65979 [Accessed January 2021].

James, L. A. 1994. Channel Changes Wrought by Gold Mining: Northern Sierra Nevada, California. Available at: https://people.cas.sc.edu/ajames/Research/Pubs/1994%20James%20_AWRA.pdf [Accessed October 2019].

James, A. 2012. Hydraulic Mining Sediment Impacts on American River Channel Morphology and Flood Stages. Available at: https://cepsym.org/Sympro2012/James.pdf [Accessed October 2019].

Johnson, D. L. and M. E. Vande Kamp. 1996. Extent and Control of Resource Damage Due to Noncompliant Visitor Behavior: A Case Study from the U.S. National Parks. *Natural Areas Journal* 16(2): 134-141.

Johnson, J. J. 1992. Personal Communication.

Jones & Stokes. 2002. Flood Management Element of the River Corridor Management Plan for the Lower American River. Available at: http://www.safca.org/Protection/NR_Documents/RCMP_8_Appendix.CFlood-ManagementElement.pdf [Accessed October 2019].

Knight, R. L. and K. J. Gutzwiller. 1995. *Wildlife and Recreationists: Coexistence Through Management and Research*. Island Press.

Knisley, C. B., and M. S. Fenster. 2005. Apparent Extinction of the Tiger Beetle, *Cicindela hirticollis aburpta* (Coleoptera: Carabidae: Cicindelinae). The Coleopterists Bulletin, 59(4): 451-458.

Kohlhorst, D.W., Botsford, L.W., Brennan, J.S., and G. M. Cailliet. 1991. Aspects of the structure and dynamics of an exploited central California population of white sturgeon. In P. Williot (ed.). 1989. Proceedings of the First International Symposium on the Sturgeon. October 3-6, 1989, Bordeaux, France. Pp. 277-293.

Kroeber, A.L. 1925. *Handbook of the Indians of California*. Bureau of American Ethnology Bulletin 78. Washington, D.C. Reprinted in 1976 by Dover Publications, Inc., New York, New York.

Kyba, C. M., Tong, K. P., Bennie, J. et al. 2015. Worldwide variations in artificial skyglow. *Sci Rep* 5, 8409. Available at: https://doi.org/10.1038/srep08409 [Accessed February 2020].

Kyle, D. E., ed. 1990. *Historic Spots in California*, by Mildred B. Hoover, Hero E. Rensch, Ethel G. Rensch, and William N. Abeloe. Stanford University Press, Stanford.

Longcore, T. and C. Rich. 2004. Ecological light pollution. Frontiers in Ecology and the Environment, 2: 191-198. Available at: doi:10.1890/1540-9295(2004)002[0191:ELP]2.0.CO;2.

Lower American River Task Force (LARTF). 2002. River Corridor Management Plan for the Lower American River: January 2002. Available at: http://www.safca.org/Protection/Environmental_Collaboration_RCMP.html [Accessed December 2019].

———. 2015. Lower American River River Corridor Management Plan: Three Year Action Plan. [Accessed September 2019].

LSA Associates. 2003. NATURAL RESOURCES PLANT LIFE: Folsom Lake State Recreation Area. Available at: https://www.parks.ca.gov/pages/500/files/plantlife.pdf [Accessed December 2019].

Lucas, R. C. 1982. Recreation Regulations – When Are They Needed? *Journal of Forestry* 80(3): 148-151.

Maret, M. 2019. Personal Communication.

Marion, J. L. 2016. A Review and Synthesis of Recreation Ecology Research Supporting Carrying Capacity and Visitor Use Management Decisionmaking. *Journal of Forestry* 114(3): 339-351.

McCabe, G.T. and C. A. Tracy. 1994. Spawning and early life history of white sturgeon *Acipenser transmontanus*, in the lower Columbia River. Fishery Bulletin 92:760-72. Available at: https://www.nwfsc.noaa.gov/assets/2/6721_12142010_111235_McCabe.and.Tracy.1994-rev.pdf [Accessed December 2019].

McGough, M. 2019. Think this week's storm is bad? Here are 5 of the worst floods in Sacramento history. Sacramento Bee. Available at https://www.sacbee.com/news/weather-news/article226861949.html. [Accessed November 2019].

Miller, M. 2000. "Fire Autecology." Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Pp. 9-34.

Monz, C. A., Pickering, C. M., and Hadwen, W. L. 2013. Recent advances in recreation ecology and the implications of different relationships between recreation use and ecological impacts. Frontiers in Ecology and the Environment. doi: 10.1890/120358

Morgan, D. L. 1964. *Jedediah Smith and the Opening of the West*. University of Nebraska Press, Lincoln.

Moritz, M.A., C. Topik, C.D. Allen, P.F. Hessburg, P. Morgan, D.C. Odion, T.T. Veblen, and I.M. McCullough. 2018. A Statement of Common Ground Regarding the Role of Wildfire in Forested Landscapes of the Western United States. Fire Research Consensus Working Group Final Report.

The National Academics of Sciences, Engineering, and Medicine (NAP). 2001. "Climate Change Science: An Analysis of Some Key Questions". Available at: https://www.nap.edu/read/10139/chapter/2 [Accessed June 2019].

National Aeronautics and Space Administration (NASA). 2019. "Climate Change: How Do We Know?" Available at: https://climate.nasa.gov/evidence/ [Accessed June 2019].

National Oceanic and Atmospheric Administration (NOAA). 2005. Endangered and Threatened Species: Final Listing Determinations for 16 ESUs of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. Available at: https://www.federalregister.gov/documents/2005/06/28/05-12351/endangered-and-threatened-species-final-listing-determinations-for-16-esus-of-west-coast-salmon-and [Accessed December 2019].

NatureServe. 2019. Explorer: *Cicindela hirticollis abrupta*-Casey, 1913. Available at: http://explorer.natureserve.org/servlet/NatureServe?-searchName=Cicindela+hirticollis+abrupta [Accessed March 2019].

Neary, Daniel G.; Ryan, Kevin C.; DeBano, Leonard F., eds. 2005. (revised 2008). Wildland fire in ecosystems: effects of fire on soils and water. Gen. Tech. Rep. RMRS-GTR-42-vol.4. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 250

Northwest Hydraulic Consultants, Inc. (nhc). 2012. Revised Task 14 Draft Memo Report - Update of Lower American River Bank Migration Analysis (Contract No. W91238-07-D-0039). [Accessed October 2019].

———. 2016. Lower American River Task Force Bank Protection Working Group Lower American River Geomorphology Assessment: Draft Report. Prepared for Sacramento Area Flood Control Agency. [Accessed September 2019].

———. 2018. Attachment 1 to the Lower American River Subreach 2: Summary of Bank Protection Conceptual Design Process. [Accessed September 2019].

Nunamaker, C., de Lasaux, M., and G. Nakamura. 2007. Forest Stewardship Series 15: Wildfire and Fuel Management. University of California Agriculture and Natural Resources, Publication 8245.

NOAA Fisheries. 2019. NOAA Fisheries | West Coast Region: Endangered Species Act Critical Habitat. Available at: https://www.westcoast.fisheries.noaa.gov/maps_data/endangered_species_act_critical_habitat.html [Accessed March 2019].

National Park Service (NPS). 2017. "Wildland Fire Behavior." Series: Wildland Fire – Learning in Depth. Available at: https://www.nps.gov/articles/wildland-fire-behavior.htm [Accessed January 2020].

National Park Service (NPS) and U.S. Forest Service (USFS). 2020. "Fire Terminology." Available at: https://www.fs.fed.us/nwacfire/home/terminology.html#F [Accessed January 2020].

National Recreation and Park Association (NRPA). 2017. Homelessness in Parks, A summary of results from an NRPA membership survey. Available at: https://www.nrpa.org/contentassets/f768428a39aa4035ae-55b2aaff372617/homelessness-in-parks-survey-report.pdf [Accessed August 2019].

National Wild and Scenic Rivers System (NWSRS). 2019. Available at: https://www.rivers.gov/rivers/american-lower.php [Accessed October 2019].

O'Hara, K. 2017. City Parks and Homelessness. Available at: https://meetingoftheminds.org/city-parks-homelessness-21554 [Accessed August 2019].

The Outdoor Foundation. 2016. 2016 *Outdoor Participation Report*. Available at: https://outdoorindustry.org/wp-content/uploads/2017/05/2016-Outdoor-Participation-Report.pdf [Accessed July 2019].

———. 2017. 2017 *Outdoor Participation Report*. Available at: https://outdoorindustry.org/wp-content/uploads/2017/05/2017-Outdoor-Recreation-Participation-Report_FINAL.pdf [Accessed July 2019].

———. 2018. 2018 *Outdoor Participation Report*. Available at: https://outdoorindustry.org/resource/2018-outdoor-participation-report/ [Accessed July 2019].

Owens, K. N. 1991. Sacramento-San Joaquin Delta, California: Historical Resources Overview. Submitted to Department of the Army, Corps of Engineers, Sacramento.

Palmer, M.A., Bernhardt, E.S., Allan, J.D., Lake, P.S., Alexander, G., Brooks, S., Carr, J., Clayton, S., Dahm, C.N., Follstad Shah, J., Galat, D.L., Loss, S.G, Goodwin, P., Hart, D.D., Hassett, B., Jenkinson, R., Kondolf, G.M., Lave, R., Meyer, J.L., O'Donnell, T.K., Pagano, L., and Sudduth, E., 2005. Forum: Standards for ecologically successful river restoration. *Journal of Applied Ecology*, vol. 42, pp. 208-217

Parret, C. 2009. USGS Internal Document: Recommended revised estimate of Jan. 1862 peak discharge on American River at Fair Oaks gauge (USGS 11446500). Available at: https://cepsym.org/history/2009-Parrett-USGS.pdf [Accessed October 2019].

Pastor, M., Lester, T. W., and Scroggins, J. 2009. "Why Regions? Why Now? Who Cares?" *Journal of Urban Affairs* 31, no. 3: 269-96.

Paul, R. W. 1965. *California Gold: The Beginning of Mining in the Far West*. University of Nebraska Press, Lincoln.

Plant Society. Sacramento, CA.

Pletterbauer, F., Melcher, A., and W. Graf. 2018. "Climate Change Impacts in Riverine Ecosystems". *Aquatic Ecology: Climate Change Impacts in Riverine Ecosystems*. Available at: https://link.springer.com/chapter/10.1007/978-3-319-73250-3_11 [Accessed June 2019].

Point Blue Conservation Science (PBCS). 2014. Patterns of Distribution and Abundance of Breeding Colonies in the Interior of California, 2009-2012. Available at: http://www.prbo.org/refs/files/12321_Shuford2014.pdf [Accessed December 2019].

Poole, G. C. and C. H. Berman. 2001. "An Ecological Perspective on In-Stream Temperature: Natural Heat Dynamics and Mechanisms of Human-Caused Thermal Degradation. Environmental Management, 27(6), pp. 787-802.

Practical Guidebook to the Control of Invasive Aquatic and Wetland Plants of the San Francisco Bay-Delta Region. 1998. Available at: https://www.sfei.org/nis/pampasgrass.html. [Accessed February 2019].

Redmond, K. T. 1999. American River Flood Frequencies: A Climate-Society Interaction. Western Regional Climate Center: Desert Research Institute, Reno, Nevada.

Resnik, M. 2019. "Trash continues to pile up along American River Parkway." KCRA3. Available at: https://www.kcra.com/article/trash-continues-to-pile-up-along-american-river-parkway/26436535 [Accessed October 2019].

Roggenbuck, J. 1992. Use of Persuasion to Reduce Resource Impacts and Visitor Conflicts. In M. J. Manfredo (Ed.), *Influencing human behavior: Theory and applications in recreation, tourism, and natural resources management* (pp. 149–208). Champaign, Illinois: Sagamore Publishing, Inc.

Ryan, K. C., Jones, A. T., Koerner, C. L., and K. M. Lee, tech. eds. 2012. Wildland fire in ecosystems: effects of fire on cultural resources and archaeology. Gen. Tech. Rep. RMRS-GTR-42-vol. 3. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 224 p.

Sacramento Area Flood Control Agency (SAFCA). 2008. Policies and Legislation. Last updated 2008. Available at: http://www.safca.org/policies.html [Accessed September 2019].

———. 2020. "Mission Statement." Available at: http://www.safca.org/ [Accessed January 2020].

Sacramento Bee (Sac Bee). 2012. The 10 Biggest Sacramento Storms of the Past 100 Years. Available at: https://www.sacbee.com/news/databases/article4059618.html [Accessed October 2019].

Sacramento County. 2006. River Corridor Management Plan and the ARPPU.

———. 2008a. American River Parkway Plan 2008. Available at: https://regionalparks.saccounty.net/Parks/Documents/Parks/ARPP06-021909_sm.pdf [Accessed December 2019].

———. 2008b. Final Environmental Impact Report: American River Parkway Plan Update 2006.

———. 2019. Sacramento Regional County Sanitation District (Regional San) – Wastewater Treatment & Conveyance. Available at: https://www.saccounty.net/services/Pages/Sacramento-Regional-County-Sanitation-District-Regional-San-Wastewater-Treatment-Conveyance.aspx [Accessed October 2019].

Sacramento County Department of Regional Parks (Regional Parks). 2008. American River Parkway Invasive Plant Management Project Phase II: 2004-2009. Prepared by Hauge Brueck Associates (HBA).

———. 2009. American River Parkway Fact Sheet Updated 2009. Available at: https://regionalparks.saccounty.net/Documents/American%20River%20Parkway%20Fact%20Sheet_REV%202009.pdf [Accessed December 2019].

———. 2018. "2018 Calendar of Events."

———. 2019. "Off-Paved Trail Cycling Pilot Program Open in Woodlake and Cal Expo." Available at: https://regionalparks.saccounty.net/Pages/OffPaveTrailCycling.aspx [Accessed October 2019].

———. 2019. "American River Parkway, Sunrise Recreation Areas, Upper and Lower." Available at: https://regionalparks.saccounty.net/Parks/Pages/SunriseRecAreasUpperandLower.aspx [Accessed July 2019].

———. 2019. "American River Parkway – Rossmoor Bar." Available at: https://regionalparks.saccounty.net/Parks/Pages/RossmoorBar.aspx [Accessed July 2019].

———. 2019. "Watt Avenue Access." Available at: https://regionalparks.saccounty.net/Parks/Pages/WattAvenueAccess.aspx [Accessed July 2019].

———. 2019. "River Bend Park [Map]." Available at: https://regionalparks.saccounty.net/Parks/Documents/River_Bend_Park_Map.pdf [Accessed July 2019].

———. 2019. "American River Parkway – Sacramento Bar." Available at: https://regionalparks.saccounty.net/Parks/Pages/SacramentoBar.aspx [Accessed July 2019].

———. 2019. "American River Parkway – Sailor Bar." Available at: https://regionalparks.saccounty.net/Parks/Pages/SailorBar.aspx [Accessed July 2019].

———. 2019. Regional Parks - Alcohol. Available at: https://regionalparks.saccounty.net/Rangers/Pages/Alcohol.aspx [Accessed November 2019].

———. 2019. Fire Risk Reduction. Available at: http://www.regionalparks.saccounty.net/Rangers/Pages/FireRiskReduction.aspx-?Paged=TRUE&p_ID=30&PageFirstRow=31&&View=%7B5AAFD-FEA-AD6D-4925-B2FB-E47ED7E7B264%7D [Accessed August 2019].

———. 2020. "Fire Risk Reduction." Available at: https://regionalparks.saccounty.net/Rangers/Pages/FireRiskReduction.aspx [Accessed January 2020].

Sacramento County Regional Sanitation District (Regional San). 2013. "Regional San Maintained Facilities." Available at: https://www.regionalsan.com/sites/main/files/file-attachments/rs_maintained_facilities_sept_2013.pdf [Accessed October 2019].

———. 2019. Major Sanitary Sewer Overflows. Available at: https://www.regionalsan.com/major-sanitary-sewer-overflows [Accessed January 2020].

Sacramento County Department of Water Resources (Sacramento County DWR). 2019. "Cordova Creek Naturalization Project." Available at: https://waterresources.saccounty.net/Pages/Cordova-Creek-Naturalization-Project.aspx [Accessed October 2019].

———. 2019. "Sacramento County Creeks." Available at: https://waterresources.saccounty.net/Documents/SacCountyCreeksMap.pdf [Accessed October 2019].

———. 2019. "Stormwater Quality Program." Available at: http://www.waterresources.saccounty.net/stormwater/Pages/default.aspx [Accessed August 2019].

———. 2019. Sacramento County Water Agency. Available at: https://waterresources.saccounty.net/scwa/Pages/default.aspx [Accessed December 2009].

Sacramento County Office of Budget and Debt Management. 2021. Annual Budgets. Available at: https://bdm.saccounty.net/Pages/AnnualBudgets.aspx [Accessed January 2021].

Sacramento River Watershed Program (SRWP). 2010. The Sacramento River Basin: a Roadmap to Watershed Management. Available at: http://www.sacriver.org/aboutwatershed/roadmap [Accessed October 2019].

Santo-Domingo, J. W. and N. Ashbolt. 2008. "Fecal Pollution of Water." *Encyclopedia of Earth*, pp. 1-12. National Council for Science and the Environment, Washington, D.C. Available at: https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NERL&dirEntryId=196784.

Save the American River Association (SARA). 2019. Available at: https://www.sarariverwatch.org/ [Accessed November 2019].

Sawyer, J. O., Keeler-Wolf, T., and J. Evans. 2009. A Manual of California Vegetation, 2nd Addition. California Native.

Schwartz, R.S. and B. May. 2008. Genetic Evaluation of Isolated Populations for Use in Reintroductions Reveals Significant Genetic Bottlenecks in Potential Stocks of Sacramento Perch. Transactions of the American Fisheries Society 137: 1764-1777.

Science Alert. 2017. Every 200 Years California Endures a Flood of Epic Proportions. Available at: https://www.sciencealert.com/every-200-years-california-endures-a-flood-of-epic-proportions-and-this-could-be-it [Accessed November 2019]

Sellheim et al. 2015. Juvenile Salmonid Utilization of Floodplain Rearing Habitat After Gravel Augmentation in a Regulated River. Available at: https://www.researchgate.net/publication/267287216_Juvenile_Salmonid_Utilization_of_Floodplain_Rearing_Habitat_After_Gravel_Augmentation_in_a_Regulated_River [Accessed October 2019].

Shlemon, R. J., Horner, T., and J. Florsheim. 2000. Quaternary Geology of the Sacramento Area. Includes Shlemon 1967 Figure. (i.e. Shlemon, R.J., 1967. Quaternary Geology of Northern Sacramento County, California; Annual Field Trip Guidebook of the Geologic Society of Sacramento).

Shuford, W. D., and T. Gardali, eds. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Sierra College. 2009. Mining Techniques of the Sierra Nevada and Gold Country. Journal of Sierra Nevada History & Biography. Spring 2009 Vol. 2 No. 1.

Smith, J. K., ed. 2000. Wildland fire in ecosystems: effects of fire on fauna. Gen. Tech. Rep. RMRS-GTR-42-vol. 1. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 83 p.

Soil Conservation Service (SCS). 1993. Soil Survey of Sacramento County, California. Available at: https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/california/CA067/0/sacramento.pdf [Accessed October 2019].

Stankey, G. H.; Clark, R. N.; Bormann, B. T. 2005. Adaptive management of natural resources: theory, concepts, and management institutions. Gen. Tech. Rep. PNW-GTR-654. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 73 p.

Thrush, G. 2017. "As Affordable Housing Crisis Grows, HUD Sits on the Sidelines." The New York Times. Available at: https://www.nytimes.

com/2018/07/27/us/politics/hud-affordable-housing-crisis.html [Accessed August 2019].
UC Davis. 2019. Interactive PISCES Map viewer: longfin smelt. Available: https://pisces.ucdavis.edu/map [Accessed February 2019].
———. 2019. UC Davis Weed Control Handbook. Available at: https://wric.ucdavis.edu/information/natural%20areas/wr_D/Dittrichia.pdf [Accessed July 2019].
UCLA Center for Climate Science. 2019. "Climate Change in the Sierra Nevada". Available at: https://www.ioes.ucla.edu/wp-content/uploads/UCLA-CCS-Climate-Change-Sierra-Nevada.pdf [Accessed June 2019].
United Nations. 2019. *Report of the Secretary-General on the 2019 Climate Action Summit and the Way Forward in 2020*. Available at: https://www.un.org/en/climatechange/assets/pdf/cas_report_11_dec.pdf.
URS-GEI. 2012. Revised Three-Dimensional Stratigraphic Model Report, American River Common Features General Reevaluation Report. [Accessed October 2019].
U.S. Army Corps of Engineers (USACE). 2015. American River, California Common Features Project General Reevaluation Report. Draft Report for Public Review. Available at: https://www.spk.usace.army.mil/Portals/12/documents/civil_works/CommonFeatures/Final_ARCF_GRR_Jan2016.pdf [Accessed March 2019].
———. 2015. Habitat Mitigation, Monitoring and Adaptive Management Plan: American River Common Features General Reevaluation Report. Available at: http://www.safca.org/documents/ARCF_GRR/Project_Documents/2015.12_ARCF_GRR_EIS_EIR/Appendix_I_Habitat_Mitigation_Monitoring_and_Adaptive_Management_Plan.pdf [Accessed October 2019].
———. 2016. American River Watershed: Common Features General Reevaluation Report, Final Report. Available at: https://www.spk.usace.army.mil/Portals/12/documents/civil_works/CommonFeatures/Final_ARCF_GRR_Jan2016.pdf [Accessed October 2019].
———. 2016. US Army Corps of Engineers Section 408 Overview. Regulatory Workshop. Available at: https://www.spk.usace.army.mil/Portals/12/documents/regulatory/Reg_workshop/2016-07-22/408-Overview-Regulatory-Workshop-7-19-16.pdf?ver=2016-08-02-134604-830.
———. 2017. Draft Folsom Dam and Lake American River, California Water Control Manual. Available at: https://www.spk.usace.army.mil/Missions/Civil-Works/Folsom-Water-Control-Manual-Update/ [Accessed October 2019].
———. 2019. Folsom Dam Modification Project Water Control Manual Update, Final, Supplemental Environmental Assessment/Environmental Impact Report. Available at: http://cvfpb.ca.gov/wp-content/uploads/2019/01/FINAL-Folsom-WCM-Update-SEAEIR.pdf [Accessed October 2019].
USACE (U.S. Army Corps of Engineers), CVFPB (State of California Central Valley Flood Protection Board), and SAFCA (Sacramento Area Flood Control Agency). 2015. American River Watershed Common Features General Reevaluation Report, Final Environmental Impact Statement Environmental Impact Report. Available at: https://www.spk.usace.army.mil/Portals/12/documents/civil_works/CommonFeatures/ARCF_GRR_Final_EIS-EIR_Jan2016.pdf [Accessed June 2019].
U.S. Bureau of Land Management (BLM), National Park Service (NPS), U.S. Fish and Wildlife Service (USFWS), and U.S. Forest Service (USFS). N.D. "National Wild and Scenic Rivers System." Available at: https://rivers.gov/ [Accessed January 2020].
U.S. Bureau of Reclamation (USBR). 2006. Folsom Dam 50th 1956-2006. Available at: https://www.usbr.gov/mp/folsom-50/docs/folsom-50-ann-booklet.pdf [Accessed October 2019].
———. 2016. Environmental Assessment Lower American River Anadromous Fish Habitat Restoration Project. Available at: https://www.usbr.gov/mp/nepa/includes/documentShow.php?Doc_ID=24637 [Accessed October 2019].
———. 2017a. Water Facts Nimbus Dam and Power Plant. Last Updated April 2017. Available at: https://www.usbr.gov/mp/arwec/facts-nimbus-dam-powerplant.html [Accessed November 2019].
———. 2017b. About the Central Valley Project. Last Updated April 2017. Available at: https://www.usbr.gov/mp/cvp/about-cvp.html [Accessed November 2019].
———. 2019. "Central Valley Project Improvement Act (CVPIA)." Available at: https://www.usbr.gov/mp/cvpia/ [Accessed July 2019].
———. 2020. "Central Valley Project." Available at: https://www.usbr.gov/projects/index.php?id=506 [Accessed January 2020].
U.S. Congress. 1940. An Act To authorize the American River Basin development, California, for irrigation and reclamation, and for other purposes. Available at: https://www.loc.gov/law/help/statutes-at-large/81st-congress/session-1/c81s1ch690.pdf [Accessed October 2019].
———. 1968. An act to provide for a National Wild and Scenic Rivers System, and for other purposes. Available at: https://www.rivers.gov/documents/act/complete-act.pdf [Accessed October 2019].
U. S. Court of Appeals of the Ninth Court. 2018. *Martin v. City of Boise*, No. 15-35845, D.C. No. 1:09-cv-00540-REB ORDER. Available at: https://cdn.ca9.uscourts.gov/datastore/opinions/2018/09/04/15-35845.pdf [Accessed September 2019].
———. 2019. *Martin v. City of Boise*, No. 15-35845, D.C. No. 1:09-cv-00540-REB ORDER AND AMENDED OPINION. Available at: http://cdn.ca9.uscourts.gov/datastore/opinions/2019/04/01/15-35845.pdf [Accessed September 2019].
U.S. Department of the Interior. 1980. Final Environmental Impact Statement: Proposed Designation of Five California Rivers in the National Wild and Scenic Rivers System. Available at: https://searchworks.stanford.edu/view/3869216 [Accessed October 2019].
U.S. District Court. 1840. California, Northern District. Land case 359 ND, page 645; land case map D-740 (Bancroft Library). Joseph L. Folsom and Anna Maria Sparks, clmts. Pen-and-ink and watercolor. 4362 R57.
U.S. Environmental Protection Agency (EPA). 2017. Climate Impacts on Ecosystems. Available at: https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-ecosystems_.html [Archived] [Accessed December 2019].
U.S. Fish and Wildlife Service (USFWS). 1991. American River watershed investigation substantiating report, lower American River. June. Sacramento, CA.
———. 1992. Shaded Riverine Aquatic Cover of the Sacramento River System: Classification as Resource Category 1 Under the FWS Mitigation Policy. Available at: http://www.deltarevision.com/Issues/fish/dpm/riverine-aquatic-cover.pdf [Accessed October 2019].
———. 2013. "ESA Basics, 40 Years of Conserving Endangered Species." Available at: https://www.fws.gov/endangered/esa-library/pdf/ESA_basics.pdf [accessed January 2020].
———. 2015. Formal Consultation on the American River Common Features (AFRC) Project, Sacramento County, California, pp. 1-313.
———. 2017. Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*). U.S. Fish and Wildlife Service; Sacramento, California. 28 pp.
———. 2019. Information for Planning and Conservation. Online at https://ecos.fws.gov/ipac/. [Accessed November 2019].
U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), National Park Service (NPS), and Bureau of Land Management (BLM). 2021. National Wild and Scenic Rivers System. American River (Lower), California. Available at: https://www.rivers.gov/rivers/american-lower.php [Accessed March 2021].
U.S. Forest Service (USFS). 2020. "Fire Effects Information System Glossary." Available at: https://www.fs.fed.us/database/feis/glossary2.html [Accessed January 2020].
———. Pacific Southwest Region. 2020. "California Dry Steppe." Chapter 31, Ecological Subregions of the United States. Available at: https://www.fs.fed.us/land/pubs/ecoregions/ch31.html [Accessed January 2020].
U.S. Geological Survey (USGS). 2019. The National Map [Online GIS Map Viewer]. Available at: https://viewer.nationalmap.gov/basic/ [Accessed October 2019].
———. 2019. Streamstats. Available at: https://streamstats.usgs.gov/ss/ [Accessed October 2019].

———. 2020. “California’s Central Valley. The Central Valley: Sacramento Valley.” Available at: https://ca.water.usgs.gov/projects/central-valley/sacramento-valley.html [Accessed January 2020].
———. 2021. NAS-Nonindigenous Aquatic Species. Available at: https://nas.er.usgs.gov/about/faq.aspx [Accessed January 2021].
Veselka, A. 2019. Personal communication. Sacramento County Department of Regional Parks (Regional Parks).
Vigars, K. N. 2016. Buried Beneath the Legislation It Gave Rise to: The Significance of Woodruff v. North Bloomfield Gravel Mining Co. Available at: https://lawdigitalcommons.bc.edu/ealr/vol43/iss1/10/ [Accessed October 2019].
Water Education Foundation. 2020. “California Wild and Scenic Rivers Act.” Available at: https://www.watereducation.org/aquapedia/california-wild-and-scenic-rivers-act [Accessed January 2020].
The Water Forum. 2006. Lower American River Flow Management Standard. Available at: http://www.waterforum.org/wp-content/uploads/2014/11/2006-Flow-Management-Standard.pdf [Accessed October 2019].
———. 2015. The Lower American River Modified Flow Management Standard: A Drought Buffer for the Environment and Local Water Supplies. Available at: https://www.waterforum.org/the-river/flow-management-standard/ [Accessed October 2019].
———. 2019. Lower American River Fisheries and In-Stream Habitat Management and Restoration Plan. 2019 Update. Available at: https://www.waterforum.org/wp-content/uploads/2019/08/FISH-Plan-2019-Action-Update-Draft-Report-8.219.pdf [Accessed March 2021].
———. 2021. Habitat Management. Available at: https://www.waterforum.org/the-river/habitat-management/ [Accessed January 2021].
Watson. 1985. Assessment of Channel and Riparian Vegetation Conditions, Lower American River, California. September 1985.
———. 2019. LAR Leveed Reach: Subreach-scale Channel Conditions, Processes, and Evolutionary Trends; --- Subreaches 1, 3, and 4 ---. [Accessed October 2019].
Welcomme, R. L., Bene, C., Brown, C. A., Arthington, A., Dugan, P., King, J. M., and V. Sugunan. 2006. “Predicting the Water Requirements of River Fisheries.” *Ecological Studies*, Vol. 190, pp.123-154.
White, C. 2013. “Environmental Impacts of Homeless Encampments in the Guadalupe River Riparian Zone.” Royal Roads University, Victoria, British Columbia. Available at: https://www.piercecountywa.org/DocumentCenter/View/44600/Environmental-Impacts-of-Homeless-Encampments.
Whitney. 1880. The Auriferous Gravels of the Sierra Nevada of California. Available at: https://theminingalliance.com/research/historical/reports/The_Auriferous_Gravels_of_the_Sierra_Nev_Whitney.pdf [Accessed October 2019].
Wildland Res Mgt; Ascent Environmental, Inc.; Interra Group. 2014. Sacramento Metropolitan Fire District Community Wildfire Protection Plan.
Wildlife Conservation Board (WCB). Lower American River Conservancy Program. Available at: https://wcb.ca.gov/Programs/Lower-American-River [Accessed January 2021].
Wilson, N. L. and A. H. Towne. 1978. “Nisenan.” In *California*, edited by Robert F. Heizer, pp. 387-397, Handbook of North American Indians, vol. 8. William G. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.
Witham, C. W. 2006. Vernal Pools of Mather Field. California Native Plant Society. Sacramento, CA.
Wolkowski, R. 2008. “Soil Compaction: Causes, Concerns, and Cures.” University of Wisconsin-Extension, Madison, Wisconsin. Available at: https://soils.wisc.edu/extension/pubs/A3367.pdf [Accessed August 2019].
Yoon-Hendricks, A. 2019. “Citations soar for homeless on American River Parkway after ruling halts ban on camping.” Available at: https://www.sacbee.com/news/local/homeless/article228738554.html [Accessed September 2019].
Zeiner, D.C., Laudenslayer, W.F., Mayer, K.E., and M. White. 1990. California’s Wildlife Vol I-III. California Department of Fish and Game, Sacramento, California.
Zouhar, K., Smith, J. K., Sutherland, S., and M. L. Brooks. 2008. Wildland fire in ecosystems: fire and nonnative invasive plants. Gen. Tech. Rep. RMRS-GTR-42-vol. 6. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 355 p.

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