COSUMNES RIVER PRESERVE
MANAGEMENT PLAN

FINAL

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COVER PHOTOS COURTESY OF MIKE EATON
Funding for this Management Plan was made available by a grant from the CALFED Watershed Program and administered by the State Water Resources Control Board.
The Cosumnes River Preserve Partners envision the permanent protection of a continuous riparian corridor extending from the Cosumnes headwaters to the Delta, including adjacent floodplain and wetland habitats, and a vast vernal pool grassland complex supporting endangered species. The Partners will utilize stewardship and compatible ranching and farming activities as methods to sustain native plant and wildlife communities and the processes that perpetuate a dynamic mosaic of habitats. We will provide opportunities for people of all ages to appreciate the flora and fauna of the Cosumnes River Preserve and to experience being part of a natural landscape.
Cosumnes River Preserve
Management Plan

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Executive Summary

The Cosumnes River Preserve (Preserve) consists of approximately 45,859 acres of wildlife habitat and agricultural lands owned by seven land-owning Partners. The Partners include The Nature Conservancy, Bureau of Land Management, California Department of Fish & Game, Sacramento County, Department of Water Resources, Ducks Unlimited, and the California State Lands Commission. The Preserve is centered along the Cosumnes River, its floodplains and riparian habitat. This habitat is buffered by a variety of agricultural operations.

The Preserve provides numerous social, economic, and recreational benefits to local communities and to people residing in the larger Sacramento and San Joaquin areas. The habitat supports wildlife, including birds that migrate throughout the Pacific Flyway.

This Management Plan contains a total of eight chapters that describe how the Preserve will be managed over the next 10 years. The most important result of the planning effort was reaching consensus among the participating Partners on a long-term vision for the Preserve. The Preserve’s Vision Statement is as follows:

“The Cosumnes River Preserve Partners envision the permanent protection of a continuous riparian corridor extending from the Cosumnes headwaters to the Delta, including adjacent floodplain and wetland habitats, and a vast vernal pool grassland complex supporting endangered species. The Partners will utilize stewardship and compatible ranching and farming activities as methods to sustain native plant and wildlife communities and the processes that perpetuate a dynamic mosaic of habitats. We will provide opportunities for people of all ages to appreciate the flora and fauna of the Cosumnes River Preserve and to experience being part of a natural landscape.”

To achieve this vision, the Partners agreed on two overarching goals describing broad and long-term aspirations, which form the second tier (after the Vision Statement) in the Plan hierarchy. The Overarching Goals are:

I. Native biological communities and the resident and migratory species dependent on them are restored and maintained to sustainable conditions and population levels.
II. Compatible uses improve stewardship of the lands in the Cosumnes River Watershed.
Tiered under the Overarching Goals is a series of sub-goals. These sub-goals create the framework for the Management Plan and are summarized below.

Chapter 2: Description of Watershed and Preserve Sub-goal

1. Actively manage the Preserve, including implementing the flow augmentation project, collecting physical process data, regularly updating infrastructure databases, and collaborating with regional planning processes.

Chapter 3: Natural Resource Stewardship Sub-goals

1. Protect the free-flowing Cosumnes River within an ecologically functional landscape.
2. Protect, maintain, and restore riparian and floodplain communities, the natural hydrologic processes that sustain the habitat, and the native species that depend on the habitat.
3. Protect, maintain, and restore vernal pool and grassland communities, maintain the ecological processes that sustain the habitat, and promote the native species that depend on the habitat.
4. Maintain and restore a mosaic of freshwater wetland habitats (seasonal and permanent) that support native species.
5. Maintain and enhance the population of the giant garter snake in the Badger Creek watershed.
6. Restore and maintain a population of fall-run Chinook salmon in the Cosumnes River, with an average annual spawning run of 2,000 adults (10-year average, range of 1,000–5,000 adults).

Chapter 4: Agricultural Stewardship Sub-goal

1. Agricultural stewardship will continue to serve as an important land-management tool and will be compatible with the Preserve’s overall mission and goals.

Chapter 5: Public Use Sub-goals

1. Recreational use of the Preserve will be compatible with the Management Plan’s Natural Resources Stewardship goals, will promote the teaching of environmental stewardship, and will have adequate and stable funding sources.
2. The Preserve’s Volunteer Program will be compatible with the Management Plan’s Natural Resources Stewardship goals, will promote the teaching of environmental stewardship, and will have adequate and stable funding sources.
3. Scientific research conducted at the Preserve will be compatible with the Management Plan’s Natural Resources Stewardship goals, will promote the teaching of environmental stewardship, and will have adequate and stable funding sources.
4. The Preserve’s Education Program will be compatible with the Management Plan’s Natural Resources Stewardship goals, will promote the teaching of environmental stewardship, and will have adequate and stable funding sources.

Chapter 6: Cultural and Visual Resources Sub-goals

1. Cultural resources located on the Preserve will be protected.
2. The Preserve’s scenic and visual resources will be protected and enhanced.

Chapter 7: Property Management Sub-goal

1. Properties will be actively managed to achieve the vision and overarching goals described in this Management Plan.

Chapter 8: Operations, Maintenance, and Monitoring Sub-goals

1. The Preserve will be financially sustainable.
2. The Partners will work together to counteract future challenges (e.g., dwindling financial and staffing resources, etc.).
3. This Management Plan will be fully implemented and will use an adaptive management approach.

The Management Plan is structured around two common themes: adaptive management and partnerships. Adaptive management is a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs. Partnership is a relationship among parties usually involving close cooperation and sometimes having specified and joint rights and responsibilities.

IMPLEMENTATION AND REVISION OF THE MANAGEMENT PLAN

This Management Plan will be implemented by the Preserve Partners as they make decisions regarding management practices. The electronic tools (i.e., GIS maps and associated databases) that were developed as part of this planning process will be updated continuously as new information is obtained. The Management Plan recommends the preparation of several additional topical plans and studies. Development of these plans will result in new information and ideas that can be incorporated into Preserve policies. In this way, the Management Plan is a dynamic tool that may evolve to address emerging concerns. Additionally, the Management Plan may be revised or amended upon consent of the Partners and will be reviewed formally at least once every five years.

Site-specific projects that comply with the Management Plan may be developed in the future. Those projects will be evaluated to ensure compliance with this Plan and environmental reviews will be completed as appropriate. Chapter 8 contains more information about the implementation of this Management Plan.
1 Introduction

The Cosumnes River is the last large river in California’s Central Valley with relatively natural and unregulated stream flows that vary from higher winter-spring flood flows to reduced or intermittent summer flows (Booth et al. 2006; Fleckenstein et al. 2004). With a watershed of nearly 1,300 square miles, the Cosumnes River is a small, low-gradient river whose headwaters begin at 7,500 feet above sea level and whose course from the Sierra Nevada to the Sacramento–San Joaquin Delta is a mere 80 miles long. The Cosumnes River is more important than its size would indicate. In its lower reaches, on its way to the confluence with the Mokelumne River and the San Joaquin Delta, the Cosumnes River flows through a landscape composed of a rich array of native trees and plants, diverse aquatic habitats, productive row-crop agriculture and pasture lands, and rural homes and businesses.

The Central Valley once contained vast expanses of native streamside forest and wetland habitat. Along with cottonwoods (Populus spp.), willows (Salix spp.), ash (Fraxinus spp.), and other flood-compatible trees, great forests of valley oaks (Quercus lobata) studded its fertile floodplains. The rich river bottom soil that nourished the streamside forests and wetlands was also coveted by early settlers who, beginning in the mid-to-late 1800s, cleared most of the land and drained nearly all of the wetlands for agriculture. Today, only tiny remnants of the once abundant streamside forests and wetlands can be found in the Central Valley. Along the lower Cosumnes River, only small stands of valley oaks have survived. These groves cover only 1,500 acres or so but, along with the remaining patches of other streamside forests and wetlands, they continue to provide habitat for wildlife within an ever-increasing urban and agricultural landscape.

While the Cosumnes River, its floodplain, and upland habitat are closer to a natural state than any other river in the Central Valley, the watershed still faces threats to its biological integrity. The greatest threat is habitat loss and fragmentation as a result of continued urbanization and agricultural conversion. Other threats include groundwater depletion, land conversion to more intensive agriculture, introduction of non-native species (especially invasive plants), alteration of the hydrologic regime, levees that prevent winter floods from reconnecting the river and floodplain, and altered disturbance regimes in vernal pool grasslands and in chaparral and oak woodland.

The Cosumnes River Preserve was created not only to protect the last remaining stands of valley oak forests, but also to protect and restore Central Valley wetlands; wetlands that once supported millions of migratory waterfowl and waterbirds such as the greater sandhill crane (Grus canadensis), a species listed as threatened by the State of California, and the northern pintail (Anas acuta), a species of special concern. In fact, up to 60 percent of the Pacific Flyway bird species and 20 percent of continental waterfowl populations winter in or migrate through...
the Central Valley (Central Valley Joint Venture 2006). This makes the Cosumnes River Preserve a critical stopover or wintering area for these migrating birds.

Waterfowl and waterbirds are not the only species benefiting from the Cosumnes River and the creation of the Cosumnes River Preserve. Chinook salmon (Oncorhynchus tschawytscha), Pacific lamprey (Lampetra tridentata), and other native and non-native Delta fish still spawn and rear offspring in the shallow waters. The giant garter snake (Thamnophis gigas), a state- and federally listed threatened species, inhabits tributary creeks and sloughs; and California tiger salamanders (Ambystoma californiense), vernal pool tadpole shrimp (Lepidurus packardi) and vernal pool fairy shrimp (Branchinecta lynchi), other federally threatened and endangered species, still breed and survive in vernal pools located throughout the Preserve’s extensive grassland areas.

1.1 PURPOSE OF THE COSUMNES RIVER PRESERVE

1.1.1 Brief History and Setting

The Cosumnes River Watershed Project began in 1984 with The Nature Conservancy’s purchase of an 85-acre parcel of rare riparian valley oak forest along the Cosumnes River. This acquisition was followed by the purchase of an additional 320-acre parcel by Ducks Unlimited. In 1987, following a second land acquisition by The Nature Conservancy, the two organizations partnered to establish the 1,000-acre Cosumnes River Preserve (Preserve). Between 1989 and 1994, the U.S. Bureau of Land Management (BLM), California Department of Fish & Game (DFG), Sacramento County, and California Department of Water Resources (DWR) all joined The Nature Conservancy (TNC) and Ducks Unlimited (DU) as formal Preserve Partners. In 1994 the Cosumnes River Preserve Visitor Center opened and the first Cooperative Management Agreement was signed by the Preserve Partners. Following a devastating fire, the Visitor Center was re-opened in 1997. The University of California, Davis (UC Davis), began a formal research program at the Preserve in 1998. The Preserve now consists of 60 properties, bringing the total acreage to nearly 46,000 acres owned in fee title or through conservation easements.

1.1.2 Vision

The Cosumnes River Preserve Partners envision the permanent protection of a continuous riparian corridor extending from the Cosumnes headwaters to the Delta, including adjacent floodplain and wetland habitats and a vast vernal pool grassland complex supporting endangered species. The Partners will utilize stewardship and compatible ranching and farming activities as methods to sustain native plant and wildlife communities and the processes that perpetuate a dynamic mosaic of habitats. We will provide opportunities for people of all ages to appreciate the flora and fauna of the Cosumnes River Preserve and to experience being part of a natural landscape.

1.1.3 Mission Statement

“We seek to protect and enhance the habitat within the Cosumnes River Preserve project area, including riparian forest, wetland, vernal pool grassland, oak woodland, riverine, marsh, and
farm habitat, in order to preserve biodiversity and benefit declining, threatened, and endangered species of wildlife and plants. We attempt to accomplish this using a cooperative management approach by developing both short- and long-term integrated conservation and management projects, as well as supporting policies compatible with our goals. We believe that effective conservation integrates the preservation of natural lands as well as agricultural lands and practices” (Cosumnes River Preserve 1996).

1.1.4 Site Significance: Cosumnes River Preserve

SITE VALUES AND SIGNIFICANCE OF THE PRESERVE

A) Eco-Reserve Designation

Section 1580 of the Fish and Game Code allows the Fish and Game Commission to acquire, designate, and manage property to protect threatened and endangered plants, animals, and specialized habitat types as “Ecological Reserves.” On October 3, 2003, the Commission held an adoption hearing to approve designation of 11,895 acres of the Cosumnes River Preserve as an Ecological Reserve in order “to protect great valley oak riparian forest, coastal and valley freshwater marsh and vernal pools” for numerous species of plants, birds, and animals.

B) Important Bird Area by Audubon Society

The Preserve has been designated as a “Globally Important Bird Area” by the National Audubon Society and the American Bird Conservancy. California’s Important Bird Area (IBA) Program is part of a worldwide effort to identify and protect sites deemed most critical to birds. Begun in the mid-1990s as a volunteer-driven effort, and expanded in 2000 into a fully-funded research project, the program has identified approximately 150 IBAs.

California Partners in Flight’s Riparian Bird Conservation Plan for California designated 14 priority species recommended as focal species for research and monitoring, 10 of which are present at the Preserve.

C) Western Shorebird Hemisphere

The Preserve lies in the heart of California’s Central Valley, which has been deemed “an internationally significant area for wintering and migrating shorebirds” by the Southern Pacific Shorebird Conservation Plan. After the Great Salt Lake in Utah, the Central Valley is the second most important inland site for shorebirds on fall migration. Restored and managed wetlands are among the most important shorebird habitats in the Valley today. Of the more than 250 species of birds occurring at the Preserve, at least 34 are shorebirds.

D) National Natural Landmark

A portion of the Preserve’s valley oak riparian forests is designated as National Natural Landmarks by the National Park Service.
STATE AND REGIONAL CONTEXT

The Preserve is centrally located in California on the edge of the Sacramento–San Joaquin Delta, approximately 20 miles south of the greater Sacramento metropolitan area. With the State’s population nearing 38 million (CA Dept. of Finance 2007), providing clean water, food, education, land for homes, recreational opportunities, and open space to the State’s residents are challenges facing many federal, state, and local agencies, including the Preserve Partners. The Preserve serves as a model in the Sacramento region for developing win-win solutions that foster pioneering techniques and partnerships in the agricultural sector, innovative water management practices, multi-organization collaboration, and innovative ecosystem restoration methods.

1.1.5 Cooperative Management Agreement

A Cooperative Management Agreement (CMA) was first entered into in April 1994. It was amended on August 15, 1996, to include additional Partners as signatories to the agreement. Today, the BLM, DFG, Ducks Unlimited, the Sacramento County Regional Parks, The Nature Conservancy, and the DWR are signatory Partners to the agreement (Partners). The California State Lands Commission is a land-owning partner at the Preserve, and the Wildlife Conservation Board and Natural Resources Conservation Service hold conservation easements at the Preserve; but as of the writing of this Management Plan, they have not become signatories to the CMA.

The CMA defines the goals, roles, and responsibilities of the above signatories for managing and administering all portions of lands currently owned by the Partners in the vicinity of the lower Cosumnes River in Sacramento and San Joaquin Counties.

The Partners recognize that their respective interests in those lands are subject to different authorities and policies, but that the CMA is intended by the Partners to define an administrative process and facilitate cooperation among them to the greatest extent possible.

PRIMARY GOALS OF THE CMA

- Cooperative management of the Preserve as a single ecological unit for the protection, restoration, and maintenance of the quality and diversity of two rare communities in California—the valley oak riparian forest and the freshwater seasonal wetlands—and their associated wildlife habitat values.
- Cooperative management of the Preserve to protect, maximize, and enhance the benefits to declining, threatened, and endangered species of wildlife and plants.
- Provide protected habitat and wintering grounds on the Preserve for migrating waterfowl and shorebirds in the Pacific Flyway.
- Protect and manage adjacent river habitats, such as grasslands, to promote growth of native flora and provide habitat for wildlife.

"I WAS RAISED IN THE CENTRAL VALLEY. THE PRESERVE GIVES YOU ANOTHER IDEA OF WHAT THE VALLEY FLOOR USED TO LOOK LIKE. WHEN YOU SIT OUT HERE AND LOOK AT THIS GROUND, YOU CAN IMAGINE ELK AND GRIZZLY BEAR MEANDERING AROUND ON THE PROPERTY."
—RICK COOPER, PRESERVE MANAGER FROM 1993 TO 2006, BUREAU OF LAND MANAGEMENT
SECONDARY GOALS OF THE CMA

- Accommodate and facilitate research, teaching, nature study and appreciation, historical and cultural interpretation, and other compatible recreational, educational, and scientific activities that are appropriate to the Preserve without detrimentally impacting its intrinsic ecological and wildlife values.
- The Partners agree that these goals may ultimately be best accomplished by integrating certain human and economic pursuits, such as agriculture, in a “buffer” area that will enhance and complement the lands’ habitat values so long as such secondary uses do not detract from the primary goals of the Preserve.
- On a case-by-case basis, facilitate mitigation for off-site habitat loss by maximizing the synergistic benefits of consolidated wildlife habitat areas, corridors, and ecological systems on the Preserve.

1.2 OVERVIEW OF MANAGEMENT PLAN

1.2.1 Definition

A Management Plan is a planning tool that serves as a roadmap for the management and use of a property’s natural resources and the development of staffing, funding, facilities, equipment, and programs needed to support that management and use.

1.2.2 Purpose and Importance

The purpose of this Management Plan is to document existing conditions, identify and prioritize needs, and describe future desired conditions for the Cosumnes River Preserve over the next 10 years. It also provides the Preserve Partners with a framework for determining budget and personnel required to implement long-term management of the Preserve over the next 10 years.
Preserve Partners developed this Management Plan in order to

- Maintain continuity of mission and vision
- Agree upon priorities and goals
- Organize information and data
- Gain consensus amongst Preserve staff and Partners
- Incorporate a broad range of input on Preserve issues through public workshops

This Management Plan considers biodiversity as a whole and is not intended to be a recovery plan or a management plan for specific individual species, nor does it dictate land use on properties located outside the Preserve. This Plan does not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisitions.

1.2.3 Process for Preparing the Plan

STEERING COMMITTEE

A Steering Committee, made up of representatives from the Preserve’s land-owning Partners, met on a quarterly basis during the planning process from March 2006 to October 2007. Participants were responsible for making basic decisions, setting the strategy and objectives, and providing oversight on the process of preparing the Management Plan as shown below in Figure 1.1: Schematic of the Planning Process. They also were responsible for holding public workshops and updating the public on the Plan’s development.

CORE WORK GROUP

A Core Work Group, composed of staff from the Partner organizations, met monthly during the planning process to provide technical work. This work included regulatory guidance and biological information, the collection of data, preparation of draft documents, completion of the Lower Cosumnes River Watershed Assessment (RBI 2006), formulation of management alternatives, and compilation of technical information for developing a management database, GIS maps, and conservation posters.

PUBLIC INPUT AND REVIEW PROCESS

Community surveys and four public workshops were conducted in 2006 to allow for public input and community involvement as part of this management planning process. This gathering of information helped the Partners better understand the concerns of the community, adjacent landowners, and Preserve volunteers, and it helped to ensure that the Preserve Partners considered those concerns during the preparation of this Management Plan.

1.2.4 Plan Organization

This Plan is organized into nine Chapters as described in the Table of Contents. Chapters 1 and 2 provide an introduction and description of the Cosumnes River watershed, the Preserve, and the Management Plan process. Chapters 3 through 8 contain the goals, objectives, and actions that will be implemented to achieve the Preserve’s Vision. These goals, objectives, and actions
are organized explicitly and hierarchically for the purposes of planning, implementing, and monitoring management actions, as well as for adjusting management over time to reflect knowledge gained via monitoring (i.e., adaptive management). Chapter 9 consists of public comments received on the draft Plan and responses to those comments.

Two **overarching goals** describe broad and long-term aspirations and form the second tier (after the Vision Statement) in the Plan hierarchy. The overarching goals are:

I. Native biological communities and the resident and migratory species dependent on them are restored and maintained to sustainable conditions and population levels.

II. Compatible uses improve stewardship of the Cosumnes River Watershed.

Sub-goals further refine and organize the goals.

**Biological sub-goals** are measures to sustain, restore, and enhance biological diversity and ecological functionality. A fundamental approach used for setting biological goals was The Nature Conservancy’s Conservation Action Plan (CAP) approach, which focused on using representative samples of ecosystems or ecological communities (course filter) as well as individual species (fine filter) as an “umbrella” to encompass the habitat requirements of many additional species, including many special status species. These representative samples are called “conservation targets.” See Chapter 3 for additional details on the CAP process and outcomes.

**Compatible Use sub-goals** are measures that describe the desired types and levels of uses (education, recreation, research, facilities) that are compatible with the overarching goals.

**Objectives** tier off the goals and can be measurable or can be in the form of a policy statement. Objectives are statements of intended results of management actions.

**Actions** are the individual projects, studies, or work elements that implement the objectives and can be useful as an aid in staff and budget allocation at the Preserve.
BIBLIOGRAPHY


Chapter 2: Description of the Cosumnes River Watershed and the Preserve

This Chapter provides background information on the Cosumnes River Watershed, on the Preserve in particular, and on a variety of planning considerations that affect the Preserve’s management. This background information sets the context for the goals, objectives, and actions that appear in later Plan Chapters. This Chapter is comprised of three main sections: Section 2.1 is “Description of the Watershed,” Section 2.2 is “Description of the Preserve,” and Section 2.3 is “Planning Framework.”

2.1 DESCRIPTION OF THE WATERSHED

The Cosumnes River watershed encompasses over 830,000 acres (1,297 square miles) and contains over 2,000 linear miles of natural waterways. The Cosumnes River watershed includes portions of Sacramento, El Dorado, and Amador Counties. Elevations range from a peak of 7,500 feet in the Sierra Nevada Mountains in Amador County to a low of slightly below mean sea level where the river terminates at the confluence with the Mokelumne River in Sacramento County, just before flowing into the Sacramento–San Joaquin Delta. Several tributaries drain into the lower portion of the Cosumnes River near the Preserve, including Deer Creek, Badger Creek, and Laguna Creek (Figure 2.1). The Preserve Partners also manage property located in the adjacent watershed of the Mokelumne River located in San Joaquin County.

The text within this section is primarily based upon the “Lower Cosumnes River Watershed Assessment” which was previously prepared for the Preserve (RBI 2006). Additionally, scientific literature, GIS data, and Preserve staff information is included herein. These sources provided information on climate, geology, hydrology, and soils characteristics throughout the Preserve and surrounding watershed. This information is provided in this Management Plan because physical processes (such as flooding) drive the biological processes (such as forest regeneration) upon which the Preserve’s diverse matrix of ecological communities depend. Information about the land cover in the watershed is provided by the Preserve’s GIS database. Both the physical and the land cover information will be helpful for those staff who are charged with implementing the actions listed in later chapters of this Plan, as well as for the general public to understand the rationale of the proposed actions.

2.1.1 Climate, Geology, Topography, Hydrology, Soil Resource

This section describes the climate, geology, topography, hydrology, and soil resource characteristics of the Preserve.

CLIMATE

Sacramento and northern San Joaquin Counties have a Mediterranean climate characterized by hot, dry summers and temperate, wet winters. A marine air influence from the Delta region to the southwest moderates the temperature extremes of the Central Valley. During the summer months (June–August), average daily high temperatures are in the mid-90s Fahrenheit (°F), and average daily lows are in the high-70s. During the winter months (December–February), average highs are in the mid-60s °F, and average lows are in the high 40s °F (NOAA 2005).
Figure 2.1: Cosumnes River Watershed
In most years, virtually all precipitation in the Central Valley falls as rain between November and April. Annual rainfall typically ranges from 22 inches in the lower Cosumnes River watershed to 60 inches in the upper portion of the watershed. Rain and spring snowmelt cause some level of flooding along the Cosumnes River each year, except during extreme drought conditions. The frost-free season is approximately 360 days annually (NOAA 2005).

Future effects of climate change are a concern, and the potential impacts of climate change are expected to be mostly negative to many of the species that inhabit the Preserve. For example, since the mid-20th century it appears that the pattern of flood timing has shifted toward more frequent early winter flooding with fewer late spring floods as described by water year types. (Booth et al. 2006; Stewart et al. 2005). Changes in flooding timing and duration could affect habitat availability and aquatic productivity of seasonal wetlands on the floodplain (Ahearn et al. 2006; Gallo et al. 2004; Grosholz and Gallo 2006). Future effects of, and solutions to, climate change may bring challenges, as well as possible opportunities, to the Preserve.

GEOLOGY AND HYDROLOGY

The Preserve is located in the Sacramento Valley in the Great Valley geomorphic province of California. The Cosumnes River watershed consists of three major river forks (North, Middle, and South) that join into a mainstem. Each river fork is comprised of a complex network of creeks, streams, and springs. The Cosumnes River is unique in that it has retained natural processes such as natural river-bank cutting, meander, and sediment transport that are characteristic of free-flowing rivers. Dams, upstream diversions, downstream flood control, mining, timber harvest, and urbanization all occur within the Cosumnes River watershed, and these in turn influence the hydrology and the ecology of the river. The Cosumnes River is generally considered to be an un-dammed river, meaning there is not a major hydroelectric dam on the river. There is, however, a small dam on Camp Creek, a tributary of the North Fork Cosumnes River, that impounds a relatively small percentage of the watershed runoff. This dam has a relatively small impact on the entire river’s flow pattern. (RBI 2006).

The relationship between natural physical processes such as flooding, human activities, and the native flora and fauna is complex and not completely understood. To better understand the Cosumnes River watershed processes, Moyle et al. (2003) defined eight distinctive segments of the Cosumnes River using a hydrogeomorphic classification of the watershed (Figure 2.2).

- Segment I is the Tidal Floodbasin segment where the river consisted of multiple shifting channels in a broad floodplain, which supported a mosaic of aquatic and terrestrial habitats. Today, farms utilize the rich tidally influenced floodplain soil and the fields are protected by low levees that do not prevent seasonal flooding. This area is the focus of major efforts to restore natural habitats, including seasonally flooded areas.
- Segment II is an Open Floodplain with no tidal influence. The river is composed of multiple shallow channels with beds dominated by sand. Riparian forest and short levees flank the river channel. River flows decline in the summer, in part due to lowered groundwater conditions along the river.
In Segment III the river is incised and meandering and is contained in a narrow valley with Pleistocene alluvial fan deposits. Agricultural levees and past attempts to stabilize banks have induced a long-term cycle of channel degradation.

Segment IV is the Lower Foothill segment where the three upper forks converge to form the mainstem Cosumnes River. Here, flows are perennial but typically low by summer. Portions of this reach were heavily altered by hydraulic mining during the late 1800s.

The upper watershed (Segment V, Lower Tributary; Segment VI, Middle Tributary; Segment VII, Upper Tributary; and Segment VIII, Mountain Meadow) includes steep-gradient, bedrock-controlled perennial streams that start in mountain meadows. Above Highway 49, the Cosumnes River is divided into three tributaries, the North, Middle, and South Forks.

**FIGURE 2.2: HYDROGEOGRAPHIC SEGMENTS OF THE COSUMNES WATERSHED**

![Hydrogeographic Segments of the Cosumnes Watershed](source: Moyle et al. 2003)

**FLOODING**

Many of the management actions recommended in this Management Plan relate to flooding and floodplain processes. Effective management of the river and its tributaries, and maintenance of associated ecosystem services, requires an understanding of the seasonal and inter-annual hydrologic variability of water flow in the channels. For this reason, basic information about flood processes and classification is provided here.
Flooding is the most critical ecological process structuring riparian floodplain systems (Florsheim and Mount 2002). It is the key process driving regeneration of riparian forest and recharge of natural seasonal wetlands that are vital to migratory waterfowl and waterbirds and numerous other flora and fauna.

UC Davis researchers have developed a method of classifying flood events for the Cosumnes River according to the events’ hydrologic, geomorphic, and ecological significance to the river’s lowland floodplain (Booth et al. 2006). Based on flood duration and peak daily flow during each flood period over a 98-year time series (1908–2005), the researchers described 12 potential flood types and found that the Cosumnes has demonstrated 10 of those types (Table 2.1). The frequency of each flood type was calculated to estimate how certain types of floods occur on the floodplain. This method of obtaining a frequency distribution of particular flood types can aid managers who are interested in restoring flood regimes to lowland rivers such as the Cosumnes.

**Table 2.1: Ten Flood Types on the Cosumnes River**

<table>
<thead>
<tr>
<th>Flood Type</th>
<th>Duration (days)</th>
<th>Magnitude</th>
<th>Peak Flow (cms)</th>
<th>Start Season</th>
<th># of occurrences</th>
<th>emp freq 1 or more</th>
<th>emp freq 2 or more</th>
<th>emp freq 3 or more</th>
<th>emp freq 4 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>&lt; 7</td>
<td>small to med</td>
<td>&lt; 100</td>
<td>All seasons</td>
<td>278</td>
<td>0.91</td>
<td>0.72</td>
<td>0.54</td>
<td>0.33</td>
</tr>
<tr>
<td>S2</td>
<td>&lt; 7</td>
<td>large</td>
<td>100-400</td>
<td>Fall to Early Spring</td>
<td>31</td>
<td>0.29</td>
<td>0.03</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>M1</td>
<td>medium</td>
<td>very large</td>
<td>&lt; 100</td>
<td>Winter to Late Spring</td>
<td>42</td>
<td>0.33</td>
<td>0.09</td>
<td>0.01</td>
<td>0.00</td>
</tr>
<tr>
<td>M2</td>
<td>medium</td>
<td>small to med</td>
<td>100-400</td>
<td>Winter</td>
<td>44</td>
<td>0.38</td>
<td>0.07</td>
<td>0.02</td>
<td>0.00</td>
</tr>
<tr>
<td>M3</td>
<td>medium</td>
<td>large</td>
<td>&gt; 400</td>
<td>Fall to Winter</td>
<td>5</td>
<td>0.05</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>L1</td>
<td>long</td>
<td>small to med</td>
<td>&lt; 100</td>
<td>Early Spring</td>
<td>20</td>
<td>0.18</td>
<td>0.02</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>L2</td>
<td>long</td>
<td>large</td>
<td>100-400</td>
<td>Winter to Early Spring</td>
<td>31</td>
<td>0.28</td>
<td>0.04</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>L3</td>
<td>long</td>
<td>very large</td>
<td>&gt; 400</td>
<td>Winter</td>
<td>12</td>
<td>0.11</td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>V2</td>
<td>very long</td>
<td>large</td>
<td>100-400</td>
<td>Winter to Early Spring</td>
<td>10</td>
<td>0.10</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>V3</td>
<td>very long</td>
<td>very large</td>
<td>&gt; 400</td>
<td>Winter to Early Spring</td>
<td>6</td>
<td>0.08</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>ALL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>479</td>
<td>0.94</td>
<td>0.88</td>
<td>0.83</td>
<td>0.70</td>
</tr>
</tbody>
</table>

Source: Booth et al. 2006

Short-duration flood types, such as S1, S2, M1, M2, and M3, are essential in jump-starting the productivity of the food web because they provide periods of disconnection throughout the flood season, which is essential for effective productivity. These floods start a positive trophic cascade in which algae and other primary producers are consumed by aquatic zooplankton, which are in turn consumed by macro-invertebrates such as ephemeropta, which are consumed by small fish, which are then consumed by larger fish such as salmon (Ahearn et al. 2006). At least one such flood occurred on average in two out of every three years during the 98-year streamflow record. At least two effective floods occurred in roughly half the years (Booth et al. 2006).

The physical variability of hydrological processes supports a diverse food web, which in turn maintains the overall biodiversity of the system. For example, the fish and invertebrates produced as a result of the flooding and food web productivity serve as eventual food items for waterfowl and mammals. In addition to the benefits of food-web productivity, floods and other hydrologic events are very important physical processes that maintain the ecological integrity of
aquatic ecosystems. For example, flooding resets ecological succession during large floods, provides ecological cues, and discourages the persistence of non-native plant species that are not adapted to natural conditions (Stewardson and Gippel 2003). Large floods export large woody debris and coarse particulate organic matter from the floodplain to the river channel and are also important avenues for energy transfer across the river–floodplain system (Booth et al. 2006).

The most serious flood events within the area of the Preserve (measured at Michigan Bar) are summarized in Table 2.2 below.

### Table 2.2 Flood History along Cosumnes River at Michigan Bar

<table>
<thead>
<tr>
<th>Date</th>
<th>Peak Flows (cfs)</th>
<th>3-Day Volume (taf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 1907</td>
<td>71,000</td>
<td>N/A</td>
</tr>
<tr>
<td>November 1950</td>
<td>27,600</td>
<td>94</td>
</tr>
<tr>
<td>December 1955</td>
<td>42,000</td>
<td>108</td>
</tr>
<tr>
<td>April 1958</td>
<td>29,300</td>
<td>69</td>
</tr>
<tr>
<td>February 1963</td>
<td>39,400</td>
<td>74</td>
</tr>
<tr>
<td>December 1964</td>
<td>37,500</td>
<td>111</td>
</tr>
<tr>
<td>January 1980</td>
<td>34,200</td>
<td>62</td>
</tr>
<tr>
<td>February 1982</td>
<td>37,000</td>
<td>78</td>
</tr>
<tr>
<td>February 1986</td>
<td>45,100</td>
<td>196</td>
</tr>
<tr>
<td>January 1997</td>
<td>93,000</td>
<td>177</td>
</tr>
<tr>
<td>December 2005</td>
<td>35,100</td>
<td>73</td>
</tr>
<tr>
<td>April 2006</td>
<td>32,600</td>
<td>90</td>
</tr>
</tbody>
</table>

Source: *USGS Surface Water for USA: Peak Streamflow

Notes
1. cfs is cubic feet per second
2. taf is total acre feet
3. Discharge is an estimate

Some of the floods summarized in Table 2.2 caused property damage to farm fields, roads, homes and related structures as a result of levee failures, land erosion, and silt deposition. However, the floods also provided ecological benefits as described above. The key to successful restoration of floodplains and habitats at the Preserve will be to find the appropriate balance between continued protection of neighboring landowners and the amount of seasonal flooding necessary for proper ecological functioning. To that end, the low-lying areas of the Preserve, and especially the restored floodplains, serve an important role in the storage of flood waters and can sometimes delay inundation of downstream areas near the Delta. This in turn can provide protection from flooding for local landowners and others downstream of the Preserve.

### Levee Breaches

As described above, the ecological productivity of the floodplain depends on the timing and duration of seasonal flooding. Natural and intentional levee breaches reconnect the river to its floodplain, which results in periodic flooding, sediment deposition and scour, and groundwater recharge. Habitat complexity is automatically generated by letting hydrogeomorphic processes sculpt the floodplain (Florsheim and Mount 2002), which then provides different microhabitats
for vegetation and aquatic biota (Crain et al. 2004; Grosholz and Gallo 2006). This consequently increases habitat diversity for birds (Wood et al. 2006) and trophic support for bats and other species dependent on emerging aquatic insects (Rainey et al. 2007).

Ecologically significant levee breaches have occurred both naturally and intentionally at the Preserve (Figure 2.3). The 1985 floods accidentally breached a levee located two miles downstream of Twin Cities Road. The accidental breach resulted in substantial sand deposition onto the floodplain. Within a few years a 15-acre area now known as the “Accidental Forest” contained a rich mosaic of 15- to 20-foot high cottonwood trees, Oregon ash, and willow thickets. By 2000, the Accidental Forest had cottonwoods over 40 feet tall, valley oak trees naturally regenerating in the understory (Tu 2000), and a variety of nesting migratory songbirds (PRBO Conservation Science 2004).

Following the 1985 levee breach, the Preserve acquired the farm field adjacent to the Accidental Forest. Following the acquisition, the Preserve conducted hydrologic modeling to determine the feasibility and outcomes of an intentional levee breach along the Cosumnes River. The modeling demonstrated that water surface elevations in the river would be reduced upstream of a levee breach because waters would spread out on the expanded floodplain (Swanson and Hart 1994). Thus, the models predicted that a levee breach would reduce flood levels elsewhere on the river.

In October 1995, the Preserve intentionally created a 50-foot gap in the levee along the Cosumnes River south of the 1985 levee breach (Figure 2.3). This reopened approximately 200 acres to natural flooding, including a 100-acre leveled farm field. Flooding first occurred in December 1995 and by March 1996, high flows had scoured the channel and deposited a 500-foot-long sand splay that was quickly covered with cottonwood and willow seedlings.

In January 1997, a massive flood struck the entire Central Valley and caused many levee breaks and extensive flooding along the Cosumnes River. This event was a record flood for the Cosumnes River, peaking at approximately 93,000 cfs, and several homes, roads, and related structures were damaged as a result. In the wake of this flood, the Preserve, local landowners, and the Army Corps of Engineers implemented a non-structural flood-management project in lieu of traditional levee repairs (Swenson et al. 2003). This 100-acre project was located north of the 1985 and 1995 levee breach project and was completed in the winter of 1998–1999. In total, the two levee breaching projects restored natural flooding to approximately 300 acres of floodplain.
Figure 2.3: Levees Near Cosumnes River Preserve

Legend
- Engineered Levee
- Agricultural Levee
- Raised Rail Road
- Paved Road
- City Limits
- Railroad
- State Route or Highway System
- Stream or River
- Major Water Body
- County Boundary
- Conservation Easement
- Fee Title
- FEMA 100 Year Flood Zone

1985: Unplanned Breach
Oct 1995: TNC Planned Breach
GROUNDWATER

Groundwater withdrawals have resulted in localized overdrafts, referred to as cones of depression, in the water table located north and south of the Cosumnes River (Mount et al. 2001). Fleckenstein et al. (2004) reported groundwater elevations as low as 79 feet below mean sea level. This is a serious problem because groundwater discharge to the river (aka base flow) is the major source of surface flow in the river during the dry season. Since the 1940s, data have shown that there has not been enough groundwater to maintain a river connection during the months of October and November (Fleckenstein et al. 2004). As shown in Figure 2.4, during the dry fall season the Cosumnes River bed dries up, blocking access to the river for salmon. This is significant for species such as fall-run Chinook salmon that are returning to spawn in the river. To allow fish migration to spawning habitat, there is a need to maintain a minimum river depth of seven inches, which corresponds to a flow of 20.13 cfs at the McConnell gage (Fleckenstein et al. 2004).

Groundwater-level decline also can result in shifts in community population structure due to variations in plant tolerance to water table depth and sediment saturations (Stromberg et al. 1996). The Cosumnes River near Highway 99 has a system of perched aquifers and low-permeability sediment layers that recharge quickly during floodplain inundation, but drain slowly (Fleckenstein et al. 2004 and 2006). Perched systems can provide a shallow water table to support riparian vegetation (Niswonger 2006). Thick riparian vegetation may, however, diminish stream seepage to perched aquifers by as much as 30 percent due to evapotranspiration losses (Niswonger 2006).

FIGURE 2.4: SEASONAL FLUCTUATIONS IN THE WATER TABLE

To solve the problem and to maintain minimum flows for salmon, the Preserve has supported an approach to add surface flows to the Cosumnes River to compensate for the groundwater withdrawals. This is referred to as “flow augmentation.” The Flow Augmentation Program has been implemented in two ways. First, a document called the “Memorandum of Agreement for the Management for Water and Environmental Resources Associated with the Lower Cosumnes River: A Collaboration of the Sacramento County Water Agency, The Nature Conservancy, and
Southeast Sacramento County Agricultural Water Authority” was signed in March 2005. This MOA has three main tenets:

- Surface Flow Augmentation: American River water resulting from an Aerojet settlement. Water transported via the Folsom South Canal would be released into the Cosumnes River channel.
- Conjunctive Use.
- Reclaimed Water Reuse.

This MOA has not yet been fully implemented. Secondly, in the interim, water was purchased in 2005 from the Environmental Water Account and utilized to enhance surface water flows in the River. The year 2006 brought high natural flows and the augmentation was not necessary.

**WATER QUALITY**

The primary water quality concerns along the lower Cosumnes River are high levels of nitrogen, phosphorus, suspended sediments, and mercury (Dahlgren, no date; Conaway et al. 2007). The Central Valley Regional Water Quality Control Board (CVRWQCB) is developing Total Maximum Daily Loads (TMDL) for total mercury and methyl mercury and a Basin Plan Amendment for mercury in the Delta.

Compliance with water quality regulations is managed by the CVRWQCB through its “Regional Board Water Quality Control Plan for the Sacramento and San Joaquin Rivers, 1998.” The Preserve is responsible for complying with federal and state water quality regulations, including the following four programs:

- Agriculture drainage (Ag Waiver Program)
- Aquatic Pesticide Program
- Water Quality Certification Program
- National Pollution Discharge Elimination System (NPDES) Phase II in designated urbanized areas

The Preserve complies with the CVRWQCB Agricultural Drainage Program via active participation and financial contributions to the Sacramento Valley Water Quality Coalition and its sub-watershed program, the South Sacramento/Amador Water Quality Alliance.

The Preserve also complies with the CVRWQCB’s Aquatic Pesticide Program. This water quality program regulates use of herbicides and pesticides within a water conveyance, detention basin, or other aquatic area via a permit process through the Regional Water Quality Control Board.

Compliance with the Water Quality Certification Program is required for activities such as dredging, filling, pipeline construction, levee reconstruction, wetland habitat improvement, pier installation, boat harbor dredging, gravel mining, flood control excavation, minor stream crossings, and other construction-related activities that are located in a wetland or “waters of the U.S.” A permit from the Regional Water Quality Control Board is required if the Preserve proposes to conduct activities such as those described above within or near waters of the U.S.
Because the Preserve is located in a rural area and does not generally alter stormwater flows, the NPDES requirements are not applicable.

**Soils**

Because the distribution of plants and agricultural crops may be dependent on soil characteristics, understanding the variety and distribution of soils is important. Soil surveys provide information about soil properties and features, including descriptions of the soils, maps of their locations, and a discussion of their suitability, limitations, and overall management concerns for specified uses. Figure 2.5 illustrates the distribution of 39 different soil components across the Preserve (USDA 1993).

### 2.1.2 Watershed Land Cover

Land cover types were classified into 25 different categories throughout the watershed by combining several previously existing GIS datasets for Sacramento, Amador, San Joaquin, and El Dorado Counties. These datasets included the California Department of Water Resources (DWR) County Land Surveys, the Central Valley Holland Vernal Pool Classification, and California GAP Analysis Layer. Since the DWR Land Survey data was not available for El Dorado County, irrigated agricultural land in this county was extracted from the LCMMP layer compiled by the California Department of Forestry and Fire Protection. Developed land in El Dorado County was incorporated from the Department of Conservation’s Farmland Mapping and Monitoring Program. The land cover GIS layer of Preserve properties underwent an additional process of review by Preserve staff and Ducks Unlimited staff. During a series of meetings, a group of Preserve staff visually reviewed land cover maps of each property and compared them to existing aerial photos. Staff also updated the land cover layer based on their knowledge of recent restoration actions or changes to farming practices on the Preserve.

As shown in Figures 2.6 and 2.7, the western part of the watershed is characterized by lowland Delta and Valley habitat types such as tule, sedge, riparian forests, and freshwater marshes located adjacent to the Cosumnes River and its tributaries. The lower floodplain has some of the best remaining valley oak riparian forest in the Central Valley. Chinook salmon spawn in the river downstream of Latrobe Falls, and native fishes rear on the seasonally flooded floodplains. Unique terrace and mudflow vernal pool systems are found embedded within annual grasslands on the eastern edge of Sacramento and San Joaquin Counties. Agricultural land, particularly irrigated agriculture, is concentrated on the fertile upland valley soils of the valley floor in the lower watershed.

The middle portion of the watershed contains blue oak (*Quercus douglasii*) woodlands, vernal pool grasslands, and mixed blue oak-foothill pine (*Pinus sabiniana*). Agricultural uses include rangeland and, increasingly, vineyards.

The eastern part of the watershed, with higher elevations, has land cover dominated by conifer forests of Ponderosa pine (*Pinus ponderosa*), incense cedar (*Calocedrus decurrens*), and Douglas fir (*Pseudotsuga menziesii*). Developed areas are located in the Cities of Galt and Elk Grove. Table 2.3 below, shows the acreage associated with each land cover category.
TABLE 2.3: COSUMNES RIVER WATERSHED LAND COVER ACREAGE

<table>
<thead>
<tr>
<th>Land Cover Type</th>
<th>Acreage</th>
<th>Square Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Infrastructure</td>
<td>2,637</td>
<td>4.1</td>
</tr>
<tr>
<td>Barren and Wasteland</td>
<td>2,382</td>
<td>3.7</td>
</tr>
<tr>
<td>Blue Oak Woodland</td>
<td>91,190</td>
<td>142.5</td>
</tr>
<tr>
<td>Blue Oak-Vernal Pool-Savannah</td>
<td>3,065</td>
<td>4.8</td>
</tr>
<tr>
<td>Chaparral</td>
<td>28,064</td>
<td>43.8</td>
</tr>
<tr>
<td>Conifer</td>
<td>254,232</td>
<td>397.2</td>
</tr>
<tr>
<td>Crops – Annual or Truck &amp; Berry</td>
<td>22,034</td>
<td>34.4</td>
</tr>
<tr>
<td>Developed</td>
<td>40,978</td>
<td>64.0</td>
</tr>
<tr>
<td>Dry Land Farmed</td>
<td>360</td>
<td>0.6</td>
</tr>
<tr>
<td>Freshwater Marsh</td>
<td>699</td>
<td>1.1</td>
</tr>
<tr>
<td>Grain and Hay Crop</td>
<td>4,477</td>
<td>7.0</td>
</tr>
<tr>
<td>Grasslands</td>
<td>180,351</td>
<td>281.8</td>
</tr>
<tr>
<td>Idle</td>
<td>3,013</td>
<td>4.7</td>
</tr>
<tr>
<td>Irrigated Pasture</td>
<td>24,365</td>
<td>38.1</td>
</tr>
<tr>
<td>Managed Marsh</td>
<td>878</td>
<td>1.4</td>
</tr>
<tr>
<td>Mixed Blue Oak-Foothill Pine</td>
<td>69,562</td>
<td>108.7</td>
</tr>
<tr>
<td>Montane Hardwood</td>
<td>17,011</td>
<td>26.6</td>
</tr>
<tr>
<td>Perennial Woody Crops</td>
<td>27,473</td>
<td>42.9</td>
</tr>
<tr>
<td>Rice</td>
<td>1,023</td>
<td>1.6</td>
</tr>
<tr>
<td>Riparian Trees &amp; Shrubs</td>
<td>5,319</td>
<td>8.3</td>
</tr>
<tr>
<td>Riparian Vegetation</td>
<td>2,379</td>
<td>3.7</td>
</tr>
<tr>
<td>Tule and Sedge</td>
<td>285</td>
<td>0.4</td>
</tr>
<tr>
<td>Urban Landscaped</td>
<td>753</td>
<td>1.2</td>
</tr>
<tr>
<td>Vernal Pool Grassland</td>
<td>42,507</td>
<td>66.4</td>
</tr>
<tr>
<td>Water</td>
<td>5,254</td>
<td>8.2</td>
</tr>
</tbody>
</table>

2.2 DESCRIPTION OF THE PRESERVE

The Preserve and associated lands encompass approximately 45,859 acres of floodplain, riparian forest, vernal pools, grasslands, blue oak woodlands, and compatible agriculture. Approximately 24,588 (54 percent) acres are held in fee title and 21,271 (46 percent) acres are held under conservation easements. The Preserve has restored approximately 1,800 acres of high quality riparian and wetland habitat (Florsheim et al. 2002). Approximately 3,000 acres of agricultural lands are seasonally flooded annually to support wintering migratory birds. (Please note that all acreages provided throughout this Management Plan are based on data contained in the Preserve’s GIS system.)

Conservation easements protect approximately 11,000 acres of vernal pool grasslands, nearly 4,000 acres of wildlife compatible agriculture, and 6,300 acres of other habitat in the Cosumnes Lowlands. Almost 90 percent of the protected lands are maintained in compatible agricultural production, including grazing, annual crops, and organic rice. More information on the Preserve property descriptions and management are included in Chapter 7.
Figure 2.5: Soils On the Preserve

Figure 2.6: Land Cover for Cosumnes River Watershed

Legend
- Stream or River
- State Route or Highway System
- County Boundary
- Blue Oak Woodland
- Blue Oak-Vernal Pool-Savannah
- Chaparral
- Conifer
- Grasslands
- Mixed Blue Oak-Foothill Pine
- Managed Marsh
- Montane Hardwood
- Riparian Trees & Shrubs
- Riparian Vegetation
- Freshwater Marsh
- Vernal Pool Grassland
- Water
- Agricultural Infrastructure
- Barren and Wasteland
- Crops - Annual or Truck & Berry
- Developed
- Dry Land Farmed
- Grain and Hay Crop
- Irrigated Pasture
- Perennial Woody Crops
- Rice
- Urban Landscaped
- Idle
2.2.1 Existing Preserve Facilities

There are currently 10 structures on the Preserve, including the Visitor Center, Farm Center, various barns and outbuildings, and private residences (Figure 2.8). Not included in this number are the existing structures on the Staten Island property. Maintenance of existing structures is discussed in Chapter 8, Operations and Maintenance.

A number of utilities cross the Preserve, including overhead power lines, telephone lines, underground gas lines, and fiber optic networks. Some of these facilities service the Preserve, in particular the power lines and phone lines, whereas others simply traverse the Preserve en route to surrounding urban areas. In addition to the structures and utilities, several public roads provide access to Preserve properties, including Twin Cities Road, Franklin Boulevard, Salas Road, Dillard Road, Desmond Road, Walnut Grove Road, New Hope Road, Orr Road, and Staten Island Road (Figure 2.8).

The Preserve has approximately eleven miles of existing trail system, four miles located near the Visitor Center on Franklin Boulevard, and a seven-mile trail starting at Rancho Seco and looping on the Howard Ranch property. Approximately one mile of the trail system near the Visitor Center is concrete and/or boardwalk with bridges, viewing platforms, restrooms, and ramps that are all accessible to mobility-impaired visitors. The Visitor Center also has a concrete trail leading to the boat ramp that is accessible to mobility-impaired visitors. The River Walk trail is a three-mile unsurfaced trail that begins at the Visitor Center and meanders along the river. This trail is not easily accessible to mobility-impaired visitors. The Rancho Seco-Howard Ranch Trail is a seven-mile loop trail that starts and ends at Rancho Seco Park, winds along Rancho Seco Lake and up onto the Howard Ranch property. The first mile of this trail is accessible to mobility-impaired visitors.

**LEVEES**

Many of the levees that currently exist on the Preserve were originally constructed to protect agricultural fields from flooding. In the future, some of these levees will be maintained and others will be breached to allow additional seasonal flooding. Over 30 linear miles of levees exist on the Preserve (Figure 2.3). Although not shown on Figure 2.3, Staten Island is completely surrounded by levees.

2.3 **Planning Framework**

Planning for the Preserve encompasses issues that cross regional, local, and project-area boundaries. This section identifies the federal, state, county, and local agency policies and other planning influences that affect the function and management planning of the Preserve.
The Preserve is unique in that it includes numerous Partners who each rely on their own set of institutional policies and plans. Together, these form a complex web of policies and other influences that need to be identified and coordinated to achieve mutual goals. The success of the Preserve is based on the premise that partnerships and cooperative planning will continue into the future.

As part of the planning process for this Management Plan, the Partners formed a “Planning Framework” Subcommittee which met several times in 2006 and early 2007 to collect data on the numerous planning efforts that affect the Preserve. They identified three major categories of planning efforts: Water Planning, Land-Use Planning, and Habitat Planning. Within these categories they identified a total of 22 separate planning processes. In the future, Preserve staff will continue to assess whether a particular planning effort is consistent with the Preserve’s mission, vision, and goals. It is not the intent of the Partners to insist that other planning efforts share the same mission, vision, and goals; rather, the strategy is to support areas of mutual benefits among the planning participants that will move the effort towards increased compatibility with the implementation of this Management Plan.

2.3.1 Transportation Corridors

Two major highways, Interstate 5 (I-5) and State Route 99 (SR99), cross the Preserve in a north/south direction. These two highways carry high traffic volumes and both have numerous interchanges that have recently been modified and/or are planned to be modified to support new residential and commercial development in the region (Figure 2.10).

Franklin Field, a general aviation facility, is located northwest of Twin Cities Road and east of Bruceville Road. Originally established in 1943, the airport is currently operated by the Sacramento County Department of Airports. The Airport Land Use Commission adopted a Comprehensive Land Use Plan for Franklin Field in December 1988 and amended it in December 1992. This plan contains restrictions on building heights, noise, and safety hazards. Interactions between birds and aircraft may be a concern, particularly if aircraft activity increases in the future.

Mustang Airport is a public-use airport located near the intersection of Arno Road and Valensin Road, in Sacramento County’s Southeast Community Planning Area. The airport consists of a runway, executive and “T” hangers, tie-downs, aircraft maintenance, flight instruction, fuel storage, aircraft sales, and pilot supplies. Plans to expand aircraft activity at this airport have been proposed and are being reviewed by Sacramento County. This expansion will likely adversely impact the habitat surrounding the Mustang Airport and ideally those impacts will be analyzed in the project’s CEQA document. The Preserve Partners have submitted numerous comments to the County over the years regarding the potential for bird-aircraft strikes and other potentially negative impacts to wildlife if the airport is allowed to expand its operations in the future. Specifically, the airfield is close to a known heron and egret rookery at Horseshoe Lake,
Figure 2.8: Structures and Public Roads on the Preserve

Legend:
- Railroad
- Roads
- Public Roads
- Conservation Easement
- Fee Title
- County Boundary
- 500 Feet

Key:
- BLM Shop
- Pole Barn
- Private Residence #1
- Private Residence #2
- Visitor Center
- The Shack
- Equipment Pad
- Private Residence #2
- Farm Center
- Pole Barn
- Private Residence #2
- Pole Barn
- Visitor Center
- The Shack
- Equipment Pad
- Private Residence #2
- Farm Center
- Pole Barn
- Private Residence #2
- Pole Barn
- Visitor Center
- The Shack
- Equipment Pad
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- Visitor Center
- The Shack
- Equipment Pad
- Private Residence #2
- Farm Center
- Pole Barn
- Private Residence #2
- Pole Barn
- Visitor Center
- The Shack
- Equipment Pad
- Private Residence #2
- Farm Center
- Pole Barn
- Private Residenc
Figure 2.9: Managed Wetlands on the Preserve
Figure 2.11: City Planning Boundaries

Legend
- Railroad
- Roads
- Stream or River
- Preserve Properties
- Proposed Boundaries
- Proposed SOI
- Existing Boundaries
- Sphere of influence
- Urban Service Boundary
- City Limits
- County Boundary

Source: City of Elk Grove, 2007; City of Galt, 1990; and Sacramento County 1993 and 2007.
and it is adjacent to pasture and agricultural fields that are used regularly by flocks of waterfowl and other large waterbirds such as the greater sandhill crane, a species listed as threatened by the State of California.

Several railroad corridors pass through and near the Preserve as shown in Figures 2.10 and 2.11. The Union Pacific and Central Traction Railroad lines are used primarily for the transportation of goods (City of Elk Grove 2003).

**Urban Interface Issues**

The Central Valley is growing rapidly, with population increasing almost 50 percent between 1980 and 1995 (Sokolow 1997). The Sacramento region in particular has experienced explosive growth and the population is expected to increase by 1.7 million over the next 40–45 years (County of Sacramento 1993 and 2007). Two new cities, Elk Grove to the north and Rancho Cordova to the northeast of the Preserve, are poised to expand beyond County growth limits (City of Elk Grove 2003 and 2007). The City of Elk Grove recently approved moving forward with their Sphere of Influence study, which would move the existing Urban Services Boundary southward towards the Preserve. To the east, the City of Galt is also growing, albeit more slowly (City of Galt 1990), as shown in Figure 2.10 and 2.11.

Ranchette development, generally defined as low-density rural development on 2-acre to 20-acre parcels, continues to fragment the agricultural landscape; landscape that serves as a buffer land between the Preserve and the urban areas. The trend projected in Sacramento County is continued residential development and concomitant loss of farmlands (~2 percent annually). This will significantly increase demands on water supply, including groundwater. Residential growth is also accelerating in the foothills to the east in Amador County along Highway 49 and other road corridors (The Nature Conservancy 1992). New development of residential, commercial, industrial, or public infrastructure within the Cosumnes River watershed has the potential to negatively impact the Preserve’s natural resources via the following mechanisms:

- Increased impervious surfacing (*i.e.*, concrete and asphalt), with corresponding changes to hydrological patterns and water quality.
- Increased habitat loss and fragmentation. Because habitat area and dispersal corridors correlate with species and genetic diversity, the potential exists for a decline in species richness and abundance as a result of local population extirpations and/or local or species-wide extinction.
- Increased loss of wildlife due to conflicts with human activities (*e.g.*, road kill, bird collisions with power lines, etc.).
- Increased impacts from non-native invasive species (*e.g.*, weeds, cats, rats, etc.).
- Decreased ability to utilize compatible habitat management tools such as prescribed burning and grazing.

Increasing development continues to fragment and degrade habitat, including wildlife-friendly agriculture. Continuing fragmentation and degradation of habitat (both natural and surrogate agricultural lands) will erode ecological function of the larger landscape by isolating populations, disrupting species movements, altering ecosystem processes, increasing edge effects, and
decreasing species richness (e.g., Hansen et al. 2005; MacArthur and Wilson 1967). In particular, this threatens species that cross eco-tones (areas of transition between two habitat types or ecosystems) and depend on upland habitat areas like agricultural lands as well as protected riparian and wetland habitat (e.g., Semlitsch and Bodie 2003).

Some of the potentially negative impacts can be mitigated through careful selection of development envelopes and through appropriate site design. Cumulative regional impacts are more difficult to mitigate and will be tracked by Preserve staff as staffing and budgeting constraints permit. Appropriately planned development could provide new opportunities to share stewardship responsibilities and to increase public support for the Preserve’s programs. Balancing the potential positive effects with the potential negative effects of new development will be an ongoing effort over the long term for the Preserve.

**NEARBY RESERVES**

The south Sacramento County region contains several parks, wildlife refuges, and public open space areas (Figure 2.13). The open space areas shown on this map include:

- City parks and playgrounds in the Cities of Elk Grove, Sacramento, and Galt
- Stone Lakes National Wildlife Refuge
- Yolo Basin
- Natomas Basin Conservancy
- SMUD’s Rancho Seco Preserve
- Sacramento Regional County Sanitation District
- Private mitigation sites
BIBLIOGRAPHY


Sacramento County.  2007.  The 2007 Transportation Improvement and Program Guide Sacramento County Department of Transportation Municipal Services Agency.


