Feasibility Study for a Sacramento-San Joaquin Delta National Heritage Area

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National Park Service Review Draft

Delta Protection Commission

January 2012

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Executive Summary

In fall 2009, the California State Legislature passed a comprehensive package reforming governance of the Sacramento-San Joaquin Delta and related aspects of statewide water management. In Section 85301 of Senate Bill X7-1 (SBX7-1), the Legislature charged the Delta Protection Commission (DPC) with developing:

> *"A proposal to protect, enhance, and sustain the unique cultural, historical, recreational, agricultural, and economic values of the Delta as an evolving place....The Commission shall include in the proposal a plan to establish state and federal designation of the Delta as a place of special significance, which may include application for a federal designation of the Delta as a National Heritage Area."*

This feasibility study serves as the 'application' for NHA designation. Upon acceptance of this study by the DPC, it will be submitted to a Delta Congressional Representative for presentation to Congress for consideration of a Delta NHA.

During the course of this process, a separate effort was initiated to establish a Delta NHA. In January 2011, Senator Dianne Feinstein introduced legislation into the Senate, with companion legislation introduced into the House of Representatives by Congressman John Garamendi to designate a Delta NHA, with the DPC as the management entity. The DPC has been monitoring the progress of this legislation while continuing to work on this feasibility study.

A NHA is a place designated by the United States Congress where natural, cultural, historic and recreational resources combine to form a cohesive, nationally-distinctive landscape arising from patterns of human activity shaped by geography. These areas tell nationally important stories about our nation and are representative of the national experience through both the physical features that remain and the traditions that have evolved within them.

The DPC developed this study with a process that incorporated public involvement throughout its entirety. A variety of activities were undertaken to acquire stakeholder input, including: public meetings, public presentations, stakeholder interviews, public review memos, and project study team meetings.

Proposed mission and vision statements for a Delta NHA have been developed as part of this study. The proposed mission is to: *'recognize, enhance, and promote 'Delta as a place' to help cultivate and retain appreciation and understanding of the Delta as an ecological, agricultural, recreational, historical, and cultural treasure.'* The proposed vision is '*a regional network of partner sites, with interpretive/educational components, that will be linked where possible and serve as the primary attractions, on existing public properties or on private properties with the voluntary consent and involvement of the landowners.'*

Project goals have also been identified. The first goal of a Delta NHA is to *'brand the Delta as a region of national significance to educate the public about 'Delta as a place', and build more support for preserving, protecting, and enhancing the Delta*.' Other goals are related to economic development, public access, historic preservation, interpretation, and more.

Utilizing public input, five proposed themes have been developed which explain the Delta's national significance:

1) At the heart of California lies America's inland Delta.
2) Conversion of the Delta from marshland to farmland was one of the largest reclamation projects in the United States.
3) Multi-cultural contributions and experiences have shaped the Delta's rural landscape.
4) The Delta, California's Cornucopia, is amongst the most fertile agricultural regions in the world.
5) The Delta lies at the center of California's water resource challenges.

This study discusses four management alternatives: current practices, a Delta NHA, a state designated Delta heritage corridor, and a locally designated Delta Heritage Area. The implications of each of these management alternatives are discussed.

Two conceptual boundary alternatives are outlined in this study. The first boundary alternative was developed by the DPC through identification of the geographical range of heritage resources which support the proposed theme. This boundary alternative includes the Primary Zone of the Legal Delta, as well as add-ons which are adjacent to the Primary Zone. The second alternative is the boundary included in the Delta NHA legislation that was introduced in 2011 to the Senate (Feinstein) and House of Representatives (Garamendi), and includes much of the Legal Delta as well as Carquinez Strait and Suisun Marsh. Based on input received from a variety of different ways, DPC staff has made the recommendation to go with the second boundary alternative, with the addition of the city of Rio Vista.

Heritage resources which support the NHA include historic and cultural sites, public lands with public access, and recreational resources. This study includes inventory lists, maps and descriptions of these sites.

The DPC is proposed as the management entity with a new or existing nonprofit, private 501c3 organization serving as a partner organization to assist with fundraising. Technical and Stakeholder Advisory committees would be developed for NHA management in order to bring the diversity of perspectives and expertise to ensure that NHA activities are carried out in ways which are#ˇ1ˇ aligned with the varied interests, capabilities and infrastructure of the region. Funding capabilities are discussed and a funding matrix can be found in appendix 5. An overview is given on current DPC projects that are compatible with the NHA. Project supporters are listed, potential project partners are explained, and letters of support and partnership commitment are included in appendix 6.

Measurements to ensure full protection of private property rights are explained which include the enabling legislation, opt-out provisions, existing right-to-farm ordinances, and the DPC's Land Use and Resource Management Plan. Finally, the feasibility of a Delta NHA is discussed in the context of the federal NHA criteria which was developed by National Park Service (NPS).

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Chapter 1 –Project Background

In fall 2009, the California State Legislature passed a comprehensive package reforming governance of the Sacramento-San Joaquin Delta and related aspects of statewide water management. In Section 85301 of SBX7-1, the Legislature charged the DPC with developing:

> *"A proposal to protect, enhance, and sustain the unique cultural, historical, recreational, agricultural, and economic values of the Delta as an evolving place....The Commission shall include in the proposal a plan to establish state and federal designation of the Delta as a place of special significance, which may include application for a federal designation of the Delta as a National Heritage Area."*

This charge had its origins in the Delta Vision process, whose recommendations and Strategic Plan formed a major basis of the subsequent legislation. Importantly, the concept of NHA designation for the Delta originated not with the appointed Delta Vision Blue Ribbon Task Force, but with the 'Delta as a place' work group, which was comprised predominantly of Delta residents. Their recommendation to consider the appropriateness of NHA designation for the Delta was included in the Delta Vision Strategic Plan, and ultimately in the legislation.

During the course of this process, a separate effort was initiated to establish a Delta NHA. In January 2011, Senator Dianne Feinstein, along with Senator Barbara Boxer, introduced legislation into the Senate for the Delta to receive NHA designation. Congressman John Garamendi, with co-sponsors Reps. George Miller, Doris Matsui, Jerry McNerney, and Mike Thompson, introduced companion legislation into the House of Representatives. This legislation would designate the Delta as a NHA, with the DPC as the management entity. In that capacity, the DPC would be required to write a management plan for the Delta NHA. The DPC has been monitoring the progress of this legislation, while continuing to work on this feasibility study. The work conducted by the DPC for this feasibility study is of value for both the study itself, as well as forming a basis for a NHA management plan, should designation occur.

NHAs are defined by the National Park System Advisory Board as:

> *"A place designated by the United States Congress where natural, cultural, historic and recreational resources combine to form a cohesive, nationally-distinctive landscape arising from patterns of human activity shaped by geography. These areas tell nationally important stories about our nation and are representative of the national experience through both the physical features that remain and the traditions that have evolved within them."*

NHAs are inhabited regions with fully functioning economies. There is no federal management of land or federal land acquisition authority granted with the designation. NHA initiatives are planned and managed by a local entity, rather than the federal government. The NHA

designation is as much about enhancement and preservation of a region's heritage for locals as it is for outside visitors. Specific benefits of NHA designation include limited federal financial assistance, technical assistance from NPS, national recognition, the use of the NPS arrowhead symbol as a branding strategy, and opportunities to connect with other federal agencies. Obtaining designation as a NHA can help develop partnerships and leverage funds for projects such as interpretive signage, historic preservation, regional branding, heritage trail development, and more. Many NHAs have received funds from other federal agencies through a variety of programs, primarily the Department of Transportation for road and infrastructure improvements.

Once a NHA is designated by Congress, NPS staff are enlisted as partners with the management entity in planning and implementing NHA activities. NPS enters into a cooperative agreement with the management entity which is a statement of assent to mutually shared goals, which also serves as the legal vehicle through which the federal funds can be passed to the management entities. NPS is only involved in an advisory context, and does not make nor carry out management decisions.

Contacts With Other NHAs

Prior to undertaking the feasibility study process, DPC staff had conducted phone interviews with representatives from NHAs in other parts of the country to ask some questions that Delta residents had posed when initially hearing about the concept. Interview questions were related to: NHA benefits, local concerns, federal involvement, and negative consequences. Below is a brief summary of responses. The full interviews can be found in appendix 3.

1) How have other regions benefited from NHA designation?

- Access to federal funds
- Increased capabilities to further leverage funds
- Tax revenues from increased visitor spending
- Increased clout for the region
- Partnering opportunities with NPS
- Collaboration amongst locals across government lines
- Increased recognition of the area's natural and cultural resources

2) How have decisions been made in regards to where to focus efforts on?

- Interested partners
- Public Input
- Visions that were developed in the management plan
- Available grant funds

3) Have there been any local people opposed to getting the designation?

- Generally there has been significant local support

- Some opposition at first due to concerns regarding land use, but these went away as people recognized the benefits

4) Have there been any strings attached? Any federal control/restrictions?

- None
- No new federal controls
- No power given to management entity to supersede local decisions
- Communities can opt-out if interested
- Management entity cannot purchase/own land

5) Have there been any negative consequences of getting the designation?

- None
- Support has continued to grow from local community

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Chapter 2 – Study Process

NPS has eight specific steps that are recommended for completion of a feasibility study. The eight steps are as follows:

1. Defining the study area.
2. Public involvement strategy.
3. Determination of the region's contribution to the national heritage and development of potential themes.
4. Natural and cultural resources inventories, integrity determinations, and affected environment data.
5. Management alternatives and preliminary assessment of impacts.
6. Boundary delineations.
7. Heritage area administration and financial feasibility.
8. Evaluation of public support and commitments.

This feasibility study process was developed around these eight steps, with public involvement incorporated throughout the entirety.

Best Practices in NHA Feasibility Studies

It is important to use 'best practices' for guidance and direction of NHA feasibility studies. Early on in this process, the DPC received a list from NPS of 'model examples' of existing feasibility studies, which were used to inform the development of this study. These examples included the Crossroads of the American Revolution (New Jersey), Upper Housatonic Valley (Connecticut and Massachusetts), and the Santa Cruz Valley (Arizona).

Crossroads of the American Revolution
The Crossroads of the American Revolution NHA, designated in 2006, encompasses a region of New Jersey incorporating 213 cities and towns within fourteen counties. Its feasibility study was prepared by NPS staff and also serves as a Special Resource Study and Environmental Assessment for the proposed project. The feasibility study includes an extensive overview of the Revolutionary War in New Jersey and serves as an excellent educational resource. A comprehensive public involvement strategy was undertaken which consisted of widespread individual and organizational outreach, a brochure, informational handouts, a web site, interviews, presentations, press releases, and public workshops. These methods promoted public understanding of the study and maximized the participation and contributions of interested individuals and organizations. Numerous discussions were conducted with local, county, and state elected officials; appointed boards; civic leaders; public administrators; and nonprofit organizations in the study area. The presentations were made to open space committees, chambers of commerce, business and industry associations, tourism organizations, boards of chosen freeholders, municipal governing bodies, and others.

The first set of public meetings involved the project team introducing the concept, reviewing the planning process and giving a brief description of historic events relating to the war in New Jersey. These meetings included opportunities for the public to identify their interests in the project, as well as relevant community resources and activities. A second set of public meetings was held to solicit input on themes and boundaries, identify heritage resources, and assess the desire for continued involvement in the project. Numerous letters of support as well as a petition with hundreds of signatures were collected for the feasibility study. Once the study was drafted, it was distributed for further public review.

Upper Housatonic Valley National Heritage Area

The Upper Housatonic Valley NHA is the watershed of the upper Housatonic River, extending 60 miles from Kent, Connecticut to Lanesboro, Massachusetts. The feasibility study was prepared by a NPS project team, and NHA designation was granted in 2006. The study contains a comprehensive explanation of the region's history (particularly aspects that relate to the NHA themes), an evaluation of the region according to federal criteria, management alternatives, an explanation of the public process, numerous maps and photographs, newspaper articles that covered the process, and much more. The Upper Housatonic Valley National Heritage Area, Inc. (UHVNHA) was incorporated as a private nonprofit organization in 2000 to create a formal vehicle for promoting the NHA, and served as the local working group throughout the process. Its broad membership includes the region's municipalities and cultural, historical, environmental, civic, educational, and economic development organizations. UHVNHA facilitated a participatory process to develop the feasibility study which consisted of representation including: state and local officials, historians, owners of historic sites, cultural organizations, regional planning commissions, chambers of commerce, local and regional environmental organizations, and other interested citizens. The group organized meetings, public workshops and site visits, and provided extensive published resources to NPS. By utilizing the participatory process, the working group provided critical input on key issues such as geographic scope, interpretive themes, the roles of different ethnic groups in the region, and heritage preservation opportunities.

Santa Cruz Valley National Heritage Area

The feasibility study for a Santa Cruz Valley NHA in Arizona was completed by the Center for Desert Archeology in April 2005, through a two-year grass-roots approach. A stakeholder working group met monthly and provided a solid foundation to conduct efforts such as conceptualization, obtaining local political support, public outreach, fundraising, and coordination with legislation sponsors. In order to build a coalition, the working group identified key local leaders, organizations, agencies, and interest groups. Meetings were set up with leaders or organization representatives to ask for time at upcoming board and membership meetings to make presentations about what an NHA is and how it could benefit the region. Following the presentation, presentees were then invited to join the coalition and in many cases asked to formalize their support with resolutions or letters of support. Additionally, formal resolutions or letters of support were requested from all local

governments, tribes, federal and state lands within the proposed boundaries, as well as certain state officials. These efforts proved to be successful as resolutions and letters of support were received from every local government, tribe, federal and state agency or official that was asked. County Board of Supervisors also wrote formal letters asking Senators and Congressmen to sponsor designation bills in the Senate and House of Representatives. The public outreach process was made a top priority in order to educate local residents and stakeholder groups on NHAs and collect their input for the feasibility study. Outreach methods included: a color brochure, a website, tables at local events, town hall meetings, and press releases.

Best Practices Conclusions

Based on the case studies, best practices were incorporated into this feasibility study, including the following:

1) Involve the public throughout all eight steps of the feasibility study.

Public involvement is one of the most important criteria by which NHA proposals are evaluated on and these case studies are stellar examples in which public input has been incorporated throughout the entirety of the study. In each case study, public involvement efforts resulted in immense support from a variety of stakeholders, hence strengthening the justification of NHA designation for each area.

2) Utilize and expand upon existing DPC outreach.

Since it was established, the DPC has incorporated extensive outreach to involve local groups who represent Delta interests including habitat, agriculture, recreation, and others. For the development of the Delta NHA feasibility study, the broad spectrum of stakeholders who may be interested and/or affected by the project include local, regional and statewide historical organizations, cultural interest groups, economic development groups, tourism organizations, landowners, citizen groups, and others.

3) Incorporate a variety of outreach methods.

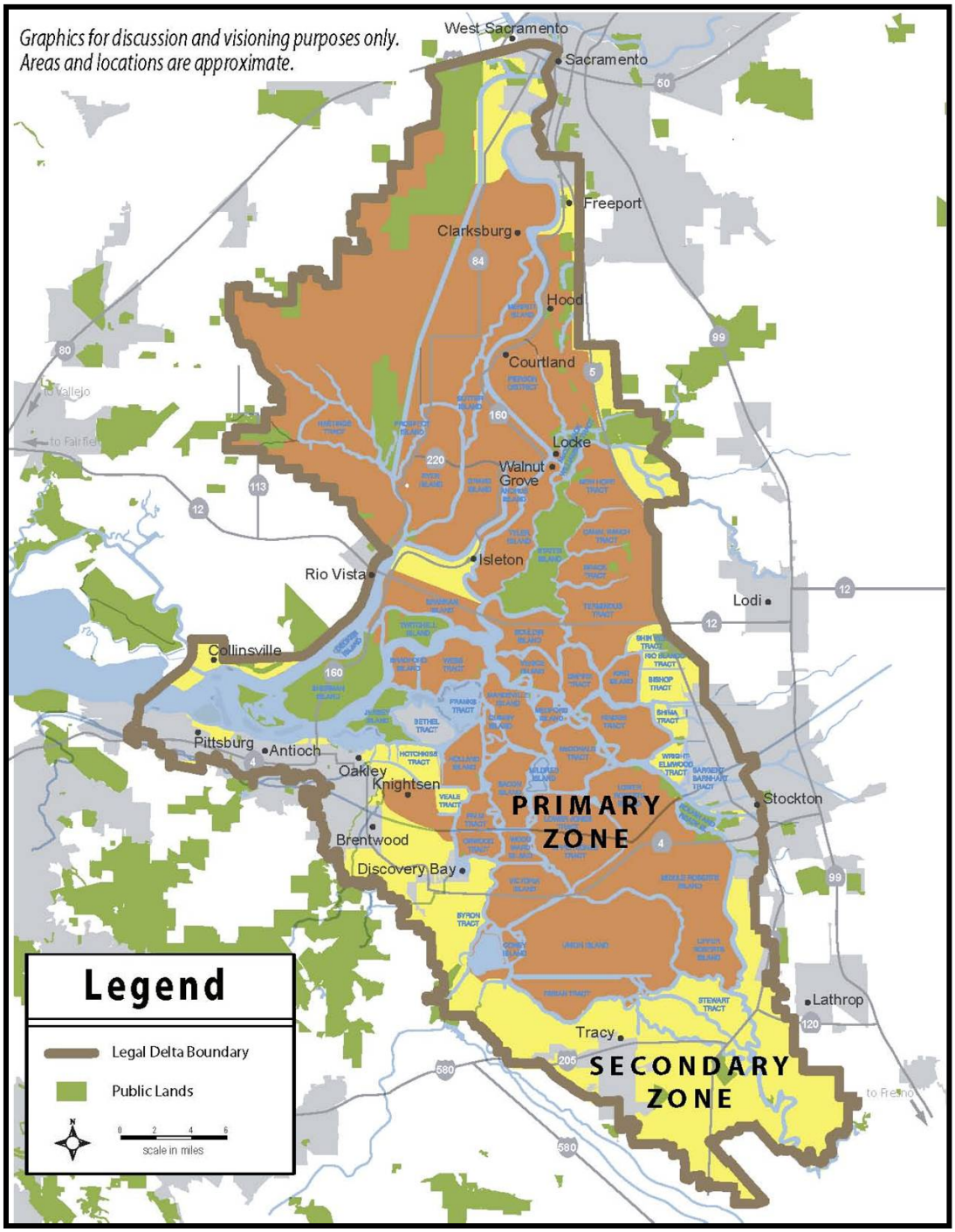
A wide variety of outreach methods are crucial to educate the public, address any questions or concerns, and provide a means for public input. These methods can include stakeholder interviews, group presentations, public workshops, handouts, press releases, and more.

4) Request letters of support from stakeholder groups and local governments.

Local public support for NHA designation is one of the most important criteria upon which NHA proposals are evaluated. Formalized documents can be extremely valuable ways to illustrate the widespread and diverse backing for the project.

Study Area

The Study Area was identified early on in the process as the Legal Delta (defined by California Water Code Section 12220 in 1965) plus the City of Rio Vista (of which a portion lies within the Legal Delta). The Study Area boundary was discussed at the project's first public meeting in 2010 and participants generally agreed that this area made sense.



The study area for this feasibility study includes the entire legal Delta, plus the City of Rio Vista.

Public Involvement

Since its inception in 1992, the DPC has utilized its membership to establish, build, and maintain a network of local stakeholders. The membership of the DPC is structured with predominantly local representation, as outlined below.

DPC Membership

Contra Costa County Board of Supervisors
Sacramento County Board of Supervisors
San Joaquin County Board of Supervisors
Solano County Board of Supervisors
Yolo County Board of Supervisors
Cities of Contra Costa and Solano Counties
Cities of Sacramento and Yolo Counties
Cities of San Joaquin County
Central Delta Reclamation Districts
North Delta Reclamation Districts
South Delta Reclamation Districts
Business, Transportation and Housing Agency
Department of Food and Agriculture
Natural Resources Agency
State Lands Commission

Local public support for NHA designation is one of the most important criteria upon which NHA proposals are evaluated, and therefore a comprehensive public involvement strategy was undertaken in the beginning of this process. The DPC utilized its existing webpage as a tool to help post and distribute information to the public. A weblink was developed specifically for the feasibility study and documents were posted regularly including meeting notices and minutes, study memos and reports, research summaries, etc. A zoomerang survey was developed and posted to the website for people wanting to submit comments or be put on the mailing list at anytime during the process. The DPC's interested parties email list, which includes hundreds of email addresses of persons from throughout the Delta, was utilized for announcements and updates. An additional email list was also developed for the NHA to assist with outreach to a number of other groups, including historical societies, cultural groups, preservation groups, chambers of commerce, tourism/marketing organizations, and more. Small postcard fliers were developed with a brief explanation on the process and how persons can become involved. These fliers were distributed in public places throughout the Delta, including the DPC's info booth at local festivals, conferences and trade shows. DPC staff also made a poster presentation on the topic at the 2011 State of the Estuary Conference in Oakland and an oral presentation at State Park's 2011 Delta recreation tour.

Stakeholder interviews were completed early on. A list of important stakeholders was developed, including persons from groups representing recreational activities, ethnic communities, wildlife habitat, local landowners, local political groups, agriculture, local businesses, and Delta history. Background information on NHAs, as well as the list of interview questions were sent prior to the interviews for stakeholders to be well informed and prepared. The interviewees were asked a number of questions including what they perceived as potential benefits or detriments to NHA designation, what types of projects they could see stemming from NHA designation, and what the potential themes and affiliated resources of a Delta NHA would be.

A local study team was also developed which included representation from different groups in the Delta, including commerce, agriculture, recreation, and local landowners. The Study Team gave input on the general timeline and scope of activities, the structure of public meetings, preliminary drafts of the study memos, and more.

Three public meetings were held throughout the process. These meetings were announced utilizing a variety of methods including the aforementioned email lists, the DPC's website, fliers, Delta enews, and press releases in local newspapers. Public meeting #1 was held in West Sacramento in June 2010 to introduce the NHA concept, discuss the proposed study area, and discuss potential benefits and concerns. Public meeting #2, held in Rio Vista in October 2010, was an interactive workshop for stakeholders to propose themes and identify natural/cultural/historic resources to support those themes. Public meeting #3 was held in Walnut Grove in July 2011, to introduce the synthesized proposed themes, introduce boundary alternatives, discuss the management alternatives, and discuss the mission, vision and goals. The final three public meetings were held in October 2011 in different parts of the Delta (Antioch, Thornton, and Clarksburg) to introduce the draft NHA feasibility study and receive input on boundary alternatives. Detailed notes were taken at the meetings and posted on the DPC website.

Numerous presentations/meetings were held throughout the process in order to further introduce the concept, answer any questions, and receive input from organizations who may be affected by, or interested in being involved with a Delta NHA. Handouts were distributed at these presentations with information on how to be involved, and mailing list sign-up sheets were passed around. Organizations who received presentations/meetings are as follows:

Antioch Historical Society
California Farm Bureau
California Preservation Foundation
California State Parks
California Travel and Tourism Commission
Central Delta Water Agency
Contra Costa County Transportation, Water and Infrastructure Committee
Delta Chambers of Commerce
Delta Citizens Municipal Advisory Council
Friends of the Great CA Delta Trail/ Ambrose Park and Recreation District
Isleton City Council
Lower Yolo Bypass Planning Forum
North Delta Conservancy
North Delta Water Agency
Pacific Inter-Club Yacht Association
Recreational Boaters of California
Restore the Delta
Rio Vista City Council
Sacramento County Board of Supervisors
Sacramento River Delta Historical Society
San Joaquin County Board of Supervisors
San Joaquin County Historical Museum Docent Council
Solano City County Coordinating Council
Solano County Board of Supervisors
South Delta Water Agency
Sportsmen Yacht Club
State Office of Historic Preservation
Striped Bass Association
West Sacramento City Council
Yolo County Board of Supervisors

Four memos were developed throughout the process on the following topics: Themes; Mission, Vision, and Goals; Boundary Alternatives; and Heritage Area Administration and Financial Feasibility. These memos served as 'seeds' of the feasibility study so that interested members of the public could review and provide feedback on specific topics, prior to the release of the draft feasibility study in its entirety. These memos were sent to the DPC's interested parties list and the Delta NHA email list, and posted on the DPC's website. Review periods for public comments ranged from 30-60 days and public meetings on the topics generally followed the review periods.

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Chapter 3 – Mission, Vision, Goals

This chapter contains the proposed mission, vision, and goals for a Delta NHA which were developed via small group discussions during this study's third public meeting.

Mission

Recognize, enhance, and promote 'Delta as a place' to help cultivate and retain appreciation and understanding of the Delta as an ecological, agricultural, recreational, historical, and cultural treasure.

Vision

A regional network of partner sites, with interpretive/educational components, that will be linked where possible and serve as the primary attractions, on existing public properties or on private properties with the voluntary consent and involvement of the landowners.

Goals

- Brand the Delta as a region of national significance to educate the public about 'Delta as a place', and build more support for preserving, protecting, and enhancing the Delta.

- Support economic development of the Delta by drawing visitors to designated partner sites, as well as local markets, restaurants, hotels, campgrounds, bed and breakfasts, hostels, farmstays, and other recreation and visitor facilities.

- Promote heritage tourism, ecotourism, and agritourism, which are aligned with existing activities, infrastructure, and land uses in the Delta. Maintain Delta agriculture, while improving public access and developing necessary visitor amenities in the Delta such as public restrooms, garbage receptacles, directional signage, and dockage.

- Make available maps of partner sites, which identify waterways and byways to connect the sites.

- Undertake and provide resources for historic preservation projects at partner sites with the consent and involvement of willing landowners.

- Develop interpretive signage to educate the public about the Delta's natural, historical and cultural heritage; and support programs which teach Delta history.

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Chapter 4 – Themes

As part of a NHA feasibility study, it is useful to develop themes which explain the national significance of a region and tell the unique stories of the place. Input on Delta NHA themes was solicited from local stakeholders via interviews and interactive public workshops. Proposed themes represent a synthesis of ideas from the public process. These were developed to be broad enough to incorporate a diversity of ideas, yet succinct enough to tell a unique story of the Delta's heritage.

Background on the Delta

The Delta lies in the heart of California and has been a vibrant center of diverse habitats, communities, industries, innovations, and infrastructure; of distinctive significance locally, regionally, statewide, nationally and internationally. The unique resources of the Delta have attracted persons from throughout the world to shape and utilize the landscape.

During the last 10,000 years, a rapid rise in sea level following the last ice age inundated the alluvial valley of the Sacramento River forming the landscape now known as the Delta. The confluence of the Sacramento and San Joaquin Rivers formed a system of freshwater and brackish marshes and from there spread a variety of habitat types: grasslands, seasonal oak woodlands, oak woodland-savannah, chaparral, and riparian, which were incredibly rich with wildlife. Native American groups inhabited the Delta, including the Wintun, Maidu and Miwok, but most died of introduced diseases prior to European settlers. Early explorers visited the Delta in the 18th and 19th centuries, and fur traders such as Jedediah Smith trekked into the region due to the abundance of wildlife such as otter, mink and beaver.

The Gold Rush era (1848-1855) is recognized as the time when the Delta was 'discovered'. Persons traveling its waters on their way from San Francisco to the goldfields of the Sierra Nevada Mountains began to recognize the fertility of the Delta's soils and the high potential for agricultural production. Reclamation began during the 1800's, and the extensive system of marshland was converted to a predominantly agricultural landscape, which the Delta remains today.

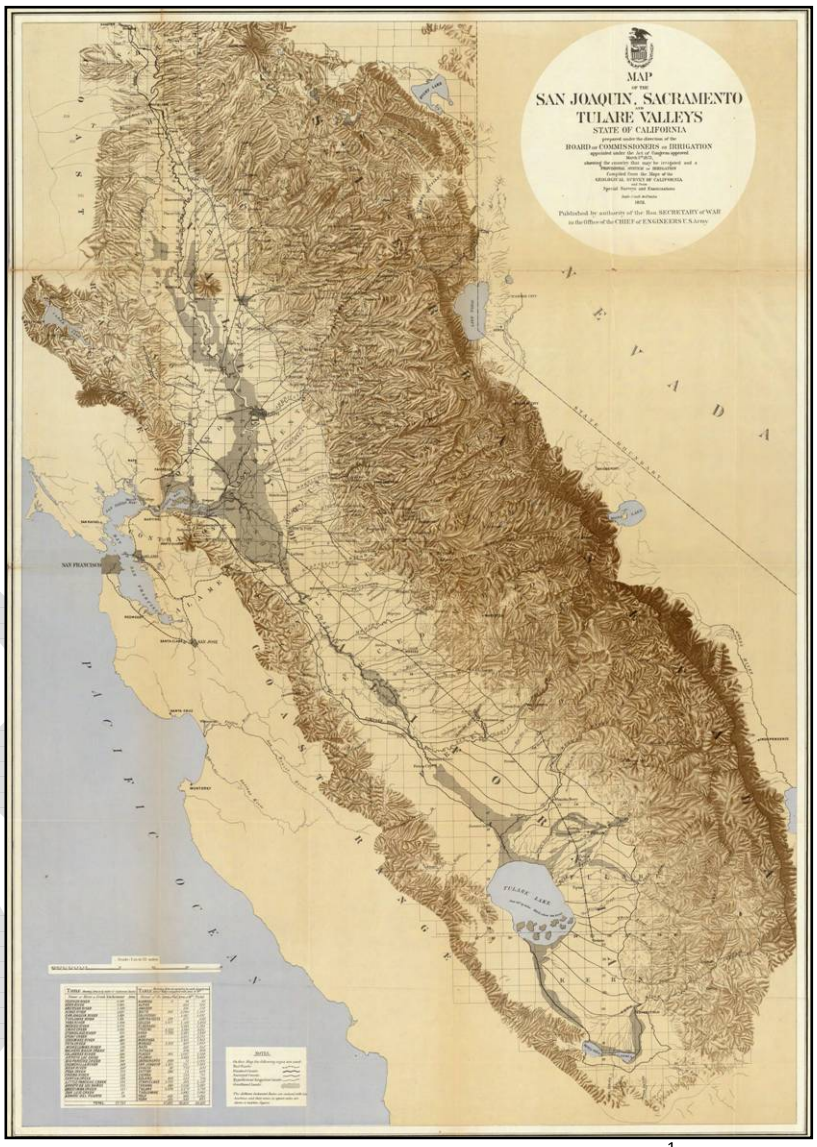
The following five themes detail the unique stories of the Delta, incorporating a broad spectrum of topics, historic and contemporary, centered around the nationally-significant aspects of the Delta's natural and cultural heritage.

<u>Theme 1</u>
At the heart of California lies America's inland Delta.

The vast size, unique shape, and geographical location of the Delta have contributed to its importance as an ecological and cultural landscape. It is a rare inland/inverse Delta, the confluence of five rivers, and the largest estuary on the West Coast of the Americas. It provides important habitat for hundreds of plant and animal species, is a key Pacific flyway stopover

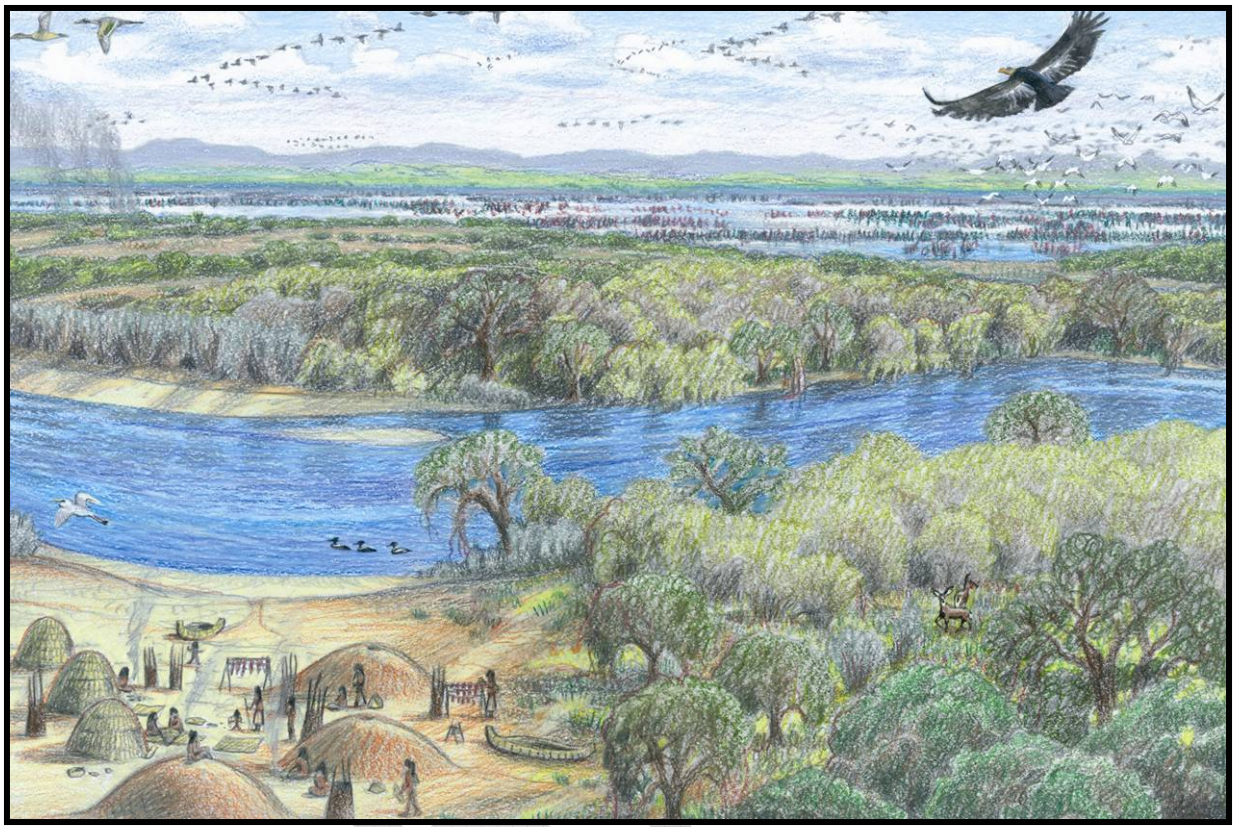
location, and an important corridor for anadromous fish. Native Americans built villages and trading posts along the banks of its waterways prior to European settlement. The waterways of the Delta have been used for recreational purposes dating back to the Gold Rush era. Many influential artists have called the Delta home due to its slower pace of life and close proximity to California population centers. While suburban sprawl has threatened the Delta landscape, legislation such as the Delta Protection Act has helped preserve the Delta's rural character.

The sheer size and distinctive shape of the Delta are landscape features which are unmatched anywhere in the world. The Bay-Delta region is the largest estuary on the West Coast of the Americas, and the second largest estuary in the United States, next to the Chesapeake Bay. The Delta's flat landscape covers about 1,000 mi^2 and is the only inland Delta in the United States, often referred to as an 'inverse Delta' as the enclosed bay is at the mouth and the deltaic formation spreads inland. The Delta serves as the confluence of five rivers: Sacramento, San Joaquin, Mokelumne, Cosumnes, and Calaveras, and has a vast watershed covering about 40% of California's land area. The large size of the Delta and its key geographical location make it an important ecological home, and an essential corridor for a vast diversity of flora and fauna. It is a key stopover location along the Pacific flyway for a wide variety of bird species. It is also an important corridor for anadromous fish, such as Chinook Salmon and Steelhead, who transfer large quantities of ocean nutrients into inland ecosystems. The rivers have supported the second largest salmon run on the west coast (excluding Alaska) and the site of the first Pacific Coast Salmon Cannery is in West Sacramento.



1873 Map Illustrating the large size of the Delta's watershed.[1]

Many Native American tribes built villages and trading posts along the banks of the resource rich Delta rivers. There are remnants of historic Miwok villages in the heart of the Delta; however, most of the Native Americans in the region died of introduced diseases long before European settlement.



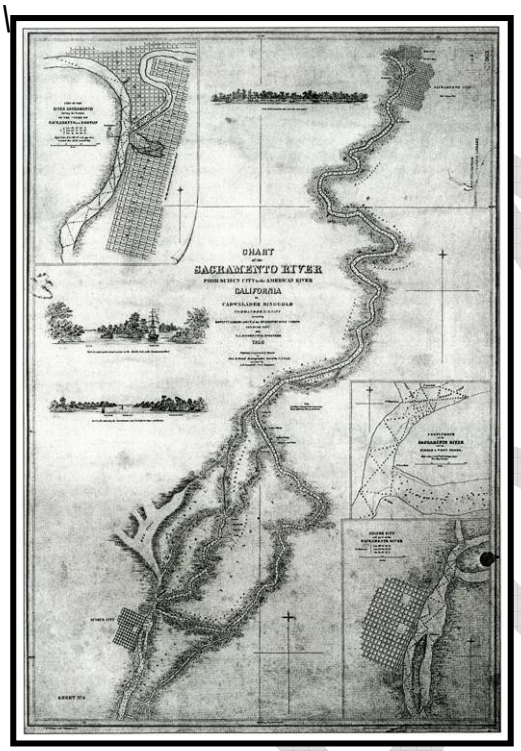
Early Spring scene along the Sacramento River in a pre-Reclamation Delta.
From Bay Nature (www.baynature.org), Original artwork by Laura Cunningham[2]

The Delta was heavily used as a corridor during the Gold Rush era (1848-1855) due to its prime location between the San Francisco Bay and the Sierra Nevadas, and thousands of forty-niners traveled its rivers on some of the finest steamboats in America. After the Gold Rush era, steamboats continued to travel the waters regularly for recreational purposes and the Delta today remains a prime location for outdoor recreation. Its 1,100+ miles of unique waterways provide opportunities for boating, wakeboarding, windsurfing, fishing, birdwatching, and more, to persons who want a leisurely retreat from urban centers that lie adjacent to it (the San Francisco Bay Area, Sacramento, and Stockton), as well as to Delta locals. Additionally, many notable artists such as Wayne Thiebaud and Gregory Kondos have called the Delta home.

Due to the Delta's location between major Northern California population centers, its flat and open terrain and its resources such as water and natural gas, it has served as an important conduit for infrastructure which is necessary for Bay Area, Sacramento Region, and Central Valley communities. Hundreds of miles of infrastructure corridors transverse the Delta

including power transmission lines, gas pipelines, aqueducts, state highways, railroads, and deep water ship channels.

However, due to the Delta's close proximity to large urban centers, suburban sprawl has been a major threat for quite some time. In the early 1990s it was identified that the valuable resources of the Delta including agricultural land, habitat, potable water, and recreational waterways were being threatened by urban development stemming from peripheral areas. To help put a halt to this problem, the Delta Protection Act of 1992 delineated a Primary and a Secondary Zone of the Delta which consist of approximately 500,000 acres and 238,000 acres, respectively. The Primary Zone is the area in which urban development is extremely limited, and includes waterways, levees, and farmed lands, extending over portions of five counties: Solano, Yolo, Sacramento, San Joaquin and Contra Costa. The Delta Protection Act is a unique approach to large scale protection of a valuable multi-resource landscape.



'Chart of the Sacramento River' used for Gold Rush Navigation, by Cadwalader Ringgold[3]

Promotional Material, circa 1911[4]

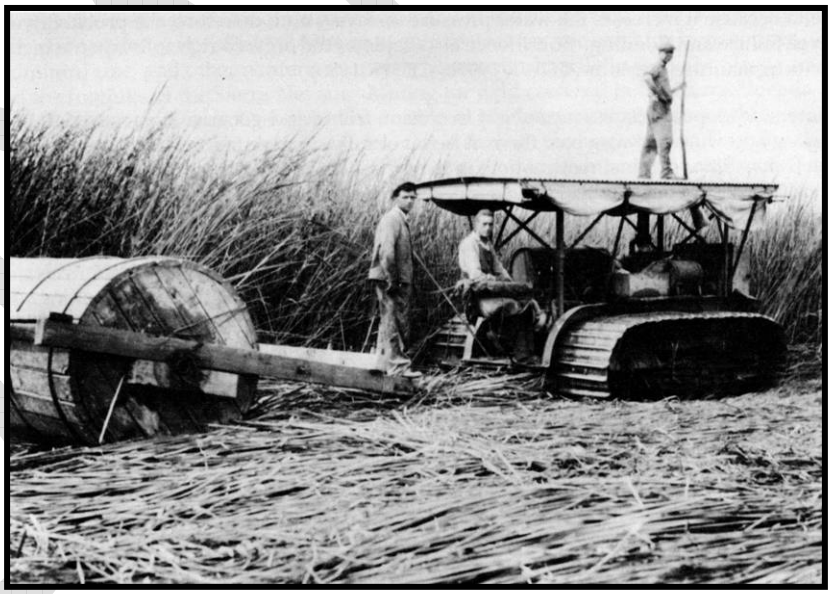
Theme 2

Conversion of the Delta from marshland to farmland was one of the largest reclamation projects in the United States.

The significant undertaking of reclaiming the Delta from a tule marsh to an agricultural landscape was one of the largest scale reclamation projects in the United States. Innovative equipment was developed for Delta reclamation and used throughout the world for a variety of purposes.

Many travelers who passed through the Delta during the Gold Rush era became aware of the region's fertile peat soils which had been developed from thousands of years of tule decay. Delta islands' had high potential for agricultural production, but in order for farming to be possible, significant changes needed to be made to the landscape. In 1850, the Swamp and Overflow Land Act conveyed ownership of all swamp and overflow lands from the federal government to the State of California, and shortly thereafter most of California's marshes were privately owned, which included almost all of the land in the Delta. The Legislature formed a Swamp Land Commission and authorized the establishment of reclamation districts.

During the reclamation era, many of the large oak trees were cut down and tule marshes disappeared as the soil was cultivated for farming. The first stage of reclamation was done primarily by Chinese laborers who built levees from the island's peat soils via wheelbarrow brigades. No larger mass of human labor was working by hand on any single project in the world, except the Suez Canal. However, it was obvious at these early stages that peat soils were not adequate levee material, and the material shrank when it dried up, which resulted in cracks being formed or levees washing away completely.



"Tule Breakers" transforming swamplands into farmland[5]

In the 1870's the sidedraft clamshell dredge was developed specifically for building levees in the Delta and surrounding areas. These steam powered dredges collected soil from alluvial channels and won out over competing machines as they were quicker than other types and generally cheaper to manufacture. This led to entrepreneurs in California introducing the world to an entirely new system of dredging. Between 85 and 90 clamshell dredges have been built

for levee construction in the central part of California and continue to be used for repair and maintenance of Delta levees. Additionally, equipment developed for Delta reclamation has been used throughout the world for a wide variety of purposes such as assisting with construction of the Panama Canal, deepening the San Francisco Bay and tributaries, dredging coral for outpost construction during World War II in several Pacific Islands, and reclaiming the Tulare Lake Basin.

Sidedraft clamshell dredger constructing levees using alluvial soil. [6]

Reclamation was complete in 1930 at which point the Delta was no longer a system of marshland, but instead the network of waterways and islands which it remains today. Around 1,100 miles of levees exist through the Delta, enclosing 57 islands which are mainly used for agricultural production.

<u>Theme 3</u>

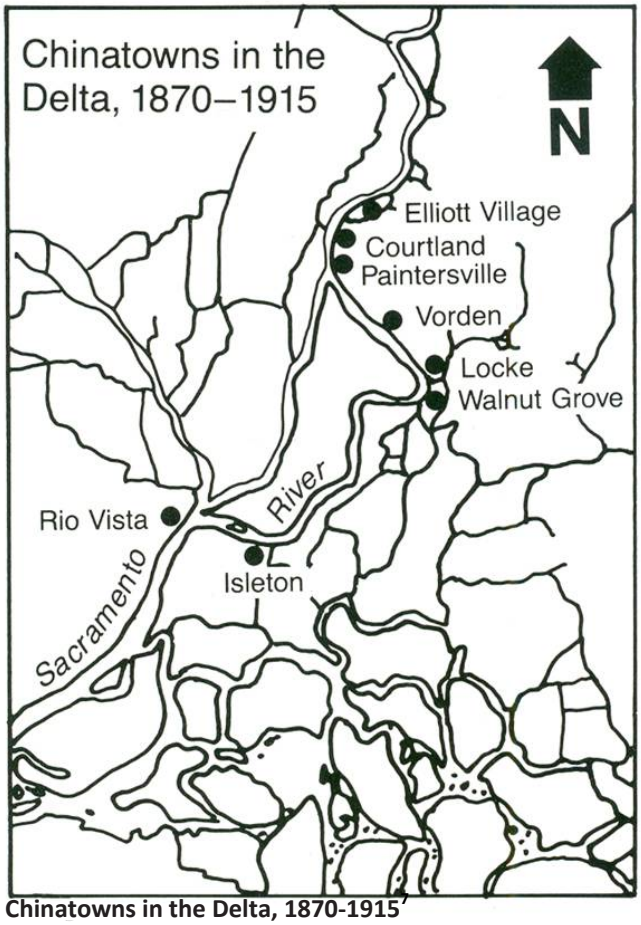
Multi-cultural contributions and experiences have shaped the Delta's rural landscape.

A number of minority groups including Chinese, Japanese, Filipinos, East Indians, Portuguese, and Italians have established communities in the Delta and made significant contributions in shaping the Delta into the agricultural landscape that it is today. A handful of historic communities in the Delta reflect the region's diverse heritage.

People of many different ethnic backgrounds have worked closely together since reclamation to make the Delta one of the most productive agricultural regions in the United States. Several ethnic minority groups have established communities in the Delta including Chinese, Japanese, Filipinos, East Indians, Mexicans, Portuguese, and Italians. The Delta likely had the largest population of Chinese tenant farmers in California, and Chinese-American farmers have maintained a continuous presence for over one and a half centuries in the Delta, though populations have declined in recent years. Around 12,000 Chinese originally came to the area

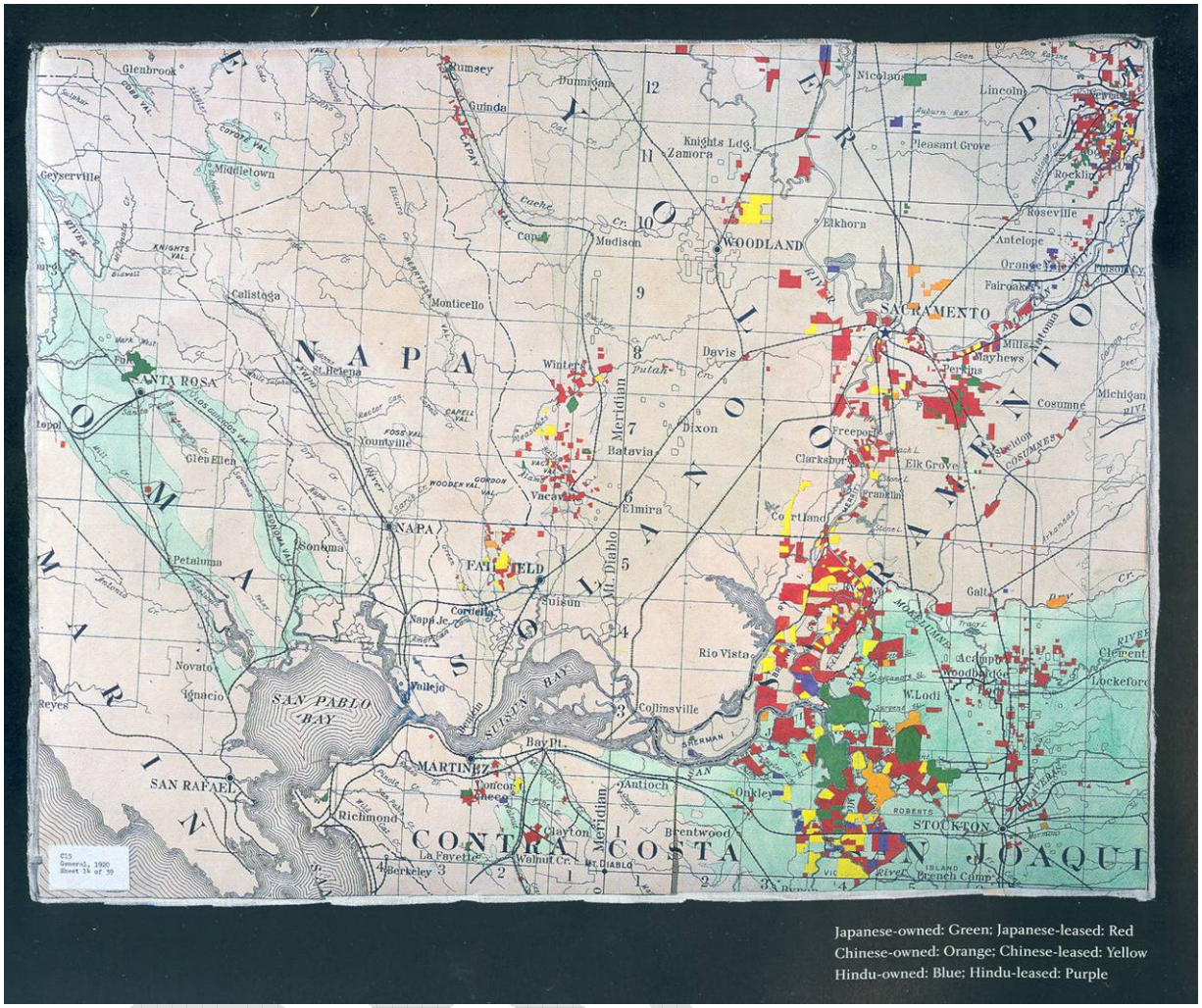
to work on the transcontinental railroad. When that project was completed in 1869, many were put to work building the first set of Delta levees using wheelbarrow brigades, and other work including tule removal and plowing. Once the land was farmable, many Chinese remained as tenant farmers and also provided essential labor in the Delta canneries.

A number of Chinatowns were developed along the Sacramento River from 1870-1915, some of which still remain in existence today as historic districts. The town of Locke is the only town which was built and inhabited exclusively by and for Chinese in the United States, and became a symbol of the Chinese contribution to the nation and the importance of Chinese to California's agriculture. Locke is a National Historic Landmark and a National Register Site. Walnut Grove and Isleton also have historic Chinese districts on the National Register, and Isleton has an annual Asian celebration to honor the town's diverse heritage. The towns of Courtland and Rio Vista also contain historic Chinese architecture.



Chinatowns in the Delta, 1870-1915

Japanese immigrants began arriving to California in the 1890s and a large number came to the Delta. Contributions to Delta agriculture from Japanese-Americans included high quality control standards and successful practices which led towards large-scale agriculture. Their aggressive and hardworking attitudes often helped them to purchase land and make significant progress economically which resulted in a widespread anti-Japanese attitude. Due to the concern that Japanese were dominating some of the 'very best lands in California,' the map of 'Oriental Land Occupation' was produced which brought attention to the large amount of land in Northern California, with particular high concentration in the Delta, that was owned or leased by Asian-Americans. This map was used to gain support for a 1920 state law that forbid even the leasing of land by Japanese, which led to other states enacting similar laws, and a 1924 federal law banning Japanese immigration. During World War II, people of Japanese ancestry were sent to internment camps, thereby eliminating the Delta's Japanese population. However, Walnut Grove and Isleton contain historic Japanese districts, both of which are National Register sites.



'Oriental Land Occupation' Map of 1920 shows large clusters of parcels in the Delta which were owned or leased by Asian immigrants. [8]

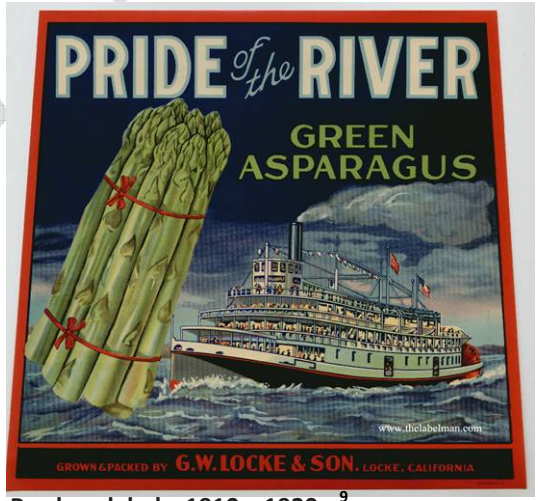
A handful of other immigrant groups have made significant contributions to the Delta. Portuguese immigrants reclaimed the areas around Clarksburg and Freeport, creating the Lisbon Reclamation District and manufacturing the first clamshell dredger. Italian settlers are widely known for fishing and farming ventures, and their impact on trade and commerce. Filipino immigrants also played a significant part in Delta agricultural labor and established strong communities.

Theme 4

The Delta, California's Cornucopia, is amongst the most fertile agricultural regions in the world.

Delta soils are highly productive and support vast diversities and quantities of crops which have contributed billions of dollars to the California economy. A number of specialty crops have been grown in the Delta and exported throughout the world, and the Delta has also been a leading center for development of innovative farm equipment.
Current agritourism initiatives are being developed to showcase the Delta's agricultural economy, and wildlife friendly farming practices are demonstrating how Delta farmland and habitat can coexist.

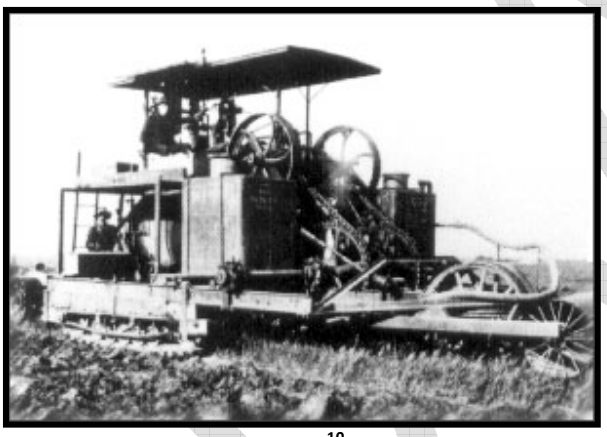
Due to the high fertility of the Delta's peat soils, the high water table, and an available water supply, the Delta has been an extremely productive agricultural region since reclamation. Water is pumped directly from Delta channels for irrigation, and 'trademark' Delta crops have included Bartlett pears, asparagus, sugar beets and Irish potatoes. A large number of other specialty crops have been grown in the Delta including peaches, plums, cherries, tomatoes, onions, peas, celery, spinach, melons, wine grapes, olives, blueberries, and more. Various seeds and grains have also been produced in the Delta including beans, wheat, sunflower seeds, and safflower. Crops from the Delta have been shipped throughout the nation, as well as other parts of the world for quite some time. The Bartlett Pear market was at its peak around World War I, at which point almost 50% of all Bartletts were produced in California, mainly in the Delta. Some of the Delta's pear trees are over 100 years old, making it the oldest pear growing region in California. Until 1930, the Delta was known as the asparagus capital of the world, growing 90% of the world's supply, for shipment throughout the United States as well as Africa, Europe and Asia. From the beginning, crops were produced for export with waterways serving as early 'highways' to transport goods to Sacramento for the mining communities and San Francisco for shipment oversees. Later, railroads and trucking were utilized to transport crops. Large corporations such as Del Monte, National Cannery, Sun Garden, Heinz Pickle, Libby McNeil, Patt Low and Golden State established canneries in the Delta.



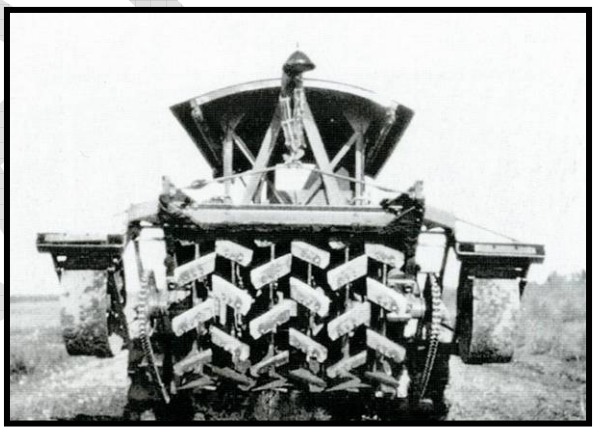
Produce labels, 1910s- 1930s. [9]

Due to the high agricultural productivity of the Delta, it was an innovative region of equipment invention which revolutionized American farming. Benjamin Holt of Stockton, invented several pieces of agricultural equipment, most notably the Caterpillar tractor which had tracks instead of wheels to alleviate the problem of tractor wheels getting stuck in the peaty Delta soils. This design was used throughout the world, for a variety of purposes, such as developing machines that helped end World War I, tumble the Berlin Wall, build the Hoover Dam, tunnel under the English Channel and help construct cities across the United States. Other notable equipment was invented in the Delta including a beet harvester, the first bean harvester, the asparagus ripper, the asparagus plow, and a number of other plows, discs, backhoes, cultivators, and subsoilers. Many of these inventions were used throughout the U.S.

Agriculture remains the dominant land use in the Delta today, and land use tools are utilized by Delta counties to preserve the agricultural landscape. Recent agritourism initiatives have helped to further enhance the economic value of Delta agriculture and to educate the surrounding urban populations about its importance. Activities in the Delta such as seasonal flooding and working landscapes projects, have ensured that farmland can also support wildlife habitat.



The original Caterpillar, 1906. [10]



Asparagus Plow. [11]

Theme 5

The Delta lies at the center of California's water resource challenges.

About two-thirds of California's residents and over seven million acres of the State's farmland rely on the Delta watershed as a source of potable water. Two major water projects, the Central Valley Project and the State Water Project, transfer water from the Delta to Southern California. The Delta relies on the availability of sufficient water flows and water quality for the vitality of the ecosystem, recreation and production agriculture.

Water transferred from the Delta plays a crucial role in sustaining the state of California, the world's eighth largest economy. Two-thirds of California's precipitation falls in the northern part of the state, while Southern California is home to two-thirds of the state's population. As groundwater and surface water supplies were not sufficient to irrigate the San Joaquin Valley and Tulare Basin, state, federal and local governments engaged in efforts, over the course of decades, to develop a plan to take water from wetter parts of Northern California to the drier part of the state in Southern California. In 1933, during the depths of the Great Depression, the federal government authorized the Central Valley Project (CVP). This led to pumping from the Delta through the Delta Mendota Canal and diversions from the San Joaquin River, which began in 1951. The CVP is the largest, and probably most controversial, water purveyor in California. Implementation of the project led to a significant loss in freshwater wetlands in the Central Valley, as more land was converted to agriculture. Dams and reservoirs were constructed for the project which blocked salmon and steelhead from reaching their native spawning grounds. It altered the timing and flow of California's major river systems, which along with pumping, has had further consequences for anadromous fish, and other native fish species, leading to their decline.

However, the 7 million acre-feet of water from the CVP did not end up being enough for the agricultural needs, as well as the increasing number of municipal and industrial users. Therefore another project, the State Water Project (SWP), was developed which also created an integrated system of dams and canals. Most of this project's water was pumped from the southern Delta into the California Aqueduct to supply water for some San Joaquin Valley farms, as well as Southern California Municipalities. Construction began in the late 1950's, with major funding approved in a 1960 bond measure. The bond measure was the largest in the nation's history (authorizing the sale of $1.75 billion in general obligation bonds), and was voter approved in 1960 by the narrowest election in the state's history. Pumps were installed at Clifton Court in the Southern Delta in 1960, and water flowed through the California Aqueduct to the south. The SWP remains the world's largest publicly built and operated water and power development and conveyance system.

An additional proposal surrounding Delta water supply was the peripheral canal in the early 1980's, which was opposed by voters on a ballot initiative in 1982. This canal would have more directly linked the northern and southern units of the CVP and SWP, but would dramatically alter Delta flows.

The water diversions of the CVP and SWP have had significant environmental impacts. River flows and water quality have declined, and native Delta fish species have plummeted to record lows at times. Federal attention has been given towards declining fish species, which resulted in legal actions to restrict water export from southern pumps. A consensus based program, called CALFED, was initiated in 1994 to bring opposing parties together, but ended up collapsing for a variety of reasons. Governor Arnold Schwarzenegger's Delta Vision process and concluded in 2008 with a suite of strategic recommendations intended to manage the Sacramento-San Joaquin Delta as a sustainable ecosystem that would continue to support environmental and economic functions that are critical to the people of California. The Delta Reform Act of 2009, SBX7-1 (Simitian) lays out a path for Delta governance to meet the co-equal goals of water supply reliability and ecosystem restoration. This included establishing the Delta Stewardship Council to develop the Delta Plan, which will be a comprehensive plan for Delta management, scheduled to be completed in 2012. The legislation also created the Delta Conservancy to carry out land acquisition and ecosystem restoration projects, and included several mandates for the DPC.

In summary, issues surrounding water resource management in the Delta have been a central focus of policy makers in California for decades, making it perhaps one of the most complex resource challenges in the United States. Mark Twain's quote: "Whiskey is for drinking; water is for fighting over" was supposedly made in California's early days, and still holds current relevancy as California's water wars continue.

CVP's Delta-Mendota Canal (left), and SWP's California Aqueduct (right) adjacent to Interstate 5 in the San Joaquin Valley. [12]

Image Credits

[1]California Irrigation Commission, United States; Congress. "Map of the San Joaquin, Sacramento and Tulare Valleys." Map. David Rumsey Map Collection. 1873. Cartography Associates. 4 Nov. 2008 <http://www.davidrumsey.com/detail?id=1-1-1635-180047&name=Map+Of+The+San+Joaquin,+Sacramento+And+Tulare+Valleys>.
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Chapter 5 – Background on the Region's Environment

Natural Resources & Special Status Species

Sacramento-San Joaquin Delta
The Delta represents the connection and confluence of a vast watershed, linking inland streams and rivers originating from the Cascade, Coastal, and Sierra Nevada ranges with the San Francisco Bay and Pacific Ocean. Approximately 40 percent of California's land area and 50 percent of its total stream flow converges at the Delta.

The ecosystem of the Delta was historically very rich, supporting abundant populations of wildlife and fish. However, native wildlife have been impacted by significant changes to the ecosystem over the past 150, including loss of habitat, loss of access to upstream habitat from dam construction, diking and draining for reclamation, urbanization, changes in flows, invasive species, pollutants, export pumping, and more. Large mammals, such as bear and elk, which historically lived in and around the Delta have either been eliminated or reduced to extremely low numbers. In recent years, pelagic fish populations, such as Delta smelt, have declined to record low levels. Salmon runs have also experienced significant declines in the Delta.

Despite the large scale changes, a number of different habitat types can still be found throughout the Delta including: intertidal wetlands, rivers, sloughs, riparian woodlands, scrub, non-tidal wetlands, grasslands, floodplains, and seasonal wetlands. With management practices such as seasonal flooding, Delta farmlands also serve as valuable habitat, particularly for resident and migratory waterfowl and shorebirds. Overall the Delta supports hundreds of species of flora and fauna, and special status species include:

- Salt Marsh Harvest Mouse, Suisun Shrew, Townsend's Big-Eared Bat, San Joaquin Kit Fox, and Hoary Bat
- Black Rail, Great Blue Heron, Snowy Egret, Sandhill Crane, Song Sparrow, Swainson's Hawk, and Burrowing Owl
- Giant Gartner Snake and Western Pond Turtle
- Chinook Salmon, Steelhead, Green Sturgeon, Delta Smelt, and Sacramento Splittail
- Elderberry Longhorn Beetle

Suisun Marsh
Suisun Marsh is the largest contiguous brackish water marsh remaining on the west coast of North America and is a critical part of the Bay-Delta ecosystem. Approximately 200 miles of levees in the Marsh contribute to managing salinity in the Sacramento–San Joaquin River Delta. The Marsh encompasses more than 10% of California's remaining natural wetlands and serves as the resting and feeding ground for thousands of birds migrating on the Pacific Flyway and resident waterfowl. In addition, the Marsh provides important habitat for more than 221 bird species, 45 mammalian species, 16 different reptile and amphibian species, and more than 40 fish species. Suisun Marsh supports the state's commercial salmon fishery by providing important tidal rearing areas for juvenile fish. Special status species include:

- Salt Marsh Harvest Mouse, Southern Sea Otter, Suisun Ornate Shrew, Harbor seal
- California Black Rail, California Least Tern, California Brown Pelican, San Pablo Song Sparrow, Western Snowy Plover
- California Red-legged Frog, San Francisco Garter Snake, Northwestern Pond Turtle
- Coho Salmon, Green Sturgeon, Pacific Lamprey, River Lamprey, Tidewater Goby

Carquinez Strait

The Carquinez Strait region is the meeting point for freshwater draining from California's inland and saltwater from the Pacific Ocean. Freshwater flows westward through the Carquinez Strait, draining the Central Valley watersheds, including the Sacramento, San Joaquin, Feather, and American Rivers. Saltwater from the ocean flows in and out with the tide twice daily. The mixing of fresh and salt water creates a transition zone, or "null" zone, which is critical to the health of the region's ecosystem.

The Strait connects the San Francisco/San Pablo Bay with Suisun Bay and the Delta. It is half-a-mile wide, eight miles long, and in places over 800 feet deep from bluff-top to bedrock bottom. Due to seismic occurrences, the channel bends sharply to the right, then back left as it opens up into the broad triangular basin of Suisun Bay.

The Carquinez Strait area is situated in the Central Coast Floristic Region of the California Floristic Province. The relative stability of the climate makes the Central Coast Floristic region one of the richer areas of endemic taxa in California. Several diverse types of plant communities are represented in the Carquinez Strait, including Foothill and Valley Grasslands, Oak/Bay Woodlands, Central Coastal Scrub, Northern Coastal Salt Marsh, Coastal Brackish marsh, and Coastal and Valley Fresh Water Marsh. Special status species include:

- Longtail Weasel, Salt Marsh Harvest Mouse, and Suisun Shrew
- American Peregrine Falcon, Salt Marsh Yellowthroat, Bald eagle, California Gull, Salt Marsh Song Sparrow
- Delta Smelt, Sacramento Splittail, Longfin Smelt
- Suisun Thistle, Bird's Beak, Marsh Gumplant, California Hibiscus, and Delta Tule Pea

Water

In California, rainfall runoff and snowmelt are captured in reservoirs to redistribute to urban and agricultural customers while meeting environmental requirements. About 75 percent of the State's water originates north of the Delta; and about 67 percent of the State's water needs occur south of the Delta.

Because the Delta drains the Sacramento River and San Joaquin River watersheds, urban stormwater runoff and waste discharges from upstream and adjacent areas enter Delta waterways and cause water quality problems. Low-flow years generally carry higher concentrations of waste discharges and agricultural runoff and drainage than do wet years.

Some treated municipal and industrial wastewater, untreated urban storm water, and agricultural runoff and drainage enter the Delta directly. Other urban and agricultural discharges from upstream in the watershed enter the Delta along with the river flows. Seepage onto Delta islands from adjacent channels and drainage from the agricultural lands are released back to the Delta channels at hundreds of locations.

The Central Valley Regional Water Quality Control Board (Board) has identified the Delta as impaired by a number of pollutants, including some pesticides, low dissolved oxygen, electrical conductivity (salinity), and mercury. Designation as an impaired water body by the Board, relevant to certain water quality criteria or other stressors, is variable depending on portions of the watershed within the Delta. Delta fish have elevated levels of methylmercury, which poses a risk to humans and wildlife that eat the fish on a regular basis.

The daily tidal cycles and the San Joaquin River contribute most of the salinity to the Delta. During periods of high Delta inflows, salinity is low; during periods of low Delta inflows, the salinity level rises. Salinity in the Delta is managed by a mix of releases from upstream reservoirs, Cross Channel Gate operations, Delta outflow, and exports from the Delta. The Delta is governed by water quality standards for municipal and industrial uses, agricultural uses, and fish and wildlife, all of which are currently under review by the State Water Resources Control Board (SWRCB). The combination of organic matter (decaying vegetation), bromide in the seawater, and disinfectants used in water treatment plants produce disinfection byproducts that may pose heath risks.

The SWRCB and the Regional Boards designate beneficial uses of the State's waters. In the Delta, beneficial uses include: municipal and domestic supply; agriculture; industry; groundwater recharge; navigation; recreation; wildlife habitat; fish migration and spawning; and preservation of rare and endangered species.

Suisun Marsh

Delta water management for agriculture, water supply diversions, and exports; and the salinity of water diverted for waterfowl habitat in the Marsh; officially became linked in the 1978 State Water Board Delta Water Control Plan and the water right decision (D-1485) Suisun Marsh salinity standards. D-1485 required the Department of Water Resources (DWR) and the Bureau of Reclamation (Reclamation) to prepare a plan to protect the beneficial use of water for fish and wildlife and meet salinity standards for the Marsh. Initial facilities included improved Roaring River Distribution System facilities to supply approximately 5,000 acres on Simmons, Hammond, Van Sickle, Wheeler, and Grizzly Islands with lower salinity water from Montezuma Slough, and the Morrow Island Distribution System and Goodyear Slough outfall to improve supply of lower salinity water for the southwestern Marsh. These initial facilities were constructed in 1979 and 1980; the required Suisun Marsh Plan of Protection was prepared and approved in 1984.

SWP and CVP projects affect Suisun Marsh salinity by regulating Delta outflow through upstream reservoir storage and releases and Delta exports. D-1485 and the currently applicable

D-1641 require DWR and Reclamation to meet various Delta outflow and salinity objectives in the Delta and in the Marsh. These objectives limit the allowable exports during some periods of relatively low Delta inflows. The State Water Board suggested in D- 1485 that "full protection of Suisun Marsh now could be accomplished only by requiring up to 2 million acre-feet of freshwater outflow in dry and critical years in addition to that required to meet other standards." This was strong motivation for DWR and Reclamation to prepare a plan of protection for Suisun Marsh that would use other facilities or management actions to provide appropriate salinity in the Marsh. The Suisun Marsh Salinity Control Gate on Montezuma Slough near Collinsville, which began operating in October 1988, were constructed by DWR and Reclamation to improve the salinity in the Marsh channels without requiring the additional Delta outflow that the State Water Board had anticipated.

Carquinez Strait

Fresh river water flows westward through the Carquinez Strait, draining the Central Valley watersheds. River and ocean water generally meet and mix around the Carquinez Strait.

Because freshwater is lighter than saltwater, the river water tends to float on top of the ocean water. Partial mixing of these waters creates a vertical salinity gradient that is greatest in the winter and in the wet years, when river flows are greater, and can extend for many miles through the estuary. This mixing zone is pushed by the tides up and down the estuary, two to six miles twice daily. Superimposed on this back-and-forth motion is a much smaller downstream flow of the freshwater surface layer, which induces an upstream return current of saltier water near the bottom. This pattern of net flow is known as estuarine or gravitational circulation. The region where the upstream and downstream currents meet and cancel out along the bottom is called the null zone.

Land Use

Sacramento-San Joaquin Delta

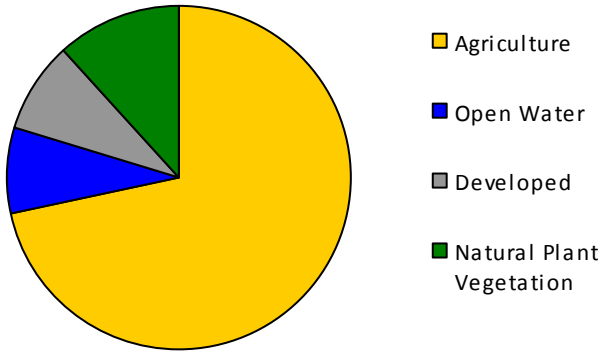
The settlement pattern of the Delta was historically, and currently remains, closely associated with the Delta's waterways, as well as the configuration of agricultural lands. The Delta is no longer the vast marshland that it historically was and instead is an agriculturally dominated landscape with a total of 1,100 miles of levees enclosing 57 islands. Due to the rich peat soils, as well as mineral soils at higher locations, the Delta's farmlands are highly productive and well suited for ongoing agricultural operations.

The Delta's Primary Zone is a predominately rural landscape as it encompasses the locations where development proposals did not currently exist and where no general plans called for growth at the time the Delta Protection Act was developed. A handful of small, unincorporated towns are in the Primary Zone, along the Sacramento River, including Clarksburg, Courtland, Hood, Locke, Walnut Grove, and Ryde. These unincorporated towns, sometimes referred to as 'legacy communities' possess a rural charm with events, local businesses, and recreational

opportunities that are attractive to visitors and locals alike. Rio Vista is located partially within the Primary Zone, but not within the Secondary Zone. The Secondary Zone consists of land at the periphery of the Delta, and contains most of the Delta's urbanized land. One incorporated city, Isleton, and portions of other incorporated cities including Stockton, Antioch, Oakley, Sacramento, West Sacramento, Elk Grove, Tracy, Lathrop and Pittsburg, are located within or just outside of the Secondary Zone.

Legal Delta's Landuse Composition[1]

Relative Proportion's of Major Landuse Types



Current and future population growth increases the demand for developable land in much of the Secondary Zone due to it being near existing population centers of the Bay Area, Sacramento and Stockton. This demand results in the conversion of open space, primarily agricultural land, to residential and commercial uses which is yielding an increase in concern about the potential for urbanization and projects in the Secondary Zone to impact the Primary Zone.

Hundreds of miles of rivers and sloughs lace the region. These waterways provide habitat for many aquatic species and the uplands provide year-round and seasonal habitat for a wide variety of terrestrial species. Some agricultural lands also provide rich seasonal wildlife habitat as thousands of acres of agricultural lands are flooded after harvest and provide feeding and resting areas for resident and migratory birds and other wildlife. Sherman Island, Twitchell Island, Staten Island, portions of the Yolo Bypass (e.g., Vic Fazio Wildlife Area) and McCormack-Williamson Tract are held as conservation lands and are currently operated as farmlands.

Suisun Marsh

The values of the Marsh have been recognized as important, and several agencies have been involved in its protection, since the mid-1970s. In 1974 the Nejedly-Bagley-Z'Berg Suisun Marsh Preservation Act was enacted by the California Legislature to protect the Marsh from urban development. It required the California Department of Fish and Game and the San Francisco Bay Conservation and Development Commission (BCDC) to develop a plan for the Marsh and called for various restrictions on development in the Marsh boundaries. In 1976, the BCDC developed the Suisun Marsh Protection Plan (SMPP), which defined and limited development within the primary and secondary management area for the "future of the wildlife values of the area as threatened by potential residential, commercial, and industrial development". The primary management area consists of tidal marshes, seasonal marshes, managed wetlands, and lowland grasslands within the Marsh. The secondary management area comprises upland grasslands and agricultural lands, which provide significant buffer habitat to the Marsh. The SMPP objectives are "to preserve and enhance the quality and diversity of the Suisun Marsh

aquatic and wildlife habitats and to assure retention of upland areas adjacent to the Marsh in uses compatible with its protection".

In 1977, the California Legislature implemented Assembly Bill (AB) 1717, the Suisun Marsh Preservation Act of 1977, which replaced the 1974 Suisun Marsh Preservation Act and calls for the implementation of the SMPP; designates BCDC as the state agency with jurisdiction over the Marsh; and calls for Suisun Resource Conservation District (SRCD) to have the primary local responsibility for water management on privately owned lands in the Marsh. In 1984, DWR with cooperation from SRCD, Department of Fish and Game, U.S. Department of the Interior, Reclamation, published the Plan of Protection for Suisun Marsh, in response to the SWRCB Water Rights Decision 1485 (D-1485), Order 7 (California Department of Water Resources 1984). The Plan of Protection was a proposal for staged implementation of a combination of activities, including monitoring, a wetlands management program for landowners, physical facilities, and supplemental releases of SWP and CVP reservoirs.

Suisun Marsh is divided between the Primary Management Area and the Secondary Management Area. The Primary Management Area consists of tidal marshes, seasonal marshes, managed wetlands, and lowland grasslands within the Marsh. The intent is for this area to remain in its existing marsh and related uses as provided for in the SMPP. The Secondary Management Area comprises upland grasslands and agricultural lands, which provide significant buffer habitat to the Marsh. Within this area, existing grazing and agricultural uses should continue, and agricultural practices favoring wildlife use and habitat enhancement should be encouraged. Current land use in the Marsh is a mixture of privately and state-managed lands. Suisun Marsh has approximately 51,416 acres of managed seasonal wetlands. Most of the properties surrounding the slough and in the Marsh are privately owned duck and hunting clubs with some public recreation lands. It is home to public waterfowl hunting areas managed by DFG (13,500 acres) and 158 private duck clubs (37,500 acres).

Carquinez Strait

In the 1840s, Mexico divided the region into large land grants. Two land grants covered most of the southern shore. Rancho Canada del Hambre, granted to Teodora de Soto in 1842, included the shoreline from Crockett to near Martinez. To the east, south and west was Rancho El Pinole, granted to Ygnacio Martinez, the Commandante of the Presidio in San Francisco, in 1823. Rancho El Pinole included the present site of the City of Martinez west of Alhambra Creek, as well as the southeastern shore of San Pablo Bay from Crockett to Point Pinole. On the other side of the Strait, Rancho Suscol which included the future sites of both Vallejo and Benicia was granted to General Mariano Vallejo in 1844. The grantees used the land mainly to graze large herds of livestock which were gathered in communal rounds-ups near the bayshore, an activity for which the town of Rodeo was later named.

An influx of entrepreneurs into the Carquinez Strait region began with the onset of the Gold Rush in 1848, the end of the Mexican-American War and the admission of California to the United States in 1850. Capitalizing on the litigious outcome of the Land Act of 1851, requiring Californiaos to prove up their claims, the newcomers bought or confiscated land from the

grantees, or married into it. With great energy, between 1849 and 1892, the towns of Benicia, Vallejo, Martinez, Crockett, Port Costa, Rodeo and Hercules were founded and platted along the shore of the Bay of the Strait.

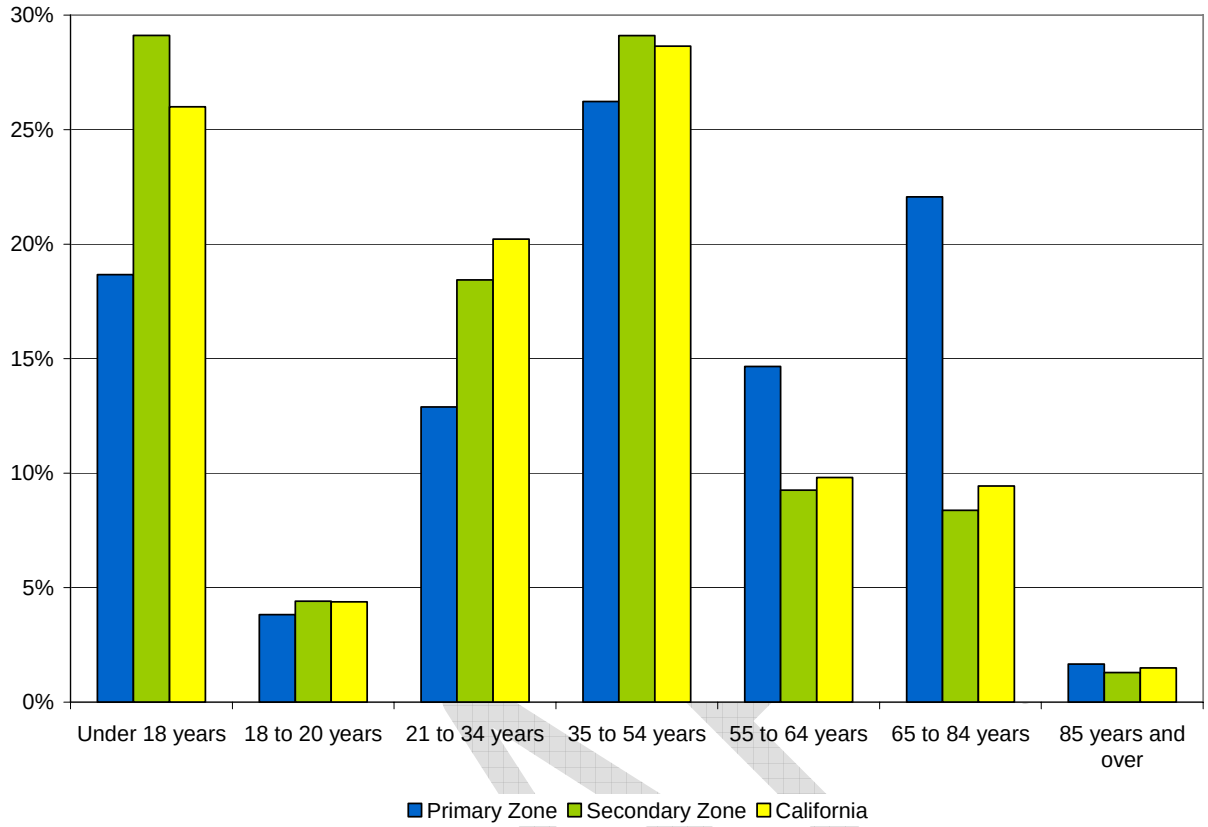
Land use in the Strait region ranges from large tracts of open space to dense urban and industrial developments along the waterfront. A number of medium to high density water front communities occur along the Strait, including Vallejo, Martinez, Benicia, Crockett, and Port Costa. Many industrial developments can also be found along the Strait, including four of California's twelve largest oil refineries – Shell, Tosco, Exxon, and Unocal. Other large industrial sites include the C & H Sugar refinery and the Energy National cogeneration plant, both in Crockett. The region also has many areas of open space developed for tourism and recreation, including a variety of municipal parks, state recreation areas, and regional shorelines.

Maritime-related activities include commercial shipping the Strait area, as well as ships bound to or returning from ports in Sacramento, Stockton, and the Pittsburg/Antioch areas. Naval vessels also pass though the Strait going to and from the Concord Naval Weapons Station. Municipal wharfs and commercial terminals line both sides of the Strait, serving largely to facilitate the handling of dry bulk goods and petroleum products.

Population

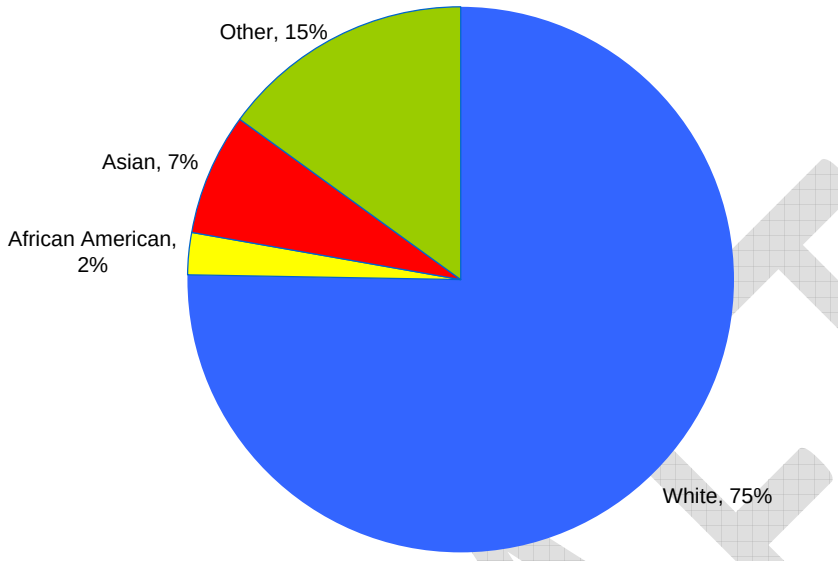
Sacramento-San Joaquin Delta

The Legal Delta has experienced rapid population growth, increasing by about 54 percent since 1990, compared to 25 percent statewide. This high growth rate is partially due to rapid urbanization due to the Delta's position in the midst of large metropolitan areas in Northern California. However, the majority of this population growth occurs in the Secondary Zone, where most of the Delta's population lies, with the highest concentrations being in Antioch and Pittsburg to the west, Stockton and Tracy to the southeast and Sacramento and West Sacramento to the north. As the Primary Zone is mainly undeveloped land, its population density is low and generally centered around the legacy communities. Its population has remained relatively stable over recent years and was about 12,000 in 2010, which was roughly the same as in 1990. The following four charts illustrate the composition of age, race, and annual income of the Delta's population.

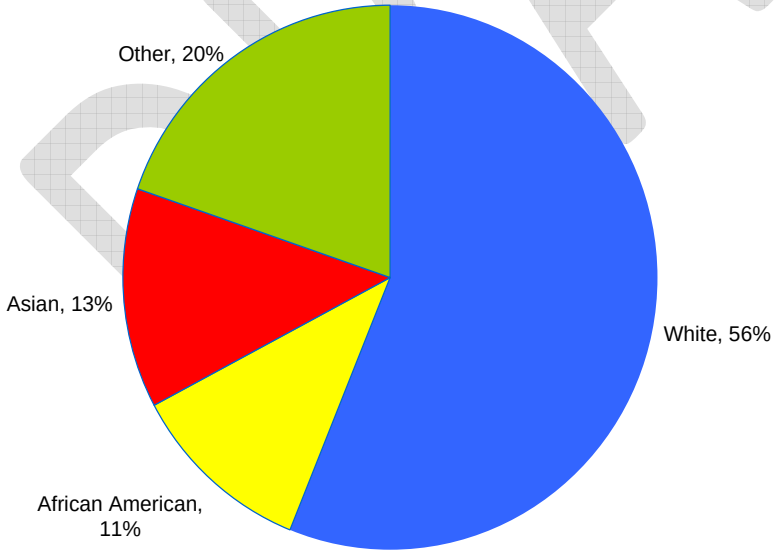


Age Distribution in the Delta[2]

DRAFT

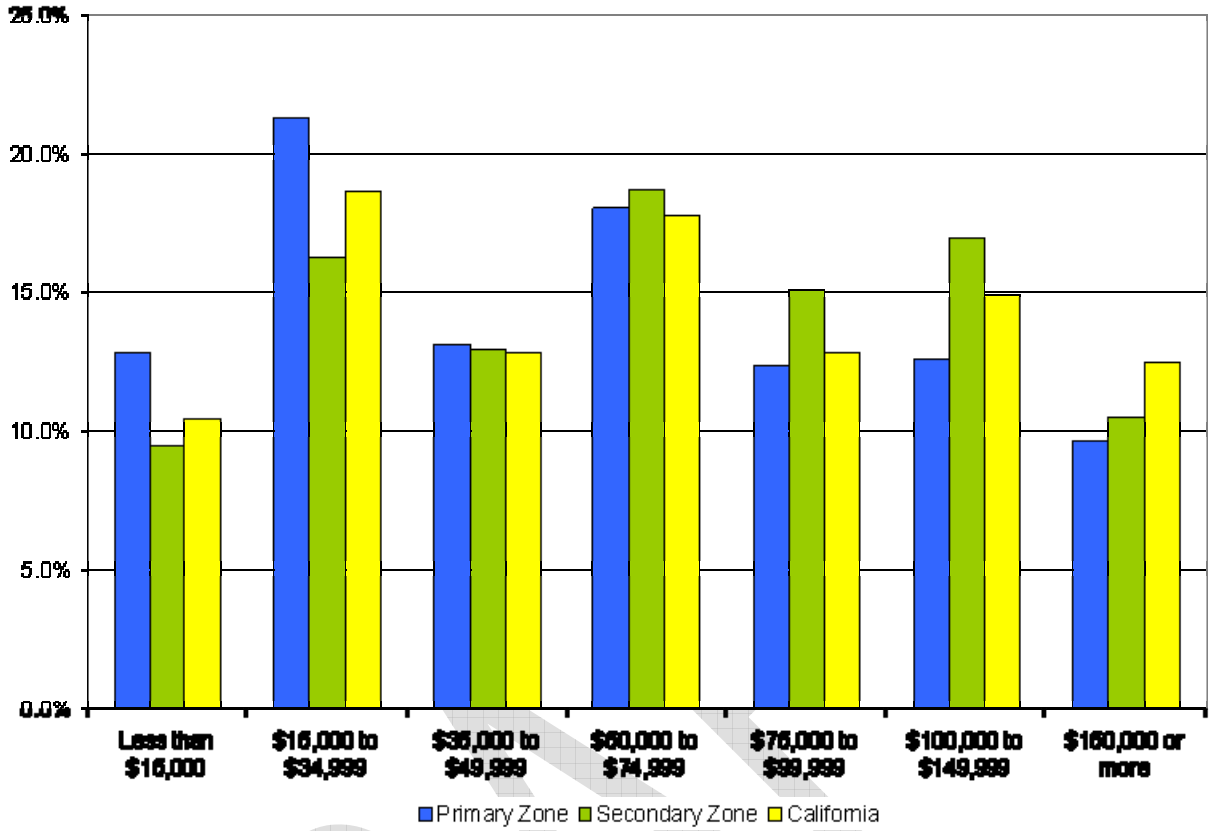


Race in the Primary Zone[3]



Race in the Secondary Zone[4]

Across all race categories approximately 26 percent of the Primary Zone population and 30 percent of the Secondary Zone population reported being of Hispanic origin.



Income Distribution in the Delta[5]

Suisun Marsh

The Suisun Marsh is located within the Suisun City zip code 94585. In 2010, the US Census Bureau estimates the 94585 population at 49,163. The urban population is centered on Suisun City, Rockville, and parts of Fairfield with a population of 35,226. While no urban development exists within the Marsh itself, the DFG Grizzly Island Wildlife Area Complex (comprising more than 15,000 acres of publicly owned lands), includes local residents, families, homes, and private structures protected by a levee system.

Carquinez Strait

Current pattern of suburbanization in the region began in the 1940s and has been on relative par with the rest of the Bay Area. A number of early factors have contributed to the local growth including, expansion of Bay Area communities, population pressure during World War II, increases in income during the war years, the universal use of the automobile, and the Californian ideal of suburban living. The 2010 Census estimates the Strait's population at 182,045, with population numbers contributing from the community areas of Vallejo, Martinez, Benicia, Crockett, and Port Costa. The 2010 is almost equal, except for a slight decline, to the area's 2000 population of 182,917.

In 1990, Caucasians constitute about 67 percent of the population in Solano County; 76 percent in Contra Costa County; 50 percent in the City of Vallejo; and 59 percent in the Strait area. Between 1980 and 1990, the Asian/Pacific Islander population grew a compounded annual rate of approximately 9.6 percent in both counties, representing the largest growth of any ethnic group. Asian/Pacific Islanders in the Strait are constitute 18 percent, higher that both county totals, but lower than the percentages in the City of Vallejo. The African-American population is higher in the City of Vallejo census tracts than in other study area locations. Persons of Hispanic origin present 13 percent in Solano County; 11 percent in Contra Costa County; 10 percent in the City of Vallejo; and 12 percent in the Strait area.

Business and Industry

Sacramento-San Joaquin Delta

The Delta's cultural, recreational, natural resource, and agricultural values are inextricably linked to economic activities that are carried out in the Delta. Therefore, maintaining a healthy economy that supports these activities within the Delta is critical to protecting these values.

As an economic place, the Delta is dependent upon agriculture, with recreation and tourism also being important economic drivers. Close to 80% of all farmland in the Delta is classified as "Prime Farmland" by the Farmland Mapping and Monitoring Program. It is estimated that Delta crop and animal production has an economic impact of roughly 9,700 jobs, $683 million in value added, and $1.4 billion in output in the five Delta counties. Across all of California, the economic impact of Delta agriculture is approximately 13,000 jobs, $819 million in value added, and $1.6 billion in output. When related value-added manufacturing such as wineries, canneries, and dairy products are included with the impact of Delta agriculture, the total economic impact of Delta agriculture is roughly 13,200 jobs, $1.059 billion in value-added, and $2.647 billion in economic output in the five Delta counties. Including value-added manufacturing, the statewide impact of Delta agriculture is about 25,000 jobs, $2.135 billion in value-added, and $5.372 billion in economic output.

Recreation is an integral part of the Delta economy, generating roughly 12 million visitor days of use annually and approximately $250 million dollars visitor spending in the Delta each year. Of the roughly 12 million visitor days spent in the Delta each year, approximately 8 million days are for resource-related activities (e.g., boating and fishing), 2 million days are for right-of-way related and tourism activities (e.g., bicycling and driving for pleasure), and 2 million days are for urban parks-related activities (e.g., picnicking and organized sports). Boating and fishing have the biggest economic impact, and are estimated to generate nearly 80 percent of the recreation and tourism spending in the Delta, including significant expenditures on lodging, meals, supplies, marina services, and fuel. In addition to visitor spending, non-trip spending such as boat purchases and marina rentals are estimated at roughly $60 million annually for total recreation-related spending of $312 million annually in the Delta. Delta recreation and tourism supports over 3,000 jobs in the five Delta counties. These jobs provide about $100 million in labor income and a total of $175 million in value added to the regional economy. Across all of

California, Delta recreation and tourism supports over 5,200 jobs, and contributes about $348 million in value added.

The Delta's cultural, recreational, natural resource, and agricultural values are inextricably linked to economic activities that are carried out in the Delta. Therefore, maintaining a healthy economy that supports these activities within the Delta is critical to protecting these values.

Suisun Marsh
Existing land use in the Marsh is zoned as marsh and agriculture, both having a resource conservation overlay. The marsh designation provides for protection of marsh and wetland areas. The land use permits aquatic and wildlife habitat, marsh-oriented recreational uses, agricultural activities compatible with the marsh environment and marsh habitat, educational and scientific research, educational facilities supportive of and compatible with marsh functions, and restoration of historical tidal wetlands. The agriculture designation provides areas for the practice of agriculture as the primary use, including areas that contribute significantly to the local agricultural economy, and allows secondary uses that support the economic viability of agriculture. Agricultural land use designations protect these areas from intrusion by nonagricultural uses and other uses that do not directly support the economic viability of agriculture.

Carquinez Strait
Today the characteristic industry of the Carquinez shore is oil refining. Early refineries were connected by pipelines to oil fields in Coalinga and the Kern-Midlway field near Bakersfield. The refineries have since expanded in number and currently include terminals at Benicia, Martinez, Ozol, Crockett and Selby. These refineries provide 72 percent of the Bay Area's refining capacity and 58 percent of its storage capacity.

Transportation and Infrastructure

Sacramento – San Joaquin Delta
Due to the Delta's location between major population areas, its unique resources, especially water and natural gas, its flat terrain, and general lack of development, the Delta has high value as a utility and transportation corridor. More than 500 miles of transmission lines and more than 60 substations lie within the Delta boundaries. Within the larger Delta-Suisun Marsh area are approximately 240 operation gas wells. Natural gas pipelines serve local gas fields and regional pipelines. PG&E's underground natural gas storage area under McDonald Island provides up to one-third of the peak natural gas supply for its service area. Pipelines carry gasoline and aviation fuel across the Delta from Bay Area refineries to depots in Sacramento and Stockton for distribution to Northern California and Nevada and provide approximately 50 percent of the transportation fuel used in that region. The Mokelumne Aqueduct, consisting of three pipelines, is the main municipal water conveyance facility for 1.3 million people in the East Bay Municipal Utility District. The aqueduct crosses five Delta islands/tracts (Orwood Tract, Woodward Island, Jones Tract, Roberts Island, and Sargent-Barnhart Tract) protected by levees. The Sacramento and Stockton deep water ship channels both play crucial roles in the international import and export of goods.

Transportation systems traversing around and through the Delta include several railroads, freeways, state highways, and county roads. Three interstate freeways (Interstate 5, Interstate 80, and Interstate 580) provide major transportation and trucking routes that pass the

periphery of the Delta. The three major state highways in the Delta (State Routes 4, 12, and 160) are typically two lanes, sometimes built on top of levees. Originally meant for lower traffic volumes at moderate speeds, the state highways are now heavily used for regional trucking, recreational access, and commuting. More than 50 bridges, including approximately 30 drawbridges, span the navigable channels.

Suisun Marsh
Many of the Marsh levees serve as important local transportation corridors and protect private and public infrastructure in addition to providing ecological and aesthetic value. Significant examples of public infrastructure, protected by locally funded levee maintenance programs, are the Union Pacific Railroad, Amtrak Capitol Corridor, the petroleum product pipeline to Travis Air Force Base, other petroleum pipelines, State Route 12, Solano County roads, natural gas production wells and transmission lines, electrical transmission lines, and more than $120 million invested by DWR and Reclamation in Suisun Marsh water conveyance facilities.

Carquinez Strait
Until 1927, the Strait could only be traversed by a series of ferries. In 1927, the Carquinez auto bridge between Vallejo and Crocket opened. The Carquinez Strait Bridge provided the final link in the Pan-American Highway, connecting Canada with Mexico. In 1958, to relieve congestion from Interstate 80, the California State Department of Transportation completed a parallel span 200 feet to the east. The bridge was recently succeeded by the Alfred Zampa Memorial Bridge which lies to the west of the former bridges.

Two other bridges of note connect Martinez with Benicia. When completed in 1930, the Southern Pacific Railroad Bridge was the longest and the heaviest double track bridge west of the Mississippi River, and boasted a load carrying capacity greater than that of any bridge in the US. A parallel highway bridge carrying Interstate 680, the George Miller, Jr. Memorial Bridge, was complete on the downstream side of the Strait in 1962.

Data Sources

[1]Department of Water Resources. "California Water Plan Update 2005." Volume 3. Chapter 12: 2
[2-5]2005-9 American Community Survey, Census Bureau

Chapter 6 - Management Alternatives

Management alternatives and a preliminary assessment of impacts is one of the eight steps that NPS recommends for the completion of a NHA feasibility study. Four different management alternatives were proposed for discussion in this process: continuation of current practices (no action), a Sacramento-San Joaquin Delta NHA, a Delta State Heritage Corridor, and a locally designated Delta Heritage Area. These alternatives and their potential impacts were outlined in a public review memo and local participants discussed the positive and negative implications of each of the four alternatives at a public meeting in July 2011.

Alternative 1

Continuation of current practices

NHA designation would not be pursued under this option, and therefore the relevant federal assistance and seed money would not be granted. Efforts for historic preservation, signage, economic development, public education, marketing, and other goals of a Delta NHA could continue to be pursued under their current auspices. The resources currently owned and operated by nonprofits; and local, state, and federal government entities would continue to be maintained and made available for public use under existing policies. There would be no new NPS program dedicated exclusively to providing technical assistance and no additional federal funding. State and local government, private nonprofit organizations and foundations, and for-profit organizations would continue to be the primary sources of funds for the protection and interpretation of heritage resources in the Delta.

Alternative 2

Creation of a Sacramento-San Joaquin Delta National Heritage Area

This management alternative involves congressional designation of a NHA in the Sacramento-San Joaquin Delta. Under this alternative, the NPS would provide technical assistance to the management entity of the NHA. The Delta would achieve national recognition as a place of special significance and would be eligible to receive federal seed money for the NHA. The seed money can be utilized to leverage funds from public and private sources. Existing NHAs leverage an average of $8 for every $1 of federal seed money. The seed money and leveraged funds can be utilized to undertake projects outlined in the management plan which could include interpretive signage, historic preservation, and regional branding.

While NHAs are not NPS units, NHAs are considered part of the 'NPS family'. NPS plays an advisory role to the NHA management entity through technical assistance for planning and implementation activities. NHA designation enables the NHA management entity to utilize the NPS arrowhead symbol for branding and marketing the region, and a link to the NHA's website is placed on the NPS website to help direct visitors to the region. Additionally, certain grant programs, such as the National Park Foundation grants, are open to NHAs as well as NPS units.

As stated in the mission statement, a Delta NHA can serve as an opportunity to recognize, enhance, and promote 'Delta as a place' in order to help cultivate and retain appreciation and understanding by residents and visitors of the Delta. For quite some time the Delta has been a lesser known region of California, and even persons living as close as the San Francisco Bay Area, Sacramento Region, and Stockton region, know little about the Delta. Designation as a NHA would give national recognition to the role of the Delta in California and American history, and draw attention to the Delta as a place of special significance, both ecologically and culturally. A NHA could help gain visibility of the Delta as a visitor destination nationally and internationally, which can lead to economic development opportunities. Currently most of the heritage tourism attractions in the Delta such as museums, have limited staff and funding, and a Delta NHA could help increase visitation to these places which could help expand their resources. An increase in visibility could also lead more visitors to State Parks and State Recreation Areas in the Delta, which could help sustain the unites economically, and help to improve visitor amenities.

Alternative 3

California Delta Heritage Corridor (State designated)

California State Parks developed a Central Valley Vision Implementation Plan in 2009. This plan recommends establishing five Central Valley driving routes as heritage corridors to draw visitors to heritage attractions. One of the recommended heritage corridors is the California Delta Heritage Corridor, which would link historic Delta towns, recreation sites, ecotourism areas, and agritourism sites. These heritage corridors would be designated under the California Recreational Trails Act, as provided in Public Resources Code Section 5070.3, 5071, and 5073.

A State Heritage Corridor would, if funds were available, have some of the same potential benefits as a NHA. Benefits may include improved visitor information (maps, wayfinding signs and kiosks, brochures, etc.) and public education about the corridor's historical, natural, and recreational assets. The enhancement of tourism activities in the Delta would be a likely outcome that could assist with economic development. Like a NHA, a State Heritage Corridor could be a valuable tool to educate the public and visitors about the Delta and could help recognize, enhance and promote 'Delta as a place'. NPS staff would not play an advisory role (unless assistance is granted through a different program). A State Heritage Corridor would not be eligible for the seed money that is granted with NHA designation, and there are no apparent sources of state funds to support its planning or implementation now. However, it could still be a valuable symbol of the desires or local organizations to develop partnerships and seek funding from other public/private sources, if local partners choose to use it as a vehicle for those activities.

The State Heritage Corridor designation could still be pursued for the Delta, regardless of whether or not the Delta receives NHA designation. While planning for it would require a separate process, the Delta NHA feasibility study could serve as a valuable reference as it contains information that is potentially relevant to both designations, such as proposed themes, heritage area resources, etc.

Alternative 4

Locally designated Sacramento-San Joaquin Delta Heritage Area

A final option is a Delta Heritage Area (DHA) which is designated, planned, and managed by a local entity. Like a NHA, projects could be undertaken, such as historic preservation and interpretive signage which recognize, enhance, and promote 'Delta as a place.' Projects which increase visitor amenities in the Delta, such as public restrooms, waste receptacles, and directional signage could still be developed. Like the State Heritage Corridor option, a DHA would not be eligible for the federal financial assistance nor the NPS partnership that NHAs are eligible for. However, federal resources and assistance could still be sought through other programs. A DHA would not receive the national recognition that a NHA would, or the statewide recognition that a state heritage corridor would, but still be a tool for the Delta to gain more visibility as a region, which could lead to economic and educational benefits. A DHA would not have to obtain Congressional approval, or go through annual congressional funding cycles, and therefore could be initiated more quickly than a NHA.

Evaluation

The four alternatives described above were presented at the July 2011 public meeting and Alternative 2 was the most favored: creation of a Sacramento-San Joaquin Delta National Heritage Area. Meeting participants recognized the following potential benefits of a Delta NHA:

- A mixture of private and public collaboration that vests control at local level for establishing priorities and allocating federal funds.
- Federal recognition to draw attention to 'Delta as a place'.
- Optimizing the likelihood for success in creating a regionally integrated approach to wildlife habitat, agritourism, recreation, etc., this is significant to achieve economic sustainability for the Delta.

The only con identified at this meeting about a Delta NHA was that concerns have been expressed by some Delta locals about impacts on property rights. Chapter 10 discusses tools that can alleviate these concerns.

Participants of the meeting were generally not in favor of Alternative 1, Continuation of current practices, due to lack of local control. Alternative 3, a Delta State Heritage Corridor, was also not generally a favored alternative due to lack of funding capabilities. Alternative 4, a locally designated DHA, was identified by some as the next best alternative to a NHA, but concerns were raised about this option due to the lack of funding and national stature.