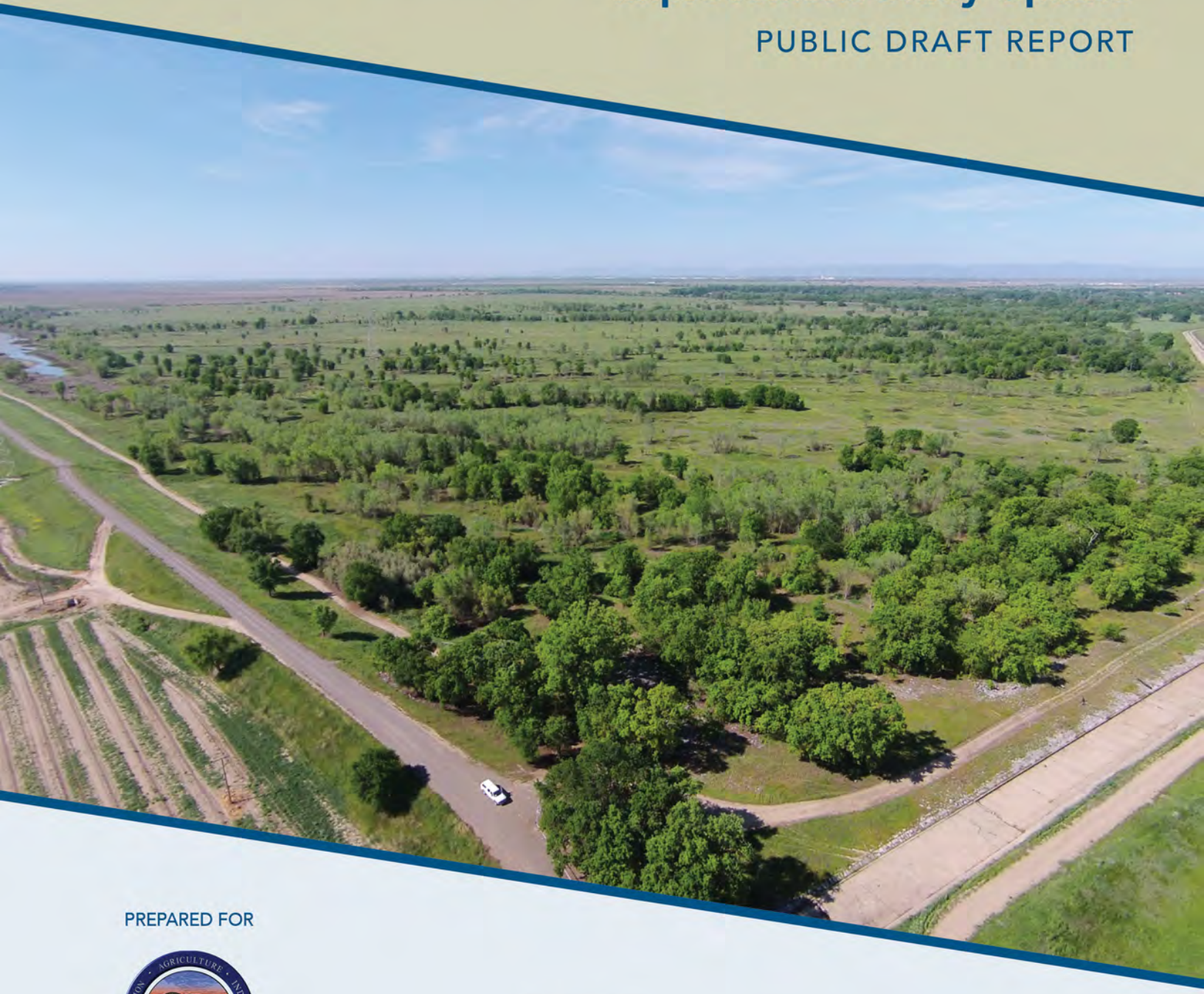
Yolo Bypass Drainage and Water Infrastructure Improvement Study Update

PUBLIC DRAFT REPORT



PREPARED FOR

County of Yolo

WITH FUNDING SUPPORT PROVIDED BY

SWC STATE WATER CONTRACTORS FOUNDED 1982

SAFCA Sacramento Area Flood Control Agency

PREPARED BY

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CONSEROSOLUTIONS

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Yolo Bypass Drainage and Water Infrastructure Improvement Study Update

Public Draft Report

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EXECUTIVE SUMMARY

Yolo County prepared this Yolo Bypass Drainage and Water Infrastructure Improvement Study Update (Study Update) to identify specific drainage and water infrastructure improvements within and directly adjacent to the Yolo Bypass that would benefit farmers and wetland managers. This study builds off of the original Yolo Bypass Drainage and Water Infrastructure Improvement Study that the County prepared in 2014 (2014 Study).

The 2014 Study represented a unique, locally-initiated effort to identify drainage and water infrastructure improvements in and adjacent to the Yolo Bypass. The approach the County took in the 2014 Study was unique in using detailed project sheets to clearly articulate the infrastructure constraints and improvement needs within and adjacent to the Yolo Bypass. These project sheets graphically represented both the existing infrastructure deficiencies through site maps and photographs but also described in detail the proposed solutions in the form of Recommended Projects. These Recommended Projects were intended to improve the ability of farmers and wetland managers to respond to changing flow conditions anticipated within the Yolo Bypass including a state and federal proposal to increase the frequency and duration of inundation for seasonal fish habitat.

Following completion of the 2014 Study, the County and other project partners pursued funding to further develop and implement the Recommended Projects. Some of the key partners who worked with the County to implement the 2014 Study Recommended Projects included the Yolo Basin Foundation, Ducks Unlimited, the California Department of Water Resources (DWR), the California Department of Fish and Wildlife, the Metropolitan Water District of Southern California, and the Sacramento Area Flood Control Agency. The project sheets facilitated the preparation of grant applications and provided a means to easily communicate the infrastructure improvement need to potential funding partners. As a result, of the twelve Recommended Projects identified in the 2014 Study, two projects have been fully implemented, portions of three projects have either been constructed or are under construction, and one project is in the planning phase.

State and federal flood improvement and habitat restoration planning efforts in the Yolo Bypass have substantially evolved and expanded since 2014, changing and/or creating new local infrastructure needs. This includes new regional planning initiatives focused on the Yolo Bypass and the pending implementation of several large-scale projects within the study area, including the Lower Elkhorn Basin Levee Setback Project and the Sacramento Weir Widening Project. These evolving planning and project implementation efforts provide a timely opportunity to integrate the ongoing and emerging needs of local stakeholders into larger regional initiatives in ways that enhance agricultural productivity while achieving broader regional objectives. Thus, in 2019, the County decided to update the 2014 Study.

Based on the success of the 2014 Study, the County was able to attract partners who were willing to fund the Study Update including the State Water Contractors and the Sacramento Area Flood Control Agency. The County also partnered with the Yolo Basin Foundation and the Yolo County Resource Conservation District to facilitate stakeholder outreach and to assist in project concept development.

In preparing the Study Update, the project team expanded the stakeholder outreach efforts to ensure as many local voices as possible were heard and again focused on the development of detailed project sheets. As a direct result of the expanded stakeholder engagement and the clear need for infrastructure improvements, 91 preliminary project concepts were identified.

Individual project concepts were combined where appropriate and ranked to identify the top twelve highest priority project concepts. Individual project sheets were then developed for each of the top twelve project concepts, which are listed below and are included in Chapter 2 of this Study Update. The project sheets constitute the heart of this Study Update and are intended to provide a clear and concise summary of the proposed improvements and their regional benefits.

Study Update Project Concepts

1. **Reclamation District 1600 Pump Station and Gravity Drain Improvements**
2. **Conaway Main Supply Canal Augmentation**
3. **Swanston Ranch Master Project**
4. **Northern Yolo Bypass Wildlife Area Drainage and Water Supply Improvement Master Project**
5. **South Davis Drain Pump Station and gravity Drain Improvement**
6. **Central Yolo Bypass Wildlife Area Drainage Improvement Master Project**
7. **Lisbon Weir Improvements**
8. **Tule Ranch Canal and Pump Improvements**
9. **Yolo Bypass Canal Maintenance Program**
10. **Yolo Bypass Crossing Improvements**
11. **Yolo Bypass Drainage Outlet Infrastructure Improvement Project**
12. **Yolo Bypasskeeper and Coordinating Committee**

1 INTRODUCTION

Yolo County prepared this Yolo Bypass Drainage and Water Infrastructure Improvement Study Update (Study Update) to identify specific drainage and water infrastructure improvements within and directly adjacent to the Yolo Bypass that would benefit farmers and wetland managers. This study builds off of the original Yolo Bypass Drainage and Water Infrastructure Improvement Study that the County prepared in 2014 (2014 Study). The Study Update identifies twelve specific drainage and water infrastructure improvements or project concepts that were identified through a series of interviews with local stakeholders (i.e., growers, landowners, and local organizations with an interest in the Yolo Bypass) and were refined from a list of 91 preliminary project concepts. The twelve project concepts were selected based on the benefits they would provide, their readiness to be constructed, the potential for local matching funds, their eligibility for state and federal funding, their costs, and whether they have a local sponsor or champion.

The twelve infrastructure improvements or project concepts were developed into project sheets, which are included in Chapter 2 of this Study Update. This Study Update also identifies the study goal and objectives, summarizes the regional planning efforts and the proposed large-scale projects that are expected to directly affect the ongoing agricultural and wetland management activities in the Yolo Bypass, describes the study area, identifies existing management constraints, discusses the project concept prioritization process, and details a funding strategy.

1.1 STUDY UPDATE GOALS AND OBJECTIVES

The Study Update envisions drainage and water infrastructure improvements within the Yolo Bypass that are integrated with state and federal flood protection and habitat restoration initiatives, which together enhance agricultural sustainability, ecosystem function, environmental education, recreation, and long-term flood system operations and maintenance. Based on this vision, the project team developed the following goal and objectives for the Study Update:

GOAL

To develop projects and prepare an update to the 2014 Yolo Bypass Drainage and Water Infrastructure Improvement Study that identifies locally-supportable and implementable drainage and water infrastructure improvement projects within the Yolo Bypass.

OBJECTIVES

- Identify potential conflicts between existing Yolo Bypass land uses and the significant flood improvement and habitat restoration initiatives proposed within the Bypass.
- Identify specific drainage, recreation, habitat enhancement, and/or water infrastructure improvement projects that can minimize or avoid these conflicts including unimplemented projects identified in the 2014 Study that still may be viable.
- Identify locally-supported projects that will contribute to state and federal goals, including recreation and wildlife habitat, while enhancing agricultural sustainability.

- Conduct extensive outreach with key stakeholders in the Yolo Bypass to further inform project identification and development.

- Develop an integrated improvement plan for the Tule Canal/Toe Drain through a design charrette process.

- Develop criteria to assist in the selection of projects to be evaluated and prioritize them for implementation.

- Prepare a funding strategy for the development and implementation of priority projects.

- Identify permitting needs for individual projects and identify agencies/entities responsible for permitting/implementation.

1.2 OVERVIEW OF STUDY UPDATE

The 2014 Study prepared by Yolo County represented a unique, locally-initiated effort to identify drainage and water infrastructure improvements in and adjacent to the Yolo Bypass to benefit farmers and wetlands managers, as well as reduce the impacts on local land uses from a state and federal proposal to increase the frequency and duration of inundation for seasonal fish habitat. The approach the County took in the 2014 Study was unique in using detailed project sheets to clearly articulate the infrastructure constraints and improvement needs within and adjacent to the Yolo Bypass. These project sheets graphically represented both the existing infrastructure deficiencies through site maps and photographs but also described in detail the proposed solutions in the form of Recommended Projects. These Recommended Projects were intended to improve the ability of farmers and wetland managers to respond to changing flow conditions anticipated within the Yolo Bypass.

Following completion of the 2014 Study, the County and other project partners pursued funding to further develop and implement the Recommended Projects. Some of the key partners who worked with the County to implement the 2014 Study Recommended Projects included the Yolo Basin Foundation, Ducks Unlimited, the California Department of Water Resources (DWR), the California Department of Fish and Wildlife, the Metropolitan Water District of Southern California, and the Sacramento Area Flood Control Agency. The project sheets facilitated the preparation of grant applications and provided a means to easily communicate the infrastructure improvement need to potential funding partners. As a result, of the twelve Recommended Projects identified in the 2014 Study, two projects have been fully implemented, portions of three projects have either been constructed or are under construction, and one project is in the planning phase. The 2014 Study Recommended Projects are discussed in further detail at the end of this Chapter.

State and federal flood improvement and habitat restoration planning efforts in the Yolo Bypass have substantially evolved and expanded since 2014, changing and/or creating new local infrastructure needs. This includes new regional planning initiatives focused on the Yolo Bypass and the pending implementation of several large-scale projects within the study area, including the Lower Elkhorn Basin Levee Setback Project and the Sacramento Weir Widening Project. These evolving planning and project implementation efforts provide a timely opportunity to integrate the ongoing and emerging needs of local stakeholders into larger regional initiatives in ways that enhance agricultural productivity while achieving broader regional objectives. Thus, in 2019, the County decided to update the 2014 Study.

Based on the success of the 2014 Study, the County was able to attract partners who were willing to fund the Study Update including the State Water Contractors and the Sacramento Area Flood Control Agency. The County also partnered with the Yolo Basin Foundation and the Yolo County Resource Conservation District to facilitate stakeholder outreach and to assist in project concept development.

In preparing the Study Update, the project team (including Yolo County, DWR, Metropolitan Water District of Southern California, Sacramento Area Flood Control Agency, and the report preparers) expanded the stakeholder outreach efforts to ensure as many local voices as possible were heard and again focused on the development of detailed project sheets. As a direct result of the expanded stakeholder engagement and the clear need for infrastructure improvements, 91 preliminary project concepts were identified. These preliminary project concepts varied substantially and included such diverse projects as pump replacements, canal realignments, and fish screen installations. Individual project concepts were combined where appropriate and ranked to identify the top twelve highest priority project concepts. The ranking and prioritization process is described in further detail in Chapter 4 of this Study Update. Individual project sheets were then developed for each of the top twelve project concepts, which are listed below and in Figure 1. The project sheets constitute the heart of this Study Update and are intended to provide a clear and concise summary of the proposed improvements and their regional benefits. The twelve project sheets are included in Chapter 2 along with summary descriptions of each project concept.

STUDY UPDATE PROJECT CONCEPTS

1. **RECLAMATION DISTRICT 1600 PUMP STATION AND GRAVITY DRAIN IMPROVEMENTS**
2. **CONAWAY MAIN SUPPLY CANAL AUGMENTATION**
3. **SWANSTON RANCH MASTER PROJECT**
4. **NORTHERN YOLO BYPASS WILDLIFE AREA DRAINAGE AND WATER SUPPLY IMPROVEMENT MASTER PROJECT**
5. **SOUTH DAVIS DRAIN PUMP STATION AND GRAVITY DRAIN IMPROVEMENT**
6. **CENTRAL YOLO BYPASS WILDLIFE AREA DRAINAGE IMPROVEMENT MASTER PROJECT**
7. **LISBON WEIR IMPROVEMENTS**
8. **TULE RANCH CANAL AND PUMP IMPROVEMENTS**
9. **YOLO BYPASS CANAL MAINTENANCE PROGRAM**
10. **YOLO BYPASS CROSSING IMPROVEMENTS**
11. **YOLO BYPASS DRAINAGE OUTLET INFRASTRUCTURE IMPROVEMENT PROJECT**
12. **YOLO BYPASSKEEPER AND COORDINATING COMMITTEE**

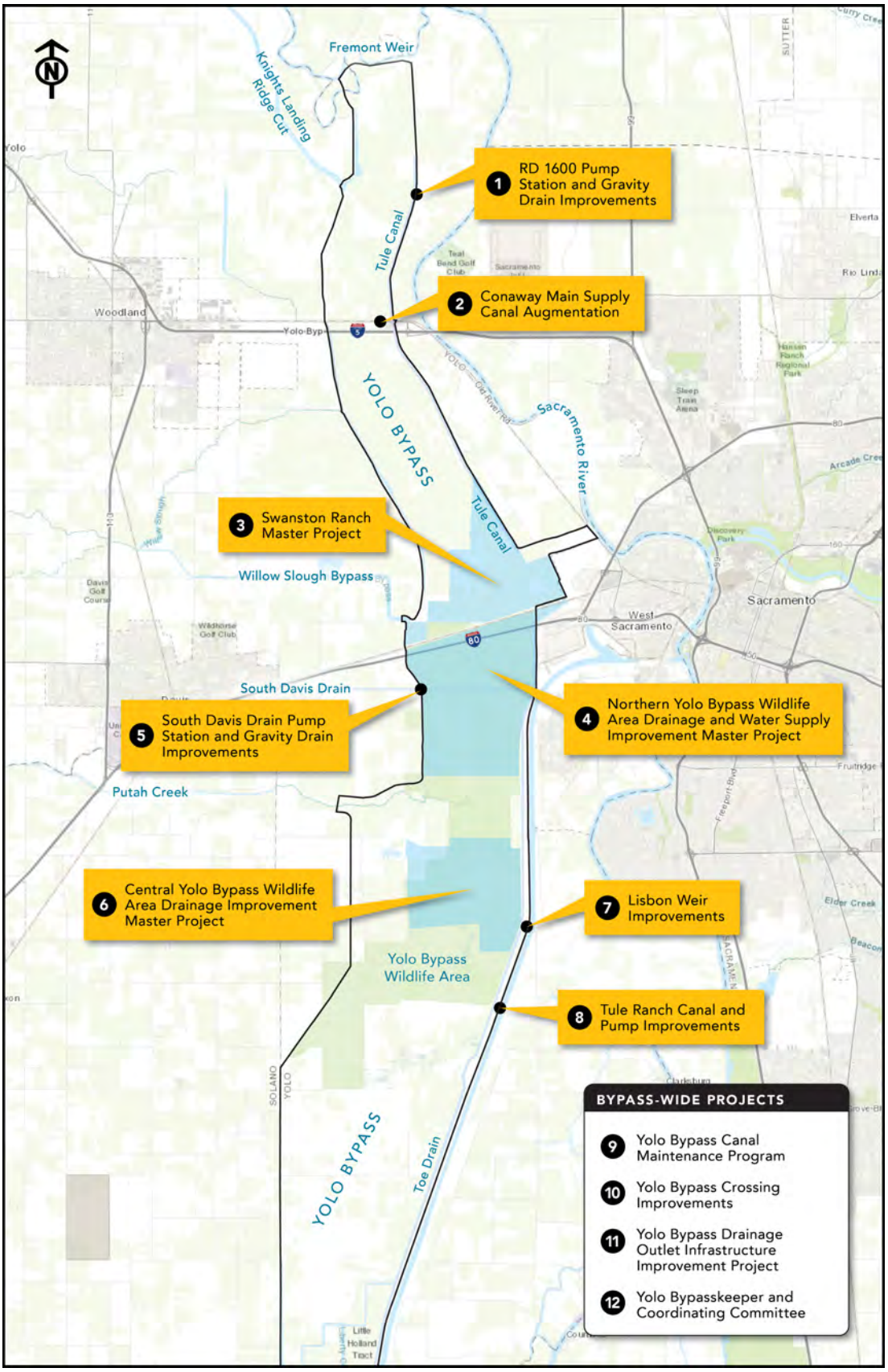


Figure 1 – Study Update Project Concepts

1.3 REGIONAL PLANNING INITIATIVES

Several significant regional planning initiatives have been conducted, or are underway, that could have significant long-term ramifications for the existing land uses within the Yolo Bypass. These planning initiatives are being undertaken to address broad systemic deficiencies in the Central Valley flood system, a long-term decline in ecosystem function, and the continuing loss of productive agricultural land. Implementation of the projects being considered in these planning initiatives have the potential to alter drainage, water supply, flood control, agricultural operations, ecosystem function, and recreation within the Yolo Bypass. If implemented without taking into consideration how the changes could affect the existing drainage and water infrastructure within the Yolo Bypass, these planning initiatives could make agricultural operations more difficult to sustain. The project concepts included in this Study Update are intended to identify drainage and water infrastructure improvements within and adjacent to the Yolo Bypass that would help farmers and wetland managers adapt to the changing land uses being contemplated in these regional planning initiatives. The primary planning initiatives include the following, which are described in detail in Appendix A.

- 2012 Central Valley Flood Protection Plan (CVFPP) and 2017 Update
- CVFPP Conservation Strategy
- Lower Sacramento/Delta North Regional Flood Management Plan
- Yolo Bypass/Cache Slough Partnership
- Programmatic Section 408 Permitting
- California EcoRestore
- Yolo Habitat Conservation Plan/Natural Community Conservation Plan

1.4 LARGE-SCALE PROJECTS IN THE YOLO BYPASS

As the largest flood bypass in the Central Valley, the 59,000-acre Yolo Bypass has become the focus for major flood improvement and habitat restoration projects proposed by state and federal agencies. While expected to create overall improved flood protection and habitat conditions for the region, when combined with climate change effects, these large-scale projects have the potential to substantially alter the landscape within the Yolo Bypass. These changes could affect farming activities and the ability of land managers to effectively manage wetlands within the Yolo Bypass, which are a key contributor to the single most important wintering area for waterfowl along the Pacific Flyway (Northern California Water Association 2016). Lastly, the changes could also affect the important public uses within the Yolo Bypass including recreation and environmental education, particularly within the Yolo Bypass Wildlife Area.

The greatest initial change is anticipated to occur when DWR and the U.S. Bureau of Reclamation (USBR) implement the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project, a project to create an operable gate in the Fremont Weir to increase inundation for floodplain fish habitat and remove fish passage barriers scheduled for construction in 2022. This project is a key component of the California EcoRestore effort to advance habitat restoration acreage in the Delta. Other large-scale projects could also affect the Bypass' existing

drainage and water infrastructure by significantly altering the flood system's levees and other infrastructure and converting agricultural lands to wildlife habitat.

The following summarizes the major projects that are planned or are being implemented in the Yolo Bypass. Many of these projects were identified in the 2017 CVFPP.

YOLO BYPASS SALMONID HABITAT RESTORATION AND FISH PASSAGE PROJECT

The Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (Salmonid Project) has been developed to improve fish passage and increase floodplain rearing habitat for sensitive fish species in the Yolo Bypass and the lower Sacramento River basin. DWR and USBR are jointly planning the Salmonid Project to comply with the Reasonable and Prudent Alternative actions I.6.1 and I.7, as described in the 2009 National Marine Fisheries Service Biological Opinion and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project, and the 2012 Yolo Bypass Salmonid Habitat Restoration and Fish Passage Implementation Plan (USBR 2019). The Salmonid Project is also intended to help meet the California EcoRestore floodplain restoration objective.

The project would include the construction of a large gated notch along the eastern end of the Fremont Weir that would allow flows from the Sacramento River to enter the Yolo Bypass when the river exceeds an elevation of 14 feet. The Fremont Weir is currently overtopped when water surface elevations in the Sacramento River exceed 32 feet. Up to 6,000 cubic feet per second would flow through the large notch between November 1st and March 15th, depending upon water surface elevations within the Sacramento River. The project is being proposed to provide open channel flow for adult fish passage, juvenile emigration, and floodplain inundation. The project would include a supplemental fish passage facility on the west side of the Fremont Weir and improvements to allow fish to pass through Agricultural Road Crossing 1 and the channel north of Agricultural Road Crossing 1 (USBR 2019). Agricultural Road Crossing 1 is located at the southeastern end of the Fremont Weir Wildlife Area and provides access over the Tule Canal. The agencies have completed 30% design and submitted permit applications to the CVFPB, with an expected construction date of 2022.

YOLO BYPASS EXPANSION IN UPPER ELKHORN BASIN

The 2017 CVFPP identified the potential 1.5-mile eastern extension of the Fremont Weir and expansion of the upper Yolo Bypass in the upper Elkhorn Basin through the construction of a setback levee to substantially increase the flood conveyance capacity of the upper portion of the Yolo Bypass. The setback project contemplated in the 2017 CVFPP also included the implementation of ecosystem enhancements and other multi-benefit improvements within the setback footprint. No detailed planning has been conducted for this project and no implementation funding is currently available.

LOWER ELKHORN BASIN LEVEE SETBACK PROJECT

DWR is currently constructing the Lower Elkhorn Basin Levee Setback Project, which includes approximately seven miles of setback levees in the Lower Elkhorn Basin along the east side of the Yolo Bypass and the north side of the Sacramento Bypass. The project includes degrading the majority of the existing Yolo Bypass East Levee south of Interstate 5 (portions will remain for high ground habitat refugia) and all of the Sacramento Bypass North Levee. Setback levees will be constructed from borrow materials excavated from agricultural lands

between the existing levee and proposed future levee, and material from the existing levee degrade will be used to restore the agricultural fields. Mitigation for the project's direct habitat impacts includes preservation of agricultural lands and the creation of habitat within the levee setback area for sensitive species and habitat communities. The project is expected to be completed in 2022.

Sacramento Weir Widening Project

The U.S. Army Corps of Engineers is proposing to expand the 1,950-foot long Sacramento Weir by an additional 1,500 feet to the north. This project connects the expanded weir to the north Sacramento Bypass levee constructed as part of the Lower Elkhorn Basin Levee Setback Project (see above). Additionally, it would include the construction of a fish passage structure within the expanded weir to provide a route for adult fish within the Sacramento Bypass to access the Sacramento River after flood events. Construction is expected to commence on this project in 2021 and to be completed by 2023.

Conaway Levee Setback and Transitory Storage Project

The 2017 CVFPP identified the potential setback of the west levee of the Yolo Bypass to provide additional flood protection for lands within the City of Woodland and Yolo County, and to provide transitory storage of water during flood events in the Yolo Bypass. The Conaway Levee Setback Transitory Storage Project would include degrading a portion of the existing Yolo Bypass west levee, constructing a weir outlet and culverts in the west levee and constructing two setback levees, one extending southwest from Interstate 5 and one extending west from just north of the Davis wetlands. Preliminary planning has been conducted for this project but no implementation funding is currently available.

Cache Creek Settling Basin Sediment Management Improvements

The 2017 CVFPP identified potential improvements within the Cache Creek Settling Basin to extend the operational life of the basin. These improvements could include excavation of mercury-contaminated sediments within the basin, modifying the basin's outfall structure, or other measures that would provide additional sediment storage capacity within the basin. No detailed planning has been conducted for this project and no implementation funding is currently available.

Setback of West Yolo Bypass Levees

The 2017 CVFPP identified the potential setback of the west levee of the Yolo Bypass by 4,000 feet north of Willow Slough and by 5,000 feet north of Putah Creek. These setbacks are proposed to increase the flood conveyance capacity of the Yolo Bypass and would include habitat restoration within a portion of the setback area. No detailed planning has been conducted for this project and no implementation funding is currently available.

Lower Yolo Bypass Expansion

The 2017 CVFPP identified the potential connection of the Sacramento Deep Water Ship Channel to the Yolo Bypass to expand the capacity of the bypass to convey flood flows. This would include breaching the east levee of the Yolo Bypass along the Deep Water Ship Channel and constructing a closure gate within the channel to ensure flood flows do not backup and inundate the City of West Sacramento through the Port of West Sacramento during

flood events. No detailed planning has been conducted for this project and no implementation funding is currently available.

1.5 2014 STUDY PROJECT SUCCESSES

Several of the projects identified in the 2014 Study successfully moved from concept to implementation due in large part to the relationships the County was able to develop during the 2014 Study and the subsequent partnerships that formed. The two projects that were fully implemented included Recommended Project 1 (RP-1) –Wallace Weir Improvements and RP-12 – Westside Tributaries Monitoring (West of Bypass). Implementation of RP-1 improved water management for farmers upstream of the weir and within the Yolo Bypass. This project also ensures that adult salmon are not stranded in the Colusa Drain by blocking access. Salmon that are captured at the weir are returned to the Sacramento River. The implementation of RP-12 has generated important baseline hydrologic data for the Westside tributaries that will improve overall understanding of the hydrologic conditions within the Yolo Bypass and will inform bypass water management.

Of the four crossings identified in RP-2 – Tule Canal Agricultural Crossing/Water Control Structure Improvements, one was substantial upgraded and a second crossing was completely removed. A third crossing is expected to be improved in 2021. These improvements enhance the ability of farmers to access their fields and remove barriers for fish within the Tule Canal. For RP-7 – Yolo Bypass Wildlife Area Dual Function Canal Reconfiguration, construction of three of the five project components was completed in 2020 and funding is being pursued by the project partners to implement the remaining two project components. These improvements substantially enhance access within the Yolo Bypass for farmers, birders, hunters and for the environmental education efforts conducted by the Yolo Basin Foundation. They also improve water manage for the agricultural operations and wetlands within the Wildlife Area. The improved water management associated with this project will specifically result in expanded wetland habitat within the Wildlife Area. For RP-8 – Yolo Bypass Wildlife Area Public and Operation & Maintenance Road Improvements, some of the roadway improvements included in this project were implemented as part of RP-7 during 2020, which will enhance access for all users. Finally, planning has been underway for several years on RP-3 – Lisbon Weir Improvements. Once implemented, this project is expected to improve fish passage within the Tule Canal and to improve water management for the affected farmers and wetland managers. Figure 2 summarizes the status of these Recommended Projects.

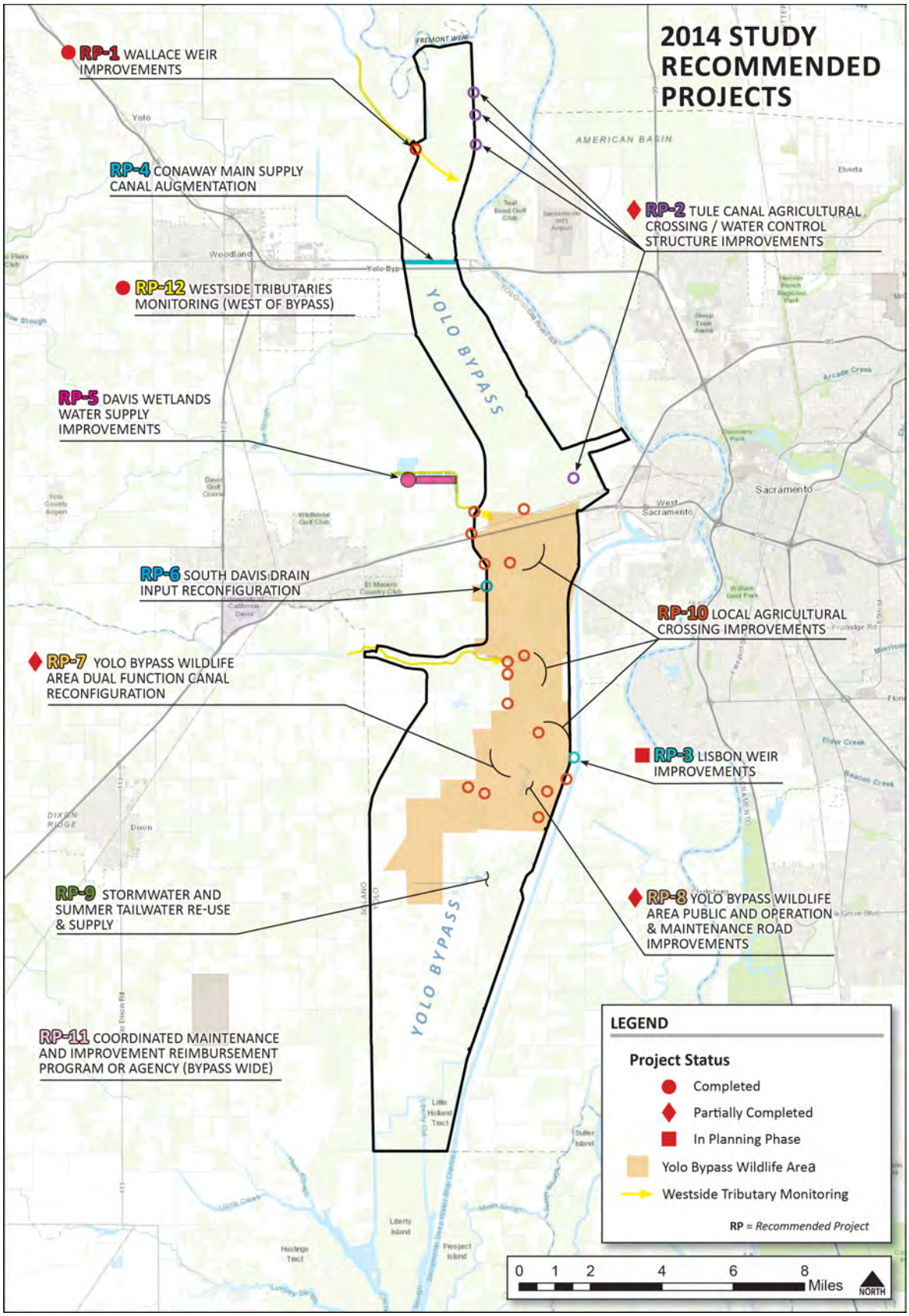


Figure 2 – 2014 Yolo Bypass Drainage and Water Infrastructure Study Recommended Projects

2 PROJECT CONCEPTS

The culmination of the stakeholder outreach efforts was the identification of twelve project concepts that according to the ranking and prioritization process, as described in Chapter 4, would best achieve the objectives of the Study Update. The project team refined these top twelve project concepts by conducting additional direct outreach with the stakeholders who would be most affected by the projects. Individual project sheets were then developed for each project concept. Each project sheet is intended to serve as a standalone communication tool that describes the project concept including the problems it addresses, the benefits it may provide and any recommended next steps.

2.1 SUMMARY OF PROJECT CONCEPTS

The following provides brief summaries of the top twelve project concepts that are described in much further detail in the project sheets that follow. These project concepts are listed geographically from north to south (Figure 1). The four Bypass-wide project concepts are summarized after the eight location-specific project concepts. For a list of the project concepts according to their ranking, please see Table 2 in Chapter 4.

1. RECLAMATION DISTRICT 1600 PUMP STATION AND GRAVITY DRAIN IMPROVEMENTS

This project concept includes improving or replacing the Reclamation District 1600 (RD 1600) pump station and gravity drain at the toe of the Yolo Bypass east levee in the northern Elkhorn Basin. The proposed improvements would ensure RD 1600 is able to meet its current drainage needs and to adapt to expected increases in the frequency and duration of flows in the Tule Canal and Yolo Bypass.

2. CONAWAY MAIN SUPPLY CANAL AUGMENTATION

This project concept includes converting the eastern 3,500 linear feet of the existing earthen main supply canal to one or more pipes to protect it from scour during frequent overtopping flows. Located immediately south of County Road 22 on the eastern side of the Yolo Bypass, the main supply canal delivers water via a pump from the Sacramento River to the 17,000-acre Conaway Ranch. The proposed improvements would significantly reduce repair and maintenance costs while also reducing water delivery delays to 10,000 acres of farmland. The improvements would also provide minor flood protection benefits and reduce the risk of fish stranding in the canal.

3. SWANSTON RANCH MASTER PROJECT

This project concept includes implementation of a combination of drainage and conveyance capacity improvements to enhance habitat and wildlife-friendly agriculture, address drainage challenges, and minimize impacts of increases in the frequency and duration of flows in the Tule Canal and Yolo Bypass. These include improvements to Agricultural Crossing # 4 on the Tule Canal, construction of a low elevation agricultural berm west of and parallel to the Tule Canal, leveraging added conveyance capacity associated with the Lower Elkhorn Basin Levee Setback Project, and degrading the Sacramento Bypass levee spur to enhance flow conveyance capacity east of the Tule Canal.

4. Northern Yolo Bypass Wildlife Area Drainage and Water Supply Improvement Master Project

This project concept includes twelve improvements in the northern portion of the Yolo Bypass Wildlife Area (Wildlife Area) to provide a holistic solution to ongoing drainage and water supply challenges. These challenges include insufficient drainage capacity, localized flooding, lack of maintenance, and lack of coordination among farmers within and outside of the Wildlife area. This master project includes improvements to drainage canals, water control infrastructure, and access roads that are intended to improve the management of wetlands and wildlife-friendly agricultural while also reducing required closure of the Wildlife Area.

5. South Davis Drain Pump Station and gravity Drain Improvement

This project concept includes rehabilitating the pump station and co-locating a gravity drain at the intersection of the South Davis Drain and the Yolo Bypass western levee. Due to the insufficient capacity of the existing pump station and a lack of coordination among users, harvest can be delayed on up to 4,000 acres and the ability to manage wetlands to achieve habitat benefits within the Wildlife Area can be diminished. The installation of a gravity drain will reduce pumping costs and will increase the passive drainage capacity through the levee by supplementing an existing gravity drain located 0.5 mile to the south.

6. Central Yolo Bypass Wildlife Area Drainage Improvement Master Project

This project concept includes enhancing the conveyance capacity of key drainage canals within the central portion of the Wildlife Area northwest of the Lisbon Weir and south of Putah Creek. The improvements would include a combination of canal widening and deepening, aquatic weed control, and replacement of undersized and beaver-susceptible crossings and culverts. The project concept also includes connecting the east-west drainage canal system to the existing tidal channel network immediately to the south, which would improve drainage and enhance tidal wetland functions.

7. Lisbon Weir Improvements

This project concept includes replacing the current rock weir and tide gate structure with an operable variable height weir, improved flap gates and a fish passage ladder. These improvements could achieve significant agricultural, wetland, public education and recreation benefits due to greatly improved temporal control of upstream water levels and drainage conditions along with reduced maintenance frequency. Also, the fish passage structure would facilitate passage over a much broader range of conditions for listed fish species.

8. Tule Ranch Canal and Pump Improvements

This project concept includes deepening the Tule Ranch Canal directly south of the Wildlife Area and upgrading the two lift pumps. The canal's shallow depth and ineffective lift pumps limit the ability to deliver water necessary to manage wetlands in the southern portion of the Wildlife Area and within the duck clubs to the south. These improvements would enhance habitat conditions in the managed wetlands within the Wildlife Area and within the duck clubs to the south and would ensure irrigated pasture remains viable in the Wildlife Area.

9. YOLO BYPASS CANAL MAINTENANCE PROGRAM

This project concept includes implementing a Bypass-wide canal maintenance program. The current piecemeal maintenance conducted by landowners results in inefficiencies and less maintenance than is needed to ensure optimal management of agricultural and habitat lands, and to maintain the design flood conveyance of the Yolo Bypass. This plan concept would be implemented through the preparation of a feasibility study that would identify the optimum canal maintenance program.

10. YOLO BYPASS CROSSING IMPROVEMENTS

This project concept includes replacing canal crossings throughout the Yolo Bypass with railcar bridges and concrete abutments, prefabricated clear span bridges or similar upgrades. These crossing improvements would replace the rudimentary culvert and fill materials that require substantial ongoing maintenance to minimize blockages due to beaver activity, aquatic vegetation growth and sedimentation. These improvements would reduce maintenance costs, improve water supply and drainage for agriculture and managed wetlands, and improve flood conveyance capacity during storm events.

11. YOLO BYPASS DRAINAGE OUTLET INFRASTRUCTURE IMPROVEMENT PROJECT

This project concept includes installing or upgrading drainage gate infrastructure on all drainage outlets directly affected by backwatering during elevated flow conditions along the Tule Canal/Toe Drain. Backwatering due to inadequate gate structures can result in undesirable flooding of interior fields and managed wetlands. Improved drainage outlets would be expected to increase conveyance capacity and reduce drainage times, benefiting agriculture and wetland operations.

12. YOLO BYPASSKEEPER AND COORDINATING COMMITTEE

This project concept recommends the establishment of a Yolo Bypass Coordinating Committee and a Yolo Bypasskeeper modeled on the existing Lower Putah Creek Coordinating Committee. This plan concept would be implemented through the preparation of a feasibility study that would recommend the coordinating committee structure, operating guidance, and funding sources. The focus of the Coordinating Committee and Bypasskeeper would be on improving project outcomes, facilitating stakeholder engagement, and addressing management and other challenges that arise in the Yolo Bypass.

1 | RD 1600 Pump Station and Gravity Drain Improvements

PROJECT DETAILS

▶ Location
Reclamation District 1600 (RD 1600) pump station located at the toe of Yolo Bypass east levee in the northern Elkhorn Basin.

▶ Recommendations
Improve or replace the RD 1600 pump station and gravity drain to meet current drainage needs and maintain drainage capabilities if state/federal projects (e.g. Yolo Bypass Salmonid Project) increase Yolo Bypass flows and inundation.

▶ Description of Problem
RD 1600 is responsible for maintaining drainage capacity and levees for 18 landowners within the northern Elkhorn Basin. Located between the Sacramento River and the Yolo Bypass, RD 1600 is completely reliant on its ability to drain into the Tule Canal to meet its field and canal drainage needs. Drainage water must pass through the Yolo Bypass east levee via a combination of a gravity drain and pump station located at the western end of its main lateral canal.

Significant seepage through and under the Sacramento River west levee and Yolo Bypass east levee, which encircle the district, already exacerbate drainage challenges for RD 1600. In addition, high water levels in the Tule Canal due to flood flows overtopping the Fremont Weir and lack of canal maintenance can inhibit the utility of the gravity drain and increase the demand on the pump station to provide adequate drainage for RD 1600.

The increase in frequency and duration of flows in the Tule Canal expected with the Yolo Bypass Salmonid Project and Fremont Weir expansion in northern Elkhorn will place more demands on the pump and gravity drain. Built in 1942, the antiquated pump station shuts down when overheated, further compounding drainage challenges and jeopardizing agricultural operations. Since RD 1600 does not possess water rights or its own land to generate revenue, its financial resources are generated solely from the annual assessment of its 18 landowners to maintain the drainage and levee facilities for the district.

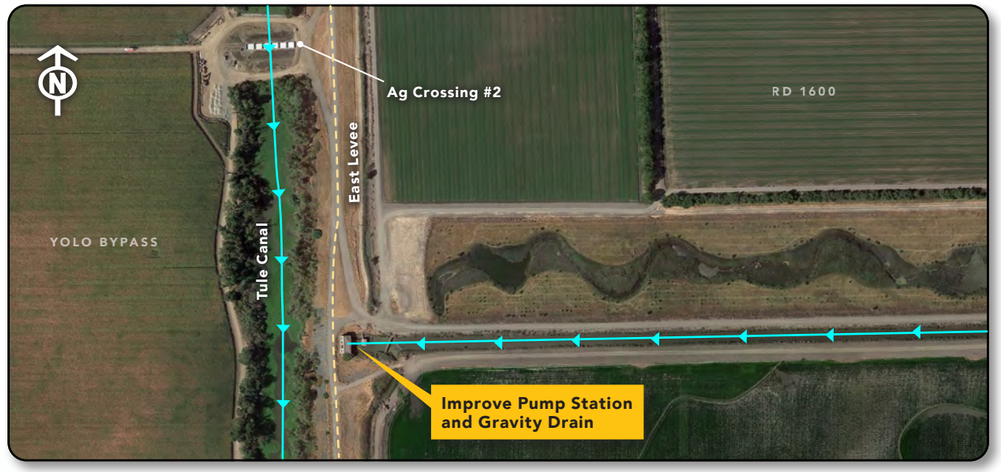
▶ Improvements and Potential Benefits
The RD 1600 pump station should be improved or replaced such that it adequately meets the drainage needs of the district, particularly if proposed projects with increased flows in the Yolo Bypass and Tule Canal move forward. An evaluation of the current pump station condition and its future demands is recommended to inform the improvement or replacement actions. Additionally, the preparation of a feasibility study is recommended to determine whether the gravity drain can be improved or augmented to better meet the passive drainage needs of RD 1600 under existing and proposed flow conditions in the Yolo Bypass.

▶ Potential Benefit Regions
RD 1600.

▶ Supporting Landowners and Stakeholders
RD 1600, Yolo County.

▶ Potential Constraints
Discharging drainage from lands within RD 1600 into the Tule Canal can be difficult when water levels are elevated due to excessive sedimentation, aquatic vegetation and weed growth that accumulates due to a lack of regular maintenance.

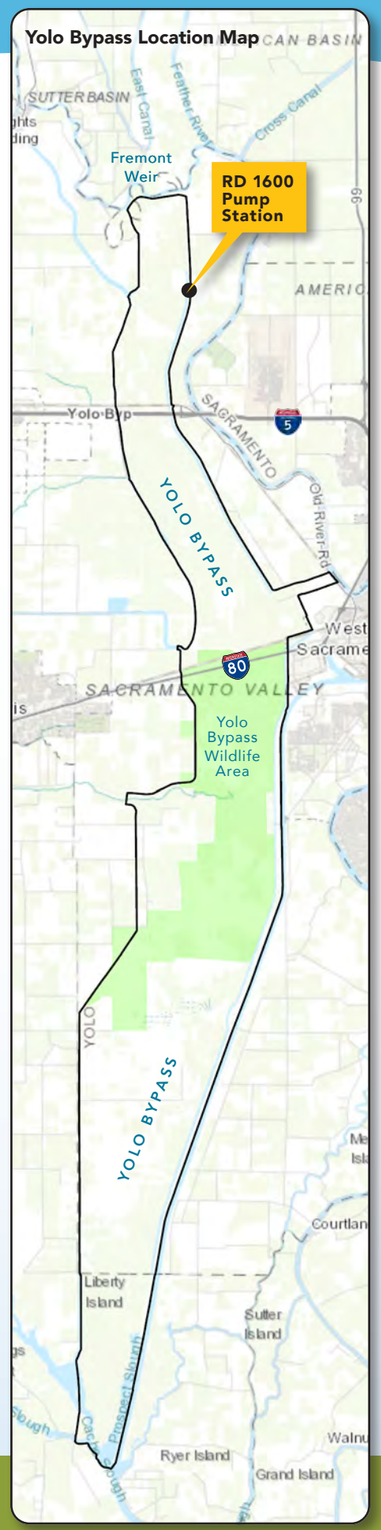
▶ Integration with Other Projects
This project should be integrated with the Yolo Bypass Canal Maintenance Program.



OPPORTUNITY EVALUATION CRITERIA, RANKING, AND NOTES

	Project Metric	High	Med	Low	N/A	Comments
Primary Benefit Criteria	Agricultural Benefit	●				Improved drainage for agricultural fields outside the Yolo Bypass.
	Migratory Waterfowl or Shorebird Habitat Benefit			●		
	Public Education and Recreation Benefit				●	None.
Secondary Benefit Criteria	Estimated Benefit Acreage[1]	●				Just over 6,000 acres in the northern Elkhorn Basin drain to the RD 1600 pump station and gravity drain.
	Listed Species Benefit				●	
Feasibility Criteria	Easement Compatibility					The project is compatible with existing easements.
	Shovel Readiness			●		The project is currently a concept and will require a feasibility study.
	Potential for Local Match		●			Additional discussions with RD 1600 are needed to determine whether funding is available for a local match.
	Eligibility for Federal/State Funding		●			The project is unlikely to secure competitive state and federal grant funding, so a state or federal agency would need to provide a direct funding commitment.
	Cost[2]		$$			
	Project Sponsor, Champion and Partners					RD 1600, Yolo County.

1: H = 6,000+ acres; M = 3,000 to 6,000 acres; L = less than 3,000 acres **2**: H = $ = less than $1M; M = $$ = $1M to $10M; L = $$$ = more than $10M



2 | Conaway Main Supply Canal Augmentation

PROJECT DETAILS

▶ Location
The Conaway Ranch Main Supply Canal is located immediately south of County Road 22 in the Yolo Bypass.

▶ Recommendations
Convert the eastern 3,500 lineal feet of the existing earthen Main Supply Canal in the Yolo Bypass to a pipe to protect it from scour during frequent overtopping flows.

▶ Description of Problem
The primary water supply for the 21,000-acre Conaway Ranch comes from the Sacramento River via the Conaway Main Supply Canal. The Main Supply Canal also occasionally supplies surplus water to two additional properties in RD 2035 that amount to an additional 1,500 acres. The earthen canal carries surface water from the pump on the Sacramento River west into the Yolo Bypass, passes under the Tule Canal (via a siphon) and then continues parallel to County Road 22 until turning south along the western levee of the Yolo Bypass. The southern berm of the canal is built at a higher elevation than County Road 22, so water overtops the berm whenever Yolo Bypass flows exceed the capacity of the Tule Canal. Annual flooding regularly scours and damages the southern berm of the Main Supply Canal as a result, requiring regular costly repairs and maintenance, particularly along the eastern 3,500 lineal feet of the canal (referred to as the "critical repair area"). At times, late season flooding and/or poor drainage and access conditions prevent timely repairs, delaying the start of agricultural operations and planting of the approximately.

The existing canal structure also results in the stranding of endangered fish species when water recedes and fish are trapped in the canal or in the pools created from scouring. The Yolo Bypass Salmonid Project will significantly increase the repair and maintenance costs associated with the Main Supply Canal and further affect water supply reliability for farming operations.

▶ Improvements and Potential Benefits
The proposed improvement replaces the earthen canal in the eastern 3,500-lineal foot critical repair area with twin pipes and repairs the siphon gates on the eastern side of the Tule Canal. This portion of the canal could be routed through twin underground 60-inch high-density polyethylene (HDPE) pipes as a continuation of the siphon that carries water under the Tule Canal. This would require slope armoring (riprap) along the southern slope of County Road 22.

Benefits include significantly reducing repair and maintenance costs and reducing water delivery delays to up to 15,300 acres farmed in an average year. In addition, the replacement of the earthen canal with twin pipes will allow the permanent degradation of 3,500 lineal feet of the canal's southern berm, which would eliminate a lateral hydraulic impediment across the Yolo Bypass and provide minor flood reduction benefits. This improvement also would reduce the risk of stranding fish in the earthen canal and associated scour pools (the frequency of which is expected to increase as a result of the increased frequency of flooding by the Yolo Bypass Salmonid Project).

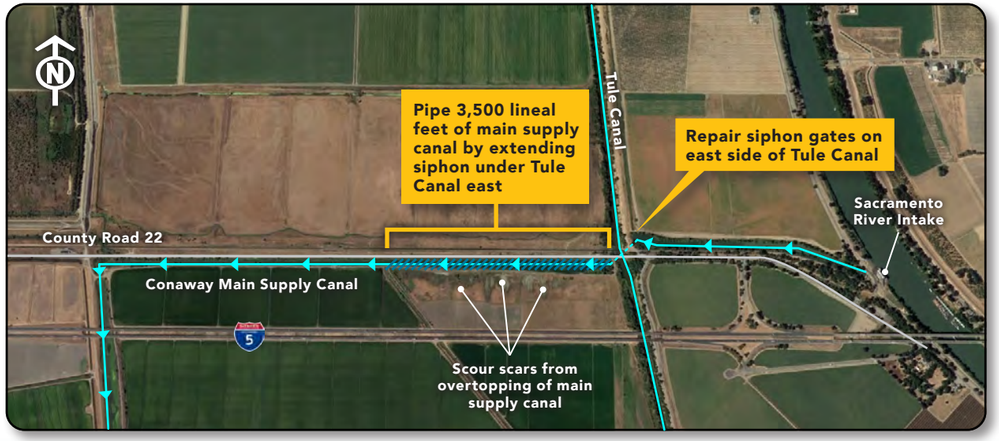
▶ Potential Benefit Regions
Conaway Ranch

▶ Supporting Landowners and Stakeholders
Conaway Ranch

▶ Potential Constraints
The project is costly and will involve a complicated permitting process as a result of the potential impacts on sensitive habitat near the Tule Canal. It may also be difficult to obtain grant funding for the project because it primarily benefits a private landowner and tenant farmers, although the water also is used to support wetlands and wildlife-friendly agriculture. The existing Main Supply Canal may also be viewed as jurisdictional waters and Giant Garter Snake habitat.

▶ Integration with Other Projects
A solution for the Conaway Main Supply Canal should be aligned with the Yolo Bypass Canal Maintenance Program.

View of Conaway Main Supply Canal, looking north. Photo by Conaway Ranch.



OPPORTUNITY EVALUATION CRITERIA, RANKING, AND NOTES

	Project Metric	High	Med	Low	N/A	Comments
Primary Benefit Criteria	Agricultural Benefit	●				The proposed improvements would increase reliability of water supply for nearly 10,000 acres of farmland on the ranch.
	Migratory Waterfowl or Shorebird Habitat Benefit		●			
	Public Education and Recreation Benefit				●	
Secondary Benefit Criteria	Estimated Benefit Acreage[1]	●				
	Listed Species Benefit		●			The project will reduce stranding risk for listed fish species. The Main Supply Canal also provides water to easements for Swainson's hawk, giant garter snake, tricolored blackbird and wildlife friendly agriculture.
Feasibility Criteria	Easement Compatibility	●				The project is consistent with or will benefit existing agricultural land and endangered species easements served by the Main Supply Canal. It is also consistent with existing flood easements.
	Shovel Readiness			●		A conceptual design and cost estimate have been prepared for this project.
	Potential for Local Match	●				Conaway Ranch owners are willing to provide matching funds.
	Eligibility for Federal/State Funding			●		In order to be eligible for state/federal competitive grant funding, the project will likely need to demonstrate significant benefits to endangered species and migratory waterfowl associated with the project. Alternatively, a state or federal agency would need to provide a direct funding commitment.
	Cost[2]		$$			Approximate cost of $6M including permitting, based on 2019 cost estimate.
	Project Sponsor, Champion and Partners			●		Conaway Ranch

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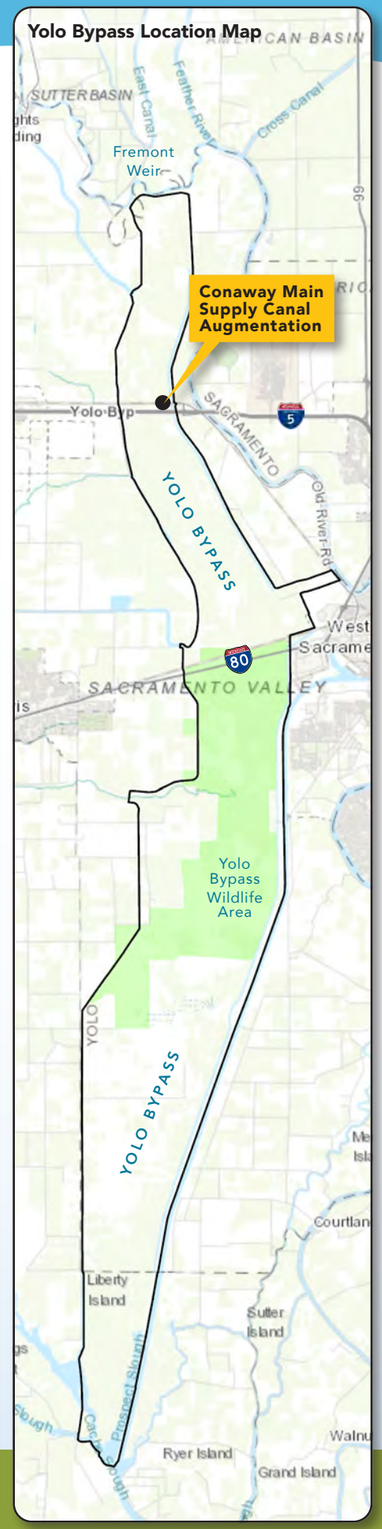


3 | Swanston Ranch Master Project

PROJECT DETAILS

▶ Location
The Swanston Ranch, composed of multiple parcels and approximately 12 landowners, is located immediately north of Interstate 80.

▶ Recommendation
The proposed project implements a combination of drainage and conveyance capacity improvements to enhance habitat and wildlife-friendly agriculture, address drainage challenges, and minimize impacts of flow increases due to the Yolo Bypass Salmonid Project on existing land uses.

▶ Description of Problem
Flow increases associated with the Yolo Bypass Salmonid Project have the potential to impact the management of wetland habitat and wildlife-friendly agriculture. Swanston Ranch consists of privately-owned wetlands managed exclusively for high-quality waterfowl habitat and duck hunting, as well as approximately 900 acres farmed in rice. Waterfowl habitat quality is heavily influenced by water depth since shallow water provides food sources for waterfowl not available at higher water depths. As a result, relatively small changes in water depth can significantly reduce habitat attractiveness for waterfowl.

Wetlands management and wildlife-friendly agriculture are also both affected if landowners cannot drain the land at appropriate times, resulting in more invasive weeds in the wetlands and lower rice yields. If increased Yolo Bypass flows result in undesirable inundation or changes to the carefully managed water levels at Swanston Ranch, the quality of the habitat and associated hunting and other recreation opportunities may be significantly compromised. Additionally, a lack of maintenance and adequate infrastructure along Willow Slough and adjacent canals create drainage challenges and nuisance flooding for Swanston Ranch and surrounding property owners.

▶ Improvements and Potential Benefits
The proposed project reduces, but does not eliminate, increases in the frequency and duration of inundation on Swanston Ranch due to the Yolo Bypass Salmonid Project (Big Notch) by implementing a combination of the following measures:

1. Enhance Tule Canal conveyance capacity including improvements to Ag Crossing #4
2. Construct a low elevation agricultural berm west of and parallel to the Tule Canal
3. Leverage added capacity of the Lower Elkhorn Basin Levee Setback Project to convey water on the eastern side of the Tule Canal; and
4. Degrade the Sacramento Bypass levee spur to enhance flow conveyance capacity east of the Tule Canal

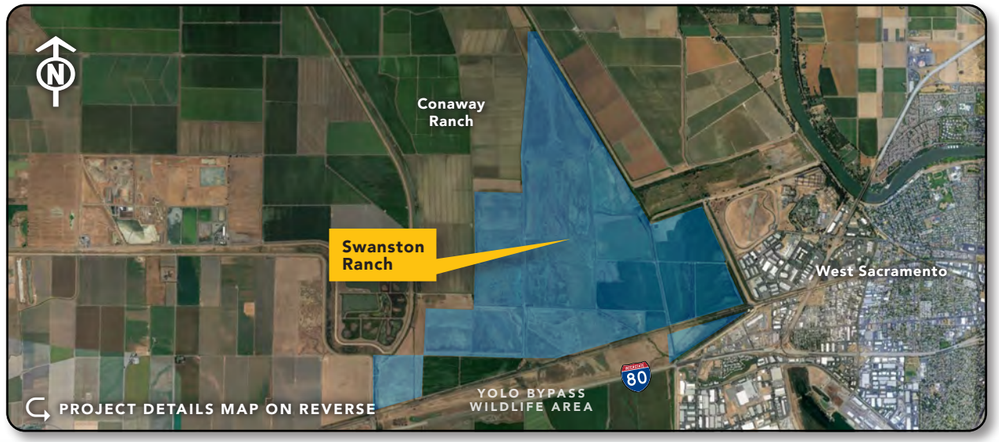
The proposed project also includes improvements to the conveyance capacity of the Willow Slough Bypass and adjacent canals as well as the operability of the water control structure (see graphic on reverse side) to improve drainage and water supply and reduce nuisance flooding at the Yolo Bypass Wildlife Area main entrance.

▶ Potential Benefit Regions
Swanston Ranch, Conaway Ranch, Yolo Bypass Wildlife Area

▶ Supporting Landowners and Stakeholders
CDFW and Yolo Basin Foundation (Yolo Bypass Wildlife Area improvements, including main entrance) and Conaway Ranch (enhanced agricultural drainage).

▶ Potential Constraints
A gas pipeline alignment and potentially other utilities near Willow Slough Bypass will need to be considered for maintenance and improvement efforts (project elements 6 and 8 on reverse).

▶ Integration with Other Projects
This project should be integrated with drainage and infrastructure improvement projects including the Northern Yolo Bypass Wildlife Area Master Project and the Yolo Bypass Canal Maintenance Program.



OPPORTUNITY EVALUATION CRITERIA, RANKING, AND NOTES

	Project Metric	High	Med	Low	N/A	Comments
Primary Benefit Criteria	Agricultural Benefit		●			Improved operability of the water control structure and drainage along Willow Slough Bypass will assist with rice field drainage for southern Conaway Ranch and the 900 acres of rice on the Swanston Ranch.
	Migratory Waterfowl or Shorebird Habitat Benefit	●				These improvements will help maintain and enhance managed habitat for migratory waterfowl and shorebirds on private wetlands.
	Public Education and Recreation Benefit		●			Improved operability of the water control structure and drainage along Willow Slough Bypass will help alleviate nuisance flooding at the YBWA main entrance, therefore reducing Wildlife Area closures and the associated K-12 educational activities and recreation opportunities.
Secondary Benefit Criteria	Estimated Benefit Acreage[1]		●			
	Listed Species Benefist			●		The ranch is not managed for listed species.
Feasibility Criteria	Easement Compatibility		●			The project is highly likely to be consistent with existing wetlands and flood easements.
	Shovel Readiness			●		A project concept has been developed and some elements of the project concept have been preliminarily evaluated with two-dimensional hydraulic modeling. Additional analysis, design and permitting are required along with project funding.
	Potential for Local Match		●			The 12 Swanston landowners have not publicly said whether they will contribute matching funds.
	Eligibility for Federal/State Funding			●		The project is unlikely to secure competitive state and federal grant funding, so a state or federal agency would need to provide a direct funding commitment.
	Cost[2]			$$$		The project involves extensive infrastructure improvements, which are likely very expensive.
	Project Sponsor, Champion and Partners			●		

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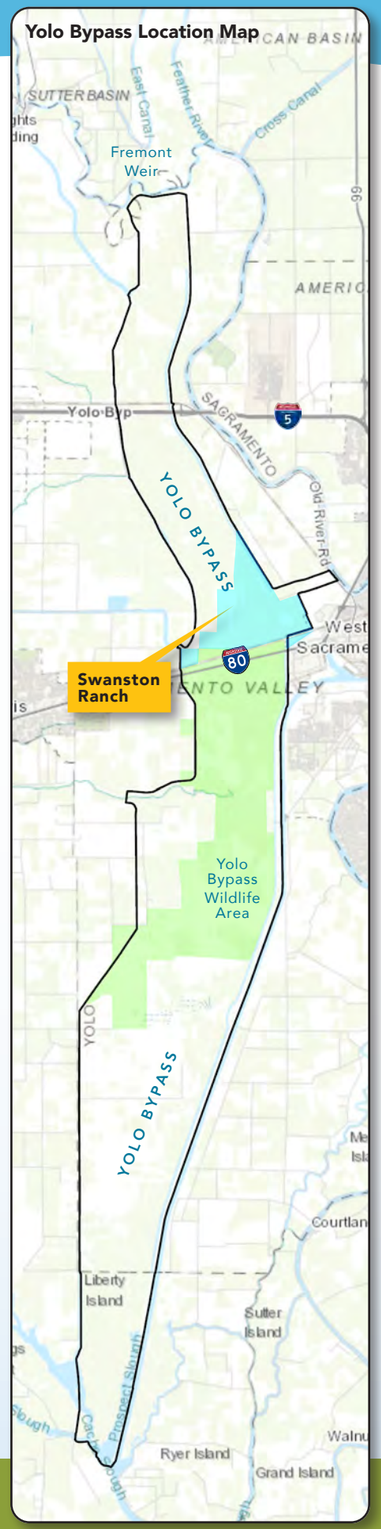
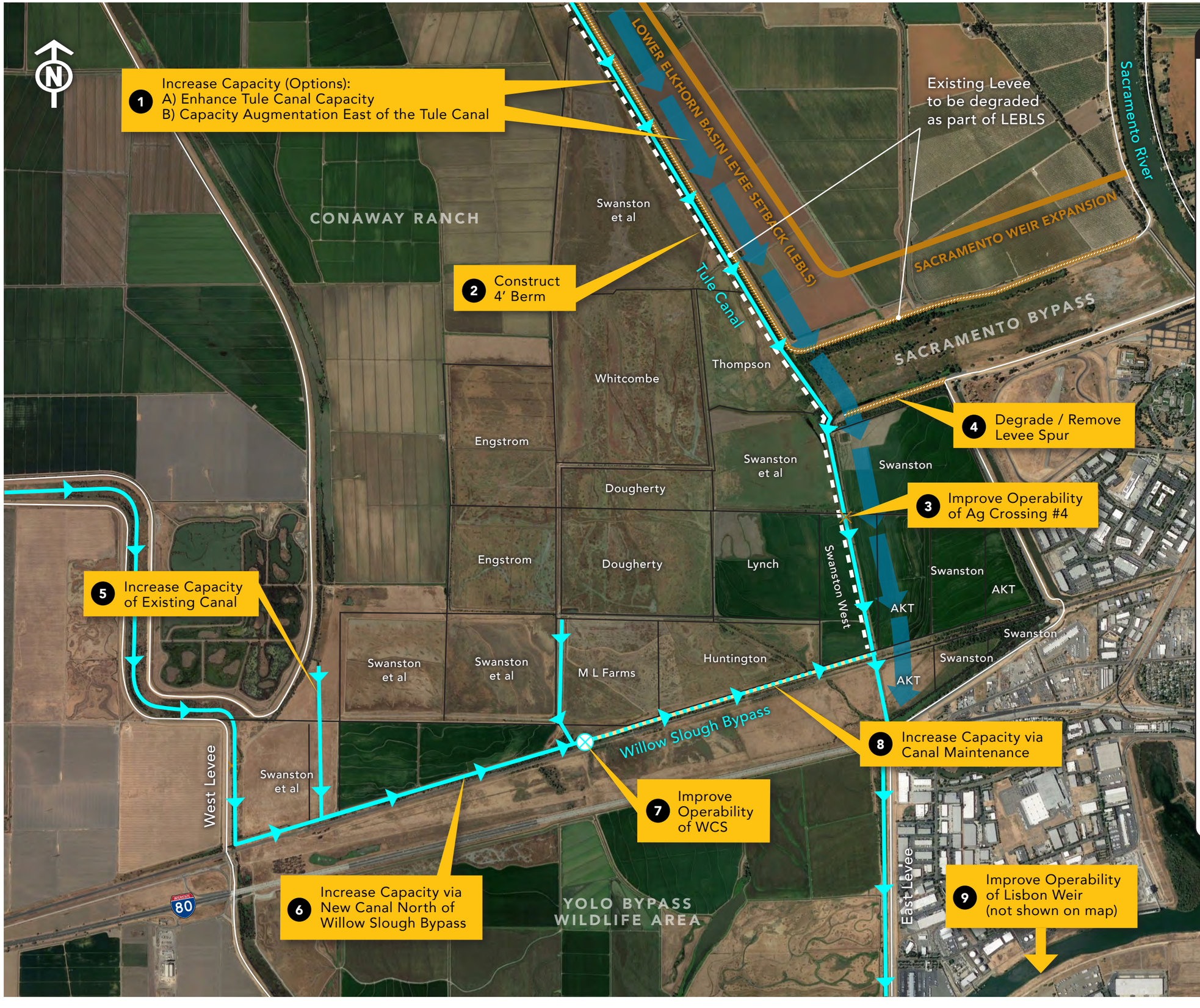




PROJECT ELEMENTS

1. **Increase Capacity (Options)**
   Increase flow conveyance capacity by (1A) enhancing Tule Canal capacity, clarify and/or (1B) moving flows through the Lower Elkhorn Levee Setback Project floodplain and existing Bypass lands east of the Tule Canal.

2. **Construct 4' Berm**
   Construct a 4-foot tall agricultural berm on the western side of the Tule Canal and associated riparian habitat corridor to reduce frequency and duration of inundation of Swanston Ranch. The berm could be colocated with the existing dirt road to improve access during low-level flood conditions.

3. **Improve Operability of Ag Crossing #4**
   Enhance operability of agricultural crossing #4 with an improved structure (currently under design by landowners).

4. **Degrade / Remove Levee Spur**
   Increase flow conveyance capacity east of the Tule Canal by degrading or removing the Sacramento Bypass levee spur

5. **Increase Capacity of Existing Canal**
   Increase the flow conveyance capacity of the existing highlighted canal to improve drainage

6. **Increase Capacity via New Canal North of Willow Slough Bypass**
   Increase capacity of Willow Slough Bypass by establishing a new parallel canal immediately north of the existing canal

7. **Improve Operability of WCS**
   Improve operability of the water control structure for water supply and drainage

8. **Increase Capacity via Canal Maintenance**
   Increase capacity of the eastern portion of Willow Slough Bypass along the dashed segment through maintenance measures

9. **Improve Operability of Lisbon Weir**
   Improve the operability of Lisbon Weir (not shown on map) to facilitate better drainage of upstream fields within the Yolo Bypass and address capacity limitations of current infrastructure.

4 | Northern Yolo Bypass Wildlife Area Drainage and Water Supply Improvement Master Project

PROJECT DETAILS

▶ Location
Northern Yolo Bypass Wildlife Area ("Wildlife Area").

▶ Recommendations
Implement priority drainage and infrastructure improvements in the northern Wildlife Area to holistically address drainage, canal capacity, nuisance flooding and access issues.

▶ Description of Problem
Poor drainage of northern Wildlife Area lands exacerbates local flooding, compromises wetlands management and wildlife-friendly agriculture, and reduces access for wetland managers, farmers and the public. Canal capacity is often exceeded by a combination of infrastructure challenges (e.g., lack of maintenance, limited size/capacity of drainage and water supply canals) and a lack of communication among farmers within and outside of the Yolo Bypass. Drainage challenges are exacerbated by discharge into the Wildlife Area from the South Davis Drain (one of the City of Davis' main stormwater drains and a drainage canal for farmland west of the Yolo Bypass), the Willow Slough Bypass, and lands north of the Wildlife Area. These drainage problems, which frequently occur when Toe Drain water levels are elevated, result in closure of the Wildlife Area because of flooding at the main entrance and other areas.

In addition, the timing of drainage also impacts Wildlife Area management. In March/April, the Wildlife Area manager drains wetlands to prevent growth of invasive plants and to maximize the next year's waterfowl and shorebird food supply. This water drains into the canals at the same time rice farmers need to use the canals to flood rice fields. Rice farmers also need to drain rice fields in the early fall at the same time the Wildlife Area manager needs the canals to flood winter wetlands for shorebirds and migratory waterfowl. Improvements identified in the 2014 Drainage and Water Infrastructure Improvement Study were partially implemented in 2020, but additional work is needed to address remaining issues.

▶ Improvements and Potential Benefits
The proposed project includes 12 improvements (see reverse side of this project sheet) to provide a holistic solution to ongoing drainage and water supply challenges. These measures include improvements to drainage canals, water control infrastructure, and access roads. The identified physical improvements should be pursued in combination with an expanded maintenance program and improved coordination among land managers within and to the west and north of the Wildlife Area. Without this system-wide solution, drainage and water supply challenges will continue to affect land uses and access, resulting in the closure of the Wildlife Area due to flooding and associated impacts. These impacts include cancellation of Yolo Basin Foundation school field trips, reduced wildlife viewing and hunting access, reduction of agricultural yields, and a decrease in waterfowl food availability due to increased invasive weeds.

Wildlife Area Main Entrance subject to routine nuisance flooding that limits public access.

▶ Potential Benefit Regions
Lands within the Wildlife Area, lands immediately north of the Wildlife Area and lands west of the Yolo Bypass west levee.

▶ Supporting Landowners and Stakeholders
California Department of Fish and Wildlife (CDFW), Yolo Basin Foundation (YBF), City of Davis, other landowners west of the Wildlife Area, Swanston Ranch, Conaway Ranch.

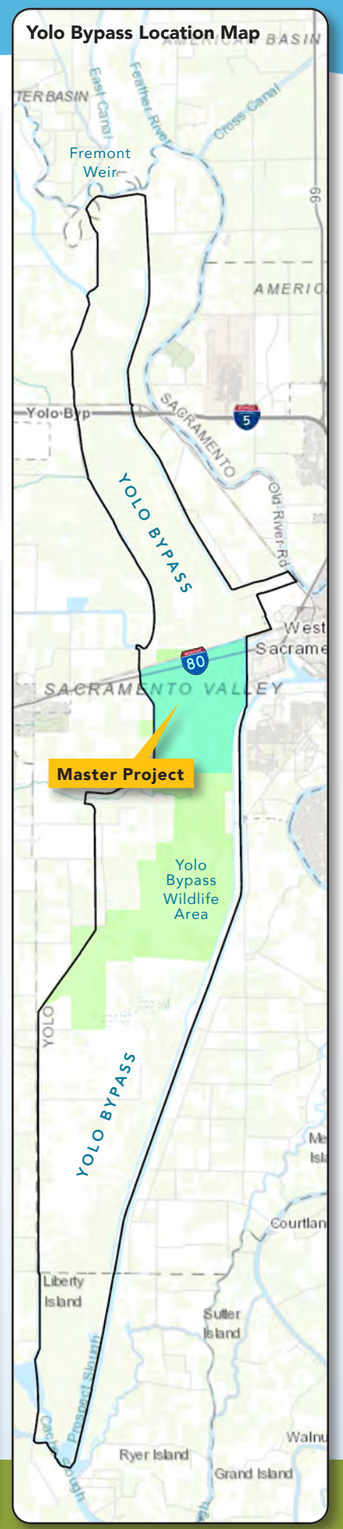
▶ Potential Constraints
Gas pipeline alignment near Willow Slough may affect maintenance and improvement proposals(project elements 3 and 4 on reverse), as well as the availability of funding.

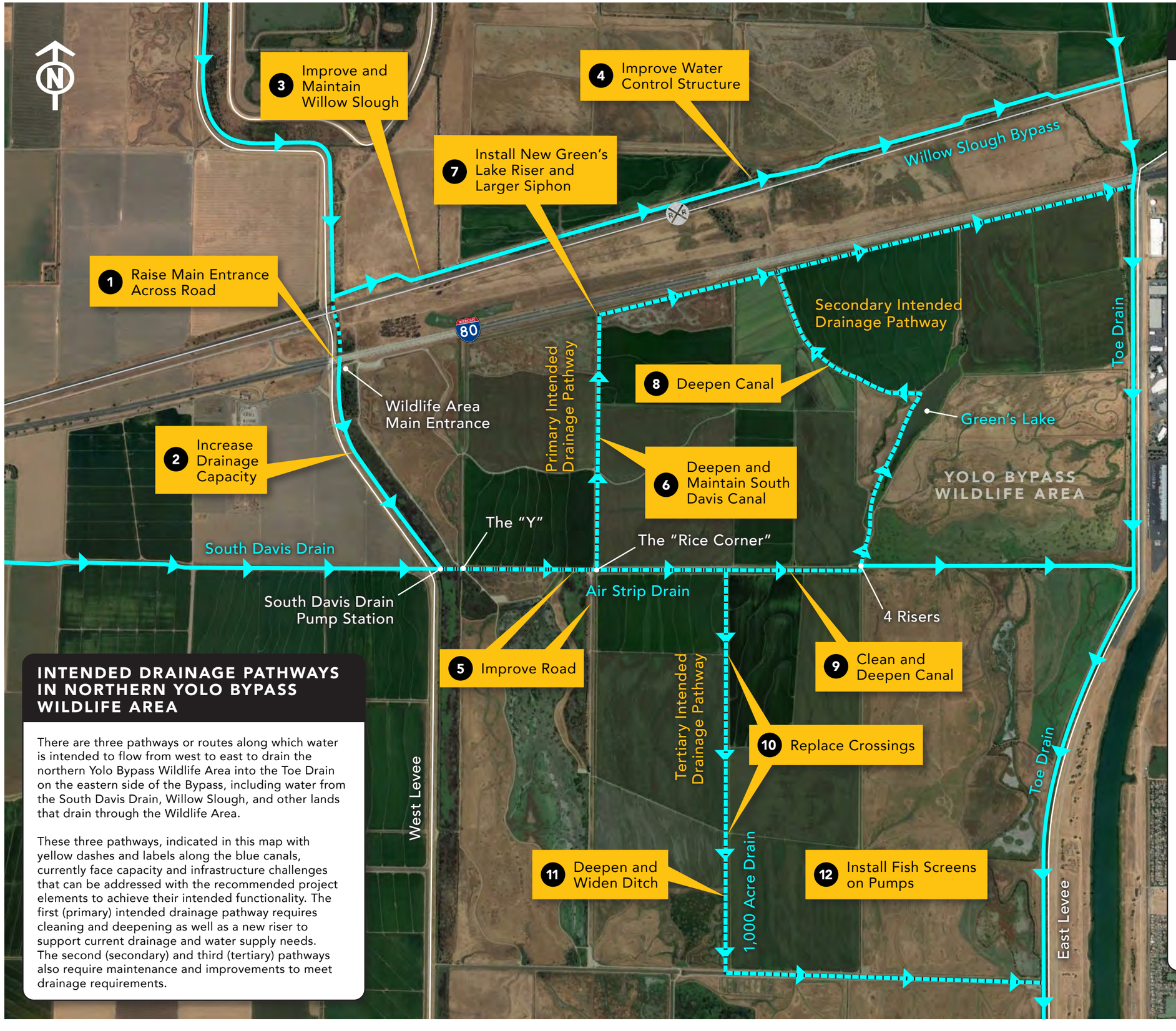
▶ Integration with Other Projects
This project should be integrated with other nearby drainage and infrastructure improvement projects, including the South Davis Drain Pump Station and Gravity Drain Improvements Project, Swanston Ranch Master Project, and the Yolo Bypasskeeper and Coordinating Committee.

OPPORTUNITY EVALUATION CRITERIA, RANKING, AND NOTES

	Project Metric	High	Med	Low	N/A	Comments
Primary Benefit Criteria	Agricultural Benefit	●				Improved drainage capacity and water supply improvements will greatly enhance agricultural water management within the northern Wildlife Area and on lands west of the Yolo Bypass that drain into South Davis Drain. Maintaining agriculture in the Wildlife Area is important because of habitat benefits and because agricultural lease revenue funds Wildlife Area maintenance.
	Migratory Waterfowl or Shorebird Habitat Benefit	●				Drainage, water supply, and access improvements will significantly improve water management for waterfowl and shorebird habitat within the Wildlife Area, including allowing wetlands to drain at times appropriate to prevent growth of invasive weeds and increase the availability of beneficial plants that provide food for migrating waterfowl and shorebirds.
	Public Education and Recreation Benefit	●				Drainage capacity and Wildlife Area main entrance access improvements will facilitate expanded public access during times when the Wildlife Area currently closes due to nuisance flooding and safety concerns at the main entrance.
Secondary Benefit Criteria	Estimated Benefit Acreage[1]	●				Project will benefit lands within the northern Wildlife Area, west of the Yolo Bypass that drain into South Davis Drain and portions of Swanston Ranch and Conaway Ranch.
	Listed Species Benefit			●		An MOU between CDFW and flood protection agencies does not currently allow for specific management actions for endangered species, although the land provides habitat for giant garter snake and Swainson's hawk.
Feasibility Criteria	Easement Compatibility	●				Implementing drainage and water supply improvements will not negatively impact the ability of the state to place an easement or other long-term restrictions on the property. The improvements will instead help to drain the Bypass faster than would otherwise be possible.
	Shovel Readiness			●		None of the 11 proposed improvements have been designed. Some federal funding is available for design and construction of improvements to the Wildlife Area entrance, but the funding has not yet been appropriated for this purpose.
	Potential for Local Match			●		The project will mostly likely rely on state and federal grant funding for implementation costs, although other partners may be willing to contribute funding as they have for previous Yolo Bypass projects.
	Eligibility for Federal/State Funding	●				As a result of the multiple benefits, the projects are compelling candidates for state and federal funding.
	Cost[2]			$$$		Infrastructure improvements are expensive, based on the experience with the 2020 improvements in the Wildlife Area (which total over $7.7 million).
	Project Sponsor, Champion and Partners	●				The 2020 drainage and water supply improvements brought together a diverse team of partners. The expanded project will increase the number and diversity of project partners, including, California Department of Fish and Wildlife, Yolo Basin Foundation, City of Davis, Hafeez Rehman, Los Rios Farms, DeWit Farms, Metropolitan Water District of Southern California, and others.

1: H = 6,000+ acres; M = 3,000 to 6,000 acres; L = less than 3,000 acres **2**: H = $ = less than $1M; M = $$ = $1M to $10M; L = $$$ = more than $10M





INTENDED DRAINAGE PATHWAYS IN NORTHERN YOLO BYPASS WILDLIFE AREA

There are three pathways or routes along which water is intended to flow from west to east to drain the northern Yolo Bypass Wildlife Area into the Toe Drain on the eastern side of the Bypass, including water from the South Davis Drain, Willow Slough, and other lands that drain through the Wildlife Area.

These three pathways, indicated in this map with yellow dashes and labels along the blue canals, currently face capacity and infrastructure challenges that can be addressed with the recommended project elements to achieve their intended functionality. The first (primary) intended drainage pathway requires cleaning and deepening as well as a new riser to support current drainage and water supply needs. The second (secondary) and third (tertiary) pathways also require maintenance and improvements to meet drainage requirements.

PROJECT ELEMENTS

1. **Raise Main Entrance Access Road**
   Improve main entrance crossing by raising road by a minimum of 12" to 24" and installing additional culverts to prevent inundation (and loss of public access) during relatively minor flooding conditions in the Bypass.
2. **Increase Drainage Capacity**
   Remove vegetation and accumulated debris and sediment from the borrow canal to improve drainage and enable water to move south.
3. **Improve and Maintain Willow Slough**
   Improve conveyance capacity of Willow Slough through routine maintenance (i.e. sediment removal, vegetation maintenance, etc.) and/or deepening or widening.
4. **Improve Water Control Structure**
   Upgrade or otherwise improve the existing earthen water control structure in Willow Slough.
5. **Improve Road**
   Raise road levels to reduce nuisance flooding while providing alternate drainage capacity (i.e. culverts under road base) to avoid exacerbating current drainage challenges.
6. **Deepen and Maintain South Davis Canal**
   Clean and deepen primary drain for the South Davis Drain system to enable improved flow conveyance capacity north to I-80 and east to Toe Drain
7. **Install New Green's Lake Riser and Larger Siphon**
   Install a new riser and larger siphon to provide water level control for Green's Lake while enabling improved water recirculation and reuse in the northern Wildlife Area during the growing season. Very high priority.
8. **Deepen Canal**
   Deepen canal to enable increased conveyance capacity out of Green's Lake.
9. **Clean and Deepen Canal**
   Clean and deepen the canal between the "Rice Corner" and 4 Risers.
10. **Replace Crossings**
    Replace the two existing crossings along the 1,000 Acre Drain with rail cars or other crossings capable of supporting 80,000 lb rice harvester load.
11. **Deepen and Widen Ditch**
    Deepen and widen the existing 1,000 Acre Drain south of the southern extent of Ducks Unlimited's prior canal maintenance activities to improve conveyance capacity. Very high priority.
12. **Install Fish Screens on Pumps**
    Install fish screens on all unscreened pumps.

5 | South Davis Drain Pump Station and Gravity Drain Improvements

PROJECT DETAILS

▶ Location
South Davis Drain Pump Station at the Yolo Bypass west levee.

▶ Recommendations
Rehabilitate the existing South Davis Drain Pump Station and co-locate a new gravity drain with the rehabilitated facility for improved functionality.

▶ Description of Problem
The South Davis Drain is one of the primary drains for the City of Davis' stormwater system and the nearby unincorporated area of Yolo County, including Willowbank, El Macero, and farm fields inside and west of the Yolo Bypass Wildlife Area ("Wildlife Area"). The South Davis Drain flows west to the east from South Davis through the Wildlife Area and eventually empties into the Toe Drain, but has insufficient capacity for the existing uses by farmers, the City, the County, and the Wildlife Area. A lack of coordination among users also exacerbates drainage challenges. The drainage capacity and coordination problems result in delayed harvests on up to 4,000 acres, increasing farming costs, as well as impacts to wetlands management in the Wildlife Area. The drainage issues also prevent farmers from improving management of their agricultural fields during the winter months for migrating waterfowl or other terrestrial species.

There are currently two options to drain water from the South Davis Drain and nearby fields through the Yolo Bypass west levee: 1) the City of Davis may pump the water through the levee at the City's aging South Davis Drain pump station, which was constructed in 1965; or 2) the water may flow through the existing gravity drain located approximately 0.5 miles south of the pump station (see map for locations). The specific drivers of this drainage capacity challenge at the Yolo Bypass west levee include:

1. The elevation of the City's existing pump station is too low, resulting in the inundation and damage of pumps and electrical hardware during routine high water conditions;
2. The City's pump station, operated by SCADA, has very limited ability to be operated remotely; and
3. The existing gravity drain pipe through the west levee is set too high for adequate gravity drainage and is not located at the ideal point (north to south) along the levee to maximize drainage

In addition to these physical drainage challenges, the City of Davis currently incurs electrical and maintenance costs to operate the South Davis Drain pump to drain water not associated with City uses. The City only needs to operate the pump during the winter for stormwater, but operates the pump year round to benefit other landowners. The City has indicated this arrangement is unsustainable.

▶ Improvements and Potential Benefits
The City supports upgrading the pump station, including elevating the station at its current location and augmenting the drainage capacity at the pump station location by either modifying the existing drain to enable gravity drainage or installing a new gravity drain through the levee. The new gravity drain functionality at the pump station location will expand the cumulative passive drainage capacity through the levee, which is currently limited by the inadequate gravity drain 0.5 miles south of the pump station. In addition, the new gravity drain capacity will provide a low-cost drainage option compared to operating the pump station. The elevated pump station will increase the reliability of pumping and will reduce the operation and maintenance costs associated with routine flooding of the pumps and electrical hardware. This combined project will enhance drainage of approximately 4,000 acres of farmland inside and west of the Bypass, improve the ability of farmers to manage lands for wildlife habitat, enable improved management of the Wildlife Area wetlands, and reduce the City's operational costs.

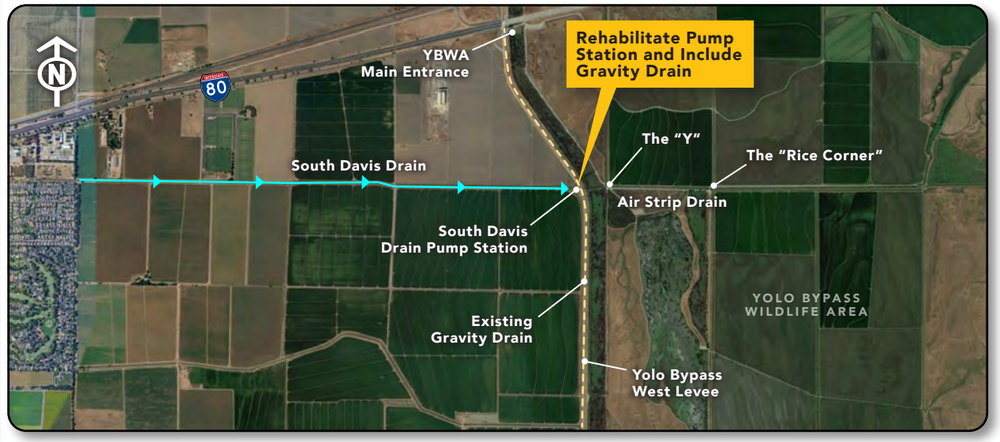
As part of this project, the City would like to discuss a cost-sharing agreement for operation and maintenance with the other beneficiaries of the drainage system. The first step in developing this project is a feasibility study that is (1) developed with active participation from all stakeholders, (2) identifies whether the existing pump station drain can be modified to also facilitate gravity drainage or whether a new gravity drain must be installed, (3) that estimates one-time capital costs, and ongoing operation and maintenance costs, and (4) that proposes a cost-sharing model.

▶ Potential Benefit Regions
Lands within the Wildlife Area; City of Davis south of Interstate 80; El Macero, Willowbank, and other unincorporated lands west of the Yolo Bypass levee and north of Putah Creek.

▶ Supporting Landowners and Stakeholders
CDFW, Yolo Basin Foundation, Los Rios Farms, Hafeez Rehman, City of Davis, other landowners west of the Wildlife Area.

▶ Potential Constraints
If a new pipe through a Sacramento River Flood Control Project levee is required, permitting may be costly and time consuming.

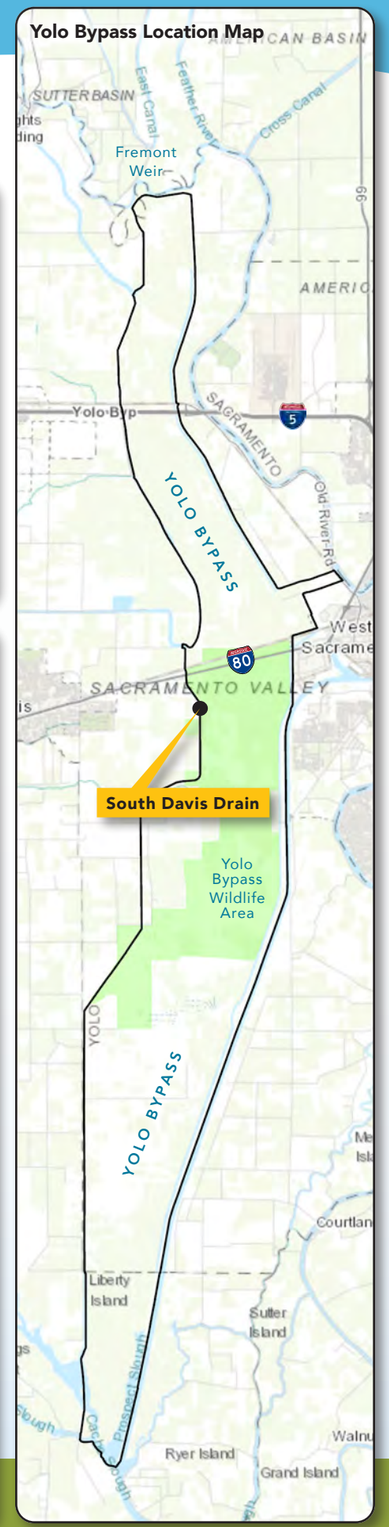
▶ Integration with Other Projects
This project would benefit significantly from other drainage improvements proposed in the Northern Yolo Bypass Wildlife Area Drainage and Water Supply Improvement Master Project because all increases in drainage capacity within the northern Wildlife Area will help the system as a whole accommodate drainage. This project should also be integrated with improved communication and coordination among land managers and stakeholders facilitated through the Bypass Keeper and Coordinating Committee Project.



OPPORTUNITY EVALUATION CRITERIA, RANKING, AND NOTES

	Project Metric	High	Med	Low	N/A	Comments
Primary Benefit Criteria	Agricultural Benefit	●				Improved operability and capacity delivered by the combined pump station improvements and gravity drain augmentation will improve agricultural production by improving field water management, preventing delayed harvests (which lowers yield), and providing other agricultural management benefit.
	Migratory Waterfowl or Shorebird Habitat Benefit			●		Management of the Wildlife Area wetlands habitat will improve with improved water control.
	Public Education and Recreation Benefit			●		When implemented in conjunction with the Northern Wildlife Area Drainage Improvement Master Project, these improvements will help reduce nuisance flooding at the Wildlife Area main entrance and associated closures and other access issues.
Secondary Benefit Criteria	Estimated Benefit Acreage[1]	●				Project will benefit at least 5,000 acres within and west of the Wildlife Area.
	Listed Species Benefit			●		
Feasibility Criteria	Easement Compatibility	●				The project is consistent with existing easements.
	Shovel Readiness			●		The project will require a feasibility study and extensive stakeholder coordination, followed by selection of a final option and design/engineering and permitting.
	Potential for Local Match	●				The City of Davis is willing to consider providing up to $50K as matching funds to support a planning / feasibility study. The City will continue to pay operation and maintenance costs for the pump station proportional to the City's share of usage / benefits.
	Eligibility for Federal/State Funding	●				The availability of matching funds and benefits to the Wildlife Area will increase eligibility for funding.
	Cost[2]			$$$		Costs include a feasibility study, followed by design/ engineering, permitting, and construction.
	Project Sponsor, Champion and Partners	●				California Department of Fish and Wildlife, Yolo Basin Foundation, Los Rios Farms, Hafeez Rehman, City of Davis, other landowners west of the Wildlife Area.

1: H = 6,000+ acres; M = 3,000 to 6,000 acres; L = less than 3,000 acres **2**: H = $ = less than $1M; M = $$ = $1M to $10M; L = $$$ = more than $10M



6 | Central Yolo Bypass Wildlife Area Drainage Improvement Master Project

PROJECT DETAILS

▶ Location
The central portion of the Yolo Bypass Wildlife Area ("Wildlife Area") northwest of Lisbon Weir and south of Putah Creek.

▶ Recommendations
Enhance capacity and reliability of primary drainage canals in the central Wildlife Area and establish connection with existing tidal channels.

▶ Description of Problem
Sedimentation, aquatic weed growth and beaver activity have significantly reduced the conveyance capacity of key drainage canals within the central portion of the Wildlife Area. Increased rice production west of the Wildlife Area has resulted in increased volumes of water that must be drained through the Wildlife Area. Increased rice production west of the Wildlife Area has resulted in increased volumes of water that must be drained through the Wildlife Area. These increased flows have resulted in perennial (year-round) or near-perennial flow conditions along drainage canals that previously went dry. Current conditions encourage rampant growth of primrose and significantly increase beaver activity.

Several crossings and culverts along key drainage canals are particularly vulnerable to beaver activity and dam building. The combination of significant drainage requirements for upstream rice growing and impaired conveyance capacity results in poor drainage from land within and west of the Wildlife Area, negatively impacting agricultural operations and management of wetland habitat for waterfowl and shorebirds. The loss of conveyance capacity also results in more frequent flooding and reduced access to the drainage canals and crossings for regular maintenance efforts, further compounding these drainage challenges.

▶ Improvements and Potential Benefits
The recommended project elements include enhancing the conveyance capacity of key drainage canals within the central Wildlife Area through a combination of canal widening and deepening, aquatic weed control and replacement of undersized and beaver-susceptible crossings and culverts. The target canal segments are shown on the map on the reverse side of the project sheet.

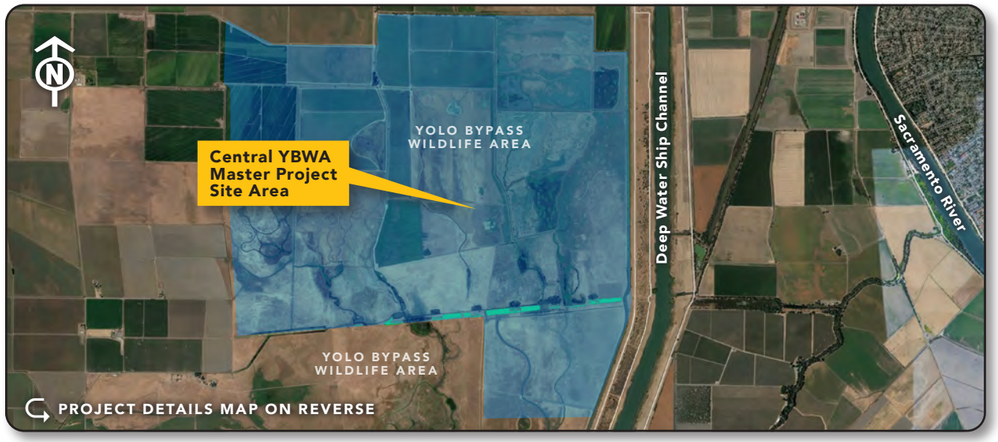
Additionally, the east-west drainage canal system could be connected to the existing tidal channel network immediately south, improving drainage and connectivity of the system and enhancing tidal wetland functions. Furthermore, an undersized crossing over the primary tidal channel could be replaced with larger culverts to improve tidal conveyance, drainage, and access for grazing.

▶ Potential Benefit Regions
Central Yolo Bypass Wildlife Area, lands west and north of the central Wildlife Area

▶ Supporting Landowners and Stakeholders
California Department of Fish and Wildlife, Yolo Basin Foundation, Los Rios Farms

▶ Potential Constraints
To be determined as the project is advanced.

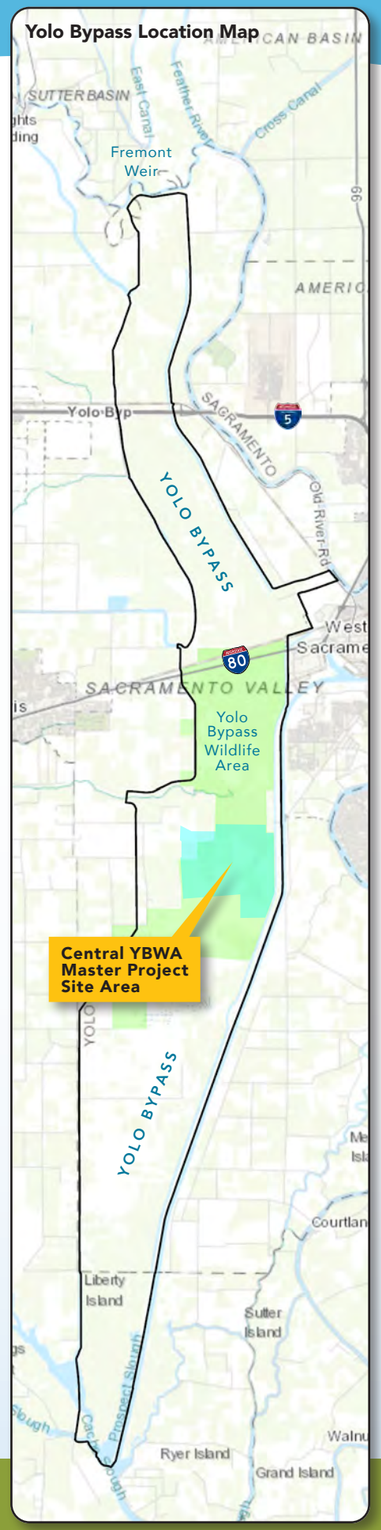
▶ Integration with Other Projects
This project should be integrated with maintenance support measures included in the Yolo Bypass Canal Maintenance Program and Yolo Bypass Crossing Improvements Project.



OPPORTUNITY EVALUATION CRITERIA, RANKING, AND NOTES

	Project Metric	High	Med	Low	N/A	Comments
Primary Benefit Criteria	Agricultural Benefit	●				These canal conveyance capacity enhancement measures will significantly improve drainage of agricultural land within and west of the Wildlife Area.
	Migratory Waterfowl or Shorebird Habitat Benefit	●				These canal conveyance capacity enhancement measures will significantly improve drainage of agricultural land within and west of the Wildlife Area.
	Public Education and Recreation Benefit		●			Improved drainage will reduce nuisance flooding and improve access to the central Wildlife Area for recreation.
Secondary Benefit Criteria	Estimated Benefit Acreage[1]		●			
	Listed Species Benefit			●		
Feasibility Criteria	Easement Compatibility	●				Implementing drainage and water supply improvements will not negatively impact the ability of the state to place an easement or other long-term restrictions on the property. The improvements will instead help to drain the Bypass faster than would otherwise be possible.
	Shovel Readiness			●		None of the 4 proposed project elements have been designed.
	Potential for Local Match			●		
	Eligibility for Federal/State Funding		●			
	Cost[2]		$			
	Project Sponsor, Champion and Partners			●		California Department of Fish and Wildlife, Yolo Basin Foundation, Los Rios Farms

1: H = 6,000+ acres; M = 3,000 to 6,000 acres; L = less than 3,000 acres **2**: H = $ = less than $1M; M = $$ = $1M to $10M; L = $$$ = more than $10M



Yolo Bypass Wildlife Area Boundary

YOLO BYPASS WILDLIFE AREA

Poor Field Drainage Due to Limited Ditch Capacity

Poor Field Drainage Due to Limited Ditch Capacity

Provides Dual Conveyance

Serves as a Primary Drain for Land West of This Portion of the YBWA

2 Enhance Channel Capacity

Tule Canal

Deep Water Ship Channel

Lisbon Weir

Beaver Dams Present Maintenance Challenges

3 Establish Connection with Tidal Channel

1 Enhance Channel Capacity and Improve Crossings

Wildlife Corridors for Flood Escape Along Abandoned Railroad Alignment

4 Replace Undersized Culvert

East Levee

YOLO BYPASS WILDLIFE AREA

PROJECT ELEMENTS

1 Enhance Channel Capacity and Improve Crossings
Enhance capacity along this dashed canal alignment to improve drainage by widening and deepening the canal, addressing primrose overgrowth and retrofitting or replacing crossings to make them less susceptible to beaver activity

2 Enhance Channel Capacity
Deepen and widen the dashed channel/canal alignment and retrofit or replace crossings to make them less susceptible to beaver activity

3 Establish Connection with Tidal Channel
Establish a direct connection between the canal and the existing tidal channels. The connection design must consider beaver activity and limit the need for associated maintenance.

4 Replace Undersized Culvert
The existing undersized culvert should be replaced with multiple 48-inch culverts or a clear span bridge (e.g., railcar bridge).

7 | Lisbon Weir Improvements

PROJECT DETAILS

▶ Location
The Toe Drain adjacent to Yolo Bypass Wildlife Area, approximately 6.5 miles south of Interstate 80.

▶ Recommendations
Replace the current rock weir and tide gate structure with an operable variable height weir, improved flap gates and a fish passage ladder.

▶ Description of Problem
The Lisbon Weir consists of a 100-foot wide rock weir, a concrete rubble island and a tide gate structure placed across the Toe Drain in the southern Yolo Bypass. It is a critical part of the irrigation system for over 17,000 acres of surrounding agricultural land and wetlands. In conjunction with three tide (flap) gates on the west side, the rock weir is used to regulate upstream water levels for water supply. The weir creates the pool in the Toe Drain that serves as the first lift for the pumps, which raise the water supply for distribution to agricultural land and managed wetlands. The series of three flap gates allows flood tides to surcharge the pool upstream of the weir. Ebb tides are able to pass back over the tide gate if surcharge elevations exceed the crest elevation of the tide gate structure. As a relatively fixed elevation structure, Lisbon Weir controls upstream water surface elevations and limits water slope (gradient) along the Toe Drain, thus affecting drainage capacity of a significant portion of the Yolo Bypass.

The static (inoperable) nature of the rock weir and tide gates inhibits potential improvements in drainage capacity at times when drainage (rather than water supply) is the sole or primary objective for land managers. Annual maintenance is also necessary when degradation by flood flows occurs, requiring mechanical means to replace the rocks. Maintenance is sometimes delayed by excessive flows in the Toe Drain, as equipment cannot safely access the rock weir. While the flap gates on the west side of the weir allow for some fish passage upstream on a flood tide, additional passage improvements are needed to minimize fish passage delays. Despite the structure's current challenges, many of the land managers who rely on Lisbon Weir for water supply are hesitant to modify or replace the structure because of concerns that a new structure will not improve functionality or may reduce functionality, particularly if compromised by other operational objectives.

▶ Improvements and Potential Benefits
Improvements could include replacing the existing structure with an operable variable height weir (Obermeyer or similar), new tide gates, and a fish ladder. In addition, the top of a new weir would be designed to support maintenance vehicles to access the upgraded structure. The operable variable height weir could be similar to the Davis Weir in Colusa County (GCID) or the recently constructed facility at Wallace Weir. Conceptual details are provided on the reverse side of the project sheet. The concept includes three Obermeyer-type inflatable bladder dams installed in 30-foot wide bays on the eastern side of the structure within the primary flow path of the Toe Drain. New tide gates could be installed to the west of the bladder dams to mimic the current tide gate functionality. A fish ladder or naturalized fishway could be installed at the far western extent of the structure outside of the primary flow path to provide fish passage. Crest elevations of the three elements could be set to mimic or improve the current water supply functionality of Lisbon Weir while maintaining continuous flow through the fish ladder or fishway. The structure could be flanked by wing walls and outfitted with a driveable bridge deck to facilitate maintenance access. A control building, likely constructed on the Yolo Bypass east levee, would house the equipment for the real-time control of the weir.

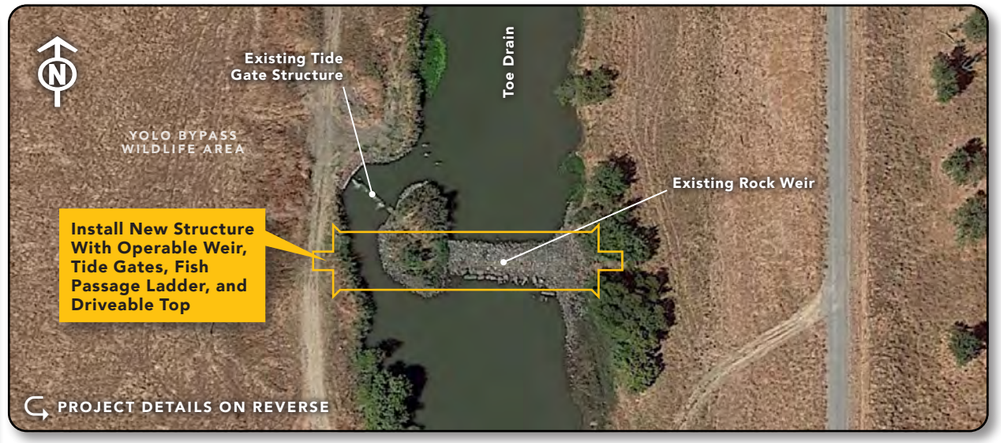
The project could achieve significant agricultural, wetland, public education and recreation benefits due to greatly improved temporal control of upstream water levels and drainage conditions along with reduced frequency of maintenance. For example, the variable height weir could be operated in a manner during low flow conditions to maintain the upstream water supply pool, but with real-time controls, the weir levels can be lowered to accommodate increased flows (flooding or receding) due to rice drainage, flow actions, or augmented inflows at Fremont and Sacramento Weirs (via adult fish passage or notch structures), while maintaining upstream water supply to the extent practicable. The fish ladder would facilitate passage over a much broader range of conditions. Yolo County or another coordinating entity will need to conduct a feasibility study to seek feedback from landowners and the California Department of Fish and Wildlife related to project criteria and design options as well as to evaluate potential operational regimes and temporal and spatial extents of benefits to agriculture, managed wetlands and fish passage.

▶ Potential Benefit Regions
Yolo Bypass Wildlife Area, Los Rios Farms, other agricultural land

▶ Supporting Landowners and Stakeholders
California Department of Fish and Wildlife, Yolo Basin Foundation

▶ Potential Constraints
Project must maintain or improve current water supply functionality and overcome land manager concerns about possible reduced water supply functionality.

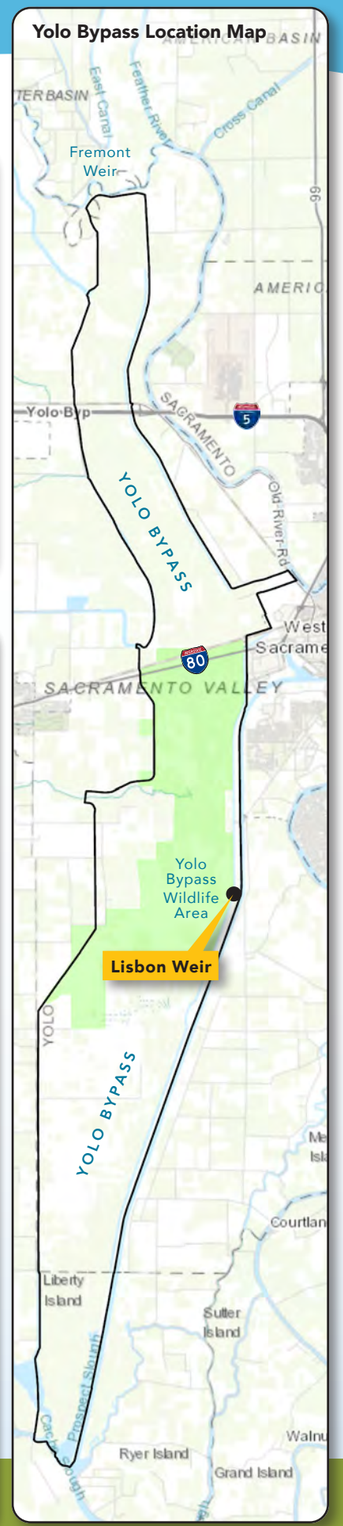
▶ Integration with Other Projects
Improvements to Lisbon Weir can support many other drainage improvements in the Yolo Bypass including the Northern Yolo Bypass Wildlife Area Drainage and Water Supply Improvement Master Project.



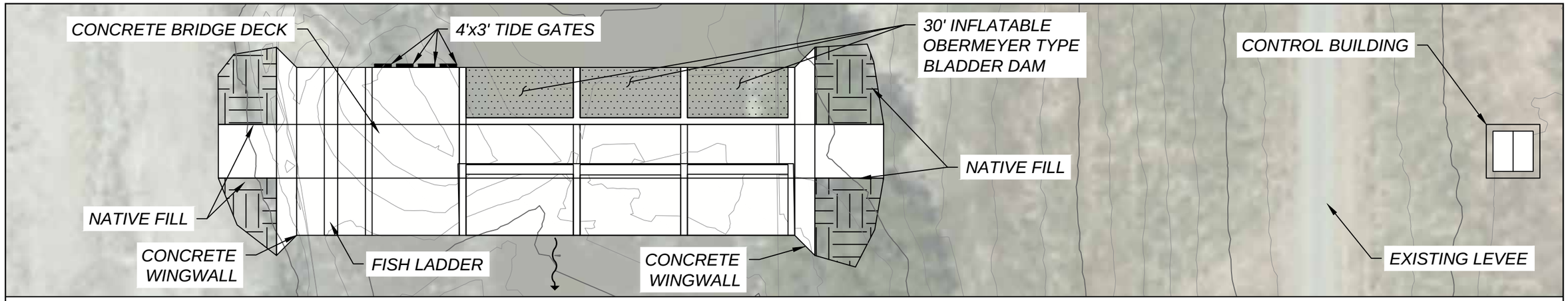
OPPORTUNITY EVALUATION CRITERIA, RANKING, AND NOTES

	Project Metric	High	Med	Low	N/A	Comments
Primary Benefit Criteria	Agricultural Benefit	●				This project could significantly improve drainage and water supply for agricultural operations.
	Migratory Waterfowl or Shorebird Habitat Benefit	●				This project could also significantly improve drainage and water supply for managed wetland operations.
	Public Education and Recreation Benefit		●			This project will provide improved drainage to facilitate public and operation and maintenance access in the Yolo Bypass Wildlife Area.
Secondary Benefit Criteria	Estimated Benefit Acreage[1]	●				Approximately 21,000 acres.
	Listed Species Benefit	●				This project could provide fish passage benefits to listed fish species.
Feasibility Criteria	Easement Compatibility	●				The project will not affect existing easements and/or is compatible with existing easements.
	Shovel Readiness			●		Potential design concepts have been developed. A feasibility study, conducted in close coordination with local landowners, is required to identify alternatives, determine potential weir operations and evaluate benefits.
	Potential for Local Match			●		Additional discussions with landowners are necessary as part of a feasibility study to ensure the desired water supply functionality is maintained or improved. Landowner interest or skepticism will affect potential for a local match.
	Eligibility for Federal/State Funding	●				Fish passage benefits for listed fish species and benefits to managed wetlands in the Yolo Bypass Wildlife Area increase eligibility for state and federal grants. A state or federal agency may also directly fund at least part of the project cost.
	Cost[2]			$$$		
	Project Sponsor, Champion and Partners		●			The California Department of Fish and Wildlife and the California Department of Water Resources.

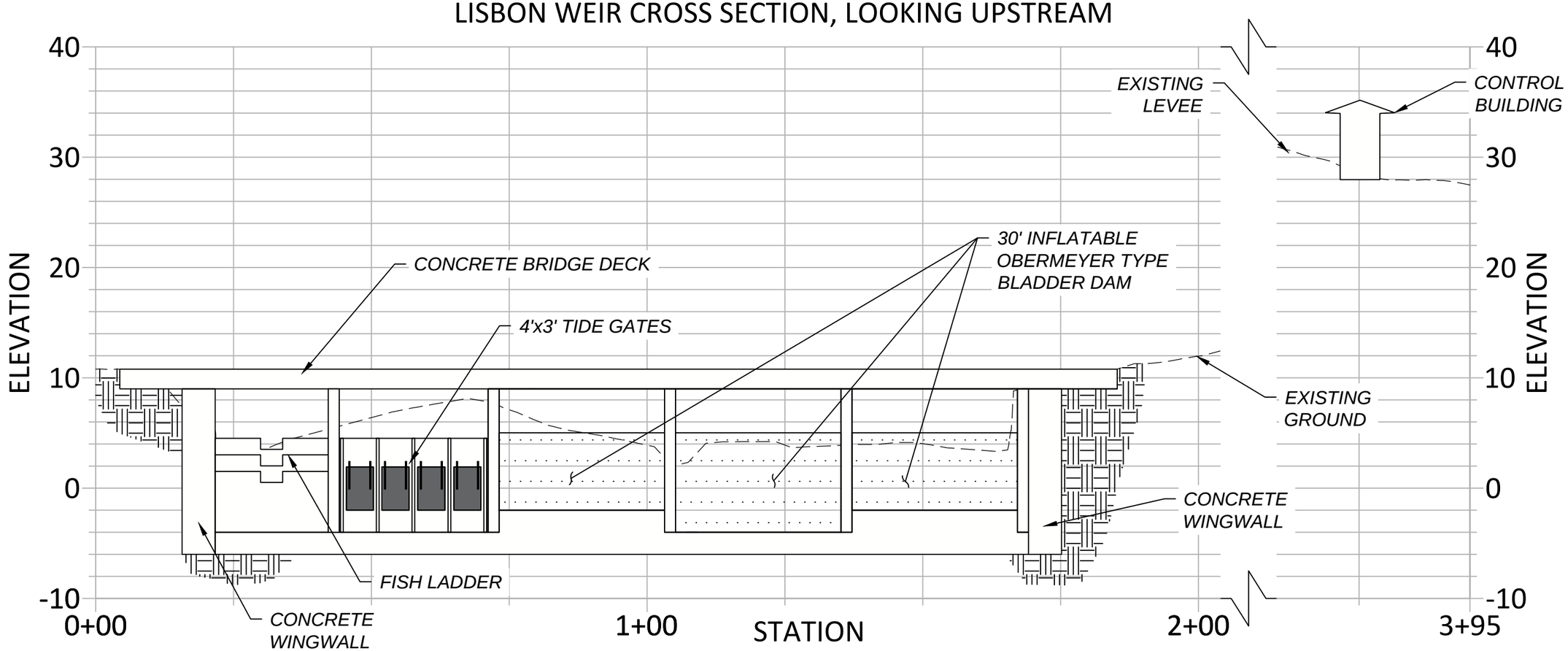
1: H = 6,000+ acres; M = 3,000 to 6,000 acres; L = less than 3,000 acres **2**: H = $ = less than $1M; M = $$ = $1M to $10M; L = $$$ = more than $10M



7 | Lisbon Weir Improvements



LISBON WEIR CROSS SECTION, LOOKING UPSTREAM



8 | Tule Ranch Canal and Pump Improvements

PROJECT DETAILS

▶ Location
Tule Ranch Canal and lift pumps between the southern boundary of Yolo Bypass Wildlife Area ("Wildlife Area") and Glide-In Ranch, H-Pond, Senator Outing, Bull Sprig and Skyrakers duck clubs.

▶ Recommendations
Deepen Tule Ranch Canal (the primary supply canal) and upgrade lift pumps to address current water delivery capacity limitations needed for management of the Wildlife Area and duck clubs.

▶ Description of Problem
A combination of the Tule Canal's shallow depth and ineffective lift pumps significantly limits the ability to deliver water in a timely manner to managed wetlands in the listed duck clubs, as well as managed wetlands and irrigated pasture in the Wildlife Area. The insufficient capacity compromises land management objectives in both Wildlife Area and duck clubs. Key issues include:

1. The Tule Ranch Canal, which enables conveyance of water from the Toe Drain along the southern boundary of the Wildlife Area, is too wide and insufficiently deep between Duck Club 1 and Duck Club 2 pumps to convey water and provide the appropriate water depth for pumping.
2. The connector channel between Duck Club 1 pumps and the Toe Drain is also too shallow to facilitate pumping when water levels in the Toe Drain drop during low tide.
3. The Duck Club 1 and Duck Club 2 pumps need to be upgraded to meet demand.

These water supply capacity constraints are most problematic between September and early November when the Wildlife Area managers and adjacent duck club managers need to flood wetlands and irrigated pasture in the Wildlife Area still requires a regular water supply. Flooding up fields earlier in the season to address capacity issues is problematic due to mosquito and vector control requirements.

▶ Improvements and Potential Benefits
The implementation of four improvements will address the water supply capacity limitations in this region of the Yolo Bypass:

1. Deepen the connector channel between Duck Club 1 Pumps and the Toe Drain so pumps have adequate water depth to facilitate pumping when the Toe Drain water levels drop but the Toe Drain is still inundated.
2. Upgrade or repair Duck Club 1 Pumps.
3. Deepen Tule Ranch Canal between Duck Club 1 and Duck Club 2 Pump locations to provide adequate canal conveyance capacity and depth for pumps.
4. Upgrade the Duck Club 2 Pumps.

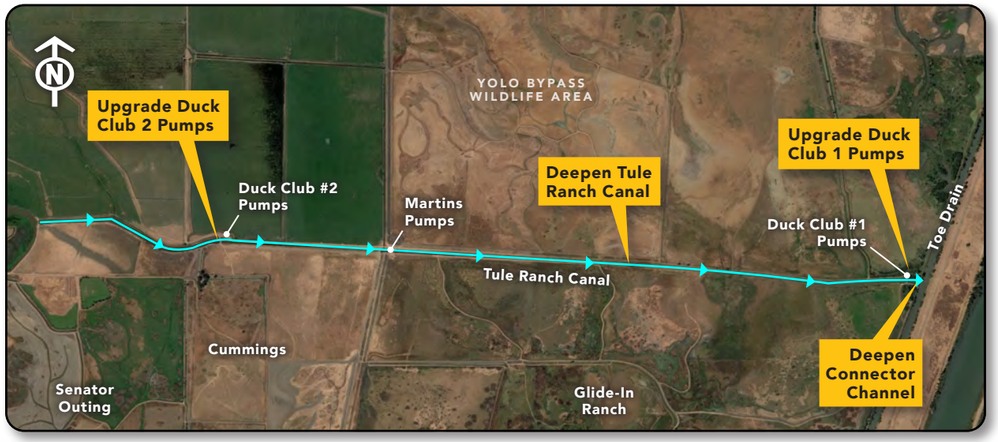
These project elements will improve habitat conditions in managed wetlands within the Wildlife Area and duck clubs to the south and also improve irrigated pasture conditions within the Wildlife Area. The irrigated pasture lease provides revenue for Wildlife Area management, so this project will also help ensure irrigated pasture remains viable and the Wildlife Area continues to receive this important revenue source.

▶ Potential Benefit Regions
Lands within the southern Wildlife Area, duck clubs directly south of the Wildlife Area.

▶ Supporting Landowners and Stakeholders
California Department of Fish and Wildlife (CDFW), CDFW grazing tenant, and Bull Sprig, Senator Outing, H-Pond, Glide-In Ranch and Skyrakers duck clubs.

▶ Potential Constraints
Increased pumping capacity must be within permissible water right diversion rate of 6,600 gpm.

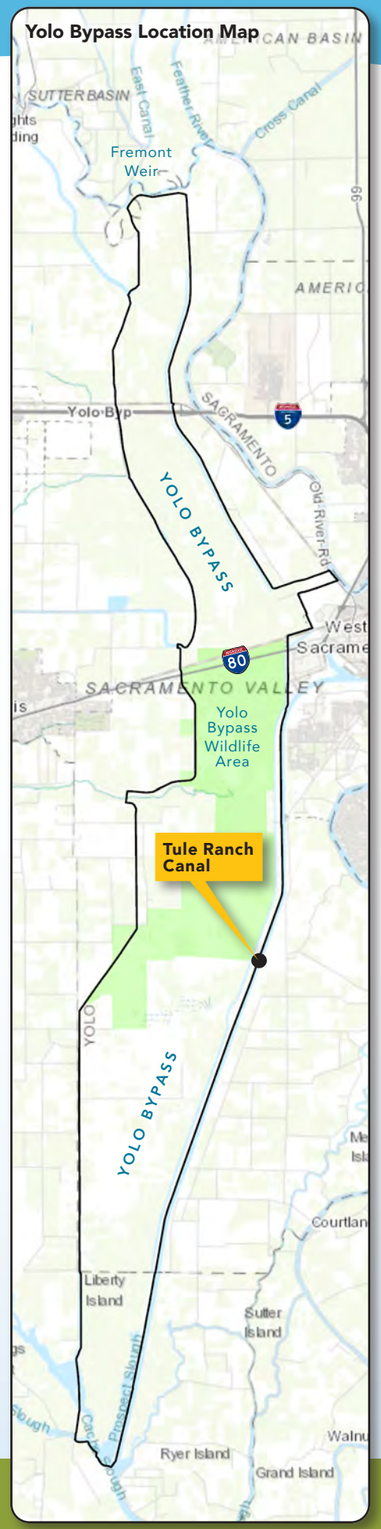
▶ Integration with Other Projects
This project should be integrated with the Yolo Bypass Canal Maintenance Program.



OPPORTUNITY EVALUATION CRITERIA, RANKING, AND NOTES

	Project Metric	High	Med	Low	N/A	Comments
Primary Benefit Criteria	Agricultural Benefit	●				Project will improve conditions of irrigated pasture in the southern Wildlife Area.
	Migratory Waterfowl or Shorebird Habitat Benefit	●				The improved water supply capacity will improve the availability and quality of managed wetland habitat within the Wildlife Area and duck clubs to the south.
	Public Education and Recreation Benefit			●		Improvement of hunting opportunities on privately owned wetlands (duck clubs), as well as ongoing revenue from the irrigated pasture lease to support the maintenance needed for public education and recreation opportunities.
Secondary Benefit Criteria	Estimated Benefit Acreage[1]	●				
	Listed Species Benefit			●		
Feasibility Criteria	Easement Compatibility	●				No easement constraints identified to date.
	Shovel Readiness			●		This project is currently at the conceptual level. The next step is to secure funding for analysis, design and engineering.
	Potential for Local Match			●		
	Eligibility for Federal/State Funding		●			The project may be eligible for some state/federal grant funding because of benefits to the Wildlife Area, but projects that benefit private property (e.g. duck clubs) are not typically eligible unless the owners are agreeing to significant habitat enhancements.
	Cost[2]		$$			The project will likely cost over $1 million as a result of the expense associated with pump improvements and modifications to the Tule Ranch Canal.
	Project Sponsor, Champion and Partners			●		California Department of Fish and Wildlife, California Department of Fish and Wildlife grazing tenant, adjacent duck clubs.

1: H = 6,000+ acres; M = 3,000 to 6,000 acres; L = less than 3,000 acres **2**: H = $ = less than $1M; M = $$ = $1M to $10M; L = $$$ = more than $10M



9 | Yolo Bypass Canal Maintenance Program

PROJECT DETAILS

▶ Location
Bypass-wide.

▶ Recommendations
Provide ongoing maintenance support for drainage and dual conveyance canals on multiple properties throughout the Bypass including the Tule Canal and Toe Drain.

▶ Description of Problem
The combination of sedimentation, debris The combination of sedimentation, debris accumulation and aquatic weed growth significantly reduces the conveyance capacity of many drainage and dual conveyance canals (canals that are used for both drainage and water supply) in the Yolo Bypass, which are essential to maintain the mosaic of land uses that provide flood control, habitat, wildlife friendly-agriculture, and other benefits. Central to these challenges is the lack of maintenance of the Tule Canal and Toe Drain which also affects landowners outside of the Yolo Bypass (e.g., RD 1600). The increased frequency and duration of inundation associated with changes to the Yolo Bypass (e.g., Yolo Bypass Salmonid Project, Fremont Weir expansion, Sacramento Weir widening) and associated flow regime modifications will likely increase the cost and time required to maintain this important drainage and water supply system.

Maintenance costs are already high as a result of the co-location of agricultural operations and managed habitat within a multi-purpose floodway. In addition, maintenance currently occurs on a property-by-property basis and is dependent on individual landowners. This piecemeal maintenance results in inefficiencies and less maintenance than may be needed to both ensure optimal management of agricultural and habitat lands, as well as to maintain the flood conveyance capacity of the Yolo Bypass.

▶ Improvements and Potential Benefits
Implement an ongoing canal maintenance program to coordinate maintenance, increase efficiency, defray existing maintenance costs, increase or maintain flood conveyance capacity, and offset added maintenance requirements associated with projects that would increase the frequency, duration and magnitude of inundation in the Yolo Bypass. Efforts would include maintenance of the Tule Canal and Toe Drain. A canal maintenance program may involve one or both of the following options:

1. Create and fund a formal canal maintenance entity (i.e. maintenance yard) that conducts regular maintenance on behalf of land managers in the Yolo Bypass (or in addition to baseline maintenance activities)
2. Establish a canal maintenance cost reimbursement program with a set rate or agreed upon rate structure based on factors such as canal length, width, design conveyance capacity, acres served, etc.

The study team recommends Yolo County or another coordinating entity undertake a feasibility study to determine an optimal solution for a canal maintenance program. Considerations of interest may include typical timing of maintenance activities, maintenance priorities and locations, potential peak maintenance demand (if a maintenance entity option is pursued), maintenance equipment requirements, feasibility of equipment mobilization to service canal maintenance needs, cost ranges for typical canal maintenance, potential cost share and reimbursement rate structures, land manager preferences and other factors. The feasibility study should also determine whether canals within lands adjacent to and directly affected by Yolo Bypass flows and water levels (e.g., RD 1600) should also be included in the program.

▶ Potential Benefit Regions
Bypass-wide.

▶ Supporting Landowners and Stakeholders
Landowners and stakeholders identified canal maintenance as a major issue during the stakeholder meetings, but a comprehensive solution was not discussed. Support for a particular outcome will be determined through the feasibility study process.

▶ Potential Constraints
If the program seeks to only address the added maintenance burden associated with projects increasing Yolo Bypass flood frequency, duration and magnitude, it will be very challenging to cleanly delineate existing (pre-project) maintenance requirements from added maintenance needs. A feasibility study will be essential to address this question as well as to identify and address the numerous constraints that will arise with either of the two maintenance program options described above (maintenance yard vs. reimbursement program).

▶ Integration with Other Projects
This project should be integrated with other canal improvement efforts included in the Conaway Main Supply Canal Augmentation Project, Swanston Ranch Master Project, Northern Yolo Bypass Wildlife Area Drainage and Water Supply Improvement Master Project, the Central Yolo Bypass Wildlife Area Drainage Improvement Master Project, and the Tule Ranch Canal and Pump Improvements Project.

↪ PROJECT DETAILS ON ACCOMPANYING MAPS

OPPORTUNITY EVALUATION CRITERIA, RANKING, AND NOTES

	Project Metric	High	Med	Low	N/A	Comments
Primary Benefit Criteria	Agricultural Benefit	●				Agricultural operations would realize a significant benefit from improved drainage and water supply and/or reduced costs associated with canal maintenance.
	Migratory Waterfowl or Shorebird Habitat Benefit	●				Managed wetland habitat for migratory waterfowl and shorebird habitat would similarly experience a significant benefit from improved drainage and water supply and/or reduced costs associated with canal maintenance.
	Public Education and Recreation Benefit		●			Canal maintenance would improve drainage conditions and hence improve public access at areas subject to nuisance flooding such as the Yolo Bypass Wildlife Area's main entrance.
Secondary Benefit Criteria	Estimated Benefit Acreage[1]	●				These improvements will benefit a significant portion of the land within the 57,000-acre Yolo Bypass.
	Listed Species Benefit			●		Drainage improvements may facilitate improved passage and reduce stranding of listed fish species.
Feasibility Criteria	Easement Compatibility	●				Implementing drainage and water supply improvements will not negatively impact the ability of the land owners to place easements or other long-term restrictions on their properties.
	Shovel Readiness			●		This project will require a feasibility study to determine the best structure for canal maintenance.
	Potential for Local Match		●			Local match will be explored through the feasibility study, but landowners may contribute at least what they are already paying to maintain canals.
	Eligibility for Federal/State Funding		●			The added maintenance burden that would result from proposed state and federal projects which will increase Yolo Bypass inundation, combined with the state and federal interest in maintaining or improving the flood conveyance capacity of the Yolo Bypass, makes this program a likely candidate for state and federal funding.
	Cost[2]			$$$		Costs will include an initial feasibility study, program development, initial implementation (start-up) expenses and ongoing (annual) operating expenses.
	Project Sponsor, Champion and Partners	●				Support for a particular outcome will be determined through the feasibility study process.

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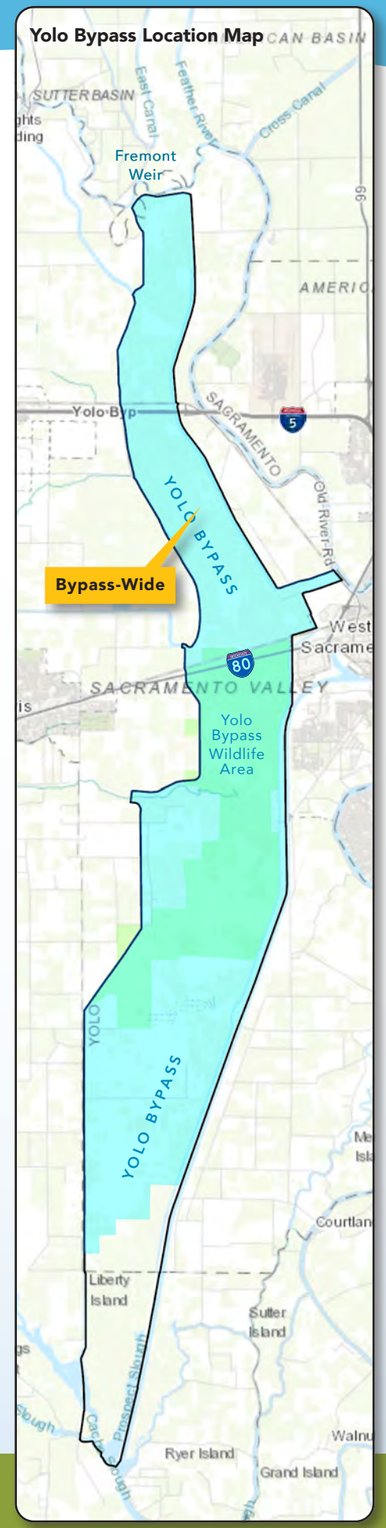


10 | Yolo Bypass Crossing Improvements

PROJECT DETAILS

▶ Location
Throughout the Yolo Bypass at canal crossings.

▶ Recommendations
Replace canal crossings with railcar bridges and concrete abutments, prefabricated clear span bridges or similar upgrades, if feasible.

▶ Description of Problem
Many existing local canal crossings consist of rudimentary culvert and fill materials that require persistent maintenance to minimize blockages due to beaver activity, aquatic vegetation growth and sedimentation. Certain existing canal crossings experience access restrictions during frequent flood events and nuisance flooding caused by drainage capacity or maintenance challenges. When proposed state and federal projects (e.g. the Yolo Bypass Salmonid Project, Fremont Weir expansion, Sacramento Bypass expansion) add additional water into the Yolo Bypass, the drainage issues caused by these canal crossings will be further exacerbated. The existing crossing limitations and loss of access will be amplified, preventing landowners and farmers from flooding and draining rice fields and wetlands effectively.

▶ Improvements and Potential Benefits
Improvements to canal crossings include replacing existing crossings with clear span decks consisting of either railcar bridges, prefabricated structures, or other structural solutions. Benefits include reduced maintenance costs, improved water supply and drainage for agriculture and managed wetlands, and improved conveyance during natural overtopping of the Fremont Weir and additional inundation resulting from the Yolo Bypass Salmonid Project and other state/federal projects. Control of mosquito populations may also improve. By approaching crossing improvements on a bypass-wide basis, permitting and environmental clearances could be achieved collectively to avoid piece-meal efforts and to streamline implementation as funding is available.

Landowners and wetland managers have indicated beavers are less likely to block railcar bridges than culverts. Yolo County or another coordinating entity should conduct additional research and outreach and complete and prioritize a list of crossings in need of replacement.

▶ Potential Benefit Regions
Bypass-wide.

▶ Supporting Landowners and Stakeholders
California Department of Fish and Wildlife, Yolo Basin Foundation, California Waterfowl Association, Ducks Unlimited, H Pond and others.

▶ Potential Constraints
Constraints will be determined on a site-by-site basis.

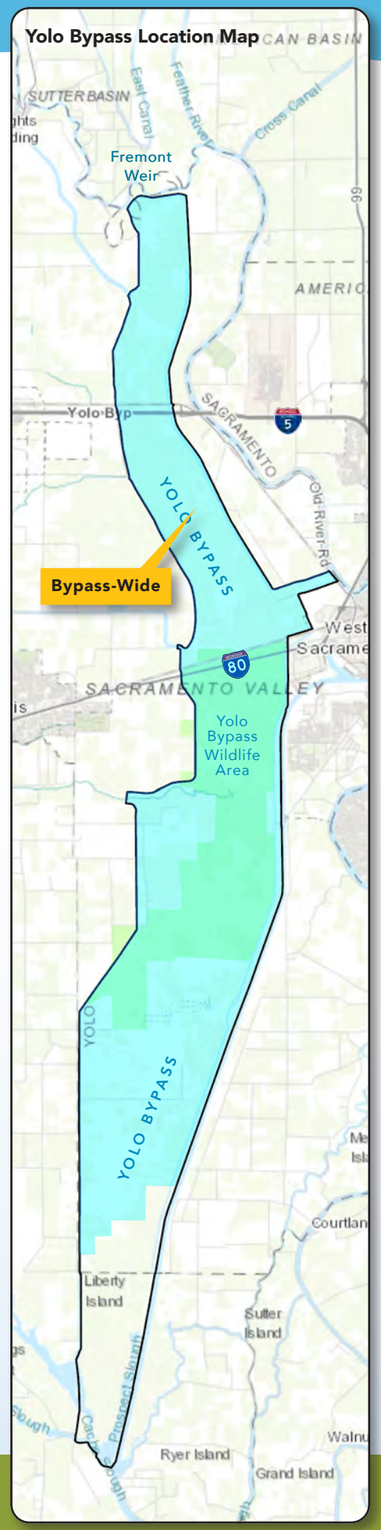
▶ Integration with Other Projects
This effort should be integrated with the Yolo Bypass Canal Maintenance Program as well as specific crossing improvements included in the Northern Yolo Bypass Wildlife Area Drainage and Water Supply Improvement Master Project, and the Central Yolo Bypass Wildlife Area Drainage Improvement Master Project.

PROJECT DETAILS ON ACCOMPANYING MAPS

OPPORTUNITY EVALUATION CRITERIA, RANKING, AND NOTES

	Project Metric	High	Med	Low	N/A	Comments
Primary Benefit Criteria	Agricultural Benefit	●				Improved crossings will enhance access to agricultural fields, increase the efficiency of water supply and drainage, and reduce maintenance costs.
	Migratory Waterfowl or Shorebird Habitat Benefit	●				Improved crossings will enhance access for wetland management, increase the efficiency of water supply and drainage, and reduce maintenance costs.
	Public Education and Recreation Benefit	●				Improved crossings will enhance public access within the Yolo Bypass Wildlife Area for public education and recreation opportunities.
Secondary Benefit Criteria	Estimated Benefit Acreage[1]	●				Improved crossings will benefit a significant portion of the overall 57,000 acres of Yolo Bypass land.
	Listed Species Benefit			●		Some crossing improvements may help improve fish passage.
Feasibility Criteria	Easement Compatibility	●				Improved crossings will not negatively impact the ability of the landowners to place easements or other long-term restrictions on their properties.
	Shovel Readiness		●			A list of prioritized crossings needs to be developed, but crossings generally require less intensive engineering and therefore should be relatively easy to install. The project would benefit from consolidated permitting of multiple crossings versus a crossing by crossing approach to construction.
	Potential for Local Match		●			Discussions with landowners are necessary to identify matching funds, but are likely given the direct benefits to existing land uses.
	Eligibility for Federal/State Funding			●		The multi-benefit nature of crossing improvements may increase eligibility for grants in some cases.
	Cost[2]		$$			Costs will be determined by the number of crossings requiring upgrades, nature of the upgrades and whether permitting can be accomplished on a programmatic (rather than site-by-site) level.
	Project Sponsor, Champion and Partners		●			California Department of Fish and Wildlife, Yolo Basin Foundation, Yolo County

1: H = 6,000+ acres; M = 3,000 to 6,000 acres; L = less than 3,000 acres **2**: H = $ = less than $1M; M = $$ = $1M to $10M; L = $$$ = more than $10M



11 | Yolo Bypass Drainage Outlet Infrastructure Improvement Project

PROJECT DETAILS

▶ Location
Bypass-wide.

▶ Recommendations
Install or upgrade drainage gate infrastructure on all drainage outlets directly affected by backwatering during elevated flow conditions along the Tule Canal/Toe Drain.

▶ Description of Problem
The lack of effective gate infrastructure on some drainage outlets along the Tule Canal/Toe Drain and primary canals that drain into the Tule Canal/Toe Drain results in undesirable backwatering during elevated flow conditions along the Tule Canal/Toe Drain. These flow conditions refer to times when water levels in the Tule Canal/Toe Drain are elevated (e.g., the rising limb of a larger flood event, North Delta Flow Action, proposed increases in flows associated with the Yolo Bypass Salmonid Project, etc.) but system-wide flooding of the Yolo Bypass is not actively occurring.

As water levels rise along the Tule Canal/Toe Drain, water levels can rise along connected drainage canals that lack effective gate infrastructure (i.e. the ability to exclude water) and undesirable flooding of interior fields and managed wetlands may occur. Undesirable flooding is especially problematic at certain times of the year (e.g., rice harvesting) and has negative consequences for agriculture, wetland habitat (for waterfowl and shorebirds) and other land management objectives.

▶ Improvements and Potential Benefits
Gate infrastructure should be installed or upgraded on select drainage outlets along the Tule Canal/Toe Drain and associated primary canals to minimize backwatering. Improvements may range from installing flap gates on ungated culverts to more involved infrastructure upgrades for siphons and weir boxes. These measures will prevent undesirable backwater-driven flooding of interior fields and wetlands during elevated water level conditions on the Tule Canal/Toe Drain that would otherwise not induce flooding.

Furthermore, by reducing the prevalence of undesirable backwater-driven flooding of fields and habitat areas, these infrastructure improvements may also improve Bypass-wide drainage time by reducing the overall volume of water that needs to be drained via the Tule Canal/Toe Drain and lateral canals. Improved drainage outlets may also increase conveyance capacity and also contribute to reduced drainage times, benefitting agriculture and wetlands operations. Additional research and outreach, ideally through a feasibility study, should be conducted to finish identifying and prioritizing drainage outlet infrastructure to be improved.

▶ Potential Benefit Regions
Bypass-wide.

▶ Supporting Landowners and Stakeholders
California Department of Fish and Wildlife, Yolo Basin Foundation, Yolo County, others.

▶ Potential Constraints
To be determined through a feasibility study.

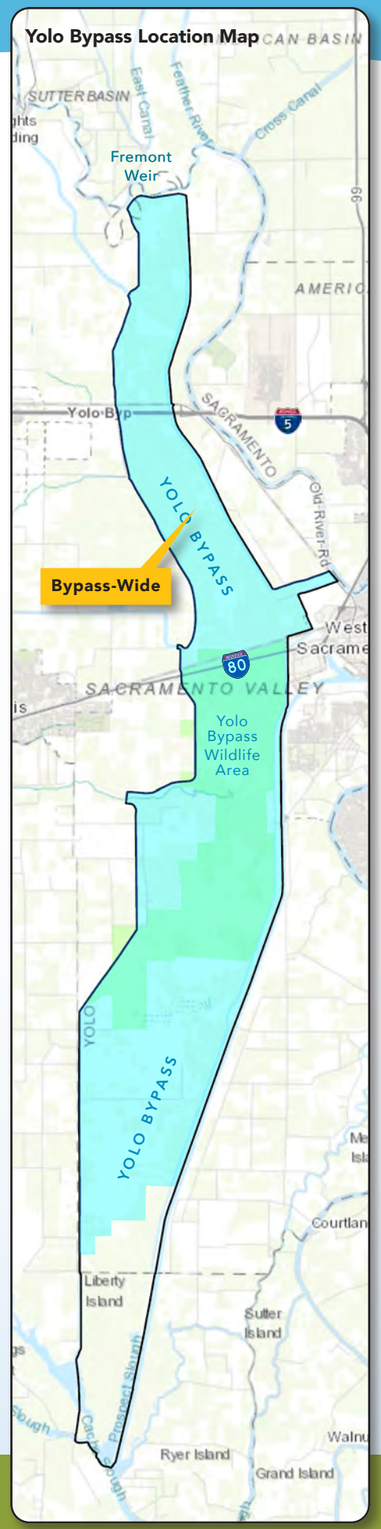
▶ Integration with Other Projects
This bypass-wide effort should be coordinated with the Yolo Bypass Canal Maintenance Program, the Northern Yolo Bypass Wildlife Area Drainage and Water Supply Improvement Master Project, and the Tule Ranch Canal and Pump Improvement Project.

PROJECT DETAILS ON ACCOMPANYING MAPS

OPPORTUNITY EVALUATION CRITERIA, RANKING, AND NOTES

	Project Metric	High	Med	Low	N/A	Comments
Primary Benefit Criteria	Agricultural Benefit	●				Agricultural operations would realize a significant benefit from the reduction in undesirable flooding associated with backwatering from the Tule Canal/Toe Drain and the reduction in field drainage times.
	Migratory Waterfowl or Shorebird Habitat Benefit	●				Wetland habitat management efforts for migratory waterfowl and shorebird habitat would similarly experience a significant benefit from reduced frequency of undesirable flooding associated with Tule Canal/Toe Drain backwatering and improved drainage conditions.
	Public Education and Recreation Benefit			●		The reduction in backwatering from the Tule Canal/Toe Drain may reduce nuisance flooding of roads within the Yolo Bypass Wildlife Area and hence improve public access for education and recreation opportunities. This could also improve access to hunting areas on duck clubs.
Secondary Benefit Criteria	Estimated Benefit Acreage[1]	●				This drainage outlet infrastructure improvement project would benefit a significant acreage of land in the Yolo Bypass.
	Listed Species Benefit			●		Improved drainage outlets and installation of flap gates will reduce the risk of listed fish species becoming stranded in canals and fields.
Feasibility Criteria	Easement Compatibility	●				Improving drainage outlet infrastructure will not negatively impact the ability of the land owners to place easements or other long-term restrictions on their properties.
	Shovel Readiness		●			Installation of flap gates and culverts may be considered part of normal operations and maintenance. Permitting may not be necessary on some properties.
	Potential for Local Match			●		Land managers may be willing to provide at least some matching funds, particularly for interior drainage outlets (i.e. those not directly along the Toe Drain) if they will realize a benefit relative to baseline conditions.
	Eligibility for Federal/State Funding		●			The multi-benefit nature of drainage outlet improvements may increase eligibility for grants.
	Cost[2]		$$			Costs will be determined by the number of drainage outlet structures requiring improvements.
	Project Sponsor, Champion and Partners		●			California Department of Fish and Wildlife, Yolo Basin Foundation, Yolo County

1: H = 6,000+ acres; M = 3,000 to 6,000 acres; L = less than 3,000 acres **2**: H = $ = less than $1M; M = $$ = $1M to $10M; L = $$$ = more than $10M



Fremont Weir

Knights Landing Ridge Cut

Tule Canal

Sacramento River

Willow Slough Bypass

YOLO BYPASS WILDLIFE AREA

0 1 2 Miles

LEGEND

- Field Outlets to Ditches
- Crossings
- Controlling Drainage Outlets
- Main Channels
- Primary Canals
- Yolo Bypass Boundary
- Yolo Bypass Wildlife Area Boundary

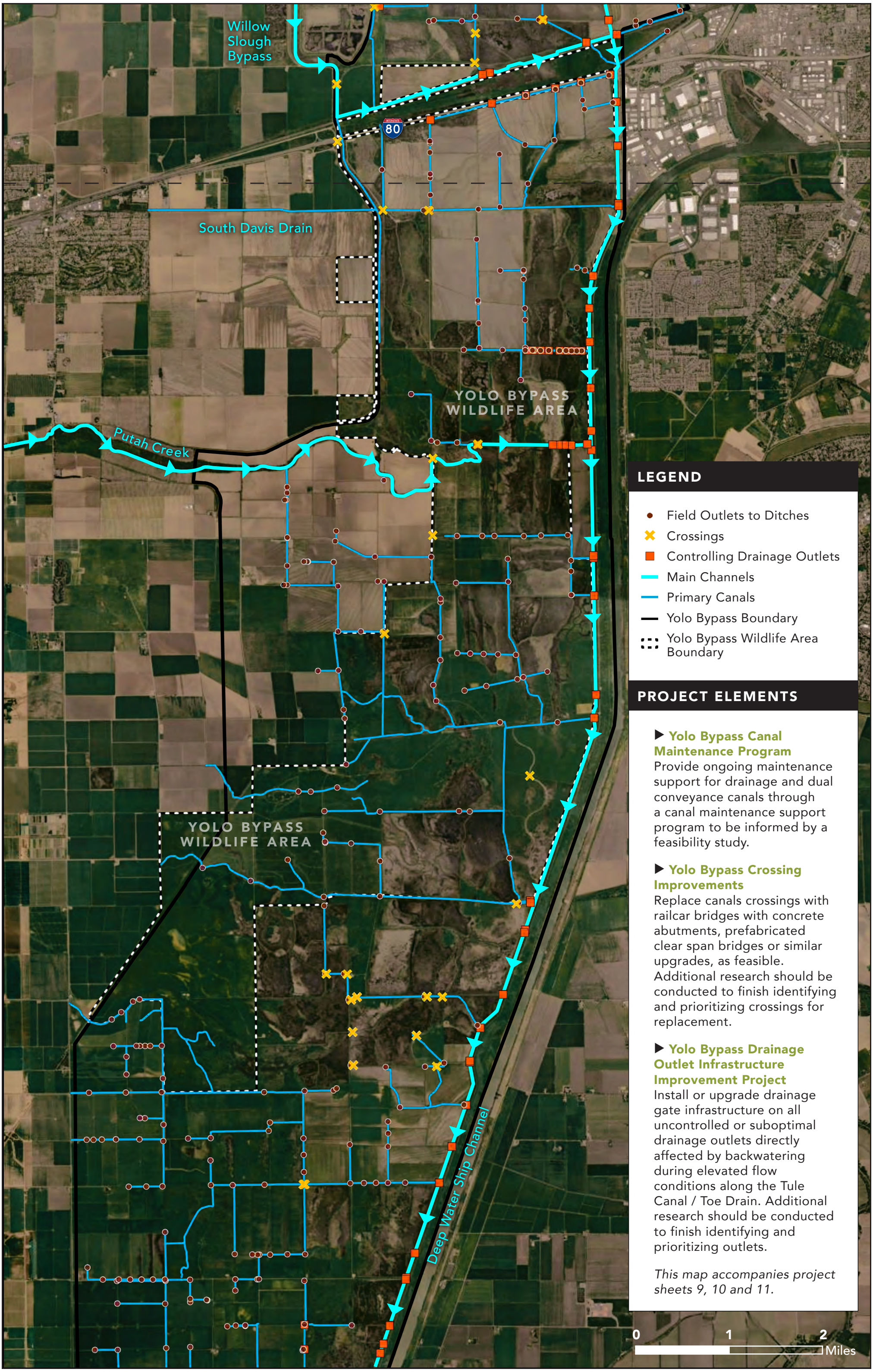
PROJECT ELEMENTS

▶ **Yolo Bypass Canal Maintenance Program**
Provide ongoing maintenance support for drainage and dual conveyance canals through a canal maintenance support program to be informed by a feasibility study.

▶ **Yolo Bypass Crossing Improvements**
Replace canals crossings with railcar bridges with concrete abutments, prefabricated clear span bridges or similar upgrades, as feasible. Additional research should be conducted to finish identifying and prioritizing crossings for replacement.

▶ **Yolo Bypass Drainage Outlet Infrastructure Improvement Project**
Install or upgrade drainage gate infrastructure on all uncontrolled or suboptimal drainage outlets directly affected by backwatering during elevated flow conditions along the Tule Canal / Toe Drain. Additional research should be conducted to finish identifying and prioritizing outlets.

This map accompanies project sheets 9, 10 and 11.



LEGEND

- Field Outlets to Ditches
- Crossings
- Controlling Drainage Outlets
- Main Channels
- Primary Canals
- Yolo Bypass Boundary
- Yolo Bypass Wildlife Area Boundary

PROJECT ELEMENTS

▶ **Yolo Bypass Canal Maintenance Program**
Provide ongoing maintenance support for drainage and dual conveyance canals through a canal maintenance support program to be informed by a feasibility study.

▶ **Yolo Bypass Crossing Improvements**
Replace canals crossings with railcar bridges with concrete abutments, prefabricated clear span bridges or similar upgrades, as feasible. Additional research should be conducted to finish identifying and prioritizing crossings for replacement.

▶ **Yolo Bypass Drainage Outlet Infrastructure Improvement Project**
Install or upgrade drainage gate infrastructure on all uncontrolled or suboptimal drainage outlets directly affected by backwatering during elevated flow conditions along the Tule Canal / Toe Drain. Additional research should be conducted to finish identifying and prioritizing outlets.

This map accompanies project sheets 9, 10 and 11.

12 | Yolo Bypasskeeper and Coordinating Committee

PROJECT DETAILS

▶ Location
Bypass-wide.

▶ Recommendations
The study team recommends Yolo County or another entity representing the Yolo Bypass initiate a feasibility study to comprehensively describe options for development of a Yolo Bypass Coordinating Committee (YBCC) and a Yolo Bypasskeeper. The YBCC could be modeled on the existing Lower Putah Creek Coordinating Committee established in a settlement agreement for litigation concerning Putah Creek (Putah Creek Council v. Solano Irrigation District and Solano County Water Agency).

▶ Description of Problem
State, federal, and local agencies have proposed over a dozen projects in the 57,000-acre Yolo Bypass, already a national model for successful multi-benefit land management, to enhance habitat for sensitive terrestrial and aquatic species, expand the existing flood control capacity, and improve drainage and water supply infrastructure. As management of the Bypass changes to accommodate these new projects, land management for recreation (including hunting), existing wetlands, environmental education, and wildlife-friendly agriculture will become increasingly challenging. Climate change will further exacerbate these challenges. Without a coordinating entity to encourage collaboration, identify issues, recommend solutions, apply for grants, and seek feedback from stakeholders on management challenges and new projects, the success of the Yolo Bypass' complex mosaic of land uses may erode.

▶ Improvements and Potential Benefits
The feasibility study would recommend a coordinating structure, operating guidance, and funding sources to improve project outcomes, facilitate stakeholder engagement, and address management and other challenges that arise in the Yolo Bypass. The coordinating entity will employ at least one staff person to implement activities, known as the Yolo Bypasskeeper. The Yolo Bypasskeeper duties could include organizing regular meetings and briefings on projects and programs, preparing reports to the coordinating entity, conducting administrative work, applying for grants, identifying stakeholder concerns, and helping to resolve these concerns, if feasible. The feasibility study will consider the following activities:

- Monitor implementation of the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project, the Lower Elkhorn Basin Levee Setback Project, and other related Yolo Bypass habitat, flood control, and water supply and drainage improvement projects to ensure the projects minimize impacts and sufficient information is collected for adaptive management during implementation.
- Make recommendations to appropriate agencies to maintain and improve the multi-benefit Yolo Bypass land uses, including flood protection, agriculture, managed wetlands, public and private recreation, and environmental education.
- Coordinate the efforts of public agencies, private property owners, and participating nongovernmental organizations in actions and projects related to maintenance, monitoring, research, habitat restoration and enhancement, and infrastructure improvements.
- Serve as a forum for discussion and resolution of land use concerns and issues.
- Implement an online data sharing platform for Yolo Bypass related flows, monitoring, research and other information, as described in Yolo County's 2020 Yolo Bypass Datasharing Proposal.
- Support active public communication and education programs.
- In collaboration with member agencies, seek grants and other funds where appropriate for projects in pursuit of the above goals.

▶ Potential Benefit Regions
Entire Yolo Bypass and adjacent landowners.

▶ Supporting Landowners and Stakeholders
To be determined in the proposed feasibility study.

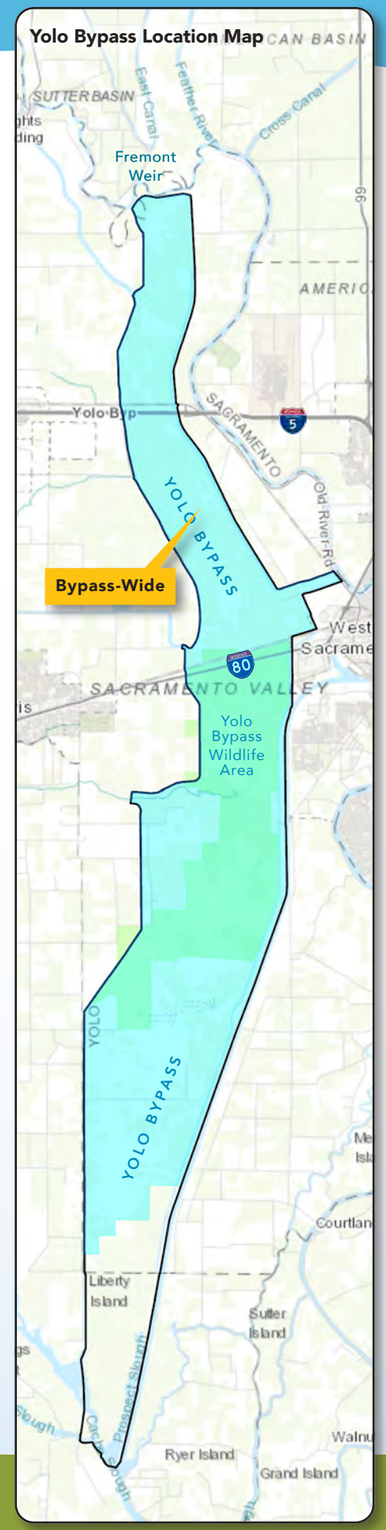
▶ Potential Constraints
The feasibility study may require a lengthy process to ensure coordination with all stakeholders.

▶ Integration with Other Projects
Depending on its timing, this initiative should be integrated with all other recommended drainage and infrastructure improvement projects in this study, particularly the Yolo Bypass Canal Maintenance Program.

OPPORTUNITY EVALUATION CRITERIA, RANKING, AND NOTES

	Project Metric	High	Med	Low	N/A	Comments
Primary Benefit Criteria	Agricultural Benefit	●				Farmers and landowners will benefit from a single point of contact for information about proposed projects as well as a staff person designated to help resolve concerns as they arise.
	Migratory Waterfowl or Shorebird Habitat Benefit	●				Wetlands managers will benefit from a single point of contact for information about proposed projects as well as a staff person designated to help resolve concerns as they arise.
	Public Education and Recreation Benefit		●			Additional public education and recreation opportunities could emerge within a formal communication structure. Issues related to hunting and public access could be resolved within a coordinated forum.
Secondary Benefit Criteria	Estimated Benefit Acreage[1]	●				Entire Yolo Bypass: 57,000 acres
	Listed Species Benefit			●		Coordinated monitoring of listed species could save time and money.
Feasibility Criteria	Easement Compatibility	●				No anticipated impact
	Shovel Readiness			●		Does not apply to a feasibility study
	Potential for Local Match		●			To be determined by the feasibility study
	Eligibility for Federal/State Funding		●			To be determined by the feasibility study
	Cost[2]	$				To be determined by the feasibility study
	Project Sponsor, Champion and Partners		●			Yolo County, Yolo Basin Foundation

1: H = 6,000+ acres; M = 3,000 to 6,000 acres; L = less than 3,000 acres **2**: H = $ = less than $1M; M = $$ = $1M to $10M; L = $$$ = more than $10M



3 STUDY AREA

3.1 STUDY AREA BOUNDARIES

The study area boundary included the portion of the Yolo Bypass in Yolo County that extends from the Fremont Weir to the southern Yolo County line. This includes all of the lands located between the eastern and western levees of the Yolo Bypass. The study area also included the Sacramento Bypass extending from the Sacramento River to the Yolo Bypass. Because the Yolo Bypass is strongly influenced by and has influence on the drainage infrastructure located directly outside of the inundation footprint, the study area also included limited areas outside of the Yolo Bypass. These areas were included in the study area if they included drainage or water infrastructure projects that were directly connected to the Yolo Bypass.

3.2 YOLO BYPASS INFRASTRUCTURE AND LAND USES

The Yolo Bypass is part of the Sacramento River Flood Control Project, which includes levees, weirs, and bypass facilities that help manage the historic flooding in the Sacramento Valley. The Yolo Bypass conveys a design flow of 343,000 cubic feet per second, which is about 80 percent of the floodwaters in this area (DWR 2010). Flows enter the Yolo Bypass through Fremont Weir on the Sacramento River upstream of the confluence with the Feather River, and through the Sacramento Weir and Bypass. The Sacramento Weir is on the Sacramento River upstream of the confluence with the American River. The Yolo Bypass also receives water from the Westside tributaries, which drain the western foothill watersheds. These tributaries include the Knights Landing Ridge Cut, Cache Creek, Willow Slough Bypass, and Putah Creek. The water that enters the Yolo Bypass helps protect the cities of Sacramento and West Sacramento from flood flows on the Sacramento River system. Water flows through the Yolo Bypass and into the Cache Slough complex at the southern end. The water then joins the Sacramento River just north of Rio Vista.

The northern portion of the Yolo Bypass is non-tidal and bounded on the east by the Tule Canal (the upper extension of the Toe Drain) and the east bypass levee and on the west by the west bypass levee. The Interstate 5 causeway bisects the northern portion of the Yolo Bypass east to west. The southern portion of the Yolo Bypass is bounded on the east by the Toe Drain and the east bypass levee. This is also considered the west levee of the Sacramento River Deep Water Ship Channel. Interstate 80 bisects the central portion of the Yolo Bypass east to west and establishes the boundary where the Tule Canal transitions to the Toe Drain.

The west side of the southern portion of the Yolo Bypass is bounded by the west bypass levee to just north of Putah Creek and Putah Creek Sink located downstream of Putah Creek. The southern portion of the Yolo Bypass does not have a levee on the west side for about eight miles. The lack of levees allows floodwaters to flow unimpeded as far west as Yolo County Road (CR) 104. Farther downstream (approximately two miles north of Delhi Road), the west bypass levee resumes and extends south and west of Liberty Island. Within Yolo County, the Yolo Bypass extends to just south of the most southern step levee (staircase shaped levees in southern Yolo Bypass), or approximately one mile south of the east-west segment of Liberty Island Road. The southern portion Yolo Bypass north to Interstate 80 lies within the boundaries of the legally defined Delta.

The topography in the Yolo Bypass is mostly flat since the area is located in a basin characterized by natural levees created by overflow sediment from the Sacramento River. The bypass generally slopes from higher elevations in the north to lower elevations in the south and from higher elevations in the west to lower in the east.

The elevation in the northern portion of the Yolo Bypass ranges from 20 to 32 feet above mean sea level while elevations in the southern portion range from 5 to 15 feet above mean sea level (DWR/USBR 2019).

Agriculture is the dominant land use within the Yolo Bypass and surrounding lands. The Bypass contains extensive areas of Prime Farmland, Unique Farmland and Farmland of Local Importance, as defined by the California Department of Conservation's Farmland Mapping and Monitoring Program (FMMP). This farmland is located primarily on large, privately-held ranches in the northern portion of the Bypass, and on smaller, privately-held parcels and within the publicly-owned Yolo Bypass Wildlife Area in the southern portion of the Bypass. Several private duck clubs provide wetland habitat and hunting opportunities both north and south of the Yolo Bypass Wildlife Area.

Those portions of the Yolo Bypass that are flooded in winter and early spring function as a migration route and spawning and rearing habitat for many sensitive special-status fish species endemic to the region. This migration connection occurs when floodwaters are spilling over the Fremont and Sacramento weirs, creating an upstream hydrologic connection between the Yolo Bypass and Sacramento River. The Yolo Bypass also provides important habitat for shorebirds, waterfowl, and terrestrial species (Jones and Stokes 2001). The Yolo Bypass is considered an important wintering area for waterfowl along the Pacific Flyway (Northern California Water Association 2016). Large areas in the bypass are currently managed year-round for wildlife habitat, including the Yolo Bypass Wildlife Area and private duck club lands.

3.3 STAKEHOLDER OUTREACH

The project team collected information and project ideas from the people who know the Yolo Bypass best: the farmers, landowners, wetlands managers, and water managers with years of experience working in the Bypass. The project team expanded the stakeholder outreach efforts conducted for the 2014 Study by leveraging the close working relationships that have been developed by the Yolo Basin Foundation and the Yolo County Resource Conservation District within and adjacent to the Yolo Bypass. These two entities worked closely with the consultant team to organize and facilitate multiple small group meetings and interviews with landowners, farmers, water managers, wetland managers and others with extensive knowledge and experience with Yolo Bypass and drainage and water supply systems. The meetings and interviews were conducted in person to allow a review of drainage maps and aerial photographs.

The small group meetings and interviews were followed up with emails and telephone calls to clarify information and refine the project concepts. The project team contacted as many people as possible within the study area to ensure the team understood the drainage and water supply interconnections within and between properties. This included contacting the advocates for the yet-to-be implemented projects identified in the original 2014 Study to assess how they would be updated. Current and expected future drainage and water supply challenges and constraints were discussed in detail during these meetings as well as the potential improvements needed to enhance drainage and water supply operations. Additionally, the team performed limited field reconnaissance to supplement the information gathered during the interviews.

Each group of landowners was given two opportunities to review maps and draft project sheets for further comments. A public comment period was also held on the draft version of this report following its release in November 2020, which provided an additional opportunity for stakeholders to comment on the project sheets.

3.4 BYPASS WIDE MANAGEMENT CHALLENGES

Several management challenges affect farmers and wetland managers through the Yolo Bypass including operations and maintenance of the flood system, mosquito abatement, and methylmercury production. These challenges decrease the productivity of the lands within the Yolo Bypass by increasing labor and regulatory compliance costs, reducing water management flexibility, and increasing overall flood risk.

LONG-TERM OPERATIONS AND MAINTENANCE

The State, through the CVFPB, has provided assurances to the U.S. Army Corps of Engineers that it will be responsible for operation, maintenance, repair, rehabilitation and replacement of State-federal Central Valley levees and flood control facilities such as the Yolo Bypass. Subsequently, reclamation districts such as RDs 1600 and 537 signed assurance agreements with the CVFPB for operation and maintenance of their local levee systems and flood control facilities. DWR and applicable RDs share responsibility for operation and maintenance of State Plan of Flood Control (SPFC) flood management facilities within the Yolo Bypass. The State and RDs face several complex challenges to keep the Yolo Bypass levees in good repair including:

- Chronic underfunding of operations and maintenance activities;
- Management of multiple-objectives within the legal framework of a single-purpose federal project authorization and limitations on using Proposition 218 assessments on maintaining ecological elements;
- Declining natural resources have led to a regulatory framework in which flood managers often face conflicting laws and mandates, often putting the pursuit of life safety and ecosystem vitality at odds;
- Deferred maintenance that is not addressed quickly ultimately results in critical problems that may require emergency repairs during the flood season to maintain the integrity of the flood management system, prevent loss of life, reduce property damage and loss, and prevent possible ecological harm;
- Increasing vegetation growth in the bypass system that prevents these facilities from functioning as intended, resulting in increased flows and stress on the riverine levee system; and
- Complex governance structure and inconsistent operations and maintenance practices.

The implementation of large-scale State-federal projects throughout the Yolo Bypass will require that they be sustainably maintained for the variety of benefits they are intended to provide (e.g., flood risk reduction, ecosystem vitality, recreation, water quality, agricultural production). Long-term operations and maintenance of those multi-benefit improvements would need to include activities to maintain both flood protection and habitat quality as well as ongoing agricultural operations. The implementation of the project concepts identified in this Study Update could help farmers and wetland managers better adapt to the anticipated large-scale projects within the Yolo Bypass and better implement long-term operations and maintenance within the flood system.

MOSQUITO ABATEMENT

The control of vectors, primarily mosquitoes, is a Yolo Bypass-wide management concern as the Yolo Bypass is close to population centers. The Sacramento-Yolo Mosquito and Vector Control District (SYMVCD) provides

mosquito abatement services to Sacramento County and Yolo County. The SYMVCD operates under a system of Best Management Practices including physical, biological and chemical control. SYMVCD promotes a proactive management approach by meeting with farmers and wetland managers to produce local plans for drainage and maintenance. Additionally, the District provides ditch maintenance equipment and personnel to improve conditions in problematic breeding areas. Maintenance of vegetation and sediment within the Yolo Bypass is a key concern, including maintaining mosquito fish swales for biological control and disking fields in mosaic patterns to promote clumps of cattail rather than large stands. The reduction of pesticide use is also a key management goal.

A couple of locations within the Yolo Bypass have been identified as problematic drainage areas by the SYMVCD (cbec et al. 2014). The first is on the Toe Drain near the constriction under the Interstate 80 causeway and the second is on the duck clubs in the southern Bypass where supply and drainage are limited by a lack of a cooperative water management system that is hindered by a treatment cost program that is perceived as prohibitive by landowners. The implementation of any project concepts that could increase mosquito populations will need to be implemented consistent with SYMCVD requirements, including the implementation of Best Management Practices. Because the project concepts identified in this Study Update are generally intended to improve water management, their implementation would be expected to reduce mosquito populations and abatement requirements.

METHYLMERCURY PRODUCTION

The Central Valley Regional Water Quality Control Board developed requirements for the Sacramento – San Joaquin Delta Estuary Methylmercury Total Maximum Daily Load (TMDL), to ensure that discharges to the Sacramento – San Joaquin River Delta have acceptable concentrations of methylmercury. Methylmercury is a bioavailable neurotoxin to living organisms and exposure to excessive concentrations or prolonged exposure can have serious health effects.

Methylmercury issues are important to consider during potential project implementation as future changes to agricultural and wetland discharge management will likely be required with TMDL implementation to minimize exposure. In addition, future changes to the Yolo Bypass flooding regime as a result of the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project or other actions to increase inundation may increase methylation rates or spatial distribution (cbec et al. 2014). Seasonal wetlands and floodplains tend to methylate more than tidal wetlands, which typically show net zero methylation (cbec et al. 2014). The degree to which patterns like this can be managed by land use type is still under development. However, because the project concepts identified in this Study Update are generally intended to improve water management, their implementation would be expected to improve the ability for farmers and wetland managers to control mercury methylation within the Yolo Bypass.

4 PROJECT CONCEPT PRIORITIZATION

During and after the stakeholder interviews, the project team identified project concepts to address the drainage and water infrastructure challenges identified by the stakeholders. This effort focused primarily on identifying physical improvements to infrastructure to address drainage and water supply challenges. Examples included replacing inadequately sized drainage culverts, installing new drainage and water supply pumps, expanding or redirecting drainage canals, and addressing aquatic weed overgrowth within channels. In addition, the team also identified non-structural measures such as improved communication and coordination among landowners using shared infrastructure to help address drainage and water supply challenges. Drawing on new information and yet-to-be-implemented projects from the 2014 Study, over 80 potential project concepts were identified. The identified concepts were compiled and organized in a project concept spreadsheet database (Appendix B). Through review of the initial project concept list and additional stakeholder engagement, some project concepts were grouped and refined to generate Bypass-wide solutions where appropriate.

Following refinement and grouping, the project team screened, evaluated and ranked the project concepts across the eleven criteria identified in Table 1. The selected ranking criteria broadly fell into one of two categories: benefit criteria and feasibility criteria. Benefit criteria sought to evaluate the potential benefits or uplift that could be provided by a project concept with respect to priorities such as agriculture, wetland habitat, public access and listed species. Feasibility criteria sought to assess the practicality of implementing a project concept with regard to factors such as shovel readiness, easement compability, order of magnitude cost and funding availability. The eleven criteria were also split into two tiers of importance. The first-tier criteria were limited to three criteria: (1) agricultural benefit, (2) migratory waterfowl or shorebird habitat benefit and (3) public education and recreation benefit. The other two benefit criteria and all six feasibility criteria were considered second-tier criteria. For each criterion, a description, a metric and scoring guidelines (i.e., high, medium and low) were established, as applicable. These descriptions, metrics and scoring guidelines are summarized below in Table 1.

The refined list was then evaluated and each project concept was scored as either high, medium, low or not applicable with respect to each criterion. The scores for each project concept were then summed by assigning a numerical score of 3 for a high score, 2 for a medium score, 1 for a low score and 0 when the criterion was not applicable. The grouped and screened project concepts list was ranked by the cumulative score across all eleven criteria and is provided in Appendix B. The top twelve project concepts are listed in Table 2 below in order of their ranking with the highest ranked project listed first.

Table 1. Ranking Criteria Summary

Criteria	Type	Tier	Description	Score Definitions			
				High (3)	Medium (2)	Low (1)	N/A (0)
Agricultural Benefit	Benefit	1st	This benefit represents the ability to irrigate and drain agricultural land more efficiently, access and maintain the land, and prepare it for agricultural production.	Subjective			
Migratory Waterfowl or Shorebird Habitat Benefit	Benefit	1st	This benefit represents the ability to flood up and drain habitat at various seasonal intervals and to access and maintain the land.	Subjective			
Public Education and Recreation Benefit	Benefit	1st	Supports public education and recreation opportunities (e.g., hunting, fishing, wildlife viewing, hiking, etc.) and measured in acre-days of land access annually.	Significant increase in Acre Days	Moderate increase in Acre Days	Low increase in Acre Days	No increase in Acre Days
Estimated Benefit Acreage	Benefit	2nd	The number of acres of agriculture and/or migratory waterfowl or shorebird habitat benefited.	> 6,000 acres	3,000 to 6,000	< 3,000 acres	0 acres
Listed Species Benefit	Benefit	2nd	Benefit to threatened or endangered species.	Subjective			
Easement Compatibility	Feasibility	2nd	Compatability with existing flood, habitat or agriculture easements	Highly Compatible / No Easements	Limited easement constraints	Substantial easement constraints	Completely incompatible with easement
Shovel Readiness	Feasibility	2nd	Measure of project readiness for construction including status of design and permit applications.	100% Designs Completed and Permits Granted	30% Design Complete and Permitting Process Started OR Very Simple / No Design	Concept Plans Only	No Concept Plan available
Potential for Local Match	Feasibility	2nd	Potential percentage of the project that could be funded by a local match.	> 30%	11-30%	1-10%	0%
Eligibility for State or Federal Funding	Feasibility	2nd	Potential percentage of the project that could be funded by state or federal funding sources including grants or direct funding commitments by an agency.	> 70%	50-70%	< 50%	0%
Cost	Feasibility	2nd	Cost to advance project through feasibility study, design, permitting and construction.	< $1M	$1M to $10M	> $10M	N/A
Project Sponsor, Champion and Partners	Feasibility	2nd	This metric captures whether the project has a sponsor, champion and partners that will help advance the project for funding, permitting and construction.	3+ entities champion it in addition to Local Landowner support and sponsor	Has a Project Sponsor and Local Landowner supports it	A Landowner will support it	No Support

Table 2. Top Project Concepts Listed by Ranking

Project Name	Benefit Criteria					Feasibility Criteria						Total Score
	Agricultural Benefit	Migratory Waterfowl or Shorebird Benefit	Public Education and Recreation Benefit	Estimated Benefit Acreage	Listed Species Benefit	Easement Compatibility	Shovel Readiness	Potential Local Match	Eligibility for Federal / State Funding	Cost[1]	Project Sponsor, Champion, Partners	Total (All Criteria)
Lisbon Weir Improvements	H	H	M	H	H	H	L	L	H	$$$	M	25
Northern Yolo Bypass Wildlife Area Drainage and Water Supply Improvement Master Project	H	H	H	H	L	H	L	L	H	$$$	H	25
Yolo Bypass Crossing Improvements	H	H	H	H	L	H	M	M	L	$$	M	25
Yolo Bypass Canal Maintenance Program	H	H	M	H	L	H	L	M	M	$$$	H	24
South Davis Drain Pump Station and Gravity Drain Improvements	H	L	L	H	L	H	L	H	H	$$$	H	24
Yolo Bypasskeeper and Coordinating Committee	H	H	M	H	L	H	L	M	M	$	M	23
Yolo Bypass Drainage Outlet Infrastructure Improvement Project	H	H	L	H	L	H	M	L	M	$$	M	23
Tule Ranch Canal and Pump Improvements	H	H	L	H	L	H	L	L	M	$$	L	21
Conaway Main Supply Canal Augmentation	H	M	N/A	H	M	H	L	H	L	$$	L	21
Central Yolo Bypass Wildlife Area Drainage Improvement Master Project	H	H	M	M	L	H	L	L	M	$$	L	20
RD 1600 Pump Station and Gravity Drain Improvements	H	L	N/A	H	N/A	H	L	M	M	$$	M	19
Swanston Ranch Master Project	M	H	M	M	L	M	L	M	L	$$$	L	18

*Cost Ranges - $ = less than $1 million; $$ = $1million to $10 million; $$$ = more than $10 million. Other criteria and scoring metrics are described in Table 1.

5 FUNDING STRATEGY FOR THE CONCEPTUAL PROJECTS

The funding strategy describes potential state and federal funding opportunities for project concepts in the Study Update. Funding opportunities include not only grants, but direct contributions from regional, state, and federal agencies that can be combined with local sources to assist with implementation of project concepts that help achieve mutual goals. This strategy focuses on potential grant opportunities, including identifying project concepts for which few grant opportunities exist, since direct commitments are difficult to accurately anticipate. Table 3 below summarizes these funding opportunities by the project concepts.

5.1 DESCRIPTIONS OF FUNDING OPPORTUNITIES

The following describes the federal and state funding opportunities for the identified project concepts.

FEDERAL

CENTRAL VALLEY PROJECT IMPROVEMENT ACT – HABITAT RESTORATION PROGRAM

The U.S. Bureau of Reclamation and the U.S. Fish and Wildlife Service's Central Valley Project Improvement Act grant provides funding for the protection, restoration and enhancement of fish and wildlife. This program typically receives $1.5 million annually and funds five or more projects. This program will not have a solicitation in 2021.

WATERSMART WATER AND ENERGY EFFICIENCY

The U.S. Bureau of Reclamation administers the WaterSMART Water and Energy Efficiency Grant Program, which provides funding for projects resulting in quantifiable water savings and water reliability benefits. The projects should conserve and use water more efficiently, increase production of hydropower, mitigate conflict risk in areas at a high risk for future water conflict and accomplish other benefits that contribute to water supply reliability in the western United States. A cost share of 50% is required. Funding Group 1 projects should be completed in two years and projects in Funding Group 2 should be completed in three years. Funding Group 1 projects can request $300,000 and projects in Funding Group 2 can requested up to $1,500,000. Eligible projects include canal lining/piping, municipal metering, irrigation flow measurements, supervisory control and data acquisition (SCADA) and small-scale hydroelectric facilities that enable use of renewable energy sources. Grant applications are typically due in September.

STATE

ECOSYSTEM RESTORATION AND WATER QUALITY GRANT PROGRAM PROPOSITION 1

The Delta Conservancy's Ecosystem Restoration and Water Quality Grant Program provides funding to implement the three objectives of the California Water Action Plan: more reliable water supplies, restoration of important species and habitat, and a more resilient and sustainably-managed water infrastructure. The Program focuses on the restoration of important species and habitat. Eligible applicants include public agencies, nonprofit organizations, tribal organizations, public utilities and mutual water companies, including local and regional

Table 3. State and Federal Grant Funding Opportunities

Project Concept	Funding Opportunity	Due Date (if known)
1. RD 1600 Pump Station and Gravity Drain Improvements	No identified grants	No identified grants
2. Conaway Main Supply Canal Augmentation	WaterSMART Water and Energy Efficiency Grant (federal)	Solicitation typically occurs between July and December
	Systemwide Flood Risk Reduction Program (state)	Unknown
	Central Valley Project Improvement Act – Habitat Restoration Program (federal)	Unknown
	Watershed Restoration Grant Program (state)	Early 2021
3. Swanston Ranch Master Project	Central Valley Project Improvement Act – Habitat Restoration Program (federal)	Unknown
	Inland Wetland Conservation Program (state)	Continuous
4. Northern Yolo Bypass Wildlife Area Drainage and Water Supply Improvement Master Project	Delta Water Quality and Restoration Grant Program (state)	Early 2021
	Ecosystem Restoration and Water Quality Grant Program Proposition 1 (state)	August 2021 (final)
	Systemwide Flood Risk Reduction Program (state)	Unknown
5. South Davis Drain Pump Station and Gravity Drain Improvements	WaterSMART Water and Energy Efficiency Grant (federal)	Solicitation typically occurs between July and December
	Watershed Restoration Grant Program (state)	Early 2021
6. Central Yolo Bypass Wildlife Area Drainage Improvement Master Project	Watershed Restoration Grant Program (state)	Early 2021
	Delta Water Quality and Restoration Grant Program (state)	Early 2021
7. Lisbon Weir Improvements	WaterSMART Water and Energy Efficiency Grant (federal)	Solicitation typically occurs between July and December
	Systemwide Flood Risk Reduction Program (state)	Unknown
	Delta Water Quality and Restoration Grant Program (state)	Early 2021
	Ecosystem Restoration and Water Quality Grant Program Proposition 1 (state)	August 2021 (final)
8. Tule Ranch Canal and Pump Improvements	WaterSMART Water and Energy Efficiency Grant (federal)	Solicitation typically occurs between July and December
	Inland Wetland Conservation Program (state)	Continuous
9. Yolo Bypass Canal Maintenance Program	No identified grants	No identified grants
10. Yolo Bypass Crossing Improvements	Watershed Restoration Grant Program (state)	Early 2021
	Delta Water Quality and Restoration Grant Program (state)	Early 2021
11. Yolo Bypass Drainage Outlet Infrastructure Improvement Project	Systemwide Flood Risk Reduction Program (state)	Unknown
12. Yolo Bypasskeeper and Coordinating Committee	No identified grants	No identified grants

companies. The program previously funded $2 million of the Yolo Bypass Wildlife Area Habitat Restoration and Drainage Improvement Project, one of the projects identified in the 2014 Yolo Bypass Drainage and Water Infrastructure Improvement Study. The Conservancy estimates a final solicitation in August 2021 with an estimated $2-5 million available, with awards made in spring of 2022.

WATERSHED RESTORATION GRANT PROGRAM

The California Department of Fish and Wildlife's Watershed Restoration Grant Program focuses on watershed restoration and protection projects of statewide importance. Projects can involve planning, implementation or acquisition activities. To be eligible, projects must be located outside of the legal Sacramento-San Joaquin Delta. Eligible projects for this grant program include, but are not limited to, enhancing habitat, modernizing stream crossings, culverts and bridges, reconnecting flood plains, installing or improving fish screens, providing fish passage, improving watershed management and removing sediment or trash. The next solicitation will occur in early 2021.

DELTA WATER QUALITY AND RESTORATION GRANT PROGRAM

The California Department of Fish and Wildlife's Delta Water Quality and Restoration Grant Program provides funding for multi-benefit ecosystem and watershed protection and restoration projects within the legal Sacramento-San Joaquin Delta. Projects can involve planning, implementation, or acquisition activities. Eligible projects include projects that improve water quality or contribute to the improvement of water quality, habitat restoration or enhancement specifically for special-status, at risk, endangered or threatened species, and scientific studies that support the Delta Science Program. The program previously funded the permitting phase of the Yolo Bypass Wildlife Area Habitat and Drainage Improvement Project. The next solicitation for this grant will occur in early 2021.

INLAND WETLAND CONSERVATION PROGRAM

The Wildlife Conservation Board created the Inland Wetland Conservation Program, with an annual allocation of $2 million, to fund projects the Central Valley Joint Venture has identified through its implementation plan. Activities eligible for funding include acquisition of land or water for wetlands or wildlife-friendly agriculture, acquisition of conservation easements, restoration of public or private lands, and enhancement of existing degraded habitats. Eligible recipients include nonprofit organizations and local governmental agencies, as well as state and federal agencies. Pre-applications are accepted on a continuous basis. The program is very competitive, however, and it can takes years for a project to move to the top of the funding list. Each year, one to three projects are funded.

HABITAT ENHANCEMENT AND RESTORATION PROGRAM

The Wildlife Conservation Board's Habitat Enhancement and Restoration Program provides funding for habitat restoration projects, including wetlands, wildlife corridors and fisheries enhancements (e.g., fish ladders, barrier removal). Eligible recipients include private landowners, nonprofit organizations, resource conservation districts, and public agencies. Projects must receive a recommendation from the California Department of Fish and Wildlife and provide funds for long-term maintenance. Pre-applications for this program are accepted on a continuous basis.

SYSTEMWIDE FLOOD RISK REDUCTION PROGRAM

DWR's Systemwide Flood Risk Reduction Program oversees the work necessary to implement on-the-ground projects that further the goals and objectives of the Central Valley Flood Protection Plan. This program prioritizes multi-benefit water management strategies through watershed-scale collaborations and system-scale water and flood planning. Yolo Bypass facility improvements, such as expansion of the Fremont Weir in the Yolo Bypass and the Sacramento Weir Widening Project are specifically mentioned as priority projects meeting the goals and objectives mentioned in the Central Valley Flood Protection Plan. Final guidelines have yet to be created for this program, and it is currently unknown when the first solicitation will occur. The project team has contacted DWR to determine whether Study Update projects will be eligible for this program, as well as the amount available.

OTHER FUNDING SOURCES

Funding for projects in the study could be secured through direct commitments of funding from state, federal, and regional agencies with a shared interest in implementation. USBR, for example, included $2 million for a project to address flooding at the entrance to the Yolo Bypass Wildlife Area (included in the Northern Yolo Bypass Wildlife Area Drainage and Water Supply Improvement Project) in the Record of Decision for the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project. In addition, funding may be available from the $4 billion Parks, Environment and Water Bond (Proposition 68) approved by voters in June 2018. Proposition 68 provides funding for state and local parks, environmental protection and restoration projects, water infrastructure projects, and flood protection projects.

CONSTRAINTS

Constraints associated with this funding strategy include the following:

- **Need for project champions.** While Yolo County, Ducks Unlimited and the Yolo County Resource Conservation District have managed grants in the past to help implement projects from the 2014 Study, these organizations may not have capacity to manage future grants.

- **Funding for design/engineering.** To be competitive, most grant programs require designs that are 30% to 65% complete. Funding for the development of projects is scarce.

- **Funding and staff to write grant applications.** Grant applications are time-consuming and expensive to write, and organizations may not have the staff capacity or other funding to prepare them.

- **Availability of adequate cost share.** Grants are more competitive when a local cost share is provided, but it is not clear whether project beneficiaries have the necessary resources to provide an adequate cost share.

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APPENDIX A

REGIONAL PLANNING INITIATIVES

Several significant regional planning initiatives have been conducted, or are underway, that could have significant long-term ramifications for the existing land uses within the Yolo Bypass. These regional planning initiatives include the following:

CENTRAL VALLEY FLOOD PROTECTION PLAN

The Central Valley Flood Protection Plan (CVFPP) is California's strategic blueprint to improve flood risk management in the Central Valley. The Central Valley Flood Protection Board (CVFPB) adopted the first CVFPP in 2012 and updated it in 2017. The 2017 CVFPP identifies state investment in levees and other flood risk reduction improvements to protect major urban areas, along with levee improvements and non-structural and multi-benefit improvements for small communities. Changes for rural areas include state investment to repair erosion sites, repair of weak spots in the levees, and removal of non-compliant encroachments. Other changes focus on improving operations and maintenance of the flood control system, re-operating and better coordinating released from large reservoirs to mitigate downstream damage, improving the flood emergency response system, and constructing improved and better managed habitats that would be integrated into flood improvement projects (CVFPB 2017).

The 2017 CVFPP contemplates dramatic alterations to the Yolo Bypass including levee setbacks in the Upper Elkhorn, Lower Elkhorn, Sacramento Bypass, Conaway Ranch, and west Yolo Bypass as well as the introduction of significant habitat restoration within the setback footprints. The 2017 CVFPP also contemplates improvements or expansion of the Cache Creek Settling Basin and modifications to the Deep Water Ship Channel. The 2017 CVFPP proposed the levee setbacks to increase the overall capacity of the Sacramento River flood management system to convey large flood events, which would benefit urban, small community, and rural-agricultural areas outside of the Bypass. Peak flood stages were predicted in the CVFPP to be reduced by up to 2 feet along the main-stem upper and lower Sacramento River, Sutter Bypass, and American River with implementation of the identified levee setbacks. The Yolo Bypass expansion would also incorporate multi-benefit improvements identified in the 2017 CVFPP including increased upland, riparian, and wetland habitat acreage, as well as inundated floodplain habitat, which would be implemented to benefit a wide variety of sensitive species (CVFPB 2017). The CVFPB and DWR are currently preparing the 2022 Update to the CVFPP.

CONSERVATION STRATEGY

The 2017 CVFPP also included a companion document identified as the Conservation Strategy, which is a non-regulatory document that provides system-wide measurable ecological objectives for ecosystem processes, habitats, and species to consider during project planning and design; and includes long-term approaches for improving the riverine and floodplain ecosystems of the Yolo Bypass and surrounding lands through the implementation of multi-benefit projects. The Conservation Strategy’s measurable ecological objectives are intended to guide and support monitoring and tracking of the contributions to the CVFPP’s supporting goal of promoting ecosystem functions over time (CFVPP 2017).

LOWER SACRAMENTO/DELTA NORTH REGIONAL FLOOD MANAGEMENT PLAN

Following adoption of the 2012 CVFPP, DWR funded the development of six locally-led Regional Flood Management Plans that describe local and regional flood management priorities and challenges. The study area is located within the boundaries of the Lower Sacramento/Delta North Regional Flood Management Plan (RFMP). The RFMP was developed in 2014 by participants from the counties, reclamation districts, water agencies, emergency response agencies, tribes, resource agencies, nongovernmental organizations (NGOs), and other interested stakeholders. The RFMP outlines the long-term vision of the RFMP agencies, which include Solano County, Yolo County, West Sacramento Area Flood Control Agency, Sacramento Area Flood Control Agency, Reclamation District 2068, and Solano County Water Agency, for flood management in the Yolo Bypass/Cache Slough Complex and surrounding lands.

Following preparation of the RFMP in 2014, the RFMP agencies developed the Lower Sacramento/Delta North Corridor Management Framework (CMF). The CMF identified the locally preferred approach to achieving the federal, state, and local policy initiatives in the region. These policy objectives include the ability to (1) provide essential conveyance capacity and improve the resilience, reliability and adaptability of the flood system to climate change, (2) preserve agricultural land and promote a strong, sustainable agricultural economy; and, (3) conserve and improve functionality of aquatic and terrestrial species habitat consistent with the paramount flood management purpose of the system. This CMF was intended to serve as the basis for a collaborative, constructive, and transparent partnership between federal, state, and local agencies operating in the Yolo Bypass and Cache Slough Complex. The development of the CMF by the RFMP agencies led to the creation of the Yolo Bypass/Cache Slough Partnership, which includes local, state and federal agencies and is described in detail below.

YOLO BYPASS/CACHE SLOUGH PARTNERSHIP

In 2016, 15 local, state and federal agencies signed a Memorandum of Understanding (MOU) to serve as the vehicle to promote the discussion, prioritization, and resolution of policy and other issues critical to the success of the planning efforts in the region. The MOU memorialized the understanding between the fifteen agencies that they would partner to improve collaboration, synchronize efforts, and enhance outcomes of planning efforts related to flood conveyance, fisheries and wildlife habitat, water supply and water quality, agricultural land preservation, economic development, and recreation. The agency partners have worked under the umbrella of the Yolo Bypass/Cache Slough Partnership and have formed several working groups focused on key barriers in the region including Long-term Operations and Maintenance, Water Infrastructure Assurances, Agricultural Sustainability, Programmatic Section 408, and Water Quality. The working group focused on the implementation of a Programmatic Section 408 authorization for projects in the Yolo Bypass is described below due to its potential to streamline the Section 408 permitting process for the project concepts identified in this Study Update.

PROGRAMMATIC SECTION 408 PERMITTING

The Rivers and Harbors Act requires the U.S. Army Corps of Engineers to issue Section 408 permission for any projects that have the potential to affect the Sacramento River Flood Control Project, of which the Yolo Bypass is a part. The Section 408 permitting process can often take years to complete for complex projects and can be financially burdensome for smaller projects due to the complex hydrological modeling required by the U.S. Army Corps of Engineers. A working group of the Yolo Bypass/Cache Slough Partnership has formed to develop a programmatic approach to Section 408 permitting for projects within the Yolo Bypass/Cache Slough Complex. The intent of the programmatic Section 408 permitting approach is to substantially streamline the permitting process for projects in the region including the individual projects identified in this Study Update.

CALIFORNIA ECORESTORE

California EcoRestore is a California Natural Resources Agency initiative implemented in coordination with state and federal agencies to advance the restoration of at least 30,000 acres of Sacramento-San Joaquin Delta (Delta) habitat by 2020. The types of habitat targeted include tidal wetlands, floodplain, upland, riparian, fish passage improvements and others. The California EcoRestore program is focused on implementing a comprehensive suite of habitat restoration actions to support the long-term health of the Delta and its native fish and wildlife species. Specifically, the program aims to create 3,500 acres of managed wetlands, restore 9,000 acres of tidal and subtidal habitat, restore 17,500 acres of inundated floodplain habitat, and implement 1,000 acres of Proposition 1 and 1E funded restoration projects. To date, California EcoRestore has implemented 1,057 acres of manage wetlands, 159 acres of tidal and subtidal restoration, 0 acres of inundated floodplain habitat, 50 acres of upland and riparian forest restoration, 6,100 acres of shaded aquatic and riparian restoration, and two fish passage improvement projects (CNRA 2020). Additional tidal and subtidal restoration acreage is being added with the restoration of the Tule Red Project in Solano County and the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project is expected to result in substantial inundated floodplain habitat once constructed.

YOLO HCP/NCCP

The Yolo Habitat Conservation Plan/Natural Community Conservation Plan (Yolo HCP/NCCP) is a countywide conservation plan to provide Endangered Species Act permits and associated mitigation for infrastructure (e.g., roads and bridges) and development activities (e.g., agricultural facilities, housing, and commercial buildings) identified for construction over the next 50 years in Yolo County. The Yolo HCP/NCCP coordinates mitigation to maximize benefits to species, as well as conserve habitat above and beyond required mitigation. The Yolo Habitat Conservancy completed the Yolo HCP/NCCP in 2018 and began Yolo HCP/NCCP implementation on January 11, 2019 (Yolo Habitat Conservancy 2020).

APPENDIX B

Table B1. Project Opportunities Database

Project Name	Project ID	Location Code *	Project Description	Supporting Landowners and Key Stakeholders
Increase Tule Canal Conveyance Capacity	1	TCC	Increase conveyance capacity of Tule Canal through a combination of channel enlargement (widening and/or deepening), establishment of adjacent floodplain bench (including along the Lower Elkhorn Basin Levee Setback area) and/or creation/expansion of parallel ditches.	TBD
Address Tule Canal and Toe Drain Maintenance Needs	2	TCC	Establish and implement a plan for regular maintenance of sedimentation, debris and aquatic weeds along the Tule Canal and Toe Drain corridor to maintain full drainage, water supply and flow conveyance functionality.	TBD
Provide Yolo Bypass Farmers with Agricultural Field Releveling Support Post Flood	3	BW	Flooding disturbances to agricultural operations in the Yolo Bypass require more frequent releveling following flood flows. Provide assistance to farmers with releveling after flood flows recontour agricultural land.	TBD
Enhance Berm West of Ag Crossing #1	4	IP	Berm along northeastern corner of the Te Velde property routinely breaches during low flows over Fremont Weir and prevents timely start to planting. Provide a more permanent solution for regular breaching of berm.	Te Velde
Ag Crossing #1 Improvements	5	IP	Upgrade Ag Crossing #1 by replacing earthern facility with a more permanent solution such as a controllable weir structure.	Te Velde, RD 1600
RD 1600 Pump Station and Gravity Drain Improvements	6	IP	Improve or replace the RD 1600 pump station and gravity drain to meet current drainage needs and maintain drainage capabilities if state/federal projects (e.g. Yolo Bypass Salmonid Project) increase Yolo Bypass flows and inundation.	RD 1600
Address Gravity Flow Drainage Issues for Land Managers Adjacent to Yolo Bypass Caused by Increased Water Levels in Yolo Bypass	7	BW	Ensure that land managers in properties adjacent to the Yolo Bypass that rely on gravity flow to drain water from their land to the Yolo Bypass can continue to drain water effectively despite increased water levels associated with the Yolo Bypass Salmonid Project and additional projects proposing to increase flows.	RD 1600
Level and Clear RD 1600 Drainage Ditches	8	R	Level and clear RD 1600 ditches to improve drainage and/or install tile drains to help mitigate groundwater seepage from the Yolo Bypass to adjacent outside areas. This effort would require conducting a topographic survey of the drainage canal network to identify and prioritize actions.	RD 1600
Conduct Groundwater Studies and Monitoring in Northern Bypass and Upper Elkhorn Basin	9	R	Conduct groundwater studies and monitoring in northern Yolo Bypass and Upper Elkhorn to better characterize sub-surface connectivity between Yolo Bypass and the northern Elkhorn Basin.	RD 1600
Ag Crossing #2 Additional Improvements	10	IP	Make additional improvements to Ag Crossing #2 to address the sedimentation, debris and vegetation overgrowth issues that inhibit flow conveyance including during growing season.	RD 1600, Te Velde
Address Water Availability / Pump Power Discrepancies Affecting Smaller-Scale Farming Operations	11	BW	Address water availability issue for smaller-scale farms that are unable to compete with pumping power of neighboring large farms. As an example, this is a significant issue for Bypass Farms' ability to pump water when Knaggs and other landowners are also pumping with more powerful pumps.	Bypass Farms, other landowners
Address Primrose Overgrowth in Knights Landing Ridge Cut	12	IP	Address excessive growth of primrose in Knights Landing Ridge Cut and associated cross canal	Knaggs, Conaway

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Project Name	Project ID	Location Code *	Project Description	Supporting Landowners and Key Stakeholders
Enhance KLRC Cross Canal to Prevent Nuisance Breaching	13	IP	Improve KLRC Cross Canal to prevent nuissance breaching along vulnerable sections.	Te Velde, Knaggs Ranch
Nigiri 2.0 Project Compability Support	14	IP / R	Seek compability between Yolo Bypass drainage and infrastructure improvements and Nigiri 2.0 Project.	Knaggs, Conaway
Address Erosion Downstream of Cache Creek Settling Basin	15	IP	Address erosion issues in the Yolo Bypass downstream (east) of the Cache Creek Settling Basin.	Knaggs
Address Debris Racking at Railroad Trestle Crossing Near County Road 22	16	IP	Address debris racking issues along the Tule Canal at the existing railroad crossing immediately north of County Road 22 through structural improvements and/or debris management measures.	Te Velde, Knaggs Ranch, RD 1600
Conaway Main Supply Canal Augmentation	17	IP	Convert the eastern 3,500 lineal feet of the existing earthen Main Supply Canal in the Yolo Bypass to a pipe to protect it from scour during frequent overtopping flows.	Conaway
Ag Crossing #4 Improvements	18	IP	Replace Ag Crossing #4 with a larger structure to facilitate conveyance of increased flows without causing upstream backwatering and sediment deposition and/or flooding of upstream properties.	Swanston Ranch, Conaway
Degrade or Remove East-West Training Levee at Sac Bypass	19	IP	Degrade or remove the East-West training levee (levee spur) at Sac Bypass to lessen impact of high flows on Swanston Ranch properties.	Swanston Ranch
Redirect Mid-Range Flood Flows Away from Yolo Bypass West Levee	20	IP	Redirect mid-range flood flows from toe of western Yolo Bypass levee to east and south to discharge through gap in railroad berm. Potential impacts to flood conditions in the Yolo Bypass Wildlife Area must be considered.	Swanston Ranch
Redirect Conaway Ranch Drainage Away from Yolo Bypass West Levee	21	IP	Redirect drainage from Conaway Ranch from toe of western Yolo Bypass levee to tie into the north-south oriented ditch above the Willow Slough earthen water control structure.	Swanston Ranch
Improve Willow Slough Earthen Water Control Structure	22	IP	Upgrade or otherwise improve the earthen water control structure in Willow Slough Bypass to provide enhanced operability.	Swanston Ranch, Conaway, CDFW
Increase Willow Slough Bypass Capacity via Canal Maintenance	23	IP	Increase capacity of the eastern portion of Willow Slough Bypass along the dashed segment through maintenance measures.	Swanston Ranch, Conoway, CDFW, YBF
Increase Willow Slough Bypass Capacity via New Canal North of Willow Slough Bypass	24	IP	Increase capacity of Willow Slough Bypass by establishing a new parallel canal immediately north of the existing canal	Swanston Ranch, Conoway, CDFW, YBF
Address Debris Racking at Railroad Trestle Crossing Near Interstate 80	25	IP	Address seasonal accumulation of woody debris, primrose, sediment and other debris that dramatically reduces flow conveyance under railroad.	Swanston Ranch, Conaway, CDFW
Improve Swanston Ranch Access Roads	26	R	Raise and harden roads and install culverts to improve durability of roads and reduce access challenges associated with low level flooding and drainage issues.	Swanston Ranch

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Project Name	Project ID	Location Code *	Project Description	Supporting Landowners and Key Stakeholders
Davis Wetlands Water Supply Improvements	27	IP	Upgrade Channel A supply channel and pump to Davis Wetlands. Potentially route some Willow Slough Bypass floodwater to wetlands.	City of Davis, CDFW, YBF
Increase Toe Drain Capacity	28	TCC	Increase Toe Drain capacity to enable conveyance of 6,000 cfs via expansion of the Toe Drain and/or establishment of inset floodplain benches or parallel channels on adjacent lands to the west.	TBD
Yolo Bypass Wildlife Area Main Entrance Crossing Improvement	29	IP	Improve the Wildlife Area's main entrance crossing by raising access road and installing additional culverts to prevent inundation during relatively minor flooding conditions in the Bypass.	CDFW, YBF
Dredge Borrow Canal Downstream of Yolo Bypass Wildlife Area Main Entrance	30	IP	Remove vegetation and accumulated debris and sediment from the borrow canal to improve drainage and enable water to move south.	CDFW, YBF, Swanston Ranch
South Davis Drain Pump Station and Gravity Drain Improvements	31	IP	Rehabilitate the existing South Davis Drain Pump Station and co-locate a new gravity drain with the rehabilitated facility for improved functionality.	CDFW, Yolo Basin Foundation, Los Rios Farms, Hafeez Rehman, City of Davis, other landowners west of the Wildlife Area
Yolo Bypass Wildlife Area Dual Function Canal Reconfiguration - RP-7	32	R	Construct up to 90,000 linear feet of parallel supply and drain canals for 8 conveyance pathways as identified in RP-7 of the 2014 study. Lower elevations of drain outlets in Toe Drain if feasible. Improve trash racks to reduce maintenance at pumps.	CDFW, YBF
Yolo Bypass Wildlife Area Dual Function Canal Reconfiguration - RP-7 Site 1	33	IP	Construct parallel supply and drain canals along RP-7 Site 1, as identified in the 2014 study.	CDFW, YBF
Yolo Bypass Wildlife Area Dual Function Canal Reconfiguration - RP-7 Site 2	34	IP	Construct parallel supply and drain canals along RP-7 Site 2, as identified in the 2014 study.	CDFW, YBF
Yolo Bypass Wildlife Area Dual Function Canal Reconfiguration - RP-7 Site 3	35	IP	Construct parallel supply and drain canals along RP-7 Site 3, as identified in the 2014 study.	CDFW, YBF
Yolo Bypass Wildlife Area Dual Function Canal Reconfiguration - RP-7 Site 4	36	IP	Construct parallel supply and drain canals along RP-7 Site 4, as identified in the 2014 study.	CDFW, YBF
Yolo Bypass Wildlife Area Dual Function Canal Reconfiguration - RP-7 Site 5	37	IP	Construct parallel supply and drain canals along RP-7 Site 5, as identified in the 2014 study.	CDFW, YBF
Yolo Bypass Wildlife Area Dual Function Canal Reconfiguration - RP-7 Site 6	38	IP	Construct parallel supply and drain canals along RP-7 Site 6, as identified in the 2014 study.	CDFW, YBF
Yolo Bypass Wildlife Area Dual Function Canal Reconfiguration - RP-7 Site 7	39	IP	Construct parallel supply and drain canals along RP-7 Site 7, as identified in the 2014 study.	CDFW, YBF

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Project Name	Project ID	Location Code *	Project Description	Supporting Landowners and Key Stakeholders
Yolo Bypass Wildlife Area Dual Function Canal Reconfiguration - RP-7 Site 8	40	IP	Construct parallel supply and drain canals along RP-7 Site 8, as identified in the 2014 study.	CDFW, YBF
Lisbon Weir Improvements	41	IP	Replace the current rock weir and tide gate structure with an operable variable height weir, improved flap gates and a fish passage ladder.	CDFW, YBF, Conaway, Swanston Ranch
Green's Lake Riser Improvement	42	IP		CDFW, YBF
Improve Drainage North of Green's Lake	43	IP	Replace non-functional riser and consider installing a pump. A free-span crossing would be preferred as there is heavy beaver activity in this area. This will allow for drainage of Green's Lake to the north to increase drainage in the northeastern section of the YBWA for agricutlure, wetland O&M, and public access and operations.	CDFW, YBF
Increase Capacity of Green's Lake	44	IP	Excavate Green's Lake to improve drainage to the lake and increase water storage for additional control of delivery to rice and wildlife units.	CDFW, YBF
Culvert Improvement in G66/G67 Field	45	IP	Replace or upgrade culvert for better drainage eastward to improve operations for significant rice ground in the Bypass.	CDFW, YBF
Improve Drainage Coordination Among Land Managers in, North and West of the Wildlife Area	46	R	Drainage coordination is needed among land managers within the Wildlife Area, west of the Yolo Bypass and north of the Wildlife Area to improve drainage conditions and rice-growing operations, especially during rice harvest.	CDFW, YBF, rice farmers leasing YBWA parcels
60-Field Drainage Pond Development	47	IP	Develop wetland ponds to consolidate flood water on parcel 60 fields to improve ground for prime grazing area and create habitat ponds.	CDFW, YBF
Parking Lot M and Fortis Backup	48	IP	"Upgrade culvert capacity, regrade and clean out existing drainage, assess strategies for beaver discouragement to improve ground for prime grazing area "	CDFW, YBF
Firemen's Club Drainage Improvement	49	IP	Regrade area to improve drainage and ground for prime grazing area.	CDFW, YBF
Duck Club Pump and Drain Replacement	50	IP	Replace two 6-foot concrete culverts and pump to improve ground for grazing and wetland management.	CDFW, CDFW grazing tenant, and Bull Sprig, Senator Outing, H-Pond, Glide-In Ranch and Skyrakers duck clubs
Yolo Bypass Wildlife Area Public and Operation & Maintenance Road Improvements	51	R	RP-8 from 2014 study. Raise 6 miles of primary low lying public access road locations inundated during early stages of flooding (e.g. at the “Rice Corner” and the “Y”). Augment key O&M roads with gravel to make “all-weather” roads.	CDFW, YBF
Tidal Wetland Channel and Infrastructure Improvements	52	IP	Install crossing, improve culverts and cut new road to install pipe.	CDFW, YBF

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Project Name	Project ID	Location Code *	Project Description	Supporting Landowners and Key Stakeholders
Stormwater and Summer Tailwater Re-Use and Supply	53	IP	RP-9 from 2014 study. Re-use or divert excess winter runoff and/or agricultural tailwater near the Midway Road Area.	RD 2068, CDFW, YBF
Larger Riser Channel Ranch	54	IP	Install a larger riser at Channel Ranch. Drainage from duck clubs north and west of Channel Ranch is dependent on insufficiently sized water conveyances and a 24" discharge pipe. These features should be upgraded.	Channel Ranch, H Pond, Senator Outing, Glide-In and Skyrakers duck clubs
Upgrade Duck Club 1 Pumps	55	IP	Upgrade and replace existing pumps at the canal inlet as there is not enough capacity with current pumps to service Wildlife Area irrigated pasture, Wildlife Area tri-color pond and duck clubs. Project will help maximize benefits to agriculture and wildlife in the southern part of the Bypass.	CDFW, CDFW grazing tenant, and Bull Sprig, Senator Outing, H-Pond, Glide-In Ranch and Skyrakers duck clubs
Free-Span from Senator Outing	56	IP	Install free-span crossing.	Senator Outing
Screw Gate on Glide-In and H Pond	57	IP	Install screw gate for Glide-In and H Pond duck clubs.	Glide-In and H Pond Duck Clubs
Structure Improvements from Skyraker/ Glide to H Pond	59	IP	Provide improvements to drainage structures for Skyraker and Glide to H Pond	Senator Outing, H Pond, and Glide Duck Clubs
Improve County Road 155	60	IP	Grade and gravel County Road 155 to address lack of maintenance and large potholes.	TBD
Yolo Bypass Drainage Outlet Infrastructure Improvement Project	61	BW	Install or upgrade drainage gate infrastructure on all drainage outlets directly affected by backwatering during elevated flow conditions along the Tule Canal/Toe Drain.	TBD
Address Irrigated Pasture Depredation by Increased Number of Geese from Restoration Projects	62	R	Address depradation issues of losing grass on irrigated pasture as the significantly increased number of geese from nearby restoration projects often decimate irrigated pasture.	Southern YB grazing managers
Improve Private Road Between Parcel 116 and Parcel 55	63	IP	Improve Private Road Between Parcel 116 and Parcel 55	TBD
Yolo Bypass Crossing Improvements	64	BW	Where needed throughout the Yolo Bypass, replace canal crossings with railcar bridges and concrete abutments, prefabricated clear span bridges or similar upgrades, as feasible.	CDFW, other landowners
Improve Water Supply and Drainage Through EIP Parcel	65	IP	Improve Toe Drain water supply access and drainage capacity for landowners north and west of the Ecosystem Investment Partners' recently acquired land for the Tide's End Multibenefit Restoration Project.	EIP, Adjacent Landowners
Install Operable Structure to Facilitate Spilling Excess Water into YBWA Parcel 23	66	IP	Redirect drainage coming from RD 2068 in YBWA Parcel 23	RD 2068, CDFW, YBF
Develop Bypass Action Communication Program	68	BW	Develop a communication program to inform Bypass and other affected landowners of significant actions that affect land management, farming operations and other activities in the Bypass.	TBD

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Project Name	Project ID	Location Code *	Project Description	Supporting Landowners and Key Stakeholders
Provide New Forecasting System for Land Managers to Know When to Expect Flood Flows to Arrive at Their Properties	69	BW	Provide new forecasting system and method to help land managers in Yolo Bypass more accurately predict arrival of flood flows on their property and adapt to the Bypass starting more saturated from notch flows that will steepen the shoulders of flood events.	TBD
RP-11 Coordinated Maintenance and Improvement Reimbursement Program or Agency (Bypass Wide), or fund existing RDs and coordinate maintenance	71	BW	Develop a special district, possibly through an existing Resource Conservation District, to maintain irrigation and drainage canals and implement other system improvements.	TBD
Bypass Wide Grant Program to Improve Farm Productivity	72	BW	Establish a Yolo Bypass-wide grant program to improve farm productivity.	TBD
Howatt Ranch Water Recycling, Habitat Enhancement and Bird Health Project	73	IP	Convert existing poorly drained land to intentional wetland habitat supported by recycled water from City of Davis WWTP and also reduce / eliminate avian cholera outbreaks. The project could also potentially be designed to retain additional water and help alleviate flooding at the YBWA entrance.	City of Davis
Improve Dixon RCD Culvert Draining to Putah Creek	75	IP	Replace Dixon RCD's current 36" culvert through the levee with a larger capacity pipe at more appropriate (lower) elevation to enable drainage of 15,000 acres upstream.	Dixon RCD
Provide Ongoing Yolo Bypass Wildlife Area Maintenance Funding for Drainage Feature Maintenance	76	R	Seek funding for ongoing maintenance needs (silt, primrose, beaver, etc.) of drainage ditches that pass water through the YBWA. Funding to cover staff, equipment and supplies (including pesticides). Funding could be requested as mitigation for increased flows, debris and silt associated with the Yolo Bypass Salmonid Project and other projects.	CDFW, YBF, Los Rios Farms, Mace Ranch, City of Davis, other landowners west of YBWA
Treehouse Ditch Capacity Enhancement and Maintenance	77	IP	Increase the capacity of the current ditch at the "Treehouse" location and provide regular maintenance solution for beaver, primrose, silt, etc.	Los Rios Farms
Increase Capacity and Maintain North-South Drainage Canal	78	IP	Increase the size and maintain/clean out ditch	Los Rios Farms
Retrofit Risers with Beaver-Proof Risers	79	BW	Replace existing risers with beaver-proof risers if and where possible throughout the Bypass where beavers impacts water management.	Los Rios Farms, CDFW, other landowners
Increase Flow Conveyance Capacity Around / Through Swanston Ranch	81	R	Achieve a 6,000 cfs flow conveyance capacity by enhancing Tule Canal capacity and/or moving flows through the Lower Elkhorn Levee Setback Project floodplain and existing Bypass lands east of the Tule Canal to avoid additional impacts from increased flows associated with the Yolo Bypass Salmonid Project.	Swanston Ranch
Enhance South Davis Drain Canal Segment Immediately East of Yolo Bypass East Levee	81	IP	Enhance South Davis Drain Canal Segment Immediately East of Yolo Bypass East Levee by removing accumulated sediment, debris and vegetation.	CDFW, YBF, City of Davis, farmers west of Yolo Bypass who drain to South Davis Drain
Improve Road Along Air Strip Drain	82	IP	Raise road levels to reduce nuisance flooding while providing alternate drainage capacity (i.e. culverts under road base) to avoid exacerbating current drainage challenges.	CDFW, YBF

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Project Name	Project ID	Location Code *	Project Description	Supporting Landowners and Key Stakeholders
Deepen and Maintain Canal	83	IP	Clean and deepen primary canal for the South Davis Drain system to enable improved flow conveyance capacity north to I-80 and east to Toe Drain	CDFW, YBF, City of Davis, farmers west of Yolo Bypass who drain to South Davis Drain
Install New Riser in Northern Wildlife Area to Provide Green's Lake Water Level Control	84	IP	Install a new riser and larger siphon to provide water level control for Green's Lake while enabling improved water recirculation and reuse in the northern Wildlife Area during the growing season. Very high priority.	CDFW, YBF, rice farmers leasing YBWA parcels
Deepen Canal North of Green's Lake	85	IP	Deepen canal to enable increased conveyance capacity out of Green's Lake.	CDFW, YBF, rice farmers leasing YBWA parcels
Replace Crossing #1 Along 1,000 Acre Drain	86	IP	Replace the existing crossing along the 1,000 Acre Drain with rail cars or other structure capable of supporting 80,000 lb rice harvester load.	CDFW, YBF, rice farmers leasing YBWA parcels
Replace Crossing #2 Along 1,000 Acre Drain	87	IP	Replace the existing crossing along the 1,000 Acre Drain with rail cars or other structure capable of supporting 80,000 lb rice harvester load.	CDFW, YBF, rice farmers leasing YBWA parcels
Upgrade Duck Club 2 Pumps	88	IP	Upgrade and replace existing pumps at the second lift as there is not enough capacity with current pumps to service Wildlife Area irrigated pasture, Wildlife Area tri-color pond and duck clubs. Project will help maximize benefits to agriculture and wildlife in the southern part of the Bypass.	CDFW, CDFW grazing tenant, and Bull Sprig, Senator Outing, H-Pond, Glide-In Ranch and Skyrakers duck clubs
Deepen Tule Ranch Canal Connector Channel	89	IP	Deepen the connector channel between Duck Club 1 Pumps and the Toe Drain so pumps have adequate water depth to facilitate pumping when the Toe Drain water levels drop but the Toe Drain is still inundated.	CDFW, CDFW grazing tenant, and Bull Sprig, Senator Outing, H-Pond, Glide-In Ranch and Skyrakers duck clubs
Deepen Tule Ranch Canal	90	IP	Deepen Tule Ranch Canal between Duck Club 1 and Duck Club 2 Pump locations to provide adequate canal conveyance capacity and depth for pumps.	CDFW, CDFW grazing tenant, and Bull Sprig, Senator Outing, H-Pond, Glide-In Ranch and Skyrakers duck clubs
Install Fish Screens on Pumps	91	BW	Install fish screens on all unscreened pumps, particularly if juvenile salmonid rearing projects are implemented.	CDFW

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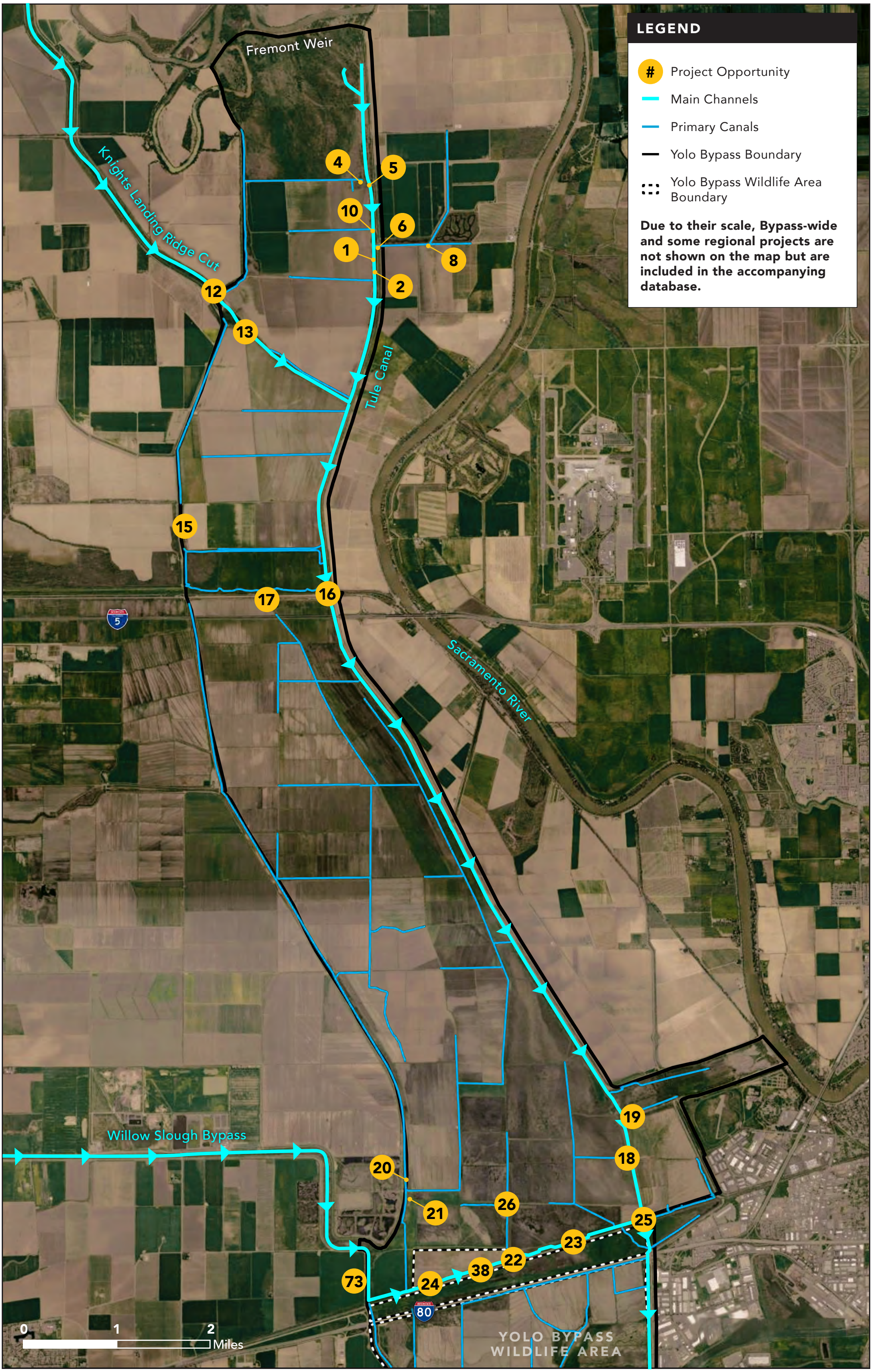
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Project Opportunity
Main Channels
Primary Canals
Yolo Bypass Boundary
Yolo Bypass Wildlife Area Boundary
Due to their scale, Bypass-wide and some regional projects are not shown on the map but are included in the accompanying database.
Fremont Weir
Knights Landing Ridge Cut
Tule Canal
Sacramento River
Willow Slough Bypass
YOLO BYPASS WILDLIFE AREA
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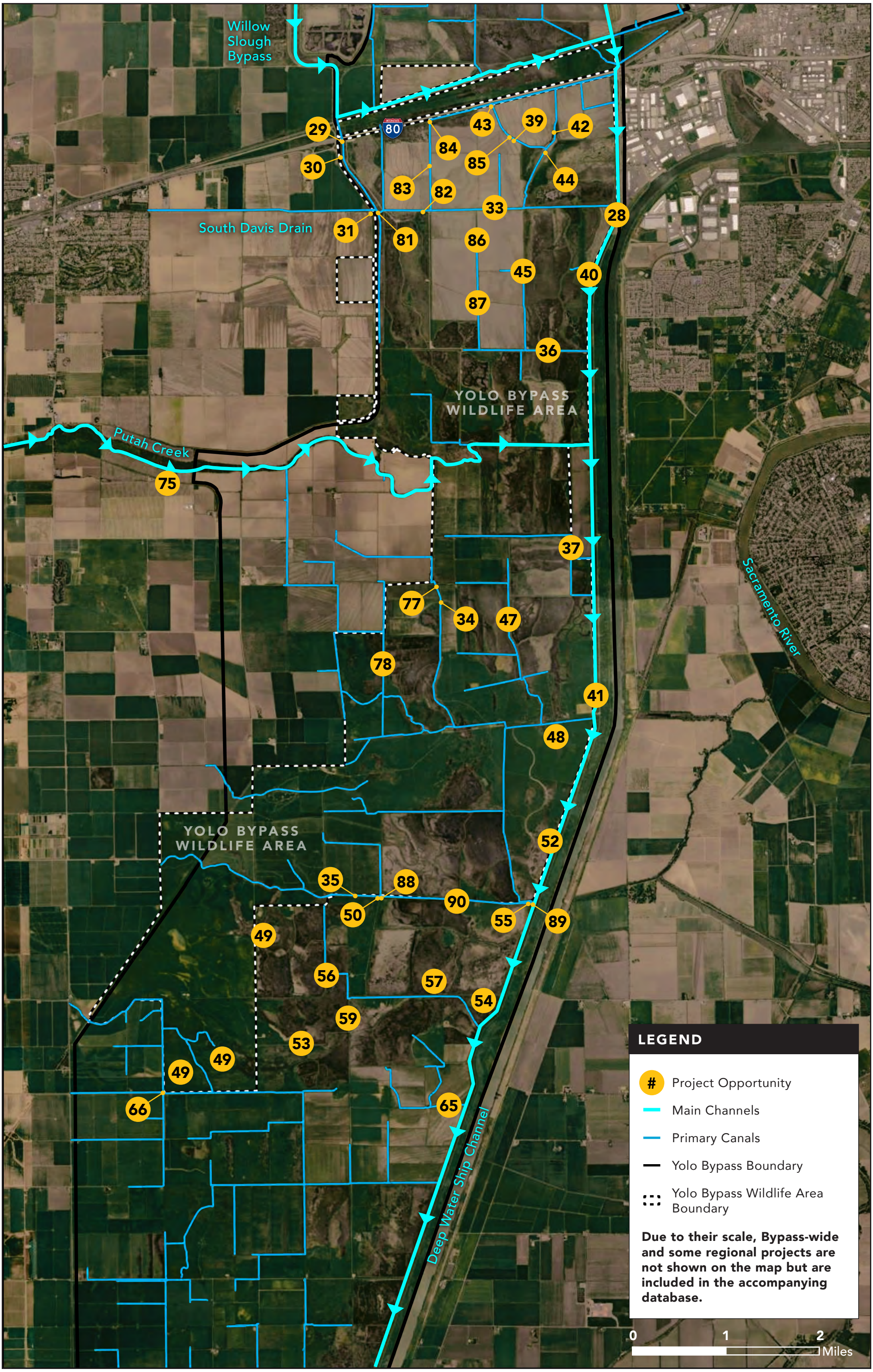
Willow Slough Bypass
South Davis Drain
Putah Creek
YOLO BYPASS WILDLIFE AREA
YOLO BYPASS WILDLIFE AREA
Sacramento River
Deep Water Ship Channel
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LEGEND
Project Opportunity
Main Channels
Primary Canals
Yolo Bypass Boundary
Yolo Bypass Wildlife Area Boundary
Due to their scale, Bypass-wide and some regional projects are not shown on the map but are included in the accompanying database.
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