Environmental Assessment

Merced National Wildlife Refuge Well Replacement

U.S. Department of the Interior
Bureau of Reclamation

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Eastside Bypass Improvements Project Environmental Assessment/Initial Study

Response to Comments and Errata

The U.S. Bureau of Reclamation (Reclamation), as the lead agency in accordance with the National Environmental Policy Act, and the State of California Department of Water Resources (DWR), as the lead agency in accordance with the California Environmental Quality Act, released for public review the Eastside Bypass Improvements Project (EBIP) Draft Environmental Assessment/Initial Study (EA/IS) on December 11, 2017. Comments were originally due January 9, 2018. The lead agencies granted a request to extend the comment period for an additional 10 days, and the comment period was extended to January 19, 2018. This document provides responses to substantive comments received and any resulting revisions made to the EA/IS. The EBIP Final EA/IS consists of the December 2017 Draft EA/IS, including Appendices A and B, which are hereby incorporated by reference; public comments received (Appendix C), responses to public comments received and minor text changes to the EA/IS as described below, Endangered Species Act (ESA) compliance documentation (Appendix E) and National Historic Preservation Act (NHPA) Section 106 compliance documentation (Appendix F).

Response to Comments

Response 1 - Coordination with the Merced National Wildlife Refuge: The lead agencies have considered all Merced National Wildlife Refuge (Refuge) comments, and are committed to continued coordination with the Refuge on implementation of the proposed action. As discussed with Refuge staff and management, and as described in the Errata section below, the following language has been incorporated into the EA/IS: "Any project activity in this environmental assessment that needs to occur on the Merced National Wildlife Refuge will need to be reviewed and approved by the Refuge to ensure it meets the requirements of the Appropriate Use Policy and the Compatible Use Policy of the U. S. Fish and Wildlife Service's National Wildlife Refuge System. For these activities to meet standards, comply with these two Refuge policies, and ultimately be approved, additional restrictions and modifications may be required. Furthermore, project activities anticipated to occur on lands encumbered by U.S. Fish and Wildlife Service conservation easements require written approval from the U.S. Fish and Wildlife Service prior to implementation."

Response 2-Changes in Hydrology: Long-term and cumulative impacts from the release of Restoration Flows into the San Joaquin River and the Eastside Bypass were previously analyzed and disclosed in the San Joaquin River Restoration Program (SJRRP) Environmental Impact Statement/Report (PEIS/R). The Eastside Bypass Improvements Project EA/IS tiers from that document and focuses on implementation of several fish passage and levee projects that were more broadly analyzed in the PEIS/R.

The change in hydrology and wetland function from releasing Restoration Flows is not analyzed as an impact of the proposed action in this EA/IS, as the change is assumed to be part of the no action alternative condition, which is implementation of the selected alternative as described in the 2012 SJRRP PEIS/R Record of Decision, including release of up to 4,500 cubic feet per second of Restoration Flows in the Restoration Area. Reclamation recognizes that this no action alternative condition has affected the Refuge and will continue to work with the Refuge on avoiding and/or minimizing potential changes to Refuge operations and wetlands.

Reclamation acknowledges that the proposed removal of the two weirs in the Eastside Bypass that the U.S. Fish and Wildlife Service (Service) historically operated to provide water to the Merced National Wildlife Refuge has the potential to impact Refuge operations. Therefore, the proposed action includes replacing an existing non-operational well with a new well to provide an alternate water supply for the Refuge. The well replacement element of the proposed action is currently being coordinated with the Refuge and is anticipated to be operational in either FY18 or FY19. Reclamation has been coordinating closely with the Refuge on implementation of the well replacement element of the proposed action and is committed to continuing this coordination to ensure that an adequate replacement water supply is available to the Refuge, therefore avoiding any potentially significant impact to Refuge water operations.

Reclamation and the Refuge are coordinating to determine the acreage of the affected wetland and appropriate measures to reduce the energy costs for the Refuge to maintain a comparable water supply.

Reclamation maintains that the project does not interfere with the Refuge's right and ability to receive water. Contractual water that the Refuge receives would not change. The SJRRP does not have the authority to issue new water rights for surface water and Restoration Flows cannot legally be diverted from the bypass; therefore, it is beyond the scope of this analysis. The new well will not be funded by the Central Valley Project Improvement Act (CVPIA) Restoration Fund. The project analyzed in this EA/IS is not intended to affect the prioritization of CVPIA funding.

A wetland delineation has been conducted and report prepared for the proposed action. The wetland delineation will be submitted to the U.S. Army Corps of Engineers (Corps) with the Clean Water Act (CWA) Section 404 permit application. Due to the nature of the project, the placement of fill in Waters of the U.S. is unavoidable. Acreages of permanent and temporary impacts, as well as volumes of fill material, will be calculated and submitted as part of the CWA Section 404 permit application. Any compensation necessary in accordance with Section 404 of the Clean Water Act will be determined through the CWA 404 processes in coordination with the USACE and implemented by the lead agencies as appropriate.

All project components are downstream of the SR 152 bridge. No change in flows under SR 152 bridge are expected as a result of the proposed action.

Response 3 – Construction Impacts to Biological Resources: Reclamation has completed informal consultation with the Service in accordance with Section 7 of the Endangered Species Act (ESA) (Appendix E). Some refinements to the conservation measures were developed during the consultation process, and the lead agencies will implement the conservation measures

as described in Appendix E to avoid and minimize to the extent feasible the impacts of the proposed action on ESA listed species. The lead agencies will also implement the other environmental commitments as described in the EA/IS and Mitigated Negative Declaration (MND), as appropriate.

The SJRRP Conservation Measures from the PEIS/R include measures to limit impacts to Delta Button Celery and those measures are included as part of the proposed project described in the EA/IS. Additionally, the lead agencies have committed in the EA/IS to monitor Button Celery populations potentially affected by the proposed project prior to construction as well as 1 year, 3 years, and 5 years after construction. Also, DWR will work with California Department of Fish and Wildlife (CDFW) on other potential minimization and avoidance measures. Reclamation is in the process of completing formal consultation with the National Marine Fisheries Service (NMFS) in accordance with Section 7 of the ESA for the elements of the proposed action that have the potential to affect anadromous fish species. The proposed well replacement on the Refuge would not affect anadromous fish species. Reclamation will complete formal consultation with NMFS prior to completing a decision document on the elements of the proposed action with a potential to affect ESA listed anadromous fish species. Implementation of the proposed action, including the environmental commitments, would therefore have less than significant impacts to special status species.

The outfall structure downstream of the Eastside Bypass Control Structure only flows during flooding and high intensity rainfall events. When it does flow, it typically is only a small portion of flow when compared to flood flows in the bypass. Though screening of the outfall may provide some benefit, it is not part of the project. However, Reclamation and DWR will continue to coordinate with NMFS through the consultation process on this issue.

Reclamation and DWR will also work with NMFS and CDFW to create and implement a fish monitoring and rescue plan. Constructed wetlands and depressions in the Eastside Bypass are part of the existing condition and are not part of this proposed action.

In addition, a suite of best management practices (BMPs) will be used to limit the temporary construction impacts associated with clearing and grubbing. The contractor's activities will be limited to the contractor use area designated in the EA/IS. This focuses use on existing roads and lay down areas as much as possible limiting clearing and grubbing to only those areas necessary. In areas where the contractor will access the river over open ground, the shortest access route will be preferred. Any staging area such as fueling areas or stock pile locations will be covered with a biofabric covered in gravel to protect the native vegetation while allowing the contractor the space necessary for work.

It is beyond the scope of the lead agencies to prevent grazing on private lands.

DWR plans on implementing the Dan McNamara Road crossing element of the proposed action in 2020 and will continue to move forward with the design and permitting of the culvert replacement. However, DWR is completing additional monitoring to better understand the existing fish passage conditions at the site. If the existing road and culvert are acceptable to the SJRRP, the existing road crossing may not need to be modified. Future plans to modify or

remove the existing structure will include further discussions between the SJRRP and Merced County.

Response 4 - Construction Timing: The April through November 15 work window is broad language for all the projects analyzed in the EA/IS, including those on both Refuge and non-Refuge land. Construction activities will be coordinated with the Refuge as described in Response 2 above. If a more limited time frame is needed for some construction activities the Refuge can provide that requirement as part of their approval process.

Response 5 – Groundwater, Seepage and Subsidence: Reclamation is committed to providing the Refuge with a groundwater well (or wells) to replace the capacity lost from the gator pump they will no longer be able to use as an element of the proposed action. Reclamation has maintained that the replacement well would draw water from above the Corcoran clay layer, in the shallow aquifer. Reclamation is providing this well to the Refuge to operate, and will not maintain ownership and will not operate or maintain the well. The effects on groundwater of implementing the proposed action are discussed in the EA/IS in Chapter 3.11.3. The Errata section below contains more detail on clarifications to the EA/IS reflecting that the replacement well would be within the shallow aquifer, and therefore would not contribute to subsidence.

The purpose of the project does not include groundwater recharge, and therefore it is beyond the scope of this proposed action. Seepage issues are addressed through the SJRRP Seepage Management Plan and the associated seepage actions. Programmatic seepage issues are beyond the scope of this proposed action. As federal agencies, the Service and Reclamation are not required to participate in a groundwater sustainability agency under the Sustainable Groundwater Management Act. As a federal agency, Reclamation is not required to comply with county ordinances. However, Reclamation will coordinate with the County to the extent practicable.

Response 6 – Flood Management: Improving the Reach O levees would allow the SJRRP to increase Restoration Flows in the Eastside Bypass. Restoration Flows are essential to the success of the SJRRP. As stated in Section 2.1.1 of the draft EA/IS "The Eastside Bypass between Sand Slough and the Mariposa Bypass has been identified by the SJRRP as the most limiting channel reach with regards to levee seepage and stability. Geotechnical analysis has further showed that the uppermost 3 miles of the right bank of the reach (Reach O) is the critical segment of the reach that will limit the release of Restoration Flows within the next 10-20 years (SJRRP 2017). DWR's Division of Flood Management performed geotechnical evaluations in the reach and identified three segments of the approximately 3-mile levee segment that need improvements."

DWR will be in contact with all applicable landowners for the elements of the proposed action they are implementing, and will implement measures to avoid cracking and leakage of siphons, or any other infrastructure that may be within or adjacent to the project footprint. Modification or replacement of pipe drains in levees is not applicable to the levees in the project area. The proposed action reinforces levees and improves fish passage in the Eastside Bypass. The project has been designed to avoid and minimize impacts to flood operations within the Eastside Bypass and inflows from the Merced Streams Group are downstream of the proposed action area. The one exception to this is the modification of the Eastside Bypass Control Structure. The effort to minimize any flood effects from those modifications are described below.

Design capacity downstream of the proposed action depends on the improvements that have been made to the levee system. The design manual indicates that future design flows can range between 8,000 cfs and 12,000 cfs. The Lower San Joaquin Levee District (LSJLD) has reported much greater flows that have been diverted into the Lower Eastside Bypass. Although the Reclamation Board Operation and Maintenance Manual makes reference to an agreement regarding Dan McNamara Road, it is noted that a signed agreement does not exist. Restoration Flow releases will be managed in accordance with the criteria specified in the SJRRP PEIS/R to ensure any increases in flood risk are less than significant.

The LSJLD currently operates the Eastside Bypass Control Structure to reduce flood impacts to the flood system. The rock ramp may require some slight changes in the way the gates are operated under a very narrow (and unexpected) flow scenario that has currently never occurred in the past 50 years of operation. If there is a need for the LSJLD to operate the gates in the future under an extreme flow scenario it is expected that the LSJLD will continue to operate the structure to best reduce flood impacts. The SJRRP will provide the LSJLD some guidance on how this can be done but realizes the LSJLD will operate the structure to the best of its ability and some movement of the rock in the rock ramp may occur. Any maintenance of the rock ramp element of the proposed action will be conducted outside of flood season and therefore will not increase flood risk. Any project land acquisitions are expected to be easements and will have limited effects to LSJLD revenues.

DWR is currently working with the LSJLD and Central Valley Flood Protection Board to ensure any modifications to existing structures will not impact the stability of the structure. Final designs will have all modifications necessary to ensure the stability of the structures.

DWR has completed an analysis of how flows will be split between the Mariposa Bypass and Lower Eastside Bypass with the implementation of the project. The analysis showed that some change will occur, but could be mitigated through the operation of the gates.

DWR assessed the use of a fish ladder at the Eastside Bypass Control Structure. However, after reviewing the costs, overall benefit of a ladder for fish passage, and further demands of a new structure on flood operations of the flood system, it was determined that the implementation of a ramp would be the most beneficial to fish passage and flood management operations.

Initial communication with the Corps suggests that Section 408 may not be applicable to the proposed action. DWR will continue to coordinate with the Central Valley Flood Protection Board on applicability of Section 408.

Response 7 – Public Access: A determination whether a waterbody is a navigable water of the United States is made by the division engineer of the U.S. Army Corps of Engineers. The Eastside Bypass is not currently designated as a Navigable Waterway. As a fish passage and levee improvement project, public right of navigation is beyond the scope of the analysis.

Response 8 – NEPA/CEQA Process: Trustee Agencies are identified as appropriate as part of the CEQA process. Scoping is not required for an EA or IS/Mitigated Negative Declaration. DWR and Reclamation have been meeting with the landowners on this project and will continue

that outreach. The independent utility of the proposed action is described in Section 1.3.3 of the EA/IS.

Response 9– National Historic Preservation Act Compliance: Reclamation has completed consultation with the State Historic Preservation Office in accordance with Section 106 of the National Historic Preservation Act (Appendix F).

Errata

The following corrections and/or clarifications have been made to the EA/IS text. These include minor corrections to improve writing clarity, grammar, typographical errors, and consistency; and corrections or clarifications in accordance with specific responses to comments, as described above. The text revisions are organized by the chapter, section, and page number that appear in the EA/IS. Deletions are indicated by strikethrough text (~~deleted text~~), and new text is indicated by underlined text (new text). Text, table, and figure revisions are itemized below. Corrections and clarifications are organized according to the section, chapter, and appendices to which they apply. The changes do not alter the conclusions related to environmental impacts that were presented in the Draft EA/IS.

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NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
O&M	operation and maintenance

Page 1-5

1.3.3 Relationship Between Proposed Project and Reach 4B/ESB Project

The Reach 4B, Eastside Bypass, and Mariposa Bypass Channel and Structural Improvements Project (Reach 4B/ESB Project) is a project under the SJRRP which would implement specific channel and structural modifications have been determined to be required to fulfill the goals of the Settlement ~~required by the Settlement~~ in the area of Reach 4B of the San Joaquin River and the associated flood bypass system.

Page 1-7

There are two weirs in the Eastside Bypass operated by the Service as part of the Merced NWR. The two weirs were constructed to divert water from the bypass ~~into~~ on the Merced NWR to irrigate wetlands.

Page 1-8

1.5.1 Other Public Agencies Whose Approval May Be Required

Reclamation will obtain all required Federal permits and approvals, including those Federal permits and approvals delegated to State agencies by Congress (i.e., Section 401 of the Clean Water Act and the Clean Air Act). The SJRRP Conservation Strategy (see pages 2-

52 to 2-79 of the SJRRP Draft PEIS/R [SJRRP2011]) includes specific conservation measures to conserve listed and sensitive species and habitats affected by SJRRP project- and program-level actions. Reclamation will defer to DWR regarding implementation of relevant SJRRP Conservation Strategy commitments specific to State agencies and State permits. At a minimum, however, Reclamation will coordinate with CDFW on potential effects to State-listed species, consistent with the SJRRP Conservation Strategy.

Any project activity in this environmental assessment that needs to occur on the Merced National Wildlife Refuge will need to be reviewed and approved by the Refuge to ensure it meets the requirements of the Appropriate Use Policy and the Compatible Use Policy of the U. S. Fish and Wildlife Service's National Wildlife Refuge System. For these activities to meet standards, comply with these two Refuge policies, and ultimately be approved, additional restrictions and modifications may be required. Furthermore, project activities anticipated to occur on lands encumbered by U.S. Fish and Wildlife Service conservation easements require written approval from the U.S. Fish and Wildlife Service prior to implementation.

Page 2-9

2.1.4 Merced National Wildlife Refuge Weirs

The upper weir prevents water from flowing upstream, thereby creating a small ~~lake~~ pool between the two weirs.

Page 2-12

The lower and upper weirs ~~currently~~ would impede the upstream migration of adult Chinook salmon at varying flows depending on whether the boards are installed (DWR 2012). Because the weirs work together to create a pool/lake when the boards are installed, the lower weir is the primary barrier and controls the water surface elevation at the upper weir. When the boards are in at both weirs, unimpeded passage is possible when flows exceed about 3,000 cfs. The upper weir is completely submerged when the boards are in at the lower weir, so passage at the upper weir is unimpeded. The weirs also do not meet passage conditions for many native fish at lower flows including sturgeon and the slower swimming, non-jumping species such as Pacific lamprey, Sacramento pike minnow, and hitch.

The MNWR historically utilized the weirs (upper and lower) for two main purposes. The first was to impound water and raise the water level near the lower weir so the Refuge could use a pump to transfer water to the Mariposa wetlands unit. Water diverted for inundation of the MNWR wetlands within the bypass was generally opportunistic and available from either upstream MNWR drainage inputs or flood flows. The timing of when the wetlands were inundated depended on the water year-type, the wetland, and available water sources, and could have occurred anytime between September and March. The second purpose of the weirs was to impound water in the Eastside Bypass to create shallow water wetland habitat for waterbirds in the upstream areas. When the weirs

were operational with full boards in, the bypass would back up all the way to El Nido Road and activate floodplains outside of the low flow channel.

The current flow conditions in the Eastside Bypass preclude the Refuge from utilizing the weirs. Restoration Flows have fully connected the San Joaquin River from Friant Dam to the confluence of the Merced since the fall of 2016 and currently all Restoration Flows can only be routed through the Eastside Bypass. Because Restoration Flows cannot be impounded without the appropriate approvals, only very limited operation of the weirs is permissible.

Page 2-27

Discharge piping would include approximately 70 feet of a 16-inch diameter pipeline connected to the existing ~~pipe~~ water conveyance system that feeds the units of the Mariposa Wetlands.

Page 3-4

In fall, winter, and spring, when wetlands are flooded, peak wildlife is present, and the grasses are green, the Grasslands Wildlife Management Area and the Merced NWR display a high degree of visual cohesiveness, intactness, and unity.

Page 3-68

Managed Wetland

Hydrology and vegetation are heavily managed in some wetland areas within portions of the Merced NWR and a duck club ~~north~~ east of the NWR. ~~Vegetation within the managed wetlands within the Merced NWR includes target desirable wetland species including narrow-leaf cattail (*Typha angustifolia*), swamp timothy (*Crypsis schoenoides*), sprangletop (*Leptochloa sp.*), smartweed (*Polygonum sp.*), millet, and hardstem bulrush (*Schoenoplectus acutus*). Vegetation within the managed wetlands within the duck club includes swamp picklegrass (*Crypsis schoenoides*) and Baltic rush (*Juncus balticus*). Occurs within the Eastside Bypass south of Mariposa Bypass.~~ Active management is required for almost all of the regularly flooded wetlands on San Luis NWR, Merced NWR, and Grasslands WMA. The primary goal of wetland management is to produce a variety of high quality habitats for migratory birds and other wetland-dependent wildlife. These include mudflats for foraging shorebirds, shallow wetlands with moist soil food plants for waterfowl and wading birds, open water interspersed with emergent vegetation for resting and thermal cover, cattail/bulrush stands for nesting and roosting, summer wetlands for resident birds and other water-dependent wildlife, and deeper water habitats for diving ducks, grebes, cormorants and pelicans.

Water for managed wetlands is supplied through various water irrigation districts, deep wells, and lift pumps. It is conveyed via irrigation district canals and Complex-owned or privately-owned canals, pipelines, and other infrastructure. The canals are engineered so that most of the water moves by gravity flow. In some instances, lift pumps are used to move water from a channel or recirculation pond to another canal. The individual wetland basins (units) are linked to the conveyance systems with inlet structures; have staff

gauges installed to measure water levels, and outlet structures to dewater the unit when necessary. These wetland units comprise a mix of artificial impoundments, modified/reshaped basins, former basins restored from leveled agricultural fields, and natural basins. All of the artificial and most of the modified/reshaped or restored basins have constructed levees surrounding them while the natural basins do not. Most units can be managed independently. However, some units are linked in that the water from the outlet structure on one unit flows into another down-slope in a stair-step fashion and must be managed together. After filling the wetland units adequate flows of water through the outlets are maintained to promote water quality.

Because of the importance of the Complex to wintering waterfowl, and the need of providing food for the hundreds of thousands of waterfowl and shorebirds that use these Refuge units each winter, seasonal marshes make up the dominant wetland type (85-90 percent). Individual seasonal wetlands are dewatered on a staggered basis from late February through May to germinate moist soil plants and provide mudflat foraging habitat for shorebirds through the spring. They are irrigated one to three times in the spring and summer, depending on management objective; and then flooded on a staggered basis from early September through late November. The timing of drawdown, number of irrigations, duration of irrigations, soil type, and other conditions determine the resulting composition of moist soil plant species and robustness of growth and seed production. In the "Grasslands", managed seasonal wetlands are subdivided into several types based on the dominant species of moist soil plants present. These subtypes consist of swamp timothy (*Crypsis schoenoides*) units, watergrass units, and mixed marsh units, which typically have a mix of smartweed (*Polygonum* spp.), watergrass, and swamp timothy (*Crypsis schoenoides*), and are not strongly dominated by any one species. Other food-producing moist soil plant species associated with these subtypes include sprangletop (*Leptochloa fascicuaris*), spikerush (*Eleocharis spp.*), and ammania (*Ammannia coccinea*). These units are also usually vegetated with varying amounts of alkali bulrush (*Scirpus robustus*), hardstem bulrush (*Scirpus acutus* var. *occidentalis*), cattail (*Typha latifolia*), cocklebur (*Xanthium* spp.), aster (*Aster subulatus*), yellow sweet clover (*Melilotus officianalis*), and rush (*Juncus* spp.). These plant species are less desirable from a food production standpoint, but provide thermal and escape cover for wetland birds.

Semi-permanent wetlands are typically kept inundated from November through August to provide summer water for locally breeding waterbirds, such as grebes, coots (*Fulica americana*), ducks, moorhens (*Gallinula chloropus*), herons, egrets, and tricolored blackbirds (*Agelaius tricolor*). The wetlands are drawn down in late summer to germinate plants such as arrowheads (*Saggitaria spp.*), burrhead (*Echinadorus bertornoi*), and pondweeds (*Potamogeton* spp.) to provide a greater diversity of food resources for migratory birds. Although most of the semi-permanent wetlands occur in marshland environment, several oxbow ponds adjacent to the San Joaquin River and Salt Slough are connected to the Complex's water supply and can be managed under the same regime. Planned inundation periods for these ponds (December through July) have been chosen to emulate the natural period of flooding that occurred in the area prior to water diversions for agriculture and the damming of the rivers.

Permanent wetlands are inundated year-round, and are used by the same breeding birds found in semi-permanent marshes. These ponds are generally deeper than seasonal and semi-permanent wetlands. The cattail/bulrush stands generally provide nesting and roosting cover, and the submerged aquatic vegetation, invertebrates, and associated fish provide foraging habitat. Although they usually have a lower density of breeding birds, permanent wetlands typically have greater numbers of cormorants, pelicans, western (*Aechmophorus occidentalis*) and Clark's (*A. clarkii*) grebes, and molting ducks. Productivity of permanent wetlands declines after the first two or three years of inundation and the numbers of most species using those ponds decrease. Therefore, they are drained about once every three to five years to oxidize the soils/sediments to re-stimulate productivity, and to eliminate populations of carp (*Cyprinus carpio*) and bullheads (*Ameiurus* spp.) whose presence reduce growth of submerged aquatic vegetation In addition to water manipulation, wetland management also includes mowing, disking, burning and herbicide spraying. Objectives for these actions are to maintain biodiversity, maintain desirable proportions of emergent vegetation in wetlands, enhance desirable species, reduce undesirable species, and to prepare for habitat restoration projects. Many of the seasonal wetlands are mowed each year after the irrigations with a farm tractor pulling a large disking implement. Much of this mowing takes place to control cocklebur (*Xanthium* spp.), an undesirable species that can overtake seasonal wetlands and crowd out desirable moist soil food plants (Mensik and Reid 1995). Mowing is also used to reduce encroachment of cattail/bulrush stands, open up feeding areas, and remove vegetation from islands and parts of levees to provide loafing habitat for waterbirds. In addition to annual mowing, the different wetland types must undergo physical disturbance every several years to keep the units in the desired habitat conditions. Wetlands under a stable management regime tend to lose productivity over time, and become overgrown with emergent cattail/bulrush stands or other undesirable perennial plants such as Bermuda grass (*Cynodon dactylon*) and aster (*Aster* spp.). Seasonal and semi-permanent wetland basins are disked with heavy farm equipment every five to seven years. This replicates the periodic scouring flood events that occurred prior to the river being constrained by flood control levees. Cattail/bulrush stands and other undesirable plants are reduced, nutrients are more quickly recycled, and soil is made bare to promote growth of pioneer species such as swamp timothy (*Crypsis schoenoides*), smartweed (*Polygonum* spp.) and watergrass. Greatest productivity of these moist soil plants generally occurs during the first one to two years after rehabilitation of the units. Prescribed burning is sometimes done in combination with disking as part of wetland unit rehabilitation. This is done most often in units with heavy stands of cattail/bulrush that would require multiple passes with a tractor and disk to control. Herbicide spraying is sometimes used when the unit is dewatered as a spot treatment to reduce and/or eliminate persistent stands of Bermuda grass and joint grass (*Paspalum distichum*) that are difficult to control solely by disking.

Wetland management techniques and practices are fairly standardized across the units of San Luis NWR, Merced NWR, and the Grasslands WMA. However, there are some differences in how wetlands management is accomplished based on location,

development or restoration history, soil types, water supplies, and management objectives.

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Row added to Table 3.5-3. Prevalent Invasive Plant Species in the Project Area

Scientific Name	Common Name	Cal-IPC Category[1]	CDFA Rating[2]
Terrestrial Species			
Brassia hyssopifolia	five-hook brassia	limited	--

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Invasive Wildlife

Commonly occurring invasive wildlife known or potentially occurring within the project area includes bullfrog (*Lithobates catesbeianus),* nutria ( ), black rat ( ), Norway rat ( ), crayfish (*Procambarus clarkii),* red-eared sliders (*Trachemys scripta elegans),* Asian clam (*Corbicula* spp.*),* and Chinese mitten crab (*Eriocheir sinensis).*

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Migratory Waterbirds

Waterfowl

These Refuge units form a major migration and wintering use area for Pacific Flyway waterfowl. Annual peak numbers of ducks and geese recorded at San Luis NWR, Merced NWR, and the Grasslands WMA have ranged from 800,000 to 1,400,000 during the past 10 winters (Service Midwinter Waterfowl Survey data). This represents about 25 percent of the waterfowl population wintering in the Central Valley of California. Thirty-two species of waterfowl have been recorded using the area. The most common ducks wintering on or near the Refuges include northern pintail (*Anas acuta*), green-winged teal (*Anas crecca*), mallard (*Anas platyrhynchos*), northern shoveler (*Anas clypeata*), gadwall (*Anas strepera*), ring-necked duck (*Aythya collaris*), American wigeon (*Anas Americana*), wood duck (*Aix sponsa*) and cinnamon teal (*Anas cyanoptera*). Diving duck

species such as canvasback (*Aythya valisineria*), redhead (*Aythya americana*) common goldeneye (*Bucephala clangula*) and bufflehead (*Bucephala albeola*) are present in smaller numbers. The most common geese include Ross' goose (*Chen rossii*), lesser snow goose (*Chen caerulescens*), and greater white-fronted goose (*Anser albifrons*). Various subspecies of Canada and cackling geese; including the Aleutian cackling goose (*Branta hutchinsii leucopareia*), cackling goose (*B. h. minima*) and western Canada goose (*Branta canadensis moffitti*), are present in smaller numbers. Tundra swans (*Cygnus columbianus*) are seen on a regular basis. Species seen infrequently, or as accidentals, include trumpeter swan (*Cygnus buccinator*), brant (*Branta bernicla*), blue-winged teal (*Anas discors*), Eurasian wigeon (*Anas penelope*), and hooded merganser (*Lophodytes cucullatus*).

Species distribution varies throughout the area based on habitat attributes of the different Refuge units. Fee-title and easement Refuge lands east of the San Joaquin River (East Grasslands) are characterized by extensive floodplain grasslands interspersed with managed wetlands. The majority of the geese in the "Grasslands", especially Ross' (*Chen rossii*) and snow geese (*Chen caerulescens*) use this area, as well as pintail (*Anas acuta*), wigeon (*Anas americana*), and other ducks. Greatest use of the East unit of the Grasslands WMA occurs in January –March following late winter rainfall and green-up of the annual grasses. In years of heavy rainfall and flood events, many of the ducks normally in the West and South units of the Grasslands shift to the East unit, at least temporarily, to forage in the extensive sheetwater habitat. San Luis NWR and easement lands west of the San Joaquin River and north of Los Banos (West unit of the Grasslands WMA) are characterized by extensive managed wetlands, often with a heavy emergent cover component, and a relatively smaller amount of uplands. Dominant waterfowl species there include mallard (*Anas platyrhynchos*), green-winged teal (*Anas crecca*), northern pintail (*Anas acuta*), northern shoveler (*Anas clypeata*), gadwall (*Anas strepera*), and ring-necked duck (*Aythya collaris*). Geese are present in much lower numbers and tend to be mostly greater white-fronted geese (*Anser albifrons*). The Grasslands WMA easement lands south of Los Banos (South unit of the Grasslands WMA) primarily consist of more saline and open managed wetlands with very little associated uplands. In this part of the Grasslands WMA, the dominant waterfowl are northern pintail (*Anas acuta*), green-winged teal (*Anas crecca*), northern shoveler (*Anas clypeata*), canvasback (*Aythya valisineria*), and lesser snow geese (*Chen caerulescens*).

Waterfowl also use the area during the breeding season. Twelve species of duck and one goose species have been recorded as nesting on Refuge lands. The most common nesting species are mallards (*Anas platyrhynchos*), gadwall (*Anas strepera*), and cinnamon teal (*Anas cyanoptera*) (Fredrickson and Laubban 1995). Wood ducks (*Aix sponsa*) are becoming more common as a nesting species due to nest boxes being put out as a part of the statewide California Wood Duck Program.

Shorebirds

The "Grasslands", representing about a third of California's remaining wetland habitat, is one of the most important shorebird habitats on the west coast of the United States. This area has been designated as one of only 22 international shorebird reserves in the world.

Populations of shorebirds are present on the Refuges and easement lands throughout the year, with the highest numbers occurring during the non-breeding season. Approximately 25 species of shorebirds make use of the "Grasslands" throughout the year. Large scale shorebird censuses in the area have documented 200,000 individuals (mainly Western Sandpipers [*Calidris mauri*], long-billed dowitchers [*Limnodromus scolopaceus*], dunlins [*Calidris alpine*], and least sandpipers [*Calidris minutilla*]) during the spring, and up to 14,000 shorebirds (mainly long-billed dowitchers [*Limnodromus scolopaceus*], least sandpipers [*Calidris minutilla*], and black-necked stilts [*Himantopus mexicanus*]) during the autumn (Shuford et al. 1998). The difference in shorebird numbers between the spring and fall is due to the migratory route that many species follow. Many species tend to follow more coastal routes during the fall, and more inland routes during the spring. Populations of killdeer (*Charadrius vociferous*), black-necked stilts (*Himantopus mexicanus*), and American avocets (*Recurvirostra Americana*), breed annually in the San Luis NWR Complex. Seasonal wetlands and vernal pools are managed to provide mud flat and shallow water habitat for foraging shorebirds. Irrigated pastures, alfalfa fields, and to a lesser extent native uplands, are also used by longer billed species for foraging, such as long-billed curlew (*Numenius americanus*), whimbrel (*Numenius phaeopus*), and marbled godwit (*Limosa fedoa*). These habitats support large numbers of aquatic invertebrates and other insects used by shorebirds to replenish nutrient reserves lost during long migrations.

Wading/Diving Birds

Numerous species of wading and diving birds make use of the wetland, riparian, and upland habitats found on San Luis NWR, Merced NWR, and the Grasslands WMA. Great blue herons (*Ardea herodias*), great egrets (*Ardea alba*), and double crested cormorants (*Phalacrocorax auritus*) have established several rookeries in riparian areas on Refuge and easement lands. Rookeries begin to develop in late February and young are usually fledged by July. Within wetland units, snowy egrets (*Egretta thula*), cattle egrets (*Bubulcus ibis*), and black-crowned night herons (*Nycticorax nycticorax*) establish roosting and breeding colonies in robust emergent vegetation. While large flocks of white-faced ibis (*Plegadis chihi*) are common during winter months in the Grasslands, breeding colonies have only been documented once in the past 20 years. In 1991 a colony of approximately 5,000 adults was established on the Kesterson unit of San Luis NWR. More solitary wading species such as, Virginia rail (*Rallus limicola*), sora (*Porzana carolina*), American bittern (*Botaurus lentiginosus*), least bittern (*Ixobrychus exilis*), common moorhen (*Gallinula chloropus*), and American coot (*Fulica americana*) are common year-round and breed annually in permanent wetlands throughout the Refuges and easement lands. Pied-billed grebes (*Podilymbus podiceps*) are a common year-round species in seasonal and permanent wetlands throughout the "Grasslands". Western and Clark's grebes (*Aechmophorus occidentalis* and *A. clarkii*) are common during the spring and often breed in permanent wetlands when open water and emergent vegetation are interspersed at suitable levels. Large numbers of American white pelicans (*Pelecanus erythrorhynchos*) make use of wetlands during winter months for foraging and roosting, however this species does not breed in the Central Valley.

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Special Status Lands

San Luis NWR, Merced NWR, and the Grasslands WMA are located in the portion of the San Joaquin Valley referred to as the "Grasslands" (also known as the GEA – Grasslands Ecological Area). The area contains more than one-third of the wetlands remaining in the Central Valley and is the largest contiguous block of freshwater wetlands habitat in California. The GEA has been designated a wetlands of international importance through the Ramsar Convention – less than thirty sites in the United States have received this importance designation. The importance of this critical area for waterfowl and other waterbirds has been recognized by the Central Valley Joint Venture (CVJV) and the North American Waterfowl Management Plan. It is considered of international importance for migrating shorebirds and has been designated as an International Shorebird Reserve by the Western Hemispheric Shorebird Reserve Network. In addition, the Refuges collectively have been selected as a flagship project for California Riparian Habitat Joint Venture (RHJV).

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3.5.2 Regulatory Setting

Merced National Wildlife Refuge

Any project activity in this environmental assessment that needs to occur on the Merced National Wildlife Refuge will need to be reviewed and approved by the Refuge to ensure it meets the requirements of the Appropriate Use Policy and the Compatible Use Policy of the U. S. Fish and Wildlife Service's National Wildlife Refuge System. For these activities to meet standards, comply with these two Refuge policies, and ultimately be approved, additional restrictions and modifications may be required. Furthermore, project activities anticipated to occur on lands encumbered by U.S. Fish and Wildlife Service conservation easements require written approval from the U.S. Fish and Wildlife Service prior to implementation.

Page 3-90 and 3-91 (Also MND-7)

Mitigation Measure BIO-9: Avoid Effects to California Tiger Salamander.

a) Prior to project construction activities, a biologist approved by the Service and CDFW will identify and map potential California tiger salamander habitat (areas within 1.3 miles of known or potential California tiger salamander breeding habitat) within the project footprint. Prior to ground-disturbing activities, the approved biologist will survey for and flag the presence of ground squirrel and gopher burrow complexes. Where burrow complexes are present, a 250-foot-wide buffer shall be placed to avoid and minimize disturbance to the species.

Reclamation has completed informal consultation with the Service in accordance with Section 7 of the Endangered Species Act (ESA) (Appendix E). During this informal consultation process, some refinements to the conservation measures have been developed. The lead agencies will implement the conservation measures as described in

Appendix E to avoid and minimize to the extent feasible the impacts of the proposed action on ESA listed species. The lead agencies will also implement the other environmental commitments as described in the EA/IS and MND as appropriate.

Mitigation Measure BIO-10: Minimize Effects to California Tiger Salamander.

a) Before the start of construction activities, construction exclusion fencing will be installed just outside the work limit or around vernal pools where California tiger salamander may occur. This fencing will be maintained throughout construction and will be removed at the conclusion of ground-disturbing activities. No vehicles will be allowed beyond the exclusion fencing. A Service- and CDFW-approved biological monitor will be present on site, during intervals recommended by the Service and CDFW, to inspect the fencing.

Reclamation has completed informal consultation with the Service in accordance with Section 7 of the Endangered Species Act (ESA) (Appendix E). During this informal consultation process, some refinements to the conservation measures have been developed. The lead agencies will implement the conservation measures as described in Appendix E to avoid and minimize to the extent feasible the impacts of the proposed action on ESA listed species. The lead agencies will also implement the other environmental commitments as described in the EA/IS and MND as appropriate.

Page 3-95 (Also MND-10 to MND-11)

Mitigation Measure BIO-15: Avoid and Minimize Impacts to Swainson's Hawk.

b) If known or active nests are identified through preconstruction surveys or other means, a 0.5-mile no-disturbance buffer shall be established, if feasible, around all active nest sites if construction cannot be limited to occur outside the nesting season (February 15 through September 15). The no-disturbance buffer will be maintained around active nests until the breeding season has ended or until a CDFW-approved biologist has determined that the birds have fledged and are no longer reliant upon the nest or parental care for survival. If encroachment into the buffer area is required, CDFW will be coordinated with to determine appropriate compensation measures for impacts to Swainson's hawk with a performance standard of unauthorized take of this species and net loss of habitat.

Mitigation Measure BIO-16. Avoid and Minimize Loss of Individual Raptors.

c) If active nests are located in or adjacent to the project footprint, a no-disturbance buffer will be established if feasible until a Service- and CDFW-approved biologist determines that the nest is no longer active. If a 0.5-mile buffer cannot be established, then the size of the buffer will be established by the approved biologist in coordination with the Service and/or CDFW based on the sensitivity of the resource, the type of disturbance activity, and nesting stage. ~~The size of the buffer will be established by the approved biologist in coordination with USFWS and/or CDFW based on the sensitivity of the resource, the type of disturbance activity, and nesting stage~~. No activity shall occur within the buffer area, and worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented. If encroachment into the buffer is

required, the Service and/or CDFW will be coordinated with to determine appropriate compensation measures to avoid and minimize loss of individual raptors with a performance standard of no net loss of habitat and no unauthorized take of nesting birds, fledglings, and eggs.

Page 3-97 (Also MND-11)

Mitigation Measure BIO-18: Avoid and Minimize Effects to Migratory Bird Species.

e) Any project activity in this environmental assessment that needs to occur on the Merced National Wildlife Refuge will need to be reviewed and approved by the Refuge to ensure it meets the requirements of the Appropriate Use Policy and the Compatible Use Policy of the U. S. Fish and Wildlife Service's National Wildlife Refuge System. For these activities to meet standards, comply with these two Refuge policies, and ultimately be approved, additional restrictions and modifications may be required. Furthermore, project activities anticipated to occur on lands encumbered by U.S. Fish and Wildlife Service conservation easements require written approval from the U.S. Fish and Wildlife Service prior to implementation.

Page 3-105 Footnote

[1] The Fish and Wildlife Coordination Act Report for the SJRRP (Appendix F of the SJRRP Draft PEIS/R), dated April 15, 2011, programmatically assesses the potential effects to fish and wildlife species and their habitats resulting from the implementation of the San Joaquin River Restoration Program. The preliminary recommendations included in the Report to avoid, minimize, rectify, or compensate for potential adverse effects are in accordance with the Service's Mitigation Policy as published in the Federal Register (46:15; January 23, 1981). The Report concluded that the SJRRP has the potential to vastly improve the diversity, quality, and quantity of habitat along the San Joaquin River system, thus benefiting a variety of resident and migratory wildlife species, especially riparian dependent species such as migratory birds, amphibians, and fish species.

The Service made four overarching recommendations, summarized as follows:

1) Construction or modification of riverine structures, such as fish ladders at dams, incorporate designs that accommodate and improve passage for all native fishes, including lamprey.
2) Restoration actions should be prioritized for bird conservation taking into account the surrounding land use and surrounding landscape conditions, such as the proximity and prevalence of other natural areas, urban areas, agricultural areas, or brown-headed cowbird foraging areas (RHJV 2004).
3) Flow releases should be managed, to the extent possible, to align with the near natural hydrograph (i.e., mimic natural flood events) sufficient to support scouring, deposition,

and point bar formation. However, timing of pulse flows should be time managed to avoid detrimental impacts to bank swallow nesting colonies and should not raise levels more that 2-3 feet during the breeding season (April-July) (RHJV 2004).

4) Continuance of the collaborative approach to the planning and implementation of this Program with the Service.

Page 3-108 (Also MND-17)

Mitigation Measure BIO-32: Obtain Permit and Compensate for any Loss of Wetlands and other Waters of the United States/Waters of the State.

b) The proposed project will adhere to a "no net loss" basis for the acreage of wetlands and other waters of the United States and waters of the State that will be removed and/or degraded. Wetland habitat will be restored, enhanced, and/or replaced at acreages, types, seasonality, depth, and locations and by methods agreed on by USACE, the Service, and the Central Valley RWQCB, as appropriate, depending on agency jurisdiction.

Page 3-163 (Also MND-24)

Mitigation Measure HAZ-4a: Integrate Best Management Practices for Mosquito Control and Implement Workplace Precautions Against Vector-borne Diseases.

Construction activities will incorporate applicable Best Management Practices (BMPs) identified in the *Best Management Practices for Mosquito Control on California State Properties* (California Department of Public Health 2008); and other guidelines such as the Central Valley Joint Venture's *Technical Guide to Best Management Practices for Mosquito Control in Managed Wetlands* (Kwasny et al. 2004) and *Best Management Practices for Mosquito Control in California* (California Department of Public Health and Mosquito and Vector Control Association of California 2012) to reduce the public risk from exposure to West Nile Virus. DWR and/or Reclamation will also inform the Merced County Mosquito Abatement District about implementation of the project, and will provide information requested to support vector control activities along the Eastside Bypass at project construction sites. No mosquito control using pesticides will be allowed on Merced NWR unless there are exigent circumstances, per NWRS policy, as coordinated with Refuge staff. In addition, DWR and/or Reclamation will implement the following workplace precautions:

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Degraded water quality in various segments of the San Joaquin River has been a long-term problem due to low river flows and discharges from water users ~~agricultural areas, wildlife refuges, and municipal waste water treatment plants~~ (Reclamation 2010).

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b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)? (Less-than-Significant Impact)

Removing the two Merced NWR weirs and installing a new groundwater well would change the way the refuge uses its surface water and groundwater supplies in the project vicinity. ~~The refuge relies on surface water supplies from the Merced Irrigation District and has several groundwater wells that can be used for water supply to apply to its wetland areas within and adjacent to the Eastside Bypass.~~ Removing the weirs would preclude the Refuge from using surface supplies in the Eastside Bypass.

The new well would have a capacity of 1,500 gallons per minute (gpm) and would be screened at about 150 to 200 feet below ground surface, not to extend below the bottom of the Corcoran clay layer, making withdrawals from the shallow aquifer.

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The project area encompasses a portion of the Merced NWR and the Grasslands Wildlife Management Area. Established in 1951, the Merced NWR encompasses ~~10,258~~ 10,252 acres of wetlands, native grasslands, vernal pools, and riparian areas.

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3.17.1 Environmental Setting

Fire Protection

The department participates in statewide fire and rescue mutual aid systems and other non-fire emergencies such as floods, earthquakes, and other disasters (Merced County 2016). The Merced National Wildlife Refuge also has a fire response program.

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Law Enforcement

The California Highway Patrol handles all traffic enforcement and automobile accident investigations for the unincorporated parts of the County (Merced County 2013). The Merced Refuge also has a law enforcement program.

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Grasslands Wildlife Management Area

A portion of the project area is located within the Grasslands Wildlife Management Area, which supports the largest remaining block of wetlands in the Central Valley. ~~The management area contains 70,000 acres of private wetlands and 53,000 acres of State and Federal lands, all of which are held under conservation easements. General public access~~

~~in the management area is not permitted. However, recreation opportunities are present in the form of private waterfowl hunting clubs.~~

The Grasslands WMA was established in 1979. In 1978, the Migratory Bird Conservation Commission approved the West Grasslands WMA acquisition boundary at 48,000 acres, allowing Complex staff to officially offer private landowners within that boundary, monetary compensation for perpetual conservation easements on their lands. Since acquisition funding was generated through the sale of federal duck stamps, potentially protected lands as part of the easement program must benefit migratory birds and specifically waterfowl. Properties that benefited wintering waterfowl the most were existing duck hunting clubs west and south of the San Luis NWR and adjacent state wildlife areas. The easement lands while remaining under private ownership would forever offer waterfowl habitat while also protecting core state and federal lands from urban and agricultural encroachment.

On June 27, 2005 the Service expanded the acquisition boundary and this addition brings the total Grasslands WMA acquisition boundary to 133,300 acres. This area is dominated by vast fields of row crops, irrigated pastures, and tracts of native vernal wetland/upland complexes. This area marks a shift in the focus of the easement program from traditional waterfowl hunting properties to native grazing pastures (i.e., native grasslands). These potential easement lands provide important habitat requirements to wintering migratory bird populations and serve as a critical east-west corridor for wildlife.

As of January 2009, the Service has acquired 75,225 acres in permanent conservation easements in the Grasslands WMA.

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CDFW and the Service allow licensed hunting for geese, ducks, coots, and moorhens within designated areas of the refuge. There are six hunting blinds within the Mariposa Creek Hunting Unit on the south side of Sandy Mush Road west of the Eastside Bypass, and ~~nine~~ fourteen blinds within the West Marsh Hunting Unit on the south side of Sandy Mush Road east of the Eastside Bypass, accommodating a total of 43 hunters (USFWS 2016c).

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Therefore, an existing well that is no longer operational in the Merced NWR would be replaced with a ~~deep~~ shallow well, which would provide the water required to meet the irrigation needs of the Merced NWR.

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Other privately-owned hunting blinds may be in proximity to the construction work that would occur on the Eastside Bypass Control Structure. There are ~~15~~ 20 public use hunting blinds in the Merced NWR, accommodating a total of 43 hunters: six blinds in the Mariposa Creek Hunting Unit on the south side of Sandy Mush Road west of the

Eastside Bypass, and ~~nine~~ fourteen blinds in the West Marsh Hunting Unit on the south side of Sandy Mush Road east of the Eastside Bypass (USFWS 2016c).

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Merced National Wildlife Refuge

~~The Merced NWR receives water from MID, which delivers water into the Eastside Bypass. The Merced NWR diverts this water from the Eastside Bypass using two weirs and primarily uses the downstream weir for diversions because the crest elevation is higher and it creates a pool for use by a temporary, trailer-mounted pump. Diversions vary based on water year type and volume of water available but the approximate schedule is below:~~

- ~~Flood up: September 1 to October 15 – flooding to create waterfowl habitat~~
- ~~Draw down: March 1 to May 15 – draining of the refuge area~~
- ~~Irrigation: April 1 to July 1 – managing water to produce forage for waterfowl.~~

The majority of the water used on the San Luis NWR Complex is delivered by local water districts through delivery and/or drain canals or is from groundwater at the Refuge units. The San Joaquin River, which is centrally located through the San Luis NWR Complex, has little natural flow in this area and immediately upstream is typically dry most of the year. The source, quality, location, availability (time of year when water can be sourced or accessed), cost, and opportunity cost of accessing available water quantities are all factors that determine the costs and benefits of using possible water sources for habitat management purposes.

Adequate water supplies are in high demand and short supply in the San Joaquin Valley of California. Approximately 70 percent of the existing wetlands on both Merced and San Luis NWRs have sufficiently reliable water supplies to manage at optimal levels. The remaining 30 percent of wetlands either remain dry due to lack of water or are sporadically flooded when intermittent water sources become available. The Refuges are also challenged by the timing when water is available. Surface water deliveries correspond to agricultural irrigation cycles that begin in April and end in September or October. However, most of the managed wetlands are flooded during the autumn when the irrigation season is ending; they hold water throughout the winter and are drained during the spring. As a result, surface water is not available in sufficient quantities to manage the wetlands when it is most needed. Consequently, the Refuges, particularly Merced NWR, must rely on groundwater pumping (which is more expensive, less efficient, and of lower water quality) or other costlier sources of water. The wildlife-friendly agricultural production occurring on the Merced NWR is better aligned to the current water delivery schedule and does not suffer the same constraints; however, it also requires a significant quantity of water. Any reduction of the water supply will negatively affect one or both of these management programs.

The potential impacts of climate change on water availability are of serious concern to both Merced NWR and San Luis NWR. Temperature increases will cause less

precipitation to fall as snow, resulting in a reduction in the amount and reliability of water available in Central Valley reservoirs which would lead to increased demands and rising water costs thereby increasing competition between a growing urban population, the agriculture industry, and wildlife needs. Additionally, the increased demands for electricity will make it costlier for the Refuges to operate lift pumps and deep wells making it more difficult to manage wetland habitat and the wildlife beneficial agricultural program on Merced NWR.

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An existing groundwater well on the refuge site would be replaced to provide an alternative water source. The updated well would pump approximately ~~240~~ 400 to 600 acre-feet per year of water to the refuge, which is anticipated to be sufficient to maintain refuge operations consistent with existing conditions.