Long-Term Operation – Final Environmental Impact Statement

Chapter 13 – Terrestrial Biological Resources

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Chapter 13 Terrestrial Biological Resources

This chapter is based on the background information and technical analysis documented in Appendix P, *Terrestrial Biological Resources Technical Appendix*, which includes additional information on terrestrial biological resource conditions and technical analysis of the effects of each alternative.

13.1 Affected Environment

The study area includes the aquatic areas and associated aquatic margins of CVP reservoirs, rivers, and wetlands, including the Bay-Delta. Additionally, the study area includes irrigated agricultural lands of the Sacramento River Settlement (SRS) Contractors due to changes in the operation of Shasta Reservoir that make less water available for SRS actions.

Most of the rivers in the study area contain some riparian vegetation although many areas once supporting extensive riparian habitat now contain limited riparian habitat due to agricultural and residential development and dam installation. The Trinity River is characterized by montane habitats including annual grassland, fresh emergent wetland, montane riparian, valley-foothill riparian, and riverine habitats (California North Coast Regional Water Quality Control Board and Bureau of Reclamation 2009; California North Coast Regional Water Quality Control Board et al. 2013). The Sacramento and American rivers support willow, valley oak, and alder-dominated riparian communities. Riparian vegetation is limited to a narrow band along the channel margins in the confined canyon reaches of Clear Creek between Whiskeytown Dam and Clear Creek Bridge. The lower reach of Clear Creek contains freshwater emergent wetlands where the valley widens, the channel becomes predominately alluvial, and floodplains and terraces allow riparian vegetation to be more extensive (California Bay-Delta Authority 2004). Near the Stanislaus River, vegetation is characterized by riparian woodland with cottonwood, willows, white alder, blue elderberry, and Himalayan blackberry. Some low-gradient areas in the Stanislaus River downstream of New Melones Dam along the shoreline of Goodwin Reservoir support small patches of emergent aquatic vegetation such as bulrush and cattail (Goodwin Power 2013). Along the San Joaquin River, the lower and intermediate terrace floodplains support riparian forest while the higher portion of the floodplain are dominated by valley oak. Appendix P, *Terrestrial Biological Resources Technical Appendix*, identifies the wildlife species that occupy each river or stream reach within the study area.

The Delta overlies the western portions of the Sacramento River and San Joaquin River watersheds. The Delta is a network of islands, channels, and marshland at the confluence of the Sacramento and San Joaquin rivers. Substantial areas of the Delta and Suisun Marsh have been modified by agricultural, urban and suburban, and recreational land uses (Bureau of Reclamation et al. 2011; San Francisco Estuary Institute–Aquatic Science Center 2012). The remaining natural vegetation is fragmented, and largely restricted to the edges of waterways, flooded islands, and small protected areas such as parks, wildlife areas, and nature reserves (Hickson and Keeler-Wolf 2007). A substantial portion of the emergent wetlands exists as thin strips along the margins of constructed levees (San Francisco Estuary Institute–Aquatic Science Center 2012). Current habitat along the Delta waterways includes seasonal wetlands, tidal wetlands, managed

wetlands, riparian forests, and riparian scrub. The Delta provides habitat for waterfowl and shorebirds, California Ridgway's rail, California black rail, Suisun song sparrow, salt marsh common yellowthroat, and other ground nesting birds (Bureau of Reclamation et al. 2011).

Lakes and reservoirs in the study area support vegetation consistent with species associated with standing water, including floating species, rooted aquatic species, and emergent wetland species. Reservoirs in the study area include Contra Loma, San Justo, Bethany, Patterson, Lake Del Valle, Lewiston Reservoir, Los Vaqueros, Briones Reservoir, San Pablo Reservoir, Lafayette Reservoir, Upper San Leandro Reservoir, Lake Chabot, Goodwin Reservoir, Trinity Reservoir, and Whiskeytown Reservoir.

13.1.1 Special-Status Species

Species with special status are defined as species that are legally protected or otherwise considered sensitive by federal, state, or local resource agencies. Such species include the following:

- Species listed by the federal government as threatened or endangered.
- Species that are formally proposed for federal listing or are candidates for federal listing as threatened or endangered.
- Species identified by the U.S. Fish and Wildlife Service (USFWS) as Birds of Conservation Concern.
- Species considered sensitive by the Bureau of Land Management or U.S. Forest Service.
- Species listed by the state of California as threatened, endangered, or rare (rare status is for plants only).
- Species that are candidates for state listing as threatened or endangered.
- Species designated by California statute as fully protected (e.g., California Fish and Game Code, sections 3511 [birds], 4700 [mammals], and 5050 [reptiles and amphibians] and 5515 [fish]).
- Species, subspecies, and varieties of plants considered by the CDFW and California Native Plant Society (CNPS) to be rare, threatened, or endangered in California. The CNPS's *Inventory of Rare and Endangered Plants of California* assigns California Rare Plant Ranks (CRPR) categories for plant species of concern. Only plant species in CRPR categories 1 and 2 are considered special-status plant species in this document.
    - **CRPR 1A—**Plants presumed to be extinct in California.
    - **CRPR 1B—**Plants that are rare, threatened, or endangered in California and elsewhere.
    - **CRPR 2—**Plants that are rare, threatened, or endangered in California but more common elsewhere.

Lists of wildlife and plant species with special status that occur or may occur in portions of the study area are provided in Appendix P, *Terrestrial Biological Resources Technical Appendix,* **Error! Reference source not found.** and **Error! Reference source not found.**.

13.1.2 Critical Habitat

The federally listed wildlife and plant species considered in this EIS that have designated critical habitat areas are presented in Appendix P, *Terrestrial Biological Resources Technical Appendix,* **Error! Reference source not found.**.

13.1.3 Wetlands and Open Water

Wetlands and open water that occur in the study area are described in Appendix P, *Terrestrial Biological Resources Technical Appendix,* Section P.1.10.

13.2 Effects of the Alternatives

The impact assessment considers changes in terrestrial biological resources related to changes in CVP and SWP operations under the action alternatives as compared to the No Action Alternative. The CalSim 3 model simulation was utilized to analyze and compare the No Action Alternative and action alternatives. The CalSim 3 model (overview, methods) and associated results are summarized and fully described in Appendix F.

Under the No Action Alternative, Reclamation would continue with the current operation of the CVP, as described in the 2020 Record of Decision and subject to the 2019 Biological Opinions. The 2020 Record of Decision for the CVP and the 2020 Incidental Take Permit for the SWP represent current management direction or intensity pursuant to 43 CFR Section 46.30.

The No Action Alternative is based on 2040 conditions. The changes to terrestrial biological resources that are assumed to occur by 2040 under the No Action Alternative conditions would be different than existing conditions because of the following factors:

- Climate change and sea-level rise
- General plan development throughout California, including increased water demands in portions of the Sacramento Valley

The No Action Alternative is expected to result in potential changes in terrestrial biological resources and critical habitat at reservoirs that store CVP water, tributaries, and the Delta. These changes were described and considered in the 2020 Record of Decision.

13.2.1 Potential changes to terrestrial resources from seasonal operations

For the purposes of the wildlife and plant species analyses, *flow changes* constitute the expected effects of implementing the action alternatives in comparison with the No Action Alternative. Differences in flow management between the action alternatives and the No Action Alternative would have the potential to affect a special-status wildlife or plant species if flow changes were to directly harm the species, directly alter habitat availability or quality, or result in vegetation changes that would alter habitat availability or quality. Implementation of the action alternatives would generally result in minor potential changes relative to the No Action Alternative, and these changes are small relative to normal month-to-month and year-to-year variability in the system. Potential changes to terrestrial resources from seasonal operations as a result of the action alternatives are fully described in Appendix P, *Terrestrial Biological Resources Technical Appendix*.

13.2.1.1 Trinity River

Different alternatives may import water from the Trinity River to the Sacramento River to a different extent in different years and on different patterns. Flows under the Trinity River Restoration Program Record of Decision (2000) are common to all alternatives; therefore, impacts occur as a result of different reservoir levels and rare safety of dam releases. Flow changes in the Trinity River under all alternatives are the same as the No Action Alternative. The simulated CalSim3 results are attributed to modeling assumptions for Alternatives 1-4 described in Appendix F. Furthermore, as explained in the Summary Chapter, Section 0.1.7.2, *Trinity River Division*, changes or impacts described for resources associated with the Trinity Reservoir levels and Trinity River flows have been previously analyzed.

Northwestern pond turtle

Flow changes in the Trinity River under all alternatives are the same as the No Action Alternative, therefore, there are no anticipated adverse impacts to northwestern pond turtle.

Foothill Yellow-Legged Frog (North Coast DPS)

Flow changes in the Trinity River under all alternatives are the same as the No Action Alternative, therefore, there are no anticipated adverse impacts to foothill yellow-legged frog.

13.2.1.2 Sacramento River

Northwestern Pond Turtle

Compared to the No Action Alternative, flow changes in the upper Sacramento River downstream of Shasta Dam and through Keswick Reservoir under all action alternatives would result in relatively minor increases to much higher flows (up to 2,400 cfs higher) during at least some months of the water year which may cause some inundation of upland nesting, basking, overwintering, aestivation, and movement habitat, and may increase water depth to the extent that some aquatic breeding and basking habitat becomes unsuitable. If higher flows result in increased velocity and water levels, this may directly kill eggs if nests are inundated and/or kill hatchlings and make hatchlings more vulnerable to predation by causing shallower areas to become more accessible to aquatic predators. Increased flows relative to the No Action Alternative may also result in lower water temperatures, which can slow growth rates of developing juveniles.

Lower flows resulting from the action alternatives could adversely impact the availability of aquatic breeding and aquatic basking habitat for northwestern pond turtle. Decreased flows under these alternatives may also increase distances juveniles would need to traverse between areas of aquatic and upland habitat, making them more vulnerable to predation. Lower flows relative to the No Action Alternative may also cause aquatic habitat to become unsuitable for hatchlings and force them to move into deeper areas that are more accessible to aquatic predators. Potential reductions in water deliveries to CVPIA wildlife refuges in the Sacramento River watershed under the alternatives could also have impacts on the availability of aquatic habitat, however, Reclamation does not control the distribution of water to CVPIA wildlife refuges beyond initial water year allocations. Therefore, the changes or impacts described for terrestrial resources associated with CVPIA refuges are outside the scope of this alternatives analysis.

Foothill Yellow-Legged Frog (North Coast DPS)

Proposed flow changes in the upper Sacramento River downstream of Shasta Dam and through Keswick Reservoir under all action alternatives (between -1,733 cfs lower and up to 2,400 cfs higher) during at least some months of the water year could result in adverse impacts to aquatic habitat for the North Coast DPS of the foothill yellow-legged frog. Changes in flows, may dislodge, isolate, or kill egg masses, and strand and/or kill tadpoles and metamorphs. Higher flows and resulting increases in velocity and water levels may kill adults feeding or residing (e.g., for breeding or overwintering) in the Sacramento River, and may lead to sedimentation of cobbled substrates. Cobbled substrates are used for oviposition and tadpole and metamorph development; thus, sedimentation would decrease the suitability and availability of habitat for these three life stages. High flows in the summer will decrease water temperatures, which can preclude breeding, slow development of eggs, tadpoles, and metamorphs and make these life stages more vulnerable to predation and changing habitat conditions and may make tadpoles and metamorphs more susceptible to pathogens (U.S. Fish and Wildlife Service 2023a). Seasonal operations under all action alternatives may reduce natural variability in water releases, beyond major flood events, which will create more stable conditions (i.e., more stable flow levels that are less likely to flush and/or kill eggs, tadpoles, metamorphs, and adults, and increase sedimentation) and provide some potential benefits for foothill yellow-legged frogs.

Giant Garter Snake

Sacramento Valley populations of giant garter snake depend on rice fields and associated irrigation and drainage channels, leaving them vulnerable to wide-scale habitat loss in the event of changes in agricultural management such as changes in crops or fallowing large areas of rice fields (Paquin et al. 2006). Long-term fallowing of rice fields can reduce or eliminate habitat and individual giant garter snakes could be subjected to a greater risk of predation while seeking new habitat (U.S. Fish and Wildlife Service 2020). When rice fields are left out of production there is a reduction or elimination in the use of the surrounding and nearby water conveyance structures by snakes where water supply is dependent upon surface or ground water from non-adjacent or on-site sources (U.S. Fish and Wildlife Service 2012). The giant garter snake active season extends approximately April through September and giant garter snake requires aquatic habitat during this phase.

Alternative 1 does not propose decreasing water diversions to SRS Contractors in agricultural areas. Therefore, temporary loss of habitat for giant garter snake as a result of cropland

idling/shifting actions would not occur. Alternatives 2, 3, and 4 propose reductions in total water diversions to SRS Contractors that is anticipated to result in fallowed rice lands during dry and critical years. As described in Table E-16 (Appendix E, *Draft Alternatives*), SRS Contractors will fallow 25,000 acres of rice which is credited with 110 TAF. Maximum fallowing as a result of Alternatives 2, 3, and 4 would be approximately 5.3% of the annual rice acreage grown in the Sacramento Valley in 2023 (U.S. Department of Agriculture 2024). The new flow contributions from the Sacramento River Basin under Alternatives 2, 3, and 4 are not intended to result in idling more than 35,000 acres of rice land in the Sacramento River Basin. Cropland idling/shifting would reduce the availability of aquatic habitat and increase the risk of predation on individual giant garter snakes.

Giant garter snakes in the action area are within an active rice growing region that experiences variability in rice production and farming activities, therefore they are already subject to these risks relative to the No Action Alternative. Under the four phases of Alternative 2, and Alternatives 3 and 4, CalSim 3 model results indicate that total SRS Contractor diversions would remain the same or decrease relative to the No Action Alternative. In dry and critical water year types, SRS Contactor agricultural diversions are reduced by 34% from 100 TAF to 66 TAF in April and approximately 11% during the remaining months of the active season for giant garter snake under Alternative 3. Some of the largest reductions in average SRS Contactor agricultural diversions would be by 11-13% during some months of the active season for giant garter snake under Alternative 2 Without TUCP Without Delta VA and Alternative 4. Proposed decreases in water diversions to SRS Contractors in agricultural areas during dry and critical water year types under these alternatives could result in temporary loss of aquatic habitat for giant garter snake through the conversion of rice to dryland farming or fallowed lands. Additionally, potential reductions in water deliveries to CVPIA wildlife refuges in the Sacramento River watershed under Alternatives 2 through 4 could have impacts on the availability of aquatic habitat, however, Reclamation does not control the distribution of water to CVPIA wildlife refuges beyond initial water year allocations. Therefore, the changes or impacts to giant garter snake associated with CVPIA refuges are outside the scope of this alternatives analysis.

Bank Swallow

Flow change could potentially affect nesting habitat for bank swallows on the Sacramento River. Due to limited available habitat and the reduction of natural river processes, the species is highly sensitive to reductions in winter flows necessary to erode banks for habitat creation, and high flows during the breeding season (generally April 1–August 31) resulting in flooding of active burrows and destruction of colonies from increased bank sloughing. Bank swallows arrive in California and begin to excavate their burrows in March, and peak egg-laying occurs between April and May (Bank Swallow Technical Advisory Committee 2013). Therefore, high-flow events on the Sacramento River that occur after March when the swallows have nested and laid eggs in the burrows could adversely impact bank swallows and result in the loss of nests. On the Sacramento River, breeding season flows between 14,000 and 30,000 cubic feet per second (cfs) have been associated with localized bank collapses that resulted in partial or complete colony failure (Stillwater Sciences 2007). Additionally, flows above 50,000 cfs on the Sacramento River could lead to multiple bank swallow colony failures during the breeding season, but they may be beneficial during the non-breeding season because erosion can create new breeding habitat in the form of cut banks (Stillwater Sciences 2007).

CalSim 3 model results illustrate that, relative to the No Action Alternative, flows on the Sacramento River would be higher under Alternative 1 (up to 1,522 cfs higher in an above normal year) and Alternative 2 without TUCP without VA (up to 1,756 cfs higher in a critically dry year) for the majority of bank swallow breeding season (April through June). Flows would be lower under Alternative 1 (up to 1,277 cfs lower in an above normal year) and under Alternative 2 without TUCP without VA (up to 540 cfs lower in an above normal year) than the No Action Alternative towards the end of the breeding season (July to August). Flows would generally be higher under Alternative 2 without TUCP With Delta VA (+1,794 cfs in July of a critically dry year), Alternative 2 without TUCP With All VA (+1,780 cfs in July of a critically dry year), and under Alternative 4 (+468 cfs in a April of a critically dry year) during the bank swallow breeding season. Flows on the Sacramento River under Alternative 4 would generally be lower for the remainder of the breeding season (June to August) in all water years. Flows under Alternative 3 would be up to 1,990 cfs higher than the No Action Alternative in May in above normal and wet years and up to 1,913 cfs higher in August in dry years during bank swallow breeding season. Flows under Alternative 3 would be up to 954 cfs lower from April to June in below normal, dry, and critically dry years, and up to 2,218 cfs lower in July of above normal years. Projected flows would be between 2 cfs and 1,518 cfs higher under Alternatives 1 through 4 at variable times during the non-breeding season, from October to March. The increased flows in the Sacramento River during a majority of the non-breeding season could provide the necessary bank erosion functions needed for new bank swallow breeding habitat and therefore could result in a beneficial effect on bank swallow.

Flows greater than 14,000 cfs are anticipated under all action alternatives at some point during the breeding season on the Sacramento River at locations such as at Verona. Flows at this location could exceed 20,187 cfs under Alternative 2 without TUCP With All VA, an approximate increase of 1,224 cfs compared to the No Action Alternative. Flows over 20,500 cfs in April under Alternative 3 would be more than 1,600 cfs above the No Action Alternative. These increases in flow could result in localized bank collapses that result in partial or complete colony failure during the breeding season. Under Alternatives 1 and 4, flow increases are expected to be minor during the bank swallow breeding compared to the No Action Alternative, with approximate increases of 181 cfs and 164 cfs, respectively. Therefore, habitat conditions are expected to be similar to habitat conditions experienced by bank swallow under the No Action Alternative. Effects on bank swallow nesting habitat are anticipated based on these modelling results; however, the degree of impacts are dependent upon the relative increase in flows and the timing of flow changes. Downstream of the Sacramento River at Verona, the river becomes channelized by levee banks which do not provide suitable bank habitat for nesting, therefore there is no potential for the alternatives to impact bank swallow downstream of the confluence of the Sacramento and Feather Rivers.

Western Yellow-Billed Cuckoo

Seasonal operations will on average maintain current vegetation for western yellow-billed cuckoo, with limited floodplain activation to stimulate regeneration. Seasonal operations under all action alternatives may reduce natural variability beyond major flood events and will likely contribute to the further reduction of natural successional processes that result in non-climax stage riparian woodlands and loss of suitable western yellow-billed cuckoo habitat over time. However, habitat conditions with implementation of the action alternatives are expected to be

similar to habitat conditions experienced by western yellow-billed cuckoo under the No Action Alternative.

Least Bell's Vireo

Least Bell's vireo does not currently occupy breeding habitat in the upper Sacramento River, however, changes in flow and operations could adversely impact least Bell's vireo through changes in riparian habitats if the species recolonizes the Sacramento River Valley during the timeframe of all action alternatives. The proposed changes, however, are unlikely to produce a measurable change in quantity or quality of least Bell's vireo habitat in the upper Sacramento watershed due to the minimal change in hydrological conditions associated with the action alternatives, and there is no apparent mechanism by which these changes could result in harm to individual least Bell's vireos. In addition, the action alternatives may provide benefits to the species through high fall flows, avoiding drought stress in riparian or wetland vegetation, and by keeping more constant spring flows and avoiding erosion at restoration sites.

13.2.1.3 Clear Creek

Northwestern Pond Turtle

Compared to the No Action Alternative, the four phases under Alternative 2 would result in variable increases and decreases in flow depending on the time of year and Alternatives 3 and 4 would result in relatively minor increased flows (up to 86 cfs higher) which may contribute to similar adverse impacts to northwestern pond turtle as described above for the Sacramento River. Alternative 1 would result in decreased flows up to 181 cfs which could adversely impact availability of aquatic breeding and aquatic basking habitat and may increase distances juveniles would need to traverse between areas of aquatic and upland habitat, making them more vulnerable to predation. Generally higher flows may contribute to similar adverse impacts to northwestern pond turtle as described. Lower flows resulting from Alternative 1, the four phases of Alternative 2, and Alternatives 3 and 4 may also cause similar adverse impacts to aquatic habitat.

Foothill Yellow-Legged Frog (North Coast DPS)

Proposed flow changes in Clear Creek under all action alternatives may also cause adverse impacts to aquatic habitat for the North Coast DPS of the foothill yellow-legged frog as described above.

13.2.1.4 Lower American River

Northwestern Pond Turtle

Compared to the No Action Alternative, Alternative 1 and 3 would result in flows up to 870 cfs higher which may contribute to similar adverse impacts to northwestern pond turtle as described above for the Sacramento River. Lower flows up to 773 cfs lower than the No Action Alternative resulting from Alternatives 1 and 3 may also cause similar adverse effects to aquatic habitat. CalSim 3 model results illustrate that average flows under the four phases of Alternative 2 and under Alternative 4 will be similar to the No Action Alternative, therefore there are no anticipated adverse impacts to northwestern pond turtle.

Foothill Yellow-Legged Frog (South Sierra DPS)

There would be no actions under all the alternatives that affect suitable habitat for the South Sierra DPS of foothill yellow-legged frog in the lower American River.

Western Yellow-Billed Cuckoo and Least Bell's Vireo

Similar to Section 13.2.1.2, *Sacramento River*, seasonal operations will on average maintain current vegetation for western yellow-billed cuckoo, with limited floodplain activation to stimulate regeneration. Seasonal operations under all action alternatives may reduce natural variability beyond major flood events. Seasonal operations will likely contribute to the further reduction of natural successional processes that result in non-climax stage riparian woodlands and loss of suitable western yellow-billed cuckoo habitat over time. However, habitat conditions with implementation of the action alternatives are expected to be similar to habitat conditions experienced by western yellow-billed cuckoo under the No Action Alternative.

13.2.1.5 Stanislaus River

Northwestern Pond Turtle

Compared to the No Action Alternative, the action alternatives would result in incremental increases in flows which may contribute to but is not likely to cause adverse impacts to northwestern pond turtle as described above for the Sacramento River. Incremental increases in flows could increase velocity and water levels, which may adversely impact eggs if nests are inundated and/or kill hatchlings, and make hatchlings more vulnerable to predation by causing shallower areas to become more accessible to aquatic predators. Lower flows between 81 cfs and 205 cfs resulting from Alternatives 1, 3, and 4 may also cause similar adverse impacts to aquatic habitat.

Foothill Yellow-Legged Frog (South Sierra DPS)

Under all the alternatives, flows would not affect the South Sierra DPS of foothill yellow-legged frog upstream of New Melones Reservoir, as there would be no actions that affect suitable habitat in that area. While there are no currently documented South Sierra DPS foothill yellow-legged frog populations below New Melones Reservoir, suitable breeding habitat potentially exists along the river, and the absence of foothill yellow-legged frog cannot be confirmed as survey data is lacking in this area for the species. Hayes et al. (2016) reports that breeding can take place on the Stanislaus River below New Melones Reservoir as late as July, indicating presence of the species, but does not go into further detail about the current population. Given the best available data, Reclamation is assuming presence of this species for all relevant life stages in the action area but the species presence has not been definitively proven in the action area.

Under all action alternatives, proposed flow changes in the lower Stanislaus River downstream of New Melones Reservoir could adversely impact aquatic habitat for the South Sierra DPS of foothill yellow-legged frog. Compared to the No Action Alternative, the action alternatives would result in relatively minor increased flows which may contribute to similar adverse impacts to foothill yellow-legged frog as described above for the Sacramento River. Lower flows are also anticipated as a result of the action alternatives, which may also cause similar adverse impacts to aquatic habitat. Seasonal operations under the action alternatives may also reduce natural

variability in water releases, beyond major flood events, which would create more stable conditions (i.e., more stable flow levels that are less likely to flush and/or kill eggs, tadpoles, metamorphs, and adults, and increase sedimentation) and provide some potential benefits for foothill yellow-legged frogs. Ultimately the limited discretion on flow releases from New Melones Reservoir into the Stanislaus River will result in limited impacts. These limited impacts could include possible dislodging, isolation, or mortality of egg masses, and possibly strand and/or kill tadpoles and metamorphs. Incrementally higher flows and water levels could impact adults' ability to feed or reside in the Stanislaus River and may lead to sedimentation of cobbled substrates. These impacts could adversely alter the applicable life stages for the foothill yellow legged frog associated with lower water temperatures in the summer, higher flow water releases during developmental periods, and a minor increase in sedimentation of cobbled substrates.

Western Yellow-Billed Cuckoo and Least Bell's Vireo

The seasonal operations under the alternatives and spring pulse flows under the four phases of Alternative 2 in the Stanislaus River and generally higher flows will have a negligible impact on the existing riparian vegetation. Elevated water flows are not anticipated to rise to the level that would cause impacts to nesting western yellow-billed cuckoos or least Bell's vireo.

13.2.1.6 San Joaquin River

Under Alternative 1, the four phases of Alternative 2, and Alternative 4, there would be no changes in average flows that would affect suitable habitat of the northwestern pond turtle or the South Sierra DPS of foothill yellow-legged frog in the San Joaquin River watershed. Under Alternative 3, average flows are expected to be lower across all water years than the No Action Alternative in the San Joaquin River watershed, with decreases between 30 cfs and 123 cfs. Lower flows may cause similar adverse impacts to aquatic habitat for northwestern pond turtle as described above in Section 13.2.1.2. The last remaining reproductive population of the giant garter snake in the San Joaquin Valley exists in CVPIA refuges. Reduced water deliveries to CVPIA wildlife refuges in the San Joaquin River under Alternative 3 could have impacts on the availability of aquatic habitat for giant garter snake and northwestern pond turtle, however, Reclamation does not control the distribution of water to CVPIA wildlife refuges beyond initial water year allocations. Therefore, the changes or impacts to giant garter snake and northwestern pond turtle associated with CVPIA refuges are outside the scope of this alternatives analysis.

13.2.1.7 Bay-Delta

Reclamation would continue to operate Delta facilities by season with the same primary purposes as described in the Common Components in Appendix E, Section E.2.4, *Delta*. The Suisun Marsh Salinity Control Gates (SMSCG) are the only component in the Bay-Delta where proposed flow changes were found to have the potential to impact terrestrial resources based on flow modeling, therefore, the terrestrial analysis is centered around SMSCG reoperations.

Northwestern Pond Turtle

The SMSCG reoperations proposed under Alternative 1 would not include Delta smelt summer and fall habitat actions to improve Delta smelt food supply and habitat. This could incrementally increase marsh salinities in the summer and fall compared to the No Action Alternative. Northwestern pond turtles are a primarily freshwater species, and higher basking activity has been observed in Suisun Marsh in areas with low salinity, indicating an increase in habitat

suitability when salinity is decreased and vice versa. Northwestern pond turtles were also found to have higher abundance, survival, and growth rates in areas with reduced salinities (Agha et al. 2020; U.S. Fish and Wildlife Service 2023b). Thus, a seasonal increase in salinity in summer and fall may result in decreased habitat suitability and contribute to adverse impacts on Northwestern pond turtle under Alternative 1. The SMSCG are being proposed to direct more fresh water into the Suisun Marsh to improve habitat conditions for Delta smelt in the region under the four phases of Alternative 2, and under Alternatives 3 and 4. Therefore, these alternatives will likely have a beneficial impact on northwestern pond turtle.

Soft bird's beak and Suisun thistle

SMSCG reoperations under Alternative 1 could incrementally increase marsh salinities in the summer and fall, creating a vegetation shift in Suisun Marsh. However, salinity levels of the habitat in which soft bird's-beak or Suisun thistle are found would not be substantially increased, thus, the proposed operation of the SMSCG associated with Alternative 1 would result in a negligible effect to either soft bird's beak or Suisun thistle. SMSCG reoperations under the four phases of Alternative 2 and Alternatives 3 and 4 are expected to lower marsh salinities. Because salinity levels of the habitat in which soft bird's-beak or Suisun thistle are found would not be substantially altered, the proposed operation of the SMSCG associated with the four phases of Alternative 2 and Alternatives 3 and 4 would likely be negligible to either soft bird's beak or Suisun thistle.

13.2.2 Potential changes to Critical Habitat from seasonal operations

Proposed flow changes are included under all alternatives in the Sacramento River within western yellow-billed cuckoo critical habitat. The proposed changes are unlikely to produce measurable change in quantity or quality of western yellow billed cuckoo habitat, including riparian vegetation, in the upper Sacramento watershed.

Critical habitat for valley elderberry longhorn beetle is present along the lower American River. However, under the alternatives, proposed flow changes are unlikely to produce measurable changes in quantity or quality of valley elderberry longhorn beetle critical habitat in the lower American River watershed, as the riparian vegetation of the surrounding habitat would not be measurably altered.

Critical habitat for soft bird's-beak and Suisun thistle is present in the Delta region. SMSCG reoperations under Alternative 1 could incrementally increase marsh salinities in the summer and fall. However, salinity levels of the habitat in which soft bird's-beak or Suisun thistle are found would not be substantially increased, thus the proposed operation of the SMSCG associated with Alternative 1 would likely result in a negligible effect to both soft bird's beak and Suisun thistle critical habitat. SMSCG reoperations under the four phases of Alternative 2 and Alternatives 3 and 4 are expected to lower marsh salinities. These slightly lower salinity levels in the surrounding habitat would not be result in measurable effects on the primary constituent elements for soft bird's beak and Suisun thistle critical habitat due to the variability of existing salinities as well as the variability created between years under these alternatives.

13.3 Mitigation Measures

Appendix D includes a detailed description of mitigation measures identified for terrestrial resources per alternative. These mitigation measures include avoidance and minimization measures that are part of each alternative and, where appropriate, additional mitigation to lessen impacts of the alternatives. Additional mitigation measures for terrestrial resources are identified: Mitigation Measures BIO-1: Governance group considerations for Foothill Yellow-legged Frog; BIO-2: Real-time group considerations for Northwestern Pond Turtle; BIO-3: Real-time group considerations for Foothill Yellow-Legged Frog, BIO-4: Flow criteria and real-time group considerations for Bank Swallow; and BIO-5: Conservation actions to advance Bank Swallow conservation on the Sacramento River.

13.4 Cumulative Impacts

The No Action Alternative would continue with the current operation of the CVP and may result in potential changes in terrestrial biological resources and critical habitat from seasonal operations at reservoirs that store CVP water, tributaries and the Delta, and agricultural lands. The action alternatives will result in changes to terrestrial biological resources and critical habitat from seasonal operations at reservoirs that store CVP water, tributaries and the Delta, and agricultural lands. The magnitude of the changes is dependent on alternative and water year type. Therefore, the No Action Alternative and action alternatives may contribute to cumulative changes to terrestrial biological resources as described in Appendix P, *Terrestrial Biological Resources* and Appendix Y, *Cumulative Impacts Technical Appendix.*