Long-Term Operation – Biological Assessment

Appendix AB, Chapter 12 – Cumulative Effects

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Chapter 12 Cumulative Effects

Cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). For this Biological Assessment, these include agricultural practices, increased urbanization, recreational activities, and changes in location, volume, timing and method of delivery for non-Central Valley Project (CVP)/State Water Project (SWP) diversions. These actions typically result in habitat fragmentation and degradation of habitats that incrementally reduces the carrying capacity of the rearing and migratory corridors found within the action area. Cumulative effects also include the implementation of changes in state law. Several related and reasonably foreseeable future State or private projects and actions could result in impacts on Federally listed aquatic species considered in this Biological Assessment.BA These projects are described below.

12.1 Agricultural Practices

Agricultural practices can adversely affect riparian and wetland habitats and the federally listed species that inhabit those habitats through upland modifications that lead to increased siltation or reductions in water flow in stream channels flowing into the action area, including the Sacramento River, Stanislaus River, San Joaquin River, and Delta. Any increases in grazing activities from dairy and cattle operations would degrade or reduce suitable critical habitat for listed fish species by increasing erosion and sedimentation. These agricultural practices introduce salmonid, sturgeon, and Delta smelt exposure to contaminants ranging in degrees of effect. Stormwater and irrigation discharges related to both agricultural and urban activities contain numerous pesticides and herbicides that may disrupt various physiological mechanisms and may negatively affect reproductive success and survival rates of listed anadromous fish (Dubrovsky et al. 1998; Kuivila and Moon 2004; Scholz et al. 2012; Scott and Sloman 2004). Additionally, agricultural practices introduce nitrogen, ammonia, and other nutrients into the watershed, which then flow into receiving waters (Lehman et al. 2014). The State of California issues Waste Discharge Requirements (WDRs) to dischargers, including irrigators, dairy operations, and cattle operations, that require implementation of Best Management Practices (BMPs) designed to be protective of surface water quality, with benefits for listed fish species. Monitoring and reporting requirements associated with those WDRs ensure compliance with BMPs.

12.2 Increased Urbanization

With a projected growth rate of 1.2% annually through 2030, California can expect to observe future increases in urbanization and housing developments (California Department of Finance 2012). Increased urbanization is anticipated to result in the need for additional municipal water and human health and safety water during periods of drought. Increases in urbanization and housing developments can impact habitat by altering watershed characteristics, and changing both water use and stormwater runoff patterns. Increased growth will place additional burdens on resource allocations, including natural gas, electricity, and water, as well as on infrastructure such as wastewater sanitation plants, roads and highways, and public utilities.

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Adverse effects on listed fish species and their critical habitat may result from urbanization-induced point and non-point source chemical contaminant discharges within the action area. These contaminants include, but are not limited to, ammonia and free ammonium ion, numerous pesticides and herbicides, and oil and gasoline product discharges. These may disrupt various physiological mechanisms and reproductive success as mentioned previously.

12.3 Recreational Activities in the Region

Recreational boating is expected to increase in volume and frequency in the future. Boating activities typically result in increased wave action and propeller wash in waterways. This potentially will degrade riparian and wetland habitat by eroding channel banks and mid-channel islands, thereby causing an increase in siltation and turbidity. Wakes and propeller wash also churn up benthic sediments thereby potentially resuspending contaminated sediments and degrading areas of submerged vegetation. This, in turn, would reduce habitat quality for the invertebrate forage base required for listed fish species. Increased recreational boat operation is anticipated to result in more contamination from the operation of gasoline and diesel-powered engines on watercraft entering the associated water bodies. Increased recreational boat operation may increase underwater acoustics that fish are exposed to which can alter activity, habitat selection, feeding, and predator defense. Increased boating is reasonably certain to result in additional docks and piers, creating new predator habitat and decreasing survival of anadromous fish species.

12.4 Changes in Location, Volume, Timing and Method of Delivery for Non—Central Valley Project/State Water Project Diversions

Changes in location, volume, timing, and method of delivery for non-CVP/SWP diversions may be implemented. While not certain, changes may be expected to occur due to:

- Future implementation of the California Sustainable Groundwater Management Act that requires development and implementation of Groundwater Sustainability Plans; Reduced reliance on groundwater under SGMA could result in increased surface water diversions in some cases, and associated impacts on listed species. Reduction of urban water use would be expected to have beneficial effects on listed species by reducing diversions.

- Future implementation of the Delta Stewardship Council's Delta Plan (amended July 2019) required by the California 2009 Delta Reform Act.
- Future implementation of the California Water Action Plan released by Governor Jerry Brown in January 2014, specifically, per capita reductions in water use by 2030 and future drought actions.

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