Chapter 21 – Public Health and Safety

This page intentionally left blank

Contents

This page intentionally left blank.

Chapter 21 Public Health and Safety

This chapter is based on the background information and technical analysis documented in Appendix X, *Public Health and Safety Technical Appendix*, which includes additional information on public health and safety conditions and technical analysis of the effects of each alternative.

21.1 Affected Environment

21.1.1 Valley Fever

Coccidioidomycosis (Valley fever) is an illness that is caused by inhaling the spores of a soil-dwelling fungus, *Coccidioides* (Centers for Disease Control and Prevention 2019). This fungus lives in the top layers of some soils within 2 to 12 inches from the ground surface (California Division of Occupational Safety and Health 2017). When the soil is disturbed by digging, vehicles, cultivation, or wind, the fungal spores are dispersed and can be inhaled by people in the area. Irrigated soils are less likely to contain the fungus than dry, previously undisturbed soils.

21.1.2 Bioaccumulation of Methylmercury in Fish

In aquatic environments, sulfate-reducing bacteria, and, to a lesser degree, iron-reducing bacteria, convert inorganic mercury to methylmercury, and this process is enhanced by multiple environmental variables in water and sediment including temperature, pH, oxygen, sulfate and/or iron, and the presence of organic matter (U.S. Geological Survey 2014; State Water Resources Control Board 2017). Conversion of inorganic mercury to methylmercury occurs primarily at the sediment-water interface, but also in anoxic waters, and drying and rewetting of soils and sediment stimulates mercury methylation (State Water Resources Control Board 2017). Methylmercury production is greatest in high marshes that experience wet and dry periods over the highest monthly tidal cycles, and production is lower in low marshes that are always inundated and not subject to dry periods (Alpers et al. 2008). Total mercury concentrations in sediment positively correlate with methylmercury levels in sediment and water (Central Valley Regional Water Quality Control Board 2010). Positive correlations also exist between fish tissue methylmercury concentrations and concentrations of total mercury and methylmercury in water (State Water Resources Control Board 2017). High concentrations of mercury in the form of methylmercury can bioaccumulate in fish and shellfish through food consumption and absorption from water based upon the water quality.

21.1.3 Harmful Algal Blooms

Cyanobacteria harmful algal blooms (CHABs) are overgrowths of cyanobacteria in surface waterbodies that generally occur from spring to fall (May to October) when water temperatures are warmer and are therefore conducive to bloom formation (Central Valley Regional Water Quality Control Board 2019). Cyanobacteria are microscopic, photosynthetic organisms that occur naturally in fresh, marine, and brackish waters (ITRC 2021). Under certain conditions,

cyanobacteria can multiply and become very abundant, discoloring the water throughout a water body, accumulating at the surface, and/or attached to surfaces in a water body (e.g., rocks, submerged vegetation). The overgrowth of cyanobacteria in surface waters is referred to as a bloom. Generally, CHABs are dependent on warmer water temperatures; water clarity and irradiance; a calm, stratified water column coupled with long water residence times; and sufficient availability of dissolved nitrogen and phosphorus (U.S. Environmental Protection Agency 2019; Lehman et al. 2013; Berg and Sutula 2015). Some species of cyanobacteria produce toxins, referred to as cyanotoxins, which can have adverse health effects on humans, domestic animals, fish and other aquatic biota, and other wildlife.

21.2 Effects of Alternatives

The impact analysis considers changes in public health and safety conditions related to changes in CVP and SWP operation under the alternatives as compared with the No Action Alternative.

The No Action Alternative and action alternatives may introduce public health hazards to the study area through the following mechanisms.

- A reduction in surface water supplies could result in an increase in agricultural land fallowing and a consequent increase in dust, which could increase the potential for exposure to Valley fever fungal spores.
- Central Valley Project and State Water Project operations could affect water and fish tissue methylmercury concentrations.
- Increase the potential for public exposure to cyanotoxins due to an increase in CHABs.

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 not expected to result in potential changes to Public Health and Safety resources, such as changes to Valley fever related to changes in irrigated agricultural land. Potential changes are not anticipated in methylmercury production and resultant changes in bioaccumulation in fish for human consumption, nor public exposure to cyanotoxins due to an increase in CHABs. These impacts were described and considered in the LTO 2020 Record of Decision and associated documents.

21.2.1 Potential changes in the potential for Valley fever related to changes in irrigated agricultural land

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. CVP and SWP operations under the No Action Alternative are not expected to result in an increase in nonirrigated agricultural land relative to existing conditions and, thus, there would be

no increased potential for growth of *Coccidioides* in the study area. Accordingly, adverse effects on public health are not expected related to Valley fever under the No Action Alternative.

Alternative 1 would increase irrigated agricultural acreages in the study area (i.e., the Sacramento River and San Joaquin River regions) over the long-term average condition and in dry and critical dry years relative to the No Action Alternative. Because there would be no reduction of irrigated agricultural land in the study area under Alternative 1, there would be a decrease in the potential for Valley fever due to CVP and SWP operations under this alternative. There would be a decrease in irrigated agricultural acreages in the study area over the long-term average condition under Alternatives 2 and 3 relative to the No Action Alternative, and an increase in irrigated agricultural acreages in the study area over the long-term average condition under Alternative 4 relative to the No Action Alternative.

Under dry and critical conditions, the Sacramento River region and San Joaquin River region would have fewer irrigated acres relative to the No Action Alternative under Alternatives 2 and 3. There would be a decrease in irrigated acreages in the San Joaquin River region under Alternative 4. Although there would be a reduction in irrigated agricultural land in the study area relative to the No Action Alternative, conversion of this land to non-agricultural use would not necessarily mean that the land would be fallowed or idled; land taken out of production could be converted to a different land use altogether that is not conducive to the growth of *Coccidioides*. Further, implementation of Mitigation Measure AG-1, *Diversify Water Portfolios,* could help reduce the magnitude of irrigated agricultural land conversion by encouraging water users to develop alternative sources of water. Accordingly, an increase in the potential for Valley fever due to CVP and SWP operations under Alternatives 2, 3, and 4 is not expected.

21.2.2 Potential changes in methylmercury production and resultant changes in bioaccumulation in fish for human consumption

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. Given the lack of changes under the No Action Alternative to CVP and SWP operations, there are no expected additional changes on water quality conditions in the study area associated with methylmercury or increased risks for humans consuming fish in the study area.

Under Alternatives 1, 2 and 4, there would be no adverse effects on public health due to methylmercury exposure related to consumption of fish because modeled changes in water column concentrations of methylmercury would have little to no measurable effect on fish tissue concentrations in the Delta, Suisun Marsh, Suisun Bay or San Francisco Bay relative to the No Action Alternative.

Alternative 3 would not result in increased water column methylmercury concentrations or increased methylmercury bioaccumulation in biota in Suisun Marsh relative to the No Action Alternative. Modeled long-term average water column concentrations of methylmercury in the Delta under Alternative 3 would not differ from those under the No Action Alternative at the modeled Delta assessment locations except for increases of 0.01 ng/L at Victoria Canal, Contra Costa Water District Pumping Plant #1, Banks Pumping Plant, and Jones Pumping Plant. Under Alternative 3, modeled changes in water column concentrations of total methylmercury could have a measurable effect on Delta fish tissue concentrations relative to the No Action Alternative.

All modeled fish tissue concentrations exceed the water quality objective of 0.24 milligrams per kilogram (mg/kg) wet weight (ww) [350 mm largemouth bass fillets])[1] under both the No Action Alternative and Alternative 3. Average modeled fish tissue concentrations for all years increased at all modeled Delta locations by 0.01 to 0.08 mg/kg ww relative to the No Action Alternative, which indicates a increase in the potential for methylmercury bioaccumulation in fish tissue. Because Alternative 3 would result in higher Delta outflow in all months except June, relative to the No Action Alternative, methylmercury loads to Suisun Bay and San Francisco Bay could potentially increase, which could result in increased methylmercury bioaccumulation in fish in these areas. OEHHA standards for the consumption of fish in the study area would continue to be implemented and thus would serve to protect people against the overconsumption of fish with increased body burdens of mercury.

21.2.3 Potential changes in the potential for public exposure to cyanotoxins due to an increase in CHABs

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. There would be no additional changes in CVP or SWP system operations under the No Action Alternative relative to existing conditions. Additionally, it is foreseeable that there would be implementation of water resources management projects to provide water supplies. As a result there would be no change in the limits on water supply deliveries currently in place. Given the lack of changes to CVP and SWP operations under the No Action Alternative, there would be no expected changes associated with the operation of the CVP and SWP on water quality associated with CHABs in the study area.

Because there would not be substantial effects on changes in Delta inflows from the Sacramento and San Joaquin rivers June through November, Alternatives 1, 2, and 4 are expected to have only minor, if any, effect on the environmental variables (i.e., irradiance, nutrients, water column turbulence/mixing, temperature and residence time) correlated with the frequency or magnitude of CHABs, relative to the No Action Alternative. As such, Alternatives 1, 2 and 4 would not increase the potential for public exposure to cyanotoxins in the study area and there would be no associated adverse effects.

Alternative 3 would have similar effects on nutrients and water clarity as Alternatives 1, 2, and 4, which would be minimal changes from the No Action Alternative. However, relative to the No Action Alternative, Alternative 3 would result in substantial reductions in Sacramento River flows at Freeport and San Joaquin River flows at Vernalis entering the Delta during the months June through September, when CHABs are most likely to occur. The substantial flow reductions that would occur under this alternative, relative to the No Action Alternative, in June and July in all but critical water years types; June through August for wet, above normal, and below normal years; and in June and July of dry years would be expected to increase residence time throughout many locations within the study area. Reduced Sacramento River and San Joaquin River inflows to the Delta and increased water residence times within the Delta could cause increased water temperatures at some Delta locations in some months of the June through September period. The

[1] The methylmercury objectives protective of human health and wildlife include a goal of not exceeding 0.24 mg/kg wet weight in muscle tissue of trophic level 4 fish (200–500 mm total length) normalized to 350 mm total length.

substantial reductions in Delta inflows from these rivers may also result in reduced turbulence and mixing of water in the Delta, relative to that for the No Action Alternative. This reduction in turbulence would create a calmer water column favored by cyanobacteria. Alternative 3 could increase the potential for public exposure to cyanotoxins in waterbodies in the Bay-Delta region.

Because Alternative 3 is expected to make CHABs worse in the Delta, greater volumes of cyanobacteria cells would be expected to flow from the Delta into Suisun Marsh, relative to the No Action Alternative. Also, salinity is typically sufficiently low within the eastern portion of the marsh to allow CHABs to form. Consequently, Alternative 3 could increase CHABs in Suisun Marsh. However, because of higher salinity levels in Suisun Bay and San Francisco Bay that typically prevent *Microcystis* and other cyanobacteria common to the Delta from producing problematic blooms in these water bodies, Alternative 3 is not expected to measurably increase CHABs in Suisun Bay or San Francisco Bay.

21.3 Mitigation Measures

21.3.1 Avoidance and Minimization Measures

21.3.1.1 Alternatives 1 – 4

No avoidance and minimization measures have been identified.

21.3.2 Additional Mitigation

21.3.2.1 Alternative 1

No mitigation measures have been identified.

21.3.2.2 Alternatives 2, 3, and 4

Alternatives 2, 3, and 4 would result in fewer irrigated irrigation acres relative to the No Action Alternative, with Alternative 4 experiencing a decrease in just the San Joaquin River region. Although there would be a reduction in irrigated agricultural land in the study area under Alternatives 2, 3, and 4 relative to the No Action Alternative, conversion of this land to non-agricultural use would not necessarily mean that the land would be fallowed or idled; land taken out of production could be converted to a different land use altogether that is not conducive to the growth of *Coccidioides*.

- **Mitigation Measure AG-1, *Diversify Water Portfolios*** could be implemented to reduce impacts.

21.4 Cumulative Impacts

The No Action Alternative would continue with the current operation of the CVP and may contribute to potential changes to Public Health and Safety resources. The action alternatives are anticipated to result in changes in Valley fever related to changes in irrigated agricultural land, methylmercury production and resultant changes in bioaccumulation in fish for human

consumption, and public exposure to cyanotoxins due to an increase in CHABs. The magnitude of the changes is dependent on alternative and water year type. Therefore, the No Action Alternative and the action alternatives may contribute to cumulative changes to Public Health and Safety resources as described in Appendix X, *Public Health and Safety Technical Appendix* and Appendix Y, *Cumulative Impacts Technical Appendix*.