UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
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OCT 30 2015

OFFICE OF THE
REGIONAL ADMINISTRATOR

David Murillo, Regional Director
Bureau of Reclamation, Mid-Pacific Region
2800 Cottage Way, MP-700
Sacramento, CA 95825

Subject: Supplemental Draft Environmental Impact Statement
Bay Delta Conservation Plan/California WaterFix CEQ# 20150196

Dear Mr. Murillo:

The U.S. Environmental Protection Agency has reviewed the Bay Delta Conservation Plan (BDCP)/California WaterFix Supplemental Draft EIS pursuant to the National Environmental Policy Act, Council on Environmental Quality regulations (40 CFR Parts 1500-1508), and our NEPA review responsibilities under Section 309 of the Clean Air Act. The San Francisco Bay/Sacramento-San Joaquin Delta is an important estuarine system, supporting over 750 species and supplying drinking water to 25 million people and irrigation water to 4 million acres of farmland.

Background

The WaterFix project evolved from the BDCP, which was proposed as a Habitat Conservation Plan (HCP) to support the issuance of a 50-year incidental take permit under Section 10 of the Endangered Species Act (ESA). A joint federal and state Draft Environmental Impact Statement/Draft Environmental Impact Report (DEIS/DEIR) for the BDCP was released on December 13, 2013, with the U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS), and Bureau of Reclamation (Reclamation) as joint federal lead agencies for the DEIS, and the California Department of Water Resources (DWR) as the State lead agency for the DEIR. The BDCP included a major habitat restoration program, targeting over 150,000 acres, as well as a proposed new conveyance facility (tunnels) to transport water from the Sacramento River to existing pumps in the South Delta.

In August 2014, the federal and State lead agencies committed to supplement/recirculate the DEIS/DEIR in response to public comments received on that document, including those submitted by EPA on August 26, 2014. In a collaborative effort to resolve the issues that we had raised, EPA met frequently with DWR and the original federal lead agencies for several months after submitting our comments on the DEIS, and we appreciate the attention given to the analysis of the proposed project's impacts on specific water quality parameters.

In April 2015, Reclamation and DWR announced fundamental changes to the proposed project and changed its name from BDCP to the California WaterFix. The WaterFix project focuses on the construction and operation of proposed new water export intakes on the Sacramento River to divert water into a proposed 40 mile twin tunnel conveyance facility. Reclamation is now the sole lead federal agency. The proposed federal action has changed from implementing a Habitat Conservation Plan under

Section 10 of the ESA to modifying operations of the federal Central Valley Project (CVP) in order to accommodate new water conveyance infrastructure.

Project Benefits

The proposed project and alternatives would provide greater water supply reliability for the users of exported Delta water and would reduce certain adverse impacts of the CVP and State Water Project (SWP) on fish. The SDEIS shows that transporting water in tunnels would reduce the risks to CVP/SWP exports in several ways. The proposed tunnel project would provide greater protection against sudden degradation of exported freshwater caused by the catastrophic failure of the earthen levees in the Delta and the consequent intrusion of saltwater that could foul supplies of water for municipal, agricultural and industrial consumption. Given the potential for earthquakes and floods in the region and the numerous earthen levees encircling the Delta islands, water supply security is a significant concern. Transporting water via tunnels would substantially address longer term threats to export water quality caused by sea level rise, with its concomitant salt water intrusion. The proposed project would also enhance CVP/SWP project flexibility by adding a northern diversion point. The current system, which relies solely on the southerly intakes, provides limited operational flexibility and at times results in reverse flows in Old and Middle Rivers which are associated with decreased survival of endangered fishes. Added flexibility would enable better real-time management of the export operations in response to observed movement of special status fish populations. Furthermore, the SDEIS predicts that flexible use of the proposed new intake facilities, combined with the establishment of biological criteria for operation, the installation of state-of-the-art fish screens, and the reduction of reverse flows in Old and Middle Rivers, would reduce the entrapment of certain fish species into poor habitats and the entrainment of fish into the CVP/SWP system. By making these physical and operational changes in the Delta, the proposed project would address some of the many identified stressors to aquatic resources in the Delta. In addition, although not part of the WaterFix project, the State of California has launched a separate EcoRestore initiative to pursue the restoration and stewardship of 30,000 acres of floodplains, riparian forests, and wetlands within the Delta over the next four years. As this significant conservation effort was not part of the SDEIS, it was not reviewed or rated as part of our NEPA review.

Project Purpose and Need

As stated in the SDEIS, the purpose and need for the WaterFix project, as was the case for the BDCP, is to advance the co-equal goals set forth in the Delta Reform Act of 2009. Those are (1) to provide a more reliable water supply for California, and (2) to protect, restore, and enhance the Delta ecosystem. EPA recognizes the crucial public health, economic, and ecological importance of both goals. The proposed project and the alternatives evaluated in the SDEIS support the water reliability component, but largely defer actions necessary to protect water quality and aquatic life to the future.

As has been discussed throughout the development of this project, the most essential decision for achieving the desired balance between water reliability and restoration of the Bay Delta ecosystem is how freshwater flows through the Delta will be managed. This key decision is not described in the SDEIS and is, instead, deferred to future regulatory processes administered by the State of California in consultation with federal resource and regulatory agencies. The decision by the State of California and Reclamation to defer these decisions means that the impacts of the WaterFix project on the Delta ecosystem cannot be fully evaluated at this time, and that any attempt to describe the environmental impacts of the project is necessarily incomplete. Once those decisions, described below, are concluded, the evaluation of possible impacts and consideration of alternatives can be completed.

Aquatic Habitat and Water Quality

As noted above, the project has been significantly revised since the initial DEIS, yet the SDEIS relies on modeling results that are based on the BDCP alternatives. Information in the SDEIS indicates that the modeling completed for the BDCP alternatives is not necessarily representative of the environmental effects resulting from the WaterFix alternatives. NMFS and FWS concluded in 2008 and 2009, respectively, that continued operation of the CVP/SWP would jeopardize the existence of delta smelt, winter-run Chinook salmon, green sturgeon and several other fish species. Even with the predictive limitations of the modeling, the SDEIS predicts a loss of valuable aquatic habitat for many fish species in the Delta and upstream tributaries due to the combined effects of the WaterFix project, CVP/SWP exports, climate change, and increased water diversions upstream of the Delta in the Sacramento River Basin. These species have experienced sharp population declines in the last decade and showed record low abundance over the last five years. Information presented in the SDEIS shows that the WaterFix project could reduce habitat conditions for delta smelt, winter-run Chinook salmon, green and white sturgeon, striped bass, and American shad, and result in a decline of longfin smelt abundance. For example, according to the SDEIS, winter-run Chinook salmon and sturgeon may be negatively impacted when migrating past new intakes, because significant volumes of freshwater flows are diverted at the intakes resulting in less water that is also of lower quality downstream of the intakes. The SDEIS also predicts that selenium concentrations in sturgeon would increase by 12-19% as a result of the proposed project, and would exceed the FWS and NMFS benchmark for adverse impacts to sensitive species.

The modeling results presented in the SDEIS show predicted exceedances of a salinity standard at both Prisoner's Point and Emmaton. The water quality modeling predicts that the Western Delta and Suisun Marsh will become saltier over time, which is likely to cause increased exceedances of chloride criteria near municipal water supply intakes. Mitigation actions are identified in the SDEIS to prevent exceedances, and the compliance history shows that salinity standards have rarely been exceeded in non-drought years. Nevertheless, if the proposed project operations contribute to a general increase in salinity in the Delta, the flexibility that Reclamation and DWR have to operate the system to ensure that water quality criteria are met will be seriously diminished, and the two agencies will have little room for error in operating the system to protect beneficial uses and achieve the co-equal goals.

While the impacts stated above may be mitigated by appropriately timed increased flows and habitat restoration, the WaterFix project does not propose additional flows in the Delta, nor does it propose significant habitat restoration (See EcoRestore above). CVP/SWP operation scenarios that propose additional outflow, such as BDCP Alternatives 7 and 8 from the DEIS, could provide substantially more water for resident and migratory fish and provide benefits to aquatic life; however, these were not evaluated as alternatives in the SDEIS.

Pending Regulatory Actions

Several pending regulatory actions are important to understanding the full impacts of the project. First, the State Water Resources Control Board (State Water Board) will be acting on Reclamation's and DWR's recent request to add points of freshwater diversion from the South Delta to the Sacramento River in the North Delta (at the northern end of the new conveyance facility). This State regulatory action is likely to include terms and conditions, including flow requirements, that could modify proposed WaterFix operations sufficiently to produce environmental and water supply effects that have not been analyzed in the SDEIS. Additionally, the State Water Board is in the midst of comprehensively updating water quality standards through the Bay Delta Water Quality Control Plan (Bay Delta WQCP). The updated standards could result in freshwater flow management provisions and corresponding changes to water supply diversions throughout the watershed that have not been analyzed

in the SDEIS. The Delta is listed as impaired for several water quality parameters under Section 303(d) of the CWA. EPA is working closely with the State Water Board to ensure that the revised standards are sufficient to address impaired water quality conditions in the Delta and reverse the declines in the fish species. The updated standards could result in altered environmental and water supply impacts that have not been analyzed in the SDEIS.

Second, ESA Section 7 consultation with FWS and NMFS regarding the construction and operation of new conveyance facilities is underway. We understand that the FWS and NMFS are not relying solely on the SDEIS for the Section 7 consultation process and that additional information is being generated to identify criteria for operating the new WaterFix facilities, to be included in the Biological Opinions and Incidental Take Permits. This information and such operating criteria could result in environmental impacts that have not been analyzed in the SDEIS.

Third, construction of WaterFix's new water intake and conveyance infrastructure would require authorization under Clean Water Act Section 404, as well as a Rivers and Harbors Act Section 14 modification of levees permit, from the U.S. Army Corps of Engineers. Water quality and aquatic life analyses in the SDEIS show that the proposed project may cause or contribute to violations of state water quality standards and significant degradation of waters of the U.S.; therefore, additional avoidance and minimization of environmental impacts and/or compensatory mitigation may be necessary in order to comply with CWA Section 404. It is also likely that additional information and analysis not included in the SDEIS will be required to support those permit decisions and that information and analysis will better inform the overall evaluation.

All of the above listed regulatory processes will develop new data and likely new compliance requirements beyond those provided in the SDEIS. EPA understands that these as yet incomplete regulatory requirements will be addressed through the pending actions by the State Water Resources Control Board, FWS, NMFS, and Corps of Engineers. These key decisions, and the analysis that will support them, are not yet done. Our statutory responsibility is to review the NEPA document that is in front of us at this time, however, the reality is that these future regulatory processes will have an important bearing on the project. Because these subsequent regulatory processes are likely to generate real world operational scenarios that are significantly different from the operations proposed in the SDEIS, the information is not yet available to reach definitive conclusions concerning the environmental impacts of the proposed project.

The tunnels that are discussed in detail in this draft NEPA document are an important improvement for water reliability, but the choices that will affect the operation of the tunnels, and thus the overall impacts of the project, will not be made until future regulatory actions are completed. These future decisions will supply the missing pieces necessary to determine the environmental impact of the entire project. The unusual circumstances of this project mean that the information is not yet available for a complete evaluation of environmental impacts – and for that reason a rating of *"3"(Inadequate)* for the SDEIS is required – but EPA expects that the project will continue to move forward, with those necessary additional pieces to be supplied as the later regulatory processes proceed. Under the unique circumstances of this case, the additional data, analysis and public input associated with these future regulatory processes are expected to provide the needed supplemental information to allow a full review of the environmental impacts without requiring another draft supplemental EIS. EPA will have the opportunity to support Reclamation, other federal agencies, and the State of California as they collectively continue to define an environmentally sound and effective project that would operate in a manner that simultaneously supports water supply reliability and enhances the Delta's ecosystem. EPA

believes that the upcoming actions by USFWS, NMFS, the State Water Board, and the Corps of Engineers will be critical next steps in the design and review of the project, and EPA looks forward to continuing to work with these agencies as the project moves forward.

If you have any questions, please contact me at 415-947-8702. Alternatively, your office may contact Kathleen Johnson, Enforcement Division Director. Ms. Johnson can be reached at 415-972-3873.

Sincerely,

Jared Blumenfeld

7 Effects Determination

7.1 Introduction

The Biological Assessment's (BA) determination of effects for listed species and their designated critical habitat considers direct and indirect effects of the proposed action (PA) together with the effect of other activities that are interrelated or dependent on the PA. The BA also considers effects associated with actions identified in the environmental baseline and effects anticipated to result from future state or private activities that are reasonably certain to occur (cumulative effects). This Chapter presents a summary of the effects for listed species and their designated critical habitat discussed in detail in Chapters 4 to 6 of the BA. The effects determinations for terrestrial species in Suisun Marsh are provided in Appendix 6.C, *Suisun Marsh Species*.

7.2 Chinook Salmon, Sacramento River Winter-run ESU

7.2.1 Sacramento River Upstream of Delta

Upstream quantitative analyses of temperature and flow effects are based on CalSim II modeling. The uncertainties associated with using CalSim II outputs must be considered in interpreting biological analyses (Appendix 5.A, *CALSIM Methods and Results*). CalSim II is a long-term planning model that allows for quantitative simulation of the CVP and SWP operations on a monthly time-step across a wide range of hydrologic, regulatory and operations instances. CalSim II uses a set of pre-defined generalized rules, which represent the assumed regulations, to specify operations of the CVP/SWP. These rules are often specified as a function of year type or a prior month's simulated storage or flow condition. As described above, the model has no capability of adjusting these rules to respond to specific events that may have occurred historically, e.g., fish presence, levee failures, fluctuations in barometric pressure that may have affected Delta tides and salinities, facility outages, etc. These generalized rules have been developed based on historical operational trends and on limited CVP/SWP operator input and only provide a coarse representation of the project operations over the inputted hydrologic conditions. Thus, results do not exactly match what operators might do in a specific month or year within the simulation period since the latter will be informed by numerous real-time considerations that cannot be input to CalSim II. Rather, results are intended to be a reasonable representation of long-term operational trends of CVP and SWP, providing the ability to compare and contrast the effect of current and assumed future operational conditions.

Analysis of potential effects of the PA on Sacramento River winter-run Chinook salmon in the Sacramento River upstream of the Delta found differences between the NAA and PA that include

- Increased frequency of water temperature threshold exceedances during August through October coinciding with the winter-run Chinook salmon spawning and rearing period;
- Increased risk of redd dewatering for egg cohorts spawned in June and August; and
- Reduced flows in above normal, below normal, and dry water years during September and in wet and above normal water years during November that could affect juvenile migration.

The reduced Shasta releases associated with the PA's operational modeling result in the modeled increased frequency of the water temperature threshold exceedances during September. However, modeling of the cold-water pool volume, which is more indicative of temperature management, suggests PA end-of-September storage similar to that of the NAA (Appendix 5.C, *Upstream Water Temperature Methods and Results*). Based on the proposed decision making approaches and criteria for real-time cold-water pool management efforts described in Section 3.1.5, *Real-Time Operations Upstream of the Delta*, and 3.3.3, *Real-Time Operational Decision-Making Process*, releases from Shasta Lake under the PA will be at similar levels as the NAA during September. Thus, the PA will not result in higher September water temperatures. Considering these results, the frequency and magnitude of differences in effects between NAA and the PA are so small as to be biologically insignificant to the species. The PA will provide flows and water temperatures for spawning, rearing, and migration consistent with those required by NMFS (2009, 2011). As such, there will be no take of winter-run Chinook salmon in areas upstream of the Delta, other than the take previously authorized by NMFS (2009).

The effects described above will be further minimized, in a manner that cannot be demonstrated within the limitations of the CalSim II modeling environment, by day-to-day decision-making on the part of the CVP/SWP operators. These decisions consider the recommendations from many of the decision-making/advisory teams, such as the Sacramento River Temperature Technical Group (SRTTG), Water Operations Management Team (WOMT), b2 interagency team (B2IT) and American River Operations Group. The current decision-making processes and the advisory groups will continue and will be improved under the PA (Section 3.1.5, *Real-Time Operations Upstream of the Delta*, and Section 3.3, *Operations and Maintenance for the New and Existing Facilities*). A separate real time operations coordination team (RTOCT) will meet to assist DWR and Reclamation in fulfilling their responsibility to inform the SWP and CVP participants regarding available information and real-time decisions. This coordination effort may also periodically review how to enhance or strengthen the scientific and technical information used to inform decision-making, and how to communicate with the public and other interested parties. This revised process and RTOCT will allow for alternative criteria to be developed, based on the results of coordinated monitoring and research under real-time operations (RTO) and the Adaptive Management Program, that will continue to address effects to listed species under future operations of the PA consistent with the applicable requirements of the ESA, while maximizing water supplies.

In addition, Reclamation will work with NMFS and other state and Federal agencies to adjust the RPA Action Suite 1.2, as described in Section 3.1.4.5, *Annual/Seasonal Temperature Management Upstream of the Delta*. This process is anticipated to conclude in the fall of 2016, and may include refinements and additions to the existing annual/seasonal temperature management processes, including spring storage targets, revised temperature compliance criteria and a range in summertime Keswick release rates. The adjusted RPA Action Suite I.2 will apply to Reclamation's Shasta operations. This RPA revision process is intended to improve egg-to-fry survival of winter-run Chinook salmon to Red Bluff, but would likely improve survival of other races of Chinook salmon, steelhead, and green sturgeon, depending on the timing of refinements that will be made.

7.2.2 Sacramento-San Joaquin Delta

The PA is expected to result in incidental take of Sacramento River winter-run Chinook salmon associated with construction effects of the PA by mechanisms including underwater noise from pile driving, in-water use of construction equipment, fish rescue efforts, and possibly the accidental discharge of contaminants (Section 5.2, *Effects of Water Facility Construction on Fish*). The effects of construction activities will be minimized through avoidance and minimization measures. Temporary and permanent habitat losses will be offset by 4.3 miles of channel margin enhancement and 154.8 acres of tidal perennial habitat restoration (Table 3.4-1).

The PA has the potential to result in incidental take of Sacramento River winter-run Chinook salmon through operational effects that include entrainment (Sections 5.4.1.3.1.1.1.1 *Entrainment* and 5.4.1.3.1.1.2.1 *Entrainment*), impingement (Section 5.4.1.3.1.1.1.2 *Impingement and Screen Contact*), and predation (Sections 5.4.1.3.1.1.1.3 *Predation* and 5.4.1.3.1.1.2.2 *Predation*) at the NDD (see also Section 5.4.1.4.1.1.1 *Risk to Salmonids from North Delta Exports*) and south Delta facilities (see also Section 5.4.1.4.1.1.2 *Risk to Salmonids from South Delta Exports*), and changes in flows that may affect migratory success (Section 5.4.1.3.1.2.1 *Indirect Mortality Within the Delta;* Section 5.4.1.4.1.2.1 *Risk to Salmonids from Indirect Mortality Within the Delta*) and availability of inundated riparian bench habitat (Section 5.4.1.3.1.2.2.1.1 *Operational Effects;* Section 5.4.1.4.1.2.2 *Risk to Salmonids from Changes in Habitat Suitability*). PA operations in compliance with NMFS (2009) BiOp conditions together with the additional PA proposed operational criteria for south Delta, NDD, and DCC provide protection during the winter and spring, thereby reducing the impact of CVP/SWP Delta operations on Chinook salmon. The RTO and adaptive management and monitoring provisions included in the PA provide additional opportunities to refine the operating criteria and make adjustments to the CVP/SWP Delta operations to minimize the risk of incidental take while maximizing water supply. Adverse operational effects will be offset by restoring channel margin habitat (Section 5.4.1.3.1.2.2.1.2 *Channel Margin Enhancement*) and installing a nonphysical barrier at the Sacramento River-Georgiana Slough divergence (Section 5.4.1.3.1.2.1.2.2 *Nonphysical Fish Barrier at Georgiana Slough*). Projected operation of other Delta facilities (for example, the North Bay Aqueduct, Rock Slough Diversion, and the Suisun Marsh Salinity Control Gates [SMSCG]) is expected to result in a discountable risk of incidental take of Sacramento River winter-run Chinook salmon (Sections 5.4.1.3.1.1.5 through 5.4.1.3.1.1.7, *Suisun Marsh Facilities, North bay Aqueduct,* and *Other Facilities,* respectively; Sections 5.4.1.4.1.1.5 through 5.4.1.4.1.1.7 *Risk to Salmonids from Suisun Marsh Facilities, Risk to Salmonids from North Bay Aqueduct,* and *Risk to Salmonids from Other Facilities,* respectively).

7.2.3 Cumulative Effects and the Changing Baseline

Cumulative effects on Sacramento River winter-run Chinook salmon include effects associated with water diversions, agricultural practices, increased urbanization, and wastewater treatment plants. These effects will accrue over the duration of the PA. Non-federal water diversions are potentially a cause of mortality via entrainment, but ongoing projects such as the CVPIA fish screen program are reducing the number of such diversions and their mortality risk, so this effect is likely to diminish over time. Potentially adverse agricultural practices primarily entail water

quality impairments; the action area is already fully developed with regard to agricultural land uses, and regulations in place constrain the associated water quality effects, so this effect is likely to be maintained in the future. Adverse effects of urbanization include point and nonpoint-source water quality impairments, and increased vessel traffic in waterways. These activities are likely to further degrade Chinook salmon habitat over time. Wastewater treatment plants also contribute to impaired water quality, but significant improvements in discharge water quality and reductions in discharge water volume have occurred in recent years, primarily in response to regulatory and economic factors increasing the value of reusable water; thus this stressor is likely to diminish over time. Some of these effects will improve, and others will impair habitat quality for Chinook salmon in the action area; their net effect is to approximately maintain current conditions for the foreseeable future because improvements are generally implemented to compensate for adverse project effects through the ESA consultation and other environmental review processes. These cumulative effects have little potential to impair the effectiveness of avoidance and minimization measures described in the PA, nor are they expected to alter the efficacy of offsetting measures in the PA such as habitat creation and restoration.

The environmental baseline for Sacramento River winter-run Chinook salmon is described in Chapter 4. Due to the span of time until the beginning of water operations under the proposed action, and over the course of the proposed operations, the baseline is expected to change. The principal such changes concern climate change, and certain federal actions that are reasonably certain to occur but have not yet been implemented.

Foreseeable climate change effects, described in Section 4.3.2.1 *Climate Conditions*, include sea level rise, reduced Sierra Nevada winter snowpack, warmer water temperatures, and increased climate variability as seen in changes such as more severe winter storms, more intense droughts, larger floods, etc. These effects will tend to impair habitat quality and quantity for Chinook salmon, and also to increase year-to-year fluctuations in population sizes. There will also be changes in the marine environment where Chinook salmon spend most of their life cycle. Marine changes, and their likely effects upon Chinook salmon, are difficult to forecast, and may include both beneficial and adverse consequences.

Federal actions that are reasonably certain to occur but have not yet been implemented primarily include habitat protection and restoration requirements and passage above dams on the Sacramento River, included in the NMFS (2009) BiOp. These actions are expected to have beneficial consequences for adult and juvenile passage, and for juvenile migration and rearing, within the action area.

7.2.4 Determination of Effects to Sacramento River Winter-run Chinook Salmon ESU

The PA is likely to adversely affect the Sacramento River winter-run Chinook salmon ESU due to incidental take associated with facility construction and operation.

7.2.5 Determination of Effects to Sacramento River Winter-run Chinook Salmon ESU Designated Critical Habitat

Due to the implementation of avoidance and minimization measures and the construction of habitat restoration measures, the PA will minimize effects on the physical and biological

features of the Sacramento River winter-run Chinook salmon designated critical habitat. Restoration measures proposed under the PA include 154.8 acres of tidal perennial aquatic habitat and 4.3 miles of channel margin habitat, as described in Section 3.4 *Conservation Measures*.

The physical and biological features (PBFs)[1] of critical habitat for winter-run Chinook salmon include: (1) access to spawning areas in the upper Sacramento River; (2) the availability of clean gravel for spawning substrate; (3) adequate river flows for successful spawning, incubation of eggs, fry development and emergence, and downstream transport of juveniles; (4) water temperatures for successful spawning, egg incubation, and fry development; (5) habitat areas and adequate prey that are not contaminated; (6) riparian habitat that provides for successful juvenile development and survival; and (7) access downstream so that juveniles can migrate from spawning grounds to San Francisco Bay and the Pacific Ocean.

As discussed in Chapter 5, *Effects Analysis for Chinook Salmon, Central Valley Steelhead, Green Sturgeon, and Killer Whale*, Section 5.4.2.1.5.1, *Winter-Run Chinook Salmon*, upstream of the Delta, these PBFs could only be affected by the PA through changes in instream flows and water temperatures. Because any effects of the project on flow and water temperature upstream of the Delta will be insignificant and consistent with the requirements of NMFS (2009), the PA will have insignificant effects on these PBFs. These insignificant effects will be further minimized, in a manner that cannot be demonstrated within the limitations of the CalSim II modeling environment, by real-time operations as described in Section 3.1.5, *Real-Time Operations Upstream of the Delta*, and Section 3.3.3, *Real-Time Operational Decision-Making Process*, which will be used to avoid and minimize the modeled effects found in this effects analysis.

As described in Section 5.4.1.5, *Effects of the Action on Designated Critical Habitat*, within the Delta, operational criteria (bypass flows) will minimize the potential for adverse effects to PBF 7, downstream access, for juvenile winter-run Chinook salmon (e.g., from reduced Sacramento River flows downstream of the NDD influencing probability of survival because reduced transit speed), and the Georgiana Slough NPB will minimize near-field and far-field effects of the NDD on PBF 7 by keeping a greater proportion of juvenile winter-run Chinook salmon migrating down the Sacramento River out of the low-survival interior Delta. Channel margin enhancement of poor habitat will compensate for potential reduction in PBF 6, riparian habitat, at inundated bench areas caused by reductions in Sacramento River water level by the NDD.

[1] The designations of critical habitat for listed species have generally used the term primary constituent elements (PCEs). NMFS and USFWS' recently issued a final rule amending the regulations for designating critical habitat (81 FR 7414; February 11, 2016), which replaced the term PCEs with physical or biological features (PBFs). In addition, NMFS and USFWS' recently issued a final rule revising the regulatory definition of "destruction or adverse modification" of critical habitat (81 FR 7214; February 11, 2016), which refers to PBFs, not PCEs. The shift in terminology does not change the approach used in conducting an analysis of the effects of the proposed action on critical habitat, which is the same regardless of whether the original designation identified PCEs or PBFs. In this biological assessment, we use the term PBFs to include PCEs, as appropriate for the specific critical habitat, for NMFS species.

In summary, the PA is likely to adversely affect the physical and biological features of designated critical habitat for Sacramento River winter-run Chinook salmon because the temporary impairment of critical habitat functions associated with in-water construction activities, permanent impairment associated with permanent placement of in-water structures, and potential impairment associated with flow diversion at the NDDs. However, these effects will be avoided, minimized, and/or compensated. The impairment associated with in-water construction activities will be minimized through avoidance and minimization measures. The impairment associated with permanent placement of in-water structures will be offset by habitat restoration in the form of tidal perennial aquatic habitat restoration and channel margin enhancement. The impairment associated with flow diversion will be minimized through real-time operations that use transitional flow criteria based on fish presence, installing a nonphysical barrier at the Sacramento River-Georgiana Slough divergence, and restoring channel margin habitat.

7.3 Chinook Salmon, Central Valley Spring–run ESU

7.3.1 Sacramento River Upstream of Delta

Upstream quantitative analyses of temperature and flow effects are based on CalSim II modeling. The uncertainties associated with using CalSim II outputs must be considered in interpreting biological analyses (Appendix 5.A, *CALSIM Methods and Results*). CalSim II is a long-term planning model that allows for quantitative simulation of the CVP and SWP operations on a monthly time-step across a wide range of hydrologic, regulatory and operations instances. CalSim II uses a set of pre-defined generalized rules, which represent the assumed regulations, to specify operations of the CVP/SWP. These rules are often specified as a function of year type or a prior month's simulated storage or flow condition. As described above, the model has no capability of adjusting these rules to respond to specific events that may have occurred historically, e.g., fish presence, levee failures, fluctuations in barometric pressure that may have affected Delta tides and salinities, facility outages, etc. These generalized rules have been developed based on historical operational trends and on limited CVP/SWP operator input and only provide a coarse representation of the project operations over the inputted hydrologic conditions. Thus, results do not exactly match what operators might do in a specific month or year within the simulation period since the latter will be informed by numerous real-time considerations that cannot be input to CalSim II. Rather, results are intended to be a reasonable representation of long-term operational trends of CVP and SWP, providing the ability to compare and contrast the effect of current and assumed future operational conditions.

Analysis of potential effects of the PA on Central Valley spring-run Chinook salmon in the Sacramento River upstream of the Delta found differences between the NAA and PA that include

- Increased frequency of water temperature threshold exceedances during August through October coinciding with the spring-run Chinook salmon spawning and rearing period;

- Increased risk of redd dewatering for egg cohorts spawned in August;

- Decreased rearing WUA during June in some portions of the Sacramento River, if population numbers were high enough that habitat could be limiting[2];

- Reduced flows in above normal, below normal, and dry water years during September that could affect adult migration and in wet and above normal water years during November that could affect juvenile migration.

The reduced Shasta releases associated with the PA's operational modeling result in the modeled increased frequency of water temperature threshold exceedances during September. However, modeling of the cold-water pool volume, which is more indicative of temperature management, suggests PA end-of-September storage similar to that of the NAA (Appendix 5.C, *Upstream Water Temperature Methods and Results*). Based on the proposed decision making approaches and criteria for real-time cold-water pool management efforts described in Section 3.1.5, *Real-Time Operations Upstream of the Delta,* and 3.3.3, *Real-Time Operational Decision-Making Process*, releases from Shasta Lake under the PA will be at similar levels as the NAA during September. Thus, the PA will not result in higher September water temperatures. Considering these results, the frequency and magnitude of differences in effects between NAA and the PA are so small as to be biologically insignificant to the species. The PA will provide flows and water temperatures for spawning, rearing, and migration consistent with those required by NMFS (2009). As such, there will be no take of spring-run Chinook salmon in areas upstream of the Delta, other than the take previously authorized by NMFS (2009).

The effects described above will be further minimized in a manner that cannot be demonstrated within the limitations of the CalSim II modeling environment, by day-to-day decision-making on the part of the CVP/SWP operators. These decisions consider the recommendations from many of the decision-making/advisory teams, such as the Sacramento River Temperature Technical Group (SRTTG), Water Operations Management Team (WOMT), b2 interagency team (B2IT) and American River Operations Group. The current decision-making processes and the advisory groups will continue and will be improved under the PA (Section 3.1.5, *Real-Time Operations Upstream of the Delta*, and Section 3.3, *Operations and Maintenance for the New and Existing Facilities*). A separate real time operations coordination team (RTOCT) will meet to assist DWR and Reclamation in fulfilling their responsibility to inform the SWP and CVP participants regarding available information and real-time decisions. This coordination effort may also periodically review how to enhance or strengthen the scientific and technical information used to inform decision-making, and how to communicate with the public and other interested parties. This revised process and RTOCT will allow for alternative operating criteria to be developed, based on the results of the coordinated monitoring and research under real-time operations (RTO) and the Adaptive Management Program, that will continue to address effects to listed species under future operations of the PA consistent with the applicable requirements of the ESA, while maximizing water supplies.

[2] Habitat limitation has not been a concern in recent years due to low population size, but it could be in the future if population size was to increase or there was a strong year class. Awareness of the effects to be managed in the best interest of the species is necessary, regardless of variability in population size.

In addition, Reclamation will work with NMFS and other state and Federal agencies to adjust the RPA Action Suite 1.2, as described in Section 3.1.4.5, *Annual/Seasonal Temperature Management Upstream of the Delta*. This process is anticipated to conclude in the fall of 2016, and may include refinements and additions to the existing annual/seasonal temperature management processes, including spring storage targets, revised temperature compliance criteria and a range in summertime Keswick release rates. The adjusted RPA Action Suite I.2 will apply to Reclamation's Shasta operations. This RPA revision process is intended to improve egg-to-fry survival of winter-run Chinook salmon to Red Bluff, but would likely improve survival of spring-run Chinook salmon as well, depending on the timing of refinements that will be made.

7.3.2 Sacramento-San Joaquin Delta

The PA is expected to result in incidental take of Central Valley spring-run Chinook salmon associated with construction effects of the PA by mechanisms including underwater noise from pile driving, in-water use of construction equipment, fish rescue efforts, and possibly the accidental discharge of contaminants (Section 5.2, *Effects of Water Facility Construction on Fish*). The effects of construction activities will be minimized through avoidance and minimization measures. Temporary and permanent habitat losses will be offset by 4.3 miles of channel margin enhancement and 154.8 acres of tidal perennial habitat restoration (Table 3.4-1).

The PA has the potential to result in incidental take to Central Valley spring-run Chinook salmon through operational effects that include entrainment (Sections 5.4.1.3.1.1.1.1, *Entrainment* and 5.4.1.3.1.1.2.1, *Entrainment*), impingement (Section 5.4.1.3.1.1.1.2, *Impingement and Screen Contact*), and predation (Sections 5.4.1.3.1.1.1.3, *Predation*, and 5.4.1.3.1.1.2.2, *Predation*) at the NDD (see also Section 5.4.1.4.1.1.1 *Risk to Salmonids from North Delta Exports*) and south Delta facilities (see also Section 5.4.1.4.1.1.2 *Risk to Salmonids from South Delta Exports*), and changes in flows that may affect migratory success (Section 5.4.1.3.1.2.1, *Indirect Mortality Within the Delta;* Section 5.4.1.4.1.2.1 *Risk to Salmonids from Indirect Mortality Within the Delta*) and availability of inundated riparian bench habitat (Section 5.4.1.3.1.2.2.1.1, *Operational Effects;* Section 5.4.1.4.1.2.2 *Risk to Salmonids from Changes in Habitat Suitability*), although San Joaquin River basin spring-run Chinook would not be affected by NDD construction or operations. PA operations in compliance with NMFS (2009) BiOp conditions together with the additional PA proposed operational criteria for south Delta, NDD, and DCC provide protection during the winter and spring, thereby reducing the impact of CVP/SWP Delta operations on Chinook salmon. The RTO and adaptive management and monitoring provisions included in the PA provide additional opportunities to refine the operating criteria and adjust the CVP/SWP Delta operations to minimize the risk of incidental take while maximizing water supply. Adverse operational effects will be offset by restoring channel margin habitat (Section 5.4.1.3.1.2.2.1.2, *Channel Margin Enhancement*) and installing a nonphysical barrier at the Sacramento River-Georgiana Slough divergence (Section 5.4.1.3.1.2.1.2.2, *Nonphysical Fish Barrier to Georgiana Slough*). Projected operation of other Delta facilities (for example, the North Bay Aqueduct, Rock Slough Diversion, and the Suisun Marsh Salinity Control Gates [SMSCG]) is expected to result in a discountable risk of incidental take of Central Valley spring-run Chinook salmon(Sections 5.4.1.3.1.1.5 through 5.4.1.3.1.1.7, *Suisun Marsh Facilities, North Bay Aqueduct, and Other Facilities*, respectively; Sections 5.4.1.4.1.1.5

through 5.4.1.4.1.1.7 *Risk to Salmonids from Suisun Marsh Facilities, Risk to Salmonids from North Bay Aqueduct,* and *Risk to Salmonids from Other Facilities*, respectively; Sections 5.4.1.4.1.1.5 through 5.4.1.4.1.1.7 *Risk to Salmonids from Suisun Marsh Facilities, Risk to Salmonids from North Bay Aqueduct*, and *Risk to Salmonids from Other Facilities*, respectively). Additionally, the PA would result in benefits to San Joaquin River basin spring-run Chinook due to the reduced use of the south Delta facilities (*Section 5.4.1.4.1.1.2 Risk to Salmonids from South Delta Exports).*

7.3.3 Cumulative Effects and the Changing Baseline

Cumulative effects on Central Valley spring-run Chinook salmon are the same as those effects on the Sacramento River winter-run Chinook salmon and include effects associated with water diversions, agricultural practices, increased urbanization, and wastewater treatment plants. These effects will accrue over the duration of the PA. Non-federal water diversions are potentially a cause of mortality via entrainment, but ongoing projects such as the CVPIA fish screen program are reducing the number of such diversions and their mortality risk, so this effect is likely to diminish over time. Potentially adverse agricultural practices primarily entail water quality impairments; the action area is already fully developed with regard to agricultural land uses, and regulations in place constrain the associated water quality effects, so this effect is likely to be maintained in the future. Adverse effects of urbanization include point and nonpoint-source water quality impairments, and increased vessel traffic in waterways. These activities are likely to further degrade Chinook salmon habitat over time. Wastewater treatment plants also contribute to impaired water quality, but significant improvements in discharge water quality and reductions in discharge water volume have occurred in recent years, primarily in response to regulatory and economic factors increasing the value of reusable water; thus this stressor is likely to diminish over time. Some of these effects will improve, and others will impair habitat quality for Chinook salmon in the action area; their net effect is to approximately maintain current conditions for the foreseeable future because improvements are generally implemented to compensate for adverse project effects through the ESA consultation and other environmental review processes. These cumulative effects have little potential to impair the effectiveness of avoidance and minimization measures described in the PA, nor are they expected to alter the efficacy of offsetting measures in the PA such as habitat creation and restoration.

The environmental baseline for Central Valley spring-run Chinook salmon is described in Chapter 4. Due to the span of time until the beginning of water operations under the proposed action, and over the course of the proposed operations, the baseline is expected to change. The principal such change concern climate change, and certain federal actions that are reasonably certain to occur but have not yet been implemented.

Foreseeable climate change effects, described in Section 4.3.2.1 *Climate Conditions*, include sea level rise, reduced Sierra Nevada winter snowpack, warmer water temperatures, and increased climate variability as seen in changes such as more severe winter storms, more intense droughts, larger floods, etc. These effects will tend to impair habitat quality and quantity for Chinook salmon, and also to increase year-to-year fluctuations in population sizes. There will also be changes in the marine environment where Chinook salmon spend most of their life cycle. Marine changes, and their likely effects upon Chinook salmon, are difficult to forecast, and may include both beneficial and adverse consequences.

Federal actions that are reasonably certain to occur but have not yet been implemented primarily include habitat protection and restoration requirements and passage above dams on the Sacramento and American Rivers, included in the NMFS (2009) BiOp. These actions are expected to have beneficial consequences for adult and juvenile passage, and for juvenile migration and rearing, within the action area.

7.3.4 Determination of Effects to Central Valley Spring-run Chinook Salmon ESU

The PA is likely to adversely affect the Central Valley spring-run Chinook salmon ESU due to incidental take associated with facility construction and operation.

7.3.5 Determination of Effects to Central Valley Spring-run Chinook Salmon ESU Designated Critical Habitat

Due to the implementation of avoidance and minimization measures and the construction of habitat restoration measures, the PA will minimize effects on the physical and biological features of the Central Valley spring-run Chinook salmon designated critical habitat. Restoration measures proposed under the PA include 154.8 acres of tidal perennial aquatic habitat and 4.3 miles of channel margin habitat, as described in Section 3.4 *Conservation Measures*.

The physical and biological features (PBFs)[3] of critical habitat for Central Valley spring-run Chinook salmon include: (1) spawning habitat with water quantity and quality conditions and substrate supporting spawning, incubation and larval development; (2) freshwater rearing habitat with water quantity and quality, floodplain connectivity, forage, and natural cover supporting juvenile development, growth, mobility, and survival; (3) freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover supporting juvenile and adult mobility and survival; and (4) estuarine areas free of obstruction and excessive predation supporting mobility and survival, with water quantity, water quality, and salinity conditions supporting juvenile and adult physiological transitions between fresh and saltwater, and natural cover and forage supporting growth, maturation and survival.

As discussed in Chapter 5, *Effects Analysis for Chinook Salmon, Central Valley Steelhead, Green Sturgeon, and Killer Whale*, Section 5.4.2.1.5.2, *Spring-Run Chinook Salmon*, upstream of the Delta, these PBFss could only be affected by the PA through changes in instream flows and water temperatures. Because any effects of the project on flow and water temperature upstream of the Delta will be insignificant and consistent with the requirements of NMFS (2009), the PA will have insignificant effects on these PBFs. These insignificant effects will be

[3] The designations of critical habitat for listed species have generally used the term primary constituent elements (PCEs). NMFS and USFWS' recently issued a final rule amending the regulations for designating critical habitat (81 FR 7414; February 11, 2016), which replaced the term PCEs with physical or biological features (PBFs). In addition, NMFS and USFWS' recently issued a final rule revising the regulatory definition of "destruction or adverse modification" of critical habitat (81 FR 7214; February 11, 2016), which refers to PBFs, not PCEs. The shift in terminology does not change the approach used in conducting an analysis of the effects of the proposed action on critical habitat, which is the same regardless of whether the original designation identified PCEs or PBFs. In this biological assessment, we use the term PBFs to include PCEs, as appropriate for the specific critical habitat, for NMFS species.

further minimized, in a manner that cannot be demonstrated within the limitations of the CalSim II modeling environment, by real-time operations as described in Section 3.1.5, *Real-Time Operations Upstream of the Delta*, and Section 3.3.3, *Real-Time Operational Decision-Making Process*, which will be used to avoid and minimize the modeled effects found in this effects analysis.

As described in Section 5.4.1.5, *Effects of the Action on Designated Critical Habitat*, and above for winter-run Chinook salmon, within the Delta, operational criteria (bypass flows) will minimize the potential for adverse effects to PBF 7, downstream access, for juvenile spring-run Chinook salmon (e.g., from reduced Sacramento River flows downstream of the NDD influencing probability of survival because of reduced transit speed), and the Georgiana Slough NPB will minimize near-field and far-field effects of the NDD on PBF 7 by keeping a greater proportion of juvenile spring-run Chinook salmon migrating down the Sacramento River out of the low-survival interior Delta.. Channel margin enhancement of poor habitat will compensate for potential reduction in PBF 6, riparian habitat at inundated bench areas caused by reductions in Sacramento River water level by the NDD..

In summary, the PA is likely to adversely affect the physical and biological features of designated critical habitat for Central Valley spring-run Chinook salmon because the temporary impairment of critical habitat functions associated with in-water construction activities, permanent impairment associated with permanent placement of in-water structures, and potential impairment associated with flow diversion at the NDDs. However, these effects will be avoided, minimized, and/or compensated. The impairment associated with in-water construction activities will be minimized through avoidance and minimization measures. The impairment associated with permanent placement of in-water structures will be offset by habitat restoration in the form of tidal perennial aquatic habitat restoration and channel margin enhancement. The impairment associated with flow diversion will be minimized through real-time operations that use transitional flow criteria based on fish presence.

7.4 Steelhead, California Central Valley DPS

7.4.1 Upstream (Sacramento and American Rivers)

Upstream quantitative analyses of temperature and flow effects are based on CalSim II modeling. The uncertainties associated with using CalSim II outputs must be considered in interpreting biological analyses (Appendix 5.A, *CALSIM Methods and Results*). CalSim II is a long-term planning model that allows for quantitative simulation of the CVP and SWP operations on a monthly time-step across a wide range of hydrologic, regulatory and operations instances. CalSim II uses a set of pre-defined generalized rules, which represent the assumed regulations, to specify operations of the CVP/SWP. These rules are often specified as a function of year type or a prior month's simulated storage or flow condition. As described above, the model has no capability of adjusting these rules to respond to specific events that may have occurred historically, e.g., fish presence, levee failures, fluctuations in barometric pressure that may have affected Delta tides and salinities, facility outages, etc. These generalized rules have been developed based on historical operational trends and on limited CVP/SWP operator input and only provide a coarse representation of the project operations over the inputted hydrologic conditions. Thus, results do not exactly match what operators might do in a specific month or

year within the simulation period since the latter will be informed by numerous real-time considerations that cannot be input to CalSim II. Rather, results are intended to be a reasonable representation of long-term operational trends of CVP and SWP, providing the ability to compare and contrast the effect of current and assumed future operational conditions.

Analysis of potential effects of the PA on California Central Valley steelhead in the Sacramento River upstream of the Delta and the American River found differences between the NAA and PA that include:

- Decreased rearing WUA during June in some portions of the Sacramento River, if population numbers were high enough that habitat could be limiting[4];
- Reduced flows in above normal, below normal, and dry water years during September that could affect adult migration in the Sacramento River and in wet and above normal water years during November that could affect juvenile and adult migration in the Sacramento River and adult migration in the American River.

The reduced Shasta releases associated with the PA's operational modeling result in the modeled reduced migratory flows during September. Based on the proposed decision making approaches and criteria for real-time reservoir operations described in Section 3.1.5, *Real-Time Operations Upstream of the Delta*, and 3.3.3, *Real-Time Operational Decision-Making Process*, releases from Shasta Lake under the PA will be at similar levels as the NAA during September. Thus, the PA will not result in adult California Central Valley steelhead experiencing reduced flows during September. Considering these results, the frequency and magnitude of differences in effects between NAA and the PA are so small as to be biologically insignificant to the species. The PA will provide flows and water temperatures for spawning, rearing, and migration consistent with those required by NMFS (2009). As such, there will be no take of steelhead in areas upstream of the Delta, other than the take previously authorized by NMFS (2009).

The effects described above will be further minimized, in a manner that cannot be demonstrated within the limitations of the CalSim II modeling environment, by day-to-day decision-making on the part of the CVP/SWP operators. These decisions consider the recommendations from many of the decision-making/advisory teams, such as the Sacramento River Temperature Technical Group (SRTTG), Water Operations Management Team (WOMT), b2 interagency team (B2IT) and American River Operations Group. The current decision-making processes and the advisory groups will continue and will be improved under the PA (Section 3.1.5, *Real-Time Operations Upstream of the Delta*, and Section 3.3, *Operations and Maintenance for the New and Existing Facilities*). A separate real time operations coordination team (RTOCT) will meet to assist DWR and Reclamation in fulfilling their responsibility to inform the SWP and CVP participants regarding available information and real-time decisions. This coordination effort may also periodically review how to enhance or strengthen the scientific and technical information used to inform decision-making, and how to communicate with the public and other interested parties.

[4] Habitat limitation has not been a concern in recent years due to low population size, but it could be in the future if population size was to increase or there was a strong year class. Awareness of the effects to be managed in the best interest of the species is necessary, regardless of variability in population size.

This revised process and RTOCT will allow for alternative operating criteria to be developed, based on the results of coordinated monitoring and research under the RTO and Adaptive Management Program, that will continue to address effects to listed species under future operations of the PA consistent with the applicable requirements of the ESA, while maximizing water supplies.

In addition, Reclamation will work with NMFS and other state and Federal agencies to adjust the RPA Action Suite 1.2, as described in Section 3.1.4.5, *Annual/Seasonal Temperature Management Upstream of the Delta*. This process is anticipated to conclude in the fall of 2016, and may include refinements and additions to the existing annual/seasonal temperature management processes, including spring storage targets, revised temperature compliance criteria and a range in summertime Keswick release rates. The adjusted RPA Action Suite I.2 will apply to Reclamation's Shasta operations. This RPA revision process is intended to improve egg-to-fry survival of winter-run Chinook salmon to Red Bluff, but would likely improve survival of steelhead as well, depending on the timing of refinements that will be made.

7.4.2 Sacramento-San Joaquin Delta

The PA is expected to result in incidental take of California Central Valley steelhead associated with construction effects of the PA by mechanisms including underwater noise from pile driving, in-water use of construction equipment, fish rescue efforts, and possibly the accidental discharge of contaminants (Section 5.2, *Effects of Water Facility Construction on Fish*). The effects of construction activities will be minimized through avoidance and minimization measures. Temporary and permanent habitat losses will be offset by 4.3 miles of channel margin enhancement and 154.8 acres of tidal perennial habitat restoration (Table 3.4-1).

The PA has the potential to result in incidental take to California Central Valley steelhead through entrainment (Sections 5.4.1.3.1.1.1.1 *Entrainment* and 5.4.1.3.1.1.2.1 *Entrainment*), impingement (Section 5.4.1.3.2.1.1.2 *Impingement and Screen Contact*), and predation (Sections 5.4.1.3.1.1.1.3 *Predation* and 5.4.1.3.1.1.2.2 *Predation*) at the NDD (see also Section 5.4.1.4.1.1.1 *Risk to Salmonids from North Delta Exports*) and south Delta facilities (see also Section 5.4.1.4.1.1.2 *Risk to Salmonids from South Delta Exports*), and changes in flows that may affect migratory success (Section 5.4.1.3.1.2.1 *Indirect Mortality Within the Delta*; Section 5.4.1.4.1.2.1 *Risk to Salmonids from Indirect Mortality Within the Delta*) and availability of inundated riparian bench habitat (Section 5.4.1.3.1.2.2.1.1, *Operational Effects;* Section 5.4.1.4.1.2.2 *Risk to Salmonids from Changes in Habitat Suitability*). PA operations in compliance with NMFS (2009) BiOp conditions together with the additional PA proposed operational criteria for south Delta, NDD, and DCC provide protection during the winter and spring, thereby reducing the impact of CVP/SWP Delta operations on steelhead. The RTO and adaptive management and monitoring provisions included in the PA provide additional opportunities to refine the operating criteria and make adjustments to CVP/SWP Delta operations to minimize the risks of incidental take while maximizing water supply. Adverse operational effects will be offset by restoring channel margin habitat (Section 5.4.1.3.1.2.2.1.2 *Channel Margin Enhancement*) and installing a nonphysical barrier at the Sacramento River-Georgiana Slough divergence (Section 5.4.1.3.1.2.1.2.2, *Nonphysical Fish Barrier at Georgiana Slough*). Projected operation of other Delta facilities (for example, the North Bay

Aqueduct, Rock Slough Diversion, and the Suisun Marsh Salinity Control Gates [SMSCG]) is expected to result in a discountable risk of take of California Central Valley steelhead (Sections 5.4.1.3.1.1.5 through 5.4.1.3.1.1.7, *Suisun Marsh Facilities, North Bay Aqueduct, and Other Facilities*, respectively; Sections 5.4.1.4.1.1.5 through 5.4.1.4.1.1.7 *Risk to Salmonids from Suisun Marsh Facilities, Risk to Salmonids from North Bay Aqueduct*, and *Risk to Salmonids from Other Facilities*, respectively).

7.4.3 Cumulative Effects and the Changing Baseline

Cumulative effects on California Central Valley steelhead are similar to those for both Sacramento River winter-run and Central Valley spring-run Chinook Salmon, and include effects associated with water diversions, agricultural practices, increased urbanization, and wastewater treatment plants. These effects will accrue over the duration of the PA. Non-federal water diversions are potentially a cause of mortality via entrainment, but ongoing projects such as the CVPIA fish screen program are reducing the number of such diversions and their mortality risk, so this effect is likely to diminish over time. Potentially adverse agricultural practices primarily entail water quality impairments; the action area is already fully developed with regard to agricultural land uses, and regulations in place constrain the associated water quality effects, so this effect is likely to be maintained in the future. Adverse effects of urbanization include point and nonpoint-source water quality impairments, and increased vessel traffic in waterways. These activities are likely to further degrade steelhead habitat over time. Wastewater treatment plants also contribute to impaired water quality, but significant improvements in discharge water quality and reductions in discharge water volume have occurred in recent years, primarily in response to regulatory and economic factors increasing the value of reusable water; thus this stressor is likely to diminish over time. Some of these effects will improve, and others will impair habitat quality for steelhead in the action area; their net effect is to approximately maintain current conditions for the foreseeable future because improvements are generally implemented to compensate for adverse project effects through the ESA consultation and other environmental review processes. These cumulative effects have little potential to impair the effectiveness of avoidance and minimization measures described in the PA, nor are they expected to alter the efficacy of offsetting measures in the PA such as habitat creation and restoration.

The environmental baseline for California Central Valley steelhead is described in Chapter 4. Due to the span of time until the beginning of water operations under the proposed action, and over the course of the proposed operations, the baseline is expected to change.. The principal such changes concern climate change, and certain federal actions that are reasonably certain to occur but have not yet been implemented.

Foreseeable climate change effects, described in Section 4.3.2.1, *Climate Conditions*, include sea level rise, reduced Sierra Nevada winter snowpack, warmer water temperatures, and increased climate variability as seen in changes such as more severe winter storms, more intense droughts, larger floods, etc. These effects will tend to impair habitat quality and quantity for steelhead, and also to increase year-to-year fluctuations in population sizes. There will also be changes in the marine environment where steelhead spend most of their life cycle. Marine changes, and their likely effects upon steelhead, are difficult to forecast, and may include both beneficial and adverse consequences.

Federal actions that are reasonably certain to occur but have not yet been implemented primarily include habitat protection and restoration requirements and passage above dams on the Sacramento and American Rivers, included in the NMFS (2009) BiOp. These actions are expected to have beneficial consequences for adult and juvenile passage, and for juvenile migration and rearing, within the action area.

7.4.4 Determination of Effects to California Central Valley Steelhead DPS

The PA is likely to adversely affect the California Central Valley steelhead DPS due to incidental take associated with facility construction and operation.

7.4.5 Determination of Effects to California Central Valley Steelhead DPS Designated Critical Habitat

Due to the implementation of avoidance and minimization measures and the construction of habitat restoration measures, the PA will minimize effects on the physical and biological features of the California Central Valley steelhead designated critical habitat. Restoration measures proposed under the PA include 154.8 acres of tidal perennial aquatic habitat and 4.3 miles of channel margin habitat, as described in Section 3.4 *Conservation Measures*..

The physical and biological features PBFs of critical habitat for California Central Valley steelhead include: (1) spawning habitat with water quantity and quality conditions and substrate supporting spawning, incubation and larval development; (2) freshwater rearing habitat with water quantity and quality, floodplain connectivity, forage, and natural cover supporting juvenile development, growth, mobility, and survival; (3) freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover supporting juvenile and adult mobility and survival; and (4) estuarine areas free of obstruction and excessive predation supporting mobility and survival, with water quantity, water quality, and salinity conditions supporting juvenile and adult physiological transitions between fresh and saltwater, and natural cover and forage supporting growth, maturation and survival.

As discussed in Chapter 5, *Effects Analysis for Chinook Salmon, Central Valley Steelhead, Green Sturgeon, and Killer Whale*, Section 5.4.2.1.5.3, *California Central Valley Steelhead*, upstream of the Delta these PBFs could only be affected by the PA through changes in instream flows and water temperatures. Because any effects of the project on flow and water temperature upstream of the Delta will be insignificant and consistent with the requirements of NMFS (2009), the PA will have insignificant effects on these PBFs. These insignificant effects will be further minimized, in a manner that cannot be demonstrated within the limitations of the CalSim II modeling environment, by real-time operations as described in Section 3.1.5, *Real-Time Operations Upstream of the Delta*, and Section 3.3.3, *Real-Time Operational Decision-Making Process*, which will be used to avoid and minimize the modeled effects found in this effects analysis.

As described in Section 5.4.1.5, *Effects of the Action on Designated Critical Habitat*, and above for winter-run and spring-run Chinook salmon, within the Delta, operational criteria (bypass flows) will minimize the potential for adverse effects to PBF 7, downstream access,

for juvenile steelhead (e.g., from reduced Sacramento River flows downstream of the NDD influencing probability of survival because of reduced transit speed), and the Georgiana Slough NPB will minimize near-field and far-field effects of the NDD on PBF 7 by keeping a greater proportion of juvenile steelhead migrating down the Sacramento River out of the low-survival interior Delta. Channel margin enhancement of poor habitat will compensate for potential reduction in PBF 6, riparian habitat, at inundated bench areas caused by reductions in Sacramento River water level by the NDD.

In summary, the PA is likely to adversely affect the physical and biological features of designated critical habitat for California Central Valley steelhead because the temporary impairment of critical habitat functions associated with in-water construction activities, permanent impairment associated with permanent placement of in-water structures, and potential impairment associated with flow diversion at the NDDs. However, these effects will be avoided, minimized, and/or compensated. The impairment associated with in-water construction activities will be minimized through avoidance and minimization measures. The impairment associated with permanent placement of in-water structures will be offset by habitat restoration in the form of tidal perennial aquatic habitat restoration and channel margin enhancement. The impairment associated with flow diversion will be minimized through real-time operations that use transitional flow criteria based on fish presence.

7.5 Green Sturgeon, Southern DPS

7.5.1 Sacramento River Upstream of Delta

Upstream quantitative analyses of temperature and flow effects are based on CalSim II modeling. The uncertainties associated with using CalSim II outputs must be considered in interpreting biological analyses (Appendix 5.A, *CALSIM Methods and Results*). CalSim II is a long-term planning model that allows for quantitative simulation of the CVP and SWP operations on a monthly time-step across a wide range of hydrologic, regulatory and operations instances. CalSim II uses a set of pre-defined generalized rules, which represent the assumed regulations, to specify operations of the CVP/SWP. These rules are often specified as a function of year type or a prior month's simulated storage or flow condition. As described above, the model has no capability of adjusting these rules to respond to specific events that may have occurred historically, e.g., fish presence, levee failures, fluctuations in barometric pressure that may have affected Delta tides and salinities, facility outages, etc. These generalized rules have been developed based on historical operational trends and on limited CVP/SWP operator input and only provide a coarse representation of the project operations over the inputted hydrologic conditions. Thus, results do not exactly match what operators might do in a specific month or year within the simulation period since the latter will be informed by numerous real-time considerations that cannot be input to CalSim II. Rather, results are intended to be a reasonable representation of long-term operational trends of CVP and SWP, providing the ability to compare and contrast the effect of current and assumed future operational conditions.

Analysis of potential effects of the PA on Southern DPS green sturgeon in the Sacramento River upstream of the Delta found insignificant differences between the NAA and PA in flows and water temperatures for spawning, rearing, and migration. The PA will provide flows and water temperatures consistent with those required by NMFS (2009). As such, there will be no take of

green sturgeon in areas upstream of the Delta, other than the take previously authorized by NMFS (2009).

These insignificant effects will be further minimized, in a manner that cannot be demonstrated within the limitations of the CalSim II modeling environment, by day-to-day decision-making on the part of the CVP/SWP operators. These decisions consider the recommendations from many of the decision-making/advisory teams, such as the Sacramento River Temperature Technical Group (SRTTG), Water Operations Management Team (WOMT), b2 interagency team (B2IT) and American River Operations Group. The current decision-making processes and the advisory groups will continue and will be improved under the PA (Section 3.1.5, *Real-Time Operations Upstream of the Delta*, and Section 3.3, *Operations and Maintenance for the New and Existing Facilities*). A separate real time operations coordination team (RTOCT) will meet to assist DWR and Reclamation in fulfilling their responsibility to inform the SWP and CVP participants regarding available information and real-time decisions. This coordination effort may also periodically review how to enhance or strengthen the scientific and technical information used to inform decision-making, and how to communicate with the public and other interested parties. This revised process and RTOCT will allow for alternative criteria to be developed, based on the results of coordinated monitoring and research under the RTO and Adaptive Management Program, that will continue to address effects to listed species under future operations of the PA consistent with the applicable requirements of the ESA, while maximizing water supplies.

In addition, Reclamation will work with NMFS and other state and Federal agencies to adjust the RPA Action Suite 1.2, as described in Section 3.1.4.5, *Annual/Seasonal Temperature Management Upstream of the Delta*. This process is anticipated to conclude in the fall of 2016, and may include refinements and additions to the existing annual/seasonal temperature management processes, including spring storage targets, revised temperature compliance criteria and a range in summertime Keswick release rates. The adjusted RPA Action Suite I.2 will apply to Reclamation's Shasta operations. This RPA revision process is intended to improve egg-to-fry survival of winter-run Chinook salmon to Red Bluff, but would likely improve survival of green sturgeon as well, depending on the timing of refinements that will be made.

7.5.2 Sacramento-San Joaquin Delta

The PA is expected to result in incidental take of Southern DPS green sturgeon associated with construction effects of the PA by mechanisms including underwater noise from pile driving, in-water use of construction equipment, fish rescue efforts, and possibly the accidental discharge of contaminants (Section 5.2, *Effects of Water Facility Construction on Fish*). The effects of construction activities will be minimized through avoidance and minimization measures. Temporary and permanent habitat losses will be offset by 154.8 acres of tidal perennial habitat restoration (Table 3.4-1).

The PA has the potential to result in incidental take to Southern DPS green sturgeon through entrainment, impingement, and predation at the NDD (Section 5.4.1.3.2.1.1 *North Delta Exports;* Section 5.4.1.4.2.1.1 *Risk to Green Sturgeon from North Delta Exports)* and south Delta facilities (Section 5.4.1.3.2.1.2 *South Delta Exports;* 5.4.1.4.2.1.2 *Risk to Green Sturgeon from South Delta Exports*), and changes in flows that may affect migratory success (Section 5.4.1.3.2.2.1 *Indirect Mortality Within the Delta;* 5.4.1.4.2.2.1 *Risk to Green*

Sturgeon from Indirect Mortality Within the Delta). PA operations in compliance with NMFS (2009) BiOp conditions together with the additional PA proposed operational criteria for south Delta, NDD, and DCC provide protection during the winter and spring, thereby reducing the impact of CVP/SWP Delta operations on green sturgeon. The RTO and adaptive management and monitoring provisions included in the PA provide additional opportunities to better define the operating criteria and make adjustments to CVP/SWP Delta operations to minimize the risks of incidental take while maximizing water supply. Projected operation of other Delta facilities (for example, the North Bay Aqueduct, Rock Slough Diversion, and the Suisun Marsh Salinity Control Gates [SMSCG]) is expected to result in a discountable risk of take of green sturgeon (Sections 5.4.1.3.1.1.5 through 5.4.1.3.1.1.7 *Suisun Marsh Facilities, North Bay Aqueduct, and Other Facilities*, respectively; Sections 5.4.1.4.2.1.5 through 5.4.1.4.2.1.7 *Risk to Green Sturgeon from Suisun Marsh Facilities, Risk to Green Sturgeon from North Bay Aqueduct*, and *Risk to Green Sturgeon from Other Facilities*, respectively).

7.5.3 Cumulative Effects and the Changing Baseline

As with the salmonids, cumulative effects on Southern DPS green sturgeon include effects associated with water diversions, agricultural practices, increased urbanization, and wastewater treatment plants. These effects will accrue over the duration of the PA. Non-federal water diversions are potentially a cause of mortality via entrainment, but ongoing projects such as the CVPIA fish screen program are reducing the number of such diversions and their mortality risk, so this effect is likely to diminish over time. Potentially adverse agricultural practices primarily entail water quality impairments; the action area is already fully developed with regard to agricultural land uses, and regulations in place constrain the associated water quality effects, so this effect is likely to be maintained in the future. Adverse effects of urbanization include point and nonpoint-source water quality impairments, and increased vessel traffic in waterways. These activities are likely to further degrade green sturgeon habitat over time. Wastewater treatment plants also contribute to impaired water quality, but significant improvements in discharge water quality and reductions in discharge water volume have occurred in recent years, primarily in response to regulatory and economic factors increasing the value of reusable water; thus this stressor is likely to diminish over time. Some of these effects will improve, and others will impair habitat quality for green sturgeon in the action area; their net effect is to approximately maintain current conditions for the foreseeable future because improvements are generally implemented to compensate for adverse project effects through the ESA consultation and other environmental review processes. These cumulative effects have little potential to impair the effectiveness of avoidance and minimization measures described in the PA, nor are they expected to alter the efficacy of offsetting measures in the PA such as habitat creation and restoration.

The environmental baseline for Southern DPS green sturgeon is described in Chapter 4. Due to the span of time until the beginning of water operations under the proposed action, and over the course of the proposed operations, the baseline is expected to change. The principal such changes concern climate change, and certain federal actions that are reasonably certain to occur but have not yet been implemented.

Foreseeable climate change effects, described in Section 4.3.2.1, *Climate Conditions*, include sea level rise, reduced Sierra Nevada winter snowpack, warmer water temperatures, and increased

climate variability as seen in changes such as more severe winter storms, more intense droughts, larger floods, etc. These effects will tend to impair habitat quality and quantity for green sturgeon, and also to increase year-to-year fluctuations in population sizes. There will also be changes in the marine environment where green sturgeon spend much of their life cycle. Marine changes, and their likely effects upon green sturgeon, are difficult to forecast, and may include both beneficial and adverse consequences.

Federal actions that are reasonably certain to occur but have not yet been implemented primarily include habitat protection and restoration requirements of the NMFS (2009) BiOp. These actions are expected to have beneficial consequences for adult and juvenile passage, and for juvenile migration and rearing, within the action area.

7.5.4 Determination of Effects to Southern DPS Green Sturgeon

The PA is likely to adversely affect Southern DPS green sturgeon because of incidental take associated with facility construction and operation.

7.5.5 Determination of Effects to Southern DPS Green Sturgeon Designated Critical Habitat

Due to the implementation of avoidance and minimization measures and the construction of habitat restoration measures, the PA will minimize effects on the physical and biological features of the Southern DPS green sturgeon designated critical habitat. Restoration measures proposed under the PA include 154.8 acres of tidal perennial aquatic habitat, as described in Section 3.4 *Conservation Measures*.

The PBFs for Southern DPS green sturgeon include: (1) food resources for larval, juvenile, subadult, and adult life stages; (2) water flow regime with flow magnitude, duration, seasonality, and rate-of-change supporting growth, survival, and migration of all life stages; (3) water quality including temperature, salinity, oxygen content, and other chemical characteristics supporting growth and viability of all life stages; (4) migratory corridor free of obstruction and excessive predation with water quantity and quality conditions supporting safe and timely passage of juveniles and adults within and between riverine, estuarine and marine habitats; (5) water depth sufficient (>5 m) for holding pools supporting adults and subadults; (6) substrate type or size (for freshwater riverine systems but not estuarine habitat) supporting egg deposition, egg and larval development, subadult and adult holding, and adult spawning; and (7) sediment quality (*i.e*, chemical characteristics) supporting growth and viability of all life stages. .

As discussed in Chapter 5, *Effects Analysis for Chinook Salmon, Central Valley Steelhead, Green Sturgeon, and Killer Whale*, Section 5.4.2.1.5.4, *Green Sturgeon*, upstream of the Delta, these PBFs could only be affected by the PA through changes in instream flows and water temperatures. Because any effects of the project on flow and water temperature upstream of the Delta will be insignificant and consistent with the requirements of NMFS (2009), the PA will have insignificant effects on these PBFs. These insignificant effects will be further minimized, in a manner that cannot be demonstrated within the limitations of the CalSim II modeling environment, by real-time operations as described in Section 3.1.5, *Real-Time*

Operations Upstream of the Delta, and Section 3.3.3, *Real-Time Operational Decision-Making Process,* which will be used to avoid and minimize any of the modeled effects found in this effects analysis.

As described in Section 5.4.1.5.1, *Effects of the Action on Designated Critical Habitat*, the potential adverse effects to the PBFs of critical habitat in the Delta will be limited.

In summary, the PA is not likely to adversely affect the physical and biological features of designated critical habitat for Southern DPS green sturgeon because the temporary impairment of critical habitat functions associated with in-water construction activities, permanent impairment associated with permanent placement of in-water structures, and potential impairment associated with flow diversion at the NDDs. However, these effects will be avoided, minimized, and/or compensated. The impairment associated with in-water construction activities will be minimized through avoidance and minimization measures. The impairment associated with permanent placement of in-water structures will be offset by habitat restoration in the form of tidal perennial aquatic habitat restoration. The impairment associated with flow diversion will be minimized through real-time operations that use transitional flow criteria based on fish presence.

7.6 Killer Whale, Southern Resident DPS

The PA has insignificant potential to alter the Southern Resident killer whale prey base. Project operations have the potential to affect Southern Resident killer whales by altering salmonid populations, thereby altering prey availability for Southern Resident killer whales. Reductions in prey availability could force the whales to spend more time foraging, and could lead to reduced reproductive rates and higher mortality. However, the effects analysis for salmonids, including the EFH assessment including fall-run Chinook salmon, does not find evidence that the PA will lead to any measurable reduction in abundance of Central Valley salmonid populations that will affect the Southern Resident killer whale prey base.

Based on the effects analysis, the PA may affect, but is not likely to adversely affect the Southern Resident DPS of killer whales, due to an insignificant potential for the PA to affect the Southern Resident killer whale prey base.

Based on the effects analysis, the PA is not likely to adversely affect designated critical habitat for the Southern Resident killer whale due to the PA's insignificant potential to affect the Southern Resident killer whale prey base, compounded by the small percentage of Central Valley salmon potentially present in the Washington waters designated as critical habitat.

7.7 Delta Smelt

7.7.1 Determination of Effects to Delta Smelt

The central component of the PA is to move the point of diversion of water for CVP and SWP export to the north Delta, outside the main range of Delta Smelt, and to minimize and avoid entrainment effects through further reduced reliance on the south Delta export facilities. As a result, the overall effects of the PA on Delta Smelt will be minor and the PA will not affect flows and water temperatures for spawning and rearing. The PA has the potential to result in

incidental take of Delta Smelt associated with construction effects of the PA including underwater noise from pile driving, in-water use of construction equipment, fish rescue efforts, and accidental discharge of contaminants (Section 6.1.1, *Effects of Water Facility Construction on Delta Smelt*). The effects of construction activities will be minimized through avoidance and minimization measures and all habitat losses will be offset by tidal perennial habitat and shallow water habitat restoration. Additionally, the in-water construction activities will occur in areas and/or during periods when Delta Smelt are likely not present but could be present in very low densities.

The PA has the potential to result in incidental take of Delta Smelt through entrainment (Sections 6.1.3.2.1, *Entrainment*, and 6.1.3.3.1, *Entrainment*), impingement (Section 6.1.3.2.2, *Impingement and Screen Contact*), and predation (6.1.3.3.2, *Predation at the South Delta Export Facilities*, and 6.1.3.3.2, *Predation at the South Delta Export Facilities*), at the north Delta intakes and south Delta export facilities. The shifting of exports to the NDD, which is outside the main range of Delta Smelt, allows water exports to occur where the potential to affect most Delta Smelt is substantially reduced or avoided, and the screen design and operations (0.2-ft/s approach velocity) will minimize the potential for entrainment and impingement of Delta Smelt that do occur near the NDD. Actions taken in compliance with USFWS (2008) and the proposed operational criteria for south Delta provide additional protection during the winter and spring, and shifting of pumping to the screened NDD provides further protection, thereby substantially reducing the potential impact of CVP/SWP Delta operations on Delta Smelt. Delta operations and outflows have been designed to minimize effects on Delta Smelt habitat based on assessment of current science. The RTOs and Adaptive Management Program included in the PA provide additional opportunities to better define the operating criteria and make adjustments to CVP/SWP Delta operations to minimize the risks of incidental take while maximizing water supply. Projected operations of other Delta facilities (for example, the North Bay Aqueduct, Rock Slough Diversion, and the Suisun Marsh Salinity Control Gates [SMSCG]) are expected to result in minimal take of Delta Smelt (Sections 6.1.3.7 through 6.1.3.9, *Suisun Marsh Facilities, North Bay Aqueduct,* and *Other Facilities,* respectively).

Accordingly, the PA is likely to adversely affect Delta Smelt in the action area.

7.7.2 Cumulative Effects and the Changing Baseline

Cumulative effects on Delta Smelt include effects associated with water diversions, agricultural practices, increased urbanization, and wastewater treatment plants. These effects will accrue over the duration of the PA. Non-federal water diversions are likely a minor cause of mortality via entrainment (Nobriga et al. 2004), and this effect is likely to be maintained for the foreseeable future. Potentially adverse agricultural practices primarily entail water quality impairments; the action area is already fully developed with regard to agricultural land uses, and regulations in place constrain the associated water quality effects, so this effect is also likely to be maintained in the future. Adverse effects of urbanization include point and nonpoint-source water quality impairments, and increased vessel traffic in waterways. These activities are likely to further degrade Delta Smelt habitat over time. Wastewater treatment plants also contribute to impaired water quality, but significant improvements in discharge water quality and reductions in discharge water volume have occurred in recent years, primarily in response to regulatory and

economic factors increasing the value of reusable water; thus this stressor is likely to diminish over time. Overall, these effects will variously improve, maintain, or impair habitat quality for Delta Smelt in the action area; their net effect is to approximately maintain current conditions for the foreseeable future. These cumulative effects have little potential to impair the effectiveness of avoidance and minimization measures described in the PA, nor are they expected to alter the efficacy of offsetting measures in the PA such as habitat creation and restoration.

The environmental baseline for Delta Smelt is described in Chapter 4. Due to the span of time until the beginning of water operations under the proposed action, and over the course of the proposed operations, the baseline is expected to change. The principal such effects concern climate change, and certain federal actions that are reasonably certain to occur but have not yet been implemented.

Foreseeable climate change effects, described in Section 4.3.2.1, *Climate Conditions*, include sea level rise, reduced Sierra Nevada winter snowpack, warmer water temperatures, and increased climate variability as seen in changes such as more severe winter storms, more intense droughts, larger floods, etc. These effects will tend to impair habitat quality and quantity for Delta Smelt, and also to increase year-to-year fluctuations in population sizes.

Federal actions that are reasonably certain to occur but have not yet been implemented primarily include habitat protection and restoration requirements of the USFWS (2008) BiOp. These actions are expected to have beneficial consequences for the abundance and quality of Delta Smelt habitat within the action area.

7.7.3 Determination of Effects to Delta Smelt Designated Critical Habitat

Due to the implementation of avoidance and minimization measures and the construction of habitat restoration measures, the PA will minimize effects on the primary constituent elements of Delta Smelt designated critical habitat. Restoration measures proposed under the PA include 74.7 acres of tidal perennial aquatic habitat and 273 acres of shallow water habitat, of which 108 acres of the shallow water habitat will be sandy beach spawning habitat, as described in Section 3.4 *Conservation Measures*.

The PA is likely to adversely affect the primary constituent elements of designated critical habitat for Delta Smelt because of temporary impairment of critical habitat functions associated with in-water construction activities and permanent impairment associated with permanent placement of in-water structures. Additionally, there is a potential for impairment associated with flow diversion at the NDDs. However, these effects will be minimized, avoided, and/or compensated. Water diversion at the NDDs occur through screens meeting agency criteria, including approach velocity of 0.2 ft/s to minimize potential effects on Delta Smelt. The impairment associated with in-water construction activities will be minimized through avoidance and minimization measures. The impairment associated with permanent placement of in-water structures at the NDD will be offset with shallow water habitat at a 5:1 ratio for the intakes and their wing walls, plus the acreage associated with the in-water construction disturbance and a 1,000-foot-downstream suspended sediment effect (28 acres in total). In addition, the potential for reduced access to critical habitat upstream of the NDD because of conversion of low-velocity habitat to high-velocity screen face will be mitigated

with restoration of 245 acres of shallow water habitat, of which 108 acres will be sandy beach habitat (representing a 3:1 mitigation ratio for the potential loss of access to 36 acres of existing shallow water sandy beach habitat). In-water effects from construction and facility footprints at the HOR gate and barge landings will be offset by habitat restoration in the form of tidal perennial habitat restoration (74.7 acres in total, representing a 3:1 mitigation ratio).

Continued operation of the south Delta export facilities will be at a lower rate than exists under the NAA, generally resulting in less potential for effects to PCE 3 (river flow); management of Old and Middle River flows in similar ways to those currently in place under the USFWS (2008) BiOp would minimize the potential for adverse effects on PCE 3. Inclusion of the fall X2 criteria from the USFWS (2008) BiOp in the PA would minimize the potential for adverse effects to PCE 4 (low salinity zone) during the important juvenile rearing period, and the general similarity of low salinity zone conditions throughout the year between NAA and PA would minimize effects on PCE 4 for the other life stages.

7.8 Riparian Brush Rabbit

There is minimal potential for the PA to affect riparian brush rabbit. There is no potentially suitable habitat for riparian brush rabbit within the PA construction footprint, and there is not likely to be suitable habitat within 1,260 feet of the HOR gate construction site.

Avoidance and minimization measures require that construction activity be confined to existing disturbed areas. These avoidance and minimization measures will avoid harm or harassment of riparian brush rabbit. Suitable riparian brush rabbit habitat is not expected to be present within 1,260 feet from the HOR gate construction site. At this distance, noise and light associated with construction activity may be perceived by the brush rabbit, but will only slightly exceed background levels and thus is not expected to alter essential behaviors that affect foraging, reproduction, predation risk, etc. Avoidance and minimization measures require that the area within 1,260 feet of riparian brush rabbit habitat be surveyed to confirm there is no suitable habitat in the vicinity of HOR gate related activities – if habitat exists in this area, measures will be implemented to reduce noise and light to the extent that it will not be expected to alter essential behaviors that affect foraging, reproduction, predation risk. Thus the PA may affect, is not likely to adversely affect riparian brush rabbit.

Critical habitat has not been designated for riparian brush rabbit.

7.9 San Joaquin Kit Fox

7.9.1 Determination of Effects to San Joaquin Kit Fox

Overall effects of the PA on San Joaquin kit fox breeding, foraging, and dispersal habitat are less than 50 acres, and will be offset with protection and restoration of habitat. The PA may affect San Joaquin kit fox based on the following.

- Project related activities will occur within and adjacent to San Joaquin kit fox modeled habitat.

- San Joaquin kit fox presence has been detected in the vicinity of the PA, within grassland landscape south of Brentwood, with the most recent sighting in the late 1990s. The species has not been detected, nor is it expected to occur, elsewhere within the action area.

- Protection of San Joaquin kit fox habitat will beneficially affect the species.

The PA is likely to adversely affect the San Joaquin kit fox as follows.

- Harm could result from the permanent loss of 47 acres of San Joaquin kit fox modeled habitat potentially occupied by the species.

- Harm could occur as a result of use of land clearing and construction equipment, vehicular transportation, storage of equipment onsite, and other construction, operations, and maintenance related activities.

- Harassment could result from noise, lighting, or other human disturbances, which could affect San Joaquin kit fox during construction, operations, and maintenance.

These adverse effects will be minimized through implementation of minimization and avoidance measures to reduce the risk of injury, mortality, and harassment of individuals, and offset by the protection or restoration of up to 141 acres of habitat based on current project impact estimates.

Thus the PA may affect, is likely to adversely affect the San Joaquin kit fox.

7.9.2 Cumulative Effects and Changing Baseline

Potential cumulative effects on San Joaquin kit fox in the action area include habitat loss and impairment, primarily through conversion of rangeland to more developed land uses. This is not likely to be extensive, due to existing constraints upon land use changes, e.g. via existing or developing habitat conservation plans that cover much of the range of San Joaquin kit fox in the action area. In particular the habitat in the action area with the highest likelihood of supporting San Joaquin kit fox is within the plan area of the East Contra Costa County HCP/NCCP, where large scale conservation efforts are being implemented that will benefit the species.

Changing baseline effects are also likely to alter habitat conditions for San Joaquin kit fox between now and the conclusion of the PA. The principal such effects concern climate change. Foreseeable climate change effects, described in Section 4.3.2.1, *Climate Conditions*, include increased climate variability as seen in changes such as more severe winter storms, more intense droughts, larger floods, etc. These effects will tend to impair habitat quality and quantity for San Joaquin kit fox, with potential adverse effects upon species status in the action area.

7.9.3 Determination of Effects to San Joaquin Kit Fox Designated Critical Habitat

Critical habitat has not been designated for the San Joaquin kit fox.

7.10 California Least Tern

There is minimal potential for the PA to affect California least tern. The PA will result in permanent loss of 269 acres of open water that constitutes modeled California least tern foraging habitat, but a Clifton Court Forebay modifications will result in a gain of 677 acres of foraging habitat, for a net gain of 408 acres of habitat. Dredging will temporarily disturb another 1,930 acres. The proposed construction activities are located at least 20 miles from the nearest known or recently active California least tern nesting locations. Typically, foraging habitat for California least tern is located within 2 miles of their colonies (Atwood and Minsky 1983), so the foraging habitat that will be lost to construction is rarely or never used. Furthermore, foraging habitat in the region (San Francisco Bay and the action area) is abundant and is not considered limiting for California least tern (e.g., there are 61,751 acres of modeled foraging habitat in the action area). Therefore, in consideration of the amount of available foraging habitat in the action area and its distance from known nesting sites, the total permanent and temporary foraging habitat loss due to the PA is insignificant. For these reasons, the PA is may affect, is not likely to adversely affect California least tern.

Critical habitat has not been designated for California least tern.

7.11 Western Yellow-Billed Cuckoo

7.11.1 Determination of Effects to Western Yellow-Billed Cuckoo

Overall effects of the PA on western yellow-billed cuckoo include loss of 32 acres of habitat, and will be offset with restoration of its habitat. The PA may affect western yellow-billed cuckoo based on the following.

- Project related activities will occur within and adjacent to western yellow-billed cuckoo modeled habitat.
- Migratory western yellow-billed cuckoos have been detected in the action area in recent years.
- Restoration of western yellow-billed cuckoo habitat will beneficially affect the species.

The PA is likely to adversely affect the western yellow-billed cuckoo as follows.

- Harm could result from the permanent loss of 32 acres of modeled western yellow-billed cuckoo migratory habitat.

These adverse effects will be minimized through implementation of minimization and avoidance measures to reduce the risk of injury, mortality, and harassment of individuals, and offset by the protection or restoration of up to 64 acres of suitable habitat based on current project impact estimates.

Thus the PA may affect, is likely to adversely affect the western yellow-billed cuckoo.

7.11.2 Cumulative Effects and the Changing Baseline

Potential cumulative effects on western yellow-billed cuckoo in the action area include habitat loss and fragmentation, and predation from introduced and native species. Habitat loss and fragmentation could result from conversion of riparian habitat to alternative cover types, which is not likely to be extensive due to existing constraints emplaced to protect riparian natural communities. Predation by existing introduced and native species is likely to be maintained at levels comparable to current conditions; the introduction of new predators or parasites is possible, but not foreseeable; nor are the consequences of such an introduction. These effects will tend to slightly impair habitat quality for western yellow-billed cuckoo in the action area, but their net effect is to approximately maintain current conditions for the foreseeable future. These cumulative effects have little potential to impair the effectiveness of avoidance and minimization measures described in the PA, nor are they expected to alter the efficacy of offsetting measures in the PA such as habitat creation and restoration.

Changing baseline effects are also likely to alter habitat conditions for western yellow-billed cuckoo between now and the conclusion of the PA. The principal such effects concern climate change. Foreseeable climate change effects, described in Section 4.3.2.1, *Climate Conditions*, include sea level rise, reduced Sierra Nevada winter snowpack, warmer water temperatures, and increased climate variability as seen in changes such as more severe winter storms, more intense droughts, larger floods, etc. These effects will tend to impair habitat quality and quantity for western yellow-billed cuckoo, e.g. by increasing the frequency of flood disturbance in riparian habitat and thus scouring and clearing areas of habitat temporarily, and potentially increasing the fragmentation of that habitat.

7.11.3 Determination of Effects to Western Yellow-Billed Cuckoo Designated Critical Habitat

There is no designated western yellow-billed cuckoo critical habitat in the action area.

7.12 Giant Garter Snake

7.12.1 Determination of Effects to Giant Garter Snake

Overall effects of the PA on giant garter snake and its habitat are minor and temporary, and will be offset with protection and restoration of its habitat. The PA may affect the giant garter snake based on the following.

- Project related activities will occur within and adjacent to giant garter snake modeled habitat.
- Giant garter snake presence has been recorded in the vicinity of areas proposed for clearing and construction.
- Protection and restoration of giant garter snake habitat will beneficially affect the species.

The PA is likely to adversely affect the giant garter snake as follows.

- Harm could result from the loss of 205 acres of aquatic habitat and 570 acres of upland habitat potentially occupied by the species.

- Harm could occur as a result of use of land clearing and construction equipment, vehicular transportation, and other construction, operations, and maintenance related activities.

- Harassment could result from noise, lighting, and vibrations, or other human disturbance adjacent to occupied giant garter snake habitat during construction, operations, and maintenance.

These adverse effects will be minimized and offset through implementation of minimization and avoidance measures to reduce the risk of harm or harassment of individuals, and by the protection or restoration of aquatic and upland habitat in the amounts and according to the mitigation ratios detailed in Table 3.4-4, *Compensation for Direct Effects on Giant Garter Snake Habitat*.

Thus the PA may affect, is likely to adversely affect the giant garter snake.

7.12.2 Cumulative Effects and the Changing Baseline

Potential cumulative effects on giant garter snake in the action area include habitat loss and fragmentation, changes in agricultural and land management practices, predation from introduced and native species, and water pollution. Both habitat loss and fragmentation, and changes in land management practices, could result from conversion of agricultural land to more developed land uses, which is not likely to be extensive due to existing constraints upon land use changes; or from conversion of agricultural land to different crop types having lower habitat suitability, which is not foreseeable. Predation by existing introduced and native species is likely to be maintained at levels comparable to current conditions; the introduction of new predators or parasites is possible, but not foreseeable; nor are the consequences of such an introduction. Water pollution effects could result from a variety of causes, including agricultural practices, increased urbanization, and wastewater treatment plants. Effects associated with agricultural practices are likely to be maintained, because the action area is already fully developed with regard to agricultural land uses, and regulations in place constrain the associated water quality effects. Water quality effects of urbanization include point and nonpoint-source water quality impairments, and there is a potential for those effects to further degrade water quality as further urbanization occurs in the action area. Wastewater treatment plants also contribute to impaired water quality, but significant improvements in discharge water quality and reductions in discharge water volume have occurred in recent years, primarily in response to regulatory and economic factors increasing the value of reusable water; thus this stressor is likely to diminish over time. Some of these effects will improve, and others will impair habitat quality for giant garter snake in the action area; their net effect is to approximately maintain current conditions for the foreseeable future. These cumulative effects have little potential to impair the effectiveness of avoidance and minimization measures described in the PA, nor are they expected to alter the efficacy of offsetting measures in the PA such as habitat creation and restoration.

Changing baseline effects are also likely to alter habitat conditions for giant garter snake between now and the conclusion of the PA. The principal such effects concern climate change. Foreseeable climate change effects, described in Section 4.3.2.1, *Climate Conditions*, include sea level rise, reduced Sierra Nevada winter snowpack, warmer water temperatures, and increased climate variability as seen in changes such as more severe winter storms, more intense droughts, larger floods, etc. These effects will tend to impair habitat quality and quantity for giant garter snake, and also to increase the potential for year-to-year fluctuations in population sizes, with potential adverse effects upon species status in the action area.

7.12.3 Determination of Effects to Giant Garter Snake Designated Critical Habitat

Critical habitat has not been designated for the giant garter snake.

7.13 California Red-Legged Frog

7.13.1 Determination of Effects to California Red-Legged Frog

Overall effects of the PA on California red-legged frog and its habitat are minor and temporary, and will be offset with protection and restoration of its habitat. The PA may affect the California red-legged frog based on the following.

- Project related activities will occur within and adjacent to California red-legged frog modeled habitat.
- California red-legged frog presence has been recorded in the vicinity of areas proposed for clearing and construction.
- Protection and restoration of California red-legged frog habitat will beneficially affect the species.

The PA is likely to adversely affect the California red-legged frog as follows.

- Harm could result from the permanent loss of 51 acres of modeled upland cover and dispersal habitat (four of which would be outside the construction footprint but subject to vibrations within 75 feet of project activity) and 1 acre of modeled aquatic habitat potentially occupied by the species.
- Harm could occur as a result of use of land clearing and construction equipment, vehicular transportation, and other construction, operations, and maintenance related activities.
- Harassment could result from noise, lighting, and vibrations, and other human disturbance adjacent to occupied California red-legged frog habitat during construction, operations, and maintenance.

These adverse effects will be minimized and offset through implementation of minimization and avoidance measures to reduce the risk of harm or harassment of individuals, and by the

protection or restoration of up to 153 acres of upland habitat and 3 acres of aquatic habitat based on current project impact estimates.

Thus the PA may affect, is likely to adversely affect the California red-legged frog.

7.13.2 Cumulative Effects and the Changing Baseline

Potential cumulative effects on California red-legged frog in the action area include habitat loss and impairment, primarily through conversion of rangeland to more developed land uses. This is not likely to be extensive, due to existing constraints upon land use changes, e.g. via existing or developing habitat conservation plans that cover much of the range of California red-legged frog in the action area. In particular the habitat in the action area with the highest likelihood of supporting California red-legged frog is within the plan area of the East Contra Costa County HCP/NCCP, where large scale conservation efforts are being implemented that will benefit the species.

Changing baseline effects are also likely to alter habitat conditions for California red-legged frog between now and the conclusion of the PA. The principal such effects concern climate change. Foreseeable climate change effects, described in Section 4.3.2.1, *Climate Conditions*, include increased climate variability as seen in changes such as more severe winter storms, more intense droughts, larger floods, etc. These effects will tend to impair habitat quality and quantity for California red-legged frog, with potential adverse effects upon species status in the action area.

7.13.3 Determination of Effects to California Red-Legged Frog Designated Critical Habitat

No California red-legged frog critical habitat occurs in the action area. The closest occurrence of critical habitat is approximately 0.5 miles from the nearest construction activity area. Because there is no California red-legged frog critical habitat in the action area, the PA will have no effect on California red-legged frog critical habitat.

7.14 California Tiger Salamander

7.14.1 Determination of Effects to California Tiger Salamander

Overall effects of the PA on California tiger salamander and its habitat are minor and temporary, and will be offset with protection and restoration of its habitat. The PA may affect the California tiger salamander based on the following.

- Project related activities will occur within and adjacent to California tiger salamander modeled habitat.
- California tiger salamander presence has been recorded in the vicinity of areas proposed for clearing and construction.
- Protection and restoration of California tiger salamander upland cover and aestivation habitat will beneficially affect the species.

The PA is likely to adversely affect the California tiger salamander as follows.

- Harm could result from the permanent loss of 50 acres of terrestrial cover and aestivation habitat (three acres of which would be outside the construction footprint but subject to vibrations resulting from construction activities within 75 feet) potentially occupied by the species.

- Harm could occur as a result of use of land clearing and construction equipment, vehicular transportation, and other construction, operations, and maintenance related activities.

- Harassment could result from noise, lighting, vibrations, and other human disturbance adjacent to occupied California tiger salamander upland cover and aestivation habitat during construction, operations, and maintenance.

These adverse effects will be minimized and offset through implementation of minimization and avoidance measures to reduce the risk of harm or harassment of individuals, and by the protection or restoration of up to 150 acres of upland cover and aestivation habitat based on current project impact estimates.

Thus the PA may affect, is likely to adversely affect the California tiger salamander.

7.14.2 Cumulative Effects and the Changing Baseline

Potential cumulative effects on California tiger salamander in the action area include habitat loss and impairment, primarily through conversion of rangeland to more developed land uses. Unauthorized take as a result of urbanization is unlikely where most of the habitat occurs west of CCF because urbanization within the cities of Brentwood, Pittsburg, Oakley, and Clayton is covered by the East Contra Costa County HCP/NCCP. Urban development outside these incorporated cities (i.e., in the jurisdiction of Contra Costa County) is not covered by the East Contra Costa County HCP/NCCP. Although unlikely to occur due to land use controls, if urban development was proposed in or near the community of Byron it could have an adverse effect on California tiger salamander in the action area.

Changing baseline effects are also likely to alter habitat conditions for California tiger salamander between now and the conclusion of the PA. The principal such effects concern climate change. Foreseeable climate change effects, described in Section 4.3.2.1, *Climate Conditions*, include increased climate variability as seen in changes such as more severe winter storms, more intense droughts, larger floods, etc. These effects will tend to impair habitat quality and quantity for California tiger salamander, with potential adverse effects upon species status in the action area.

7.14.3 Determination of Effects to California Tiger Salamander Designated Critical Habitat

Critical habitat for California tiger salamander occurs in the Jepson Prairie area and overlaps with the action area near the terminus of Lindsey Slough, west of Rio Dixon Road. There are no water conveyence facility construction activities proposed in this region, however, tidal

restoration could occur in the Cache Slough and Lindsey Slough area. Avoidance and minimization measures require tidal restoration projects be designed to avoid areas within 250 feet of any of the PCEs of California tiger salamander habitat within the designated critical habitat unit, or some lesser distance if it is determined through project review and concurrence by USFWS that tidal restoration actions will not result in changes in hydrology or soil salinity that could adversely affect these PCEs.

In conclusion, the PA is not likely to adversely affect California tiger salamander critical habitat for the following reasons.

- No water conveyance facilities will be constructed in any designated critical habitat unit.
- Tidal restoration associated with mitigation for impacts to other species or habitats will be designed to avoid areas within 250 feet of California tiger salamander PCEs in the critical habitat unit, or a lesser distance with concurrence from USFWS that the restoration will not adversely affect any PCEs for this species.
- No other restoration, management, or enhancement activities will occur in the critical habitat unit without prior concurrence from USFWS that such activity will not adversely affect any PCEs for this species.

7.15 Valley Elderberry Longhorn Beetle

7.15.1 Determination of Effects to Valley Elderberry Longhorn Beetle

Overall effects of the PA on valley elderberry longhorn beetle and its habitat are minor and temporary, and will be offset with restoration of its habitat. The PA may affect the valley elderberry longhorn beetle based on the following.

- Project related activities will occur within and adjacent to valley elderberry longhorn beetle modeled habitat.
- Protection of riparian habitat suitable and managed for elderberry shrubs and planting of elderberry seedlings and associated natives in conservations areas will beneficially affect the species.

The PA is likely to adversely affect the valley elderberry longhorn beetle as follows.

- Harm could result from the removal of an estimated 107 elderberry shrubs with an estimated 2,121 stems that are greater than 1 inch in diameter. The PA will result in the permanent loss of 276 acres of modeled valley elderberry longhorn beetle habitat including 227 acres of modeled grassland habitat and 49 acres of modeled riparian habitat.
- Harm could also result from the deposition of dust and other airborne construction related particulate matter on elderberry shrubs, which could stress and damage shrubs resulting in effects on valley elderberry longhorn beetle.

- Harm could occur as a result of transplanting shrubs that are occupied and the operation of equipment in the vicinity of occupied shrubs if adults are actively dispersing between shrubs.

- Harassment could result from lighting, dust, and other disturbances adjacent to occupied valley elderberry longhorn beetle habitat during construction, operations, and maintenance.

These adverse effects will be minimized and offset through implementation of minimization and avoidance measures to reduce the risk of injury, mortality, and harassment of individuals, and by the restoration of up to an estimated 79 acres of habitat dedicated to the planting of elderberry seedlings and associated natives, as well as the transplanting of an estimated up to 83 shrubs based on current project impact estimates.

Thus the PA may affect, is likely to adversely affect the valley elderberry longhorn beetle.

7.15.2 Cumulative Effects and the Changing Baseline

Potential cumulative effects on valley elderberry longhorn beetle in the action area include habitat loss and impairment, primarily through conversion of rangeland to more developed land uses. Although unlikely to occur due to land use controls, such development could have an adverse effect on valley elderberry longhorn beetle in the action area.

Changing baseline effects are also likely to alter habitat conditions for valley elderberry longhorn beetle between now and the conclusion of the PA. The principal such effects concern climate change. Foreseeable climate change effects, described in Section 4.3.2.1, *Climate Conditions*, include increased climate variability as seen in changes such as more severe winter storms, more intense droughts, larger floods, etc. These effects will tend to impair habitat quality and quantity for valley elderberry longhorn beetle, with potential adverse effects upon species status in the action area. The environmental baseline for valley elderberry longhorn beetle may also be affected by future habitat protection and restoration efforts in the Delta that may protect existing habitat or create new habitat, e.g. by restoration of riparian corridors along Delta waterways.

7.15.3 Determination of Effects to Valley Elderberry Longhorn Beetle Designated Critical Habitat

Critical habitat has been designated for valley elderberry longhorn beetle, but does not occur within the action area. The proposed action will have no effect on designated critical habitat for valley elderberry longhorn beetle.

7.16 Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

7.16.1 Determination of Effects to Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

Overall effects of the PA on vernal pool fairy shrimp and vernal pool tadpole shrimp, and their habitat, are minor and temporary, and will be offset with protection and restoration of their

habitat. The PA may affect the vernal pool fairy shrimp and vernal pool tadpole shrimp based on the following.

- Project related activities will occur within and adjacent to vernal pool fairy shrimp and vernal pool tadpole shrimp modeled habitat.

- Protection and restoration of vernal pool fairy shrimp and vernal pool tadpole shrimp will benefit the species.

The PA is likely to adversely affect the vernal pool fairy shrimp and vernal pool tadpole shrimp as follows.

- Harm could result from the permanent loss of 6 acres of modeled habitat for the species.

- Harm could result from altering the hydrology of vernal pool fairy shrimp and vernal pool tadpole shrimp habitat within 250 feet of construction areas, which could reduce the hydroperiod of affected habitat, making it less suitable for the species.

- Harm could occur as a result of changes to water quality in watersheds that support vernal pool fairy shrimp and vernal pool tadpole shrimp habitat.

These adverse effects will be minimized and offset through implementation of minimization and avoidance measures to reduce the risk of injury, mortality, and the conversion of habitat, and by the protection or restoration of habitat. If an existing mitigation bank were used to offset effects, up to 12 acres of habitat restoration credits would be provided. If DWR were to select a non-bank site, habitat losses would be offset by protection of up to 18 acres of existing habitat, based on current project impact estimates.

Thus the PA may affect, is likely to adversely affect the vernal pool fairy shrimp and vernal pool tadpole shrimp.

7.16.2 Cumulative Effects and the Changing Baseline

Potential cumulative effects on vernal pool fairy shrimp and vernal pool tadpole shrimp in the action area include habitat loss and impairment, primarily through conversion of vernal pool or degraded vernal pool natural communities to more developed land uses. This is unlikely to occur due to regulatory prohibitions on such activity. If it were to occur, for example via unauthorized actions, such development could have an adverse effect on vernal pool fairy shrimp and vernal pool tadpole shrimp in the action area.

Changing baseline effects are also likely to alter habitat conditions for vernal pool fairy shrimp and vernal pool tadpole shrimp between now and the conclusion of the PA. The principal such effects concern climate change. Foreseeable climate change effects, described in Section 4.3.2.1, *Climate Conditions*, include increased climate variability as seen in changes such as more severe winter storms, more intense droughts, larger floods, etc. These effects will tend to impair habitat quality and quantity for vernal pool fairy shrimp and vernal pool tadpole shrimp, with potential adverse effects upon species status in the action area. The environmental baseline for vernal pool

fairy shrimp and vernal pool tadpole shrimp may also be affected by future habitat protection and restoration efforts in the Delta that may protect existing habitat or create new habitat.

7.16.3 Determination of Effects to Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Designated Critical Habitat

A critical habitat unit for vernal pool fairy shrimp occurs to the west of Clifton Court Forebay and overlaps with two RTM storage areas. As discussed in Section 6.10.11, *Effects on Critical Habitat*, the wetland delineation prepared by DWR did not identify any modeled vernal pools or alkali seasonal wetland within these RTM footprints. However, two vernal pools occurring in the critical habitat unit may be indirectly affected by one of the RTM storage areas areas and therefore the PA is likely to adversely affect critical habitat for the vernal pool fairy shrimp. However, the PA will not appreciably diminish the value of the designated critical habitat to conservation due to the implementation of avoidance and minimization measures. In addition, to further address effects associated with facilities construction, operation, and maintenance within designated critical habitat, the PA includes implementation of restoration measures.

There is no designated critical habitat for vernal pool tadpole shrimp in the action area. Because there is no vernal pool tadpole shrimp critical habitat in the action area, the PA will have no effect on vernal pool tadpole shrimp critical habitat.

7.17 Least Bell's Vireo

7.17.1 Determination of Effects to Least Bell's Vireo

Overall effects of the PA on least Bell's vireo will include removal of 32 acres of habitat, and will be offset with restoration of 64 acres of its habitat. The PA may affect least Bell's vireo based on the following.

- Project related activities will occur within and adjacent to least Bell's vireo habitat.
- Least Bell's vireos have been detected near the action area in recent years.
- Restoration of least Bell's vireo habitat will beneficially affect the species.

The PA is likely to adversely affect the least Bell's vireo as follows.

- Harm could result from the permanent loss of 32 acres of least Bell's vireo habitat.

These adverse effects will be minimized through implementation of minimization and avoidance measures to reduce the risk of injury, mortality, and harassment of individuals, and offset by the protection or restoration of 64 acres of suitable habitat based on current project impact estimates.

Thus the PA may affect, is likely to adversely affect the least Bell's vireo.

7.17.2 Cumulative Effects and the Changing Baseline

Potential cumulative effects on least Bell's vireo in the action area include habitat loss and fragmentation, and predation from introduced and native species. Habitat loss and fragmentation could result from conversion of riparian habitat to alternative cover types, which is not likely to be extensive due to existing constraints emplaced to protect riparian natural communities. Predation by existing introduced and native species is likely to be maintained at levels comparable to current conditions; the introduction of new predators or parasites is possible, but not foreseeable; nor are the consequences of such an introduction. These effects will tend to slightly impair habitat quality for least Bell's vireo in the action area, but their net effect is to approximately maintain current conditions for the foreseeable future. These cumulative effects have little potential to impair the effectiveness of avoidance and minimization measures described in the PA, nor are they expected to alter the efficacy of offsetting measures in the PA such as habitat creation and restoration.

Changing baseline effects are also likely to alter habitat conditions for least Bell's vireo between now and the conclusion of the PA. The principal such effects concern climate change. Foreseeable climate change effects, described in Section 4.3.2.1, *Climate Conditions*, include sea level rise, reduced Sierra Nevada winter snowpack, warmer water temperatures, and increased climate variability as seen in changes such as more severe winter storms, more intense droughts, larger floods, etc. These effects will tend to impair habitat quality and quantity for least Bell's vireo, e.g. by increasing the frequency of flood disturbance in riparian habitat, and potentially increasing the fragmentation of that habitat.

7.17.3 Determination of Effects to Least Bell's Vireo Designated Critical Habitat

There is no designated least Bell's vireo critical habitat in the action area.

7.18 Conclusion

Reclamation has analyzed the effects of the Proposed Action using the best available science and has made the following effects determinations (Table 7-1).

Table 7-1. Determination of Effects for Species Addressed in This BA

Common and Scientific Names	Scientific Name	Jurisdiction	Status	Effect Determination
Chinook salmon, Sacramento River winter-run ESU	*Oncorhynchus tshawytscha*	NMFS	Endangered	Species: May affect, likely to adversely affect Critical Habitat: Likely to adversely affect
Chinook salmon, Central Valley spring-run ESU	*Oncorhynchus tshawytscha*	NMFS	Threatened	Species: May affect, likely to adversely affect Critical Habitat: Likely to adversely affect
Steelhead, California Central Valley DPS	*Oncorhynchus mykiss*	NMFS	Threatened	Species: May affect, likely to adversely affect Critical Habitat: Likely to adversely affect
Green sturgeon, southern DPS	*Acipenser medirostris*	NMFS	Threatened	Species: May affect, likely to adversely affect Critical Habitat: Likely to adversely affect
Killer whale, Southern Resident DPS	*Orcinus orca*	NMFS	Endangered	Species: May affect, not likely to adversely affect Critical Habitat: Not likely to adversely affect
Delta Smelt	*Hypomesus transpacificus*	USFWS	Threatened	Species: May affect, likely to adversely affect Critical Habitat: Likely to adversely affect
Riparian brush rabbit	*Sylvilagus bachmani riparius*	USFWS	Endangered	Species: May affect, not likely to adversely affect Critical Habitat: Not designated
San Joaquin kit fox	*Vulpes macrotis mutica*	USFWS	Endangered	Species: May affect, likely to adversely affect Critical Habitat: Not designated
California least tern	*Sternula antillarum browni*	USFWS	Endangered	Species: May affect, not likely to adversely affect Critical Habitat: Not designated
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	USFWS	Threatened	Species: May affect, likely to adversely affect Critical Habitat: Not in action area
Giant garter snake	*Thamnophis gigas*	USFWS	Threatened	Species: May affect, likely to adversely affect Critical Habitat: Not designated
California red-legged frog	*Rana draytonii*	USFWS	Threatened	Species: May affect, likely to adversely affect Critical Habitat: Not in action area
California tiger salamander	*Ambystoma californiense*	USFWS	Threatened	Species: May affect, likely to adversely affect Critical Habitat: Not likely to adversely affect
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	USFWS	Threatened	Species: May affect, likely to adversely affect Critical Habitat: Not in action area
Vernal pool fairy shrimp	*Branchinecta lynchi*	USFWS	Threatened	Species: May affect, likely to adversely affect Critical Habitat: Likely to adversely affect
Vernal pool tadpole shrimp	*Lepidurus packardi*	USFWS	Endangered	Species: May affect, likely to adversely affect Critical Habitat: Not in action area
Least Bell's vireo	*Vireo pusillus*	USFWS	Endangered	Species: May affect, likely to adversely affect Critical Habitat: Not in action area
Salt Marsh harvest mouse[a]	*Reithrodontomys raviventris*	USFWS	Endangered	Species: May affect, not likely to adversely affect Critical Habitat: not designated

Common and Scientific Names	Scientific Name	Jurisdiction	Status	Effect Determination
California clapper rail[a]	*Rallus longirostris obsoletus*	USFWS	Endangered	Species: May affect, not likely to adversely affect Critical Habitat: not designated
Soft bird's beak[a]	*Chloropyron molle* ssp. *molle*	USFWS	Endangered	Species: May affect, not likely to adversely affect Critical Habitat: Not likely to adversely affect
Suisun thistle[a]	*Cirsium hydrophilum* var. *hydrophilum*	USFWS	Endangered	Species: May affect, not likely to adversely affect Critical Habitat: Not likely to adversely affect

DPS = distinct population segment
ESU = evolutionarily significant unit
[a] The effects determinations for these species are described in Appendix 6.C, *Suisun Marsh Species.*

7.18.1 References

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EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL ON ENVIRONMENTAL QUALITY
WASHINGTON, D.C. 20503

August 1, 2016

MEMORANDUM FOR HEADS OF FEDERAL DEPARTMENTS AND AGENCIES

FROM: CHRISTINA GOLDFUSS
COUNCIL ON ENVIRONMENTAL QUALITY

SUBJECT: Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews

I. INTRODUCTION

The Council on Environmental Quality (CEQ) issues this guidance to assist Federal agencies in their consideration of the effects of greenhouse gas (GHG) emissions[1] and climate change when evaluating proposed Federal actions in accordance with the National Environmental Policy Act (NEPA) and the CEQ Regulations Implementing the Procedural Provisions of NEPA (CEQ Regulations).[2] This guidance will facilitate compliance with existing NEPA requirements, thereby improving the efficiency and consistency of reviews of proposed Federal actions for agencies, decision makers, project proponents, and the public.[3] The guidance provides Federal agencies a common

[1] For purposes of this guidance, CEQ defines GHGs in accordance with Section 19(m) of Exec. Order No. 13693, Planning for Federal Sustainability in the Next Decade, 80 Fed. Reg. 15869, 15882 (Mar. 25, 2015) (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride, and sulfur hexafluoride). Also for purposes of this guidance, "emissions" includes release of stored GHGs as a result of land management activities affecting terrestrial GHG pools such as, but not limited to, carbon stocks in forests and soils, as well as actions that affect the future changes in carbon stocks. The common unit of measurement for GHGs is metric tons of CO_2 equivalent (mt CO_2-e).

[2] *See* 42 U.S.C. 4321 et seq.; 40 CFR Parts 1500–1508.

[3] This guidance is not a rule or regulation, and the recommendations it contains may not apply to a particular situation based upon the individual facts and circumstances. This guidance does not change or substitute for any law, regulation, or other legally binding

approach for assessing their proposed actions, while recognizing each agency's unique circumstances and authorities.[4]

Climate change is a fundamental environmental issue, and its effects fall squarely within NEPA's purview.[5] Climate change is a particularly complex challenge given its global nature and the inherent interrelationships among its sources, causation, mechanisms of action, and impacts. Analyzing a proposed action's GHG emissions and the effects of climate change relevant to a proposed action—particularly how climate change may change an action's environmental effects—can provide useful information to decision makers and the public.

CEQ is issuing the guidance to provide for greater clarity and more consistency in how agencies address climate change in the environmental impact assessment process. This guidance uses longstanding NEPA principles because such an analysis should be similar to the analysis of other environmental impacts under NEPA. The guidance is intended to assist agencies in disclosing and considering the reasonably foreseeable effects of proposed actions that are relevant to their decision-making processes. It confirms that agencies should provide the public and decision makers with explanations of the basis for agency determinations.

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requirement, and is not legally enforceable. The use of non-mandatory language such as "guidance," "recommend," "may," "should," and "can," is intended to describe CEQ policies and recommendations. The use of mandatory terminology such as "must" and "required" is intended to describe controlling requirements under the terms of NEPA and the CEQ regulations, but this document does not affect legally binding requirements.

[4] This guidance also addresses recommendations offered by a number of stakeholders. *See* President's State, Local, and Tribal Leaders Task Force on Climate Preparedness and Resilience, *Recommendations to the President* (November 2014), p. 20 (recommendation 2.7), *available at* www.whitehouse.gov/sites/default/files/docs/task_force_report_0.pdf; U.S. Government Accountability Office, *Future Federal Adaptation Efforts Could Better Support Local Infrastructure Decision Makers*, (Apr. 2013), *available at* http://www.gao.gov/assets/660/653741.pdf. Public comments on drafts of this guidance document are available at http://www.whitehouse.gov/administration/eop/ceq/initiatives/nepa/comments.

[5] NEPA recognizes "the profound impact of man's activity on the interrelations of all components of the natural environment." (42 U.S.C. 4331(a)). It was enacted to, *inter alia,* "promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man." (42 U.S.C. 4321).

Focused and effective consideration of climate change in NEPA reviews[6] will allow agencies to improve the quality of their decisions. Identifying important interactions between a changing climate and the environmental impacts from a proposed action can help Federal agencies and other decision makers identify practicable opportunities to reduce GHG emissions, improve environmental outcomes, and contribute to safeguarding communities and their infrastructure against the effects of extreme weather events and other climate-related impacts.

Agencies implement NEPA through one of three levels of NEPA analysis: a Categorical Exclusion (CE); an Environmental Assessment (EA); or an Environmental Impact Statement (EIS). This guidance is intended to help Federal agencies ensure their analysis of potential GHG emissions and effects of climate change in an EA or EIS is commensurate with the extent of the effects of the proposed action.[7] Agencies have discretion in how they tailor their individual NEPA reviews to accommodate the approach outlined in this guidance, consistent with the CEQ Regulations and their respective implementing procedures and policies.[8] CEQ does not expect that implementation of this guidance will require agencies to develop new NEPA implementing procedures. However, CEQ recommends that agencies review their NEPA procedures and propose any updates they deem necessary or appropriate to facilitate their consideration of GHG emissions and climate change.[9] CEQ will review agency

[6] The term "NEPA review" is used to include the analysis, process, and documentation required under NEPA. While this document focuses on NEPA reviews, agencies are encouraged to analyze GHG emissions and climate-resilient design issues early in the planning and development of proposed actions and projects under their substantive authorities.
[7] *See* 40 CFR 1502.2(b) (Impacts shall be discussed in proportion to their significance); 40 CFR 1502.15 (Data and analyses in a statement shall be commensurate with the importance of the impact…).
[8] *See* 40 CFR 1502.24 (Methodology and scientific accuracy).
[9] *See* 40 CFR 1507.3. Agency NEPA implementing procedures can be, but are not required to be, in the form of regulation. Section 1507.3 encourages agencies to publish explanatory guidance, and agencies also should consider whether any updates to explanatory guidance are necessary. Agencies should review their policies and implementing procedures and revise them as necessary to ensure full compliance with NEPA.

proposals for revising their NEPA procedures, including any revision of CEs, in light of this guidance.

As discussed in this guidance, when addressing climate change agencies should consider: (1) The potential effects of a proposed action on climate change as indicated by assessing GHG emissions (e.g., to include, where applicable, carbon sequestration);[10] and, (2) The effects of climate change on a proposed action and its environmental impacts.

This guidance explains the application of NEPA principles and practices to the analysis of GHG emissions and climate change, and

- Recommends that agencies quantify a proposed agency action's projected direct and indirect GHG emissions, taking into account available data and GHG quantification tools that are suitable for the proposed agency action;
- Recommends that agencies use projected GHG emissions (to include, where applicable, carbon sequestration implications associated with the proposed agency action) as a proxy for assessing potential climate change effects when preparing a NEPA analysis for a proposed agency action;
- Recommends that where agencies do not quantify a proposed agency action's projected GHG emissions because tools, methodologies, or data inputs are not reasonably available to support calculations for a quantitative analysis, agencies include a qualitative analysis in the NEPA document and explain the basis for determining that quantification is not reasonably available;

[10] Carbon sequestration is the long-term carbon storage in plants, soils, geologic formations, and oceans.

- Discusses methods to appropriately analyze reasonably foreseeable direct, indirect, and cumulative GHG emissions and climate effects;
- Guides the consideration of reasonable alternatives and recommends agencies consider the short- and long-term effects and benefits in the alternatives and mitigation analysis;
- Advises agencies to use available information when assessing the potential future state of the affected environment in a NEPA analysis, instead of undertaking new research, and provides examples of existing sources of scientific information;
- Counsels agencies to use the information developed during the NEPA review to consider alternatives that would make the actions and affected communities more resilient to the effects of a changing climate;
- Outlines special considerations for agencies analyzing biogenic carbon dioxide sources and carbon stocks associated with land and resource management actions under NEPA;
- Recommends that agencies select the appropriate level of NEPA review to assess the broad-scale effects of GHG emissions and climate change, either to inform programmatic (e.g., landscape-scale) decisions, or at both the programmatic and tiered project- or site-specific level, and to set forth a reasoned explanation for the agency's approach; and
- Counsels agencies that the "rule of reason" inherent in NEPA and the CEQ Regulations allows agencies to determine, based on their expertise and

experience, how to consider an environmental effect and prepare an analysis based on the available information.

II. BACKGROUND

A. NEPA

NEPA is designed to promote consideration of potential effects on the human environment[11] that would result from proposed Federal agency actions, and to provide the public and decision makers with useful information regarding reasonable alternatives[12] and mitigation measures to improve the environmental outcomes of Federal agency actions. NEPA ensures that the environmental effects of proposed actions are taken into account before decisions are made and informs the public of significant environmental effects of proposed Federal agency actions, promoting transparency and accountability concerning Federal actions that may significantly affect the quality of the human environment. NEPA reviews should identify measures to avoid, minimize, or mitigate adverse effects of Federal agency actions. Better analysis and decisions are the ultimate goal of the NEPA process.[13]

Inherent in NEPA and the CEQ Regulations is a "rule of reason" that allows agencies to determine, based on their expertise and experience, how to consider an environmental effect and prepare an analysis based on the available information. The usefulness of that information to the decision-making process and the public, and the

[11] 40 CFR 1508.14 ("'Human environment' shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment.").
[12] 40 CFR 1508.25(b) ("Alternatives, which include: (1) No action alternative. (2) Other reasonable courses of actions. (3) Mitigation measures (not in the proposed action).").
[13] 40 CFR 1500.1(c) ("Ultimately, of course, it is not better documents but better decisions that count. NEPA's purpose is not to generate paperwork—even excellent paperwork—but to foster excellent action. The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment.").

extent of the anticipated environmental consequences are important factors to consider when applying that "rule of reason."

B. Climate Change

Climate change science continues to expand and refine our understanding of the impacts of anthropogenic GHG emissions. CEQ's first Annual Report in 1970 referenced climate change, indicating that "[m]an may be changing his weather."[14] At that time, the mean level of atmospheric carbon dioxide (CO_2) had been measured as increasing to 325 parts per million (ppm) from an average of 280 ppm pre-Industrial levels.[15] Since 1970, the concentration of atmospheric carbon dioxide has increased to approximately 400 ppm (2015 globally averaged value).[16] Since the publication of CEQ's first Annual Report, it has been determined that human activities have caused the carbon dioxide content of the atmosphere of our planet to increase to its highest level in at least 800,000 years.[17]

It is now well established that rising global atmospheric GHG emission concentrations are significantly affecting the Earth's climate. These conclusions are built upon a scientific record that has been created with substantial contributions from the

[14] *See* CEQ, *Environmental Quality The First Annual Report*, p. 93 (August 1970); *available at* https://ceq.doe.gov/ceq_reports/annual_environmental_quality_reports.html.
[15] *See* USGCRP, *Climate Change Impacts in the United States The Third National Climate Assessment* (Jerry M. Melillo, Terese (T.C.) Richmond, & Gary W. Yohe eds., 2014) [hereinafter "Third National Climate Assessment"], *Appendix 3 Climate Science Supplement*, p. 739; EPA, April 2015: *Inventory of U.S. Greenhouse Emissions and Sinks 1990-2013, available at* https://www3.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2015-Main-Text.pdf. *See also* Hartmann, D.L., A.M.G. Klein Tank, M. Rusticucci, et al., *2013 Observations Atmosphere and Surface. In Climate Change 2013 The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K., et al. (eds)]. Cambridge University Press: Cambridge, United Kingdom and New York, NY, USA. *Available at* http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter02_Final.pdf.
[16] *See* Ed Dlugokencky & Pieter Tans, National Oceanic and Atmospheric Administration/Earth System Research Laboratory, http://www.esrl.noaa.gov/gmd/ccgg/trends/global.html.
[17] *See* http://earthobservatory.nasa.gov/Features/CarbonCycle; University of California Riverside, National Aeronautics and Space Administration (NASA), and Riverside Unified School District, *Down to Earth Climate Change*, http://globalclimate.ucr.edu/resources.html; USGCRP, *Third National Climate Assessment, Appendix 3 Climate Science Supplement*, p. 736 ("Although climate changes in the past have been caused by natural factors, human activities are now the dominant agents of change. Human activities are affecting climate through increasing atmospheric levels of heat-trapping gases and other substances, including particles.").

United States Global Change Research Program (USGCRP), which informs the United States' response to global climate change through coordinated Federal programs of research, education, communication, and decision support.[18] Studies have projected the effects of increasing GHGs on many resources normally discussed in the NEPA process, including water availability, ocean acidity, sea-level rise, ecosystem functions, energy production, agriculture and food security, air quality and human health.[19]

Based primarily on the scientific assessments of the USGCRP, the National Research Council, and the Intergovernmental Panel on Climate Change, in 2009 the Environmental Protection Agency (EPA) issued a finding that the changes in our climate caused by elevated concentrations of greenhouse gases in the atmosphere are reasonably anticipated to endanger the public health and public welfare of current and future generations.[20] In 2015, EPA acknowledged more recent scientific assessments that "highlight the urgency of addressing the rising concentration of CO_2 in the atmosphere," finding that certain groups are especially vulnerable to climate-related effects.[21] Broadly

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[18] *See* Global Change Research Act of 1990, Pub. L. 101–606, Sec. 103 (November 16, 1990). For additional information on the United States Global Change Research Program [hereinafter "USGCRP"], visit http://www.globalchange.gov. The USGCRP, formerly the Climate Change Science Program, coordinates and integrates the activities of 13 Federal agencies that conduct research on changes in the global environment and their implications for society. The USGCRP began as a Presidential initiative in 1989 and was codified in the Global Change Research Act of 1990 (Public Law 101–606). USGCRP-participating agencies are the Departments of Agriculture, Commerce, Defense, Energy, Interior, Health and Human Services, State, and Transportation; the U.S. Agency for International Development, the Environmental Protection Agency, NASA, the National Science Foundation, and the Smithsonian Institution.

[19] *See* USGCRP, *Third National Climate Assessment*, *available at* http://nca2014.globalchange.gov/system/files_force/downloads/low/NCA3_Climate_Change_Impacts_in_the_United%20States_LowRes.pdf?download=1; IPCC, *Climate Change 2014 Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (R.K. Pachauri, & L.A. Meyer eds., 2014), *available at* https://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full.pdf; *see also* http://www.globalchange.gov; 40 CFR 1508.8 (effects include ecological, aesthetic, historic, cultural, economic, social, and health effects); USGCRP, *The Impacts of Climate Change on Human Health in the United States A Scientific Assessment, available at* https://health2016.globalchange.gov/.

[20] *See generally Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act*, 74 Fed. Reg. 66496 (Dec. 15, 2009). (For example, at 66497-98: "[t]he evidence concerning how human-induced climate change may alter extreme weather events also clearly supports a finding of endangerment, given the serious adverse impacts that can result from such events and the increase in risk, even if small, of the occurrence and intensity of events such as hurricanes and floods. Additionally, public health is expected to be adversely affected by an increase in the severity of coastal storm events due to rising sea levels").

[21] *See* EPA, *Final Rule for Carbon Pollution Emission Guidelines for Existing Stationary Sources Electric Utility Generating Units*, 80 Fed. Reg. 64661, 64677 (Oct. 23, 2015) ("Certain groups, including children, the elderly, and the poor, are most vulnerable to climate-related effects. Recent studies also find that certain communities, including low-income communities and some communities of color … are disproportionately affected by certain climate change related impacts—including heat waves, degraded air quality, and

stated, the effects of climate change observed to date and projected to occur in the future include more frequent and intense heat waves, longer fire seasons and more severe wildfires, degraded air quality, more heavy downpours and flooding, increased drought, greater sea-level rise, more intense storms, harm to water resources, harm to agriculture, ocean acidification, and harm to wildlife and ecosystems.[22]

III. CONSIDERING THE EFFECTS OF GHG EMISSIONS AND CLIMATE CHANGE

This guidance is applicable to all Federal actions subject to NEPA, including site-specific actions, certain funding of site-specific projects, rulemaking actions, permitting decisions, and land and resource management decisions.[23] This guidance does not – and cannot – expand the range of Federal agency actions that are subject to NEPA. Consistent with NEPA, Federal agencies should consider the extent to which a proposed action and its reasonable alternatives would contribute to climate change, through GHG emissions, and take into account the ways in which a changing climate may impact the proposed action and any alternative actions, change the action's environmental effects over the lifetime of those effects, and alter the overall environmental implications of such actions.

This guidance is intended to assist agencies in disclosing and considering the effects of GHG emissions and climate change along with the other reasonably foreseeable environmental effects of their proposed actions. This guidance does not establish any

extreme weather events—which are associated with increased deaths, illnesses, and economic challenges. Studies also find that climate change poses particular threats to the health, well-being, and ways of life of indigenous peoples in the U.S.").

[22] *See* http://www.globalchange.gov/climate-change/impacts-society and Third National Climate Assessment, Chapters 3-15 (Sectors) and Chapters 16-25 (Regions), *available at* http://nca2014.globalchange.gov/downloads.

[23] *See* 40 CFR 1508.18.

particular quantity of GHG emissions as "significantly" affecting the quality of the human environment or give greater consideration to the effects of GHG emissions and climate change over other effects on the human environment.

A. GHG Emissions as a Proxy for the Climate Change Impacts of a Proposed Action

In light of the global scope of the impacts of GHG emissions, and the incremental contribution of each single action to global concentrations, CEQ recommends agencies use the projected GHG emissions associated with proposed actions as a proxy for assessing proposed actions' potential effects on climate change in NEPA analysis.[24] This approach, together with providing a qualitative summary discussion of the impacts of GHG emissions based on authoritative reports such as the USGCRP's National Climate Assessments and the Impacts of Climate Change on Human Health in the United States, a Scientific Assessment of the USGCRP, allows an agency to present the environmental and public health impacts of a proposed action in clear terms and with sufficient information to make a reasoned choice between no action and other alternatives and appropriate mitigation measures, and to ensure the professional and scientific integrity of the NEPA review.[25]

Climate change results from the incremental addition of GHG emissions from millions of individual sources,[26] which collectively have a large impact on a global scale.

[24] *See* 40 CFR 1502.16, 1508.9.
[25] *See* 40 CFR 1500.1, 1502.24 (requiring agencies to use high quality information and ensure the professional and scientific integrity of the discussions and analyses in environmental impact statements).
[26] Some sources emit GHGs in quantities that are orders of magnitude greater than others. *See* EPA, *Greenhouse Gas Reporting Program 2014 Reported Data*, Figure 2: Direct GHG Emissions Reported by Sector (2014), *available at* https://www.epa.gov/ghgreporting/ghgrp-2014-reported-data (amounts of GHG emissions by sector); *Final Rule for Carbon Pollution Emission Guidelines for Existing Stationary Sources Electric Utility Generating Units*, 80 Fed. Reg. 64661, 64663, 64689 (Oct. 23, 2015) (regulation of GHG emissions from fossil fuel-fired electricity generating power plants); *Oil and Natural Gas Sector Emission Standards for New, Reconstructed, and Modified Sources*, 81 Fed. Reg. 34824, 35830 (June 3, 2016 (regulation of GHG emissions from oil and gas sector).

CEQ recognizes that the totality of climate change impacts is not attributable to any single action, but are exacerbated by a series of actions including actions taken pursuant to decisions of the Federal Government. Therefore, a statement that emissions from a proposed Federal action represent only a small fraction of global emissions is essentially a statement about the nature of the climate change challenge, and is not an appropriate basis for deciding whether or to what extent to consider climate change impacts under NEPA. Moreover, these comparisons are also not an appropriate method for characterizing the potential impacts associated with a proposed action and its alternatives and mitigations because this approach does not reveal anything beyond the nature of the climate change challenge itself: the fact that diverse individual sources of emissions each make a relatively small addition to global atmospheric GHG concentrations that collectively have a large impact. When considering GHG emissions and their significance, agencies should use appropriate tools and methodologies for quantifying GHG emissions and comparing GHG quantities across alternative scenarios. Agencies should not limit themselves to calculating a proposed action's emissions as a percentage of sector, nationwide, or global emissions in deciding whether or to what extent to consider climate change impacts under NEPA.

1. GHG Emissions Quantification and Relevant Tools

This guidance recommends that agencies quantify a proposed agency action's projected direct and indirect GHG emissions. Agencies should be guided by the principle that the extent of the analysis should be commensurate with the quantity of projected GHG emissions and take into account available data and GHG quantification tools that

are suitable for and commensurate with the proposed agency action.[27] The rule of reason and the concept of proportionality caution against providing an in-depth analysis of emissions regardless of the insignificance of the quantity of GHG emissions that would be caused by the proposed agency action.

Quantification tools are widely available, and are already in broad use in the Federal and private sectors, by state and local governments, and globally.[28] Such quantification tools and methodologies have been developed to assist institutions, organizations, agencies, and companies with different levels of technical sophistication, data availability, and GHG source profiles. When data inputs are reasonably available to support calculations, agencies should conduct GHG analysis and disclose quantitative estimates of GHG emissions in their NEPA reviews. These tools can provide estimates of GHG emissions, including emissions from fossil fuel combustion and estimates of GHG emissions and carbon sequestration for many of the sources and sinks potentially affected by proposed resource management actions.[29] When considering which tool(s) to employ, it is important to consider the proposed action's temporal scale, and the availability of input data.[30] Examples of the kinds of methodologies agencies might consider using are presented in CEQ's 2012 Guidance for Accounting and Reporting GHG Emissions for a wide variety of activities associated with Federal agency operations.[31] When an agency determines that quantifying GHG emissions would not be

[27] *See* 40 CFR 1500.1(b) ("Most important, NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail."); 40 CFR 1502.2(b) (Impacts shall be discussed in proportion to their significance); 40 CFR 1502.15 (Data and analyses in a statement shall be commensurate with the importance of the impact…).
[28] *See* https://ceq.doe.gov/current_developments/GHG-accounting-tools.html.
[29] For example, USDA's COMET-Farm tool can be used to assess the carbon sequestration of existing agricultural activities along with the reduction in carbon sequestration (emissions) of project-level activities, http://cometfarm.nrel.colostate.edu/. Examples of other tools are available at https://ceq.doe.gov/current_developments/GHG-accounting-tools.html.
[30] *See* 40 CFR 1502.22.
[31] *See*
https://www.whitehouse.gov/sites/default/files/microsites/ceq/revised_federal_greenhouse_gas_accounting_and_reporting_guidance_

warranted because tools, methodologies, or data inputs are not reasonably available, the agency should provide a qualitative analysis and its rationale for determining that the quantitative analysis is not warranted. A qualitative analysis can rely on sector-specific descriptions of the GHG emissions of the category of Federal agency action that is the subject of the NEPA analysis.

When updating their NEPA procedures[32] and guidance, agencies should coordinate with CEQ to identify 1) the actions that normally warrant quantification of their GHG emissions, and consideration of the relative GHG emissions associated with alternative actions and 2) agency actions that normally do not warrant such quantification because tools, methodologies, or data inputs are not reasonably available. The determination of the potential significance of a proposed action remains subject to agency practice for the consideration of context and intensity, as set forth in the CEQ Regulations.[33]

2. The Scope of the Proposed Action

In order to assess effects, agencies should take account of the proposed action – including "connected" actions[34] – subject to reasonable limits based on feasibility and practicality. Activities that have a reasonably close causal relationship to the Federal action, such as those that may occur as a predicate for a proposed agency action or as a consequence of a proposed agency action, should be accounted for in the NEPA analysis.

060412.pdf. Federal agencies' Strategic Sustainability Performance Plans reflecting their annual GHG inventories and reports under Executive Order 13514 are available at https://www.performance.gov/node/3406/view?view=public#supporting-info.

[32] *See* 40 CFR 1507.3.

[33] 40 CFR 1508.27 ("'Significantly' as used in NEPA requires considerations of both context and intensity: (a) Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. . . . (b) Intensity. This refers to the severity of impact.").

[34] 40 CFR 1508.25(a) (Actions are connected if they: (i) Automatically trigger other actions which may require environmental impact statements; (ii) Cannot or will not proceed unless other actions are taken previously or simultaneously, or; (iii) Are interdependent parts of a larger action and depend on the larger action for their justification.).

For example, NEPA reviews for proposed resource extraction and development projects typically include the reasonably foreseeable effects of various phases in the process, such as clearing land for the project, building access roads, extraction, transport, refining, processing, using the resource, disassembly, disposal, and reclamation. Depending on the relationship between any of the phases, as well as the authority under which they may be carried out, agencies should use the analytical scope that best informs their decision making.

The agency should focus on significant potential effects and conduct an analysis that is proportionate to the environmental consequences of the proposed action.[35] Agencies can rely on basic NEPA principles to determine and explain the reasonable parameters of their analyses in order to disclose the reasonably foreseeable effects that may result from their proposed actions.[36]

3. Alternatives

Considering alternatives, including alternatives that mitigate GHG emissions, is fundamental to the NEPA process and accords with NEPA Sections 102(2)(C) and 102(2)(E).[37] The CEQ regulations emphasize that the alternatives analysis is the heart of the EIS under NEPA Section 102(2)(C).[38] NEPA Section 102(2)(E) provides an independent requirement for the consideration of alternatives in environmental documents.[39] NEPA calls upon agencies to use the NEPA process to "identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment."[40] The requirement to

[35] *See* 40 CFR 1501.7(a)(3), 1502.2(b), and 1502.15.
[36] *See* 40 CFR 1502.16.
[37] 42 U.S.C. 4332(2)(C), 4332(2)(E); 40 CFR 1502.14, 1508.9(b).
[38] 40 CFR 1502.14.
[39] *See* 40 CFR 1500.2, 1508.9(b).
[40] 40 CFR 1500.2(c).

consider alternatives ensures that agencies account for approaches with no, or less, adverse environmental effects for a particular resource.

Consideration of alternatives also provides each agency decision maker the information needed to examine other possible approaches to a particular proposed action (including the no action alternative) that could alter the environmental impact or the balance of factors considered in making the decision. Agency decisions are aided when there are reasonable alternatives that allow for comparing GHG emissions and carbon sequestration potential, trade-offs with other environmental values, and the risk from – and resilience to – climate change inherent in a proposed action and its design.

Agencies must consider a range of reasonable alternatives consistent with the level of NEPA review (e.g., EA or EIS) and the purpose and need for the proposed action, as well as reasonable mitigation measures if not already included in the proposed action or alternatives.[41] Accordingly, a comparison of these alternatives based on GHG emissions and any potential mitigation measures can be useful to advance a reasoned choice among alternatives and mitigation actions. When conducting the analysis, an agency should compare the anticipated levels of GHG emissions from each alternative – including the no-action alternative – and mitigation actions to provide information to the public and enable the decision maker to make an informed choice.

Agencies should consider reasonable alternatives and mitigation measures to reduce action-related GHG emissions or increase carbon sequestration in the same fashion as they consider alternatives and mitigation measures for any other environmental effects. NEPA, the CEQ Regulations, and this guidance do not require the decision

[41] *See* 42 U.S.C. 4332(2)(C), 4332(2)(E), and 40 CFR 1502.14(f), 1508.9(b). The purpose and need for action usually reflects both the extent of the agency's statutory authority and its policies.

maker to select the alternative with the lowest net level of emissions. Rather, they allow for the careful consideration of emissions and mitigation measures along with all the other factors considered in making a final decision.

4. Direct and Indirect Effects

If the direct and indirect GHG emissions can be quantified based on available information, including reasonable projections and assumptions, agencies should consider and disclose the reasonably foreseeable direct and indirect emissions when analyzing the direct and indirect effects of the proposed action.[42] Agencies should disclose the information and any assumptions used in the analysis and explain any uncertainties.

To compare a project's estimated direct and indirect emissions with GHG emissions from the no-action alternative, agencies should draw on existing, timely, objective, and authoritative analyses, such as those by the Energy Information Administration, the Federal Energy Management Program, or Office of Fossil Energy of the Department of Energy.[43] In the absence of such analyses, agencies should use other available information. When such analyses or information for quantification is unavailable, or the complexity of comparing emissions from various sources would make quantification overly speculative, then the agency should quantify emissions to the extent that this information is available and explain the extent to which quantified emissions information is unavailable while providing a qualitative analysis of those emissions. As

[42] For example, where the proposed action involves fossil fuel extraction, direct emissions typically include GHGs emitted during the process of exploring for or extracting the fossil fuel. The indirect effects of such an action that are reasonably foreseeable at the time would vary with the circumstances of the proposed action. For actions such as a Federal lease sale of coal for energy production, the impacts associated with the end-use of the fossil fuel being extracted would be the reasonably foreseeable combustion of that coal.
[43] For a current example, see Office of Fossil Energy, Nat'l Energy Tech. Lab., U.S. Dep't of Energy, *Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States*, Pub. No. DOE/NETL-2014/1649 (2014), *available at* http://energy.gov/sites/prod/files/2014/05/f16/Life%20Cycle%20GHG%20Perspective%20Report.pdf.

with any NEPA analysis, the level of effort should be proportionate to the scale of the emissions relevant to the NEPA review.

5. Cumulative Effects

"Cumulative impact" is defined in the CEQ Regulations as the "impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions."[44] All GHG emissions contribute to cumulative climate change impacts. However, for most Federal agency actions CEQ does not expect that an EIS would be required based *solely* on the global significance of cumulative impacts of GHG emissions, as it would not be consistent with the rule of reason to require the preparation of an EIS for every Federal action that may cause GHG emissions regardless of the magnitude of those emissions.

Based on the agency identification and analysis of the direct and indirect effects of its proposed action, NEPA requires an agency to consider the cumulative impacts of its proposed action and reasonable alternatives.[45] As noted above, for the purposes of NEPA, the analysis of the effects of GHG emissions is essentially a cumulative effects analysis that is subsumed within the general analysis and discussion of climate change impacts. Therefore, direct and indirect effects analysis for GHG emissions will adequately address the cumulative impacts for climate change from the proposed action and its alternatives and a separate cumulative effects analysis for GHG emissions is not needed.

6. Short- and Long-Term Effects

[44] 40 CFR 1508.7.
[45] *See* 40 CFR 1502.16, 1508.7, 1508.8. *See also* CEQ Memorandum to Heads of Federal Agencies, *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis*, June 24, 2005, *available at* https//ceq.doe.gov/nepa/regs/Guidance_on_CE.pdf.

When considering effects, agencies should take into account both the short- and long-term adverse and beneficial effects using a temporal scope that is grounded in the concept of reasonable foreseeability. Some proposed actions will have to consider effects at different stages to ensure the direct effects and reasonably foreseeable indirect effects are appropriately assessed; for example, the effects of construction are different from the effects of the operations and maintenance of a facility.

Biogenic GHG emissions and carbon stocks from some land or resource management activities, such as a prescribed burn of a forest or grassland conducted to limit loss of ecosystem function through wildfires or insect infestations, may result in short-term GHG emissions and loss of stored carbon, while in the longer term a restored, healthy ecosystem may provide long-term carbon sequestration. Therefore, the short- and long-term effects should be described in comparison to the no action alternative in the NEPA review.

7. Mitigation

Mitigation is an important component of the NEPA process that Federal agencies can use to avoid, minimize, and compensate for the adverse environmental effects associated with their actions. Mitigation, by definition, includes avoiding impacts, minimizing impacts by limiting them, rectifying the impact, reducing or eliminating the impacts over time, or compensating for them.[46] Consequently, agencies should consider reasonable mitigation measures and alternatives as provided for under existing CEQ Regulations and take into account relevant agency statutory authorities and policies. The NEPA process is also intended to provide useful advice and information to State, local

[46] *See* 40 CFR 1508.20, 1508.25 (Alternatives include mitigation measures not included in the proposed action).

and tribal governments and private parties so that the agencies can better coordinate with other agencies and organizations regarding the means to mitigate effects of their actions.[47] The NEPA process considers the effects of mitigation commitments made by project proponents or others and mitigation required under other relevant permitting and environmental review regimes.[48]

As Federal agencies evaluate potential mitigation of GHG emissions and the interaction of a proposed action with climate change, the agencies should also carefully evaluate the quality of that mitigation to ensure it is additional, verifiable, durable, enforceable, and will be implemented.[49] Agencies should consider the potential for mitigation measures to reduce or mitigate GHG emissions and climate change effects when those measures are reasonable and consistent with achieving the purpose and need for the proposed action. Such mitigation measures could include enhanced energy efficiency, lower GHG-emitting technology, carbon capture, carbon sequestration (e.g., forest, agricultural soils, and coastal habitat restoration), sustainable land management practices, and capturing or beneficially using GHG emissions such as methane.

Finally, the CEQ Regulations and guidance recognize the value of monitoring to ensure that mitigation is carried out as provided in a record of decision or finding of no significant impact.[50] The agency's final decision on the proposed action should identify those mitigation measures that the agency commits to take, recommends, or requires

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[47] NEPA directs Federal agencies to make "advice and information useful in restoring, maintaining, and enhancing the quality of the environment" available to States, Tribes, counties, cities, institutions and individuals. NEPA Sec. 102(2)(G).
[48] *See* CEQ Memorandum to Heads of Federal Agencies, *Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact*, 76 FR 3843 (Jan. 21, 2011) *available at* https://ceq.doe.gov/current_developments/docs/Mitigation_and_Monitoring_Guidance_14Jan2011.pdf.
[49] *See* Presidential Memorandum: *Mitigating Impacts on Natural Resources from Development and Encouraging Related Private Investment* (https://www.whitehouse.gov/the-press-office/2015/11/03/mitigating-impacts-natural-resources-development-and-encouraging-related) defining "durability" and addressing additionality.
[50] *See* 40 CFR 1505.2(c), 1505.3. *See also* CEQ Memorandum to Heads of Federal Agencies, *Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact*, 76 FR 3843 (Jan. 21, 2011) *available at* https://ceq.doe.gov/current_developments/docs/Mitigation_and_Monitoring_Guidance_14Jan2011.pdf.

others to take. Monitoring is particularly appropriate to confirm the effectiveness of mitigation when that mitigation is adopted to reduce the impacts of a proposed action on affected resources already increasingly vulnerable due to climate change.

B. CONSIDERING THE EFFECTS OF CLIMATE CHANGE ON A PROPOSED ACTION AND ITS ENVIRONMENTAL IMPACTS

According to the USGCRP and others, GHGs already in the atmosphere will continue altering the climate system into the future, even with current or future emissions control efforts.[51] Therefore, a NEPA review should consider an action in the context of the future state of the environment. In addition, climate change adaptation and resilience — defined as adjustments to natural or human systems in response to actual or expected climate changes — are important considerations for agencies contemplating and planning actions with effects that will occur both at the time of implementation and into the future.[52]

1. Affected Environment

An agency should identify the affected environment to provide a basis for comparing the current and the future state of the environment as affected by the proposed action or its reasonable alternatives.[53] The current and projected future state of the environment without the proposed action (i.e., the no action alternative) represents the reasonably foreseeable affected environment, and this should be described based on

[51] *See* Third National Climate Assessment, *Appendix 3 Climate Science Supplement* 753-754, *available at* http://s3.amazonaws.com/nca2014/low/NCA3_Full_Report_Appendix_3_Climate_Science_Supplement_LowRes.pdf?download=1.
[52] *See* Third National Climate Assessment, Chapter 28, "Adaptation" and Chapter 26, "Decision Support: Connecting Science, Risk Perception, and Decisions," *available at* http://www.globalchange.gov/nca3-downloads-materials; see also, Exec. Order No. 13653, 78 Fed. Reg. 66817 (Nov. 6, 2013) and Exec. Order No.13693, *Planning for Federal Sustainability in the Next Decade*, 80 Fed. Reg. 15869 (Mach 25, 2015) (defining "climate-resilient design").
[53] *See* 40 CFR 1502.15 (providing that environmental impact statements shall succinctly describe the environmental impacts on the area(s) to be affected or created by the alternatives under consideration).

authoritative climate change reports,[54] which often project at least two possible future scenarios.[55] The temporal bounds for the state of the environment are determined by the projected initiation of implementation and the expected life of the proposed action and its effects.[56] Agencies should remain aware of the evolving body of scientific information as more refined estimates of the impacts of climate change, both globally and at a localized level, become available.[57]

2. Impacts

The analysis of climate change impacts should focus on those aspects of the human environment that are impacted by both the proposed action and climate change. Climate change can make a resource, ecosystem, human community, or structure more susceptible to many types of impacts and lessen its resilience to other environmental impacts apart from climate change. This increase in vulnerability can exacerbate the effects of the proposed action. For example, a proposed action may require water from a stream that has diminishing quantities of available water because of decreased snow pack in the mountains, or add heat to a water body that is already warming due to increasing atmospheric temperatures. Such considerations are squarely within the scope of NEPA and can inform decisions on whether to proceed with, and how to design, the proposed action to eliminate or mitigate impacts exacerbated by climate change. They can also

[54] *See, e.g.,* Third National Climate Assessment (Regional impacts chapters) *available at* http://www.globalchange.gov/nca3-downloads-materials.
[55] *See, e.g.,* Third National Climate Assessment (Regional impacts chapters, considering a low future global emissions scenario, and a high emissions scenario) *available at* http://www.globalchange.gov/nca3-downloads-materials.
[56] CEQ, *Considering Cumulative Effects Under the National Environmental Policy Act* (1997), https://ceq.doe.gov/publications/cumulative_effects html. Agencies should also consider their work under Exec. Order No. 13653, *Preparing the United States for the Impacts of Climate Change*, 78 Fed. Reg. 66817 (Nov. 6, 2013), that considers how capital investments will be affected by a changing climate over time.
[57] *See, e.g.,* http://nca2014.globalchange.gov/report/regions/coasts.

inform possible adaptation measures to address the impacts of climate change, ultimately enabling the selection of smarter, more resilient actions.

3. Available Assessments and Scenarios

In accordance with NEPA's rule of reason and standards for obtaining information regarding reasonably foreseeable effects on the human environment, agencies need not undertake new research or analysis of potential climate change impacts in the proposed action area, but may instead summarize and incorporate by reference the relevant scientific literature.[58] For example, agencies may summarize and incorporate by reference the relevant chapters of the most recent national climate assessments or reports from the USGCRP.[59] Particularly relevant to some proposed actions are the most current reports on climate change impacts on water resources, ecosystems, agriculture and forestry, health, coastlines, and ocean and arctic regions in the United States.[60] Agencies may recognize that scenarios or climate modeling information (including seasonal, inter-annual, long-term, and regional-scale projections) are widely used, but when relying on a single study or projection, agencies should consider their limitations and discuss them.[61]

4. Opportunities for Resilience and Adaptation

As called for under NEPA, the CEQ Regulations, and CEQ guidance, the NEPA review process should be integrated with agency planning at the earliest possible time that would allow for a meaningful analysis.[62] Information developed during early

[58] *See* 40 CFR 1502.21 (material may be incorporated by reference if it is reasonably available for inspection by potentially interested persons during public review and comment).
[59] *See* http://www.globalchange.gov/browse/reports.
[60] *See* Third National Climate Assessment, *Our Changing Climate*, *available at* http://nca2014.globalchange.gov/report. Agencies should consider the latest final assessments and reports when they are updated.
[61] *See* 40 CFR 1502.22. Agencies can consult www.data.gov/climate/portals for model data archives, visualization tools, and downscaling results.
[62] *See* 42 U.S.C. 4332 ("agencies of the Federal Government shall … utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making"); 40 CFR 1501.2 ("Agencies shall integrate the NEPA process with other planning at the earliest possible time…"); *See also* CEQ Memorandum

planning processes that precede a NEPA review may be incorporated into the NEPA review. Decades of NEPA practice have shown that integrating environmental considerations with the planning process provides useful information that program and project planners can consider in the design of the proposed action, alternatives, and potential mitigation measures. For instance, agencies should take into account increased risks associated with development in floodplains, avoiding such development wherever there is a practicable alternative, as required by Executive Order 11988 and Executive Order 13690.[63] In addition, agencies should take into account their ongoing efforts to incorporate environmental justice principles into their programs, policies, and activities, including the environmental justice strategies required by Executive Order 12898, as amended, and consider whether the effects of climate change in association with the effects of the proposed action may result in a disproportionate effect on minority and low income communities.[64] Agencies also may consider co-benefits of the proposed action, alternatives, and potential mitigation measures for human health, economic and social stability, ecosystem services, or other benefit that increases climate change preparedness or resilience. Individual agency adaptation plans and interagency adaptation strategies, such as agency Climate Adaptation Plans, the National Fish, Wildlife and Plants Climate Adaptation Strategy, and the National Action Plan: Priorities for Managing Freshwater

for Heads of Federal Departments and Agencies, *Improving the Process for Preparing Efficient and Timely Environmental Reviews under the National Environmental Policy Act*, 77 Fed. Reg. 14473 (Mar. 12, 2012), *available at* https://ceq.doe.gov/current_developments/docs/Improving_NEPA_Efficiencies_06Mar2012.pdf.

[63] *See* Exec. Order No. 11988, "Floodplain Management," 42 Fed. Reg. 26951 (May 24, 1977), *available at* http://www.archives.gov/federal-register/codification/executive-order/11988.html; Exec. Order No. 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*, 80 Fed. Reg. 6425 (Jan. 30, 2015), *available at* https://www.gpo.gov/fdsys/pkg/FR-2015-02-04/pdf/2015-02379.pdf.

[64] *See* Exec. Order No. 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, 59 Fed. Reg. 7629 (Feb. 16, 1994), *available at* https://ceq.doe.gov/nepa/regs/eos/ii-5.pdf; CEQ, *Environmental Justice Guidance Under the National Environmental Policy Act* (Dec. 1997), *available at* http://ceq.doe.gov/nepa/regs/ej/justice.pdf.

Resources in a Changing Climate, provide other good examples of the type of relevant and useful information that can be considered.[65]

Climate change effects on the environment and on the proposed project should be considered in the analysis of a project considered vulnerable to the effects of climate change such as increasing sea level, drought, high intensity precipitation events, increased fire risk, or ecological change. In such cases, a NEPA review will provide relevant information that agencies can use to consider in the initial project design, as well as alternatives with preferable overall environmental outcomes and improved resilience to climate impacts. For example, an agency considering a proposed long-term development of transportation infrastructure on a coastal barrier island should take into account climate change effects on the environment and, as applicable, consequences of rebuilding where sea level rise and more intense storms will shorten the projected life of the project and change its effects on the environment.[66] Given the length of time involved in present sea level projections, such considerations typically will not be relevant to short-term actions with short-term effects.

In addition, the particular impacts of climate change on vulnerable communities may be considered in the design of the action or the selection among alternatives to

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[65] *See* http://sustainability.performance.gov for agency sustainability plans, which contain agency adaptation plans. *See also* http://www.wildlifeadaptationstrategy.gov; http://www.whitehouse.gov/sites/default/files/microsites/ceq/2011_national_action_plan.pdf; and https://www.epa.gov/greeningepa/climate-change-adaptation-plans

[66] *See* U.S. Department of Transportation, Gulf Coast Study, Phase 2, *Assessing Transportation Vulnerability to Climate Change Synthesis of Lessons Learned and Methods Applied*, FHWA-HEP-15-007 (Oct. 2014) (focusing on the Mobile, Alabama region), *available at* http://www.fhwa.dot.gov/environment/climate_change/adaptation/ongoing_and_current_research/gulf_coast_study/phase2_task6/fhwahep15007.pdf; U.S. Climate Change Science Program, Synthesis and Assessment Product 4.7, Impacts of Climate Change and Variability on Transportation Systems and Infrastructure: Gulf Coast Study, Phase I (Mar. 2008) (focusing on a regional scale in the central Gulf Coast), *available at* https://downloads.globalchange.gov/sap/sap4-7/sap4-7-final-all.pdf. Information about the Gulf Coast Study is *available at* *http //www.fhwa.dot.gov/environment/climate_change/adaptation/ongoing_and_current_research/gulf_coast_study*. *See also* Third National Climate Assessment, Chapter 28, "Adaptation," at 675 (noting that Federal agencies in particular can facilitate climate adaptation by "ensuring the establishment of federal policies that allow for "flexible" adaptation efforts and take steps to avoid unintended consequences"), *available at* http://nca2014.globalchange.gov/report/response-strategies/adaptation#intro-section-2.

assess the impact, and potential for disproportionate impacts, on those communities.[67] For example, chemical facilities located near the coastline could have increased risk of spills or leakages due to sea level rise or increased storm surges, putting local communities and environmental resources at greater risk. Increased resilience could minimize such potential future effects. Finally, considering climate change preparedness and resilience can help ensure that agencies evaluate the potential for generating additional GHGs if a project has to be replaced, repaired, or modified, and minimize the risk of expending additional time and funds in the future.

C. Special Considerations for Biogenic Sources of Carbon

With regard to biogenic GHG emissions from land management actions – such as prescribed burning, timber stand improvements, fuel load reductions, scheduled harvesting, and livestock grazing – it is important to recognize that these land management actions involve GHG emissions and carbon sequestration that operate within the global carbon and nitrogen cycle, which may be affected by those actions. Similarly, some water management practices have GHG emission consequences (e.g., reservoir management practices can reduce methane releases, wetlands management practices can enhance carbon sequestration, and water conservation can improve energy efficiency).

Notably, it is possible that the net effect of ecosystem restoration actions resulting in short-term biogenic emissions may lead to long-term reductions of atmospheric GHG concentrations through increases in carbon stocks or reduced risks of future emissions. In the land and resource management context, how a proposed action affects a net carbon sink or source will depend on multiple factors such as the climatic region, the distribution

[67] For an example, *see* https://www.blm.gov/epl-front-office/projects/nepa/5251/42462/45213/NPR-A_FINAL_ROD_2-21-13.pdf.

of carbon across carbon pools in the project area, and the ongoing activities and trends. In addressing biogenic GHG emissions, resource management agencies should include a comparison of estimated net GHG emissions and carbon stock changes that are projected to occur with and without implementation of proposed land or resource management actions.[68] This analysis should take into account the GHG emissions, carbon sequestration potential, and the changes in carbon stocks that are relevant to decision making in light of the proposed actions and timeframes under consideration.

One example of agencies dealing with biogenic emissions and carbon sequestration arises when agencies consider proposed vegetation management practices that affect the risk of wildfire, insect and disease outbreak, or other disturbance. The public and the decision maker may benefit from consideration of the influence of a vegetation management action that affects the risk of wildfire on net GHG emissions and carbon stock changes. NEPA reviews should consider whether to include a comparison of net GHG emissions and carbon stock changes that are anticipated to occur, with and without implementation of the proposed vegetation management practice, to provide information that is useful to the decision maker and the public to distinguish between alternatives. The analysis would take into account the estimated GHG emissions (biogenic and fossil), carbon sequestration potential, and the net change in carbon stocks relevant in light of the proposed actions and timeframes under consideration. In such cases the agency should describe the basis for estimates used to project the probability or likelihood of occurrence or changes in the effects or severity of wildfire. Where such

[68] One example of a tool for such calculations is the Carbon On Line Estimator (COLE), which uses data based on USDA Forest Service Forest Inventory & Analysis and Resource Planning Assessment data and other ecological data. COLE began as a collaboration between the National Council for Air and Stream Improvement, Inc. (NCASI) and USDA Forest Service, Northern Research Station. It currently is maintained by NCASI. It is available at http://www.fs.usda.gov/ccrc/tools/cole.

tools, methodologies, or data are not yet available, the agency should provide a qualitative analysis and its rationale for determining that the quantitative analysis is not warranted. As with any other analysis, the rule of reason and proportionality should be applied to determine the extent of the analysis.

CEQ acknowledges that Federal land and resource management agencies are developing agency-specific principles and guidance for considering biological carbon in management and planning decisions.[69] Such guidance is expected to address the importance of considering biogenic carbon fluxes and storage within the context of other management objectives and ecosystem service goals, and integrating carbon considerations as part of a balanced and comprehensive program of sustainable management, climate change mitigation, and climate change adaptation.

IV. TRADITIONAL NEPA TOOLS AND PRACTICES

A. Scoping and Framing the NEPA Review

To effectuate integrated decision making, avoid duplication, and focus the NEPA review, the CEQ Regulations provide for scoping.[70] In scoping, the agency determines the issues that the NEPA review will address and identifies the impacts related to the proposed action that the analyses will consider.[71] An agency can use the scoping process to help it determine whether analysis is relevant and, if so, the extent of analysis

[69] *See* Council on Climate Change Preparedness and Resilience, *Priority Agenda Enhancing the Climate Resilience of America's Natural Resources*, at 52 (Oct. 2014), *available at* http://www.whitehouse.gov/sites/default/files/docs/enhancing_climate_resilience_of_americas_natural_resources.pdf.
[70] *See* 40 CFR 1501.7 ("There shall be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. This process shall be termed scoping."); *see also* CEQ Memorandum for Heads of Federal Departments and Agencies, *Improving the Process for Preparing Efficient and Timely Environmental Reviews under the National Environmental Policy Act*, March 6, 2012, *available at* https://ceq.doe.gov/current_developments/docs/Improving_NEPA_Efficiencies_06Mar2012.pdf (the CEQ Regulations explicitly require scoping for preparing an EIS, however, agencies can also take advantage of scoping whenever preparing an EA).
[71] *See* 40 CFR 1500.4(b), 1500.4(g), 1501.7.

appropriate for a proposed action.[72] When scoping for the climate change issues associated with the proposed agency action, the nature, location, timeframe, and type of the proposed action and the extent of its effects will help determine the degree to which to consider climate projections, including whether climate change considerations warrant emphasis, detailed analysis, and disclosure.

Consistent with this guidance, agencies may develop their own agency-specific practices and guidance for framing the NEPA review. Grounded on the principles of proportionality and the rule of reason, such aids can help an agency determine the extent to which an analysis of GHG emissions and climate change impacts should be explored in the decision-making process and will assist in the analysis of the no action and proposed alternatives and mitigation.[73] The agency should explain such a framing process and its application to the proposed action to the decision makers and the public during the NEPA review and in the EA or EIS document.

B. Frame of Reference

When discussing GHG emissions, as for all environmental impacts, it can be helpful to provide the decision maker and the public with a recognizable frame of reference for comparing alternatives and mitigation measures. Agencies should discuss relevant approved federal, regional, state, tribal, or local plans, policies, or laws for GHG emission reductions or climate adaptation to make clear whether a proposed project's

[72] *See* 40 CFR 1501.7 (The agency preparing the NEPA analysis must use the scoping process to, among other things, determine the scope and identify the significant issues to be analyzed in depth) and CEQ, *Memorandum for General Counsels, NEPA Liaisons, and Participants in Scoping*, April 30, 1981, *available at* https://ceq.doe.gov/nepa/regs/scope/scoping.htm.

[73] *See, e.g.,* Matthew P. Thompson, Bruce G. Marcot, Frank R. Thompson, III, Steven McNulty, Larry A. Fisher, Michael C. Runge, David Cleaves, and Monica Tomosy, *The Science of Decisionmaking Applications for Sustainable Forest and Grassland Management in the National Forest System* (2013), *available at* http://www.fs.fed.us/rm/pubs_other/rmrs_2013_thompson_m004.pdf; U.S. Forest Service Comparative Risk Assessment Framework And Tools, *available at* www.fs.fed.us/psw/topics/fire_science/craft/craft; and Julien Martin, Michael C. Runge, James D. Nichols, Bruce C. Lubow, and William L. Kendall, *Structured decision making as a conceptual framework to identify thresholds for conservation and management* (2009), Ecological Applications 19:1079–1090, *available at* http://www.esajournals.org/doi/abs/10.1890/08-0255.1.

GHG emissions are consistent with such plans or laws.[74] For example, the Bureau of Land Management has discussed how agency actions in California, especially joint projects with the State, may or may not facilitate California reaching its emission reduction goals under the State's Assembly Bill 32 (Global Warming Solutions Act).[75] This approach helps frame the policy context for the agency decision based on its NEPA review.

C. Incorporation by Reference

Incorporation by reference is of great value in considering GHG emissions or where an agency is considering the implications of climate change for the proposed action and its environmental effects. Agencies should identify situations where prior studies or NEPA analyses are likely to cover emissions or adaptation issues, in whole or in part. When larger scale analyses have considered climate change impacts and GHG emissions, calculating GHG emissions and carbon stocks for a specific action may provide only limited information beyond the information already collected and considered in the larger scale analyses. The NEPA reviews for a specific action can incorporate by reference earlier programmatic studies or information such as management plans, inventories, assessments, and research that consider potential changes in carbon stocks, as well as any relevant programmatic NEPA reviews.[76]

Accordingly, agencies should use the scoping process to consider whether they should incorporate by reference GHG analyses from other programmatic studies, action

[74] *See* 40 CFR 1502.16(c), 1506.2(d) (where an inconsistency exists, agencies should describe the extent to which the agency will reconcile its proposed action with the plan or law). *See also* Exec. Order No. 13693, 80 Fed. Reg. 15869 (Mar. 25, 2015) (establishing GHG emission and related goals for agency facilities and operations. Scope 1, 2, and 3 emissions are typically separate and distinct from analyses and information used in an EA or EIS.).
[75] *See*, *e.g.*, U.S. Bureau of Land Management, Desert Renewable Energy Conservation Plan Proposed Land Use Plan Amendment and Final Environmental Impact Statement, Vol. I, § I.3.3.2, at 12, *available at* http://drecp.org/finaldrecp/.
[76] *See* 40 CFR 1502.5, 1502.21.

specific NEPA reviews, or programmatic NEPA reviews to avoid duplication of effort. Furthermore, agencies should engage other agencies and stakeholders with expertise or an interest in related actions to participate in the scoping process to identify relevant GHG and adaptation analyses from other actions or programmatic NEPA documents.

D. Using Available Information

Agencies should make decisions using current scientific information and methodologies. CEQ does not expect agencies to fund and conduct original climate change research to support their NEPA analyses or for agencies to require project proponents to do so. Agencies should exercise their discretion to select and use the tools, methodologies, and scientific and research information that are of high quality and available to assess the impacts.[77]

Agencies should be aware of the ongoing efforts to address the impacts of climate change on human health and vulnerable communities.[78] Certain groups, including children, the elderly, and the poor, are more vulnerable to climate-related health effects, and may face barriers to engaging on issues that disproportionately affect them. CEQ recommends that agencies periodically engage their environmental justice experts, and the Federal Interagency Working Group on Environmental Justice, [79] to identify approaches to avoid or minimize impacts that may have disproportionately high and

[77] *See* 40 CFR 1502.24 (requiring agencies to ensure the professional and scientific integrity of the discussions and analyses in environmental impact statements).
[78] USGCRP, *The Impacts of Climate Change on Human Health in the United States A Scientific Assessment* (Apr. 2016), *available at* https://health2016.globalchange.gov/downloads.
[79] For more information on the Federal Interagency Working Group on Environmental Justice co-chaired by EPA and CEQ, *see* http://www.epa.gov/environmentaljustice/interagency/index.html.

adverse human health or environmental effects on minority and low-income populations.[80]

E. Programmatic or Broad-Based Studies and NEPA Reviews

Agency decisions can address different geographic scales that can range from the programmatic or landscape level to the site- or project-specific level. Agencies sometimes conduct analyses or studies that are not NEPA reviews at the national level or other broad scale level (e.g., landscape, regional, or watershed) to assess the status of one or more resources or to determine trends in changing environmental conditions.[81] In the context of long-range energy, transportation, and resource management strategies an agency may decide that it would be useful and efficient to provide an aggregate analysis of GHG emissions or climate change effects in a programmatic analysis and then incorporate by reference that analysis into future NEPA reviews.

A tiered, analytical decision-making approach using a programmatic NEPA review is used for many types of Federal actions[82] and can be particularly relevant to addressing proposed land, aquatic, and other resource management plans. Under such an approach, an agency conducts a broad-scale programmatic NEPA analysis for decisions such as establishing or revising USDA Forest Service land management plans, Bureau of Land Management resource management plans, or Natural Resources Conservation Service conservation programs. Subsequent NEPA analyses for proposed site-specific

[80] *President's Memorandum for the Heads of All Departments and Agencies, Executive Order on Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* (Feb. 11, 1994), *available at* https://ceq.doe.gov/nepa/regs/eos/ii-5.pdf; CEQ, *Environmental Justice Guidance Under the National Environmental Policy Act*, *available at* https://ceq.doe.gov/nepa/regs/ej/justice.pdf.

[81] Such a programmatic study is distinct from a programmatic NEPA review which is appropriate when the action under consideration is itself subject to NEPA requirements. *See* CEQ, *Memorandum for Heads of Federal Departments and Agencies, Effective Use of Programmatic NEPA Reviews*, Dec. 18, 2014, § I(A), p. 9, *available at* https://www.whitehouse.gov/sites/default/files/docs/effective_use_of_programmatic_nepa_reviews_final_dec2014_searchable.pdf (discussing non-NEPA types of programmatic analyses such as data collection, assessments, and research, which previous NEPA guidance described as joint inventories or planning studies).

[82] *See* 40 CFR 1502.20, 1508.28. A programmatic NEPA review may be appropriate when a decision is being made that is subject to NEPA, such as establishing formal plans, programs, and policies, and when considering a suite of similar projects.

decisions – such as proposed actions that implement land, aquatic, and other resource management plans – may be tiered from the broader programmatic analysis, drawing upon its basic framework analysis to avoid repeating analytical efforts for each tiered decision. Examples of project- or site-specific actions that may benefit from being able to tier to a programmatic NEPA review include: constructing transmission lines; conducting prescribed burns; approving grazing leases; granting rights-of-way; issuing leases for oil and gas drilling; authorizing construction of wind, solar or geothermal projects; and approving hard rock mineral extraction.

A programmatic NEPA review may also serve as an efficient mechanism in which to assess Federal agency efforts to adopt broad-scale sustainable practices for energy efficiency, GHG emissions avoidance and emissions reduction measures, petroleum product use reduction, and renewable energy use, as well as other sustainability practices.[83] While broad department- or agency-wide goals may be of a far larger scale than a particular program, policy, or proposed action, an analysis that informs how a particular action affects that broader goal can be of value.

F. Monetizing Costs and Benefits

NEPA does not require monetizing costs and benefits. Furthermore, the weighing of the merits and drawbacks of the various alternatives need not be displayed using a monetary cost-benefit analysis and should not be when there are important qualitative considerations.[84] When an agency determines that a monetized assessment of the impacts of greenhouse gas emissions or a monetary cost-benefit analysis is appropriate and

[83] *See* Exec. Order No. 13693, 80 Fed. Reg. 15869 (Mar. 25, 2015).
[84] *See* 40 CFR 1502.23.

relevant to the choice among different alternatives being considered, such analysis may be incorporated by reference[85] or appended to the NEPA document as an aid in evaluating the environmental consequences.[86] For example, a rulemaking could have useful information for the NEPA review in an associated regulatory impact analysis which could be incorporated by reference.[87] When using a monetary cost-benefit analysis, just as with tools to quantify emissions, the agency should disclose the assumptions, alternative inputs, and levels of uncertainty associated with such analysis. Finally, if an agency chooses to monetize some but not all impacts of an action, the agency providing this additional information should explain its rationale for doing so.[88]

V. CONCLUSION AND EFFECTIVE DATE

Agencies should apply this guidance to all new proposed agency actions when a NEPA review is initiated. Agencies should exercise judgment when considering whether to apply this guidance to the extent practicable to an on-going NEPA process. CEQ does not expect agencies to apply this guidance to concluded NEPA reviews and actions for

[85] *See* 40 CFR 1502.21 (material may be cited if it is reasonably available for inspection by potentially interested persons within the time allowed for public review and comment).

[86] When conducting a cost-benefit analysis, determining an appropriate method for preparing a cost-benefit analysis is a decision left to the agency's discretion, taking into account established practices for cost-benefit analysis with strong theoretical underpinnings (for example, see OMB Circular A-4 and references therein). For example, the Federal social cost of carbon (SCC) estimates the marginal damages associated with an increase in carbon dioxide emissions in a given year. Developed through an interagency process committed to ensuring that the SCC estimates reflect the best available science and methodologies and used to assess the social benefits of reducing carbon dioxide emissions across alternatives in rulemakings, it provides a harmonized, interagency metric that can give decision makers and the public useful information for their NEPA review. For current Federal estimates, *see* Interagency Working Group on Social Cost of Carbon, United States Government, *Technical Support Document Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866* (revised July 2015), *available at* https://www.whitehouse.gov/omb/oira/social-cost-of-carbon.

[87] For example, the regulatory impact analysis was used as a source of information and aligned with the NEPA review for Corporate Average Fuel Economy (CAFÉ) standards, *see* National Highway Traffic Safety Administration, Corporate Average Fuel Economy Standards, Passenger Cars and Light Trucks, Model Years 2017-2025, Final Environmental Impact Statement, Docket No. NHTSA-2011-0056 (July 2012), § 5.3.2, *available at* http://www.nhtsa.gov/Laws+&+Regulations/CAFE+-+Fuel+Economy/Environmental+Impact+Statement+for+CAFE+Standards,+2017-2025.

[88] For example, the information may be responsive to public comments or useful to the decision maker in further distinguishing between alternatives and mitigation measures. In all cases, the agency should ensure that its consideration of the information and other factors relevant to its decision is consistent with applicable statutory or other authorities, including requirements for the use of cost-benefit analysis.

which a final EIS or EA has been issued. Agencies should consider applying this guidance to projects in the EIS or EA preparation stage if this would inform the consideration of differences between alternatives or address comments raised through the public comment process with sufficient scientific basis that suggest the environmental analysis would be incomplete without application of the guidance, and the additional time and resources needed would be proportionate to the value of the information included.

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2016 WL 3974183
This case was not selected for publication in West's Federal Reporter.
See Fed. Rule of Appellate Procedure 32.1 generally governing citation of judicial decisions issued on or after Jan. 1, 2007. See also U.S.Ct. of App. 9th Cir. Rule 36-3.

United States Court of Appeals,
Ninth Circuit.

PACIFIC COAST FEDERATION OF FISHERMEN'S ASSOCIATIONS; SAN FRANCISCO CRAB BOAT OWNERS ASSOCIATION, INC., Plaintiffs - Appellants,

v.

UNITED STATES DEPARTMENT OF THE INTERIOR; UNITED STATES BUREAU OF RECLAMATION, Defendants - Appellees,

and

WESTLANDS WATER DISTRICT; et al., Intervenor-Defendants - Appellees.

No. 14-15514D.C. No. 1:12-cv-01303-LJO-MJS
Argued and Submitted February 9, 2016 San Francisco, CaliforniaResubmitted March 28, 2016JULY 25, 2016

Appeal from the United States District Court for the Eastern District of California
Lawrence J. O'Neill, District Judge, Presiding

Before: SILVERMAN, FISHER, and TALLMAN, Circuit Judges.

ORDER

***1** The memorandum disposition filed on March 28, 2016, is replaced with the concurrently filed amended memorandum disposition.

With these amendments, Judges Silverman and Tallman have voted to deny appellants' petition for rehearing en banc, and Judge Fisher so recommends.

The full court has been advised of the petition for rehearing en banc, and no judge has requested a vote on whether to rehear the matter en banc, Fed. R. App. P. 35.

The petition for rehearing en banc (Docket Entry No. 56) is **DENIED**. No further petitions for panel rehearing or rehearing en banc will be entertained.

AMENDED MEMORANDUM*

Pacific Coast Federation of Fishermen's Associations, Inc., and San Francisco Crab Boat Owners Association, Inc. (“plaintiffs”) appeal the district court's partial dismissal and partial summary judgment of their action under the National Environmental Policy Act (“NEPA”) against the United States Department of the Interior and the United States Bureau of Reclamation. We have jurisdiction under 28 U.S.C. § 1291. We affirm in part, reverse in part, and remand.

Prior to approving eight interim two-year contracts for the delivery of water from the Central Valley Project to California water districts, Reclamation issued an environmental assessment (“EA”) and a finding of no significant impact (“FONSI”). Plaintiffs seek declaratory and injunctive relief on the basis of alleged violations of NEPA in (1) an inadequate EA and FONSI and (2) failure to prepare an

environmental impact statement (“EIS”) for the interim contracts. The district court dismissed plaintiffs' claims that an EIS was required and that the EA's “no action” alternative was deficient, and it granted summary judgment in favor of defendants on the remaining challenges to the EA.

Even though the two-year contracts expired on February 28, 2014, this appeal is not moot. The short duration and serial nature of Reclamation's interim water contracts place plaintiffs' claims within the mootness exception for disputes capable of repetition yet evading review. *See A.D. ex rel. L.D. v. Haw. Dep't of Educ.*, 727 F.3d 911, 914 (9th Cir. 2013).

We review de novo a dismissal for failure to state a claim under Fed. R. Civ. P. 12(b)(6). *Chubb Custom Ins. Co. v. Space Sys./Loral, Inc.*, 710 F.3d 946, 956 (9th Cir. 2013). We also review de novo the district court's ruling on summary judgment. *San Luis & Delta-Mendota Water Auth. v. Jewell*, 747 F.3d 581, 601 (9th Cir. 2014), *cert. denied*, 134 S. Ct. 948 & 950 (2015). Claims under NEPA are reviewed under the standards of the Administrative Procedure Act, which provides that an agency action must be upheld unless it is “ ‘arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.’ ” *Id.* (quoting 5 U.S.C. § 706(2)(A)).

I. “No Action” Alternative

The EA's “no action” alternative, which assumed continued interim contract renewal, did not comply with NEPA. A “no action” alternative may be defined as no change from a current management direction or historical practice.43 C.F.R. § 46.30. But a “no action” alternative is “meaningless” if it assumes the existence of the very plan being proposed. *Friends of Yosemite Valley v. Kempthorne*, 520 F.3d 1024, 1038 (9th Cir. 2008). Rather, the “no action alternative looks at effects of not approving the action under consideration.” 43 C.F.R. § 46.30. Here, the action under consideration was the renewal of the water delivery contracts. *See Pit River Tribe v. U.S. Forest Serv.*, 469 F.3d 768, 784 (9th Cir. 2006) (holding that extensions of Bureau of Land Management leases permitting production of geothermal energy did not preserve the status quo where the extensions were not mandatory).*Ass'n of Pub. Agency Customers, Inc. v. Bonneville Power Admin.*, 126 F.3d 1158 (9th Cir. 1997), is not to the contrary. There, the “no action” alternative was not defined as the status quo of continuing existing power contracts; instead, the proposed action was a new business strategy that would result in “profound alterations in [Bonneville Power Administration's] relationships with certain large industrial customers,” and the “no action” alternative analyzed in the EIS, and upheld by this court, was continued operations under the existing management strategy. *Id.* at 1163, 1168, 1188.

***2** When an agency action is mandatory, the “no action” alternative is properly defined as the carrying out of that action. *Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752, 769 (2004). But we do not agree with the district court that the Central Valley Project Improvement Act (“CVPIA”), a part of the Reclamation Projects Authorization and Adjustment Act of 1992, required Reclamation to enter into the interim contracts. The CVPIA requires “appropriate environmental review,” including the preparation of a programmatic EIS (“PEIS”), before Reclamation is authorized to renew an existing long-term water service contract. CVPIA § 3404(c)(1). After the completion of the PEIS, Reclamation “shall, upon request, renew any existing long-term repayment or water service contract for the delivery of water from the Central Valley Project for a period of twenty-five years.” *Id.*Prior to the

completion of the PEIS, Reclamation “may” renew water service contracts for interim three- or two-year periods. *Id.* As the district court acknowledged, normally, when “may” and “shall” are used in the same statute, the “ ‘inference is that each is being used in its ordinary sense—the one being permissive, the other mandatory.’ ” *Ctr. for Biological Diversity v. U.S. Fish & Wildlife Serv.*, 450 F.3d 930, 935 (9th Cir. 2006) (quoting*Haynes v. United States*, 891 F.2d 235, 239-40 (9th Cir. 1989)) (interpreting Endangered Species Act). We also reject Reclamation's argument that the contracts themselves mandated renewal. NEPA imposes obligations on agencies considering major federal actions that may affect the environment. An agency may not evade these obligations by contracting around them.

Accordingly, the district court erred in dismissing plaintiffs' claim regarding the “no action” alternative.

II. Statement of Purpose and Need

The EA's statement of purpose and need did not unreasonably narrow Reclamation's consideration of alternatives. *See Alaska Survival v. Surface Transp. Bd.*, 705 F.3d 1073, 1084 (9th Cir. 2013). The statement did not assume that contract quantities would remain the same, and it was not an abuse of discretion. *See id.*

III. Reduction in Water Quantity

Reclamation's decision not to give full and meaningful consideration to the alternative of a reduction in maximum interim contract water quantities was an abuse of discretion, and the agency did not adequately explain why it eliminated this alternative from detailed study. *See Te-Moak Tribe of W. Shoshone of Nev. v. U.S. Dep't in Interior*, 608 F.3d 592, 602 (9th Cir. 2010); *Native Ecosys. Council v. U.S. Forest Serv.*, 428 F.3d 1233, 1245 (9th Cir. 2005). The four reasons set forth in the EA do not establish the non-viability of the alternative of maximum water quantity reduction. *See W. Watersheds Project v. Abbey*, 719 F.3d 1035, 1050 (9th Cir. 2013) (holding that existence of viable but unexamined alternative renders EA inadequate).

The first reason given by Reclamation was that the Reclamation Project Act mandates renewal of existing contract quantities when beneficially used. *See* 43 U.S.C. § 485h-1(1) & (4). The EA stated that the water districts had complied with contract terms, and, according to water needs assessments performed by Reclamation, each water district's needs equaled or exceeded the current total contract quantity. Plaintiffs exhausted administrative remedies as to their argument that Reclamation did not know whether existing water quantities were “beneficially used” because Reclamation did not conduct a proper water needs assessment, as contractually required, and Reclamation's 2006 assessment was inadequate because it was prepared with data from 1999 that predated a land retirement project. *See Barnes v. U.S. Dep't of Transp.*, 655 F.3d 1124, 1132 (9th Cir. 2011) (holding that issue was exhausted when agency had independent knowledge of EA flaw); *Lands Council v. McNair*, 629 F.3d 1070, 1076 (9th Cir. 2010) (holding that issue is exhausted if agency is provided sufficient information to give it a chance to bring its expertise to bear to resolve the claim). As plaintiffs argue, Reclamation acted unreasonably by relying on stale water needs data. *See W. Watersheds Project*, 719 F.3d at 1052 (holding that “an agency errs when it relies on old data without showing that the data remain accurate”).

Reclamation's second reason for concluding that consideration of a reduction in interim contract water quantities was not warranted was that the Central Valley Project-wide PEIS for long-term contract renewal selected a preferred alternative of renewal "for the full contract quantities." Additionally, the PEIS took into account the balancing requirements of the CVPIA, which provides, among other things, for the weighing of fish, wildlife, and habitat restoration goals. The PEIS did not, however, address site-specific impacts of individual contracts. *See W. Watersheds Project*, 719 F.3d at 1050-51 (holding that when modification of grazing practices was not considered at programmatic level, it must be given hard and careful look at site-specific level). The government's position that the consideration of reduced-quantity alternatives should be required only with respect to "long-term contract renewals" (Answering Brief at 47) is unreasonable under the circumstances presented here, involving an ongoing – and hence long-term – series of interim renewals.

***3** Reclamation's third reason was that a shortage provision in the interim contracts provided it with a mechanism for annual adjustments in water supplies. As plaintiffs argue, however, the existence of a mechanism for adjusting water quantities after contract approval did not relieve Reclamation of its obligation to consider a reduction in quantities prior to contract approval. *See id.* at 1050.

Reclamation's fourth reason was that "retaining the full historic water quantities under contract provides the contractors with assurance the water would be made available in wetter years and is necessary to support investments for local storage, water conservation improvements and capital repairs." This reasoning in large part reflects a policy decision to promote the economic security of agricultural users, rather than an explanation of why reducing maximum contract quantities was so infeasible as to preclude study of its environmental impacts.*See id.* Moreover, given the shortage provisions in the interim contracts and recent drought conditions, the water districts have not been able to rely on delivery of consistent quantities.

We therefore reverse as to the district court's grant of summary judgment on plaintiffs' claim that the EA was inadequate because it did not give full and meaningful consideration to the alternative of a reduction in maximum water quantities. *See id*.

IV. Geographic Scope

Plaintiffs contend that the EA's geographic scope was improperly limited to the delivery areas and should also have considered the effects, including cumulative effects, of interim contract renewal on the California River Delta, the source of the water, and on the Delta's fish and other wildlife. *See Save Our Sonoran, Inc. v. Flowers*, 408 F.3d 1113, 1122 (9th Cir. 2004) (holding that agency must analyze all environmental consequences of action). This contention lacks merit because the EA was tiered off of the PEIS, which addressed Central Valley Project-wide effects of long-term contract renewal. *See* 40 C.F.R. § 1508.28 (describing tiering). In light of Reclamation's obligation to conduct a more comprehensive analysis in the PEIS, it would be impractical to require the agency to trace the incremental effects of each two-year water service contract on the Delta and all Central Valley Project waters. *See Friends of the Wild Swan v. Weber*, 767 F.3d 936, 943 (9th Cir. 2014) (stating that agency must balance need for comprehensive analysis against considerations of practicality).

V. Impacts on Listed Species and Cumulative Impacts

Plaintiffs waived their argument that the EA's analysis of the giant garter snake and the California least tern impermissibly equated a finding of no jeopardy under the Endangered Species Act with a finding of no significant impact under NEPA. *See Lands Council*, 629 F.3d at 1076. Impacts on salmonids and green sturgeon, as well as cumulative impacts related to drainage and selenium, were more appropriately addressed in the PEIS and the San Luis Drainage Feature ReEvaluation Final EIS, rather than the EA for interim contract renewal. *See Friends of the Wild Swan*, 767 F.3d at 943.

We affirm the district court's judgment in part. We reverse in part and remand with instructions for the district court to vacate its grant of summary judgment in favor of defendants on plaintiffs' claim that the EA was inadequate because it did not give full and meaningful consideration to the alternative of a reduction in maximum water quantities. On remand, the district court shall direct Reclamation consider such an alternative in any future EA for an interim contract renewal. In satisfying this duty, Reclamation may rely upon any water needs assessment for which the data remain accurate. *See W. Watersheds Project*, 719 F.3d at 1052. We also reverse the district court's dismissal of plaintiffs' claim that the "no action" alternative set forth in the EA was inadequate under NEPA.

***4** Each party shall bear its own costs.

AFFIRMED in part, REVERSED in part, and REMANDED.

All Citations

--- Fed.Appx. ----, 2016 WL 3974183