# Summary of NMFS BiOp RPA Actions for Water Year 2015

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| NMFS BiOp | | | | | |
| 11.2.1.1 | Responsibilities and Procedures of Technical Teams | Technical teams for making recommendations for adjusting operations to meet contractual obligations for water delivery and minimize adverse effects on listed anadromous fish species (Sacramento River Temperature Task Group, Clear Creek Technical Working Group, American River Group, San Joaquin River Technical Committee, Delta Operations for Salmon and Sturgeon Group, Stanislaus Operations Group, Interagency Fish Passage Steering Committee) | Varies by team | Ongoing thru 2030 | Teams meeting as required. Fish monitoring is being addressed through the 5-Agencies and Implementation Management Team groups. |
| 11.2.1.2 | Research and Adaptive Management | Annual science review workshop | USBR/ NMFS | 11/30/15 | Annual science review scheduled for November 5-6, 2015. |
| | | Development and implementation of specific research projects, including:<br>1) Cooperative development of a salmonid lifecycle model acceptable to NMFS, USBR, DFW and DWR. | USBR/ NMFS | Ongoing thru 2030 | The Southwest Fisheries Science Center (SWFSC) continues to make progress on developing a life-cycle model for Central Valley Chinook salmon that can used as a tool to evaluate the effects of various factors (hydrology, water project operations, climate change, restoration) on the population dynamics of Central Valley Chinook salmon runs. The SWFSC's coordinated with the Delta Science Panel (DSP) to convene an independent review panel for the winter-run life cycle model framework in the spring of 2015. |
| | | 2) Temperature monitoring and modeling identified in RPA Action I.5 | USBR | | Contract for temperature modeling awarded in September 2013. Work initiated in late 2014 and continues through 2016. |
| | | 3) Green sturgeon research described in the Red Bluff Diversion Dam actions | USBR | | See RPA Action I.3.4. |
| | | 4) Rearing habitat evaluation metrics to guide rearing habitat Action I.6 | USBR/ DWR | | Rearing habitat evaluation metrics are expected to be developed as part of the EIS/EIR required to implement RPA actions I.1.6 and I.7. |
| | | 5) A 6-year acoustic-tagged study of juvenile salmonids out-migration in the San Joaquin River and through the southern Delta identified in Action IV.2.2. | USBR | | See RPA Action IV.2.2 |
| 11.2.1.3 | Monitoring and Reporting Requirements | 1) Reclamation and DWR shall participate in the design, implementation, and funding of the comprehensive CV steelhead monitoring program on CVP- and SWP-controlled streams. | USBR/ DWR | Ongoing thru 2030 | Ongoing. DWR/Reclamation have received a DFW proposal to initiate a 3-year CV steelhead pilot monitoring program for the Sacramento River that can be expanded system-wide based on funding availability. Work began on this program in 2015. |
| | | 2) Reclamation and DWR shall ensure that all monitoring programs regarding the effects of CVP and SWP operations and which result in the direct take of winter-run, spring-run, CV steelhead, or Southern DPS of green sturgeon, are conducted by a person or entity that has been authorized by NMFS. | USBR/ DWR | 10/1/2012 | Coordination is ongoing; monitoring programs being developed and funded through agencies for listed species. |
| | | 3) Reclamation and DWR shall submit weekly reports to the interagency Data Assessment Team (DAT) regarding the results of monitoring and incidental take of winter-run, spring-run, CV steelhead, and Southern DPS of green sturgeon associated with operations of project facilities. | USBR/ DWR | | Data Assessment Team (DAT) is receiving weekly reports on monitoring and incidental take of listed species. DAT reports data to DOSS each week, which is then published on the OCAP webpage with DOSS notes. |
| | | 4) Reclamation and DWR shall provide an annual written report to NMFS describing the results of real-time monitoring of winter-run, spring-run, CV steelhead, and Southern DPS of green sturgeon associated with operations of the DCC/CVP/SWP Delta pumping facilities, and other Division level operations authorized through this RPA. | USBR/ DWR | Ongoing thru 2030 | Ongoing & being done. |
| | | 5) Reclamation and DWR shall continue the real-time monitoring between October 1 and June 30 each year of winter-run, spring-run, CV steelhead, and Southern DPS of green sturgeon in the lower Sacramento River, the lower San Joaquin River, and the Delta to establish presence and timing to serve as a basis for the management of Delta pumping operations consistent with actions in this RPA. | USBR/ DWR | | Ongoing & being done. |
| | | 6) Reclamation and DWR shall submit weekly DAT reports and an annual written report to NMFS describing the results of real-time monitoring of winter-run, spring-run, CV steelhead, and Southern DPS of green sturgeon associated with operations of Delta pumping facilities and other Division level operations authorized through this RPA. | USBR/ DWR | | Ongoing & being done. |
| | | 7) Reclamation shall coordinate with NMFS, FWS, and DFW to continue implementing and funding fisheries monitoring of spring-run and CV steelhead in Clear Creek to aide in determining the benefits and effects of flow and temperature management. | USBR/ DWR | | Ongoing & being done. |

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| | | 8) Reclamation and DWR shall jointly fund these monitoring locations for the duration of the Opinion (through 2030) to ensure compliance with the RPA and assess the performance of the RPA actions. | USBR/ DWR | | |
| | | a) Upstream: Adult escapement and juvenile monitoring for spring-run, winter-run, and steelhead on the Sacramento River, American River, Feather River, Clear Creek, Mill Creek, Deer Creek and Battle Creek. | | | Ongoing & being done. |
| | | b) Red Bluff Diversion Dam – completed | | | Ongoing & being done. |
| | | c) Installed and operating at Tisdale Bypass | | | New monitoring station installed and operating at Tisdale Bypass. |
| | | d) Delta: Continuation of the following monitoring stations that are part of the IEP: Chipps Island Trawl, Sacramento Trawl, Knights Landings RST, and beach seining program. Additionally, assist in funding new studies to determine green sturgeon relative abundance and habitat use in the Delta. | | | Ongoing & being done. |
| | | e) San Joaquin River monitoring shall include: Adult escapement and juvenile monitoring for steelhead on the Stanislaus River; Mossdale Kodiak Trawling to determine steelhead smolt passage; steelhead survival studies associated with VAMP; monitoring at HORB to determine steelhead movement in and around the barrier; predation studies in front of HORB and at the three agricultural barriers in the South Delta; and new studies to include the use of non-lethal fish guidance devices (e.g., sound, light, or air bubbles) instead of rock barriers to keep juveniles out of the area influenced by export pumping. | | | Ongoing & being done. |
| Sac River Division | | | | | |
| I.1.1 Spring Attraction Flows | Encourage spring-run movement to upstream Clear Creek habitat for spawning. | Reclamation shall annually conduct at least two pulse flows in Clear Creek in May and June of at least 600 cfs for at least three days for each pulse, to attract adult spring-run holding in the Sacramento River main stem. This may be done in conjunction with channel-maintenance flows (Action I.1.2). | USBR | Ongoing thru 2030 | The CCTT conducted pulse flows of 800 cfs in May to coincide with peak spring-run migration. The second pulse flow was in June and was selected based on the increased rate of spring run passage observed during June pulse flows in 2013 and 2014. |
| I.1.2. Channel Maintenance Flows | Minimize project effects by enhancing and maintain previously degraded spawning habitat for spring-run and CV steelhead | Reclamation shall re-operate Whiskeytown Glory Hole spills during the winter and spring to produce channel maintenance flows of a minimum of 3,250 cfs mean daily spill from Whiskeytown for one day, to occur seven times in a ten-year period, unless flood control operations provide similar releases. Re-operation of Whiskeytown Dam should be implemented with other project facilities as described in the EWP Pilot Program (Reclamation 2008d) | USBR | May and June 2012 | The RPA action was not implemented in this critically dry year. |
| I.1.3. Spawning Gravel Augmentation | Enhance and maintain previously degraded spawning habitat for spring-run and CV steelhead. | Reclamation, in coordination with the Clear Creek Technical team, shall continue spawning gravel augmentation efforts. By December 31 each year, Reclamation shall provide a report to NMFS on implementation and effectiveness of the gravel augmentation program. | USBR | Winter and spring | Gravel projects were not conducted in 2015 due to a BOR vacancy. For 2016, gravel injections are proposed at five sites, for a total tonnage of 7,700 tons |
| I.1.4. Spring Creek Temperature Control Curtain | Reduce adverse impacts of project operations on water temperature for listed salmonids in the Sacramento River. | Reclamation shall replace the Spring Creek Temperature Control Curtain in Whiskeytown Lake by June 2011 | USBR | 6/1/2011 | Action Completed for the Spring Creek Temperature Control Curtain.<br>Contract awarded September 2010 and new curtain installed in June 2011. Since 2011, it has become known that the Oak Bottom Temperature Control Curtain (OBTCC) is damaged and cannot be fully deployed. Reclamation has funding programmed over fiscal years 2015 and 2016 for the design, construction, and installation of the replacement of the OBTCC, The design and pre-award activities were completed in FY2015 and anticipate a bid and installation occurring in FY2016. The current budget and schedule do not include any significant changes from the existing design and any additional design work or modeling studies would most likely delay the process. This removal of the existing temperature curtain and work to install a new curtain did not affect the 2015 Drought Contingency Plan or the 2015 Sacramento River Temperature Control Plan as there were no changes to our existing temperature control facilities in 2015. The existing curtain has been functionally non-effective for the past several years and its removal had no effect on operations for WY2015. The CCTT recognizes the importance of having the SCTCC and OBTCC functioning together in tandem, and being maintained in proper working condition to reduce water temperatures of water that is released into Clear Creek through Whiskeytown Dam, as well as the Sacramento |

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| | | | | | River via the Spring Creek Tunnel. |
| I.1.5. Thermal Stress Reduction | To reduce thermal stress to over-summering steelhead and spring-run during holding, spawning, and embryo incubation. | Reclamation shall manage Whiskeytown releases to meet a daily water temperature of: 1) 60˚F at the Igo gage from June 1 through September 15; and 2) 56°F at the Igo gage from September 15 to October 31. Reclamation, in coordination with NMFS, will assess improvements to modeling water temperatures in Clear Creek and identify a schedule for making improvements. | USBR | Begin June 2012 | Reclamation awarded a contract in late 2014 to evaluate the temperature management process (also covers RPA action I.2.4 (3), and is expected to be completed in 2016. Water temperatures at Igo remained below holding criteria of 60° F for 100% of the criteria period June 1 to September 14. While Igo temperature criteria were met throughout holding, water temperatures during that period at the Whiskeytown outflow to Clear Creek were higher in 2015 than in 2014. |
| I.1.6. Adaptively Manage to Habitat Suitability/IFIM Study Results | Decrease risk to Clear Creek spring-run and CV steelhead population through improved flow management designed to implement state-of-the-art scientific analysis on habitat suitability. | Reclamation shall operate Whiskeytown Reservoir as described in the Project Description with the modifications described in Action I.1 until September 30, 2012, or until 6 months after current Clear Creek salmonids habitat suitability (e.g., IFIM) studies are completed, whichever occurs later. When the salmonid habitat suitability studies are completed, Reclamation will, in conjunction with the CCTWG, assess whether Clear Creek flows shall be further adapted to reduce adverse impacts on spring-run and CV steelhead, and report their findings and proposed operational flows to NMFS within 6 months of completion of the studies. | USBR | 12/30/2012 | Coordination is ongoing with NMFS and CCTT on coordination of IFIM studies and reports on Clear Creek flow schedules for spring-run Chinook and steelhead. The FWS completed a "Synthesis Report" which takes the findings of the four IFIM studies and recommends flows based on flow habitat relationships. This report is in draft form and should be finalized by November 2015. When these five salmonid habitat suitability studies are completed, Reclamation will, in conjunction with the CCTT, assess whether Clear Creek flows shall be further adapted to reduce adverse impacts on spring-run and CV steelhead, and report their findings and proposed operational flows to NMFS within six months of completion of the studies. |
| 1.2.1 Performance Measures. | To establish and operate to a set of performance measures for temperature compliance points and End-of-September (EOS) carryover storage, enabling Reclamation and NMFS to assess the effectiveness of this suite of actions over time. Performance measures will help to ensure that the beneficial variability of the system from changes in hydrology will be measured and maintained. | The following long-term performance measures shall be attained. Reclamation shall track performance and report to NMFS at least every 5 years. If there is significant deviation from these performance measures over a 10-year period, measured as a running average, which is not explained by hydrological cycle factors (e.g., extended drought), then Reclamation shall reinitiate consultation with NMFS. Performance measures for EOS carryover storage at Shasta Reservoir:<br>• 87 percent of years: Minimum EOS storage of 2.2 MAF<br>• 82 percent of years: Minimum EOS storage of 2.2 MAF and end-of-April storage of 3.8 MAF in following year (to maintain potential to meet Balls Ferry compliance point)<br>• 40 percent of years: Minimum EOS storage 3.2 MAF (to maintain potential to meet Jelly's Ferry compliance point in following year).<br><br>Measured as a 10-year running average, performance measures for temperature compliance points during summer season shall be:<br>• Meet Clear Creek Compliance point 95 percent of time<br>• Meet Balls Ferry Compliance point 85 percent of time<br>• Meet Jelly's Ferry Compliance point 40 percent of time<br>• Meet Bend Bridge Compliance point 15 percent of time | USBR | | Since the RPA has been in place, Reclamation has met the TCP with the exception of WY2014 and 2015, given the drought conditions. In WY2015, the temperature modeling results suggested that the TCP should be targeted at Clear Creek and after coordination of the data with the SRTTG, the TCP was maintained at Clear Creek. Monitoring studies indicated that 98% of the redds were above Highway 44, which is above the Clear Creek TCP. |
| I.2.2. November through February Keswick Release Schedule (Fall Actions) | Minimize impacts to listed species and naturally spawning non-listed fall-run from high water temperatures by implementing standard procedures for release of cold water from Shasta Reservoir. | Depending on EOS carryover storage and hydrology, Reclamation shall develop and implement a Keswick release schedule, and reduce deliveries and exports as detailed below. | USBR | | Reclamation provides a monthly temperature forecast and storage update to NMFS. |
| I.2.2.A EOS Storage ≥ 2.4 MAF | | If the EOS storage is at 2.4 MAF or above, by October 15, Reclamation shall convene a group including NMFS, USFWS, and CDFG, through B2IT or other comparable process, to consider a range of fall actions. A written monthly average Keswick release schedule shall be developed and submitted to NMFS by November 1 of each year, based on the criteria below. The monthly release schedule shall be tracked through the work group. | USBR | 11/30/2014 | Not applicable. |

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| I.2.2.B EOS Storage ≥1.9 MAF and ≤2.4 MAF | | If EOS storage is between 1.9 and 2.4 MAF, then Reclamation shall convene a group including NMFS, USFWS, and CDFG, through B2IT or other comparable workgroup, to consider a range of fall actions. Reclamation shall provide NMFS and the work group with storage projections based on 50 percent, 70 percent, and 90 percent hydrology through February, and develop a monthly average Keswick release schedule based on the criteria below. The monthly release schedule shall be submitted to NMFS by November 1. | USBR | 11/30/2014 | Not applicable. |
| I.2.2.C. EOS Storage ≤ 1.9 MAF | | If the EOS storage is at or below 1.9 MAF, then Reclamation shall: 1) In early October, reduce Keswick releases to 3,250 cfs as soon as possible, unless higher releases are necessary to meet temperature compliance points (see action I.2.3). 2) Starting in early October, if cool weather prevails and temperature control does not mandate higher flows, curtail discretionary water deliveries (including, but not limited to agricultural rice decomposition deliveries) to the extent that these do not coincide with temperature management for the species. | USBR | 10/1/2014 | The End of Month September 2014 storage was 1.157 MAF. Reclamation was seeking to conserve storage as directed by Action I.2.2.C 1. Keswick releases were at 7,250 cfs at the beginning of the water year and were ramped down to 4,250 cfs at the end of September 2014. Keswick releases were further ramped down to 4,000 cfs at the end of November 2014. Through December 2014, Keswick releases were ramped down to 3,250 cfs and maintained at 3,250cfs through mid-April 2015. |
| I.2.3. February Forecast; March – May 14 Keswick Release Schedule (Spring Actions) | To conserve water in Shasta Reservoir in the spring in order to provide sufficient water to reduce adverse effects of high water temperature in the summer months for winter-run, without sacrificing carryover storage in fall. | 1) Reclamation shall make its February 15 forecast of deliverable water based on an estimate of precipitation and runoff within the Sacramento River basin at least as conservative as the 90 percent probability of exceedance. Subsequent updates of water delivery commitments must be based on monthly forecasts at least as conservative as the 90 percent probability of exceedance.<br>2) Reclamation shall make releases to maintain a temperature compliance point not in excess of 56 degrees between Balls Ferry and Bend Bridge from April 15 through May 15. | USBR | 2/15/2014 prediction & April through May 15 releases for temp compliance | |
| I.2.3.A Implementation Procedures if February Forecast, Based on 90 Percent Hydrology, Shows that Balls Ferry Temperature Compliance Point and 2.2 MAF EOS are Both Achievable | | NMFS will review the draft February forecast to determine whether both a temperature compliance point at Balls Ferry during the temperature control season (May – October), and EOS storage of at least 2.2 MAF, is likely to be achieved. If both are likely, then Reclamation shall announce allocations and operate Keswick releases in March, April, and May consistent with its standard plan of operation. Preparation of a separate Keswick release schedule is not necessary in these circumstances. | NMFS | March, April, May for releases. May-October for temp control. | Not applicable. |
| I.2.3.B Implementation Procedures if February Forecast, Based on 90 Percent Hydrology, Shows that Only Balls Ferry Compliance or 2.2 MAF EOS, but Not Both, Is Achievable | | 1) On or before February 15, Reclamation shall reduce Keswick releases to 3,250 cfs, unless NMFS concurs on an alternative release schedule. This reduction shall be maintained until a flow schedule is developed per procedures below.<br>2) In coordination with NMFS, by March 1, Reclamation shall develop an initial monthly Keswick release schedule, based on varying hydrology of 50 percent, 70 percent, and 90 percent (similar in format to the fall and winter action implementation procedures – see table above). These schedules shall be used as guidance for monthly updates and consultations.<br>3) Based on this guidance, Reclamation shall consult with NMFS monthly on Keswick releases. Reclamation shall submit a projected forecast, including monthly average release schedules and temperature compliance point to NMFS every month, within 7 business days of receiving the DWR runoff projections for that month. Within 3 business days of receiving this information from Reclamation, NMFS will review the draft schedule for consistency with the criteria below and provide written recommendations to Reclamation.<br>4) The initial monthly Keswick release schedule, and subsequent monthly updates, shall be developed. | USBR | | Not applicable |

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| I. 2.3. C. Drought Exception Procedures if February Forecast, Based on 90 Percent Hydrology, Shows that Clear Creek Temperature Compliance Point or 1.9 MAF EOS Storage is Not Achievable | | Reclamation shall follow all procedures immediately above (Action I.2.3.B) and, in addition, shall:<br>1) By March 1, provide a contingency plan with a written justification that all actions within Reclamation's authorities and discretion are being taken to preserve cold water at Shasta Reservoir for the protection of winter-run.<br>2) The contingency plan shall also, at a minimum, include the following assessments and actions:<br>a. Relaxation of Wilkins Slough navigation criteria to at most 4,000 cfs.<br>b. An assessment of any additional technological or operational measures that may be feasible and may increase the ability to manage the cold water pool.<br>c. Notification to State Water Resources Control Board that meeting the biological needs of winter-run and the needs of resident species in the Delta, delivery of water to nondiscretionary Sacramento Settlement Contractors, and Delta outflow requirements per D-1641, may be in conflict in the coming season and requesting the Board's assistance in determining appropriate contingency measures, and exercising their authorities to put these measures in place.<br>3) If, during the temperature control season, a Clear Creek TCP on the Sacramento River cannot be achieved, then Reclamation shall bypass power at Shasta Dam if NMFS determines a bypass is necessary for preserving the cold water pool. This power by-pass may be necessary to maintain temperature controls for winter-run, or later in the temperature season, for spring-run. | USBR | 3/1/2012 | Beginning December 2014, Keswick releases were being ramped down to conserve storage and were 4,000 cfs. Releases were ramped down to 3,250 cfs by the end of December. Keswick releases were maintained at 3,250cfs through mid-April 2015. In addition, in order to extend the use of cold water pool, warm water by-pass through the outlets at 758 cfs was initiated on 4/21/15. Flows for the warm water by-pass were increased to 3,500 cfs on 4/23/15. Flows were then decreased to 3,000 cfs on 4/25/15. Flows were further reduced to 1,500 cfs on 5/20/15. Use of the warm water by-pass stopped on 5/27/15. |
| 1.2.4 May 15 Through October Keswick Release Schedule (Summer Action) | To manage the cold water storage within Shasta Reservoir and make cold water releases from Shasta Reservoir to provide suitable habitat temperatures for winter-run, spring-run, CV steelhead, and Southern DPS of green sturgeon in the Sacramento River between Keswick Dam and Bend Bridge, while retaining sufficient carryover storage to manage for next year's cohorts. To the extent feasible, manage for suitable temperatures for naturally spawning fall-run. | Reclamation shall develop and implement an annual Temperature Management Plan by May 15 to manage the cold water supply within Shasta Reservoir and make cold water releases from Shasta Reservoir and Spring Creek to provide suitable temperatures for listed species, and, when feasible, fall-run. Reclamation shall manage operations to achieve daily average water temperatures in the Sacramento River between Keswick Dam and Bend Bridge as follows:<br>1) Not in excess of 56°F at compliance locations between Balls Ferry and Bend Bridge from May 15 through September 30 for protection of winter-run, and not in excess of 56°F at the same compliance locations between Balls Ferry and Bend Bridge from October 1 through October 31 for protection of mainstem spring run, whenever possible.<br>2) Reclamation shall operate to a final Temperature Management Plan starting May 15 and ending October 31.<br>3) As part of the adaptive management process, and in coordination with NMFS, by March 2010, Reclamation shall fund an independent modeler to review these procedures and the recommendations of the Calfed Science Panel report on temperature management and recommend specific refinements to these procedures to achieve optimal temperature management, with due consideration of the Calfed Science panel's recommendations (Deas et al., 2009) regarding temperature management. Upon written concurrence of NMFS, refinements to the implementation procedures for this action suite, based on the independent contractor's report, may be adopted and implemented. | USBR | May-September, October 1 through October 31 temp controls. May 15 to October 31 operate final Temp management plan. | In WY2015, Reclamation submitted a draft temperature management plan for the Sacramento River in mid-April with updated information in early May under conditions of the TUCP. With that plan, Reclamation indicated that it could not maintain temperatures 56° F at the Clear Creek compliance location throughout the temperature control season due to significant reductions in cold water supplies indicated in reservoir temperature profile readings beginning in late April and continuing through May. Reclamation submitted a revised plan on 6/25/15. The plan called for real-time operations that targeted 57° F at the Clear Creek compliance location without exceeding 58° F with minimized flows. The revised plan was expected to be more protective over the temperature control season. However, there were still concerns with maintaining temperature control throughout the egg incubation period with the revised plan due to the very low cold water storage levels, expected heat waves, inaccuracies of the temperature control model that was used to help develop the revised plan and other issues that would need to be managed very closely. There were also concerns with meeting flow and salinity requirements in the Delta with lower flows from Shasta Reservoir because Shasta Reservoir typically provides much of the flow needed to meet these requirements. To compensate for these changes, the revised plan was predicated on higher releases from Oroville and Folsom Reservoirs, reduced exports from the Delta, effective operation of the False River drought barrier, and approval of the changes included in the TUCP. |
| I.2.5. Winter-Run Passage and Re-Introduction Program at Shasta Dam | See Fish Passage Program, Action V | | | | Shasta habitat assessment completed. Outreach, pilot planning, and permitting are underway. A winter Chinook captive broodstock had to be started in 2014 due to a shortage of appropriate study fish. The pilot study is scheduled to begin in 2017 with the first fish releases upstream of Shasta Lake. |
| Action I.2.6. Restore Battle Creek for Winter-Run, Spring-Run, and CV Steelhead | To partially compensate for unavoidable adverse effects of project operations by restoring winter-run and spring-run to the Battle Creek watershed. A second population of winter-run would reduce the risk of extinction of the species from lost resiliency and increased vulnerability to catastrophic events. | Reclamation shall direct discretionary funds to implement the Battle Creek Salmon and Steelhead Restoration Project. Phase 1A funding is currently allocated through various partners and scheduled to commence in Summer 2009 (Reclamation 2008c). DWR shall direct discretionary funds for Phase 1B and Phase 2, consistent with the proposed amended Delta Fish Agreement by December 31 of each year, Reclamation and DWR will submit a written report to NMFS on the status of the project, including phases completed, funds expended, effectiveness of project actions, additional actions planned (including a schedule for further actions), and additional funds needed. The Battle Creek Salmon and Steelhead Restoration Project shall be completed no later than 2019. | USBR | Annual reporting by December 31 | Action Completed.<br>Additional monitoring will be conducted by Reclamation to ensure performance objectives are achieved. Annual progress report to be completed by November 2015. |

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| I.3.1. Operations after May 14, 2012: Operate RBDD with Gates Out | | No later than May 15, 2012, Reclamation shall operate RBDD with gates out all year to allow unimpeded passage for listed anadromous fish. If the Red Bluff Alternative Intake Structure is not anticipated to be operational by May 15, 2012, Reclamation may submit a request to NMFS, no later than January 31, 2012, to close the gates from June 15 to September 1, 2012. This request must document that all milestones for construction of the alternative pumping plant have been met and that all other conservation measures (see below) have been implemented. | USBR | 5/15/2012, 1/31/2012 | Action Completed. |
| I.3.2. Interim Operations | | Until May 14, 2012, Reclamation shall operate RBDD according to the following schedule: • September 1 - June 14: Gates open. No emergency closures of gates are allowed. • June 15 - August 31: Gates may be closed at Reclamation's discretion, if necessary to deliver water to TCCA. | USBR | | Action Completed. |
| I.3.3. Interim Operation for Green Sturgeon | Allow passage of green sturgeon during interim operations. | When gates are in, Reclamation shall retain a minimum 18-inch opening under the gates that are open, to allow safe downstream passage of adult green sturgeon. The 18-inch opening may be modified to 12 inches by the RBDD technical team if necessary to maintain the structural integrity of the dam and/or adequate attraction flows for salmonids at the fish ladders, or in consideration of other real-time fish migratory issues. | USBR | 6/15/2009 | Action Completed. |
| I.3.4: Measures to Compensate for Adverse Effects of Interim Operations on Green Sturgeon | Offset short-term effects to green sturgeon due to interim gate operations by investing in geographically specific research needed to determine green sturgeon life history and recovery needs. | Reclamation shall continue ongoing funded research to characterize green sturgeon populations in the upper Sacramento River Basin, their movements, and habitat usage, as planned through fiscal year 2009. In addition, Reclamation (or TCCA) shall convene a technical team, including representatives from NMFS, CDFG, USFWS, Corps, the University of California at Davis (UCD), and other cooperators, to review studies and results and coordinate research needs for green sturgeon. Reclamation and/or TCCA shall provide the necessary funding to insure that research will continue to be conducted in a coordinated and cooperative manner with the express intent of fully implementing the research projects described in the UCD proposal in Appendix 2-B to this Opinion. | USBR | | Green Sturgeon Study field work has been completed by UC Davis. UCD provided final report in March 2015. |
| I.3.5. Measures to Compensate for Adverse Effects of Interim Operations on Spring-Run | Offset unavoidable short-term effects to spring-run from passage impediments of RBDD by restoring spring-run passage elsewhere in the Sacramento River system. | Reclamation shall provide $500,000 for implementation of spring- run passage improvement projects in the Sacramento River. Appendix 2-B describes specific projects that may be implemented. By December 15, 2009, Reclamation shall provide NMFS with a prioritized list of projects from Appendix 2-B and an implementation schedule. Reclamation shall provide an annual report to NMFS on implementation and effectiveness of projects. Reclamation shall monitor and maintain these projects for five years. | USBR/ DFW | 12/15/2009 | Action completed in 2014. |
| I.4. Wilkins Slough Operations | Enhance the ability to manage temperatures for anadromous fish below Shasta Dam by operating Wilkins Slough in the manner that best conserves the dam's cold water pool for summer releases. | Reclamation shall convene the SRTTG to review past operational data, hydrology, and fisheries needs for Wilkins Slough. The SRTTG shall recommend Wilkins Slough minimum flows for anadromous fish in critically dry years, in lieu of the current 5,000 cfs navigation criterion. Recommendations shall be made to NMFS by December 1, 2009. The recommendations will be implemented upon NMFS' concurrence. In years other than critically dry years, the need for a variance from the 5,000 cfs navigation criterion will be considered during the process of developing the Keswick release schedules (Action I.2.2-4). | USBR | 12/1/2009 | Issues regarding water rights navigation criterion which is under the control of the SWRCB. |
| I.5. Funding for CVPIA Anadromous Fish Screen Program (AFSP) | To reduce entrainment of juvenile anadromous fish from unscreened diversions. | Reclamation shall screen priority diversions as identified in the CVPIA AFSP, consistent with previous funding levels for this program. In addition, Reclamation/CVPIA Program shall evaluate the potential to develop alternative screened intakes that allow diverters to withdraw water below surface levels required by the antiquated Wilkins Slough navigation requirement criterion of 5,000 cfs. | USBR | Annually in September | Coordination is ongoing. |
| I.6.1. Restoration of Floodplain Rearing Habitat | To restore floodplain rearing habitat for juvenile winter-run, spring-run, and CV steelhead in the lower Sacramento River basin. This objective may be achieved at the Yolo Bypass, and/or through actions in other suitable areas of the lower Sacramento River. | In cooperation with CDFG, USFWS, NMFS, and the Corps, Reclamation and DWR shall, to the maximum extent of their authorities (excluding condemnation authority), provide significantly increased acreage of seasonal floodplain rearing habitat, with biologically appropriate durations and magnitudes, from December through April, in the lower Sacramento River basin, on a return rate of approximately one to three years, depending on water year type. In the event that this action conflicts with Shasta Operations Actions I.2.1 to I.2.3, the Shasta Operations Actions shall prevail. | USBR/ DWR | 12/31/2011, 12/31/2013, 12/31/2016 | Ongoing planning and coordination with NMFS for concurrence on an adjusted schedule for the Yolo Bypass Salmonid Habitat Improvement and Fish Passage Improvements Project. Alternative development for environmental permitting process is moving forward. |

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| I.6.2. Near-Term Actions at Liberty Island/Lower Cache Slough and Lower Yolo Bypass | | By September 30, 2010, Reclamation and/or DWR shall take all necessary steps to ensure that an enhancement plan is completed and implemented for Liberty Island/Lower Cache Slough, as described in Appendix 2-C. This action shall be monitored for the subsequent five years, at a minimum, to evaluate the use of the area by juvenile salmonids and to measure changes in growth rates. Interim monitoring reports shall be submitted to NMFS annually, by September 30 each year, and a final monitoring report shall be submitted on September 30, 2015, or in the fifth year following implementation of enhancement actions. NMFS will determine at that time whether modification of the action or additional monitoring is necessary to achieve or confirm the desired results. This action shall be designed to avoid stranding or migration barriers for juvenile salmon. | DWR | 9/30/2010, then annually to 9/30/2015 | This is a FRPA-lead RPA Action.<br>DWR submitted an official letter to NMFS in February 2012 on the Action 1.6.2 and submitted our FRP Implementation Strategy (Plan) to meet the "Liberty Island/lower Cache Slough enhancement plan" that is required by RPA 1.6.2. DWR did not hear back from NMFS on this matter. |
| I.6.3. Lower Putah Creek Enhancements | | By December 31, 2015, Reclamation and/or DWR shall develop and implement Lower Putah Creek enhancements as described in Appendix 2-C, including stream realignment and floodplain restoration for fish passage improvement and multi-species habitat development on existing public lands. By September 1 of each year, Reclamation and/or DWR shall submit to NMFS a progress report towards the successful implementation of this action. This action shall not result in stranding or migration barriers for juvenile salmon. | DWR | 9/1/09, then annually to 12/31/2015 | The project is being developed under a CDFW grant by the Yolo Basin Foundation. The grant expires March, 2016. A progress report was sent to NMFS in September 2015.<br><br>This RPA Action has been identified as an Early Implementation Project under the State's CA EcoRestore Initiative. |
| I.6.4. Improvements to Lisbon Weir | | By December 31, 2015, Reclamation and/or DWR shall, to the maximum extent of their authorities, assure that improvements to the Lisbon Weir are made that are likely to achieve the fish and wildlife benefits described in Appendix 2-C. Improvements will include modification or replacement of Lisbon Weir, if necessary to achieve the desired benefits for fish. If neither Reclamation nor DWR has authority to make structural or operational modifications to the weir, they shall work with the owners and operators of the weir to make the desired improvements, including providing funding and technical assistance. By September 1 of each year, Reclamation and/or DWR shall submit to NMFS a report on progress toward the successful implementation of this action. Reclamation and DWR must assure that this action does not result in migration barriers or stranding of juvenile salmon. | DWR | 9/1/09, then annually to 12/31/2015 | A progress report was sent to NMFS in September 2015. This RPA Action has been identified as an Early Implementation Project under the State's CA EcoRestore Initiative. |
| I.7. Reduce Migratory Delays and Loss of Salmon, Steelhead, and Sturgeon at Fremont Weir and Other Structures in the Yolo Bypass | Reduce migratory delays and loss of adult and juvenile winter-run, spring-run, CV steelhead and Southern DPS of green sturgeon at Fremont Weir and other structures in the Yolo Bypass. | By December 31, 2011, as part of the plan described in Action I.6.1, Reclamation and/or DWR shall submit a plan to NMFS to provide for high quality, reliable migratory passage for Sacramento Basin adult and juvenile anadromous fishes through the Yolo Bypass. By June 30, 2011, Reclamation and/or DWR shall obtain NMFS concurrence and, to the maximum extent of their authorities, and in cooperation with other agencies and funding sources, begin implementation of the plan, including any physical modifications. By September 30, 2009, Reclamation shall request in writing that the Corps take necessary steps to alter Fremont Weir and/or any other facilities or operations requirements of the Sacramento River Flood Control Project or Yolo Bypass facility in order to provide fish passage and shall offer to enter into a Memorandum of Understanding, interagency agreement, or other similar mechanism, to provide technical assistance and funding for the necessary work. By June 30, 2010, Reclamation shall provide a written report to NMFS on the status of its efforts to complete this action, in cooperation with the Corps, including milestones and timelines to complete passage improvements. Reclamation and/or DWR shall assess the performance of improved passage and flows through the bypass, to include an adult component for salmonids and sturgeon (i.e., at a minimum, acoustic receivers placed at the head and tail of the bypass to detect use by adults). | DWR | 9/30/2009, 6/30/2010, 6/30/2011, 12/31/2011 | See Action I.6.1. Components of this RPA Action have been identified as Early Implementation Projects under the State's CA EcoRestore Initiative. Wallace Weir Improvements are the highest priority (Implementation scheduled for 2016), followed by Tule Canal Agricultural Crossing Improvements paired with Fremont Weir Fish Passage Improvements (Implementation scheduled for 2017) and Lisbon Weir fish passage improvements (Implementation schedule TBD). |
| American River Division | | | | | |
| II.1. Lower American River Flow Management | To provide minimum flows for all steelhead life stages. | Implement the flow schedule specified in the Water Forum's Flow Management Standard (FMS), which is summarized in Appendix 2-D of this Opinion. The FMS flow schedule has been developed by the Water Forum, Reclamation, USFWS, NMFS, and CDFG in order to establish required minimum flows for anadromous salmonids in the lower American River. The flow schedule specifies minimum flows and does not preclude Reclamation from making higher releases at Nimbus Dam. Reclamation shall ensure that flow, water temperature, steelhead spawning, and steelhead rearing monitoring is conducted annually in order to help inform the ARG process and to evaluate take associated with flow fluctuations and warm water temperatures. Steelhead monitoring surveys should follow the objectives and protocols specified in the FMS Monitoring and Evaluation Program relating to steelhead spawning and rearing. | USBR | | Operational decisions were closely coordinated with agencies as a result of the extreme drought situation. Hydrologic conditions for both an "Off-Ramp" and "Conference Year" were satisfied in 2015. During the spring the FMS MRR operational decisions were outside "normal conditions" and were decided based on multi-agency input. Coordination occurred during ARG and Real-Time Drought Operations Management Team (RTDOT) meetings. Flow management adjustments were predominately for storage conservation and Delta management. Steelhead spawning and stranding surveys were completed in Spring 2015. |
| II.2. Lower American River Temperature Management | Maintain suitable temperatures to support over-summer rearing of juvenile steelhead in the lower | Each year, Reclamation shall prepare a draft Operations Forecast and Temperature Management Plan based on forecasted conditions and submit the draft Plan to NMFS for review by May 1 of each year. The information provided in the Operations Forecast will be used in the development of the | USBR | May each year | A Temperature Management Assessment was submitted to NMFS on May 1, 2015, an update on June 1, 2015 and a final Plan on August 6, 2015 for concurrence. The Plan included an iCPMM |

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| | American River. | Temperature Plan. The draft plan shall contain:<br>1) Forecasts of hydrology and storage;<br>2) A modeling run or runs, using these forecasts, demonstrating that the temperature compliance point can be attained (see Coldwater Management Pool Model approach in Appendix 2-D);<br>3) A plan of operation based on this modeling run that demonstrates that all other non-discretionary requirements are met; and<br>4) Allocations for discretionary deliveries that conform to the plan of operation. | | | temperature model run with the objective to achieve temperature (mean daily) target(s) at Hazel Avenue Bridge and Watt Avenue Bridge. The plan is reviewed for potential updates every month based on the latest hydrology and cold-water pool conditions. The model results were influenced in water year 2015 due to: extremely low projected storage conditions and small cold-water pool volume, extremely low precipitation/snow-pack and inflow, warmer inflow, system-wide operations including: reduced delivery requirements, Winter Run fishery protection/Keswick limited flows and Delta regulatory requirements. Based on these existing conditions, assumed future conditions, and iterative modeling results (adjusted to accommodate warmer scenarios), the Temperature Management Plan recommended a reasonably feasible maximum mean daily temperature target at Hazel Avenue Bridge of 71 $^{o}$F and Watt Avenue Bridge of 75 $^{o}$F through September 2015. |
| II.3. Structural Improvements | Improve the ability to manage the cold water pool to provide suitable temperatures for listed fish through physical and structural improvements at the dams. | Reclamation shall evaluate physical and structural modifications that may improve temperature management capability, as detailed below. Upon completion of the evaluation, Reclamation shall select the most promising projects and shall submit, by June 30th 2010, a proposed plan to NMFS to implement selected projects. Reclamation shall seek NMFS' concurrence that the proposed projects are likely to be effective in reducing adverse effects of warm water temperatures on listed fish. With NMFS' concurrence, Reclamation shall implement selected projects by December 15, 2012. Modifying the following structures may substantially improve the ability to manage temperature in the Lower American River to reduce adverse effects of unsuitably warm water on listed species. The comparative benefits and costs of alternative modifications that will achieve objectives have not been fully analyzed. The objective of this action is to provide effective tools to make transparent temperature management decisions. Alternatives include decision impact analyses, regular analysis of a broad array of operational scenarios, improved operations group processes, and monitoring. | USBR | 12/15/2012 for chosen project implementation | Reclamation moving forward with Folsom Dam TCD analysis (a Corps lead action agency project) and temperature management decision support tools. Progress is being made on cold water management at Folsom and is being coordinated with Corps studies to identify cold water pool benefits. Action cannot be completed until the Corps studies are done, which are estimated to take a few years. Reclamation will consult with NMFS on whether the "intent" of the RPA is being met even though no action is being taken and no alternative has been selected. Reclamation is coordinating with the El Dorado irrigation District on their Water Supply Intake TCD, completing a screening analysis of alternatives in October 2015 |
| II.4. Minimize Flow Fluctuation Effects | Reduce stranding and isolation of juvenile steelhead through ramping protocols. | The following flow fluctuation objectives shall be followed:<br>1) From January 1 through May 30, at flow levels <5,000 cfs, flow reductions shall not exceed more than 500 cfs/day and not more than 100 cfs per hour.<br>2) From January 1 through May 30, Reclamation shall coordinate with NMFS, CDFG, and USFWS to fund and implement monitoring in order to estimate the incidental take of salmonids associated with reductions in Nimbus Dam releases.<br>3) Minimize the occurrence of flows exceeding 4,000 cfs throughout the year, except as may be necessary for flood control or in response to natural high precipitation events. | USBR | Jan through May monitoring | Ramping protocols were met from January 1 through May 31 |
| II.5. Fish Passage at Nimbus and Folsom Dams | Provide access for steelhead to historic cold water habitat above Nimbus and Folsom dams. | See Fish Passage Program, Action V. | USBR | | This action will be initiated once fish passage evaluations at Shasta Dam are complete (Action I.2.5). |
| II.6.1. Preparation of Hatchery Genetic Management Plan (HGMP) for Steelhead | | Reclamation shall fund CDFG to prepare a complete draft HGMP for steelhead production at Nimbus Fish Hatchery, in accordance with current NMFS guidelines, and submit that draft for NMFS review by June 2011. Specific actions shall include: 1) Reclamation shall fund genetic screening at Nimbus Fish Hatchery for steelhead to determine most appropriate brood stock source. This action shall be completed by March 31, 2012. 2) Reclamation shall fund a study examining the potential to replace the Nimbus Fish Hatchery steelhead broodstock, with genetically more appropriate sources. This action shall be completed by March 31, 2012 | USBR | 6/1/2011, 3/31/2012 | The draft HGMP was submitted to NMFS by the due date. Genetic screening of steelhead at Nimbus hatchery and all other Central Valley hatcheries was completed annually in 2011-2013. The Nimbus steelhead broodstock replacement study is ongoing. Nearly 600 rainbow trout genetic samples were collected from American River tributaries upstream of Folsom Reservoir at 15 sites below and above historic barriers to anadromy to help determine which fish could qualify genetically as appropriate stock for replacement of the broodstock. Next, the study will collect eggs from the appropriate study fish (upstream of Folsom and potentially from other Central Valley steelhead broodstocks such as Feather River). The test stocks will be raised to determine their ability to survive and grow in the Nimbus Hatchery environment and their tendency towards anadromy. Following the tests in the hatchery environment the fish will be released into the American River to look at survival and anadromy in the wild. The final study plans are being worked out in the Nimbus Hatchery coordination team to collect eggs from test stocks in 2015. Approximately 200,000 steelhead eggs from Coleman Hatchery were transferred to Nimbus Hatchery in 2015 as a part of the study. |

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| II.6.2. Interim Actions Prior to Submittal of Draft HGMP for Steelhead | | Reclamation shall use its authorities to ensure that, prior to completion of the draft HGMP, the hatchery is operated according to the following protocols: 1) Release all hatchery-produced steelhead juveniles in the American River at Nimbus Fish Hatchery or at a location in the American River as close to Nimbus Fish Hatchery as is feasible to reduce straying. This action shall be implemented within 30 days of issuance of this Opinion. 2) Release all unclipped steelhead adults returning to Nimbus Fish Hatchery back into the lower American River so they can spawn naturally. This action shall be implemented within 30 days of issuance of this Opinion. 3) Stop inter-basin transfers of steelhead eggs or juveniles to other hatcheries, except upon specific written concurrence of NMFS. This action shall be implemented within 30 days of issuance of this Opinion. | USBR | | Ongoing & being done. |
| II.6.3: Develop and Implement Fall-run Chinook Salmon Hatchery Management Plans for Nimbus and Trinity River Fish Hatcheries | | By June 2014, develop and begin implementation of Hatchery Management Plans for fall-run production at Nimbus Fish Hatchery and spring-run and fall-run at Trinity River Fish Hatchery. Reclamation shall fund CDFG to develop and submit draft plans for NMFS review by June 2013. The goal of the plans shall be to reduce impacts of hatchery Chinook salmon on natural fall-run and spring-run, and increase the genetic diversity and diversity of run-timing for these stocks. | USBR | 6/1/2013, 6/1/2014 | Nimbus Fish hatchery plan provided to NMFS for review. Trinity River Fish Hatchery plan is on hold due to litigation. |
| Eastside Division | | | | | |
| III.1.1. Establish Stanislaus Operations Group for Real-Time Operational Decision-Making as Described in These Actions and Implementation Procedures | | Reclamation shall create a SOG to provide a forum for real-time operational flexibility implementation of the alternative actions defined in this RPA and for clarification of decision-making processes regarding other allocations of the NMTP. This group shall include Reclamation, NMFS, USFWS, DWR, CDFG, SWRCB, and outside expertise at the discretion of NMFS and Reclamation. This group shall provide direction and oversight to ensure that the East Side Division actions are implemented, monitored for effectiveness and evaluated. Reclamation, in coordination with SOG, shall submit an annual summary of the status of these actions. See introduction to RPA for further information on group procedures. | USBR | | Action completed. |
| III.1.2. Provide Cold Water Releases to Maintain Suitable Steelhead Temperatures | | Reclamation shall manage the cold water supply within New Melones Reservoir and make cold water releases from New Melones Reservoir to provide suitable temperatures for CV steelhead rearing, spawning, egg incubation smoltification, and adult migration in the Stanislaus River downstream of Goodwin Dam in order to maintain the temperature compliance schedule. Temperature compliance shall be measured based on a seven-day average daily maximum temperature. Exception: If any of these criteria is or is expected to be exceeded based on a three-day average daily maximum temperature, Reclamation shall immediately notify NMFS of this condition and shkall submit to NMFS a written determination that, after taking all actions within its authorities, it is unlikely to meet the above temperature requirement and the extent and duration of the expected exceedance. This determination must be supported by specific iterative modeling techniques that vary allocations and delivery schedules. | USBR | Begin projects after 4/16/12 | Reclamation submitted the final plan for temperature management, river releases and lake operations to the SWRCB for Stanislaus operations through December 2015. During WY 2015, because of extremely low reservoir level at New Melones due to the extended drought, the low-level outlet became available for use in late August of 2015. Except for maintenance of the main outlet, Reclamation's Regional Engineer) advised that this outlet not be operated until the elevation of New Melones Reservoir was at or below 808 feet. The final plan included temperature targets consistent with the exception procedures and flow and reservoir operations. |
| III.1.3. Operate the East Side Division Dams to Meet the Minimum Flows, as Measured at Goodwin Dam, Characterized in Figure 11-1, and as Specified in Appendix 2-E | To maintain minimum base flows to optimize CV steelhead habitat for all life history stages and to incorporate habitat maintaining geomorphic flows in a flow pattern that will provide migratory cues to smolts and facilitate out-migrant smolt movement on declining limb of pulse. | Reclamation shall operate releases from the East Side Division reservoirs to achieve a minimum flow schedule as prescribed in Appendix 2-E and generally described in figure 11-1 above. This flow schedule specifies minimum flows and does not preclude Reclamation from making higher releases for other operational criteria. When operating at higher flows than specified, Reclamation shall implement ramping rates for flow changes that will avoid stranding and other adverse effects on CV steelhead. In particular, flows that exceed 800 cfs will inundate known side channels that provide habitat, but that also pose stranding risks. When spring pulses greater than 800 cfs are identified in figure 11-1, the declining limb is not reduced below 800 cfs until the late spring flows occur. | USBR | | The October pulse was implemented according to the September SOG advice, in which SOG recommended that the fall attraction flow be reshaped. During April and May, releases were governed by Appendix 2-E and the DOP. In July, operations were governed by Ripon Dissolved Oxygen standard. This continued to be the controlling standard until August 3, 2014, when Appendix 2-E releases once again became the controlling requirement. |
| Action III.2.1. Increase and Improve Quality of Spawning Habitat with Addition of 50,000 Cubic Yards of Gravel by 2014 and with a Minimum Addition of 8,000 Cubic Yards per Year for the Duration of the Project Actions | | Reclamation shall minimize effects of their operations through improving spawning habitat with addition of 50,000 tons of gravel by 2014. Reclamation shall submit a plan, including monitoring, and schedule to NMFS for gravel augmentation by June 2010. Reclamation shall begin gravel augmentations no later than summer 2011. Reclamation shall submit to NMFS a report on implementation and effectiveness of action by 2015. Spawning gravel replenishment sites shall be monitored for geomorphic processes, material movement, and salmonid spawning use for a minimum of three years following each addition of sediment at any given site. | USBR | 6/1/2010, summer 2011, 6/1/2014, 2015 | 2015 gravel addition complete. 5,333 cubic yards of gravel was placed at Goodwin Canyon at cable crossing. Total gravel addition from 2011 to 2015 has been 18,666 cy. |

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| Action III.2.2. Conduct Floodplain Restoration and Inundation Flows in Winter or Spring to Inundate Steelhead Juvenile Rearing Habitat on One- to Three-Year Schedule. | | Reclamation shall seek advice from SOG to develop an operational strategy to achieve floodplain inundation flows that inundate CV steelhead juvenile rearing habitat on a one- to three-year return schedule. Reclamation shall submit a proposed plan of operations to achieve this flow regime by June 2011. This plan shall include the minimum flow schedule identified in Action III.1.2, or shall provide justification for any proposed modification of the minimum flow schedule. NMFS will review and, if satisfactory, approve the operational strategy. Reclamation will implement strategy starting in 2012. | USBR | 8/31/11, 2012; Need to coordinate and finalize | Coordination is ongoing with the SOG on a suite of potential habitat restoration projects relevant for the objectives of RPA Action III.2.2. |
| III.2.3. Restore Freshwater Migratory Habitat for Juvenile Steelhead by Implementing Projects to Increase Floodplain Connectivity and to Reduce Predation Risk During Migration | This action is necessary to compensate for continued operational effects on rearing and freshwater migratory habitat due to flood control operations. The goal of this action is to improve habitat quality of freshwater migratory habitat for juvenile steelhead. | By June 2010, in cooperation with the SOG, Reclamation shall develop a list of projects to improve the habitat values of freshwater migratory habitat in the Stanislaus River, and associated monitoring, for implementation and submit the list to NMFS for review. Reclamation shall begin implementation of NMFS-approved projects by June 2011. Reclamation shall submit a report of project implementation and effectiveness by June 2016. These projects may include actions that reduce exposure to predation directly, or projects that may offset predation effects by improving rearing habitat values to allow juveniles to grow larger before outmigration. These projects may include both flow- and non-flow-related actions. Flow-related actions shall be coordinated with operational flows as defined in Action III.2.2 and Action III.1.2. These projects may also include, but shall not be limited to, evaluations to identify locations or sources of higher juvenile mortality in order to identify and implement projects with the highest likelihood to prevent CV steelhead mortality. | USBR | 6/1/2010, 6/1/2011, 6/1/2016 | Coordination is ongoing with the SOG on a suite of potential habitat restoration projects relevant for the objectives of RPA Action III.2.3. Monitoring reports for 2 floodplain restoration projects – Honolulu Bar and Lancaster - are under review. |
| III.2.4. Evaluate Fish Passage at New Melones, Tulloch, and Goodwin Dams | Evaluate access for steelhead to historic cold water habitat above New Melones, Tulloch, and Goodwin dams. | See Fish Passage Program, Action V | USBR | | This action will be initiated once fish passage evaluations at Shasta Dam are complete (Action I.2.5). |
| Delta Division | | | | | |
| IV.1.1 Monitoring and Alerts to Trigger Changes in DCC Operations | To provide timely information for DCC gate operation that will reduce loss of emigrating winter-run, spring-run, CV steelhead, and green sturgeon. | Monitoring of Chinook salmon migration in the Sacramento River Basin and the Delta currently occurs at the RBDD, in spring-run tributaries to the Sacramento River, on the Sacramento River at Knights Landing and Sacramento, and sites within the Delta. Reclamation and DWR shall continue to fund these ongoing monitoring programs, as well as the monitoring of salvage and loss of Chinook salmon juveniles at the Delta fish collection facilities operated by the CVP and SWP. Funding shall continue for the duration of the proposed action (2030). Reclamation and DWR may use their own fishery biologists to conduct these monitoring programs, or they may provide funds to other agencies to do the required monitoring. Monitoring protocols shall follow established procedures utilized by the USFWS, CDFG, Reclamation, and DWR. Information collected from the monitoring programs will be used to make real-time decisions regarding DCC gate operation and export pumping. The DOSS group (Action IV.5) and WOMT will use information from monitoring to make decisions regarding DCC closures consistent with procedures below. The DCC gate operations in the fall are initiated through a series of alerts. These alerts are signals that gate operations may need to be altered in the near future to avoid diversion of juvenile Chinook salmon migrating down the Sacramento River. | Joint | Ongoing | Default DCC gate closure started 12/1/14. As per the TUCP, for the November –January period, the DCC gates were closed for a total of up to 45 days, as determined by Reclamation in consultation with FWS, NMFS, and CFWS. For the May-June 2015 period, the DCC gates were closed for a total of 14 days as determined by Reclamation in coordination with the fishery agencies. Rotary screw trapping operations no longer occur on Mill Creek and Deer Creek, and NMFS approved a request from Reclamation and DWR that the first component of the first alert be replaced by a hydrologic criterion which triggers when flows are greater than 95 cfs in Deer or Mill Creeks. |
| IV.1.2 DCC Gate Operation | Modify DCC gate operation to reduce direct and indirect mortality of emigrating juvenile salmonids and green sturgeon in November, December, and January. | During the period between November 1 and June 15, DCC gate operations will be modified from the proposed action to reduce loss of emigrating salmonids and green sturgeon. The operating criteria provide for longer periods of gate closures during the emigration season to reduce direct and indirect mortality of yearling spring-run, winter-run, and CV steelhead. From December 1 to January 31, the gates will remain closed, except as operations are allowed using the implementation procedures/modified Salmon Decision Tree (below). | Joint | Ongoing | . For most of the October 1-June 15 period of DCC gate operations management for listed salmonids and sturgeon (except mid-November until late January, when no drought contingency plan was in effect and the DCC matrix in the NMFS BiOp was implemented), DCC operations were governed by the criteria table in Attachment G of the April 2014 Drought Operations Plan. According to those criteria, when the Knights Landing Catch Index (KLCI) or Sacramento Catch Index (SCI) exceeds a fish trigger, and water quality exceeds the concern level at any of four stations, the required action response is that "DOSS review[s] monitoring data and makes recommendation to NMFS and WOMT per procedures in Action IV.5". The gates were closed from 11/2/14 through 11/6/14 in response to this pulse of fish. The gates were closed from 12/1/14 through 5/13/15. Based on a review of biological monitoring and evaluation of the DCC gate trigger matrix, the Real Time Drought Operations Team (RTDOT) determined that the DCC gates could be opened briefly during mid-May for water quality improvement. A brief opening of the DCC occurred 5/14/15 through 5/17/15. |

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| IV.1.3 Consider Engineering Solutions to Further Reduce Diversion of Emigrating Juvenile Salmonids to the Interior and Southern Delta, and Reduce Exposure to CVP and SWP Export Facilities | Prevent emigrating salmonids from entering the Georgiana Slough channel from the Sacramento River during their downstream migration through the Delta. Prevent emigrating salmonids from entering channels in the south Delta (e.g., Old River, Turner Cut) that increase entrainment risk to CV steelhead migrating from the San Joaquin River through the Delta. | Reclamation and/or DWR shall convene a working group to consider engineering solutions to further reduce diversion of emigrating juvenile salmonids to the interior Delta and consequent exposure to CVP and SWP export facilities. The working group, comprised of representatives from Reclamation, DWR, NMFS, USFWS, and CDFG, shall develop and evaluate proposed designs for their effectiveness. in reducing adverse impacts on listed fish and their critical habitat. Reclamation or DWR shall subject any proposed engineering solutions to external independent peer review and report the initial findings to NMFS by March 30, 2012. Reclamation or DWR shall provide a final report on recommended approaches by March 30, 2015. If NMFS approves an approach in the report, Reclamation or DWR shall implement it. To avoid duplication of efforts or conflicting solutions, this action should be coordinated with USFWS' Delta smelt biological opinion and BDCP's consideration of conveyance alternatives. | DWR | 3/30/2012, Delta Science Program review end: 4/2012; Final Report from DWR to NMFS: 6/30/12. 3/30/2015 | The Phase I (Initial Findings) report was completed December 2013. The Phase II report is in progress and was submitted to NMFS on March 30, 2015. |
| IV.2.1 San Joaquin River Inflow to Export Ratio | To reduce the vulnerability of emigrating CV steelhead within the lower San Joaquin River to entrainment into the channels of the South Delta and at the pumps due to the diversion of water by the export facilities in the South Delta, by increasing the inflow to export ratio. To enhance the likelihood of salmonids successfully exiting the Delta at Chipps Island by creating more suitable hydraulic conditions in the main stem of the San Joaquin River for emigrating fish, including greater net downstream flows. | Phase I: Interim Operations in 2010-2011. From April 1 through May 31: 1. Flows at Vernalis (7-day running average shall not be less than 7 percent of the target requirement) shall be based on the New Melones Index. In addition to the Goodwin flow schedule for the Stanislaus River prescribed in Action III.1.3 and Appendix 2-E, Reclamation shall increase its releases at Goodwin Reservoir, if necessary, in order to meet the flows required at Vernalis, as provided in the following table. NMFS expects that tributary contributions of water from the Tuolumne and Merced rivers, through the SJRA, will continue through 2011 and that the installation of a fish barrier at the Head of Old River will continue to occur during this period as permitted. 2. Combined CVP and SWP exports shall be restricted through the following. In addition: 1) Reclamation/DWR shall seek supplemental agreement with the SJRGA as soon as possible to achieve minimum long term flows at Vernalis (see following table) through all existing authorities. Phase II: Beginning in 2012: From April 1 through May 31: 1. Reclamation shall continue to implement the Goodwin flow schedule for the Stanislaus River prescribed in Action III.1.3 and Appendix 2-E. 2. Reclamation and DWR shall implement the Vernalis flow-to-combined export ratios in the following table, based on a 14-day running average exception procedure for multiple dry years: If the previous 2 years plus current year of San Joaquin Valley "60-20-20" Water Year Hydrologic Classification and Indicator as defined in D-1641 and provided in following table, is 6 or less, AND the New Melones Index is less than 1 MAF, exports shall be limited to a 1:1 ratio with San Joaquin River inflow, as measured at Vernalis. | Joint | Annually | The NMFS BiOp provides an exception to meeting the required I:E ratio that allows combined exports of up to 1,500 cfs when export levels needed to achieve the target I:E ratio are <1,500 cfs (in the case of the critical year 1:1 I:E ratio, anytime Vernalis inflow is <1,500 cfs). Implementation of this RPA action was modified under the Drought Operations Plan[1] . Specifically, the Drought Operations Plan allowed for modification of I:E implementation before and after the pulse flow on the San Joaquin during the April-May period. Because the pulse flow occurred late March through late April (initiated earlier than usual because of concerns over rising water temperatures), the flexibility applied late April through May. Because of low post-pulse-flow San Joaquin inflows, the exception allowing combined exports of 1,500 cfs was in effect; other constraints in the Drought Operations Plan independent of the I:E ratio RPA action (e.g. water quality and export limits) also limited exports to 1,500 cfs. |
| IV.2.2 Six-Year Acoustic Tag Experiment | To confirm proportional causes of mortality due to flows, exports and other project and non-project adverse effects on steelhead smolts out-migrating from the San Joaquin basin and through the southern Delta. | Reclamation and DWR shall fund a 6-year research-oriented action concurrent with Action IV.2.1. The research shall be composed of studies utilizing acoustically-tagged salmonids, and will be implemented to assess the behavior and movement of the outmigrating fish in the lower San Joaquin River. The studies will include three releases of acoustic tagged fish, timed to coincide with different periods and operations: March 1 through March 31, April 1 through May 31, and June 1 through June 15. NMFS anticipates that studies will utilize clipped hatchery steelhead and hatchery fall-run as test fish. During the period from March 1 through March 30, the exports will be operated in accordance with the requirements dictated by action IV.2.3. During the 60-day period between April 1 and May 30, exports will be dictated by the requirements of action IV.2.1. Reclamation shall operate to a minimum 1:1 inflow to export ratio during the period between June 1 and June 15, allowing exports to vary in relation to inflows from the San Joaquin to test varying flow to export ratios during this period. If daily water temperatures at Mossdale exceed<br>72°F for seven consecutive days during the period between June 1 and June 15, then the inflow to export ratio may be relaxed. NMFS anticipates that warm water conditions in the lower San Joaquin River will not be suitable for steelhead under these conditions. | Joint | March through June releases. | The study continued in 2015 with releases between February 15 and May 15 with similar detection infrastructure in place. The 2011 USBR report is being completed, and the 2012 University of Washington results are close to complete pending corrections of errors discovered in the USGS computer code for processing data. 2013 data is currently being processed by USGS as 2014 tagging databases are being QA/QC'd by USFWS. |
| IV.2.3 Old and Middle River Flow Management | Reduce the vulnerability of emigrating juvenile winter-run, yearling spring-run, and CV steelhead within the lower Sacramento and San Joaquin rivers to entrainment into the channels of the South Delta and at the pumps due to the diversion of water by the export facilities in the | From January 1 through June 15, reduce exports, as necessary, to limit negative flows to -2,500 to -5,000 cfs in Old and Middle rivers, depending on the presence of salmonids. The reverse flow will be managed within this range to reduce flows toward the pumps during periods of increased salmonid presence. | Joint | Annually | On 2/9/15, Reclamation and DWR requested flexibility in OMR implementation. NMFS provided it's determination on 2/10/15. Since 2/11/15, daily OMR targets were based on daily assessment of conditions. The OMR limit of no more negative than -5,000 cfs was in effect. The 14-day running average of OMR was allowed to be up to -5,500 cfs for up to a 7 day period toward the end of the month of February 2015 provided OMR is not targeted to be more negative than -5,000 cfs for more than 5 days for the remainder of the month. |

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| | South Delta. Enhance the likelihood of salmonids successfully exiting the Delta at Chipps Island by creating more suitable hydraulic conditions in the mainstem of the San Joaquin River for emigrating fish, including greater net downstream flows. | | | | |
| IV.3 Reduce Likelihood of Entrainment or Salvage at the Export Facilities | Reduce losses of winter-run, spring-run, CV steelhead, and Southern DPS of green sturgeon by reducing exports when large numbers of juvenile Chinook salmon are migrating into the upper Delta region, at risk of entrainment into the central and south Delta and then to the export pumps in the following weeks. | From November 1 through April 30, operations of the Tracy and Skinner Fish Collection Facilities shall be modified according to monitoring data from upstream of the Delta. In conjunction with the two alerts for closure of the DCC (Action IV.1.1), the Third Alert shall be used to signal that export operations may need to be altered in the near future due to large numbers of juvenile Chinook salmon migrating into the upper Delta region, increasing their risk of entrainment into the central and south Delta and then to the export pumps. Third Alert: The catch index is greater than 10 fish captured per day from November 1 to February 28, or greater than 15 fish captured per day from March 1 to April 30, from either the Knights Landing catch index or the Sacramento catch index. | Joint | Annually beginning in November | During WY 2015, no triggers were tripped that required action under RPA IV.3. |
| Action Suite IV.4 Modifications of the Operations and Infrastructure of the CVP and SWP Fish Collection Facilities | Achieve 75 percent performance goal for whole facility salvage at both state and Federal facilities. Increase the efficiency of the Tracy and Skinner Fish Collection Facilities to improve the overall salvage survival of winter-run, spring-run, CV steelhead, and green sturgeon. | Reclamation and DWR shall each achieve a whole facility salvage efficiency of 75 percent at their respective fish collection facilities. Reclamation and DWR shall implement the following actions to reduce losses associated with the salvage process, including: (1) conduct studies to evaluate current operations and salvage criteria to reduce take associated with salvage, (2) develop new procedures and modifications to improve the current operations, and (3) implement changes to the physical infrastructure of the facilities where information indicates such changes need to be made. Reclamation shall continue to fund and implement the CVPIA Tracy Fish Facility Program. In addition, Reclamation and DWR shall fund quality control and quality assurance programs, genetic analysis, louver cleaning loss studies, release site studies and predation studies. Funding shall also include new studies to estimate green sturgeon screening efficiency at both facilities and survival through the trucking and handling process. | | Annually | Construction of the new Fish Science Building at the Skinner Fish Facility has been completed by DWR and is fully operational. This new facility has been critical in continuing DWR's studies on predation in the Forebay, Skinner efficiency studies, and release site studies. However, the drought and low flow conditions in the Forebay have impacted some of these studies. |
| IV.4.1 Tracy Fish Collection Facility (TFCF) Improvements to Reduce Pre-Screen Loss and Improve Screening Efficiency | Implement specific measures to reduce pre-screen loss and improve screening efficiency at Federal facilities. | 1) Implement measures to reduce pre-screen loss and improve efficiency at Federal facilities:<br>a. Reclamation shall undertake actions at the TFCF to reduce pre-screen loss and improve screening efficiency. | USBR | | Tracy Fish Collection Facility (TFCF) currently performing whole facility evaluation (WFE) tests to determine present-day efficiencies for salmon and sturgeon. Subject to funding, authorizations, and available resources, published test data should be available to agencies by FY 2013 for salmon and FY 2014 for sturgeon. Preliminary data may be available sooner. WFE tests for steelhead have not yet commenced. The steelhead WFE test in FY 2015 has been curtailed for lack of funding. After measures are implemented to improve salvage efficiencies at the TFCF, additional WFE tests will be performed to gauge progress in salvage survival until a goal of 75% can be obtained. |
| | | b. By December 31, 2011, Reclamation shall complete studies to determine methods for removal of predators in the primary channel, leading to the primary louver screens with the goal of reducing predation loss to 10% or less. Findings shall be reported to NMFS within 90 days of study completion. By December 31, 2012, Reclamation shall implement measures to reduce pre-screen predation in the primary channel to less than 10% of exposed salmonids. | USBR | 12/31/2012 | Reclamation has completed studies to assess presence, impact, and movement of predators within the primary channel of the TFCF. Reclamation continues to develop measures to reduce predator impacts on salvage survival. The use of electric barriers is currently being considered as a method by which to reduce predation. Lab tests were completed in FY 2011 and 2012. In FY 2013, safety features will be investigated. Field testing was completed in FY 2014 after installation of the new traveling screens in the secondary channel. There are no plans to utilize $CO_2$ in the primary channel to remove predators because it would require significant structural improvements. Reclamation expected to implement more permanent measures to reduce predation in the primary channel by 2015. however those studies have been curtailed due to lack of funding. Reclamation will continue to experiment with alternative, less expensive predator removal concepts (e.g., pike netting during low pumping or temporary removal of trash rack screens during certain strategic times of year to allow predator fish to escape from the primary channel. |
| | | c. By March 31, 2011, Reclamation shall complete studies for the redesign of the secondary channel to enhance the efficiency of screening, fish survival, and reduction of predation within the secondary channel structure and report study findings to NMFS. NMFS shall review study findings and if changes are deemed feasible, Reclamation shall initiate the implementation of the study findings by January 31, 2012. | | | Designs for the secondary channel have been completed and reviewed by NMFS. However, implementation of measures to reduce pre-screen predation in the primary channel has been curtailed for lack of funding. |

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| | | d. No later than June 2, 2010, Reclamation shall submit to NMFS one or more potential solutions to the loss of Chinook salmon and green sturgeon associated with the cleaning and maintenance of the primary louver and secondary louver systems at the TFCF. In the event that a solution acceptable to NMFS is not in place by June 2, 2011, pumping at the Tracy Pumping Plant shall cease during louver cleaning and maintenance operations to avoid loss of fish during these actions. | USBR | | Replacement of the secondary channel louver system has been completed. The improvements include a Hydrolox traveling screen. Design for the replacement of the primary channel screens should be completed by FY 2016, utilizing data gathered from the secondary channel installation as a guide. Contract award and installation will take place in FY 2017 pending funding. |
| | | 2) By December 31, 2011, Reclamation shall implement operational procedures to optimize the simultaneous salvage of juvenile salmonids and delta smelt at the facility. | USBR | FY 2013: Analysis results due. | Reclamation biological staff is continuing to conduct whole-facility operational tests that consider best salvage operations for both species of fish while operating within SWRCB D-1485 fish salvage criteria. Optimization is dependent on the results of delta smelt study data. |
| | | 3) Upon issuance of this BiOp, Reclamation shall begin removing predators in the secondary channel at least once per week. By June 2, 2010, Reclamation shall install equipment to monitor for the presence of predators in the secondary channel during operations. | USBR | 2009 (predator removal), 6/2/2010 (install equipment) | Reclamation TFCF staff have periodically removed predators from the secondary channel of the TFCF since the early 1900s. Presently, Tracy office staff lack the resources to conduct predator removals once per week; however, tests are currently being conducted utilizing $CO_2$ as a more efficient and safer means of removing predators from the secondary channel. There is also presently no equipment installed to monitor presence of predators within the secondary channel. TFCF purchased a 3-D fish finder and conducted preliminary tests in FY 2012. The equipment was installed in FY 2015. |
| | | 4) Reclamation shall operate the facility to meet design criteria for louver bypasses and channel flows at least 75% efficiency. | USBR | | Reclamation currently operates the TFCF within design criteria as much as possible; however, south-Delta hydrology coupled with export pumping rates, tidal action, and high debris entrainment makes this difficult at best at times. |
| | | 5) Reclamation shall maintain a head differential at the trash rack of less than 1.5 ft. between the ambient Old River water surface elevation and the primary intake channel at all times. | USBR | | Action Completed.<br>Reclamation TFCF installed a new trash rack cleaner in FY 2010 that will allow Reclamation to meet the 1.5-ft differential objective. |
| | | 6) By January 2, 2010, Reclamation shall install and maintain flow meters in the primary and secondary channels to continuously monitor and record the flow rates in the channel. | USBR | | Action Completed.<br>Flow meters installed and operational. Regular maintenance being performed. Flow rates are continuously monitored and recorded. |
| | | 7) Reclamation shall change its operations of the TFCF to meet salvage criteria, while emphasizing the following actions: (a) Primary Bypass Ratio; (b) Secondary bypass ratio; (c) Primary Average Channel Velocity; and (d) Secondary Average Channel Velocity. | USBR | | Reclamation TFCF currently conducting studies to assess impacts of bypass ratios vs. average channel velocity on effectiveness of salvage operations. Reclamation currently abiding by SWRCB D-1485 salvage operations criteria and adjusting to latest data. |
| | | 8) Records of all operating actions shall be kept and made available to NMFS engineers upon request. NMFS shall be notified of any major or long-term deviations from normal operating design criteria within 24 h of occurrence. | USBR | 12/31/2013 | Reclamation TFCF records are available upon request. Reclamation will notify NMFS of any major or long-term deviations from normal operating design criteria. Study was run in March and May. Results are being reviewed and should be available by the end of the year. A similar study is planned for next calendar year. |
| IV.4.2 Skinner Fish Collection Facility Improvements to Reduce Pre-Screen Loss and Improve Screening Efficiency | Implement specific measures to reduce pre-screen loss and improve screening efficiency at state facilities. | DWR shall undertake the following actions at the Skinner Fish Collection Facility: 1) By December 31, 2012, operate the whole Skinner Fish Protection Facility to achieve a minimum 75 percent salvage efficiency for CV salmon, steelhead, and Southern DPS of green sturgeon after fish enter the primary channels in front of the louvers. 2) Immediately commence studies to develop predator control methods for Clifton Court Forebay that will reduce salmon and steelhead pre-screen loss in Clifton Court Forebay to no more than 40 percent. a) On or before March 31, 2011, improved predator control methods. Full compliance shall be achieved by March 31, 2014. Failure to meet this timeline shall result in the cessation of incidental take exemption at SWP facilities unless NMFS agrees to an extended timeline. b) DWR may petition the Fish and Game Commission to increase bag limits on striped bass caught in Clifton Court Forebay. 3) Remove predators in the secondary channel at least once per week. | DWR | Immediately, 3/31/2011, 12/31/2012, 3/31/2014. Concurrence by NMFS to implement action by 12/2014; full compliance by 12/2017. | Eleven pilot efficiency tests were conducted in March 2011, utilizing late-fall run Chinook Salmon. Full-facility efficiency was >75%. Fourteen additional late-fall tests were conducted in WY 2014 in addition to 15 tests in WY2015. In WY2015, 8 test releases were also conducted with fall run Chinook Salmon, and 17 test releases with steelhead Trout. Results of the WY 2014 and 2015 test releases are currently being analyzed. Tests in WY2014 and 2015 were constrained by limited water exports as a result of the ongoing drought.<br><br>Additional testing utilizing Chinook Salmon and Steelhead is planned for WY 2016, but may be constrained by the limited availability of hatchery fish to use as study fish and continued low exports, both a result of the drought.<br><br>DWR and UC Davis entered into contract to conduct laboratory based testing of louver efficiency and predation risk at the J. Amorocho Hydraulics Laboratory. In WY 2015 a flume at the laboratory was modified to include a louver panel with bypass, and testing utilizing juvenile northern DPS Green Sturgeon is currently underway. Predation risk trials utilizing juvenile Green Sturgeon and various predatory fish are scheduled to commence this winter.<br><br>New fish count and transfer buckets for the Skinner facility have been fabricated and installed. Recoating of the tanks has also been completed. The new buckets are, in part, intended to increase efficiency by eliminating an intermittent gap at the bottom of the fish holding tanks caused by warped |

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| | | | | | rims on the old buckets. The new buckets are constructed of stainless steel, include 3/32" screening, and are constructed with "fish friendly" features.<br><br>CCF predator control – Because of conflicts with Conservation Measure 1 of the California Water Fix, the fishing facility (pier) at Clifton Court Forebay was put on indefinite hold. DWR is pursuing implementation of (1) Aquatic Weed Control, (2) A Fishing Incentive Program, (3) Electrofishing, and (4) Operational Changes to reduce predation of listed fish species in the Forebay. Additional Long-term predator control measures are also being investigated. Work is being coordinated with proposed Conservation Measures proposed under the California Water Fix.<br>Additional predator control measures such as Predator removal - Predator and debris flushes are conducted routinely at the Skinner Fish Facility at least once a week and more often when debris loads are heavy. |
| IV.4.3 Tracy Fish Collection Facility and the Skinner Fish Collection Facility Actions to Improve Salvage Monitoring, Reporting and Release Survival Rates | To improve overall survival of listed species at facilities through accurate, rapid salvage reporting and state-of-the-art salvage release procedures. This reporting is also necessary to provide information needed to trigger OMR actions. | Reclamation and DWR shall undertake the following actions at the TFCF and the Skinner Fish Collection Facility, respectively. Actions shall commence by October 1, 2009, unless stated otherwise. | USBR | Immediately, 10/1/2009, 10/1/2010, 6/15/2011, 6/15/2014 | |
| | | 1) Sampling rates at the facilities for fish salvage counts shall be no less than 30 minutes every 2 hours (25 percent of operational time) year round to increase the accuracy of salvage estimates used in the determination of trigger levels. Exceptions to the 30-minute count may occur with NMFS' concurrence under unusual situations, such as high fish densities or excessive debris loading. | | | Presently, sample 30 minutes every 2 hours as a rule except during times of high debris loading impacts where a waiver is requested through NMFS and in which case sampling is temporarily set at 10 minutes every 2 hours. 30-min. sampling rate at Skinner when possible. Informal agreement with NMFS to modify count duration per DFG established procedure when too many fish are being salvaged to do 30-min. counts: |
| | | 2) By October 1, 2010, websites shall be created or improved to make salvage count data publicly available within 2 days of observations of the counts. Information available on the website shall include at a minimum: 1) duration of count in minutes, b) species of fish salvaged; c) number of fish salvaged including raw counts and expanded counts; d) volume of water in acre-feet and average daily flow in cfs; e) daily average channel velocity and bypass ratio in each channel, primary and secondary; f) average daily water temperature and electrical conductivity data for each facility, and g) periods of non-operation due to cleaning, power outages, or repairs. | | | Reclamation's Central Valley Operations Office is the lead on this action. Fish salvage data presently available through CVO and DFW websites: www.usbr.gov/mp/cvo/fishrpt.html and www.dfg.ca.gov/delta/data/salvage. DFW improved the salvage website in 2010. |
| | | 3) Release Site Studies shall be conducted to develop methods to reduce predation at the "end of the pipe" following release of salvaged fish. Studies shall examine but are not limited to: a) potential use of barges to release the fish in different locations within the western Delta with slow dispersion of fish from barge holding tanks to Delta waters; b) multiple release points (up to six) in western Delta with randomized release schedule; and c) conducting a benefit to cost analysis to maximize this ratio while reducing predation at release site to 50% of the current rate. | | 12/31/16: Construction on additional sites to be completed. | Final Release Site Predation Study Report released by DWR May 2010 and Evaluation of Mortality and Injury in a Fish Release Pipe released by DWR August 2010.<br><br>• Curtis Landing: A complete refurbishment of this site was completed in 2014 and the site became operational in early 2015.<br>• Two new fish release sites on Sherman Island are currently under final design and permitting is essentially complete. These sites are scheduled for completion in 2017. Significant levee rehabilitation, widening, and raising is necessary at these sites and began in late 2015.<br>• Predation monitoring utilizing DIDSON technology has been ongoing at the Curtis Landing and Horseshoe Bend sites since the Curtis Landing site returned to operation. A comprehensive monitoring plan to monitor predation at the new and existing sites is currently under development.<br>• Debris removal at Horseshoe Bend and Curtis Landing sites conducted bi-annually on an as needed basis. No debris removal was required in WY 2014.<br><br>Reclamation has taken the lead on analyzing opportunities for transporting and releasing fish by barge. |

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| | | 4) By June 15, 2011, predation reduction methods shall be implemented according to analysis in 3. By June 15, 2014, achieve a predation rate that has been reduced 50 percent from current rate. | | 6/15/11 | Reclamation is currently considering findings from the Release Site Predation Study Report and the Evaluation of Mortality Report and will identify actions to reduce predation impacts at its release sites. Routine inspections of the SWP release sites for underwater debris have been implemented. In addition, roosting areas for avian predators have been removed. New trucks were purchased and the Curtis Landing Release Site is currently undergoing a complete refurbishment. The SWP Curtis Landing Release Site improvements are progressing with an expected completion date of December 2014. The construction of two new fish release sites and associated levee improvements are progressing with an expected completion date of December 2016. |
| | | 5) Add salt to water within the tanker trucks hauling fish to reduce stress of transport. Assess use of other means to reduce stress, protect mucous slime coat on fish, and prevent infections from abrasions (i.e., commercially available products for this purpose). | | | Reclamation personnel already add salt to tanker trucks hauling fish and have been doing so for the past several years. Reclamation is also conducting studies and looking at ways to reduce stress on fish during the fish-hauling process. Salinity in the tanker trucks is normally maintained at 3 ppt. Other stress-relieving chemical are no longer being considered because they are not FDA approved. |
| | | 6) All personnel conducting fish counts must be trained in juvenile fish identification and have working knowledge of fish physiology and biology. | | | All personnel have been trained by DFW Fish Identification and QA/AC Biologist and receive regular training refreshers. |
| | | 7) Tanker truck runs to release salmonids should be scheduled at least every 12 hours, or more frequently if required by the "Bates Table" calculations (made at each count and recorded on the monthly report). | | | Reclamation schedules its tanker truck runs at least every 12 hours and sometimes more if needed (i.e., delta smelt presence, large amounts of fish, etc.). |
| | | 8) Reclamation and DWR shall use the Bates Table to maintain suitable environmental conditions for fish in hauling trucks. Trucks should never be overcrowded so that the carrying capacity of the tanker truck is exceeded. | | | The Bates Table is used as part of routine operations to ensure suitable conditions for fish in the haul trucks. The table as modified in 2010 to account for the increase volume of the 3500-gallon fish haul trucks. 2/4/13 Annual Report: Bates Table is used as part of routine operations to ensure suitable conditions for fish in haul trucks. |
| IV.5 Formation of Delta Operations for Salmon and Sturgeon (DOSS) Technical Working Group | Create a technical advisory team .that will provide recommendations to WOMT and NMFS on measures to reduce adverse effects of Delta operations of the CVP and SWP to salmonids and green sturgeon and will coordinate the work of the other technical teams. | The DOSS group will comprise biologists, hydrologists, and other staff with relevant expertise from Reclamation, DWR, CDFG, USFWS, and NMFS. Invitations to EPA, USGS, and Regional Water Quality Board biologists will be extended to provide expertise on issues pertinent to Delta water quality, hydrology and environmental parameters. By October 1, 2009, Reclamation shall, jointly with NMFS, convene the DOSS working group. | USBR | 10/1/2009, summary every 5 years | Action completed. |
| IV.6 South Delta Improvement Program—Phase I (Permanent Operable Gates) | | DWR shall not implement the South Delta Improvement Program, which is a proposal to replace temporary barriers with permanent operable gates. | DWR | Immediately | On indefinite hold pending completion of a Temporary Barriers Project (TBP) predation study required in the NMFS 2008 TBP biological opinion (BO), expected 2017. After NMFS evaluation of analyses of the operations of the barriers are completed, as specified in the BO, DWR may request re-initiation of consultation or may pursue permitting under ESA Section 10. |
| Near-Term Fish Passage | | | | | |
| NF 1. Formation of Interagency Fish Passage Steering Committee | To charter, and support through funding agreements, an interagency steering committee to provide oversight and technical, management, and policy direction for the Fish Passage Program. | By December 2009, Reclamation shall establish, chair and staff the Interagency Fish Passage Steering Committee. The Committee shall be established in consultation with and the approval of NMFS and shall include senior biologists and engineers with experience and expertise in fish passage design and operation, from Reclamation, NMFS, DWR, CDFG, and USFWS. The Steering Committee also shall include academic support by including at least one academic member from a California University with and established fishery program. The committee shall be limited to agency membership unless otherwise approved by Reclamation and NMFS. Steering committee membership shall include on lead member and one alternate. | USBR | 12/1/2009 | Action completed. |

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| NF 2. Evaluation of Salmonid Spawning and Rearing Habitat Above Dams | To quantify and characterize the location, amount, suitability, and functionality of existing and/or potential spawning and rearing habitat for listed species above dams operated by Reclamation. | Beginning in January 2010 and continuing through January 2012, Reclamation, shall conduct habitat evaluations to quantify and characterize the location, amount, suitability, and functionality of existing and/or potential spawning and rearing habitat for listed species above the project reservoirs. Reclamation shall obtain the Steering Committee's assistance in designing and implementing the habitat evaluations. Evaluations shall be conducted using established field survey protocols such as the USFS Region 5 Stream Condition Inventory, Field Intensive and Field Extensive protocols; and habitat models including the Salmon Habitat Integrated Resource Analysis (Shiraz) in combination with the Distributed Hydrology Soil Vegetated Model (DHSVM) or RIPPLE. Shiraz is a life-cycle model that incorporates stream flow and temperature inputs from DHSVM to develop future projections of salmon population sizes. Ripple uses digital terrain information with aquatic habitat and biological data to identify habitat limitations that affect salmon production. | USBR | 1/2010-1/2012 | Action completed. |
| NF 3. Development of Fish Passage Pilot Plan | | From January 2010 through January, 2011, Reclamation, with assistance from the Steering Committee, shall complete a 3-year plan for the Fish Passage Pilot program. | USBR | 1/2010-1/2011 | Reclamation, NMFS, and other partnering federal and state agencies hosted a webinar on 9/24/15 on the Shasta Dam Fish Passage Evaluation to provide an update on the status and next steps for pilot studies evaluating reintroduction of winter-run Chinook salmon upstream of Shasta Dam. Information presented during the session included a status and schedule update for the public release of the evaluation's Pilot Implementation Plan and its companion Environmental Assessment. An overview of the current condition of Sacramento River salmon populations and a status report on the winter-run Chinook salmon captive broodstock program at the Livingston Stone National Fish Hatchery, located at the foot of the Shasta Dam. NMFS and CFWS asked FWS to resume the LSNFH broodstock program in 2014, in response to the potential effects of California's four-year drought on the winter-run Chinook population. The agencies plan to utilize progeny of these fish for pilot studies in lieu of adult fish from the river. The pilot plan is scheduled to be released to the public |
| NF 4. Implementation of Pilot Reintroduction Program | To implement short-term fish passage actions that will inform the planning for long-term passage actions. | From January 2012 through 2015, Reclamation shall begin to implement the Pilot Reintroduction Program (see specific actions below). The Pilot Program will, in a phased approach, provide for pilot reintroduction of winter-run and spring-run to habitat above Shasta Dam in the Sacramento River, and CV steelhead above Folsom Dam in the American River. This interim program will be scalable depending on source population abundance, and will not impede the future installation of permanent facilities, which require less oversight and could be more beneficial to fish. This program is not intended to achieve passage of all anadromous fish that arrive at collection points, but rather to phase in passage as experience with the passage facilities and their benefits is gained. | USBR | 1/2012-1/2015 | See NF 3 above.<br>2015-2017 – rearing first cohort of winter Chinook captive broodstock<br>2016 – experimental population designation for winter and spring Chinook<br>2017 – first fish release marks start of the pilot study. |
| NF 4.1. Adult Fish Collection and Handling Facilities | | Beginning in 2012, Reclamation, with assistance from the Steering Committee, shall design, construct, install, operate and maintain new or rebuilt adult fish collection, handling and transport facilities at the sites listed below. The objective is to provide interim facilities to pass fish above project facilities and reservoirs. Reclamation and partner agencies shall incorporate NMFS' Fish Screening Criteria for Anadromous Salmonids (NMFS 1997a) and the best available technology. During the design phase, Reclamation and partner agencies shall coordinate with NMFS to determine if the design should accommodate possible later connection to improved facilities, if necessary in years beyond 2015. Reclamation and partner agencies shall complete all interim steps in a timely fashion to allow them to meet the following deadlines for completing construction and beginning operation of the facilities listed below. These steps may include completing plans and specifications. Reclamation and partner agencies shall give NMFS periodic updates on their progress. The order in which these facilities are completed may be modified with NMFS' concurrence,<br>based on interim analyses and biological priorities.<br><br>• Sacramento River Fish Facility – Collection facility shall be operational no later than March 2012.<br>• American River Fish Facility – Collection facility shall be operational no later than March 2012. | USBR | 3/1/2012 | The Interagency Fish Passage Steering Committee decided to focus on Shasta initially. The adult collection and handling facilities are in place. The existing Keswick Dam fish trap and Livingston Stone National Fish Hatchery facilities will be used for adult collection and handling in the pilot study. |
| NF 4.2. Adult Fish Release Sites above Dams and Juvenile Fish Sites Below Dams | | Reclamation shall provide for the safe, effective, and timely release of adult fish above dams and juvenile fish below dams. The Fish Passage Plan must identify and release sites. Fish transport and release locations and methods shall follow existing State and Federal protocols. With assistance from the Steering Committee, and in coordination with applicable landowners and stakeholders, Reclamation shall complete construction of all selected sites by March 2012. | USBR | 3/1/2012 | See NF 3 above. |

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| NF 4.3. Capture, Trapping, and Relocation of Adults | | By March 2012, Reclamation shall implement upstream fish passage for adults via "trap and transport" facilities while it conducts studies to develop and assess long-term upstream and downstream volitional fish passage alternatives. At least one fish facility must be in place at terminal upstream passage points for each river that is subject to this measure. Facilities to capture adults currently exist at or below Keswick and Nimbus Dams, though these may need to be upgraded. The Pilot Program is a first step in providing anadromous fish passage to historical habitat above Project dams but will not be sufficient by itself. The number of fish that shall be relocated is expected to vary depending on the source population, source population size, and the results of fish habitat evaluations and modeling of carrying and production capacity. | USBR | 3/1/2012 | See NF 3 above. |
| NF 4.4. Interim Downstream Fish Passage through Reservoirs and Dams | | Beginning in 2012, following the emergence of the first year class of reintroduced fish, and until permanent downstream passage facilities are constructed or operations are established at Project dams, Reclamation shall carry out interim operational measures to pass downstream migrants as safely and efficiently as possible through or around Project reservoirs and dams under current dam configurations and physical and operational constraints, consistent with authorized Project purposes. Near-term operating alternatives shall be identified, evaluated, and implemented if determined to be technically and economically feasible and biologically justified by Reclamation and partner agencies, within the framework of the Annual Operating Plan updates and revisions, and in coordination with the Fish Passage Plan Steering Committee. Interim devices shall be constructed to collect emigrating juvenile salmonids and emigrating post-spawn adult steelhead from tributaries, main stems above project reservoirs, or heads of reservoirs | USBR | 4/30/2011 | See NF 3 above. |
| NF 4.5. Juvenile Fish Collection Prototype | To determine whether the concept of a head-of-reservoir juvenile collection facility is feasible, and if so, to use head-of-reservoir facilities in Project reservoirs to increase downstream fish survival. Safe and timely downstream passage of juvenile Chinook salmon and juvenile and adult post-spawn steelhead is a critical component to the success of the Fish Passage Program. | Beginning in January, 2010, with input from the CVP/SWP operations Fish Passage Steering Committee, Reclamation shall plan, design, build, and evaluate a prototype head-of-reservoir juvenile collection facility above Shasta Dam. Construction shall be complete by September 2013. Because the head-of-reservoir fish collection concept is virtually untested, it would be imprudent to require such facilities without prior field studies, design, and prototype testing to validate the concept. For this measure, NMFS defines "prototype" to refer to temporary facilities intended for concept evaluation, not long-term operations. Further, "prototype" does not necessarily refer to a single concept; multiple concepts may be tested simultaneously. Possible options include, among others:<br>• Floating collectors in the reservoir near the mouths of tributaries<br>• Use of curtained or hardened structures near mouths of tributaries, that block surface passage into reservoirs<br>• Fish collection facilities on tributaries above the reservoir pools<br>• A combination of the above to maximize collection in high flow and low flow conditions. | USBR | 1/2010, 9/2013, 6/2016, 12/31/2016 | See NF 3 above. |
| NF 4.6. Pilot Program Effectiveness Monitoring and Evaluation | | From 2012 to 2015, Reclamation shall study, and provide annual reports on, the elements of the pilot program, including adult reintroduction locations, techniques, survival, distribution, spawning, and production; and juvenile rearing, migration, recollection, and survival. The objective is to gather sufficient biological and technical information to assess the relative effectiveness of the program elements and determine the feasibility of long-term passage alternatives. A final summary report of the 5-year pilot effort shall be completed by December 31, 2015. | USBR | 2012-2015, 12/31/2015 | Coordination is ongoing. |
| NF 4.7. Stanislaus River Fish Passage Assessment | To develop information needed in order to evaluate options for achieving fish passage on the Stanislaus River above Goodwin, Tulloch, and New Melones Dams. | By March 31, 2011, Reclamation shall develop a plan to obtain information needed to evaluate options for fish passage on the Stanislaus River above Goodwin, Tulloch and New Melones Dams and shall submit this plan to NMFS for review. This plan shall identify reconnaissance level assessments that are needed to support a technical evaluation of the potential benefits to CV steelhead that could be achieved with passage above the dams, a general assessment of logistical and engineering information needed, and a schedule for completing those assessments by December 31, 2016. | USBR | 3/31/2011, 12/31/2016 | See NF 3 above. |
| NF 5. Comprehensive Fish Passage Report | To evaluate the effectiveness of fish passage alternatives and make recommendations for the development and implementation of long-term passage alternatives and a long-term fish passage program. | By December 31, 2016, Reclamation shall prepare a Comprehensive Fish Passage Report. The Report shall include preliminary determinations by Reclamation and partner agencies regarding the feasibility of fish passage and other related structural and operational alternatives. The report should include specific recommendations for improvements to highest priority sub-basins and/or features and to include recommendations for major operational changes. It will also include identification and evaluation of high priority actions and may suggest modifying the scope or timelines of these high priority actions, based on the predicted outcome of long-term efforts. | USBR | 12/31/2016 | Coordination is ongoing |

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| Long-Term Fish Passage | | | | | |
| LF 1. Long-term Funding and Support to the Interagency Fish Passage Steering Committee | | If the Comprehensive Fish Passage Report indicates that long-term fish passage is feasible and desirable, Reclamation shall continue to convene, fund, and staff the Fish Passage Steering Committee. | USBR | after 2016 | Coordination is ongoing |
| LF 2. Action Suite: Long-Term Fish Passage Plan and Program | Provide structural and operational modifications to allow safe fish passage and access to habitat above and below Project dams in the Central Valley. | Based on the results of the Comprehensive Fish Passage Report, Reclamation, with assistance from the Steering Committee, shall develop a Long-term Fish Passage Plan and implement a Long-term Fish Passage Program. Reclamation and partner agencies shall submit a plan to NMFS on or before December 31, 2016, which shall describe planned long-term upstream and downstream fish passage facilities and operations, based on the best available information at that time. The plan shall include a schedule for implementing a long-term program for safe, timely, and effective anadromous fish passage by January 31, 2020. | USBR | 12/31/2016, 1/31/2020 | Coordination is ongoing |
| LF 2.1. Long-term Adult and Juvenile Fish Passage Facilities | | Based on the results of the Comprehensive Fish Passage Report and the Fish Passage Plan, and with the assistance of the Steering Committee, Reclamation shall construct long-term fish passage facilities necessary to successfully allow upstream and downstream migration of fish around or through project dams and reservoirs on the Sacramento and American Rivers by 2020, and Stanislaus River depending on results of study provided for in Action NF 4.7. | USBR | 2020 | Coordination is ongoing |
| LF 2.2. Supplementation and Management Plan | | Based on the results of the Comprehensive Fish Passage Report and the Fish Passage Plan, and with the assistance of the Steering Committee, in consultation with the NMFS Southwest Fishery Science Center, Reclamation shall develop and implement a long-term population supplementation plan for each species and fish passage location identified in V. Fish Passage Program, with adult recruitment and collection criteria developed with consideration for source population location, genetic and life history diversity, abundance and production. The purpose is to ensure that long-term abundance and viability criteria are met for all reintroduced populations, with contingencies for supplementing populations with wild and/or conservation hatchery fish if necessary. The plan shall be developed by 2020. The plan shall identify wild and/or hatchery sources for adult reintroductions and long-term supplementation, and the specific NMFS-approved hatchery management practices that qualify a hatchery for conservation purposes. Species-specific conservation hatchery programs may be developed to supplement reintroductions and maintain long-term performance standards for abundance and viability. | | 2020 | Coordination is ongoing |
| LF 2.3. Long-term Fish Passage Monitoring and Evaluation | | Reclamation, through the Steering Committee shall develop a Long-term Fish Passage Monitoring and Evaluation Plan by 2020, to monitor all elements of the Long-term Fish Passage Program including adult reintroduction locations, techniques, survival, distribution, spawning, and production; and juvenile rearing, migration, recollection, and survival. The objective is to gather sufficient biological and technical information to assess the relative effectiveness of the program elements and determine the feasibility of long-term passage alternatives. Annual reports shall be submitted to NMFS by September 30 of each year. | USBR | Annual reports due 9/30 | Coordination is ongoing |
| Terms & Conditions | | | | | |
| 13.3 Reasonable and Prudent Measures | NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of winter-run, spring-run, CV steelhead, and the Southern DPS of green sturgeon. | • Reclamation and DWR shall monitor the extent of incidental take of winter-run, spring-run, green sturgeon, and CV steelhead, associated with the operation of the CVP's Jones and SWP's Harvey Banks pumping facilities. | Joint | Ongoing through 2030 | Monitoring coordination is ongoing. |
| | | • Reclamation and DWR shall monitoring all incidental take associated with CVP and SWP operations. | Joint | Ongoing through 2030 | Monitoring and coordination is ongoing. |
| | | • Reclamation and DWR shall annually report to NMFS the incidental take resulting from the implementation of the Proposed Action. | Joint | Ongoing through 2030 | Coordination is ongoing. |

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| 13.4 T&C 1 | Reclamation and DWR must comply with the following non-discretionary terms and conditions to implement the reasonable and prudent measures described. | a. Reclamation and DWR shall calculate winter-run, spring-run, CV steelhead, and Southern DPS of green sturgeon loss at the Jones and Banks pumping plants on a real-time basis from October 1 through June 30 each year. | Joint | Ongoing through 2030 | Ongoing & being done. |
| | | b. Reclamation and DWR shall monitor the loss of juvenile winter-run at the CVP and SWP Delta pumping facilities and will use that information to determine whether the anticipated level of loss is likely to exceed the authorized level of 2 percent, cumulatively, of the estimated number of juvenile winter-run entering the Delta annually. | | Ongoing through 2030 | Ongoing & being done. |
| | | c. Reclamation and DWR shall monitor the loss of identified spring-run surrogate release groups at the CVP and SWP Delta pumping facilities and use that information to determine whether the cumulative estimated level of loss is expected to exceed 1%. | | Ongoing through 2030 | Ongoing & being done. |
| | | d. Reclamation and DWR shall monitor the salvage of CV steelhead at the CVP and SWP Delta pumping facilities and use that information to determine whether the cumulative estimated level of salvage is expected to exceed 3,000 unclipped steelhead (juveniles and adults combined) at the CVP and SWP Delta pumping facilities. | | Ongoing through 2030 | Ongoing & being done. |
| | | e. Reclamation and DWR shall monitor the loss of juvenile green sturgeon at the CVP and SWP Delta pumping facilities and use that information to determine whether the cumulative estimated level of loss is expected to exceed 110 juveniles annually (previous 10-year average). | | Ongoing through 2030 | Ongoing & being done. |
| | | f. If the estimated rate of loss approaches the incidental take level anticipated for any of the anadromous fish species at the SWP Harvey Banks pumping facility combined with the estimated take at the CVP Jones pumping facility is exceeded, Reclamation and DWR shall immediately convene the WOMT. | | Ongoing through 2030 | Ongoing & being done. |
| | | g. DWR shall collect additional data at the Clifton Court Forebay, the John Skinner Fish Collection Facility, and the Harvey Banks pumping plant to monitor the incidental take of winter-run, spring-run, steelhead, and green sturgeon and to develop and implement improvements to pumping facility operations to further reduce or minimize losses of listed salmonids. | | Ongoing through 2030 | Ongoing & being done. |
| | | h. DNA tissue samples and CWT samples from juvenile winter-run, spring-run, and steelhead at the Tracy and Skinner fish collection facilities shall be collected by DWR or CDFG for genetic analysis or tag removal/reading pursuant to the sampling protocols established by the IEP Salmon Genetics Project Work Team. Tissues shall be stored at the CDFG tissue bank at Rancho Cordova for subsequent analysis by Oregon State University or similar lab approved by NMFS. Whole fish or heads for CWT processing and identification shall be stored at the USFWS Bay/Delta Office in Stockton. All samples shall be clearly marked according to office protocol and a log maintained at each storage facility. | | Ongoing through 2030 | Ongoing & being done. In June 2012, Reclamation and DWR requested, and NMFS concurred, to change labs from Reclamation and DWR the Genomic Variation Laboratory at UC, Davis, to process the tissue samples. |
| T&C 2 | Reclamation shall seek to develop an alternative technique to quantify incidental take of listed anadromous salmonid species at the Federal and State export facilities. | a. In coordination with NMFS, Reclamation shall select and fund an independent contractor to determine the best technique to quantify incidental take of winter-run, spring-run, CV steelhead, and the Southern DPS of green sturgeon at the Federal and State export facilities. Reclamation shall submit a final report to NMFS by December 31, 2010, summarizing recommendations for quantifying incidental take, with the selection of a proposed technique. The technique for quantifying take shall be implemented immediately upon NMFS' concurrence. In the event that this measure is not implemented immediately and reflected in the annual report per T&C 3a. below, take authorization for CV steelhead shall cease on December 31, 2011. Incidental take, especially for CV steelhead, but for the other listed anadromous fish species as well, may be adjusted based on the application of the new technique to quantify incidental take at the Federal and State export facilities. | USBR | 11/30/13 | Ongoing & being done. |

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| T&C 3 | Reclamation shall minimize the adverse effects of flow fluctuations associated with CVP- controlled stream operations on listed anadromous fish species spawning, egg incubation, and fry and juvenile rearing. | a. Reclamation shall schedule maximum ramping down rates of non-Glory Hole (i.e., non- flood control) releases from Whiskeytown Reservoir according to the table, below (estimated at RM 3.03). Ramping rates for releases greater than 300 cfs shall be made after consultation with the Clear Creek Technical Team, considering: time of year, time of day, timing the change to occur with natural changes in-flow and/or turbidity, size of fish present in the creek, species and protected status of vulnerable fish, the amount of water required, and relative costs or benefits of proposed flow. Reclamation shall time flow decreases so that the most juvenile Chinook salmon and steelhead experience the stage decrease during darkness. Maximum ramping rate of flow releases from Whiskeytown Dam into Clear Creek shall be accomplished based on the following targets within the precision of the outlet works or the City of Redding powerplant equipment. | USBR | Ongoing through 2030 | Ongoing & being done. |
| | | b. During periods outside of flood control operations and to the extent controllable during flood control operations, Reclamation shall ramp down releases in the American River below Nimbus Dam as prescribed. | USBR | Ongoing through 2030 | Ongoing & being done. |
| | | c. During periods outside of flood control operations and to the extent controllable during flood control operations, Reclamation shall ramp releases in the Stanislaus River below Goodwin Dam as prescribed. | USBR | Ongoing through 2030 | Ongoing & being done. |
| T&C 4 | Reclamation and DWR shall monitor all incidental take associated with CVP and SWP operations. | a. Reclamation shall implement all aspects of RPA section 11.2.1.3 | USBR/ DWR | Ongoing through 2030 | Ongoing & being done. |
| T&C 5 | Reclamation and DWR shall annually report to NMFS the incidental take resulting from the implementation of the Proposed Action. | a. Reclamation and DWR shall provide an annual written report to NMFS no later than October 1 of each year. This report shall provide the data gathered and summarize the results of winter-run, spring-run, CV steelhead, and green sturgeon monitoring and incidental take associated with the CVP and SWP operations. All mortalities must be minimized and reported, including those from special studies conducted during salvage operations. | USBR/ DWR | 10/1/14 | Ongoing & being done. |
| | | b. Reclamation and DWR shall provide reports and updates to NMFS by the specified dates as provided in various RPA actions. | USBR/ DWR | Ongoing through 2030 | Ongoing & being done. |
| | | c. Unless otherwise specified during the implementation of these terms and conditions, all reports and updates shall be sent to: Supervisor, Sacramento Area Office, NMFS, 650 Capitol Mall, 8-300, Sacramento, CA 95814. | USBR/ DWR | Ongoing through 2030 | Ongoing & being done. |