

## Seasonal operations under the existing BiOps

The USFWS and NMFS BiOps on long-term operations of the Central Valley Project (CVP) and State Water Project (SWP) each contain a Reasonable and Prudent Alternative (RPA) that describes actions necessary to avoid jeopardy to species listed under the Endangered Species Act (ESA). RPA actions were developed based on the species' biological requirements<sup>1</sup>. In general, these actions include consideration of individual populations, life stage, life-history traits, and timing of species' needs throughout the year.

Table 1 summarizes the overlap in timing of some of the key Delta-related RPA actions in the 2008 USFWS BiOp and the 2009 NMFS BiOp with species presence.

**Table 1:** Summary of species presence in the Delta (darker shading indicates greater abundance) and within-year timing and overlap of some key RPA actions in the USFWS and NMFS BiOps, including OMR flow management.

|                                      |  | Oct | Nov | Dec | Jan                 | Feb | Mar                     | Apr | May | Jun | Jul | Aug | Sep                                   |
|--------------------------------------|--|-----|-----|-----|---------------------|-----|-------------------------|-----|-----|-----|-----|-----|---------------------------------------|
| Species presence in the Delta        | Juvenile winter-run  |     |     |     |                     |     |                         |     |     |     |     |     |                                       |
|                                      | Juvenile spring-run  |     |     |     |                     |     |                         |     |     |     |     |     |                                       |
|                                      | Juvenile steelhead   |     |     |     |                     |     |                         |     |     |     |     |     |                                       |
|                                      | Delta smelt  |     |     |     |                     |     |                         |     |     |     |     |     |                                       |
|                                      |  | Oct | Nov | Dec | Jan                 | Feb | Mar                     | Apr | May | Jun | Jul | Aug | Sep                                   |
| OMR management in FWS and NMFS BiOps | <b>NMFS Action IV.2.3</b> (juvenile migration and entrainment) |     |     |     |                     |     |                         |     |     |     |     |     | <i>June 15 or temperature offramp</i> |
|                                      | <b>FWS Action 1-A</b> (adult migration and entrainment)        |     |     |     | <i>Dec 1-20</i>     |     |                         |     |     |     |     |     |                                       |
|                                      | <b>FWS Action 1-B</b> (adult migration and entrainment)        |     |     |     | <i>After Dec 20</i> |     |                         |     |     |     |     |     |                                       |
|                                      | <b>FWS Action 2</b> (adult migration and entrainment)          |     |     |     |                     |     | <i>Follows Action 1</i> |     |     |     |     |     |                                       |
|                                      | <b>FWS Action 3</b> (larval entrainment)                       |     |     |     |                     |     |                         |     |     |     |     |     |                                       |
|                                      |  | Oct | Nov | Dec | Jan                 | Feb | Mar                     | Apr | May | Jun | Jul | Aug | Sep                                   |
| Other actions in NMFS BiOp           | <b>NMFS Action IV.1.2</b> (Delta Cross Channel operations)     |     |     |     |                     |     |                         |     |     |     |     |     |                                       |
|                                      | <b>NMFS Action IV.2.1</b> (I:E ratio)                          |     |     |     |                     |     |                         |     |     |     |     |     |                                       |
|                                      | <b>NMFS Action IV.3</b> (Export management)                    |     |     |     |                     |     |                         |     |     |     |     |     |                                       |

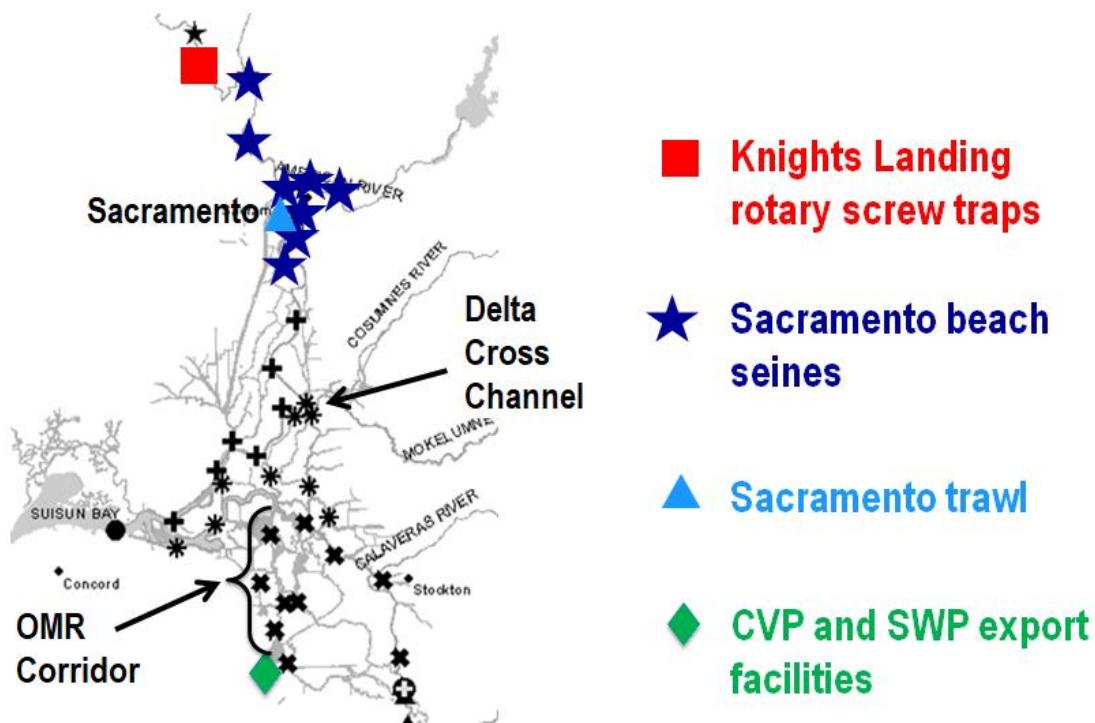
### Real-time monitoring and Delta RPA actions in the NMFS BiOp

The seasonal species presence information in Table 1 for salmonids is based on the historical monitoring record. That record shows that there is variability from year to year, particularly in the timing of the first significant migration of juvenile Chinook salmon into the Delta from upstream spawning areas (generally associated with the first storm event in the fall or winter).

<sup>1</sup> ESA-listed species included in the NMFS' BiOp: Sacramento River winter-run Chinook salmon (endangered), Central Valley spring-run Chinook salmon (threatened), California Central Valley steelhead (threatened), the Southern Distinct Population Segment of North American green sturgeon (threatened), and Southern Resident killer whales (endangered). ESA-listed species included in USFWS's BiOp: Delta smelt (endangered).

To build in flexibility based on *observed* life-history timing and fish distribution each year, some of the Delta RPA actions in the NMFS BiOp include action responses that are required only when fish presence exceeds a specified threshold at a location (see map in Figure 1) relevant to the action in question. For example:

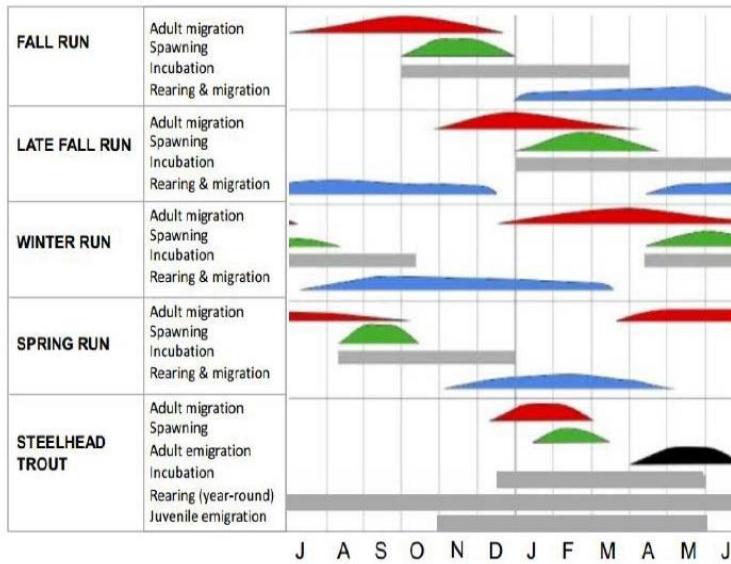
- **Action IV.2.1 (Delta Cross Channel Operations)** – From October through mid-December, closure of the Delta Cross Channel gates is required *only* when a specified catch index is exceeded based on sampling at locations upstream of the Delta Cross Channel: Knights Landing rotary screw traps, Sacramento beach seines, or Sacramento Trawl.
- **Action IV.2.3 (OMR management)** – From January through mid-June, an OMR limit of -5,000 cfs is in effect; however, OMR limits more positive than -5,000 cfs is-are required *only* when a specified loss-density threshold is exceeded based on combined loss observed at the CVP and SWP export facilities.
- **Action IV.3 (Export management)** – During November and December, export reductions are required *only* when a specified loss-density threshold is exceeded based on combined loss observed at the CVP and SWP export facilities. Because high loss early in the season is rare, the loss-density triggers in Action IV.3 have been triggered only twice since the NMFS BiOp was issued in June 2009 – both exceedances occurred in early December 2012, and only the first exceedance required an export change (at the time of the second exceedance, an OMR criterion for Delta smelt was controlling exports and no further export reduction was required).



**Figure 1:** Sampling locations associated with monitoring-based triggers for some Delta RPA Actions in the NMFS BiOp.

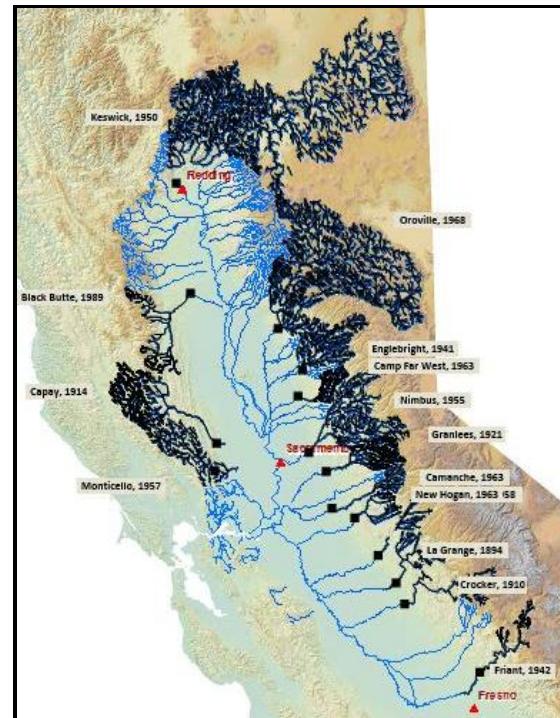
## Reintroduction as a Recovery Tool for Central Valley Chinook Salmon and Steelhead.

### Salmonid run timing in California's Central Valley

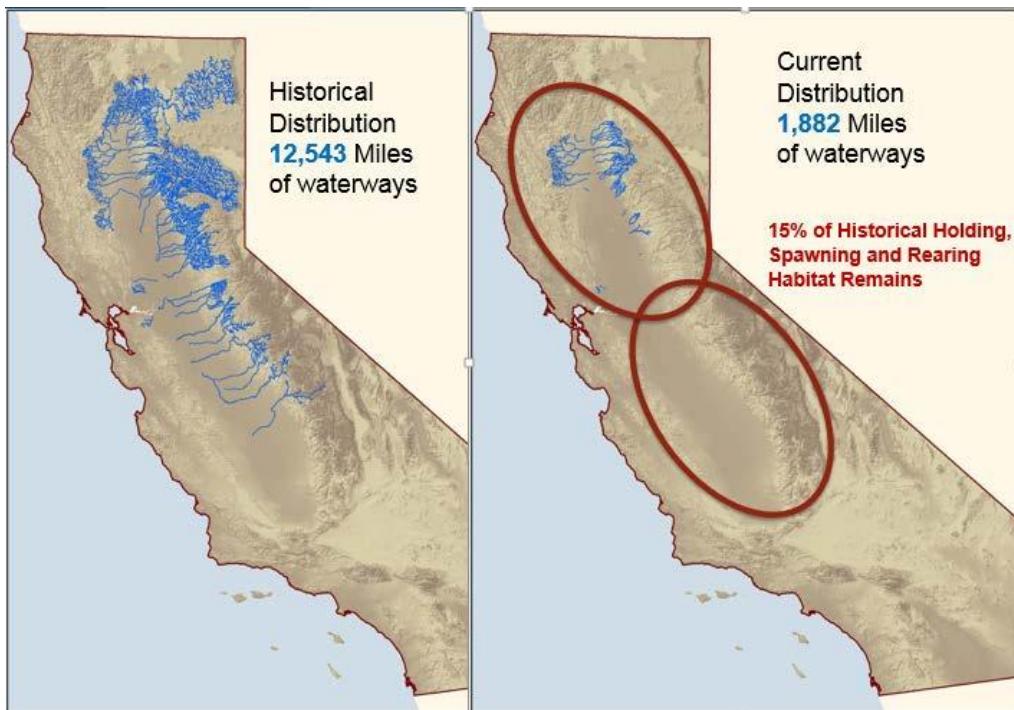


Historically accessible salmonid habitats in California's Central Valley (in blue and black) and lost upstream habitat (in black) following construction of impassable dams (black squares).

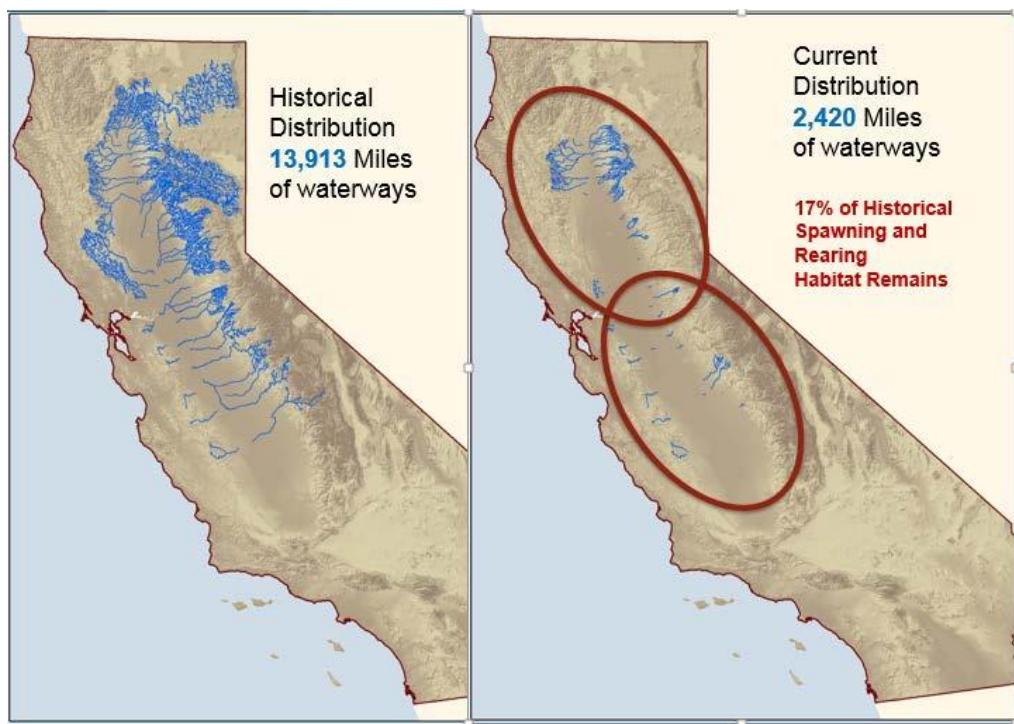
Much of the remaining anadromous habitat (in blue) is migration habitat and not suitable for spawning, holding, or rearing.



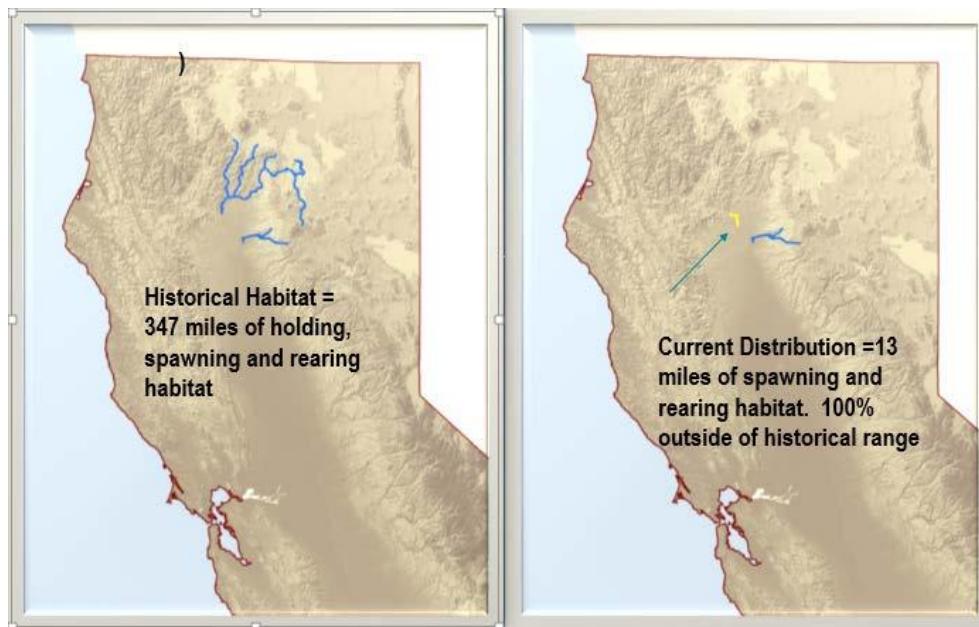
Spring-run Chinook salmon (ESA threatened) – historical vs current habitat estimate.



Steelhead (ESA threatened) – historical vs current habitat estimate.



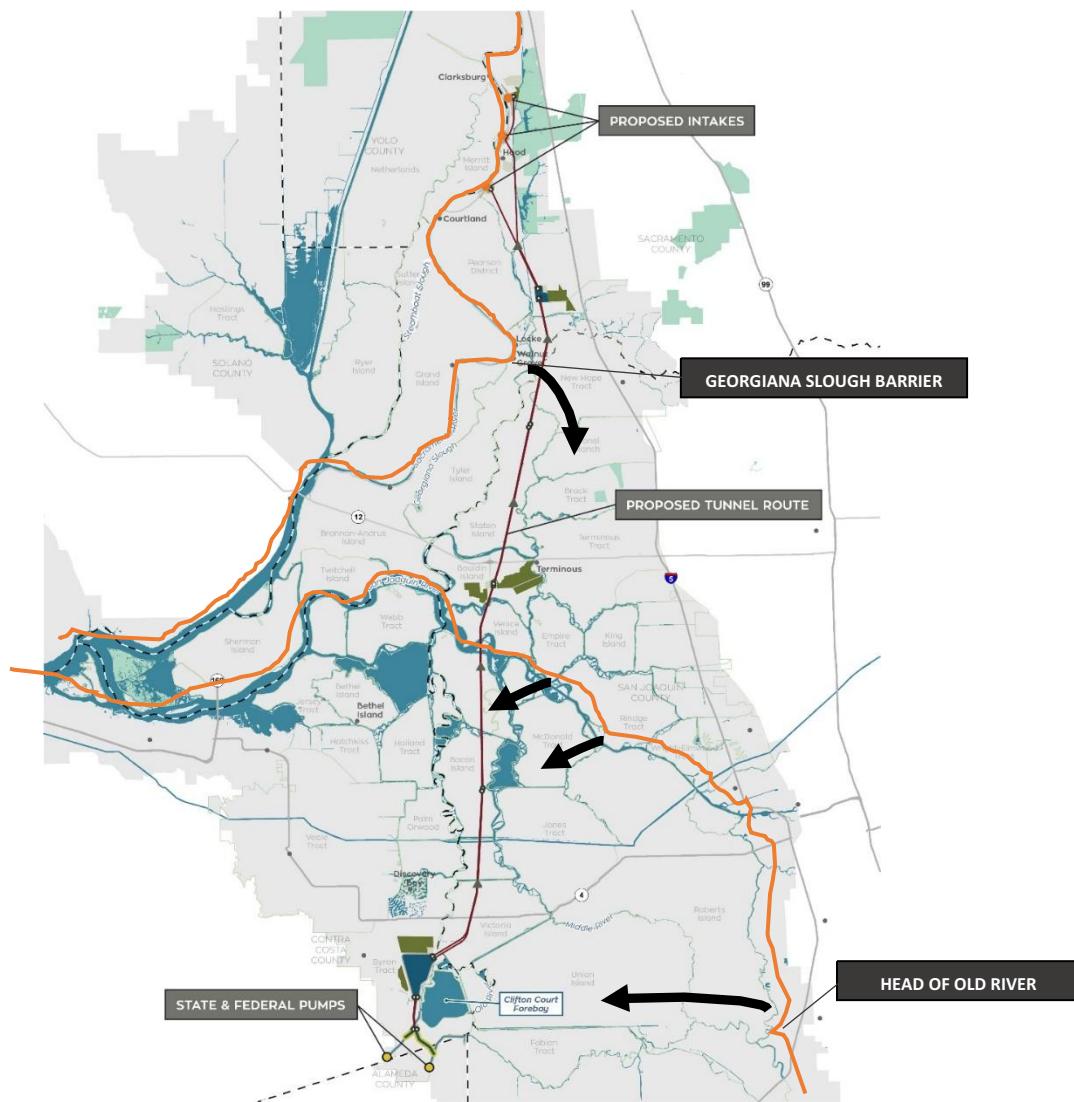
Winter-run Chinook salmon (ESA Endangered) – historical vs. current habitat estimate.



Some Key Points:

- All three ESA listed species are blocked from access to significant portion of their historical high elevation, cold water spawning and rearing habitats – a critical component in their life histories.
- Lack of access to these habitats is one key factor resulting in the decline of all three species.
- The recovery scenario in NMFS's 2014 Central Valley Recovery Plan specifically requires reintroduction into a discrete subset of historical, but currently unoccupied habitats in order to delist these species.
- No fish passage programs above large rim dams exist in California's Central Valley.
- According to the NMFS 2014 Recovery Plan for Central Valley salmonids, without reintroduction, efforts such as ongoing habitat improvements, water operations, commercial and recreational fishing management restrictions, and hatchery operations are not likely sufficient to recover these listed species.
- Significant portions of above-dam historical habitats are in Federal ownership (primarily US Forest Service) where instream habitats are generally more suitable than existing habitats on the valley floor.
- Management of these species below dams results in major constraints to water delivery and supply in California.
- Warming climate, increased drought frequencies, etc. will continue to place these species at risk as well as further constrain water supplies. Reintroduction may ultimately result in increased regulatory flexibility compared to current management scenarios.
- Reintroduction in California's Central Valley will require trap and haul operations. Trap and haul is a standard fishery management practice in the Pacific Northwest, used at  $\approx 18$  facilities.
- NMFS is working to provide regulatory relief to all potentially affected landowners and other user groups through nonessential experimental population designations (ESA section 10(j)) where reintroduction is proposed (above Shasta Dam and above Englebright Dam on the Yuba River).

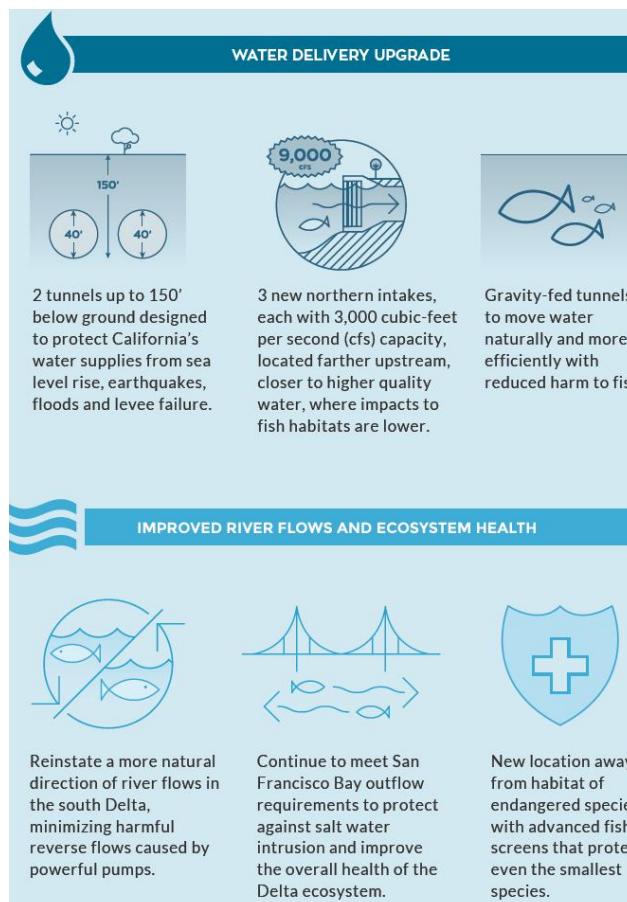
## The California WaterFix



Current CVP/SWP operations rely on through-Delta conveyance. Effects of operations on hydrodynamics can increase the likelihood of entrainment of juvenile salmonids into the interior Delta, where mortality has a much higher probability. The California WaterFix proposes new diversion and conveyance infrastructure and operations to reduce this effect while still providing a reliable water supply.

California WaterFix includes:

- Three new intakes on Sacramento River in northern Delta
- Two conveyance tunnels from new intakes to existing CVP/SWP facilities
- New forebay to retain water near existing CVP/SWP facilities
- Permanent distributary gate on San Joaquin River
- Operation of new and existing facilities



- Final biological opinion resulted from substantial cooperation among NOAA Fisheries, USFWS, Reclamation, DWR, CDFW.
- Operations proposed for the new diversions in the North Delta are consistent with the needs of listed species. Project elements critical to meeting these needs are:
  - Phased testing
  - Capped survival reductions
  - Restoration commitment (\$)
  - Adaptive management program (\$)
- The final opinion is based on our best and most current scientific understanding about the Delta and the needs of species. The Delta Science Panel independently reviewed sections of the initial analyses and agreed that our analyses relied on the best available information and science.

## Key Concerns

*Uncertainty:* NMFS' opinion contains project mitigation measures and consultation re-initiation triggers that are designed to be comprehensive, conservative, and protective. It is the result of an extensive analysis of the best available science. The uniform advice of several science panels is to address the complexity of the Delta through the use of best available science to determine initial operations, and to establish and adhere to a robust adaptive management program to better understand and reduce uncertainties over time.

*Term:* NMFS' opinion includes a trigger to reinitiate consultation by 2030. Circumstances could present that dictate an earlier reinitiation of consultation

*Recovery:* In accordance with the ESA, NMFS reviewed the California WaterFix project to assess whether or not the project would jeopardize the continued existence of listed species or modify their critical habitat, relative to their baseline conditions. The WaterFix project is not the same as a recovery plan. NMFS has an up-to-date recovery plan, and recovery of these species is possible, if we all continue to address the priority stressors faced by salmon throughout their life cycle. Creating conditions for salmon, steelhead, and sturgeon to recover can only be done by providing them access to a range of habitats that allow them to be abundant, productive, diverse, and well distributed. The only way to offer the habitat that these fish need is to provide access to their historic spawning and rearing areas in the upper tributaries above the dams.