

**FINAL ENVIRONMENTAL IMPACT REPORT/
ENVIRONMENTAL IMPACT STATEMENT**

FOR THE

**BAY DELTA CONSERVATION PLAN/
CALIFORNIA WATERFIX**

**VOLUME II. RESPONSES TO COMMENTS ON THE DRAFT EIR/EIS
AND RDEIR/SDEIS**

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1 Master Response 47: Drought and EIR/EIS Modeling

2 *This master response addresses the sufficiency of the modeling approach used for evaluation of the*
3 *alternatives in capturing the drought-related effects.*

4 The modeling approach used to evaluate alternatives in the EIR/EIS is described in Appendix 5A,
5 *BDCP/California WaterFix FEIR/FEIS Modeling Technical Appendix*. In general, the alternatives were
6 evaluated using an integrated set of models that can take into account potential future changes to
7 the climate, sea level, Central Valley Project (CVP) and State Water Project (SWP) facilities and
8 operations, and provide an indication of likely changes in the storage, flow, diversion, water
9 temperature, Delta salinity and other parameters, compared to the No Action Alternative. The Final
10 EIR/EIS evaluates long-term operation of the SWP and CVP over an 82-year long hydrologic period
11 with extended wet periods and dry/critically dry periods using the CALSIM II model. The CALSIM II
12 model cannot simulate specific operational decisions that occur in real-time to meet regulatory
13 requirements, including real-time operational decisions to avoid exceeding applicable water quality
14 standards. In addition, the CALSIM II model does not reflect emergency operational criteria such as
15 those approved on a case-by-case basis by the State Water Resources Control Board (State Water
16 Board) in response to Temporary Urgency Change Petitions (TUCPs) filed by the Bureau of
17 Reclamation (Reclamation) and the Department of Water Resources (DWR) to address the drought
18 emergency in 2014 and 2015. As explained in detail in the following subsections, it is not reasonably
19 foreseeable how the various agencies will respond to future droughts, with or without the proposed
20 project, because each drought is different in scope, location and severity, the regulatory setting is
21 likely to be different, and new or altered infrastructure and improved scientific knowledge will all
22 inform future responses to drought. However, the proposed project, the California WaterFix, is not
23 expected to affect how frequently Reclamation and DWR may file TUCPs to address future drought
24 conditions, so it has no impact relative to Existing Conditions in that regard.

25 Operational decisions modeled in CALSIM II are based upon monthly mathematical relationships
26 that do not reflect real-time decisions that occur on a daily or weekly basis by SWP and CVP
27 operations. Nor do they reflect operations approved under the TUCP Orders issued by the State
28 Water Board for the 2014 and 2015 water years. Instead the model simulates long-term monthly
29 operating criteria per the current regulations for all water year types. As described in Chapter 5,
30 *Water Supply*, the Final EIR/EIS analyses assume continued implementation of regulatory
31 requirements in accordance with the requirements under the CEQA definition of Existing Conditions
32 and under the NEPA definition of the No Action Alternative.

33 Modeling of action alternatives and the No Action Alternative with projected climate change and sea
34 level rise effects at 2025 and 2060 shows that changes in climate and sea level could result in “dead
35 pool” conditions in SWP and CVP reservoirs upstream of the Delta under both the No Action
36 Alternative as well as the action alternatives.³²⁴ The dead pool conditions presented in the CALSIM II
37 model results in the Final EIR/EIS are based on modeled SWP and CVP water operations under
38 current regulations, future demand assumptions, climate change and sea level rise. When system
39 wide storage levels are at or near dead pool, also described as stressed water supply conditions, the
40 CALSIM II model results should only be an indicator of stressed water supply conditions and should

³²⁴ “Dead pool” refers to the surface water elevation in a reservoir at which no more water can be drained by gravity through the reservoir’s outlet works.

1 not be understood to reflect what would occur in the future under a given scenario. For instance,
2 there may be operational changes and physical solutions that could be implemented to avoid dead
3 pool conditions, but the modeling does not assume such actions would occur because it is not known
4 how regulatory agencies with jurisdiction over the CVP and SWP or other agencies that own and
5 operate reservoirs will respond to climate change, sea level rise and increased water demands.

6 Instead, consistent with the requirements in CEQA and NEPA to disclose and analyze the reasonably
7 foreseeable project-specific and cumulative impacts of a project, the action alternatives evaluation is
8 a comparative analysis to determine the incremental differences between conditions under the
9 action alternatives and conditions under Existing Conditions and the No Action Alternative. The
10 modeling analyses in the Final EIR/EIS considered changes over a range of hydrologic conditions
11 that include drought periods similar to the 1927–1934, 1976–1977, and 1987–1992 droughts, as
12 described in Appendix 5A, *BDCP/California WaterFix FEIR/FEIS Modeling Technical Appendix*. The
13 comparison between the conditions under the action alternatives and the No Action Alternative
14 indicates the changes caused by each project alternative, including the proposed project, without the
15 influence of climate change, sea level rise, and population growth would have occurred with or
16 without the project.

17 **Past Responses to Drought Emergencies Demonstrate Why It Is** 18 **Infeasible to Model Project Impacts for Future Responses to** 19 **Drought**

20 There are many ways that drought can be defined. Some ways can be quantified, such as
21 meteorological drought (period of below normal precipitation) or hydrologic drought (period of
22 below average runoff); others are more qualitative in nature (shortage of water for a particular
23 purpose). There is no universal definition of when a drought begins or ends, nor is there a state
24 statutory process for defining or declaring drought.

25 Drought is a gradual phenomenon and can best be thought of as a condition of water shortage for a
26 particular user in a particular location. Although persistent drought can be an emergency, it differs
27 from other emergency events such as wildfires and floods insofar as droughts occur over a period of
28 months or years. But as with any emergency, each one is different, and requires an individualized
29 response to lessen the impacts of drought on fish, wildlife and human health and safety. As a result,
30 there is no universal definition of when a drought begins or ends, and no set response for every
31 drought. Drought impacts increase with the length of a drought, as annual carry-over storage in
32 reservoirs decrease and water levels in groundwater basins decline. Droughts that have occurred
33 throughout California’s history shape the ways in which DWR and Reclamation meet the needs of
34 both public health standards and urban and agricultural water demand, as well as protecting the
35 ecosystem and its inhabitants. The most notable droughts in recent history are the droughts of
36 1976–1977, 1987–1992, and 2013–2016 (see also Biological Assessment [BA] for the California
37 WaterFix, Section 3.7.1.1, for additional information on CVP and SWP operations during these
38 droughts).

39 These periods of drought have helped shape legislation and stressed the importance of maintaining
40 water supplies for all water users. The impacts of a dry hydrology in 1976 were mitigated by
41 reservoir storage and groundwater availability. The immediate succession of an even drier 1977,
42 however, set the stage for widespread impacts. In 1977 CVP agricultural water contractors received
43 25 percent of their allocations, municipal contractors received 25 to 50 percent, and the water rights

1 or exchange contractors received 75 percent. SWP agricultural contractors received 40 percent of
2 their allocations and urban contractors received 90 percent.

3 Managing Delta salinity was a major challenge for the SWP, given the competing needs to preserve
4 critical carry-over storage and also to release water from storage to meet Bay-Delta water quality
5 standards. In February 1977, the State Water Board adopted an interim water quality control plan to
6 modify Delta standards to allow the SWP to conserve storage in Lake Oroville. As extremely dry
7 conditions continued that spring, the State Water Board subsequently adopted an emergency
8 regulation superseding its interim water quality control plan, temporarily eliminating most water
9 quality standards and forbidding the SWP to export stored water. As a further measure to conserve
10 reservoir storage, DWR constructed temporary facilities (i.e., rock barriers, new diversions for
11 Sherman Island agricultural water users, and facilities to provide better water quality for duck clubs
12 in Suisun Marsh) in the Delta to help manage salinity with physical, rather than hydraulic,
13 approaches.

14 In 1977, SWP and CVP contractors used water exchanges to respond to drought; one of the largest
15 exchanges involved 435,000 acre-feet of SWP entitlement made available by MWD and three other
16 SWP Southern California water contractors for use by San Joaquin Valley irrigators and urban
17 agencies in the San Francisco Bay area. The MWD entitlement supplied water to Marin Municipal
18 Water District via an emergency pipeline laid across the San Rafael Bridge and a complicated series
19 of exchanges under which DWR delivered the water to the Bay Area via the South Bay Aqueduct.
20 Public Law 95-18, the Emergency Drought Act of 1977, authorized Reclamation to purchase water
21 from willing sellers on behalf of its contractors; Reclamation purchased about 46,000 acre-feet of
22 water from sources including groundwater substitution and the SWP. Reclamation's ability to
23 operate the program was facilitated by CVP water rights that broadly identified the project's service
24 area as the place of use, allowing transfers within the place of use. Institutional constraints and
25 water rights laws limited the transfer/exchange market at this time, and transfer activity outside of
26 those exchanges arranged by DWR and Reclamation's drought water bank was relatively small-
27 scale.

28 The Western Governors' Conference named a western regional drought action task force in 1977
29 and used that forum to coordinate state requests for federal assistance. Multi-state drought impacts
30 led to increased appropriations for traditional federal financial assistance programs (e.g., U.S.
31 Department of Agriculture assistance programs for agricultural producers), and two drought-
32 specific pieces of federal legislation. The Emergency Drought Act of 1977 authorized the Department
33 of the Interior to take temporary emergency drought mitigation actions and appropriated \$100
34 million for activities to assist irrigated agriculture, including Reclamation's water transfers
35 programs. The Community Emergency Drought Relief Act of 1977 authorized \$225 million for the
36 Economic Development Agency's drought program, of which \$175 million was appropriated (\$109
37 million for loans and \$66 million for grants) to assist communities with populations of 10,000 or
38 more, tribes, and special districts with urban water supply actions. Projects in California received 41
39 percent of the funding appropriated pursuant to this act.

40 In California, the Governor signed an executive order naming a drought emergency task force in
41 1977. Numerous legislative proposals regarding drought were introduced, about one-third of which
42 became law. These measures included authorization of a loan program for emergency water supply
43 facilities; authorization of funds for temporary emergency barriers in the Delta (the barriers were
44 ultimately funded by the federal Emergency Drought Act instead); prohibition of public agencies'
45 use of potable water to irrigate greenbelt areas if the State Water Board found that recycled water

1 was available; authorization for water retailers to adopt conservation plans; and the addition of
2 drought to the definition of emergency in the California Emergency Services Act.

3 During the 1987–1992 drought, the state’s 1990 population was close to 80 percent of present
4 amounts and irrigated acreage was roughly the same as that of the present, but the institutional
5 setting for water management differed significantly. Delta regulatory constraints affecting CVP and
6 SWP operations were based on State Water Board water right decision D-1485, which had taken
7 effect in 1978 immediately following the 1976-77 drought. In addition to D-1485 requirements on
8 SWP and CVP operations in the Delta, other operational constraints included temperature standards
9 imposed by the State Water Board through Orders WR 90-5 and 91-01 for portions of the
10 Sacramento and Trinity Rivers. On the Sacramento River below Keswick Dam, these orders included
11 a daily average water temperature objective of 56°F during periods of salmon egg and pre-emergent
12 fry incubation. As part of managing salinity during the drought, DWR installed temporary barriers at
13 two South Delta locations – Middle River and Old River near the Delta- Mendota Canal intake — to
14 improve water levels and water quality/water circulation for agricultural diverters.

15 In response to Executive Order W-3-91 in 1991, DWR developed a drought water bank that
16 operated in 1991 and 1992. The bank bought water from willing sellers and made it available for
17 purchase to agencies with critical water needs. Critical water needs were understood to be basic
18 domestic use, health and safety, fire protection, and irrigation of permanent plantings.

19 In 1992, the National Marine Fisheries Service (NMFS) issued its first biological opinion for the
20 Sacramento River winter-run Chinook salmon, which had been listed as threatened pursuant to the
21 federal Endangered Species Act (ESA) in 1989. The Central Valley Project Improvement Act of 1992
22 (CVPIA) was enacted just at the end of the drought, so provisions reallocating project yield for
23 environmental purposes were not in effect for 1992 water operations. The CVPIA dedicated 800,000
24 acre-feet of project yield for environmental purposes. The regulatory framework for the SWP and
25 CVP has changed significantly in terms of new ESA requirements to protect certain fish species, and
26 State Water Board water rights decisions governing the water projects’ operations in the Delta.

27 When executed in 1994 the Monterey amendments provided that an equal annual allocation would
28 be made to urban and agricultural contractors. The prior provisions in effect during the 1987–1992
29 drought called for agricultural contractors to take a greater reduction in their allocations during
30 shortages than urban contractors, which had resulted in the zero allocation to the agricultural
31 contractors in 1991.

32 The institutional setting for water management has changed greatly since the 1987–1992 drought.
33 Some of the most obvious changes have affected management of the state’s largest water projects,
34 such as the CVP, SWP, Los Angeles Aqueduct, or Colorado River system. New listings and
35 management of fish populations pursuant to the ESA have impacted operations of many of the
36 state’s water projects, including the large projects affected by listing of Central Valley fish species as
37 well as smaller projects on coastal rivers where coho salmon populations have been listed.

38 The current regulatory framework for CVP and SWP operations is distinctly different from that of
39 1987–1992. The first biological opinion for the then-threatened winter-run Chinook salmon was
40 issued in 1992, just at the end of the drought; in 1994 winter-run were reclassified as endangered. A
41 significant provision of the initial 1992 biological opinion for winter-run salmon, and also of
42 subsequent opinions, was a requirement to provide additional cold water in Sacramento River
43 spawning areas downstream of Keswick Dam, resulting in increased late-season reservoir storage.
44 Delta smelt were listed as threatened in 1993. Subsequently, other fish species listed pursuant to the

1 federal ESA or the California Endangered Species Act (CESA) included the longfin smelt, Central
2 Valley spring-run Chinook salmon, California Central Valley steelhead, and Southern distinct
3 population segment of North American green sturgeon.

4 The biological opinions for operation of the CVP and SWP, together with changes in State Water
5 Board Bay-Delta requirements, represent a major difference between 1987–1992, when State Water
6 Board Water Rights Decision D-1485 governed the projects’ Delta operations, and the present. State
7 Water Board Water Rights Decision D-1641 reduced water project exports in order to provide more
8 water for Delta outflow. Requirements of the most recent biological opinions for operation of the
9 CVP and SWP afforded additional protections to listed fish species than D-1641 requirements,
10 further reducing the water projects’ delivery capabilities by imposing greater pumping curtailments
11 and Delta outflow requirements. Additionally, the CVPIA mandate to reallocate 800,000 acre-feet of
12 CVP yield for environmental purposes and to provide a base water supply for wildlife refuges was
13 not in effect for 1987–1992 water operations.

14 **Recent Drought Management Processes and Tools**

15 With no significant precipitation in late 2013, Governor Brown formed a state interagency Drought
16 Task Force in December to provide a coordinated assessment of the dry conditions and to provide
17 recommendations on state actions. The continuing absence of precipitation led to a Governor’s
18 proclamation of emergency in January 2014 that ordered state agencies to take specified actions and
19 called on Californians to voluntarily reduce their water usage by 20 percent. Among other things, the
20 order called on local urban water suppliers to immediately implement their water shortage
21 contingency plans, directed the state’s drinking water program to identify communities in danger of
22 running out of water and to help them address shortages, and directed the State Water Board to take
23 various water rights administrative actions. In March 2014, the Legislature enacted and the
24 Governor signed measures to provide \$687.4 million for drought relief, with the largest amount of
25 that funding (\$549 million) dedicated to accelerated expenditure of Proposition 84 and Proposition
26 1E bond funds for grants to local agencies for integrated regional water management projects. In
27 April 2014, the Governor issued an executive order to redouble state drought actions that, among
28 other things, ordered the State Water Board to adopt emergency regulations as necessary to direct
29 urban water suppliers to limit wasteful outdoor water use practices and ordered DWR to conduct
30 intensive outreach to local agencies to increase their groundwater monitoring in areas of significant
31 impacts.

32 Above-normal late spring 2014 precipitation ameliorated some of the worst-case water supply
33 scenarios that had been considered earlier in the year, including evaluation by DWR of the need to
34 place temporary rock barriers in selected Delta channels to conserve upstream reservoir storage.
35 Hydrologic conditions did not improve sufficiently, however, to avoid record low allocations for
36 some CVP and SWP contractors – zero to the CVP’s agricultural contractors both north and south of
37 the Delta, zero to the CVP Friant Division contractors, and 5 percent to SWP contractors. Water year
38 2014 marked the first time that Reclamation’s Friant Division contractors received a zero allocation
39 of their Class 1 water. Reflecting the very dry hydrology, the State Water Board imposed widespread
40 curtailments of diversions in locations including parts of the Sacramento-San Joaquin River
41 watershed and the Eel and Russian River watersheds, another action that had not been taken since
42 1977.

43 During the drought, Reclamation and DWR reviewed existing and projected hydrology, exceedance
44 forecasts, and reservoir levels and the ability of the CVP and SWP to meet regulatory requirements,

1 including those in D-1641, reasonable and prudent alternatives in the NMFS and U.S. Fish and
2 Wildlife Service (USFWS) biological opinions (BiOps) for the long-term coordinated operations of
3 the CVP and SWP issued under the ESA, and the California Department of Fish and Wildlife (CDFW)
4 incidental take permit for longfin smelt issued under CESA.

5 In response to the emergency drought conditions in 2014, Reclamation and DWR jointly developed
6 proposed modifications to D-1641 and operations consistent with the BiOps and prepared
7 documentation to support the permitting and consultation processes. This included preparation of a
8 TUCP for submittal to the State Water Board, and the ESA and CESA consultation letters and
9 memorandums for exchange with USFWS, NMFS, and CDFW. In addition, as directed by the State
10 Water Board, DWR and Reclamation prepared a 2015 Drought Contingency Plan in the event of
11 continued drought. The process relied heavily on on-going communication and coordination among
12 six agencies (Reclamation, DWR, USFWS, NMFS, CDFW, and the State Water Board) through the Real
13 Time Drought Operations Management Team and frequent meetings of the executive leadership of
14 these agencies. State agencies also provided enhanced monitoring in the Delta. The effectiveness of
15 the actions under the TUCP Order issued by the State Water Board and BiOps and results of the
16 monitoring activities were reviewed and utilized, in light of the species responses, to inform the
17 continued response to drought. DWR and Reclamation made several public presentations before the
18 State Water Board regarding the Drought Contingency Plan and results of changes in operations
19 under the TUCP Order.

20 Based on lessons learned during the 2013–2016 severe drought and to prepare for future droughts,
21 Reclamation and DWR developed a set of Proposed Drought Procedures for the California WaterFix.
22 These procedures are set forth in the BA and include coordination and communication among state
23 and federal agencies to begin as early as possible (BA Section 3.7.2, available at
24 http://cms.capitoltechsolutions.com/ClientData/CaliforniaWaterFix/uploads/Ch_3_Proposed_Action.pdf
25 [accessed on November 11, 2016]). Those procedures require that on October 1, if the prior
26 water year was dry or critical, then Reclamation and DWR will convene a multi-agency drought
27 management team that includes representatives from Reclamation, DWR, USFWS, NMFS, the State
28 Water Board, and CDFW who are charged with evaluating current hydrologic conditions and the
29 potential for continued dry conditions that may necessitate the need for development of a drought
30 contingency plan for the water year (BA Section 3.7.2).

31 Under the Proposed Drought Procedures for the California WaterFix, the drought management team
32 will commit to convening at least every month to assess hydrologic conditions and forecast
33 predictions and identify the potential need for development of a drought contingency plan until it is
34 clear that drought conditions for that year will not persist. Information and recommendations from
35 the drought management team will be reported back to the executive leadership of the agencies.
36 These assessments would also inform what actions should be included in a drought contingency
37 plan, depending on the updated hydrology assessment and the magnitude and duration of the
38 preceding dry conditions. Although a drought contingency plan may recommend adhering to the
39 operations as identified in existing regulatory authorizations, in longer periods of dry conditions, the
40 plan could also propose other drought response actions. Such a contingency plan should, at a
41 minimum, include information pertaining to: an evaluation of current and forecasted hydrologic
42 conditions and water supplies; recommended actions or changes needed to respond to drought
43 (including changes to project operations, contract deliveries, and regulatory requirements) and any
44 associated water supply or fish and wildlife impacts; identified timeframes; potential benefits;
45 monitoring needs and measures to avoid and minimize fish and wildlife impacts; and proposed
46 mitigation (if necessary) (BA Section 3.7.2).

1 If the evaluation of drought conditions indicates that temporary changes to SWP and CVP water
2 right permits should be considered, then DWR and Reclamation would submit a temporary urgency
3 change petition to the State Water Board, which could deny or approve the petition, including
4 approval with additional conditions on operations.

5 As the above discussion of past drought responses demonstrates, it is not reasonably foreseeable
6 how the various agencies will respond to future droughts, with or without the proposed project.
7 Because each drought is different in scope, location, and severity, the regulatory setting is likely to
8 be different, and new or altered infrastructure and improved scientific knowledge will all inform
9 future responses to drought. Thus, the Final EIR/EIS does not, because it cannot, include modeling
10 or analysis of how the proposed project may impact the environment in severe drought conditions.