United States Department of the Interior

BUREAU OF RECLAMATION
Central Valley Operations Office
3310 El Camino Avenue, Suite 300
Sacramento, California 95821

IN REPLY
REFER TO:

CVO-100
ENV-7.00

FEB 27 2014

MEMORANDUM

To: Field Supervisor, U.S. Fish and Wildlife Service
Attn: Michael A. Chotkowski

From: Paul Fujitani
Acting Manager, Operations

Subject: Continuing Drought Response Measures Under the 2008 Coordinated Long-term Operation of the Central Valley Project (CVP) and State Water Project (SWP) Biological Opinion (2008 BiOp) to Address Reinitiation Statement Regarding Consecutive Dry Years

The Bureau of Reclamation is submitting this memorandum describing proposed drought response measures for March 2014, consistent with the Reinitiation Statement for consecutive dry or critically dry years in the 2008 BiOp. We are seeking concurrence of the U.S. Fish and Wildlife Service that the drought response actions proposed by Reclamation and the California Department of Water Resources (DWR) will result in no additional adverse effects on delta smelt or its critical habitat the for the month of March beyond those analyzed in the 2008 BiOp.

As you are aware, California is facing unprecedented critically dry conditions in the current water year, following two previous dry years. As a result of this continued aridity, the CVP and the SWP reservoir levels are forecast to be significantly below historic conditions. In response to this water shortage crisis, Reclamation and DWR submitted a Temporary Urgency Change (TUC) Petition Regarding Delta Water Quality on January 29, 2014, requesting the State Water Resources Control Board (State Board) to temporarily modify requirements of D-1641 for 180 days, with specific requests for February. In response to the TUC Petition, the State Board issued an Order on January 31, 2014, and a revised Order on February 7, 2014 (see attached). Approval of the TUC Petition by the State Board has enabled changes in operations that will provide minimum human health and safety supplies and conserve water for later protections of instream uses and water quality. The revised Order provided for increased exports (limited to natural or abandoned flow) during such times when D-1641 requirements were met. On January 31, 2014, Reclamation sought concurrence from the Service that there would be no additional adverse effects on delta smelt or its critical habitat of the drought response actions proposed by Reclamation and DWR for the month of February than those analyzed in the 2008 BiOp. On January 31, 2014, the Service concurred with Reclamation's determination. Reclamation and DWR are proposing an extension of the February actions related to Delta outflow and Delta

Cross Channel (DCC) gate operations contained within the TUC Petition and resultant State Board orders through March 31, 2014.

As issued, the revised Order temporarily modified February D-1641 Delta outflow requirements, as well as DCC gate operations. The revised Order specified that the February outflow requirements, commonly known as X2 criteria, would be set at a minimum of 3,000 cfs, with the potential for higher pulse flow. The Order provides for minimum health and safety level of export of 1,500 cfs. In addition, reservoir releases would be reduced from those otherwise required to meet D-1641 in February to conserve storage for later fishery protection, minimum human health and safety needs, and if necessary, salinity control. In addition, the Order modified DCC gate operations to allow for opening of the gates as water quality and fishery conditions warrant and as restricted to specific monitoring of fish. Finally, the revised Order issued February 7 provided that if precipitation events occurred that allowed Reclamation and DWR to meet the Delta outflow and DCC requirements in D-1641, exports could increase if there is natural or abandoned flow in the Delta. Reclamation and DWR propose to extend all of the above described provisions through March.

Reclamation and DWR will continue close coordination on current and projected operations on a weekly basis through existing meetings (Smelt Working Group, Delta Conditions Team, Water Operations Management Team, etc.). The Order also required DWR and Reclamation to convene a Real-Time Drought Operations Management Team with designated representatives from Reclamation, DWR, the State Board, Department of Fish and Wildlife, National Marine Fisheries Service (NMFS), and the Service to discuss potential changes to SWP and CVP operations to meet health and safety requirements and to reasonably protect all beneficial uses of water. The team will continue to meet at least weekly to ensure effective coordination among the pertinent agencies. We anticipate this group will help guide development of a CVP/SWP operational strategy and corresponding contingency plans to address operations through the spring as conditions continue to evolve. The results of these efforts would inform both future determinations with the 2008 BiOp and the 2009 NMFS Coordinated Long-term Operation of the CVP and SWP Biological Opinion (2009 NMFS BiOp) and additional TUC petitions to the State Board, if necessary.

Similarly to our January 31, 2014, memo to the Service regarding reinitiation of consultation under the 2008 BiOp, the proposed extension of the February actions related to Delta outflow and DCC gate operations through March 31, 2014, should be considered as part of the amended project description for drought response actions. D-1641 is part of the project description that was analyzed in the 2008 BiOp, and the proposed drought response during March represents a modification to the project description for the 2008 BiOp. The attached analysis demonstrates that the proposed March 2014 modifications to CVP and SWP operation will have no additional adverse effects on delta smelt or its critical habitat that were not previously analyzed in the 2008 BiOp. The proposed changes will not affect Reclamation's ability to meet the Reasonable and Prudent Alternative actions included in the 2008 BiOp. Reclamation seeks the Service's concurrence in this determination.

We look forward to working with you and your staff as we navigate through this extremely challenging water year and appreciate your willingness to work with us on this time-sensitive matter.

Attachments – 2

cc: Mr. Chuck Bonham
Director
California Department of Fish and Wildlife
1416 Ninth Street
Sacramento, CA 95814

Mr. Mark Cowin
Director
California Department of Water Resources
1416 Ninth Street
Sacramento, CA 95814

Mr. Dean Messer
Chief, Environmental Services
California Department of Water Resources
P.O. Box 942836
Sacramento, CA 94236-0001

Mr. John Leahigh
Operations Control Office
California Department of Water Resources
3310 El Camino Avenue, Suite 300
Sacramento, CA 95821

Ms. Maria Rea
Assistant Regional Administrator
California Central Valley Area Office
National Marine Fisheries Service
650 Capitol Mall, Suite 5-110
Sacramento, CA 95814

Mr. Ren Lohoefener
Regional Director
Pacific Southwest Region
U. S. Fish and Wildlife Service
2800 Cottage Way
Sacramento, CA 95825

Mr. David Murillo
Regional Director
Mid-Pacific Region
Bureau of Reclamation
2800 Cottage Way
Sacramento, CA 95825
(w/att to each)

STATE OF CALIFORNIA
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
STATE WATER RESOURCES CONTROL BOARD

In the Matter of Specified License and Permits[1] of the Department of Water Resources and U.S. Bureau of Reclamation for the State Water Project and Central Valley Project

ORDER APPROVING A TEMPORARY URGENCY CHANGE IN LICENSE AND PERMIT TERMS AND CONDITIONS REQUIRING COMPLIANCE WITH DELTA WATER QUALITY OBJECTIVES IN RESPONSE TO DROUGHT CONDITIONS (WITH MODIFICATIONS DATED FEBRUARY 7, 2014)

BY THE EXECUTIVE DIRECTOR

1.0 INTRODUCTION

On January 29, 2014, the Department of Water Resources (DWR) and the United States Bureau of Reclamation (Reclamation) (hereinafter Petitioners) jointly filed a Temporary Urgency Change Petition (TUCP) pursuant to Water Code section 1435 et seq., to temporarily modify requirements in their water right permits and license for the State Water Project (SWP) and Central Valley Project (CVP) (hereinafter Projects) for the next 180 days, with specific requests for February 2014. The TUCP requests temporary modification of requirements included in State Water Resources Control Board (State Water Board) Revised Decision 1641 (D-1641) to meet water quality objectives in the Water Quality Control Plan (Plan) for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta). Specifically, the TUCP requests modifications to the Delta Outflow and Delta Cross Channel (DCC) Gate closure objectives. The TUCP also proposes limits on exports at the SWP and CVP pumping facilities in the south Delta and a process to determine other changes that will best balance protection of all beneficial uses. The Petitioners are requesting these temporary modifications in order to respond to unprecedented critically dry hydrological conditions as California enters its third straight year of below average rainfall and snowmelt runoff.

[1] The petition was filed for Permits 16478, 16479, 16481, 16482 and 16483 (Applications 5630, 14443, 14445A, 17512 and 17514A, respectively) of the Department of Water Resources for the State Water Project and License 1986 and Permits 11315, 11316, 11885, 11886, 11887, 11967, 11968, 11969, 11970, 11971, 11972, 11973, 12364, 12721, 12722, 12723, 12725, 12726, 12727, 12860, 15735, 16597, 20245, and 16600 (Applications 23, 234, 1465, 5638, 13370, 13371, 5628, 15374, 15375, 15376, 16767, 16768, 17374, 17376, 5626, 9363, 9364, 9366, 9367, 9368, 15764, 22316, 14858A, 14858B, and 19304, respectively) of the United States Bureau of Reclamation for the Central Valley Project.

The proposed changes are requested to conserve storage in upstream reservoirs for use later in the year if the drought continues, and to assure that salinity levels in the Delta are maintained at levels that protect public health and safety. Conserved storage will be available for minimum instream flows, temperature control, and to continue to repel salinity in the Delta. Without this change, stored water would likely be depleted by late spring or early summer. Also without this change, salinity levels in the Delta could rise to levels that would require much more water to be released from storage later in the year to restore water quality to levels that protect public health and safety.

The petition and supporting information are available via the State Water Board's website at http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/index.shtml.

2.0 BACKGROUND

The Bay-Delta Plan specifies water quality objectives for the protection of beneficial uses of water in the Bay-Delta, including fish and wildlife, agricultural, and municipal and industrial uses. In part, D-1641 assigns responsibility for meeting the water quality objectives included in the Bay-Delta Plan.[2] D-1641 places responsibility on DWR and Reclamation for measures to ensure that specified water quality objectives included in Tables 1, 2, and 3 of D-1641 (attached) are met, in addition to other requirements. The flow objectives are intended to assist with fish migration, and also to keep the Delta and water exported from the Delta from getting too salty for municipal and agricultural uses. Flow and salinity objectives in the Bay-Delta Plan and D-1641 were developed based on historic hydrologic conditions. Provisions for the extreme dry conditions currently being experienced were therefore not considered in either the Bay-Delta Plan or D-1641.

The Delta Outflow objective is intended to protect estuarine habitat for anadromous fish and other estuarine dependent species. Delta outflows affect migration patterns of both estuarine and anadromous species and the availability of habitat. Freshwater flow is an important cue for upstream migration of adult salmon and is a factor in the survival of smolts moving downstream through the Delta. The populations of several estuarine-dependent species of fish and shrimp vary positively with flow as do other measures of the health of the estuarine ecosystem. Freshwater inflow also has chemical and biological consequences through its effects on loading of nutrients and organic matter, pollutant concentrations, and residence time.

The Delta Outflow objective includes requirements for calculated minimum net flows from the Delta to Suisun and San Francisco Bays (the Net Delta Outflow Index or NDOI) and maximum salinity requirements (measured as electrical conductivity or EC). Since salinity in the Bay-Delta system is closely related to freshwater outflow, both types of objectives are indicators of the extent and location of low salinity estuarine habitat. Listed in Table 3 of the Bay-Delta Plan, the Delta outflow objectives vary by month and water year type. With some flexibility provided through a limited set of compliance alternatives, the basic outflow objective sets minimum outflow requirements that apply year round. The Delta Outflow objectives included in the Bay-Delta Plan and D-1641for the February through June time frame are identified in Footnote 10 of Table 3 and Table 4 of Footnote 10. For this year, the requirements of Table 4 will likely not apply. In the event they do, this Order will be revisited. From February through June, Footnote 10 requires minimum daily net Delta outflows of 7,100 cubic-feet per second (cfs), calculated as

[2] D-1641 originally implemented the 1995 Bay-Delta Plan. Later, minor modifications were made to the Bay-Delta Plan in the 2006 Bay-Delta Plan.

a 3-day running average. The footnote specifies that the requirement may also be met if either the daily average or 14-day running average electrical conductivity of 2.64 mmhos/cm is met at the confluence of the Sacramento and the San Joaquin rivers near Collinsville (Station C2). Footnote 10 specifies that the Executive Director may relax the standard in March under specified low flow conditions. The footnote also specifies that the 7,100 cfs standard does not apply in May and June under specified low flow conditions and is replaced by a minimum 14-day running average flow of 4,000 cfs.

The DCC gates are located near Walnut Grove and at times allows for the transport of up to 3,500 cfs of water from the Sacramento River to Snodgrass Slough and the North Fork Mokelumne River to the interior Delta. The DCC was constructed in the early 1950s to convey Sacramento River water to the interior and southern Delta to improve water quality at the SWP and CVP export facilities. The DCC also benefits recreational uses by providing boat passage. The DCC gate objective was designed to protect fish and wildlife beneficial uses (specifically Chinook salmon) while simultaneously recognizing the need for fresh water to be moved through the interior Delta to the southern Delta for SWP and CVP uses. The current objective states that the DCC gates shall be closed for a total of up to 45 days for the November through January period, stay closed from February through May 20, and be closed for a total of 14 days for the May 21 through June 15 period. Closure of the DCC gates is important for the protection of salmon survival. Opening the DCC gates during winter and spring months can negatively affect juvenile Chinook salmon survival by causing straying into the interior and then southern Delta where survival is much lower than for fish that stay in the mainstem of the Sacramento River. Opening the DCC gates significantly improves water quality (e.g. lowers salinity) in the interior and southern Delta including at the SWP and CVP export facilities and Contra Costa Water District's diversions, particularly when Delta outflow is low.

2.1 Drought Conditions

In May 2013, due to near record-low precipitation, Governor Edmund G. Brown, Jr. issued Executive Order B-21-13, which directed the State Water Board and DWR, among other things, to take immediate action to address dry conditions and water delivery limitations by expediting the review and processing of voluntary transfers of water. In December 2013, the Governor formed a Drought Task Force to review expected water allocations and the state's preparedness for a drought.

Calendar year 2013 was the driest year in recorded history for many parts of California, and water year 2014 is the driest to date. So far this water year, the Northern Sierra 8-station precipitation accumulation is 4.5 inches; this is 9 percent of the annual average and 17 percent of the average to date. Statewide snow water content was at 9 percent of the April 1 average and 15 percent of the average to date, when measured by DWR snow survey on January 30, 2014. California generally receives half of its annual precipitation by mid- to late January. The three-month outlook weather forecast from the National Oceanic and Atmospheric Administration predicts below normal precipitation for California from now through the forecast horizon. Preceding dry years also add to the strain currently experienced on California's water resources. Water year 2012 was categorized as below normal.

On January 17, 2014, Governor Brown issued a Drought Emergency Proclamation. The Proclamation recited that California is experiencing record dry conditions, with calendar year 2014 projected to become the driest year on record. The Proclamation also recited that water supplies have dipped to alarming levels, as indicated by the fact that the snowpack is

approximately 20 percent of the normal average for January[3], the SWP and CVP reservoirs have very low water levels for January, California's major river systems, including the Sacramento and San Joaquin rivers, have significantly reduced surface water flows, and groundwater levels throughout the State have dropped significantly.

The Governor directed the State Water Board, among other things, to expedite processing of water transfers as called for in Executive Order B-21-13; to consider immediately petitions requesting consolidation of the places of use of the SWP and CVP; to accelerate funding for water supply enhancement projects; to put water right holders throughout the state on notice that they may be directed to reduce water diversions; and to consider petitions, such as this TUCP, to modify requirements for reservoir releases or diversion limitations that were established to implement a water quality control plan. As indicated in the Proclamation, such modifications may be necessary to conserve cold water stored in upstream reservoirs that may be needed later in the year to protect salmon and steelhead, to maintain water supply, and to improve water quality.

On January 17, 2014, the State Water Board issued a Notice of Surface Water Shortage and Potential for Curtailment of Water Right Diversions. The notice advised that if dry weather conditions persist, the State Water Board will notify water right holders in critically dry watersheds of the requirement to limit or stop diversions of water under their water right, based on their priority. The notice suggested that water right holders look into the use of alternative water supplies, such as groundwater wells, purchased water supplies under contractual arrangements, and recycled wastewater. Following persistent dry hydrologic conditions, the Board plans to issue Water Diversion Curtailment Notices to water right holders in water short areas in the near future.

On January 31, 2014, DWR also announced that except for a small amount of carryover water from 2013, customers of the SWP will get no deliveries in 2014 if current dry conditions persist and deliveries to agricultural districts with long-standing water right claims in the Sacramento Valley may be cut 50 percent – the maximum permitted by contract – depending upon future snow survey results. The first official 2014 CVP water allocation announcement is planned for late-February as required by contract terms. Water supply updates will then be made monthly or more often as appropriate and will be posted on Reclamation's website at: http://www.usbr.gov/mp/pa/water.

2.2 Effects of the Drought on Hydrologic Conditions

The permit terms and conditions contained in D-1641 were derived from the flow and water quality objectives contained in the Bay-Delta Plan. In adopting those objectives, the State Water Board considered the beneficial uses of water (municipal and industrial, agricultural, and fish and wildlife) based on a set of assumptions about the State's water supply, including the expected variability of this water supply. The magnitude of the current drought was not considered in the establishment of the Bay-Delta objectives or in the terms and conditions contained in D-1641. Water year 2013 was the driest year on record and 2014 is projected to be as dry or drier. Storage in major reservoirs is low, with Shasta, Oroville, Trinity, Folsom, San Luis, Exchequer, and Millerton Reservoirs all trending at or below the storage levels observed during the 1976 – 1977 drought, previously the most severe drought on record. Current projections indicate that without the requested change, there exists a substantial risk that by late spring 2014 and into

[3] As of January 30, 2014, the current snow pack is estimated at 12 percent of normal for this time of year and 7 percent of the average April 1 measurement when snowpack is normally at its peak.

2015 the Petitioners' major reservoirs will be drafted to dead pool or near dead pool levels at which point reservoir release capacities will be substantially diminished.

3.0 SUBSTANCE OF TEMPORARY URGENCY CHANGE PETITION

The flow and water quality requirements established by the State Water Board in D-1641 are summarized in the tables and figures contained in Attachment 1 to this Order: Table 1 (Municipal and Industrial Beneficial Uses), Table 2 (Agricultural Beneficial Uses), and Table 3 (Fish and Wildlife Beneficial Uses). Included in Attachment 1 are the footnotes to Table 3 that refer to definitions and other requirements contained in Figure 1 (Sacramento Valley Water Year Hydrologic Classification), Figure 2 (San Joaquin Valley Water Year Hydrologic Classification), Figure 3 (Formulas for Net Delta Outflow Index and Percent Inflow Diverted), and Table 4 (Chipps Island and Port Chicago Maximum Daily Average Electrical Conductivity).

The Petitioners have requested the following temporary modifications to D-1641 requirements:

1. **Temporary Modification of Delta Outflow and Export Requirements**

   The Petitioners request a combined modification of D-1641 requirements to help preserve water in storage to protect future cold water pool needs for listed species, future water supply, and maintain in-Delta water quality.

   The TUCP requests modification of Delta Outflow requirements described in D-1641, Table 3, Footnote 10, by modifying the Delta Outflow to the outflow that is expected to occur while maintaining SWP and CVP exports at health and safety levels of 1,500 cfs. Reclamation and DWR estimate that Delta outflow will range between 3,000 and 4,500 cfs. The petition states that this modification would provide some protection of Delta salinity levels and some protection of cold water pool for listed species later in the year. The 4,500 cfs Delta outflow level is the Petitioners' estimate of the flows that are needed to maintain salinity levels below 250 mg/l chloride at all export locations specified under Table 1 of D-1641. The Petitioners state that there are significant depletions of surface water flow that affect the certainty of the 4,500 cfs Delta Outflow estimate.

   The proposed Delta Outflow modification is based on an assumption that 1,500 cfs of combined SWP/CVP exports would be maintained to provide minimum health and safety flows to municipal and industrial diverters who rely solely on supplies from the Delta or the canal between the export pumps and San Luis Reservoir. The Petitioners requested that this modification to the maximum Export Limits, contained in D-1641 Table 3, be combined with the modification to Delta Outflow. The minimum health and safety flow level has been acknowledged by the 2009 National Marine Fisheries Service (NMFS) Biological Opinion and the 2008 U.S. Fish and Wildlife Service (USFWS) Biological Opinion. Through the Reporting and Management Plan described below, the Petitioners intend to review current conditions and health and safety needs, which might support periods of lower export levels that would be protective of health and safety.

2. **Temporary Modification of Delta Cross Channel (DCC) Gate Operation Requirements**

   D-1641 requires the closure of the DCC gates from February 1 through May 20. The Petitioners request permission to open the DCC gates for human health and safety

purposes, based on consultation with the Department of Fish and Wildlife (DFW), USFWS, and NOAA Fisheries (fishery agencies). The Petitioners state that they are currently discussing alternative operational strategies with the fishery agencies, and will continue to evaluate and discuss these strategies in consultation with the fishery agencies. As discussed above, opening of the DCC gate can help improve in-Delta salinity conditions. Normally, runoff and the Delta inflow/outflow needed to meet the Delta Outflow requirement would assist in meeting salinity requirements in the Delta with the DCC gates closed. Due to the critically dry hydrologic conditions, the TUCP states that there is a need to open the DCC gates to help achieve the salinity conditions in the interior and southern Delta needed for protection of municipal and industrial beneficial uses without expending large quantities of water needed for later use.

3. Reporting and Management Plan

In recognition of ordering paragraphs 8, 14, and 16 of the Governor's Proclamation, the Petitioners propose that this Order include regular monitoring, to ensure that this Order's terms and conditions and the requirements of Water Code Section 1435 are met.

The Petitioners also propose convening a team of managers, who would meet weekly during the period this Order is in effect, to review monitoring and operations data. These managers would be authorized to act to coordinate management of water supplies and protection of natural resources. The team of managers would consist of representatives from the Petitioners, the State Water Board, DFW, NMFS and USFWS.

4. Future Requests for Temporary Modifications

As a result of the reporting and management plan described above, the Petitioners state that they may submit to the State Water Board additional information regarding any further adjustments needed to regulatory requirements in order to balance the protection of beneficial uses, while protecting environmental resources and meeting health and safety needs. The TUCP states that future requests for temporary changes could include requests for possible modifications of other water quality objectives found in D-1641 Table 1 "Municipal and Industrial Beneficial Uses," Table 2 "Agricultural Beneficial Uses," and Table 3 "Fish and Wildlife Beneficial Uses."

4.0 APPLICABILITY OF THE CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) AND WATER CODE SECTION 13247

Ordinarily, the State Water Board must comply with any applicable requirements of the California Environmental Quality Act (CEQA) prior to issuance of a temporary urgency change order pursuant to Water Code section 1435. (See Cal. Code Regs., tit. 23, § 805.) The Governor's Proclamation concludes, however, that strict compliance with CEQA would "prevent, hinder, or delay the mitigation of the effects of the emergency." Accordingly, as authorized by Government Code section 8571, ordering paragraph 9 of the Governor's Proclamation suspends CEQA, and the regulations adopted pursuant to it, to the extent that CEQA would otherwise apply to specified actions necessary to mitigate the effects of the drought, including the State Water Board's action on the TUCP.

The Governor's Proclamation also suspends Water Code section 13247 to the extent that it would otherwise apply to specified activities, including action on the TUCP. Section 13247

requires state agencies, including the State Water Board, to comply with water quality control plans unless otherwise directed or authorized by statute. Absent suspension of section 13247, the State Water Board could not approve a change petition that modifies permits and licenses in a way that does not provide for full attainment of the water quality objectives in the Bay-Delta Plan, even during a drought emergency.

5.0 PROCEDURAL REQUIREMENTS CONCERNING THE TEMPORARY URGENCY CHANGE PETITION

The State Water Board may issue a temporary urgency change order in advance of public notice. (Wat. Code, § 1438, subd. (a).) Public notice must be provided as soon as practicable, unless the change will be in effect less than 10 days. (*Id*., § 1438, subds. (a), (b) & (c).) Any interested person may file an objection to a temporary urgency change. (*Id*., subd. (d).) The Board must promptly consider and may hold a hearing on any objection. (*Id*., subd. (e).) State Water Board Resolution 2012-0029 delegates to the Board Members individually and to the Executive Director the authority to hold a hearing, if necessary, and act on a temporary urgency change petition. (Resolution 2012-0029, ¶¶ 2.2, 4.4.1.)[4]

The State Water Board will issue and deliver to Petitioners as soon as practicable, a notice of the temporary urgency change petition pursuant to Water Code section 1438, subdivision (a). Petitioners will be required to publish the notice in newspapers in accordance with Water Code section 1438, subdivision (b)(1).

As soon as practicable, the State Water Board will provide formal notice of a public workshop to receive comments regarding drought-related activities, including the Petitioners' TUCP and this Order. The public workshop will not be an evidentiary hearing, and any comments on the TUCP will not be treated as testimony. If necessary, the State Water Board will hold an evidentiary hearing on any objections at a later date. The State Water Board will post on its website: (1) the notice of the TUCP, (2) the notice of the public workshop, (3) a copy of the TUCP and accompanying materials, and (4) this Order. The State Water Board also will distribute the notices through an electronic notification system.

6.0 REQUIRED FINDINGS OF FACT

Water Code section 1435 provides that a permittee or licensee who has an urgent need to change the point of diversion, place of use, or purpose of use from that specified in the permit or license may petition for a conditional temporary change order. The State Water Board's regulations set forth the filing and other procedural requirements applicable to TUCPs. (Cal. Code Regs., tit. 23, §§ 805, 806.) The State Water Board's regulations also clarify that requests for changes to permits or licenses other than changes in point of diversion, place of use, or purpose of use may be filed, subject to the same filing and procedural requirements that apply to changes in point of diversion, place of use, or purpose of use. (*Id*., § 791, subd. (e).)

Before approving a temporary urgency change, the State Water Board must make the following findings:

1. the permittee or licensee has an urgent need to make the proposed change;

[4] The Deputy Director for Water Rights may act on a temporary urgency change petition if there are no objections to the petition. (Resolution 2012-0029, ¶ 4.4.1.)

2. the proposed change may be made without injury to any other lawful user of water;
3. the proposed change may be made without unreasonable effect upon fish, wildlife, or other instream beneficial uses; and
4. the proposed change is in the public interest.

(Wat. Code, § 1435, subd. (b)(1-4).)

The State Water Board exercises continuing supervision over temporary urgency change orders and may modify or revoke temporary urgency change orders at any time. (Wat. Code, §§ 1439, 1440.) Temporary urgency change orders expire automatically 180 days after issuance, unless they are revoked or an earlier expiration date is specified. (*Id*., § 1440.) The State Water Board may renew temporary urgency change orders for a period not to exceed 180 days. (*Id*., § 1441.)

6.1 Urgency of the Proposed Change

Under Water Code section 1435, subdivision (c), an "urgent need" means "the existence of circumstances from which the board may in its judgment conclude that the proposed temporary change is necessary to further the constitutional policy that the water resources of the state be put to beneficial use to the fullest extent of which they are capable and that waste of water be prevented . . . ."

An urgent need exists for changes in the Petitioners' requirement to meet specified Delta Outflows, Export Limits and Delta Cross Channel Gate Closure objectives included in D-1641. As described in the Governor's drought proclamation and the petition, California is experiencing unprecedented dry conditions that were not foreseen or accounted for in the development of these requirements. Operations to meet the objectives, starting in February, would have a significant impact on stored water and the ability to meet minimum flows for the remainder of the season. Failure to act quickly to reduce releases from storage will further deplete already low storage levels in the reservoirs available for use throughout the year.

As stated in the petition, California is entering the third straight year of below average rainfall and very low snowmelt runoff. As a result of the dry hydrology, reservoir levels throughout the state were already significantly below average in October at the beginning of the 2013/2014 water year. The low initial storage and historically dry conditions experienced in the last 12 months, since January 2013, have resulted in significant reductions in water supplies and will likely lead to critical water shortages in 2014.

According to the petition, in order to meet the requirements of D-1641, the SWP and CVP have released water from storage to meet in-basin demands since April 2014. These demands upon the stored water of the SWP and CVP have been exacerbated by the unprecedentedly high use of river water on the Sacramento River and Feather River systems, referred to as depletions. DWR and Reclamation believe these depletions to be much greater than typically assumed which is resulting in further reductions in storage to meet Bay-Delta Plan water quality objectives.

According to the petition, at this time, total storage at the SWP's Lake Oroville is roughly 1.2 million acre-feet (MAF), and the total combined storage at the CVP's Shasta and Folsom reservoirs is also very low at about 1.8 MAF. Storage in all three reservoirs is below what they were at this time of year in 1977 when the state was in a severe drought. Of even more

concern is the lack of snowpack in the watersheds feeding into the Projects' major Sacramento Valley reservoirs. The current water year's lack of precipitation has resulted in a northern California snowpack which is a mere 4 percent of the typical seasonal peak.

The continuation of extremely dry conditions in the Bay-Delta watershed poses great challenges to the effective management of water resources, and the Petitioners do not believe that there is an adequate water supply to meet all obligations under D-1641. As discussed above, current projections indicate that without the requested change to the Petitioners' water right permits and license conditions, a substantial risk exists that by late spring 2014 and into 2015 the Petitioners' major reservoirs will be drafted to dead pool or near dead pool levels, at which point reservoir release capacities will be substantially diminished. As a result, there will be significant risks to temperature control, minimum instream flow requirements, and an inability to repel salinity in the Sacramento-San Joaquin Delta later this season. Under the current circumstances, the most prudent course of action is to conserve storage in upstream reservoirs until significant improvement of that storage is realized. Conservation of stored water supplies requires temporary modification of some terms and conditions contained in D-1641.

6.2 No Injury to Any Other Lawful User of Water

The proposed changes will not injure any other lawful user of water because the changes will not result in a decrease in natural flows. As used in Water Code section 1435, the term "injury" means invasion of a legally protected interest. (*State Water Resources Control Board Cases* (2006) 136 Cal.App.4th 674, 738-743.) Riparian and appropriative water right holders with rights to divert water below Project reservoirs only are entitled to divert natural and abandoned flows, and in the case of riparians only natural flows; they are not entitled to divert water previously stored or imported by the Projects that is released for use downstream. (*Id*. at pp. 738, 743, 771.)

Since March 2013, the Projects have been augmenting natural flows in the Delta with water released from storage in Project reservoirs in order to meet water quality objectives. If the proposed change to the requirement to meet the Delta Outflow objective is implemented, the Projects will reduce releases from storage, but the Projects will continue to augment natural flows with releases from storage. Accordingly, implementation of the proposed change will not reduce the natural or abandoned flows to which downstream riparian and appropriative water right holders may be entitled, and no water right holders will be injured by the proposed change.

At the present time, DWR and Reclamation have proposed changes to requirements to meet certain water quality objectives established to protect fish and wildlife beneficial uses. DWR and Reclamation have not yet requested any changes to requirements to meet water quality objectives established to protect municipal, industrial, or agricultural beneficial uses. For this reason, the proposed changes will not injure other water users due to a change in water quality. (See *State Water Resources Control Bd. Cases, supra* at pp. 744-45.) Moreover, it is questionable whether any other users could support a valid claim of injury due to a change in water quality under circumstances where the Projects are augmenting natural flows with stored water. Finally, it is worth pointing out that any impairment to water quality in the near term is likely to be outweighed by the significant impact to water quality that would occur if the proposed changes are not granted. Absent the proposed change, Project storage would be depleted, and DWR and Reclamation would no longer be able to control salinity encroachment in the Delta.

6.3 No Unreasonable Effect upon Fish, Wildlife, or Other Instream Beneficial Uses

As conditioned by this Order, the proposed changes to Delta Outflows, Export Limits and DCC Gate Closure requirements will not unreasonably impact fish, wildlife, or other instream beneficial uses of water. In determining whether the impact of the proposed changes on fish and wildlife is reasonable, the short-term impact to fish and wildlife must be weighed against the long-term impact to all beneficial uses of water, including fish and wildlife, if the changes are not approved.

According to the petition, the estimated impact to reservoir storage of not making the changes to the requirement to meet the Delta Outflow objective during February could be approximately 144 thousand acre-feet (TAF).[5] As discussed above, if the Delta Outflow requirements remain in effect through June, it could result in a "loss of control" over salinity levels in the Delta by late spring 2014 and into 2015 in a worst case scenario. If such a condition occurs, much of the Delta would be too salty to support health and safety and agricultural uses of water. It would also likely require more water than is currently available in storage to push salt back out of the Delta. This salty Delta condition would persist until Northern California receives a rainy season with sufficient runoff to flush the Delta of ocean water to once again allow for these in-Delta beneficial uses.

The DCC gates, when opened, allow high quality Sacramento River water to flow through the Central Delta, thus "freshening" the Delta. This flow path keeps water in the central Delta less saline than when the DCC gates are closed. The DCC gates are generally kept closed in the spring, however, to keep outmigrating salmon from straying into the central Delta where their survival is reduced.

A reduction in Delta outflow within the proposed range of 3,000 to 4,500 cfs may result in rapidly increasing salinity in the interior Delta if the gates are not opened at the same time this occurs which may pose a risk to minimum exports for public health and safety. Restoring Delta salinity to a range that would support public health and safety would take a much larger quantity of water than is required to maintain salinity at these levels. This would necessitate release of stored water to maintain public health and safety, and therefore jeopardize storage of water to maintain temperature control and for other environmental purposes later in the year.

The Petitioners propose to open the gates as soon as possible to reduce salinity in the central Delta. The principal benefit of opening the DCC gates in February is to move more fresh water to the interior Delta, using less storage releases than would be needed to achieve the same salinity with the gates closed. This freshening of the Delta will maintain water quality at the CVP and SWP export pumps and the intakes of Contra Costa Water District (CCWD) that are needed for the protection of public health and safety.

With the DCC gates open, there is potential for decreased survival of Sacramento River-origin species as they move through the central Delta. Potential hazards include increased entrainment, predation, and salvage. The Petitioners provided a detailed analysis of how these issues will not result in decreased survival, and state that they will continue to consult with the fishery agencies on these issues. The State Water Board concludes that the potential for impairment to instream beneficial uses from this temporary modification is not unreasonable

[5] According to the petitions this is the difference between the currently projected minimum outflow of 4,500 cfs and 7,100 cfs over the 28-day period.

considering the potential impacts to agricultural and municipal water supply that could occur if the temporary change in not approved. This Order includes a requirement for the Petitioners to continue consulting with the fish agencies on these issues.

In addition to protecting water supplies needed for consumptives uses, the proposed changes will serve to protect fish and wildlife and other instream beneficial uses of water by conserving water for use throughout the season to maintain minimal stream flows and Delta Outflows and to prevent excessive salinity intrusion into the Delta. As discussed above, without the changes, the Projects' limited water supplies would be released for short term benefits to fish and wildlife at the expense of storage and flows later in the season, which would likely have severe effects on fish and wildlife and other instream beneficial uses of water.

Providing year round Delta inflows and outflows is critically important to the survival of numerous fish and wildlife species in the Delta and upstream areas. Tributary flows, including adequate cold water resources, are needed throughout the season to provide appropriate habitat and passage conditions for anadromous species, including Endangered Species Act (ESA) listed Winter-Run and Spring-run Chinook Salmon, steelhead, and green sturgeon. Delta outflows and inflows are also needed throughout the year for the anadromous species listed above as well as various ESA listed pelagic species including long-fin smelt and Delta smelt. As discussed above, if the required Delta outflow objectives are met and the DCC gates are kept closed, the reservoirs will likely reach dead pool storage by spring, leaving little or no water in storage for later in the season for instream flows and Delta outflows needed for fish and wildlife and other instream uses. This would have serious detrimental impacts to fish and wildlife and other beneficial uses of water.

The proposed changes as conditioned by this Order balance the short-term and long-term habitat needs of fish and wildlife and other instream uses of water during the entirety of water year 2014. This Order requires the development of a Real-Time Drought Operations Management Team with designated representatives from DWR, Reclamation, the State Water Board, DFW, USFWS, and NMFS to coordinate operations consistent with this Order, and to protect fish and wildlife, other beneficial uses of water and public health and safety. The Real-Time Drought Operations Management Team will coordinate real time operations based on current conditions and fisheries information to ensure that the proposed changes pursuant to this Order do not unreasonable affect fish and wildlife and other instream uses of water. The State Water Board has ultimate authority regarding any changes.

While the TUCP does not request a specific Delta outflow level due to the uncertainty of channel depletions, to ensure that some minimal level of Delta outflow is provided to protect fish and wildlife and other instream uses of water without draining reservoir storage dramatically, the Order requires a minimum Delta outflow level of 3,000 cfs during February and also provides for a higher pulse flow to be scheduled to benefit fish species. The magnitude, timing, and duration of this pulse flow will be determined by the Real-Time Drought Operations Management Team. Further changes to Delta Outflows for the remainder of the season may be requested. At that time, State Water Board staff will evaluate current circumstances and information and determine what if any changes should be made to Delta Outflow requirements for the remainder of the year to reasonably protect fish and wildlife and other instream uses and meet the other requirements of the Water Code.

The Order limits SWP and CVP exports to SWP and CVP contractors to minimum health and safety levels to further conserve water in storage for future use to protect fish and wildlife and

other purposes. This export limitation is not intended to apply to transfers under non-Project water rights or between Project contractors. The Order requires DWR and Reclamation to refine their estimates of export needs for health and safety and provide such information to the State Water Board to inform decisions regarding changes to the allowable export limits.

This Order allows the DCC gates to be opened from February through May to reduce the need for upstream releases to maintain salinity conditions in the interior Delta. To ensure that gate opening avoids impacts to fish, decisions regarding operations of the gates are required to be made in consultation with the Real-Time Drought Operations Management Team based on real-time fisheries and hydrologic information.

To ensure that water conserved by the proposed change is available to use later in the season to reasonably protect fish and wildlife and other beneficial uses, the Order requires that DWR and Reclamation calculate and maintain a record of the amount of water conserved through the changes authorized by this Order. The Order requires that water conserved be maintained in storage to protect water needed for salmon and steelhead and other fish species, used to maintain water supplies, or used to improve water quality. The Order requires the use of the water to be coordinated through the Real-Time Drought Operations Management Team. To inform future decisions of the Real-Time Drought Operations Management Team and the State Water Board, the Order also requires DWR and Reclamation to develop monthly water balance estimates indicating actual and proposed operations through the end of the water year. In addition, the Order requires DWR and Reclamation to conduct necessary modeling and monitoring to inform real time operational decisions. The Order reserves the Executive Director's authority to require modifications to the Order to protect fish and wildlife or other uses of water based on additional information including the State Water Board workshop on February 18 and 19, 2014, concerning this Order and other drought issues.

Based on the above, the State Water Board concludes that the potential for impairment to instream beneficial uses from this temporary modification is not unreasonable considering the potential negative impacts to fish, wildlife and instream uses later in the year and the potential impacts to municipal and industrial water supply, instream beneficial uses, and recreation that could occur if the temporary change in not approved.

6.4 The Proposed Change is in the Public Interest

The proposed temporary change will help conserve stored water so that it can be released throughout 2014 to maintain instream flows for the benefit and protection of North of Delta, in-Delta, and South-of-Delta uses, including public trust uses. It is in the public interest to preserve these water supplies for these beneficial uses when hydrologic circumstances cause severe reductions to water supplies.

The changes, or temporary modifications, authorized in this Order will make the best use of a limited water supply in the near term. The temporary modifications contained in this Order are in the public interest because the changes will preserve water supplies to meet health and safety needs, and will increase the duration and likelihood of maintaining salinity control in the Delta later in year. As described in this Order, the retained water supply will be available later in the year for export flows adequate for maintaining health and safety and North-of-Delta and in-Delta environmental protection.

7.0 CONCLUSIONS

The State Water Board has adequate information in its files to make the evaluation required by Water Code section 1435.

I conclude that, based on the available evidence:

1. The permittee has an urgent need to make the proposed changes;

2. The petitioned changes, as conditioned by this Order, will not operate to the injury of any other lawful user of water;

3. The petitioned changes, as conditioned by this Order, will not have an unreasonable effect upon fish, wildlife, or other instream beneficial uses; and,

4. The petitioned changes, as conditioned by this Order, are in the public interest.

ORDER

NOW, THEREFORE, IT IS ORDERED that the petition for temporary urgency change in permit and license conditions under Permits 16478, 16479, 16481, 16482 and 16483 (Applications 5630, 14443, 14445A, 17512 and 17514A, respectively) of the Department of Water Resources (DWR) for the State Water Project (SWP) and License 1986 and Permits 11315, 11316, 11885, 11886, 11887, 11967, 11968, 11969, 11970, 11971, 11972, 11973, 12364, 12721, 12722, 12723, 12725, 12726, 12727, 12860, 15735, 16597, 20245, and 16600 (Applications 23, 234, 1465, 5638, 13370, 13371, 5628, 15374, 15375, 15376, 16767, 16768, 17374, 17376, 5626, 9363, 9364, 9366, 9367, 9368, 15764, 22316, 14858A, 14858B, and 19304, respectively) of the United States Bureau of Reclamation (Reclamation) for the Central Valley Project (CVP); is approved subject to the following terms and conditions. All other terms and conditions of the subject license and permits, including those added by the State Water Resources Control Board (State Water Board) in Revised Decision 1641 (D-1641) shall remain in effect. This Order shall be effective until July 30, 2014.

1. Except as otherwise provided in condition 2, below, ~~F~~for a period not to exceed 180 days or until such time as this Order is amended or rescinded based on changed circumstances, the requirements of D-1641 for DWR and Reclamation to meet specified water quality objectives are amended as follows:

    a. The minimum Delta Outflow levels specified in Table 3 are modified as follows: the minimum Net Delta Outflow Index (NDOI) described in Figure 3 of D-1641 during the month of February shall be no less than 3,000 cubic-feet per second (cfs). In addition to base Delta Outflows, pursuant to this Order, a higher pulse flow may also be required through the Real-Time Drought Operations Management Process described below.

    b. The maximum Export Limits included in Table 3 are modified as follows: the combined maximum SWP and CVP export rate for SWP and CVP contractors at the Harvey O. Banks and C.W. “Bill” Jones pumping plants shall be no greater than the minimum pumping levels required for health and safety purposes and

shall be no greater than 1,500 cfs on a 3-day running average. Deliveries to SWP and CVP export contractors from the SWP and CVP shall also be limited to health and safety needs. These limitations do not apply to water transfers under non-SWP or CVP water rights or between SWP and CVP contractors. DWR and Reclamation shall refine what export amounts and deliveries are required to maintain health and safety and shall provide documentation to the State Water Board to support that determination by February 14. Based on additional information or changed circumstances, the export limits imposed pursuant to this Order may be modified through the Real-Time Drought Operations Management Process described below.

c. The Delta Cross Channel (DCC) Gate Closure requirements included in Table 3 are modified as follows: the DCC gates may be opened from February 1 through May 20 as necessary to preserve limited storage in upstream reservoirs and reduce infiltration of high salinity water into the Delta while reducing impacts on migrating Chinook salmon. Requirements for closure of the DCC gates during March through May 20 shall be determined through the Real-Time Drought Operations Management Process described below.

2. <u>During the effective period of this Order, if precipitation events occur that enable DWR and Reclamation to comply with the Delta Outflow and DCC Gate Closure requirements contained in Table 3 of D-1641, then D-1641 requirements shall be operative, except that any SWP and CVP exports greater than 1500 cfs shall be limited to natural or abandoned flow, or transfers as specified in condition 1b.</u>

3. DWR and Reclamation shall convene a Real-Time Drought Operations Management Team with designated representatives from DWR, Reclamation, the State Water Board, Department of Fish and Wildlife, National Marine Fisheries Service and U.S. Fish and Wildlife Service (fisheries agencies). The Real-Time Drought Operations Management Team shall be convened to discuss potential changes to SWP and CVP operations to meet health and safety requirements and to reasonably protect all beneficial uses of water. The team shall meet on a regular basis, and no less than weekly, to discuss current conditions and may be combined with the existing Water Operations Management Team as appropriate. The State Water Board representative shall be designated by the Executive Director of the State Water Board and shall be authorized to make real-time operational decisions to modify requirements to meet pulse flows associated with the modification to the Delta Outflow objective described above, Export Limits, DCC gate closures, and the associated requirements of this Order. If the State Water Board approves any additional temporary urgency changes pursuant to the temporary urgency change petition that is the subject of this Order, or otherwise modifies this Order, the State Water Board will provide notice and an opportunity for interested persons to comment or object. Based on public comments or objections, further changes may be made to this Order. Information concerning changes to this Order will be posted on the State Water Board's website within 24 hours.

4. DWR and Reclamation shall calculate and maintain a record of the amount of water conserved through the changes authorized by this Order. The water conserved shall be maintained in storage to protect flows for fisheries, used to maintain water supplies, or used to improve water quality. The use of such water shall be determined through the Real-Time Drought Operations Management Team Process described above.

5. DWR and Reclamation shall develop monthly water balance estimates indicating actual and proposed operations through the end of the water year. Specifically, actual and projected inflows, north of Delta contract deliveries, other channel depletions, exports, and Delta outflows shall be identified. The water balance shall be posted on DWR's website and updated as necessary based on changed conditions.
6. DWR and Reclamation shall conduct necessary modeling and monitoring to inform real time operational decisions. Required modeling and monitoring shall be determined through the Real-Time Drought Operations Management Team Process or as may be required pursuant to any modification to this Order.

7. This Order may be further modified by the Executive Director based on additional public input or changed circumstances. Specifically, the State Water Board will hold a workshop on February 18 and 19, 2014, to receive public comment on what if any modifications should be made to this Order to ensure that the changes approved by this Order will not injure any lawful user of water, will not unreasonably affect fish and wildlife, and will be in the public interest.

8. This Order does not authorize any act that results in the taking of a candidate, threatened or endangered species, or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the federal Endangered Species Act (16 U.S.C.A. sections 1531 to 1544). If a "take" will result from any act authorized under this Order, the Petitioners shall obtain authorization for an incidental take permit prior to construction or operation of the project. Petitioners shall be responsible for meeting all requirements of the applicable Endangered Species Act for the temporary urgency change authorized under this Order.

9. Petitioners shall immediately notify the Executive Director of the State Water Board if any significant change in conditions occurs that warrants reconsideration of this Order.

STATE WATER RESOURCES CONTROL BOARD

ORIGINAL SIGNED BY:

Thomas Howard
Executive Director

Dated: 2/7/2014

Status of Delta Smelt

There is generally a high level of concern for delta smelt at present because the population is near its lowest level of abundance ever recorded (Figure 1). The 2013 CDFW Fall Midwater Trawl (FMT) Survey Index was 18, which is a value considered to be indistinguishable from the lowest value of 17 recorded in 2009.

The proposed action will take place in March 2014. Given the warm weather, it is expected that some delta smelt will have started spawning in February; spent female delta smelt have been observed during February Spring Kodiak Trawl Surveys (SKTS) in 2003, 2005, and 2012. Thus, adults and eggs are the two life stages expected to be exposed to the proposed action. Similar to the first, the second SKTS of 2014 showed a fairly typical pre-spawning distribution of delta smelt, with a large aggregation in Suisun Marsh and consistent detection of fish upstream of the marsh along the Sacramento River corridor and up into Cache Slough, but none in the central or southern Delta (Figure 2). It is assumed that at some point during February and March, some of these fish will move upstream in preparation for spawning. This expectation is based on the assumption that emergency drought conditions will result in sustained low Delta outflow, which will in turn keep Suisun Marsh too salty for delta smelt to spawn there, and that recent storms increased local runoff and turbidity entering the Delta resembling first flush conditions. Delta smelt often move during "first flush" periods when inflow and turbidity increase on the Sacramento and San Joaquin Rivers (Grimaldo et al. 2009, Sommer et al. 2011).

Analytical Framework

The foundation for assessing the effects of the proposed action on delta smelt is based on conceptual models (Baxter et al. 2010) developed by the Interagency Ecological Program (IEP). The basic IEP POD conceptual model (Figure 3) is rooted in classical food web and fisheries ecology. It contains four major components: (1) prior fish abundance, in which abundance history affects current recruitment (i.e., stock-recruitment effects); (2) habitat, in which the amount of water (volume or surface area) with suitable conditions for a species has changed because changes in estuarine water quality variables, disease, and toxic algal blooms in the estuary affect survival and reproduction; (3) top-down effects, in which predation and water project entrainment affect mortality rates; and (4) bottom-up effects, in which consumable resources and food web interactions affect growth and thereby survival and reproduction.

The IEP Delta smelt species model (Figure 4) identifies key seasonal drivers in red, with proximal causes and effects in yellow. In winter, entrainment is posited to affect the population through direct mortality. The number of adult spawners affects population dynamics in two primary ways. First, potential reproductive output is proportional to the number adult female spawners. This generality would not be true if maternal investment in egg batch size varied strongly from year to year, which is presently unknown. However, based on annual fork lengths of fish collected in the SKT it does not appear that egg batch size should have varied much in the POD years. For delta smelt, which are now

considered seasonal indeterminant spawners (i.e., they spawn multiple times), total reproductive output of an individual female should vary with number of eggs per batch, and the length of the spawning window (the number of days with suitable water temperatures for spawning), which will influence the number of batches produced. Obviously, reproductive output will be higher in years when adult females are larger, abundances are higher, and the spawning window is prolonged such that multiple batches are produced. Note that maximum reproductive output of the adult population at the beginning of spawning is not often realized due to mortality arising from density-dependent (e.g., food limitation or predation) or density-independent (e.g., entrainment, contaminants) mechanisms. The size of the spawning stock also directly influences total egg production. Recent investigation of the annual FMWT index values plotted versus the previous years' FMWT index shows that the population has been in downward trend. The exception was in 2011, when the FMWT index rebounded to pre-POD levels, indicating the population is still able to respond to favorable conditions.

The proposed action would modify delta outflow during February 2014 from 7,100 cfs to a level within the range of 3,000-4,500 cfs. Evaluating the effects of the proposed action is challenging because the condition is unprecedented and few data exist from which to base a quantitative effects analysis. A particular challenge is isolating the effects of outflow during a single month on delta smelt. Specifically, it would not be scientifically credible to apply assumptions about effects in a single month to historical data and previously published analyses that are based on multi-month averages (Kimmerer 2002). Therefore, the analysis of the proposed action is primarily qualitative in nature. Some limited quantitative analyses are provided primarily as background material for consideration should the low outflow conditions persist through the spring.

Effects Analysis

Contextualizing Outflow under the Proposed Action. Including 2014, there have been a total of 12 water years with a critical designation since 1929 (Figure 5). Mean March outflow in these critical water years has ranged from a high of 27,223 cfs in 1934 to a low of 3,007 cfs in 1977 (Figure 5 and Figure 6). The range of outflow of the proposed action (3,000-4,500 cfs) and the D-1641 standard (7,100 cfs) all more closely resemble the drought years of 1976, 1977, 1988, 1990 and 1991 than the other years in the record (Figure 6).

Adult Delta Smelt Entrainment. It is expected that adult delta smelt entrainment will be very low and will stay well under the established ITL based on projected OMR flows and the expectation that adult smelt will mostly remain distributed in the north Delta arc under the expected outflow conditions.

Delta Smelt Spawning. Water temperature drives the timing of delta smelt spawning. Delta outflow in the proposed action will not modify Delta water temperatures, which are principally driven by ambient air temperature (Wagner et al. 2011). It is likely that many delta smelt that spawn in February during the proposed action could survive 1-2 additional months and spawn again should water temperatures remain suitable into April.

Delta Smelt Population Growth Rate. Delta smelt population growth rate can be characterized as the ratio $FMT/FMT_{previous\ year}$. Delta smelt population growth rates are typically relatively poor during droughts (Figure 7). Thus, delta smelt will likely exhibit a negative population growth rate in 2014. There is substantial variability in population growth rates in critical years, having even been positive in three of the seven critical years during which the FMT has been conducted (Figure 7). Furthermore, there is no simple discernible relationship between delta smelt population growth rate and mean February-June delta outflow (Figure 8). Thus, although odds are that the population will decline in 2014, it is uncertain whether the proposed action will exacerbate the anticipated negative population growth rate.

Delta Smelt Recruitment. Long-term trends in delta smelt recruitment can be characterized as the ratio TNS index/FMT $index_{previous\ year}$. As expected based on population growth rate, delta smelt recruitment has typically been relatively poor during droughts. There is no simple discernible relationship between delta smelt recruitment and mean February-June delta outflow (Figure 9; Kimmerer 2002; Bennett 2005). Thus it is uncertain if the proposed action will further exacerbate the anticipated poor recruitment for delta smelt in 2014.

Discussion

Extreme drought conditions are well known to stress the aquatic resources of the San Francisco estuary and its watershed. Thus, the present drought condition and the proposed action are likely to stress the delta smelt population. However, the available data are insufficient to isolate the effects of reduced outflow for a single month during a drought on the delta smelt population. Thus, although the proposed action is likely to be stressful to the delta smelt population, quantitatively estimating the incremental effect of March outflow under the proposed action (3,000-4,500 cfs) relative to 7,100 cfs is impossible.

No Delta Smelt have been salvaged this water year at the South Delta fish facilities. This is expected due to the low turbidity observed throughout the central and southern Delta. For example, the first and second SKTS of 2014 showed the majority of delta smelt were distributed in the Suisun Bay region, with the rest in Cache Slough Complex and the lower Sacramento River and confluence region (Figure 2). Adult Delta Smelt are highly unlikely to shift their distribution towards the South Delta unless a first flush event occurs and turbidity is dispersed into the southern Delta (Grimaldo et al. 2009). A small first flush event has occurred on the Sacramento River but turbidity in the central delta remains very low. As the proposed operations will involve conditions of reduced exports and outflow, it is highly unlikely that delta smelt distribution will change in a way that increases their entrainment risk.

The status of delta smelt will be closely monitored during the proposed action. Key oversight groups (e.g. Smelt Working Group; WOMT) will continue to evaluate conditions on a weekly basis, or more frequently if necessary. Under the proposed modified operations, the IEP will continue to monitor abundance and distribution of delta smelt. Moreover, the USFWS is conducting additional trawling in the Delta that is designed to closely monitor entrainment risk to delta smelt. Additionally, DWR is

currently working on a contract to expedite the implementation of the SmeltCAM, a promising new monitoring tool with multiple applications (e.g. take reduction, habitat assessments).

References

Baxter, R., Breuer, R., Brown, L., Conrad, L., Feyrer, F., Fong, S., Gehrts, K., Grimaldo, L., Herbold, B., Hrodey, P., Mueller- Solger, A., Sommer, T., and Souza. K., Interagency Ecological Program 2010 Pelagic Organism Decline work plan and synthesis of results: Interagency Ecological Program for the San Francisco Estuary, Stockton, CA, 259 p. Available at: http://www.water.ca.gov/iep/docs/FinalPOD2010Workplan12610.pdf

Bennett, W.A., 2005, Critical assessment of the delta smelt population in the San Francisco Estuary, California: San Francisco Estuary and Watershed Science v. 3, available at *http://repositories.cdlib.org/jmie/sfews/vol3/iss2/art1.*

Grimaldo, L.F., Sommer, T., Van Ark, N., Jones, G., Holland, E., Moyle, P., Herbold, B., and Smith, P., 2009, Factors affecting fish entrainment into massive water diversions in a tidal freshwater estuary: Can fish losses be managed?: North American Journal of Fisheries Management, v. 29, p. 1253–1270.

Kimmerer, W.J., 2002. Effects of freshwater flow on abundance of estuarine organisms: physical effects or trophic linkages: Marine Ecology Progress Series, v. 243, p. 39–55.

Sommer, T., M. Nobriga, L. Grimaldo, F. Feyrer, F. Mejia. 2011. The spawning migration of delta smelt in the upper San Francisco Estuary. San Francisco Estuary and Watershed Science (9)2 http://escholarship.org/uc/item/86m0g5sz.

Wagner, R. W., Stacey, M., Brown, L. R., & Dettinger, M. 2011. Statistical models of temperature in the Sacramento–San Joaquin Delta under climate-change scenarios and ecological implications. *Estuaries and Coasts*, *34*(3), 544-556.

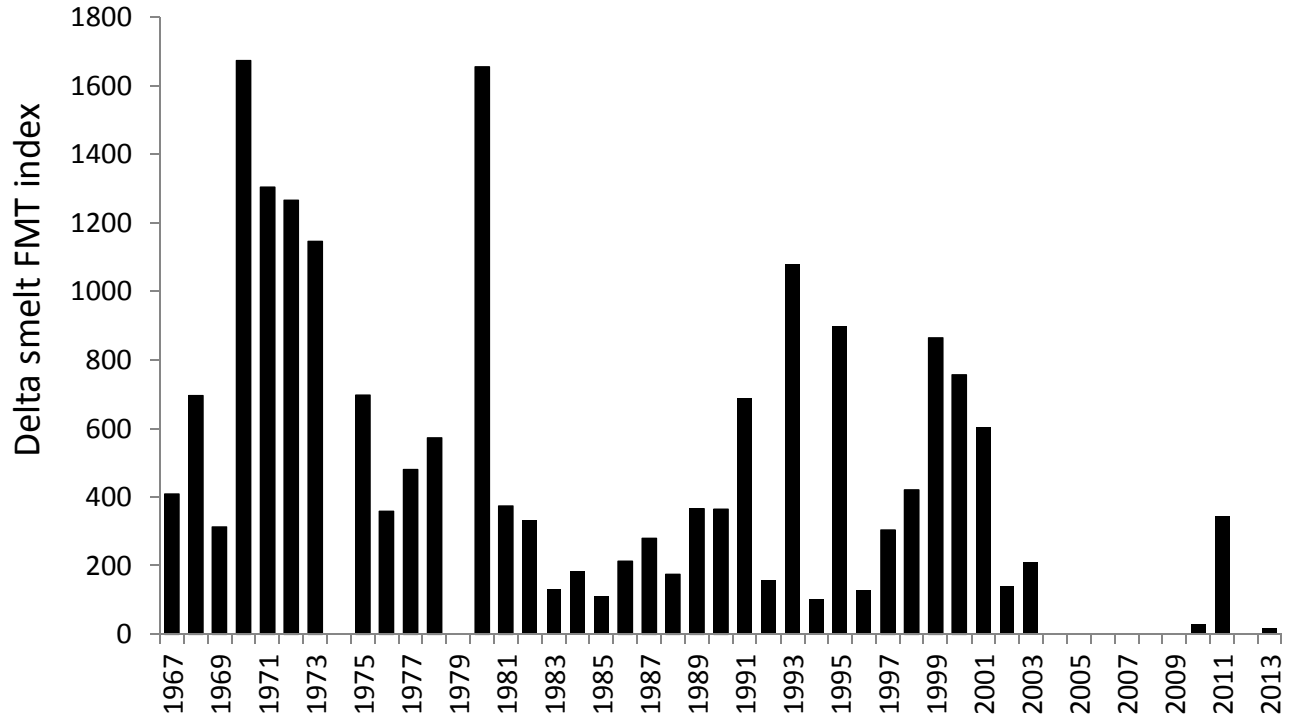

Figure 1. Delta smelt Fall Midwater Trawl abundance indices.

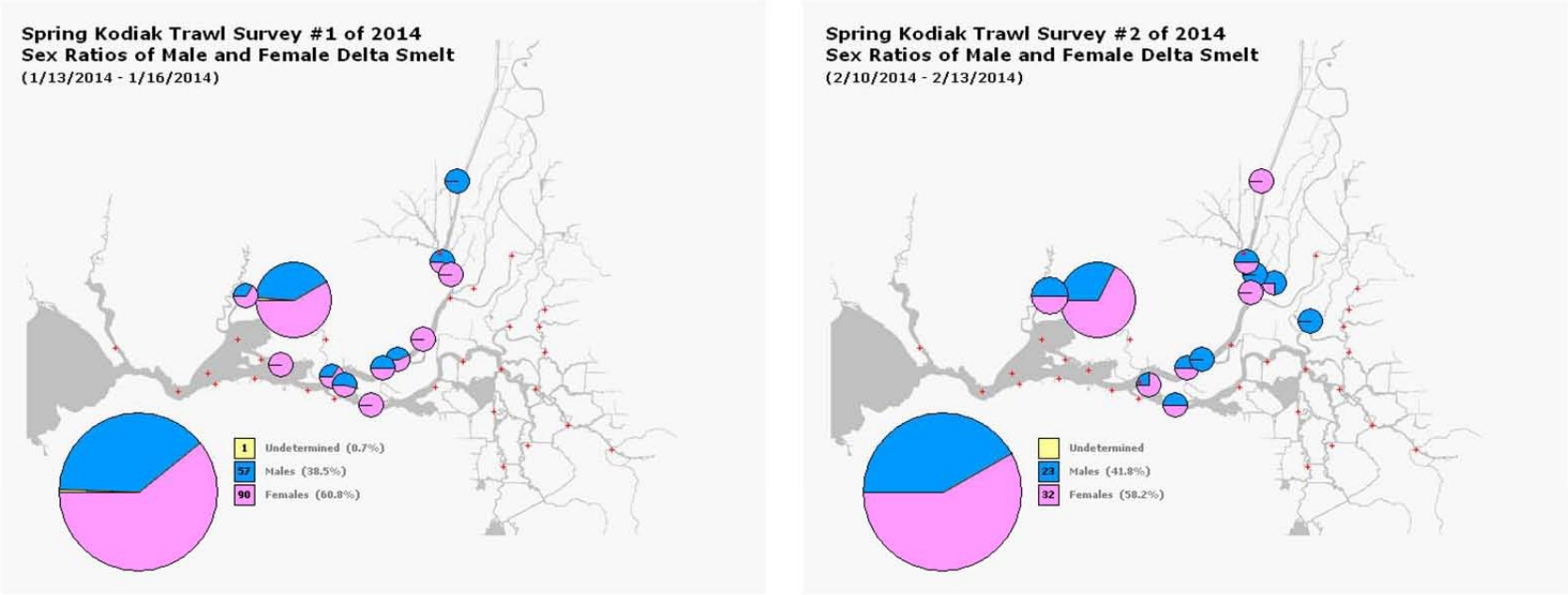

Figure 2. Present distribution of adult delta smelt.

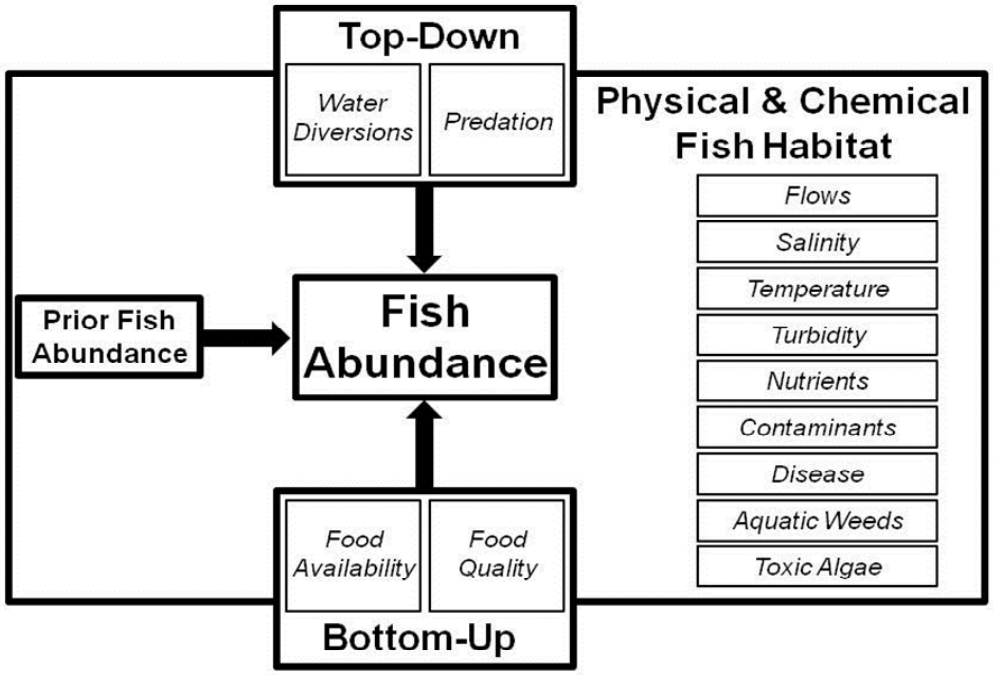

Figure 3. The basic IEP conceptual model for the pelagic organism decline.

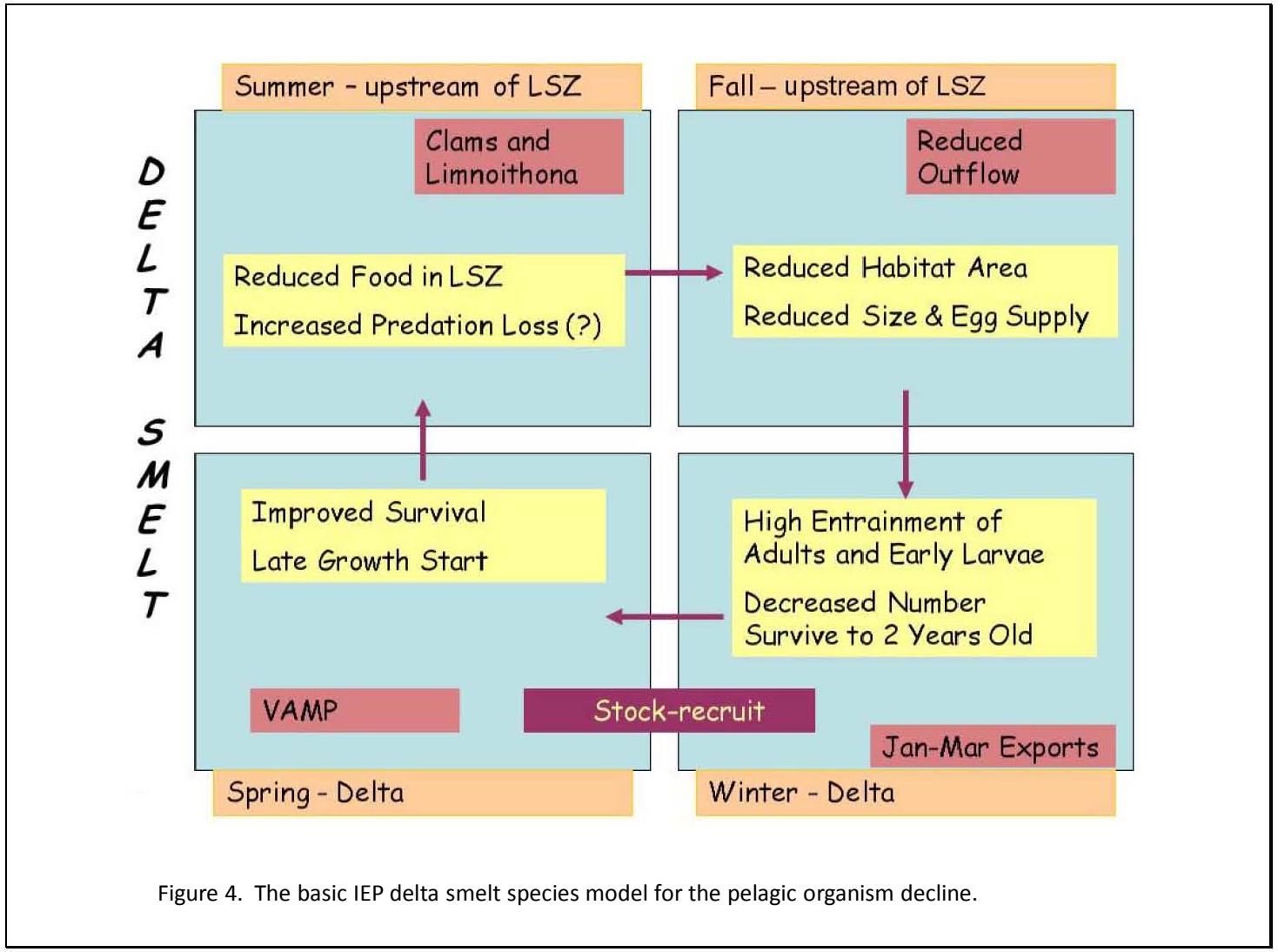

Figure 4. The basic IEP delta smelt species model for the pelagic organism decline.

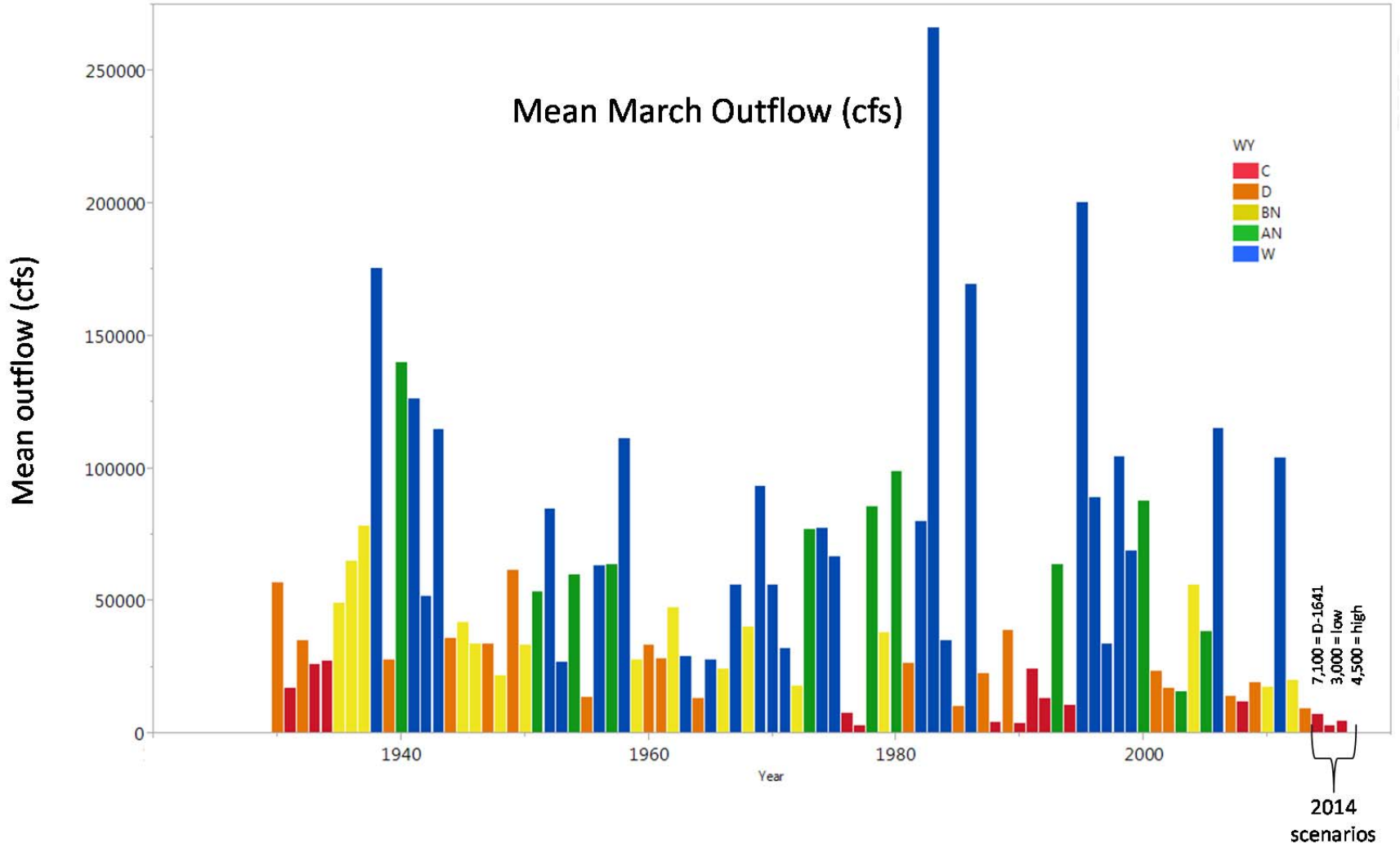

Figure 5. Mean March delta outflow for water years 1929-2013, including March outflow scenarios for 2014.

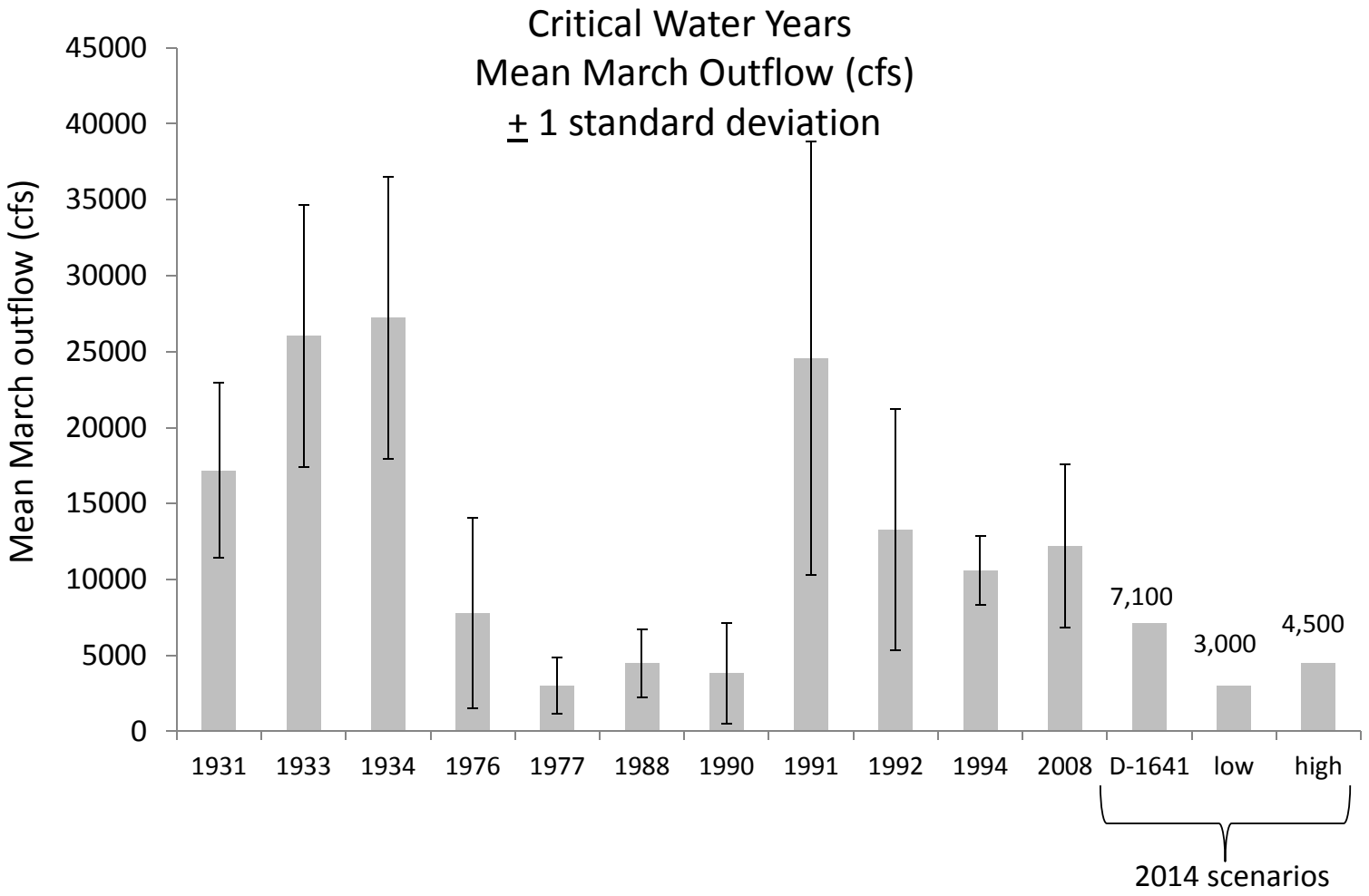

Figure 6. Mean March delta outflow for critical years, including March outflow scenarios for 2014.

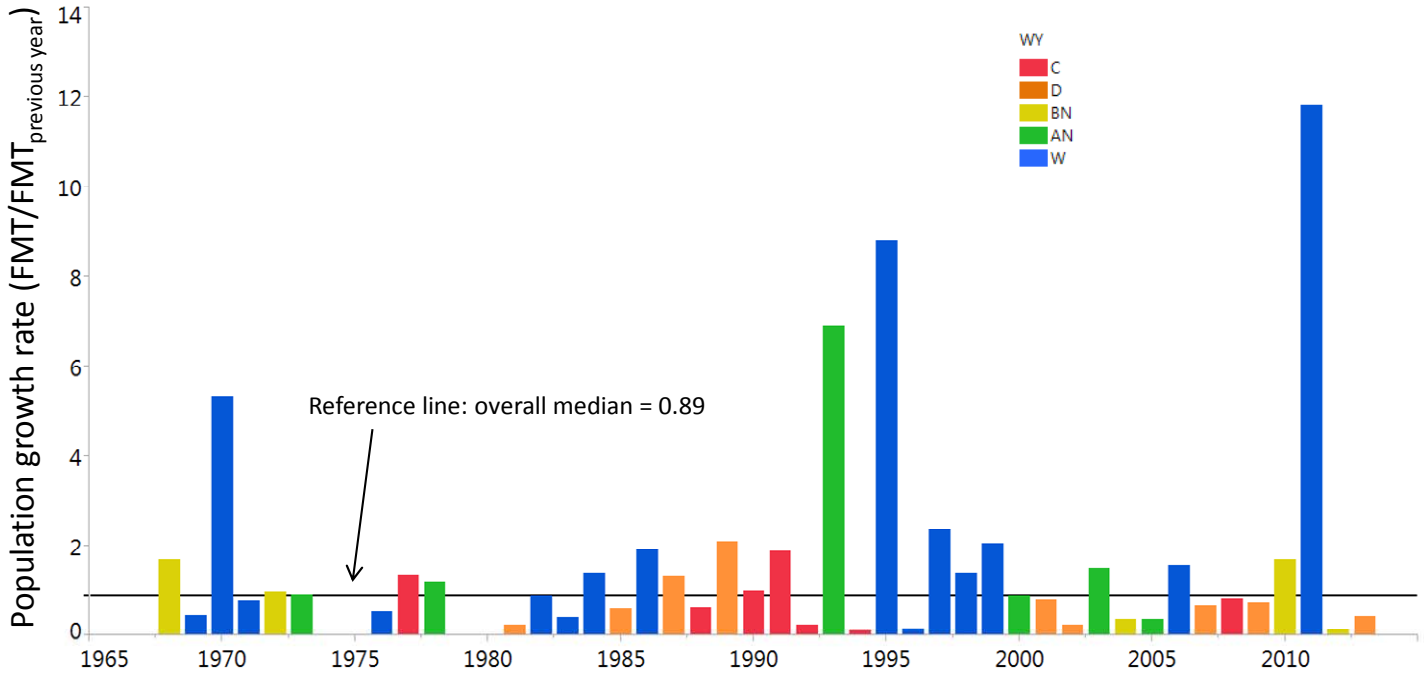

Figure 7. Time series of population growth rate of delta smelt.

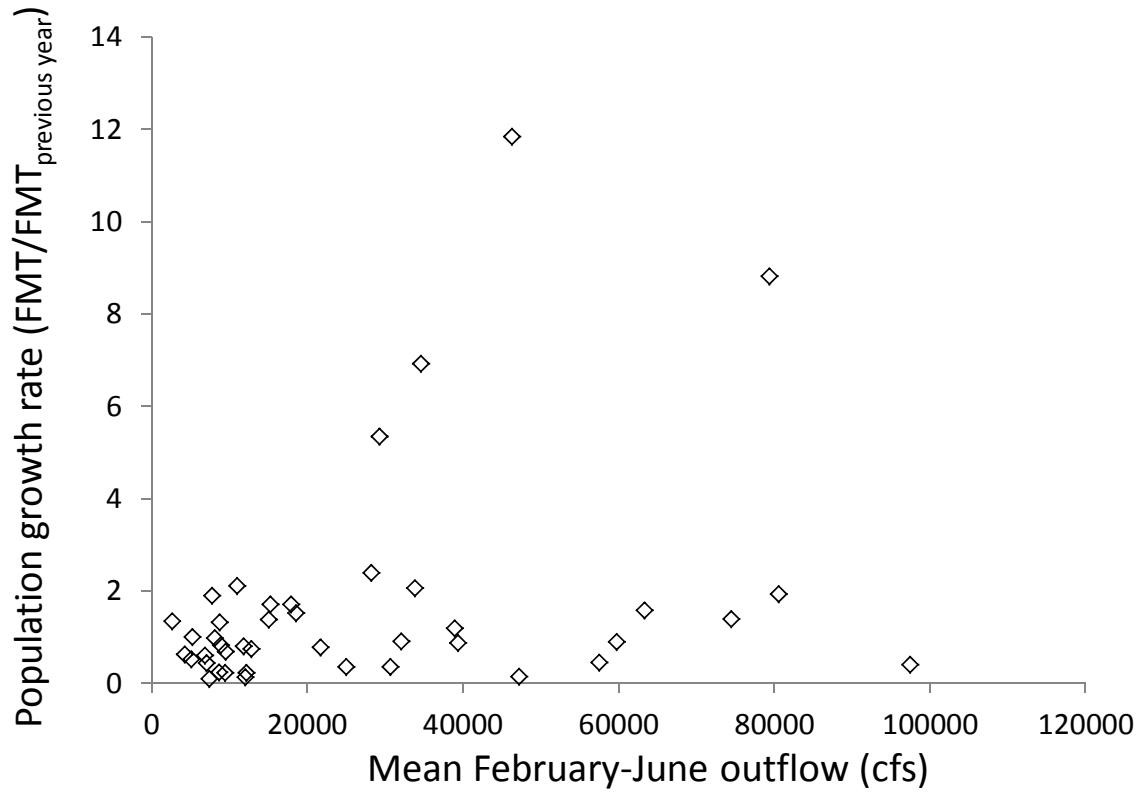

Figure 8. Mean February-June delta outflow plotted against population growth rate of delta smelt.

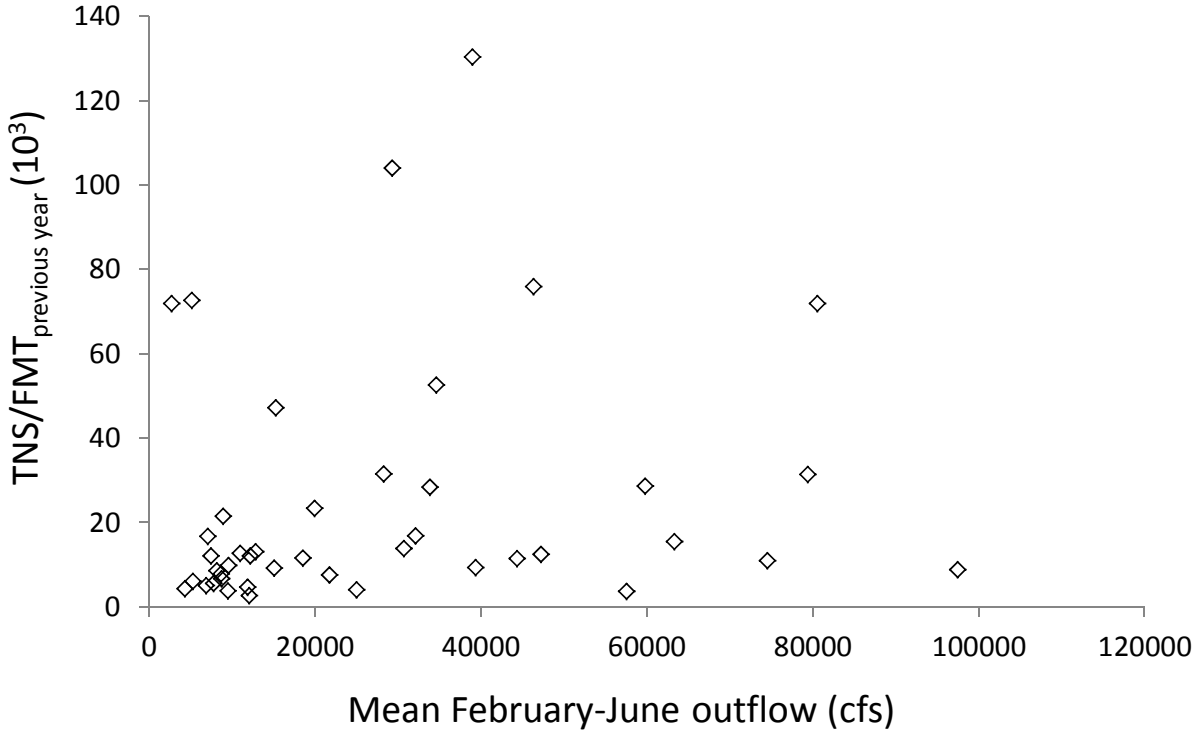

Figure 9. Mean February-June delta outflow plotted against the ratio $TNS/FMT_{previous\ year}$.