DEPARTMENT OF WATER RESOURCES
Division of Operations and Maintenance
3310 El Camino Avenue, Suite 300
Sacramento, California 95821

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

May 17, 2021

Ms. Eileen Sobeck
Executive Director
California State Water Resources Control Board
1001 I Street
Sacramento, California 95814

Subject: 2021 Temporary Urgency Change Petition Regarding Delta Water Quality

Dear Ms. Sobeck,

The U.S. Bureau of Reclamation (Reclamation) and California Department of Water Resources (DWR) jointly submit the attached 2021 Temporary Urgency Change Petition (2021 TUCP) to request the California State Water Resources Control Board (Water Board) consider modifying requirements of Reclamation's and DWR' s water right permits to enable changes in operations of the Central Valley Project (CVP) and State Water Project (SWP) (collectively Projects) that will allow for delivery of water with conservation for later instream uses and water quality requirements.

Water Year 2021 is currently the driest on record since 1977. Although well below average rainfall, the snowpack in March, 2021 indicated that sufficient reservoir inflow was likely available to meet requirements. Conditions significantly changed at the end of April 2021 when it became clear that expected reservoir inflow from snowmelt failed to materialize. The May 90% exceedence forecast for the water year Sacramento Valley Four River Index identified a reduction of expected runoff of 685 TAF from those generated only a month earlier in April. The combination of factors, including the May 2021 inflow forecast deficit being far less than predictable with available forecasting methods, parched watershed soils and extremely low rainfall, continued dry and warm conditions, and limited available water supplies in the Sacramento – San Joaquin Bay-Delta (Delta) create an urgent need to act. As announced by the Governor in his May 10, 2021 Emergency Proclamation (Emergency Proclamation) on drought conditions for the Bay-Delta and other watersheds, the continuation of extremely dry conditions in the Delta watershed mean there is not an adequate water supply to meet water right permit obligations for instream flows and water quality under Water Rights Decision 1641 (D-1641).

As described in the attached 2021 TUCP and consistent with Directive 4 of the Emergency Proclamation, Reclamation and DWR are petitioning the Water Board to modify certain terms of the Projects' water rights permits from what is currently provided in D-1641 from June 1 to August 15, 2021:

Timeframe	Proposed Action
June 1 through July 31, 2021	June 1 through June 30: Reduce net delta outflow index (NDOI) requirements for salinity control from 4,000 cubic feet per second (cfs) to 3,000 cfs on a 14-day running average
	July 1 through July 31: Reduce NDOI requirements for salinity control from 4,000 cfs to 3,000 cfs on a monthly average. D-1641, Table 3, footnote 8 remains applicable
	Cap the combined SWP and CVP exports at 1,500 cfs when Delta outflow is less than 4,000 cfs. SWP and CVP exports may exceed 1,500 cfs when Delta outflow meets D-1641 or for moving transfer

Timeframe	Proposed Action
	water (after July 1)
June 1 through August 15, 2021	Relocate the Western Delta Agriculture compliance point from Emmaton to Threemile Slough.

In addition, from June 1 through August 31, DWR and Reclamation will confer weekly with the Water Board to coordinate management of water supplies during the course of the declared drought emergency. DWR and Reclamation will utilize the Water Operations Management Team (WOMT), comprised of staff from Reclamation, DWR, National Marine Fisheries Service (NMFS), United States Fish and Wildlife (USFWS), California Department of Fish and Wildlife (CDFW), and the Water Board, for this coordination. The WOMT meets weekly to provide hydrology and operations updates and will be also used to discuss TUCP actions and other drought actions, as appropriate. The 2021 TUCP is based on operations described in the 2020 Record of Decision implementing Alternative 1, which was consulted upon for the 2019 NMFS and USFWS Biological Opinions for the Re-initiation of Consultation on the Long-Term Operation of the CVP and SWP, and the 2020 Incidental Take Permit from CDFW for Long-Term Operation of the SWP, as analyzed in the Final Environmental Impact Report certified by DWR on March 27, 2020.

In support of the 2021 TUCP, Reclamation and DWR have prepared a Biological Review (Attachment 2 of the 2021 TUCP Petition) in compliance with the Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code), which establishes California's statutory authority for the protection of water quality. The beneficial uses protected in the Regional Water Quality Control Boards' Basin Plans include fish and wildlife, rare, threatened, or endangered species, and their habitats. As described in the 2021 TUCP, the proposed changes in operations will not injure other lawful users of water; will not unreasonably effect public trust resources such as fish and wildlife or other instream beneficial uses; and are in the public interest.

If sufficient precipitation were to occur to systemically recover upstream storage, then the Projects could resume operating to the D-1641 objectives, as appropriate. However, if critically dry conditions in the Bay-Delta watershed persist, Reclamation and DWR, through a team of managers from their agencies, will continue to meet with the Water Board staff to consider additional modifications of D-1641 water quality and flow objectives and to coordinate management of water supplies during the course of the declared drought emergency.

We urge the Water Board to approve the 2021 TUCP and look forward to cooperatively working with the Water Board and its staff during this challenging period to manage Delta water resources for the benefit of the people and natural resources of the state of California.

Ernest A Conant

Digitally signed by Ernest A Conant
Date: 2021.05.17 10:00:42 -07'00'

Karla A. Nemeth
Director
Department of Water Resources

Ernest A. Conant
Regional Director
United State Bureau of Reclamation

Please indicate County where your project is located here:

Various

MAIL FORM AND ATTACHMENTS TO:
State Water Resources Control Board
DIVISION OF WATER RIGHTS
P.O. Box 2000, Sacramento, CA 95812-2000
Tel: (916) 341-5300 Fax: (916) 341-5400
http://www.waterboards.ca.gov/waterrights

PETITION FOR CHANGE

Separate petitions are required for each water right. Mark all areas that apply to your proposed change(s). Incomplete forms may not be accepted. Location and area information must be provided on maps in accordance with established requirements. (Cal. Code Regs., tit. 23, § 715 et seq.) Provide attachments if necessary.

☐ **Point of Diversion** Wat. Code, § 1701
☐ **Point of Rediversion** Cal. Code Regs., tit. 23, § 791(e)
☐ **Place of Use** Wat. Code, § 1701
☐ **Purpose of Use** Wat. Code, § 1701
☐ **Distribution of Storage** Cal. Code Regs., tit. 23, § 791(e)
☒ **Temporary Urgency** Wat. Code, § 1435
☐ **Instream Flow Dedication** Wat. Code, § 1707
☐ **Waste Water** Wat. Code, § 1211
☐ **Split** Cal. Code Regs., tit. 23, § 836
☐ **Terms or Conditions** Cal. Code Regs., tit. 23, § 791(e)
☐ **Other**

Application Various Permit Various License Various Statement

I (we) hereby petition for change(s) noted above and described as follows:

Point of Diversion or Rediversion – Provide source name and identify points using both Public Land Survey System descriptions to ¼-¼ level and California Coordinate System (NAD 83).
Present: Not requested

Proposed: No change

Place of Use – Identify area using Public Land Survey System descriptions to ¼-¼ level; for irrigation, list number of acres irrigated.
Present: Not requested

Proposed: No change

Purpose of Use
Present: Not requested

Proposed: No change

Split
Provide the names, addresses, and phone numbers for all proposed water right holders.

Not requested

In addition, provide a separate sheet with a table describing how the water right will be split between the water right holders: for each party list amount by direct diversion and/or storage, season of diversion, maximum annual amount, maximum diversion to offstream storage, point(s) of diversion, place(s) of use, and purpose(s) of use. Maps showing the point(s) of diversion and place of use for each party should be provided.

Distribution of Storage
Present: Not requested

Proposed: No change

Temporary Urgency
This temporary urgency change will be effective from to .

Include an attachment that describes the urgent need that is the basis of the temporary urgency change and whether the change will result in injury to any lawful user of water or have unreasonable effects on fish, wildlife or instream uses.

Instream Flow Dedication – Provide source name and identify points using both Public Land Survey System descriptions to ¼-¼ level and California Coordinate System (NAD 83).
Upstream Location: Not requested

Downstream Location: Not requested

List the quantities dedicated to instream flow in either: cubic feet per second or gallons per day:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Will the dedicated flow be diverted for consumptive use at a downstream location? Yes No
If yes, provide the source name, location coordinates, and the quantities of flow that will be diverted from the stream.

Waste Water
If applicable, provide the reduction in amount of treated waste water discharged in cubic feet per second.

Will this change involve water provided by a water service contract which prohibits your exclusive right to this treated waste water? ☐ Yes ☒ No

Will any legal user of the treated waste water discharged be affected? ☐ Yes ☒ No

General Information – For all Petitions, provide the following information, if applicable to your proposed change(s).

Will any current Point of Diversion, Point of Storage, or Place of Use be abandoned? ☐ Yes ☒ No

I (we) have access to the proposed point of diversion or control the proposed place of use by virtue of:
☒ ownership ☐ lease ☐ verbal agreement ☐ written agreement

If by lease or agreement, state name and address of person(s) from whom access has been obtained.

Give name and address of any person(s) taking water from the stream between the present point of diversion or rediversion and the proposed point of diversion or rediversion, as well as any other person(s) known to you who may be affected by the proposed change.

All Right Holders Must Sign This Form: I (we) declare under penalty of perjury that this change does not involve an increase in the amount of the appropriation or the season of diversion, and that the above is true and correct to the best of my (our) knowledge and belief. Dated at .

Ernest A Conant Digitally signed by Ernest A Conant
Date: 2021.05.17 10:01:02 -07'00'

Right Holder or Authorized Agent Signature

Right Holder or Authorized Agent Signature

NOTE: All petitions must be accompanied by:
(1) the form Environmental Information for Petitions, including required attachments, available at:
http://www.waterboards.ca.gov/waterrights/publications_forms/forms/docs/pet_info.pdf
(2) Division of Water Rights fee, per the Water Rights Fee Schedule, available at:
http://www.waterboards.ca.gov/waterrights/water_issues/programs/fees/
(3) Department of Fish and Wildlife fee of $850 (Pub. Resources Code, § 10005)

State of California
State Water Resources Control Board
DIVISION OF WATER RIGHTS
P.O. Box 2000, Sacramento, CA 95812-2000
Tel: (916) 341-5300   Fax: (916) 341-5400
http://www.waterboards.ca.gov/waterrights

ENVIRONMENTAL INFORMATION FOR PETITIONS

This form is required for all petitions.

Before the State Water Resources Control Board (State Water Board) can approve a petition, the State Water Board must consider the information contained in an environmental document prepared in compliance with the California Environmental Quality Act (CEQA). This form is not a CEQA document. If a CEQA document has not yet been prepared, a determination must be made of who is responsible for its preparation. As the petitioner, you are responsible for all costs associated with the environmental evaluation and preparation of the required CEQA documents. Please answer the following questions to the best of your ability and submit any studies that have been conducted regarding the environmental evaluation of your project. If you need more space to completely answer the questions, please number and attach additional sheets.

DESCRIPTION OF PROPOSED CHANGES OR WORK REMAINING TO BE COMPLETED

For a petition for change, provide a description of the proposed changes to your project including, but not limited to, type of construction activity, structures existing or to be built, area to be graded or excavated, increase in water diversion and use (up to the amount authorized by the permit), changes in land use, and project operational changes, including changes in how the water will be used. For a petition for extension of time, provide a description of what work has been completed and what remains to be done. Include in your description any of the above elements that will occur during the requested extension period.

As announced by the Governor in his May 10, 2021 Emergency Proclamation on drought conditions for the Sacramento – San Joaquin Bay-Delta (Delta) and other watersheds, the continuation of extremely dry conditions in the Delta watershed mean there is not an adequate water supply to meet water right permit obligations for instream flows and water quality under Water Rights Decision 1641 (D-1641). Thus, United States Bureau of Reclamation (Reclamation) and California Department of Water Resources (DWR) submit this 2021 Temporary Urgency Change Petition (2021 TUCP) requesting the Water Board approve modification to certain terms of the Central Valley Project (CVP) and State Water Project (SWP) water rights permits from what is currently provided in D-1641 from June 1 to August 15, 2021. Water Year 2021 is currently the driest on record since 1977. Although well below average rainfall, the snowpack in March, 2021 indicated that sufficient reservoir inflow was likely available to meet requirements. Conditions significantly changed at the end of April 2021 when it became clear that expected reservoir inflow from snowmelt failed to materialize. The May 90% exceedence forecast for the water year Sacramento Valley Four River Index identified a reduction of expected runoff of 685 TAF from those generated only a month earlier in April. The combination of factors, including the May 2021 inflow forecast deficit being far less than predictable with available forecasting methods, parched watershed soils and extremely low rainfall, continued dry and warm conditions, and limited available water supplies in the Delta create an urgent need to act.

As stated in the 2021 TUCP, the proposed changes in operations will not injure other lawful users of water, will not unreasonably affect public trust resources such as fish and wildlife or other instream beneficial uses, and are in the public interest. If sufficient precipitation were to occur to systemically recover upstream storage, then the Projects could resume operating to the D-1641 objectives, as appropriate. However, if critically dry conditions in the Bay-Delta watershed persist, Reclamation and DWR, through a team of managers from their agencies, will continue to meet with the Water Board staff to consider additional modifications of D-1641 water quality and flow objectives and to coordinate management of water supplies during the course of the declared drought emergency.

The 2021 TUCP is only for modification to certain terms of the CVP and SWP water right permits from what is currently provided in D-1641 and does not include construction activities, changes in land use, nor changes to how the water will be used.

See Attachment 1 "Supplement to 2021 Temporary Urgency Change to Certain DWR and Reclamation Permit Terms as Provided in D-1641," and Attachment 2 "Biological Review for the 2021 June through August Temporary Urgency Change Petition," and Attachment 3 “Delta Summary”

Insert the attachment number here, if applicable:

Coordination with Regional Water Quality Control Board

For change petitions only, you must request consultation with the Regional Water Quality Control Board regarding the potential effects of your proposed change on water quality and other instream beneficial uses. (Cal. Code Regs., tit. 23, § 794.) In order to determine the appropriate office for consultation, see: http://www.waterboards.ca.gov/waterboards_map.shtml. Provide the date you submitted your request for consultation here, then provide the following information.

Date of Request

Will your project, during construction or operation, (1) generate waste or wastewater containing such things as sewage, industrial chemicals, metals, or agricultural chemicals, or (2) cause erosion, turbidity or sedimentation? Yes No

Will a waste discharge permit be required for the project? Yes No

If necessary, provide additional information below:

Insert the attachment number here, if applicable:

Local Permits

For temporary transfers only, you must contact the board of supervisors for the county(ies) both for where you currently store or use water and where you propose to transfer the water. (Wat. Code § 1726.) Provide the date you submitted your request for consultation here.

Date of Contact

For change petitions only, you should contact your local planning or public works department and provide the information below.

Person Contacted: Date of Contact:

Department: Phone Number:

County Zoning Designation:

Are any county permits required for your project? If yes, indicate type below. Yes No

Grading Permit Use Permit Watercourse Obstruction Permit

Change of Zoning General Plan Change Other (explain below)

If applicable, have you obtained any of the permits listed above? If yes, provide copies. Yes No

If necessary, provide additional information below:

Insert the attachment number here, if applicable:

Federal and State Permits

Check any additional agencies that may require permits or other approvals for your project:

Regional Water Quality Control Board   Department of Fish and Game

Dept of Water Resources, Division of Safety of Dams   California Coastal Commission

State Reclamation Board   U.S. Army Corps of Engineers   U.S. Forest Service

Bureau of Land Management   Federal Energy Regulatory Commission

Natural Resources Conservation Service

Have you obtained any of the permits listed above? If yes, provide copies.   Yes   No

For each agency from which a permit is required, provide the following information:

Agency	Permit Type	Person(s) Contacted	Contact Date	Phone Number

If necessary, provide additional information below:

Insert the attachment number here, if applicable:

Construction or Grading Activity

Does the project involve any construction or grading-related activity that has significantly altered or would significantly alter the bed, bank or riparian habitat of any stream or lake?   Yes   No

If necessary, provide additional information below:

Insert the attachment number here, if applicable:

Archeology

Has an archeological report been prepared for this project? If yes, provide a copy. ☐ Yes ☒ No

Will another public agency be preparing an archeological report? ☐ Yes ☒ No

Do you know of any archeological or historic sites in the area? If yes, explain below. Yes No

If necessary, provide additional information below:

Insert the attachment number here, if applicable:

Photographs

For all petitions other than time extensions, attach complete sets of color photographs, clearly dated and labeled, showing the vegetation that exists at the following three locations:

Along the stream channel immediately downstream from each point of diversion

Along the stream channel immediately upstream from each point of diversion

At the place where water subject to this water right will be used

Maps

For all petitions other than time extensions, attach maps labeled in accordance with the regulations showing all applicable features, both present and proposed, including but not limited to: point of diversion, point of rediversion, distribution of storage reservoirs, point of discharge of treated wastewater, place of use, and location of instream flow dedication reach. (Cal. Code Regs., tit. 23, §§ 715 et seq., 794.)

Pursuant to California Code of Regulations, title 23, section 794, petitions for change submitted without maps may not be accepted.

All Water Right Holders Must Sign This Form:
I (we) hereby certify that the statements I (we) have furnished above and in the attachments are complete to the best of my (our) ability and that the facts, statements, and information presented are true and correct to the best of my (our) knowledge. Dated at .

Ernest A Conant Digitally signed by Ernest A Conant
Date: 2021.05.17 10:01:28 -07'00'

Water Right Holder or Authorized Agent Signature

Water Right Holder or Authorized Agent Signature

NOTE:

- **Petitions for Change may not be accepted unless you include proof that a copy of the petition was served on the Department of Fish and Game. (Cal. Code Regs., tit. 23, § 794.)**
- **Petitions for Temporary Transfer may not be accepted unless you include proof that a copy of the petition was served on the Department of Fish and Game and the board of supervisors for the county(ies) where you currently store or use water and the county(ies) where you propose to transfer the water. (Wat. Code § 1726.)**

Attachment 1

Supplement to 2021 Temporary Urgency Change to Certain DWR and Reclamation Permit Terms as Provided in D-1641

ATTACHMENT 1

SUPPLEMENT TO 2021 TEMPORARY URGENCY CHANGE TO CERTAIN DWR AND RECLAMATION PERMIT TERMS AS PROVIDED IN D-1641

California Department of Water Resources

Application Numbers 5630, 14443, 14445A, 17512, 17514A, Permits 16478, 16479, 16481, 16482, 16483

U.S. Bureau of Reclamation Permits for the Central Valley Project

Application Numbers: 23, 234, 1465, 5626, 5628, 5638, 9363, 9364, 9366, 9367, 9368, 13370, 13371, 14858A, 14858B, 15374, 15375, 15376,15764, 16767, 16768, 17374, 17376, 19304, 22316

License Number 1986 and Permit Numbers: 11885, 11886, 12721, 11967, 11887, 12722,12723, 12725, 12726, 12727, 11315, 11316, 16597, 20245,11968,11969, 11970, 12860, 11971, 11972, 11973, 12364, 16600, 15735

I. Requested Change

While 2021 started out with dry conditions, the hydrology in late April 2021 significantly deteriorated with significant and uncharacteristic deficits in watershed runoff, especially for the Sacramento River. Although well below average rainfall, the snowpack in March, 2021 indicated that sufficient reservoir inflow was likely available to meet requirements. Conditions significantly changed at the end of April 2021 when it became clear that expected reservoir inflow from snowmelt failed to materialize, as much of the snowmelt was absorbed into the parched soils or sublimated into the atmosphere. The Sacramento Four River Index 90% exceedence water year forecast decreased between April and May, 2021 by 685 thousand acre-feet (TAF). The combination of factors, including May 2021 runoff reduction being far greater than recent norms would anticipate, extremely low rainfall, dry soils, continued dry and warm conditions, and limited available water supplies in the Sacramento – San Joaquin Bay-Delta (Delta) create an urgent need to act. The current extremely dry conditions in the Delta watershed pose challenges to the effective management of the Central Valley Project (CVP) and State Water Project (SWP) (collectively Projects). The U.S. Bureau of Reclamation (Reclamation) and Department of Water Resources (DWR) do not believe that there is an adequate water supply to meet all obligations under the State Water Resources Control Board’s Water Rights Decision 1641 (D-1641). The May 11, 2021 Bulletin 120 (B120) hydrological projections indicate this summer poses significant risks to maintaining M&I water quality standards, temperature control, minimum instream flow, power generation and the ability to repel salinity in the Delta later this year. Under the current circumstances, Reclamation and DWR believe the most prudent course of action is to conserve storage in upstream reservoirs until significant improvement of that storage is realized. Consequently, DWR and Reclamation are requesting the State Water Resources Control Board (Water Board) change terms of the Projects' water rights permits from what is currently provided in D-1641 for the period of June 1 through August 15, 2021 as summarized in **Table 1** and outlined below.

Table 1: Summary of TUCP Operations Framework

Timeframe	Proposed Action
June 1 through July 31, 2021	June 1 through June 30: Reduce net delta outflow index (NDOI) requirements for salinity control from 4,000 cubic feet per second (cfs) to 3,000 cfs on a 14-day running average
	July 1 through July 31: Reduce NDOI requirements for salinity control from 4,000 cfs to 3,000 cfs on a monthly average. D-1641, Table 3, footnote 8 remains applicable
	Cap the combined SWP and CVP exports at 1,500 cfs when Delta outflow is less than 4,000 cfs. SWP and CVP exports may exceed 1,500 cfs when Delta outflow meets D-1641 or for moving transfer water (after July 1)
June 1 through August 15, 2021	Relocate the Western Delta Agriculture compliance point from Emmaton to Threemile Slough

In addition, from June 1 through August 31, 2021, DWR and Reclamation will meet and confer weekly with the Water Board to coordinate management of water supplies during the course of the declared drought emergency. DWR and Reclamation will utilize the Water Operations Management Team (WOMT), comprised of staff from Reclamation, DWR, National Marine Fisheries Service (NMFS), United States Fish and Wildlife (USFWS), California Department of Fish and Wildlife (CDFW), and the Water Board, for this coordination effort. The WOMT meets weekly to provide hydrology and operations updates, and will discuss TUCP actions and other drought actions as appropriate. Information on coordination with the WOMT and other technical teams is provided below and in Attachment 2 "Biological Review for the 2021 June through August Temporary Urgency Change Petition”. In addition, as part of this petition, DWR and Reclamation will continue to coordinate with Long-term Operation Agency working groups to develop a robust drought monitoring program through completion of the 2021 Drought Contingency Plan, with updates to WOMT.

The Projects are currently operating to D-1641 outflow and water quality requirements with significant storage releases given the lack of precipitation and natural flow to the system. As indicated above, forecasts indicate that relief in some of these operations is needed, along with other actions, in order to have water available later in the year for M&I water quality standards, Delta salinity control, and aquatic species cold water pool protection.

Reclamation and DWR may have a need to request further modifications of the Rio Vista flow requirement contained in D-1641 for September through December 2021. It is not yet clear whether such request will be necessary. If necessary, Reclamation and DWR will plan to request modification of the Rio Vista flow standard in September through December, 2021 to be no less than 2,500 cfs. Below are the requested changes in operations for this 2021 TUCP:

1) Reduction of Outflow Requirements (June 1 through June 30, 2021)

Beginning June 1, Reclamation and DWR request modification of D-1641 outflow. The requested changes would modify the minimum NDOI described in Figure 3 of D-1641 during the month of June to no less than 3,000 cfs on a 14-day average, to allow for some storage conservation for fishery protection and improving carryover storage while meeting minimum CVP and SWP export levels.

2) Reduction of Outflow Requirements (July 1 through July 31, 2021)

Beginning July 1, Reclamation and DWR request modification of D-1641 outflow. The requested changes would modify the minimum NDOI described in Figure 3 of D-1641 in July from a monthly average of 4,000 cfs to a monthly average of 3,000 cfs (Table 3, footnote 8 remains applicable) to allow for some storage conservation for fishery protection and improving carryover storage while meeting minimum CVP and SWP export levels.

3) Exports (June 1 through July 31, 2021)

June 1 through July 31, the maximum combined SWP and CVP exports will be limited to 1,500 cfs when Delta outflow is less than 4,000 cfs. SWP and CVP exports may exceed 1,500 cfs when Delta outflow meets D-1641 or for moving transfer water (after July 1, 2021).

The minimum combined export of 1,500 cfs, as referenced in Table 1, is consistent with other regulatory requirements. The combined 1,500 cfs export rate represents a sustainable rate and provides the CVP and SWP real-time operational flexibility in the Delta to meet D-1641 salinity and water quality standards, as Delta conditions can rapidly change due to weather and tidal cycles. Absent this flexibility, additional sustained upstream releases would be required to manage the real-time changes in Delta conditions. In addition, the 1,500 cfs rate allows the CVP the ability to maintain a one-unit operation, and minimizes the need to start and stop the unit in a 24-hour period (i.e. cycling) which could result in catastrophic damage. This rate also allows the SWP to meet Byron Bethany Irrigation District diversions, who divert from Clifton Court Forebay, and also provides for water supply delivery to the SWP South Bay Public Water Agencies who are not directly connected to San Luis Reservoir and who rely on direct diversions from the Delta to meet their municipal and industrial demands.

4) Modification of the Western Delta Salinity Compliance Point (June 1 through August 15, 2021)

In a critical year, D-1641 requires the Agricultural Western Delta Salinity Standard at Emmaton have a 14-day running average of 2.78 millimhos per centimeter from April 1 to August 15. Reclamation and DWR are petitioning the Water Board to modify this requirement by moving the compliance location from Emmaton to Threemile Slough on the Sacramento River from June 1 through August 15, 2021.

II. Basis to Authorize Modification of Water Rights

The California Water Code, Section 1435, authorizes the Water Board to grant a temporary change order for any permittee or licensee who has an urgent need to change a permit or license, where the Water Board finds: 1) the permittee has an urgent need for the proposed change, 2) the proposed change may be made without injury to any other lawful user of water, 3) the proposed change can be made without unreasonably affecting fish, wildlife, or other instream beneficial uses, 4) the proposed change is in the public interest. The law also requires consultation with representatives of the Department of Fish and Wildlife.

DWR and Reclamation provide the information below to support the findings necessary under California Water Code section 1435. The current hydrology and storage are critically low and the modifications requested, along with additional actions, are intended to decrease the risk that DWR and Reclamation will be unable to provide future protection of beneficial uses that rely upon storage from the Projects. Therefore, the modifications requested are urgent and critical and can be implemented in a manner satisfying requirements of section 1435, as described below.

1) DWR and Reclamation Have an Urgent Need for the Proposed Change

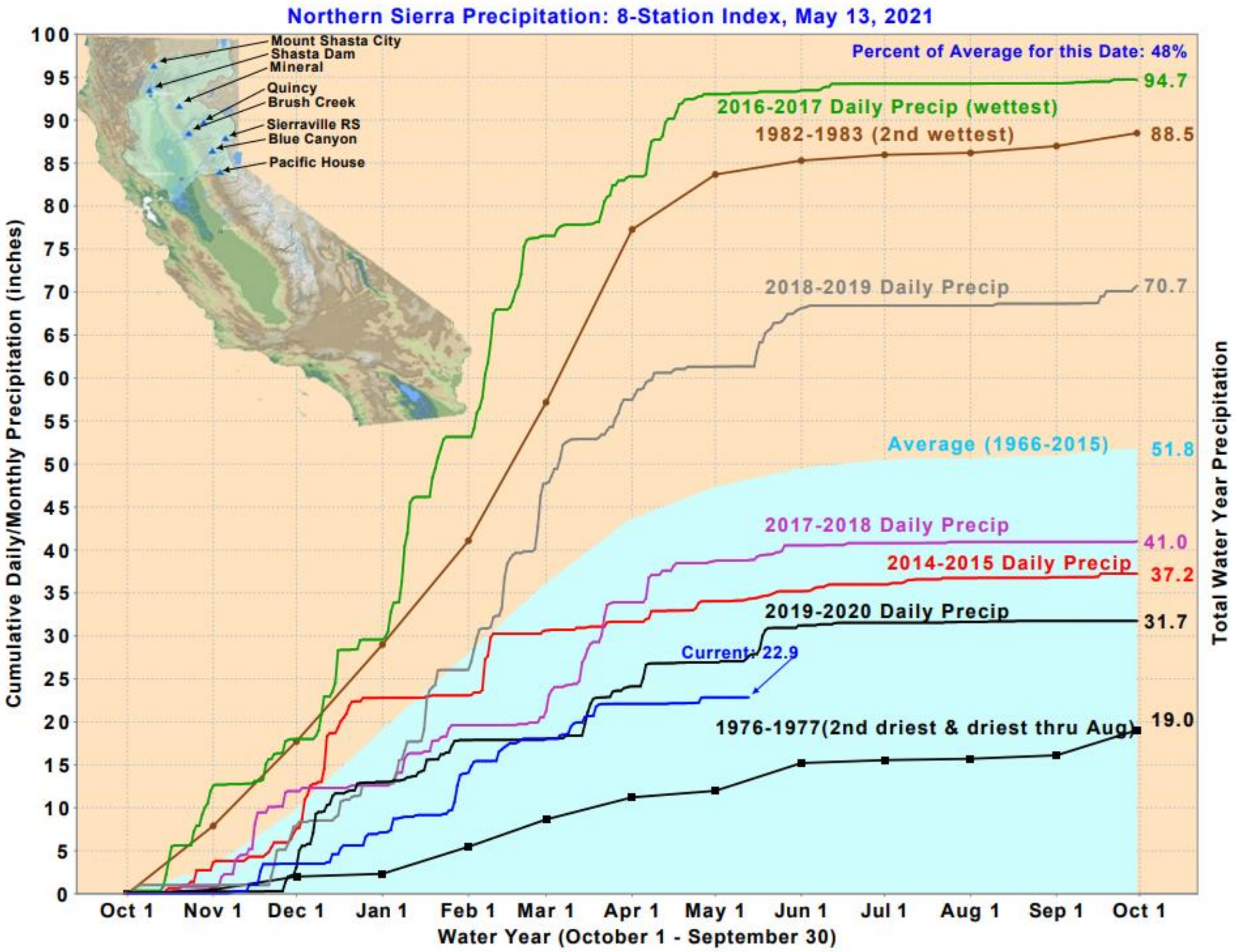
For Water Year (WY) 2021, the precipitation to date is below 50 percent of average, which ties this year for the third driest year on record (https://water.ca.gov/News/News-Releases/2021/April-21/Statewide-Snowpack-Well-Below-Normal-as-Wet-Season-Winds-Down) and the driest since D-1641, Endangered Species Act (ESA), Central Valley Project Improvement Act (CVPIA) and many other environmental regulations were put in place. As a result of this record aridity, many reservoir levels throughout the state are significantly below average. Conditions deteriorated in April 2021 when projected reservoir inflows from snowmelt did not materialize. This was uncharacteristic and likely due to unpredictably dry soils soaking up snowmelt and substantially reducing runoff into CVP and SWP reservoirs.

If the requested modification in Delta outflow requirement is granted, Reclamation and DWR forecast that a minimum Delta Outflow of 3,000 cfs will provide some additional preservation of cold water pool in reservoirs for aquatic species later in the year.

As provided in the Drought Contingency Plan Addendum, the October through March precipitation for the Northern Sierra 8-Station Index (8SI) for WY 2021 was the third driest on record, while the San Joaquin Basin and the Tulare Basin are ranked as the fifth and second, respectively. Observed October through March 2021 runoff for the Sacramento Valley, San Joaquin Valley, and Tulare Lake Basin were the third, sixth, and eighth driest in historical record, respectively. Lastly, the peak snowpack throughout the Sierra Basins was observed around the third week of March 2021 and is quickly diminishing with dismal runoff due to very dry soil conditions. Because of the continued dry conditions in April 2021, the May 1, 2021 runoff forecast was reduced substantially for all exceedance levels. Given these drier conditions, the 8SI for water years 2020 through 2021 are now the second driest on record, behind the drought of 1976 through 1977.

As of May 10, 2021, total storage at the SWP's Lake Oroville is 1.46 million acre-feet (MAF), the storage at the CVP's Shasta Reservoir is 2.2 MAF and Folsom Reservoir is 370 TAF. Storage in all three reservoirs is significantly below the historical averages (see http://cdec.water.ca.gov/cgi-progs/products/rescond.pdf). Of even more concern is the lack of snowpack in the watersheds feeding into the Projects' major Sacramento Valley reservoirs. As of May 11, 2021, the snowpack of the northern Sierra basin is 7% of historic average. **Figure 1** shows the precipitations of May 13, 2021.

Figure 1: Northern Sierra 8-Station Index



Without a modification of the D-1641 standards as described above, Reclamation and DWR would be required to increase releases from upstream reservoirs in June and July 2021 to meet Delta outflow levels up to 4,000 cfs. If the Projects were able to instead meet 3,000 cfs outflow, the estimated improvement to upstream reservoir storage could be in the range of 60 to 120 TAF. However, meeting water quality standards may result in a delta outflow greater than 3,000 cfs, and therefore this savings should be viewed as an upper limit. Such an outflow rate can also provide the water quality necessary to maintain minimum exports of up to 1,500 cfs and is contingent upon modification of Delta salinity standards. The 3,000 cfs outflow rate, in combination with the installation of a salinity barrier at West False River, is the estimated minimum nominal outflow rate assumed to maintain salinity levels above 250 mg/L chloride for municipal and industrial water supply at all export locations specified under Table 1 of D-1641.

a. Authorization to Take Extraordinary Measures

On May 10, 2021, Governor Newsom issued a Proclamation of a State of Emergency (Emergency Proclamation) (see https://www.gov.ca.gov/wp-content/uploads/2021/05/5.10.2021-Drought-Proclamation.pdf). This Emergency Proclamation includes the following directives:

4. To ensure adequate, minimal water supplies for purposes of health, safety, and the environment, the Water Board shall consider modifying requirements for reservoir releases or diversion limitations – including where existing requirements were established to implement a water quality control plan – to conserve water upstream later in the year in order to protect cold water pools for salmon and steelhead, improve water quality, protect carry over storage, or ensure minimum health and safety water supplies. The Water Board shall require monitoring and evaluation of any such changes to inform future action. The actions taken in the Sacramento-San Joaquin Delta Watershed Counties pursuant to this paragraph, Water Code Section 13247 is suspended.

5. To ensure adequate, minimal water supplies for purposes of health, safety, and the environment in the Klamath River and Sacramento-San Joaquin Delta Watershed Counties, the Water Board shall consider emergency regulations to curtail water diversions when water is not available at water right holders' priority of right or to protect releases of stored water. The Department of Water Resources shall provide technical assistance to the Water Board that may be needed to develop appropriate water accounting for these purposes in the Sacramento-San Joaquin Delta Watershed.

11. For purposes of carrying out or approving any actions contemplated by the directives in operative paragraphs 3, 4, 5, 6, 8, and 9, the environmental review by state agencies required by the California Environmental Quality Act in Public Resources Code, Division 13 (commencing with Section 21000) and regulations adopted pursuant to that Division are hereby suspended to the extent necessary to address the impacts of the drought in the Klamath River, Sacramento San Joaquin Delta and Tulare Lake Watershed Counties.

b. Coordination with Water Operations and Watershed Monitoring Technical Teams

Consistent with the Record of Decision for the Long-Term Operation of the CVP/SWP (Reclamation 2020), DWR and Reclamation propose utilizing the team of managers already part of the WOMT. These managers are already authorized to meet weekly and act in order to coordinate management of water supplies and protection of natural resources during the course of the declared drought emergency. The WOMT managers include representatives from the Water Board, California Department of Fish and

Wildlife (CDFW), National Marine Fisheries Service (NMFS) and the Fish and Wildlife Service (USFWS).

Additionally, DWR and Reclamation participate in the Watershed Monitoring Workgroups for each of the Upper Sacramento, Clear Creek, American, Delta, and Stanislaus watersheds ("Watershed Monitoring Workgroups"). Each of the Watershed Monitoring Workgroups is responsible for real-time synthesis of fisheries monitoring information and scheduling specific volumes of water. The Watershed Monitoring Workgroups include technical representatives from federal and State fishery agencies along with stakeholders and will provide information to Reclamation and DWR on species abundance, species distribution, life stage transitions, and other relevant physical parameters.

Reclamation and DWR propose continued discussions, as described in the subsection (c) "Proposed Reporting" below, in order to consider potential modifications to other standards (in conjunction with the outflow requirement) that will best balance the protection of all beneficial uses.

c. <u>Proposed Reporting</u>

As stated in the Emergency Proclamation, the dry conditions and water supply levels are of a magnitude that they present peril to the safety of persons and property. In order to facilitate Directives 4 and 5 of the Emergency Proclamation, DWR and Reclamation propose that the operations and regulatory changes requested in this petition include monitoring using existing stations and programs to ensure that the objectives of this proposal and the requirements of Water Code Section 1435 are met under any changed conditions.

2) The Proposed Change Will Not Result in Injury to Any Other Lawful Users of Water

The Projects currently do not divert natural or abandoned flows that are necessary to meet in-Delta demands. The requested changes to D-1641 will reduce the Projects anticipated releases of stored water to augment natural and abandoned flow to satisfy regulatory requirements. If the Water Board approves the requested changes that result in a reduction in stored water releases, such a reduction could not result in an injury to other legal users of water.

3) The Proposed Change Will Not Result in Unreasonable Impacts to Fish, Wildlife, and Other Instream Uses

Extreme drought conditions are well known to stress the aquatic resources of the Delta estuary and its watershed. Continued dry conditions during the remainder of WY 2021 are expected to adversely affect rearing and migration conditions for delta smelt, longfin smelt, and other species such as winter-run Chinook salmon. Continued dry conditions without modifications to D-1641 could lead to fishery impacts later in the year. For example, extremely low reservoir storage and associated cold water pool could lead to reduced ability to maintain cold water later in the year for winter-run Chinook salmon egg survival. The expected water savings is intended to provide a benefit to upstream storage and allow for some level of salinity and temperature control later in season. Analyses provided in Attachment 2, *Biological Review for the 2021 June through August Temporary Urgency Change Petition*, indicate that there would be no unreasonable impacts to fish, wildlife, or other instream resources in the Delta as a result of the 2021 TUCP relative to baseline conditions, as most of the negative effects described would occur primarily as a result of the overall drought conditions. Effects attributable to the TUCP are limited based on the Biological Review analysis, due to the following factors: nearly all juvenile salmonids will have passed through the Delta prior to the start of the 2021 TUCP period; the TUCP includes a south Delta exports cap; and continuation of existing species management actions to minimize entrainment under the 2019 NMFS and USFWS Biological Opinions for the Re-initiation of Consultation on the Long-Term Operation of the CVP and SWP, and the 2020 Incidental Take Permit from CDFW for Long-Term Operation of the SWP. In addition, while the reduction in outflow due to the TUCP may have some negative and/or beneficial impacts on other native and nonnative species, including the migratory, pelagic, and littoral species, these incremental impacts are expected to be minimal and difficult to quantify/detect given the environmental conditions associated with the drought and the small differences between TUCP and baseline flows relative to hydrological differences between water years. Therefore, there would not be an unreasonable impact of the TUCP on public trust resources such as fish and wildlife or other instream resources.

4) The Proposed Change is in the Public Interest

The public interest is best served by maintaining, for as long into the year as possible, storage to support minimum exports and water quality necessary for the protection of critical water supplies and species protections. The requested changes are in the public interest by preserving water supplies to meet M&I water quality standards, by increasing the duration and likelihood of maintaining minimal salinity control, and by increasing the duration and likelihood of success of maintaining a cold water pool sufficient for sensitive aquatic species. In addition, modifying the Delta outflow as proposed in this petition will increase the probability that the Projects will be able to prevent the uncontrolled intrusion of salinity into the Delta this summer. If by meeting unmodified D-1641 outflow objectives earlier in the year the Projects have insufficient storage to control seawater intrusion, problematic water quality would persist until Northern California receives a rainy season with sufficient runoff to flush the Delta of ocean water to once again allow for in-Delta beneficial uses.

III. Due Diligence has been Exercised

DWR and Reclamation rely upon sound science and methods to forecast and project hydrology and water supply needs. This scientific approach to water management is the most prudent course of action in such a complex and variable system. Based upon this approach, DWR and Reclamation revisit these forecasts and projections frequently and adjust project operations accordingly, which may include additional updates, such as updated hydrodynamic and water quality modeling simulations.

On December 1, 2020, DWR announced an initial SWP allocation of 10%, which amounts to 422,848-acre feet of water, of requested supplies for the 2021 water year (see https://water.ca.gov/News/News-Releases/2020/Dec-20/DWR-Releases-Initial-State-Water-Project-Allocation#:~:text=The%2010%20percent%20initial%20allocation,20%20percent%20set%20in%20May). On February 23, 2021, Reclamation announced the initial 2021 water supply allocation for CVP contractors (see https://www.usbr.gov/newsroom/newsroomold/newsrelease/detail.cfm?RecordID=7374). This announcement, in part, included a 5% allocation of water supply for agricultural water service contractors. On March 23, 2021, Reclamation announced a revised 2021 water supply allocation for CVP contractors (https://www.usbr.gov/newsroom/#/news-release/3796?filterBy=region&region=California-Great%20Basin). This announcement stated that the 5% allocation of water supply for south-of-Delta agricultural water service contractors is no longer available for delivery until further notice. In addition, on March 23, 2021, DWR also announced that the SWP water supply allocation was reduced to 5%, which amounts to 210,266 acre-feet of water (https://water.ca.gov/News/News-Releases/2021/March-21/SWP-Allocation-Update-March-23). On May 5, 2021, Reclamation announced that the 5% allocation of water supply for north-of-Delta agricultural water service contractions is no longer available. Under the current conditions there are significant deficiencies to the water supply available to all SWP and CVP users throughout the system.

Reclamation and DWR have exercised due diligence to avoid the circumstance necessitating this request by beginning this year with relatively high carryover storage after the dry year of 2020. Storage conservation measures in the beginning of water year 2021 helped to meet D-1641 requirements through the winter and early spring. In addition, the Projects exercised due diligence by both initially issuing very low allocations to its water supply contractors and then later further reducing allocations, when the worsening severe dry pattern began to emerge.

Prior to this petition, DWR and Reclamation provided weekly hydrology and condition updates through WOMT. DWR and Reclamation have met with the Water Board staff and with representatives of CDFW, NMFS and USFWS, to discuss the elements of this petition, and will continue to provide updates and to seek their input on how best to manage multiple needs for water supply. In addition, as part of this petition, DWR and Reclamation will continue to coordinate with Long-term Operation Agency working groups to develop a robust drought monitoring program through completion of the 2021 Drought Contingency Plan with updates to WOMT.

EXECUTIVE DEPARTMENT
STATE OF CALIFORNIA

PROCLAMATION OF A STATE OF EMERGENCY

WHEREAS climate change is intensifying the impacts of droughts on our communities, environment, and economy, and California is in a second consecutive year of dry conditions, resulting in drought or near-drought throughout many portions of the State; and

WHEREAS recent warm temperatures and extremely dry soils have further depleted the expected runoff water from the Sierra-Cascade snowpack, resulting in a historic and unanticipated estimated reduction of 500,000 acre feet of water – or the equivalent of supplying water for up to one million households for one year – from reservoirs and stream systems, especially in the Klamath River, Sacramento-San Joaquin Delta, and Tulare Lake Watersheds; and

WHEREAS the extreme drought conditions through much of the State present urgent challenges, including the risk of water shortages in communities, greatly increased wildfire activity, diminished water for agricultural production, degraded habitat for many fish and wildlife species, threat of saltwater contamination of large fresh water supplies conveyed through the Sacramento-San Joaquin Delta, and additional water scarcity if drought conditions continue into next year; and

WHEREAS Californians have saved water through conservation efforts, with urban water use approximately 16% below where it was at the start of the last drought years, and I encourage all Californians to undertake actions to further eliminate wasteful water practices and conserve water; and

WHEREAS on April 21, 2021, I issued a proclamation directing state agencies to take immediate action to bolster drought resilience and prepare for impacts on communities, businesses, and ecosystems, and proclaiming a State of Emergency to exist in Mendocino and Sonoma counties due to severe drought conditions in the Russian River Watershed; and

WHEREAS additional expedited actions are now needed in the Klamath River, Sacramento-San Joaquin Delta, and Tulare Lake Watersheds; and

WHEREAS it is necessary to expeditiously mitigate the effects of the drought conditions within the Klamath River Watershed Counties (Del Norte, Humboldt, Modoc, Siskiyou, and Trinity counties), the Sacramento-San Joaquin Delta Watershed Counties (Alameda, Alpine, Amador, Butte, Calaveras, Colusa, Contra Costa, El Dorado, Fresno, Glenn, Lake, Lassen, Madera, Mariposa, Merced, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, San Benito, San Joaquin, Shasta, Sierra, Siskiyou, Solano, Stanislaus, Sutter, Tehama, Trinity, Tuolumne, Yolo, and Yuba counties), and the Tulare Lake Watershed Counties (Fresno, Kern, Kings, and Tulare counties) to ensure the protection of health, safety, and the environment; and

WHEREAS under Government Code Section 8558(b), I find that the conditions caused by the drought conditions, by reason of their magnitude, are or are likely to be beyond the control of the services, personnel, equipment, and facilities of any single local government and require the combined forces of a mutual aid region or regions to appropriately respond; and

WHEREAS under Government Code Section 8625(c), I find that local authority is inadequate to cope with the drought conditions; and

WHEREAS to protect public health and safety, it is critical the State take certain immediate actions without undue delay to prepare for and mitigate the effects of, the drought conditions statewide, and under Government Code Section 8571, I find that strict compliance with various statutes and regulations specified in this proclamation would prevent, hinder, or delay the mitigation of the effects of the drought conditions in the Klamath River, Sacramento-San Joaquin Delta, and Tulare Lake Watershed Counties.

NOW THEREFORE, I, GAVIN NEWSOM, Governor of the State of California, in accordance with the authority vested in me by the State Constitution and statutes, including the California Emergency Services Act, and in particular, Section 8625, **HEREBY PROCLAIM A STATE OF EMERGENCY** to exist in the Klamath River, Sacramento-San Joaquin Delta, and Tulare Lake Watershed Counties due to drought.

IT IS HEREBY ORDERED THAT:

1. The orders and provisions contained in my April 21, 2021 Proclamation remain in full force and effect, except as modified. State agencies shall continue to implement all directions from that proclamation and accelerate implementation where feasible.

2. To ensure that equipment and services necessary for drought response can be procured quickly, the provisions of the Government Code and the Public Contract Code applicable to procurement, state contracts, and fleet assets, including, but not limited to, advertising and competitive bidding requirements, are hereby suspended to the extent necessary to address the effects of the drought in the Klamath River, Sacramento-San Joaquin Delta, and Tulare Lake Watershed Counties. Approval of the Department of Finance is required prior to the execution of any contract entered into pursuant to this provision.

3. To support voluntary approaches where hydrology and other conditions allow, the Department of Water Resources and the State Water Resources Control Board (Water Board) shall expeditiously consider requests to move water, where appropriate, to areas of need, including requests involving voluntary water transfers, forbearance agreements, water exchanges, or other means. Specifically, the Department of Water Resources and Water Board shall prioritize transfers that retain a higher percentage of water in upstream reservoirs on the Sacramento, Feather, and American Rivers for release later in the year. If necessary, the Department of Water Resources shall request that the Water Board consider changes to water rights permits to enable such voluntary movements of water. For actions taken in the Klamath River and Sacramento-San Joaquin Delta Watershed Counties pursuant to this paragraph, the following requirements of the Water Code are suspended:

   a. Section 1726(d) requirements for written notice and newspaper publication, provided that the Water Board shall post notice on its website and provide notice through electronic subscription services where interested persons can request information about temporary changes; and

b. Section 1726(f) requirement of a 30-day comment period, provided that the Water Board shall afford a 15-day comment period.

4. To ensure adequate, minimal water supplies for purposes of health, safety, and the environment, the Water Board shall consider modifying requirements for reservoir releases or diversion limitations—including where existing requirements were established to implement a water quality control plan—to conserve water upstream later in the year in order to protect cold water pools for salmon and steelhead, improve water quality, protect carry over storage, or ensure minimum health and safety water supplies. The Water Board shall require monitoring and evaluation of any such changes to inform future actions. For actions taken in the Sacramento-San Joaquin Delta Watershed Counties pursuant to this paragraph, Water Code Section 13247 is suspended.

5. To ensure protection of water needed for health, safety, and the environment in the Klamath River and Sacramento-San Joaquin Delta Watershed Counties, the Water Board shall consider emergency regulations to curtail water diversions when water is not available at water right holders' priority of right or to protect releases of stored water. The Department of Water Resources shall provide technical assistance to the Water Board that may be needed to develop appropriate water accounting for these purposes in the Sacramento-San Joaquin Delta Watershed.

6. To ensure critical instream flows for species protection in the Klamath River and Sacramento-San Joaquin Delta Watersheds, the Water Board and Department of Fish and Wildlife shall evaluate the minimum instream flows and other actions needed to protect salmon, steelhead, and other native fishes in critical streams systems in the State and work with water users and other parties on voluntary measures to implement those actions. To the extent voluntary actions are not sufficient, the Water Board, in coordination with the Department of Fish and Wildlife, shall consider emergency regulations to establish minimum drought instream flows.

7. Operative paragraph 4 of my April 21, 2021 Proclamation is withdrawn and superseded by the following, which shall apply to the Russian River Watershed identified in my April 21, 2021 Proclamation as well as the Klamath River, Sacramento-San Joaquin Delta, and Tulare Lake Watershed Counties:

   To prioritize drought response and preparedness resources, the Department of Water Resources, the Water Board, the Department of Fish and Wildlife, and the Department of Food and Agriculture, in consultation with the Department of Finance, shall:

   a. Accelerate funding for water supply enhancement, water conservation, or species conservation projects.
   b. Identify unspent funds that can be repurposed to enable projects to address drought impacts to people, ecosystems, and economic activities.
   c. Recommend additional financial support for groundwater substitution pumping to support Pacific flyway habitat needs in the lower Sacramento River and Feather River portions of the Central Valley in the Fall of 2021.

8. Consistent with operative paragraph 13 of my April 21, 2021 Proclamation, the Department of Water Resources shall take actions, if necessary, to implement plans that address potential Delta salinity issues. Such actions may include, among other things, the installation and removal of, Emergency Drought Salinity Barriers at locations within the Sacramento-San Joaquin Delta Estuary. These barriers shall be designed to conserve water for use later in the year to meet state and federal Endangered Species Act requirements, preserve to the extent possible water quality in the Delta, and retain water supply for human health and safety uses. The Water Board and the Department of Fish and Wildlife shall immediately consider any necessary regulatory approvals needed to install Emergency Drought Salinity Barriers. For actions taken pursuant to this paragraph, Section 13247 and the provisions of Chapter 3 (commencing with Section 85225) of Part 3 of Division 35 of the Water Code are suspended.

9. To support the movement of water from areas of relative plenty to areas of relative scarcity in the Sacramento-San Joaquin Delta and Tulare Lake Watershed Counties, the Department of Water Resources shall expedite the consideration and, where appropriate, the implementation of pump-back delivery of water through the State Water Project on behalf of local water agencies.

10. To proactively prevent situations where a community runs out of drinking water, the Water Board, the Department of Water Resources, the Office of Emergency Services, and the Office of Planning and Research shall assist local agencies in identifying acute drinking water shortages in domestic water supplies, and shall work with local agencies in implementing solutions to those water shortages.

11. For purposes of carrying out or approving any actions contemplated by the directives in operative paragraphs 3, 4, 5, 6, 8, and 9, the environmental review by state agencies required by the California Environmental Quality Act in Public Resources Code, Division 13 (commencing with Section 21000) and regulations adopted pursuant to that Division are hereby suspended to the extent necessary to address the impacts of the drought in the Klamath River, Sacramento-San Joaquin Delta and Tulare Lake Watershed Counties. For purposes of carrying out the directive in operative paragraph 10, for any (a) actions taken by the listed state agencies pursuant to that directive, (b) actions taken by a local agency where the Office of Planning and Research concurs that local action is required, and (c) permits necessary to carry out actions under (a) or (b), Public Resources Code, Division 13 (commencing with Section 21000) and regulations adopted pursuant to that Division are hereby suspended to the extent necessary to address the impacts of the drought in counties where the Governor has proclaimed a drought state of emergency. The entities implementing these directives shall maintain on their websites a list of all activities or approvals for which these provisions are suspended.

12. To ensure transparency in state agency actions, the Water Board and Department of Water Resources will maintain on their websites a list of the activities or approvals by their agencies for which provisions of the Water Code are suspended under operative paragraphs 3, 4, or 8 of this proclamation.

13. To ensure that posting and dissemination of information related to drought emergency activities is not delayed while accessible versions of that information are being created, Government Code Sections 7405 and 11546.7 are hereby suspended as they pertain to the posting of materials on state agency websites as part of responding to the drought emergency, provided that any state agencies failing to satisfy these code sections shall make and post an accessible version on their websites as soon as practicable.

This proclamation is not intended to, and does not, create any rights or benefits, substantive or procedural, enforceable at law or in equity, against the State of California, its agencies, departments, entities, officers, employees, or any other person.

I FURTHER DIRECT that as soon as hereafter possible, this proclamation be filed in the Office of the Secretary of State and that widespread publicity and notice be given of this proclamation.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 10th day of May 2021.

GAVIN NEWSOM
Governor of California

ATTEST:

SHIRLEY N. WEBER, PH.D.
Secretary of State

Attachment 2

Biological Review for the 2021 June through August Temporary Urgency Change Petition

Attachment 2: Biological Review for the 2021 June through August Temporary Urgency Change Petition

Purpose and Background

Based on extraordinarily dry conditions throughout California and the projections for continued dry conditions, the California Department of Water Resources (DWR) for the State Water Project (SWP) and the U.S. Bureau of Reclamation (Reclamation) for the Central Valley Project (CVP) are requesting through a 2021 Temporary Urgency Change Petition (2021 TUCP) that the State Water Resources Control Board (Water Board) change terms of the CVP and SWP water rights permits from what is currently provided in Water Rights Decision 1641 (D-1641) for the period of June 1 through August 15, 2021, as summarized in Table 1 and outlined below.

Table 1. Summary of TUCP Operations Framework

Timeframe	Proposed Action
June 1 through July 31, 2021	June 1 through June 30: Reduce net delta outflow index (NDOI) requirements for salinity control from 4,000 cubic feet per second (cfs) to 3,000 cfs on a 14-day running average
	July 1 through July 31: Reduce NDOI requirements for salinity control from 4,000 cfs to 3,000 cfs on a monthly average. D-1641, Table 3, footnote 8 remains applicable
	Cap the combined SWP and CVP exports at 1,500 cfs when Delta outflow is less than 4,000 cfs. SWP and CVP exports may exceed 1,500 cfs when Delta outflow meets D-1641 or for moving transfer water (after July 1)
June 1 through August 15, 2021	Relocate the Western Delta Agriculture compliance point from Emmaton to Threemile Slough

In addition, from June 1 through August 31, DWR and Reclamation will meet and confer weekly with the Water Board to coordinate management of water supplies during the course of the declared drought emergency. DWR and Reclamation will utilize the Water Operations Management Team (WOMT), comprised of staff from Reclamation, DWR, National Marine Fisheries Service (NMFS), United States Fish and Wildlife (USFWS), California Department of Fish and Wildlife (CDFW), and the Water Board. The WOMT meets weekly to provide hydrology and operations updates and discuss TUCP actions and other drought actions, as appropriate. Information on coordination with WOMT and other technical teams is provided below. In addition, as part of this petition, DWR and Reclamation will continue to coordinate with Long-term Operation Agency working groups to develop a robust drought monitoring program through completion of the 2021 Drought Contingency Plan with updates to WOMT.

The CVP and SWP are currently operating to D-1641 outflow and water quality requirements with storage releases given the lack of precipitation and natural flow to the system. As indicated above, forecasts indicate that relief in some of these operations is needed, along with other actions, in order to have water available later in the year for M&I water quality standards, Delta salinity control, and aquatic species cold water pool protection.

Reclamation and DWR may have a need to request further modifications of the Rio Vista flow requirement contained in D-1641 for September through December 2021. If necessary, Reclamation and DWR plan to request modification of the Rio Vista flow standard in September through December 2021 to be no less than 2,500 cfs.

1) Reduction of Outflow Requirements (June 1 through June 30, 2021)

Beginning June 1, Reclamation and DWR request modification of D-1641 outflow. The requested changes would modify the minimum NDOI described in Figure 3 of D-1641 during the month of June to no less than 3,000 cfs on a 14-day average, to allow for some storage conservation for fishery protection and improving carryover storage while meeting minimum CVP and SWP export levels.

2) Reduction of Outflow Requirements (July 1 through July 31, 2021)

Beginning July 1, Reclamation and DWR request modification of D-1641 outflow. The requested changes would modify the minimum NDOI described in Figure 3 of D-1641 in July from a monthly average of 4,000 cfs to a monthly average of 3,000 cfs (Table 3, footnote 8 remains applicable) to allow for some storage conservation for fishery protection and improving carryover storage while meeting minimum CVP and SWP export levels.

3) Exports (June 1 through July 31, 2021)

June 1 through July 31, the maximum combined SWP and CVP exports will be limited to 1,500 cfs when Delta outflow is less than 4,000 cfs. SWP and CVP exports may exceed 1,500 cfs when Delta outflow meets D-1641 or for moving transfer water (after July 1, 2021).

The minimum combined export of 1,500 cfs, as referenced in Table 1, is consistent with other regulatory requirements. The combined 1,500 cfs export rate represents a sustainable rate and provides the CVP and SWP real-time operational flexibility in the Delta to meet D-1641 salinity and water quality standards, as Delta conditions can rapidly change due to weather and tidal cycles. Absent this flexibility, additional sustained upstream releases would be required to manage the real-time changes in Delta conditions. In addition, the 1,500 cfs allows the CVP the ability to maintain a one-unit operation, and minimizes the need to start and stop the unit in a 24-hour period (i.e. cycling) which could result in catastrophic damage. This rate also allows the SWP to meet Byron Bethany Irrigation District diversions, who divert from Clifton Court Forebay, and also provides for water supply delivery to the SWP South Bay Public Water Agencies who are not directly connected to San Luis Reservoir and who rely on direct diversions from the Delta to meet their municipal and industrial demands.

4) Modification of the Western Delta Salinity Compliance Point (June 1 through August 15, 2021)

In a critical year, D-1641 requires the Agricultural Western Delta Salinity Standard at Emmaton have a 14-day running average of 2.78 millimhos per centimeter from April 1 to August 15, 2021. Reclamation and DWR are petitioning the Water Board to modify this requirement by moving the compliance location from Emmaton to Threemile Slough on the Sacramento River from June 1 through August 15, 2021.

The 2021 TUCP is based on operations described in the 2020 Record of Decision implementing Alternative 1, which was consulted upon for the 2019 NMFS and USFWS Biological Opinions for the Re-initiation of Consultation (ROC) on the Long-Term Operation (LTO) of the CVP and SWP, and the 2020 Incidental Take Permit (ITP) from CDFW for Long-Term Operation of the SWP, as analyzed in the Final Environmental Impact Report certified by DWR on March 27, 2020.

Purpose of Biological Review

As described in the 2021 TUCP, legal users to water will not be injured by the requested changes, nor will the requested changes have an unreasonable effect to fish and wildlife. In support of the 2021 TUCP, Reclamation and DWR have prepared this Biological Review of these proposed changes for compliance with the Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code), which establishes California's statutory authority for the protection of water quality. Under the Porter-Cologne Water Quality Control Act, the State must adopt water quality policies, plans, and objectives that protect the State's waters. The Porter-Cologne Water Quality Control Act sets forth the obligations of the Water Board and Regional Water Quality Control Boards pertaining to the adoption of Basin Plans and establishment of: (1) beneficial uses to be protected; (2) water quality objectives for the reasonable protection of beneficial uses, and (3) a program of implementation for achieving the water quality objectives. The beneficial uses protected in Basin Plans include fish and wildlife, rare, threatened, or endangered species, and their habitats. Additional information is also provided in the Biological Review to inform the Water Board with respect to potential effects to other public trust resources, such as fish and wildlife. The Biological Review included coordination with, and input from CDFW, NMFS, USFWS, and the Water Board staff to help inform the Biological Review to determine if the proposed changes would result in an unreasonable impact on fish, wildlife, or other instream resources.

Scope of Analysis

The area of analysis for the Biological Review is limited to the Sacramento-San Joaquin Delta (Delta) region because the proposed modification to D-1641 standards associated with the TUCP address Delta conditions. The 2020 Record of Decision implementing the Proposed Action consulted upon for the NMFS 2019 Biological Opinions addresses ESA species on the Sacramento River, Clear Creek, Stanislaus River, and American River, and their flow and temperature management requirements, and the NMFS 2016 Biological Opinion addresses Feather River flow management requirements.

The Biological Review assesses the potential for additional unreasonable impacts that could result from the TUCP, specifically, those actions identified in Table 1 above. DWR is also planning the construction and operation of an emergency drought barrier (EDB) in West False River as a separate drought contingency measure. While the EDB is being pursued as a separate action (separate from the TUCP), and will undergo its own review, it is included in the Delta Simulation Model II (DSM2) hydrodynamic modeling study to support the 2021 TUCP analysis and conclusions in this Biological Review. A description of the DWR DSM2 hydrodynamic study is provided below.

Methods and Modeling

The potential impacts of the proposed June through August 2021 operational actions as part of the TUCP are considered in the context of conceptual models. For example, the delta smelt conceptual model (Interagency Ecological Program Management, Analysis, and Synthesis Team 2015); the NMFS and USFWS CVP/SWP Biological Opinions (NMFS 2019 and USFWS 2019); the CDFW ITP (CDFW 2020); conceptual models for winter-run Chinook salmon (Windell et al. 2017), and green sturgeon (Heublein et al. 2017a,b); and other information as cited below.

DSM2 Modeling

DSM2 simulations were performed and evaluated for two operational management scenarios, a TUCP case and base case representing operations that would occur without the TUCP. These simulations were designed to evaluate potential impacts of the TUCP on Delta flows, salinity, and other factors, in order to infer potential impacts to fish and aquatic resources as part of this biological review.

To model the Delta flows, water levels and salinity, Delta models such as DSM2 need boundary inflows, exports and diversions, stages, and salinity. Up to the point where the forecast begins, DSM2 uses observed historical data. For inflows to and exports from the Delta, DSM2 uses the forecasted data from DWR's Delta Coordinated Operations (DCO) model that determine allocations to SWP water supply contractors. Information that is fed into the DCO includes hydrology data, contractor delivery requests, and legal restrictions on exports. The DCO allocation forecasts that were used for this analysis utilized a May forecast with a 90% exceedance hydrology. This represents a forecast for a very dry year. Based on historical data, a 90% exceedance hydrology assumes that only one in ten years would be drier than this forecast.

Two scenarios were run with DSM2. Scenario 1 (referred to as base case or baseline) consists of the May 1, 2021 forecast (May forecast) 90% exceedance hydrology from the DCO model meeting the objectives in D-1641, while scenario 2 consists of the May forecast 90% exceedance hydrology from the DCO model meeting the modified objectives put forward in the TUCP. No drought barrier is assumed in the baseline scenario, while the TUCP scenario includes the installation of the EDB from July 1 through October 31, 2021. Non-hydrologic modeling assumptions are listed below; these assumptions are common to both the baseline and TUCP scenarios:

1. Clifton Court Forebay gates are operating to Priority 1 through the end of the forecast period.
2. The Delta Cross Channel gates are currently closed, then open on May 28, close on June 1, open on June 4, close on June 7, open on June 11, and thereafter remain open until December 1.
3. Suisun Marsh – the flashboards are currently in place, and as of May 5, one of the salinity control gates is in tidal operation. The remaining two gates are in closed position for maintenance. The flashboards are scheduled to be removed on June 3 and at that time, one gate will be in the open position, one gate will be closed (for refurbishment), and the gate that is currently under repair will be in the closed position until repaired.
4. The Middle River agricultural barrier is in place on May 15 and is breached on November 2.
5. The Old River at Tracy agricultural barrier is in place on May 29 and is breached on November 2.
6. The Grant Line Canal agricultural barrier is in place on June 1 and is breached on November 11.

While these assumptions were used to create a conservative modeling scenario, actual operations may differ and will depend on real time conditions. Actual operations will be shared with and discussed through the WOMT. DCO Delta flow estimates are included in Attachment 3 *"Delta Summary"*.

Analysis of the Impacts of TUCP

Ecosystem Impacts

Impacts of the June–August 2021 TUCP on focal species and their habitat are discussed in the sections below. Impacts to species and their habitat reflect ecosystem-level impacts of drought conditions, key among them being factors such as potential impacts on food webs. July–September Delta outflow is positively correlated with the density of the zooplankton *Pseudodiaptomus forbesi* (an important prey item for species including delta smelt and longfin smelt) in the low salinity zone as a result of spatial subsidy from the freshwater Delta (Kimmerer et al. 2018). Drought conditions would be expected to reduce the density of *P. forbesi* but there is uncertainty in the extent to which this would be affected by the TUCP on top of baseline drought conditions given that tidal mixing mediates a large part of plankton movement in dry periods when net flows are low (Kimmerer et al. 2019). The density in the low salinity zone of *Eurytemora affinis*, another zooplankton species preyed upon by smelt and other species, has a statistically significant negative correlation with March–May X2, which is prior to the start of the TUCP period changing operations, indicating that the 2021 TUCP would not be expected to have different impacts on this species compared to baseline conditions. The density of mysid shrimp *Neomysis mercedis* (prey for species such as longfin smelt) in the low salinity zone has also been correlated with X2 during May–October, although Kimmerer (2002) observed a change in the relationship from negative to positive following 1987, indicating that less delta outflow (greater X2) under the 2021 TUCP during June–August would not be expected to negatively affect mysid density. Abundance indices of silversides, predators of larval delta smelt, are negatively related to Delta inflow (Mahardja et al. 2016) and so silverside abundance could increase as a result of the drought, although it is uncertain to what extent this would occur and whether there would be additional impacts from the TUCP on top of drought impacts. Reduced Delta inflow and increased residence time may contribute to the general drought-related increase in intensity of *Microcystis* harmful algal blooms (Lehman et al. 2018). The extent to which the TUCP's changed operations from baseline conditions would affect harmful algal blooms is uncertain but likely small given that water temperature is the main driver of bloom intensity (Lehman et al. 2020a). Less Delta outflow under drought conditions would move the salinity field upstream, allowing the invasive clam *Potamocorbula amurensis* to move further upstream and thereby expand its range and overall grazing rate if salinity remains high enough for several months (Kimmerer et al. 2019), although the incremental additional effect of the TUCP on top of the drought is small (see more detailed analysis of changes in the salinity field in *Impacts of TUCP on Delta Smelt*). Discussion of other relevant ecosystem impacts is provided in the species-specific analyses below.

Winter-Run Chinook Salmon

Presence and Life Stages of Winter-Run Chinook Salmon

By late April 2021, all juveniles from Brood Year (BY) 2020 spawning by winter-run Chinook salmon adults had passed Red Bluff Diversion Dam and catches at monitoring locations further downstream in the Sacramento River and Delta suggest all or nearly all juvenile winter-run Chinook salmon have entered and left the Delta (Figure WR1). This is consistent with historical timing suggested in summaries by NMFS (2019: Tables WR1 and WR2) and the SacPAS database of Central Valley monitoring efforts (Figures WR2, WR3, WR4, and WR5). Adult winter-run may also occur in the Delta in June (Table WR2).

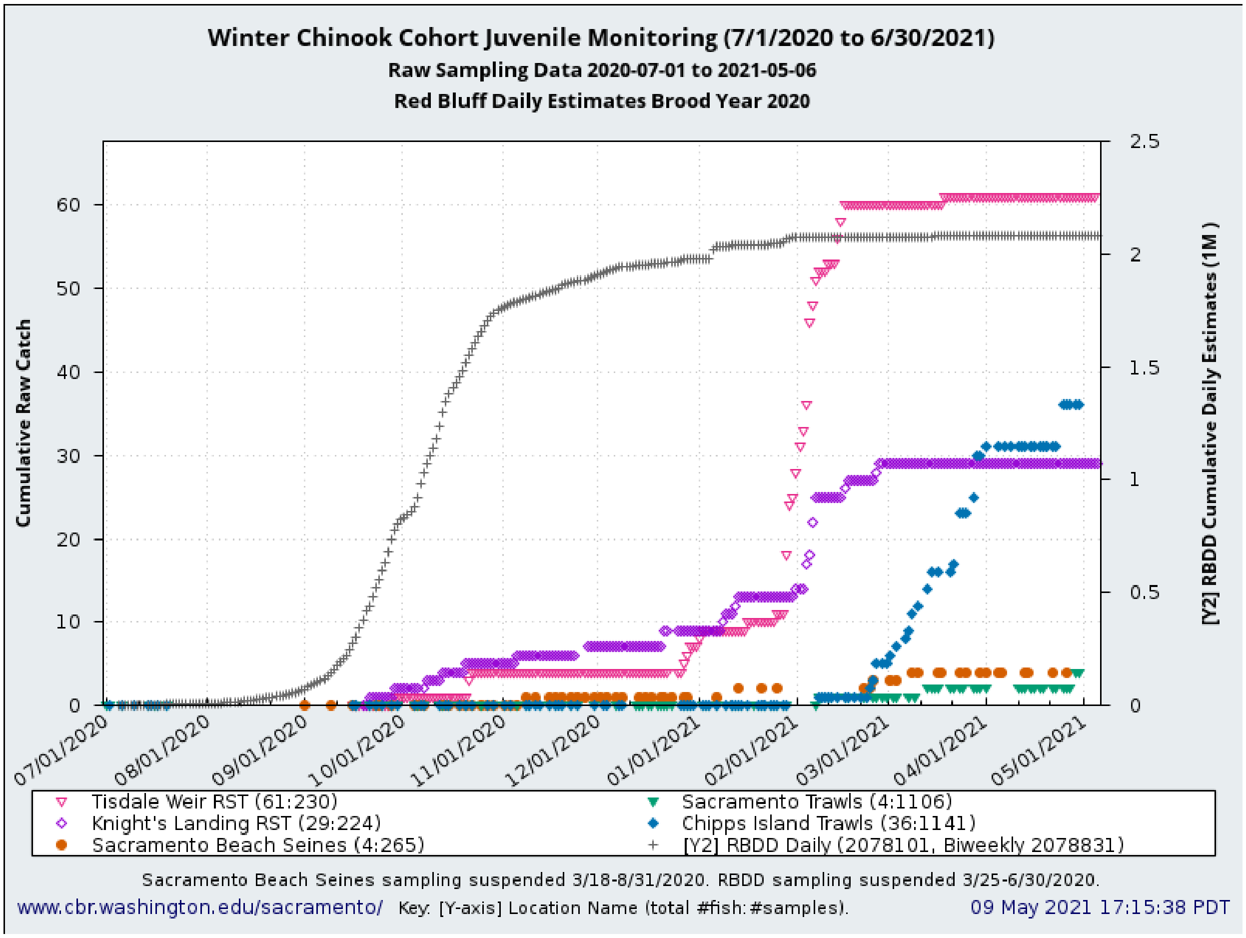


Figure WR1. Raw Catch of Juvenile Winter-Run Chinook Salmon from Brood Year 2020 to May 6, 2021.

Table WR1. Temporal Occurrence of Sacramento River Winter-Run Chinook Salmon by Life Stage in the Sacramento River

Relative Abundance	High (▼)			Medium (⊠)			Low (#)			None (-)		
Adults Freshwater	Month											
Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sacramento River basin [a,b]	⊠	⊠	⊠	⊠	⊠	⊠	⊠	-	-	-	⊠	⊠
Upper Sacramento River spawning [c]	-	-	-	-	#	▼	▼	⊠	-	-	-	-
Juvenile Emigration	Month											
Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sacramento River at Red Bluff [d]	#	#	#	-	-	-	#	⊠	⊠	⊠	⊠	⊠
Sacramento River at Knights Landing [e]	▼	⊠	#	-	-	-	-	-	-	#	⊠	▼
Sacramento trawl at Sherwood Harbor [f]	⊠	▼	▼	#	-	-	-	-	-	-	⊠	▼
Midwater trawl at Chipps Island [f]	⊠	⊠	▼	▼	#	-	-	-	-	-	-	#

Sources: [a] *Yoshiyama et al. (1998), Moyle (2002) ;* [b]*Myers et al. (1998);* [c]*Williams (2006);* [d]*Martin et al. (2001);* [e]*Knights Landing Rotary Screw Trap Data, CDFW (1999-2019);* [f] *Delta Juvenile Fish Monitoring Program, USFWS (1995-2019), del Rosario et al. (2013).*

Source: National Marine Fisheries Service 2019:67.

Table WR2. Temporal Occurrence of Sacramento River Winter-Run Chinook Salmon by Life Stage in the Delta

Relative Abundance	High (▼)			Medium (⊠)			Low (#)			None (-)		
Life-Stage	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adult [1]	⊠	▼	▼	▼	⊠	⊠	-	-	-	-	⊠	⊠
Juvenile [2]	#	⊠	▼	⊠	-	-	-	-	-	#	#	⊠
Salvaged [3]	⊠	▼	▼	#	#	#	-	-	-	-	-	#

[1] *Adults enter the Bay November to June (Hallock and Fisher 1985) and are in spawning ground at a peak time of June to July (Vogel and Marine 1991).*
[2] *Juvenile presence in the Delta was determined using Delta Juvenile Fish Monitoring Program data.*
[3] *Months in which salvage of wild juvenile winter-run at State and Federal pumping plants occurred (National Marine Fisheries Service 2016c).*

Source: National Marine Fisheries Service 2019:68.

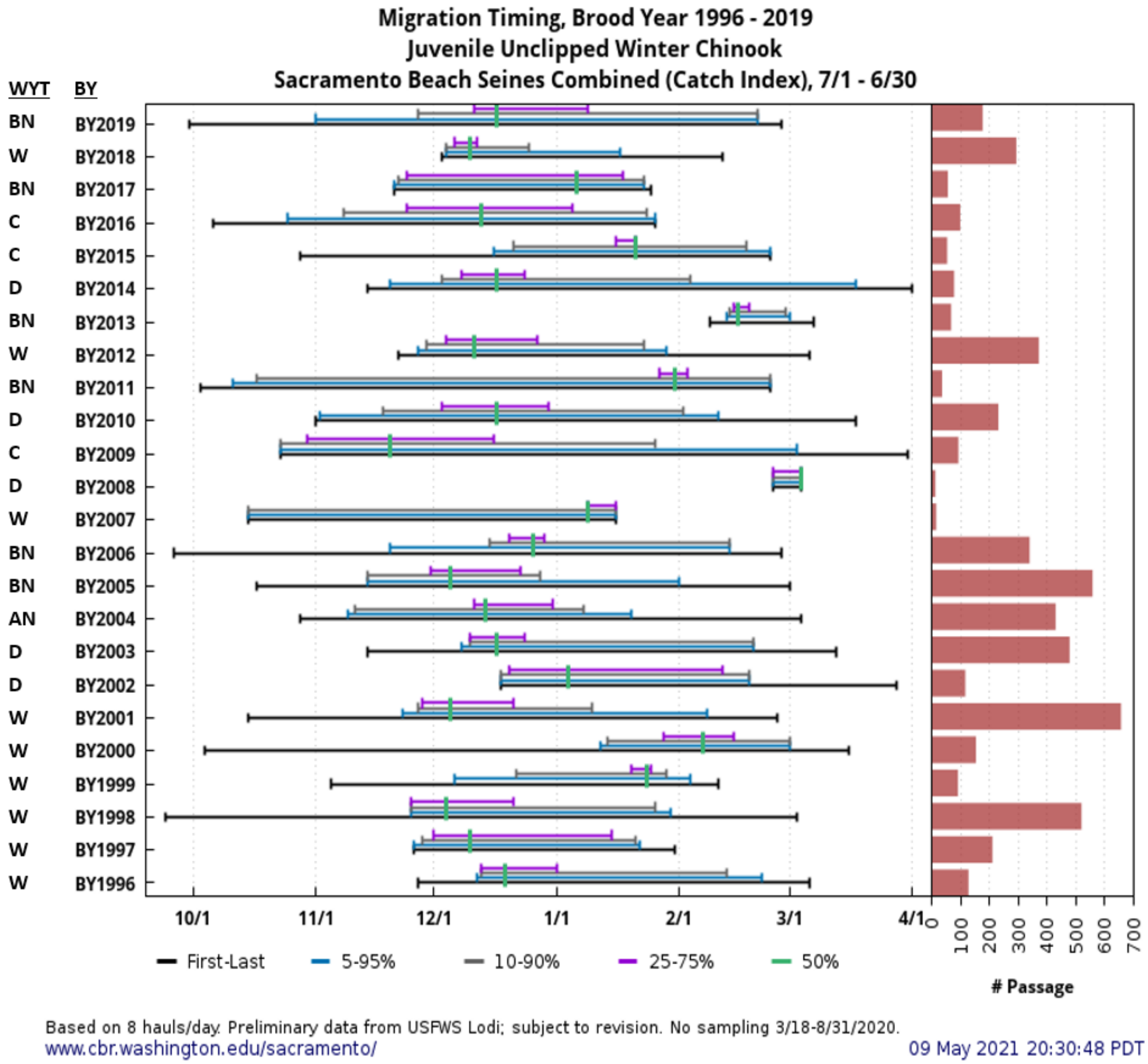


Figure WR2. Catch Index Timing and Number of Unclipped Juvenile Winter-Run Chinook Salmon in Sacramento Beach Seines.

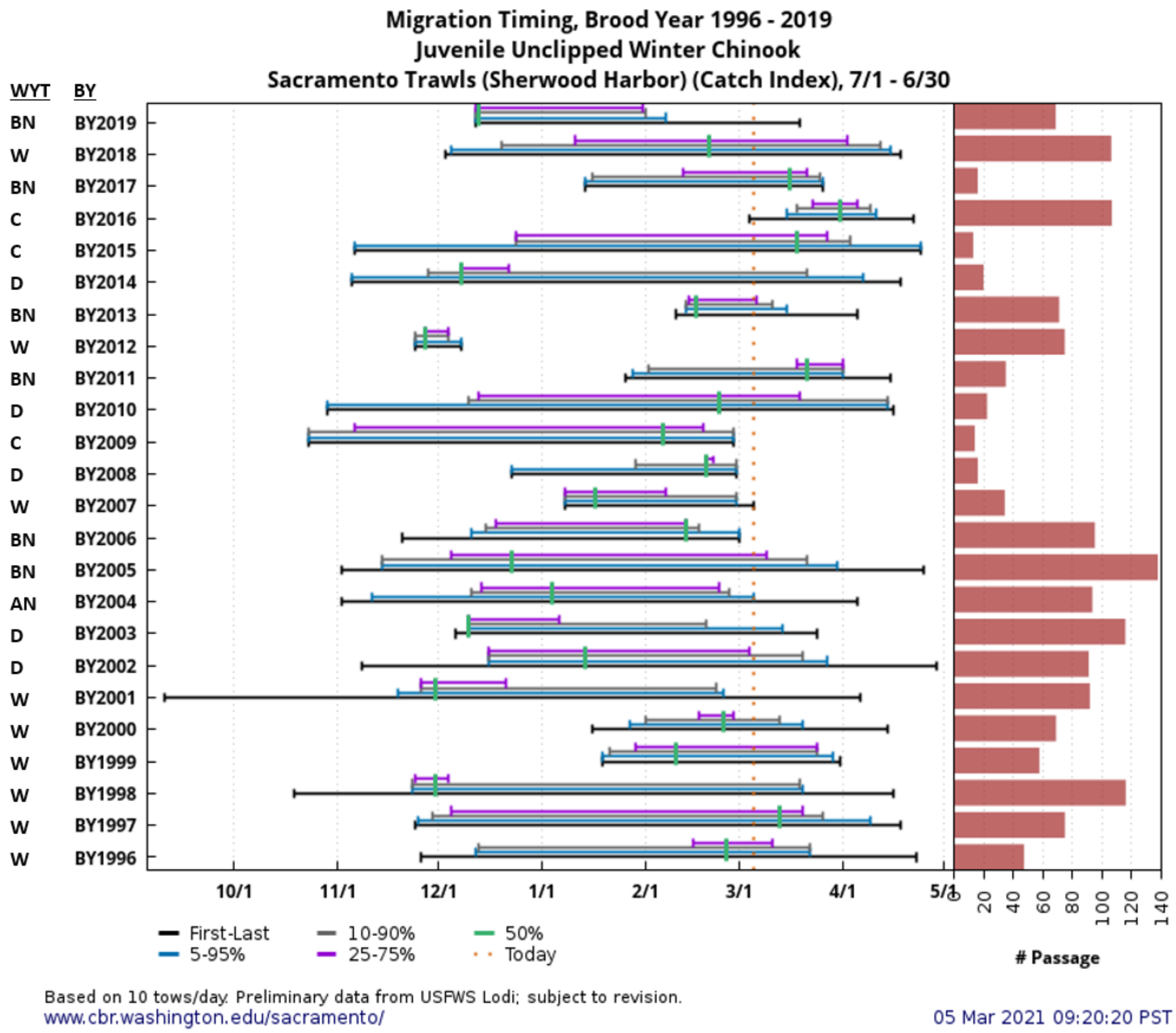


Figure WR3. Catch Index Timing and Number of Unclipped Juvenile Winter-Run Chinook Salmon in Sacramento Trawls at Sherwood Harbor.

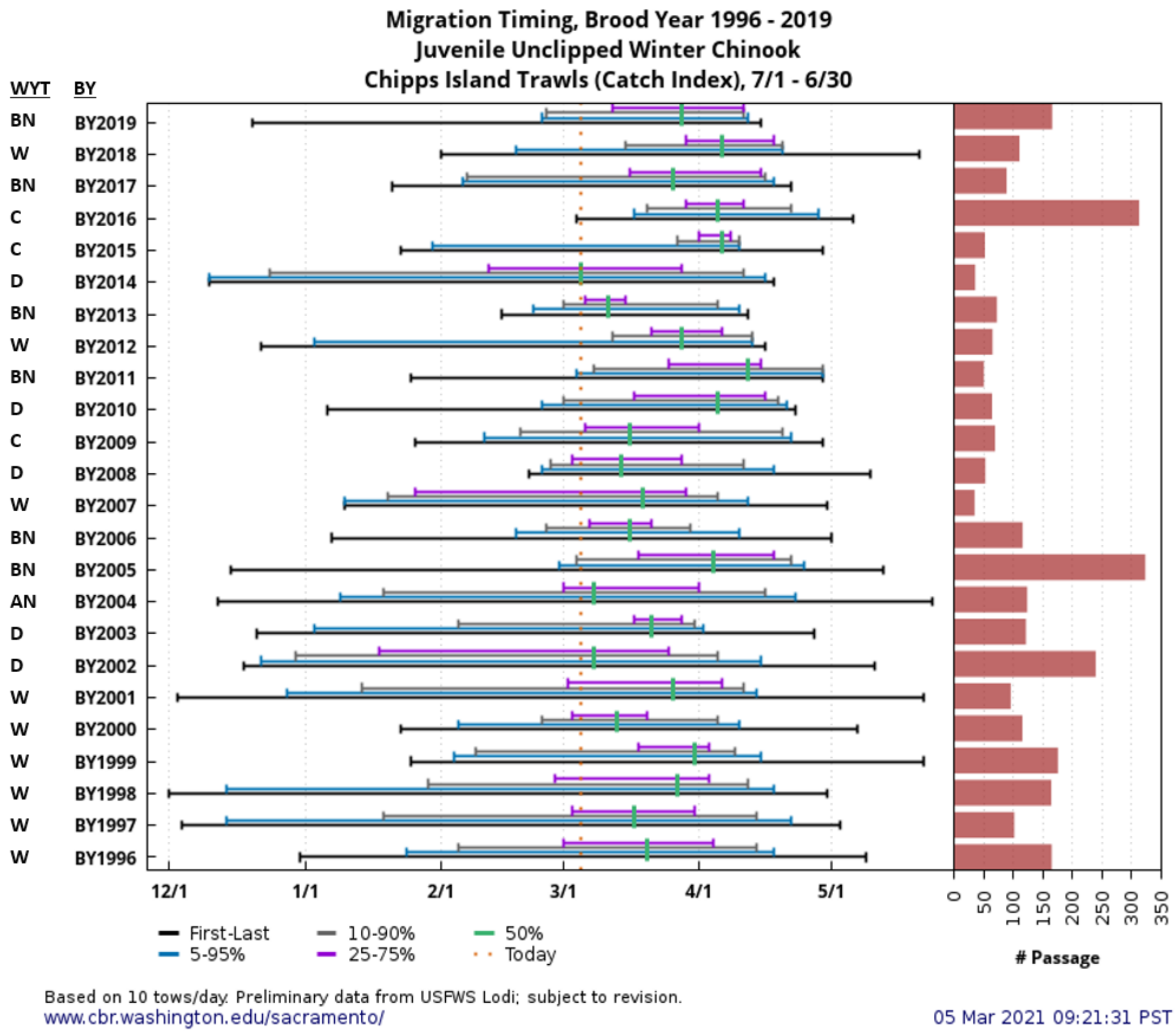


Figure WR4. Catch Index Timing and Number of Unclipped Juvenile Winter-Run Chinook Salmon in Chipps Island Trawls.

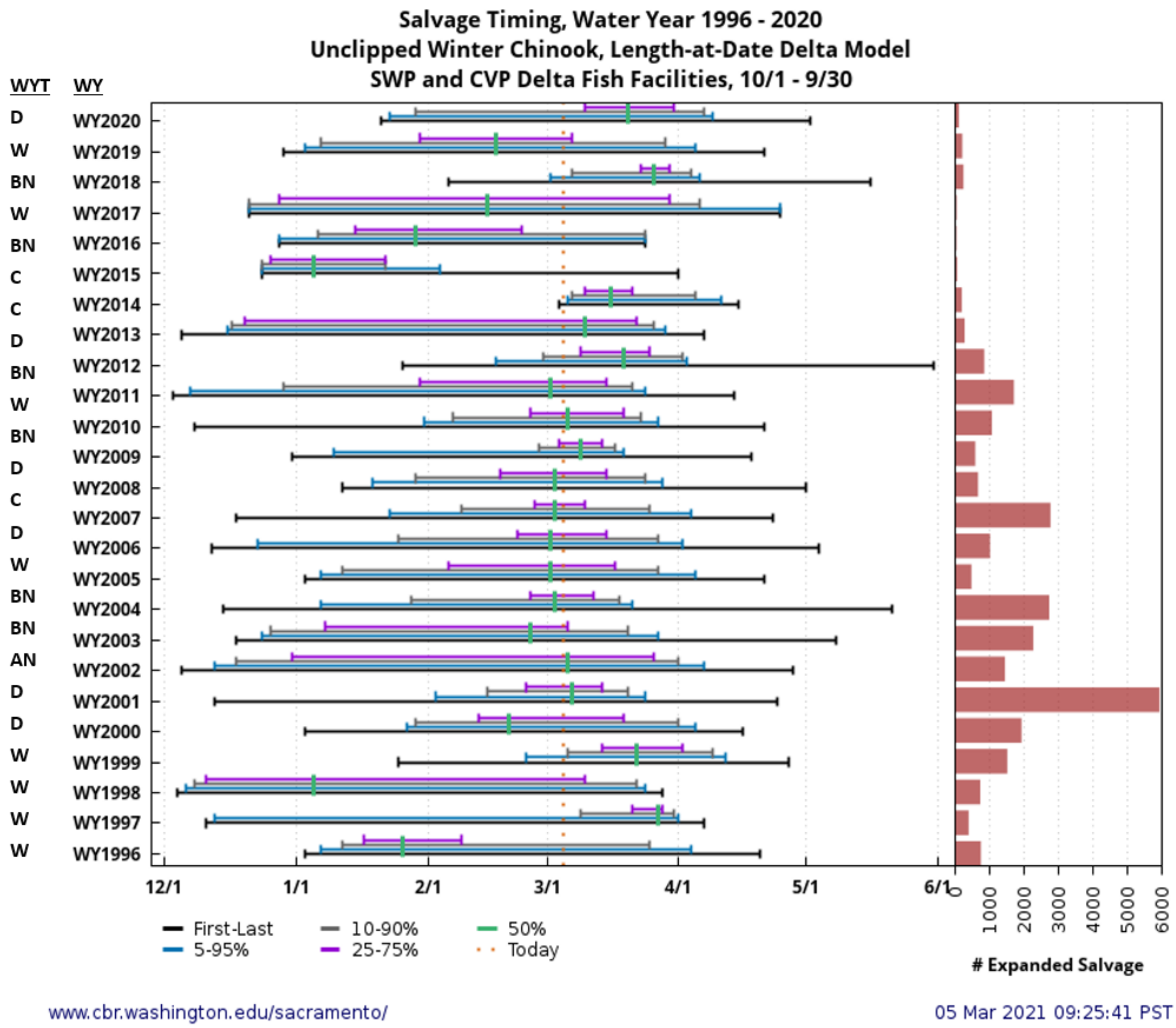


Figure WR5. Timing and Number of Unclipped Juvenile Winter-Run Chinook Salmon (Race Determined from Length at Date) at the State Water Project and Central Valley Project South Delta Fish Salvage Facilities.

Impacts of TUCP on Winter-Run Chinook Salmon

Per the presence summary above, BY 2020 winter-run Chinook salmon juveniles will likely have completely or almost completely exited the Delta by the time the TUCP results in less Delta outflow beginning in June 2021. Any individuals migrating in June could experience reduced through-Delta survival based on factors such as increasing reverse flows and slower mean velocity resulting in longer travel times (e.g., Romine et al. 2013; Perry et al. 2018) as a result of the TUCP, and thereby increasing predation risk relative to baseline conditions. DSM2 modeling results for the Sacramento River at Freeport and Delta Cross Channel gate opening status were used to estimate through-Delta survival based on the model of Perry et al. (2018)[1]. Estimates of through-Delta survival based on this model essentially integrate flow impacts on north Delta hydrodynamics, including channel flow and proportion of flow entering distributaries such as Georgiana Slough. The modeling results indicated that the differences in Delta inflow may result in relatively small differences in through-Delta survival probability of juvenile Chinook salmon (3% or less; Table WR3). These results reflect factors such as flow-survival relationships as well as entry into low-survival pathways. The Perry et al. (2018) model estimated juvenile Chinook salmon entry into the low-survival interior Delta through Georgiana Slough and the Delta Cross Channel from the Sacramento River would be similar or slightly greater (0–2%) under the TUCP relative to baseline (Table WR4).

Table WR3. Mean Monthly Probability of Through-Delta Survival of Juvenile Chinook Salmon Based on Freeport Flow and Delta Cross Channel Position from the Model of Perry et al. (2018).

Month	Baseline	TUCP
June	0.33	0.32 (-3%)
July	0.37	0.36 (-2%)
August	0.35	0.35 (0%)

Note: Percentage difference in parentheses represents TUCP minus baseline. The full TUCP period (June–August) was modeled to provide perspective for juvenile Chinook salmon in general, given discussion of spring-run and fall/late fall-run below, and the summary by Williams (2006: 91) showing small numbers of juvenile Chinook salmon occur in July and August.

Table WR4. Mean Monthly Probability of Juvenile Chinook Salmon Entering the Interior Delta Through Georgiana Slough and the Delta Cross Channel Based on Freeport Flow and Delta Cross Channel Position from the Model of Perry et al. (2018).

[1] The North Delta Routing Management Tool is a spreadsheet-based tool that was provided by Perry (pers. comm.) and reproduces the mean response of the STARS (Survival, Travel time, And Routing Simulation) model (Perry et al. 2019).

Month	Baseline	TUCP
June	0.31	0.32 (2%)
July	0.28	0.29 (1%)
August	0.29	0.29 (0%)

Note: Percentage difference in parentheses represents TUCP minus baseline.

As noted in the 2015 TUCP biological reviews, at low outflow (i.e., decreased as a result of decreased riverine inflow), channel margin habitat becomes exposed above the surface of the water and is unavailable to juvenile salmonids present. This lack of cover in habitat may reduce juvenile survival. The 2015 TUCP biological reviews hypothesized that lower outflows may intensify the density of littoral predators into a smaller, shallower area and/or decrease the quantity of cover available to outmigrating salmonids to avoid predators, but noted that there is a high level of uncertainty in this conclusion. Increases in aquatic vegetation due to low outflow may also provide increased habitat for invasive predators such as largemouth bass (Conrad et al. 2016; Kimmerer et al 2019). Durand et al. (2016) examined factors affecting the submerged aquatic vegetation species and did not find a clear effect of flow (water velocity), noting that factors other than flow may have had a greater effect on long-term increases, including increased water clarity; they also suggested that other important factors that should be considered are the effects of previous occupancy by the vegetation, increased temperatures, and changing nutrient concentrations. As such, although the TUCP would affect flow, overall drought conditions would be the main driver of changes in submerged aquatic vegetation. Drought-related increases in submerged aquatic vegetation extent may persist beyond the end of drought conditions, as illustrated by the previous drought (Kimmerer et al. 2019), and thus could increase predation risk for subsequent year-classes of juvenile winter-run Chinook salmon.

Reduced Delta inflow and increased residence time as a result of less south Delta exports may contribute to the general drought-related increase in intensity of *Microcystis* harmful algal blooms (Lehman et al. 2018), although this would be unlikely to impact winter-run Chinook salmon during the TUCP period. Drought conditions generally appear to increase susceptibility to pathogens as a result of factors such as salinity intrusion (Lehman et al. 2020b), although impacts of the TUCP would be limited relative to the overall impacts of the drought (see, for example, discussion of salinity impacts in the delta smelt analysis).

In order to minimize entrainment loss of juvenile winter-run Chinook salmon continuous real-time monitoring is required by NMFS (2019) CVP/SWP Biological Opinion and the CDFW (2020) SWP ITP. The TUCP's limits on south Delta export pumping would not contribute to increased species risk, particularly given nearly all juvenile winter-run would be expected to have left the Delta by the time the TUCP operations begin in June.

Based on timing information in Table WR2 above, some adult winter-run Chinook salmon could be migrating through the Delta in June. Based on temperatures in the 2014/2015 drought years, conditions would likely be suboptimal (20–21°C) and in the range of potential mortality (>21–24°C) based on criteria outlined by Moyle et al. (2017: 50) (Figure WR5). Moyle et al. (2017: 50) noted that migration usually stops at >21°C and that adults migrating at higher temperatures are probably moving between cooler refuges. Data for June 2014 and June 2015 showed that although mean Sacramento River inflow was higher in 2014 (monthly mean of ~8,900 cfs per the DAYFLOW database) compared to 2015 (monthly mean of ~6,900 cfs), temperature was not consistently different as a result (Figure WR5). This is consistent with atmospheric forcing being the main driver of water temperature (Wagner et al. 2011) rather than reservoir operations and suggests there would be little difference in temperature experienced by migrating adult winter-run Chinook salmon between the TUCP (modeled mean June 2021 Sacramento River inflow = 7,100 cfs) and baseline conditions (modeled mean June 2021 Sacramento River inflow = 7,950 cfs) (see Attachment 3). Dissolved oxygen conditions during June in the 2014/2015 drought were generally above 6 mg/l (Figure WR6), a level used for water quality compliance in the San Joaquin River under D-1641 (for adult fall-run Chinook salmon migration), suggesting that despite differences in flows between years, dissolved oxygen was not clearly linked to these differences. This again suggests there would be little difference in dissolved oxygen between TUCP and baseline conditions.

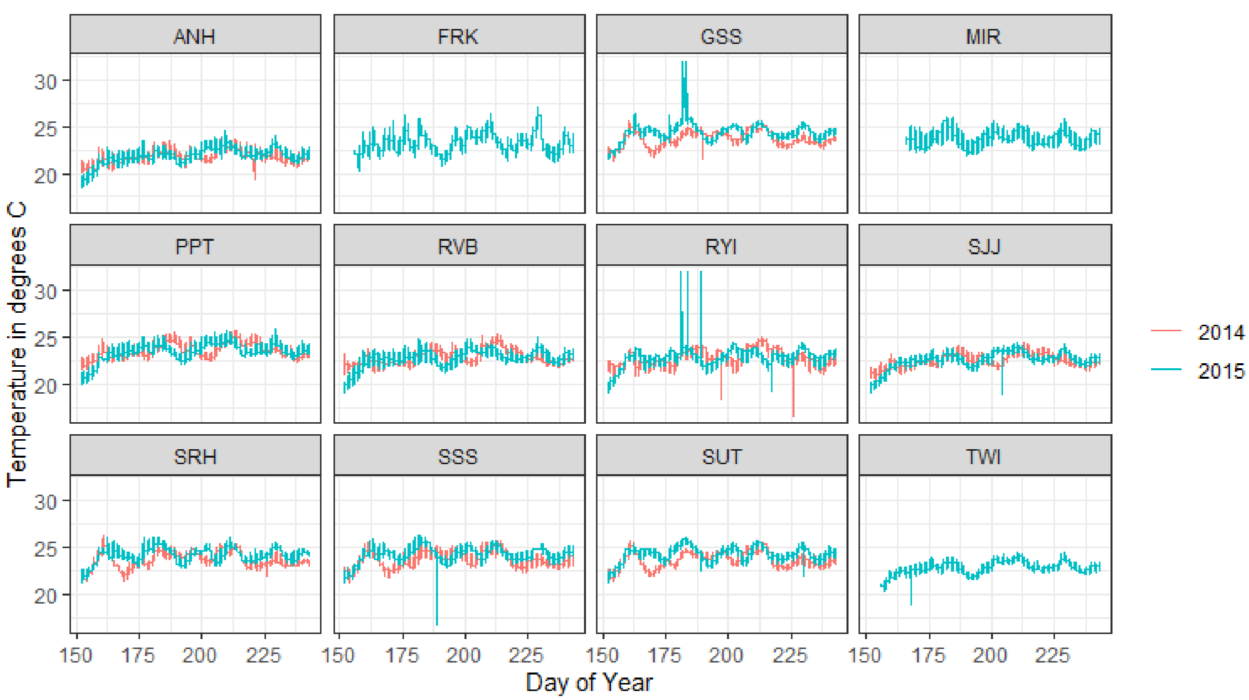


Figure WR5. Hourly Mean Temperature at Various Monitoring Locations, June–August 2014 and 2015.

Source: California Data Exchange Center (CDEC). Stations are San Joaquin River at Antioch (ANH); Frank's Tract Mid Tract (FRK); Georgiana Slough at Sacramento River (GSS); Miner Slough near Sacramento River (MIR); San Joaquin River at Prisoners Point (PPT); Sacramento River at Rio Vista Bridge (RVB); Cache Slough at Ryer Island (RYI); San Joaquin River at Jersey Point (SJJ); Sacramento River at Hood (SRH); Steamboat Slough between Sacramento River and Sutter Slough (SSS); Sutter Slough at Courtland (SUT); and San Joaquin River at Twitchell Island (TWI). June 1 = day 152; July 1 = day 183; August 1 = day 213.

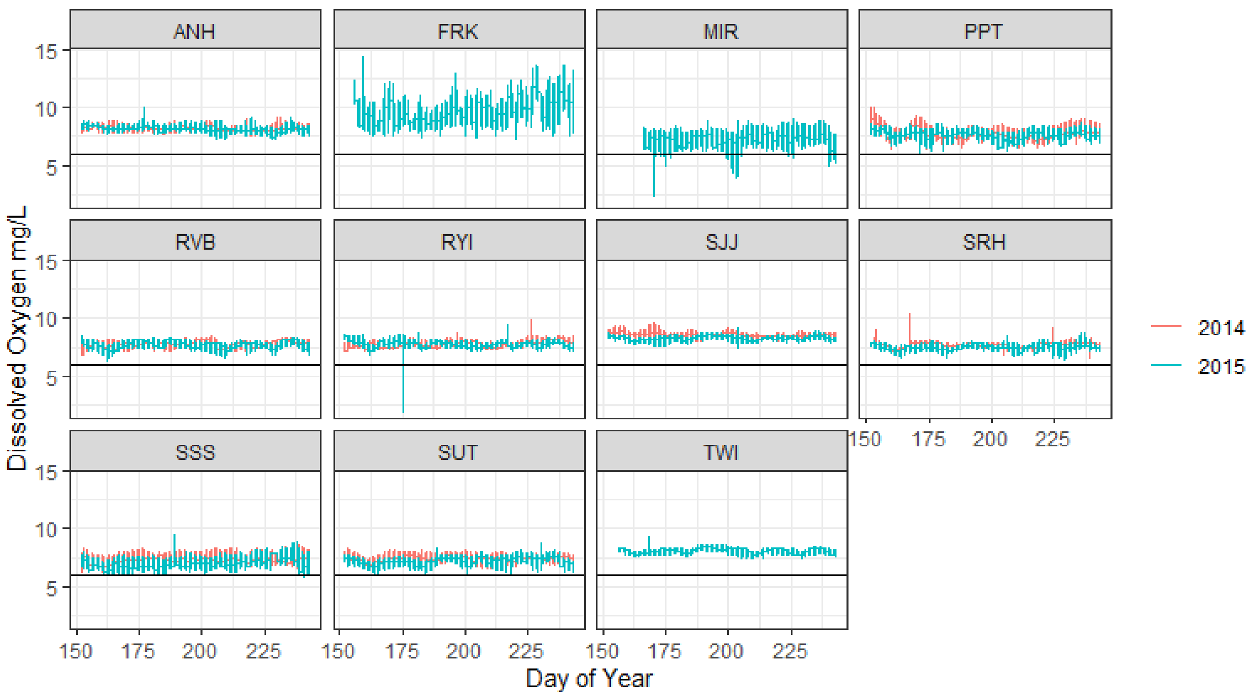


Figure WR6. Hourly Mean Dissolved Oxygen at Various Monitoring Locations, June–August 2014 and 2015.

Source: California Data Exchange Center (CDEC). Source: California Data Exchange Center (CDEC). Stations are San Joaquin River at Antioch (ANH); Frank's Tract Mid Tract (FRK); Miner Slough near Sacramento River (MIR); San Joaquin River at Prisoners Point (PPT); Sacramento River at Rio Vista Bridge (RVB); Cache Slough at Ryer Island (RYI); San Joaquin River at Jersey Point (SJJ); Sacramento River at Hood (SRH); Steamboat Slough between Sacramento River and Sutter Slough (SSS); Sutter Slough at Courtland (SUT); and San Joaquin River at Twitchell Island (TWI). June 1 = day 152; July 1 = day 183; August 1 = day 213. Reference line shows 6 mg/l dissolved oxygen.

Delta Cross Channel operations would not differ between TUCP and baseline, thus there would not be any difference between TUCP and baseline in delay of adult winter-run Chinook salmon that may move upstream via the Mokelumne River when the Delta Cross Channel is open. There is little information from which to infer the potential for migratory delay because of reductions in Delta inflow (e.g., reduced upstream migration cues), although the available information for hatchery fall-run Chinook salmon indicates stray rates of fish returning to the Sacramento River are always low (Marston et al. 2012), suggesting relatively little influence of flows and therefore no likely difference between TUCP and baseline for the remainder of winter-run Chinook salmon adults that may be returning in June.

Conclusions for Winter Run Chinook Salmon

In the Delta, all or nearly all BY 2020 juvenile winter-run Chinook salmon would have exited the Delta by the time the TUCP changes to operations would begin in June 2021. Regardless, any BY 2020 juvenile winter-run in the Delta would not experience greater risk of entrainment in June 2021, as a result of very low exports under the TUCP and continued implementation of entrainment risk assessment and operations adjustments from the NMFS (2019) Biological Opinion and the CDFW (2020) ITP. Through-Delta survival of any remaining juveniles migrating in June could be slightly lower (3% on average) than baseline as a result of less Delta inflow affecting north Delta hydrodynamics, including slightly greater entry into the interior Delta through Georgiana Slough (note that Delta Cross Channel operations would not be different between TUCP and baseline). Survival estimates are within the range evaluated by NMFS (2019[2]). Temperature migration conditions for any winter-run Chinook salmon adults occurring in June would be poor under both TUCP and baseline conditions and reflect atmospheric conditions rather than operational differences.

Spring-Run Chinook Salmon

Presence and Life Stages of Spring-Run Chinook Salmon

By early May 2021, many young-of-the-year juveniles from BY 2021 spawning by spring-run Chinook salmon adults had likely entered the Delta (Figure SR1). Historical migration timing data suggest that most young-of-the-year juveniles should have left the Delta in May, with only very low numbers remaining in June (Tables SR1 and SR2; Figures SR3, SR4, and SR5). The footnote for Table SR1 indicates that yearlings downstream emigration generally occurs in fall and winter. Adult presence in the Delta extends into June (Table SR2).

[2] Full documentation of survival values evaluated by NMFS was provided by Perry et al. (2019).

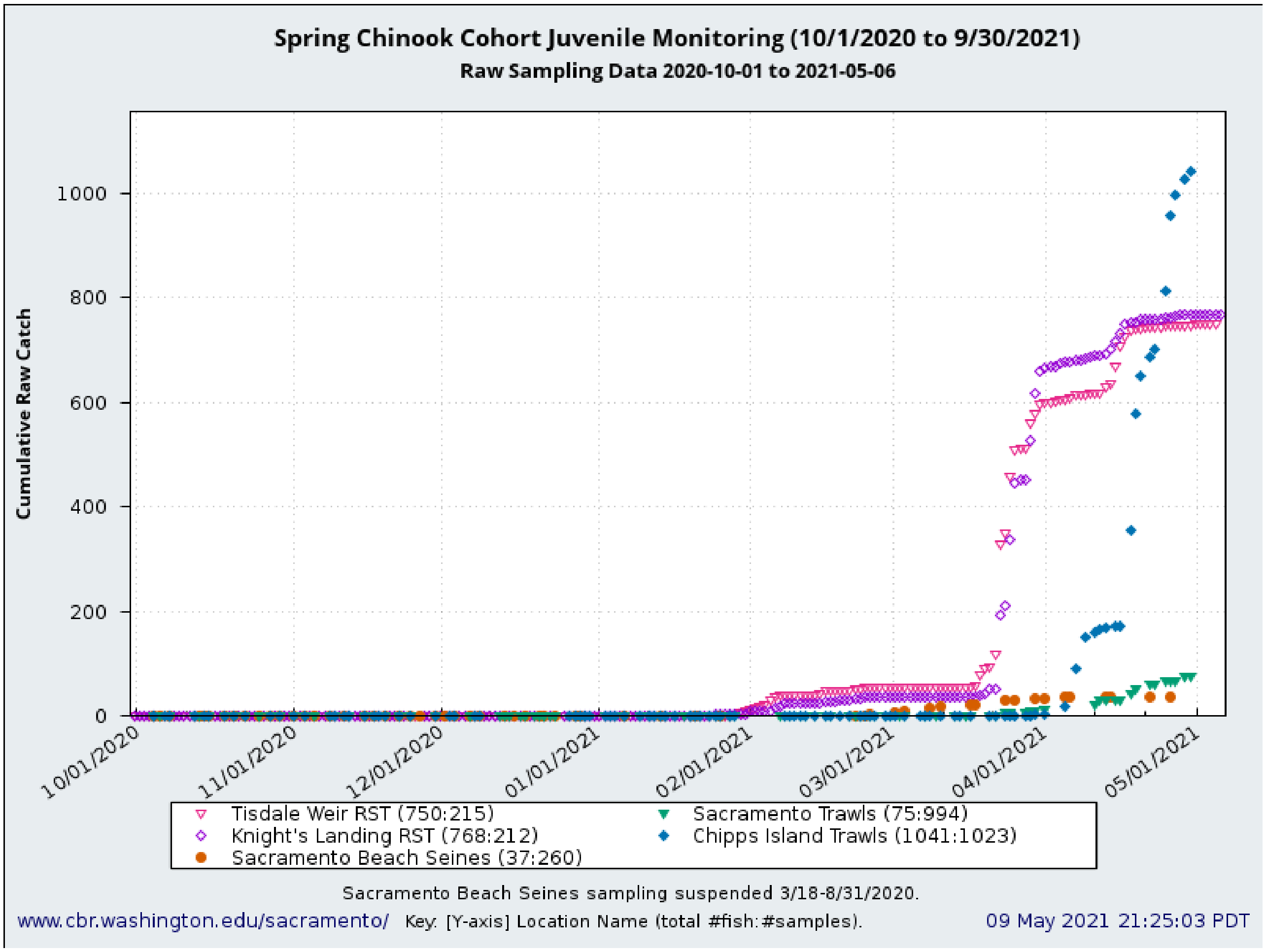


Figure SR1. Raw Catch of Juvenile Spring-Run Chinook Salmon from Brood Year 2020 to May 6, 2021.

Table SR1. Temporal Occurrence of Central Valley Spring-Run Chinook Salmon by Life Stage in the Sacramento River

Relative Abundance	High (▼)	Medium (⊠)	Low (#)	None (-)

(a) Adult Migration	Month																							
Location	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Sac. River Basin [a,b]	-	-	-	-	⊠	⊠	⊠	⊠	▼	▼	▼	▼	⊠	⊠	⊠	⊠	⊠	⊠	#	-	-	-	-	-
Sac. River Mainstem [b,c]	-	#	#	#	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	#	#	-	-	-	-	-	-	-	-
Adult Holding [a,b]	-	-	#	#	⊠	⊠	▼	▼	▼	▼	▼	▼	▼	▼	▼	⊠	⊠	#	#	-	-	-	-	-
Adult Spawning [a,b,c]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	#	⊠	▼	▼	⊠	#	-	-	-	-
(b) Juvenile Migration	Month																							
Location	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Sac. River at Red Bluff Diversion Dam [c]	▼	▼	#	#	#	#	#	#	#	-	-	-	-	-	-	-	-	-	-	-	▼	▼	▼	▼
Sac. River at Knights Landing[h]	⊠	⊠	⊠	⊠	▼	▼	▼	▼	⊠	⊠	-	-	-	-	-	-	-	-	-	-	⊠	⊠	▼	▼

Sources: [a] *Yoshiyama et al. (1998);* [b] *Moyle (2002);* [c] *Myers et al. (1998);* [d] *Lindley et al. (2004);* [e] *California Department of Fish and Game (1998);* [f] *McReynolds et al. (2007);* [g] *Ward et al. (2003);* [h] *Snider and Titus (2000b)*

Note: Yearling spring-run Chinook salmon rear in their natal streams through the first summer following their birth. Downstream emigration generally occurs the following fall and winter. Most young-of-the-year spring-run Chinook salmon emigrate during the first spring after they hatch.

Source: National Marine Fisheries Service 2019:83.

Table SR2. Temporal Occurrence of Central Valley Spring-Run Chinook Salmon by Life Stage in the Delta

Relative Abundance	High (▼)	Medium (⊠)	Low (#)	None (-)

Life Stage	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adult [1]	⊠	▼	▼	▼	⊠	⊠	-	-	-	-	-	-
Juvenile [2]	#	#	#	▼	⊠	-	-	-	-	-	-	#
Salvaged [3]	#	#	⊠	▼	⊠	-	-	-	-	-	-	-

[1]*Adults enter the Bay late January to early February* (California Department of Fish and Game 1998) *and enter the Sacramento River in March* (Yoshiyama et al. 1998). *Adults travel to tributaries as late as July* (Lindley et al. 2004). *Spawning occurs September to October* (Moyle 2002).
[2]*Juvenile presence in the Delta based on Delta Juvenile Fish Monitoring Program data.*
[3]*Juvenile presence in the Delta based on salvage data* (National Marine Fisheries Service 2016a).

Source: National Marine Fisheries Service 2019:84.

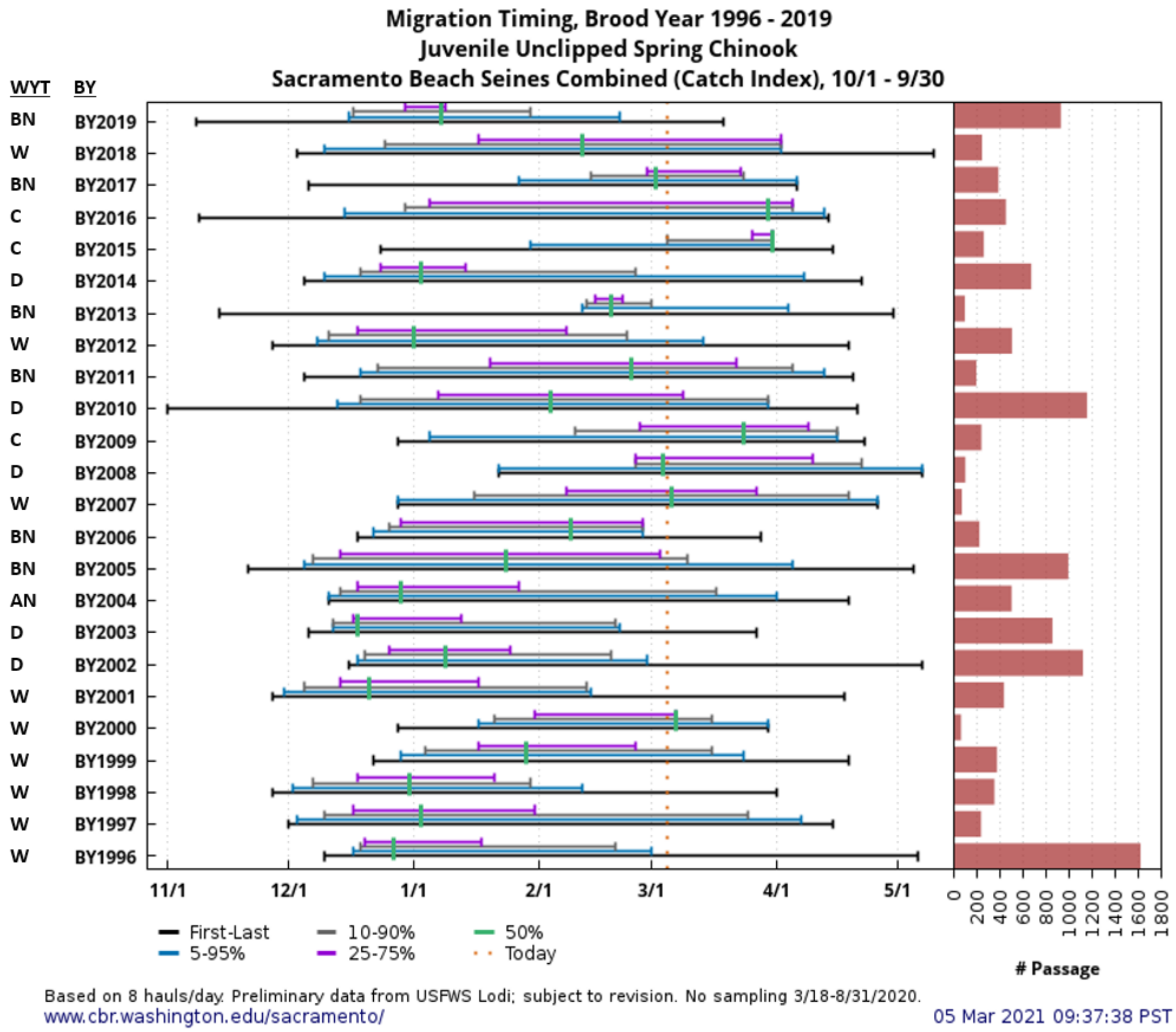


Figure SR2. Catch Index Timing and Number of Unclipped Juvenile Spring-Run Chinook Salmon in Sacramento Beach Seines.

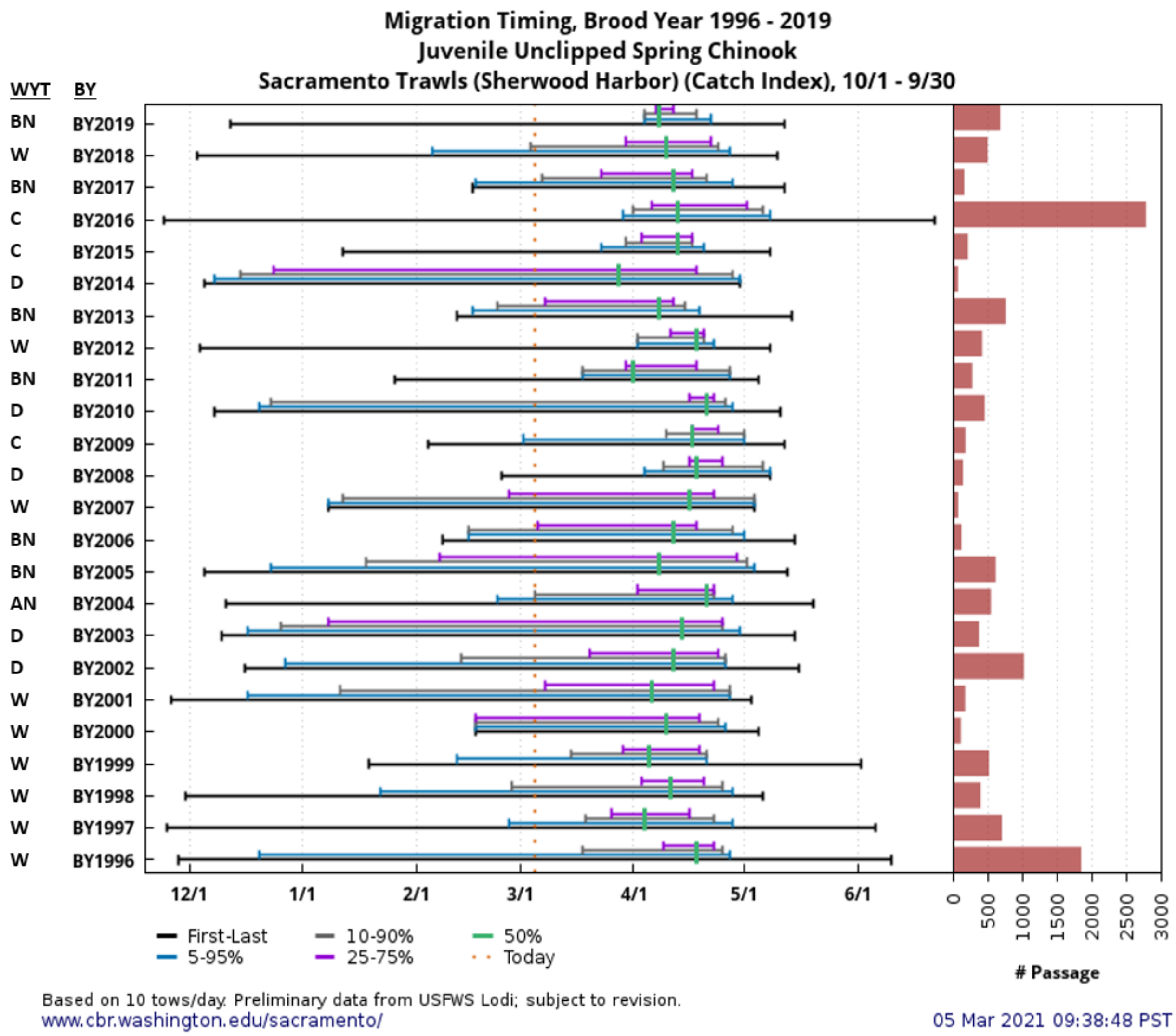


Figure SR3. Catch Index Timing and Number of Unclipped Juvenile Spring-Run Chinook Salmon in Sacramento Trawls at Sherwood Harbor.

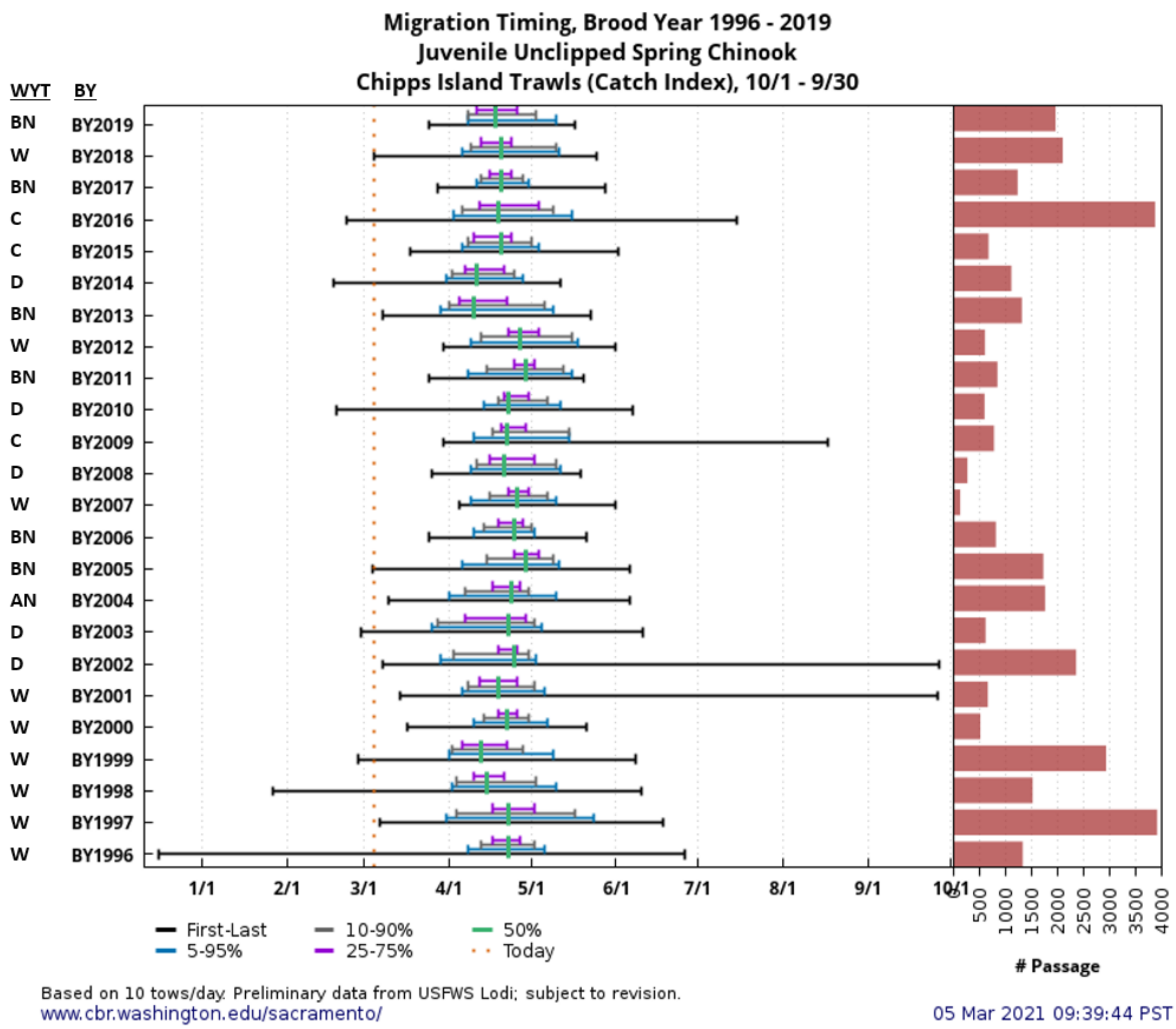


Figure SR4. Catch Index Timing and Number of Unclipped Juvenile Spring-Run Chinook Salmon in Chipps Island Trawls.

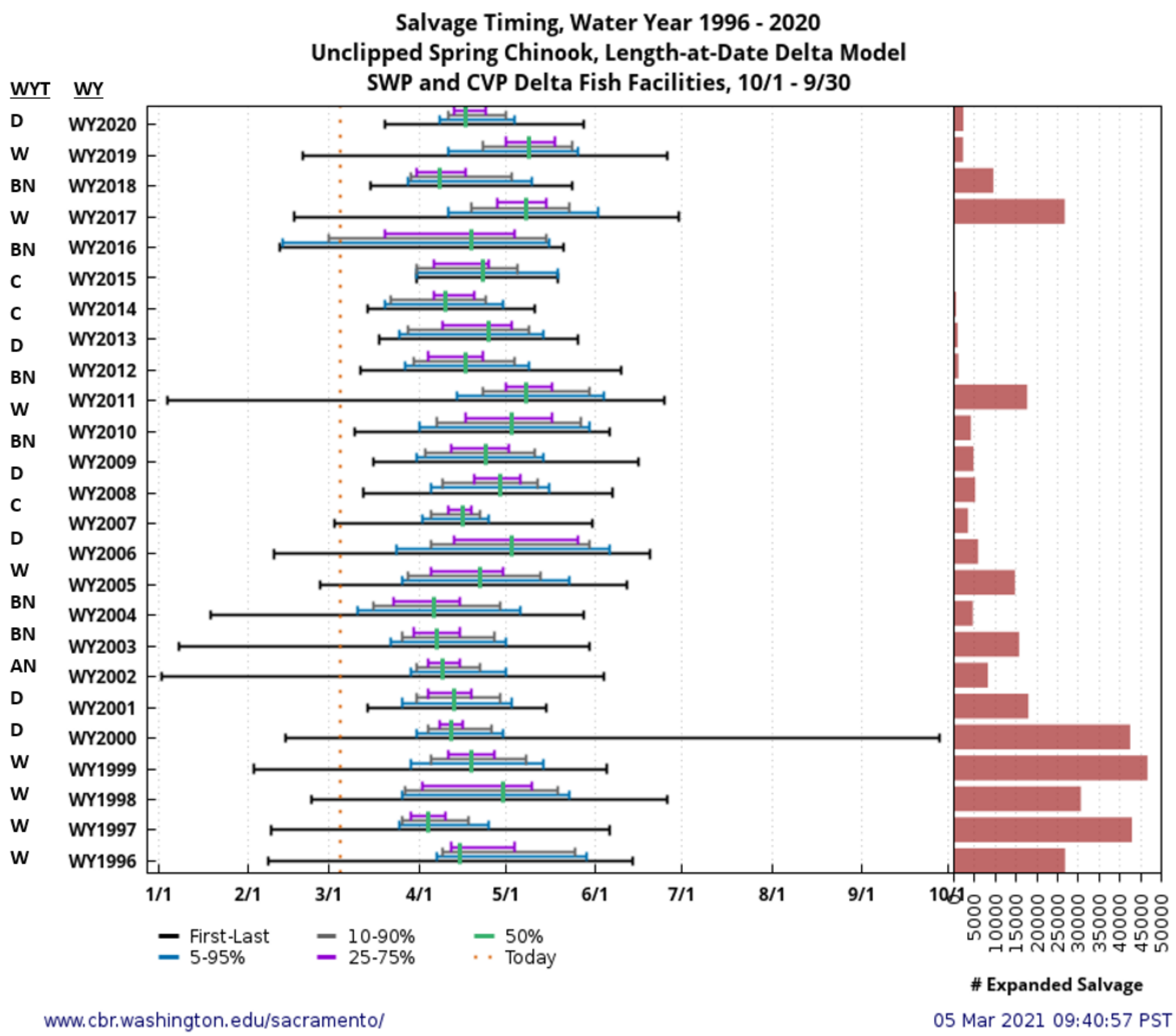


Figure SR5. Timing and Number of Unclipped Juvenile Spring-Run Chinook Salmon (Race Determined from Length at Date) at the State Water Project and Central Valley Project South Delta Fish Salvage Facilities.

Impacts of TUCP on Spring-run Chinook Salmon

Within the Delta, there is the potential for similar types of impacts to young-of-the-year juvenile spring-run Chinook salmon and habitat as discussed previously for winter-run. The footnote for Table SR1 indicates that yearling spring-run Chinook salmon downstream emigration generally occurs in fall and winter and therefore yearlings would not overlap the June–August TUCP period. By the time of TUCP operations reducing Delta inflow/outflow and south Delta exports in June, all or nearly all young-of-the-year BY 2020 spring-run would be expected to have left the Delta (see summary of temporal occurrence in *Status of Spring Run Chinook Salmon* above) and so the potential for negative migration impacts would be limited to few, if any, individuals. Entrainment risk for these fish would remain low because the TUCP limits on south Delta exports as well as continued entrainment risk management under the NMFS (2019) Biological Opinion and the CDFW (2020) ITP. As with winter-run, through-Delta survival modeling suggests the potential for small negative impacts to young-of-the-year juvenile spring-run through-Delta survival in 2021 as a result of the TUCP for any remaining individuals migrating in June (Table WR3), reflecting factors such as slightly increased entry into lower survival pathways in the interior Delta (Table WR4).

Based on timing information in Table SR2 above, some adult spring-run Chinook salmon could be migrating through the Delta in June. As discussed in more detail for winter-run Chinook salmon, temperature and dissolved oxygen data for June 2014 and June 2015 (Figures WR5 and WR6) showed that although mean Sacramento River inflow was higher in June 2014 (monthly mean of ~8,900 cfs per the DAYFLOW database) compared to June 2015 (monthly mean of ~6,900 cfs), temperature and dissolved oxygen were not consistently different. This suggests that migration conditions under the TUCP (modeled mean June 2021 Sacramento River inflow = 7,100 cfs) and baseline conditions (modeled mean June 2021 Sacramento River inflow = 7,950 cfs) would not be greatly different. As noted for winter-run Chinook salmon, Delta Cross Channel operations would not differ between TUCP and baseline, thus there would not be any difference between TUCP and baseline in delay of adult spring-run Chinook salmon that may move upstream via the Mokelumne River when the Delta Cross Channel is open. Straying rates for Chinook salmon returning to the Sacramento River are low based on historical flows over many years (Marston et al. 2012), including dry years, and therefore suggest there would be little difference in straying of adult spring-run Chinook salmon because of reductions in Sacramento River inflow as a result of the TUCP.

Conclusions for Spring-run Chinook Salmon

In the Delta, all or nearly all BY 2020 young-of-the-year juvenile spring-run Chinook salmon would have exited the Delta by the time the TUCP changes to operations would begin in June 2021. Regardless, any BY 2020 juvenile spring-run in the Delta would not experience greater risk of entrainment in June 2021, as a result of very low exports under the TUCP and continued implementation of entrainment risk assessment and operations adjustments from the NMFS (2019) Biological Opinion and the CDFW (2020) ITP. As noted for winter-run, through-Delta survival of BY 2020 juveniles in June could be slightly lower (3% or less) under the TUCP than baseline as a result of less Delta inflow affecting north Delta hydrodynamics (Table WR3). Survival estimates are within the range evaluated by NMFS (2019[3]). Temperature migration conditions for any spring-run Chinook salmon adults occurring in June would be poor under both TUCP and baseline conditions and reflect atmospheric conditions rather than operational differences.

Green Sturgeon

Presence and Life Stages of Green Sturgeon

There are relatively limited monitoring data available for green sturgeon. In the Delta, juveniles and adults may occur year-round (Tables GS1 and GS2), although the main adult upstream migration to spawning grounds primarily in the upper Sacramento River is late winter to early summer (Heublein et al. 2017a).

Table GS1. Temporal Occurrence of Southern Distinct Population Segment Green Sturgeon by Life Stage

Relative Abundance	High (▼)						Medium (⊠)							Low (#)						None (-)					
Life-Stage: (a) Adult-sexually mature[1]	Month																							
Location	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Sac River (river mile 332.5-451)	#	#	#	#	⊠	⊠	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	⊠	⊠	⊠
Sac River (<river mile 332.5)	#	#	#	⊠	⊠	⊠	⊠	⊠	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#
Sac-SJ-SF Estuary	#	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	#	#
(b) Larva	Month																							
Location	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Sac River (<river mile 332.5)	-	-	-	-	-	#	⊠	⊠	▼	▼	▼	▼	▼	▼	⊠	⊠	⊠	⊠	#	#	-	-	-	-
(c) Juvenile (≤5 months old)	Month																							
Location	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Sac River (<river mile 332.5)	-	-	-	-	-	-	-	#	⊠	⊠	⊠	⊠	▼	▼	▼	▼	▼	▼	▼	⊠	⊠	⊠	⊠	⊠
(d) Juvenile (≤5 months old)	Month																							
Sac River (<river mile 391)	⊠	⊠	⊠	⊠	#	#	#	#	#	#	#	⊠	⊠	⊠	⊠	▼	▼	▼	▼	▼	▼	▼	▼	#
(e) Sub-Adults and Non-spawning adults	Month																							
Location	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Sac-SJ-SF Estuary	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	⊠	⊠
Pacific Coast	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠
Coastal Bays & Estuaries	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	▼	▼	▼	▼	▼	▼	▼			▼	▼ ▼	▼	▼ ⊠	⊠

[1] Sexually mature adults (≥4.8 feet TL females, ≥ 3.9 feet TL males including pre- and post- spawning individuals)

Sources: (a) (Heublein et al. 2009); (DuBois and Danos 2018; Klimley et al. 2015a; Mora et al. 2018; Poytress et al. 2015); (b) (Heublein et al. 2017; Poytress et al. 2015); (c) (Heublein et al. 2017; Poytress et al. 2015); (d) (California Department of Fish and Game 2002; Heublein et al. 2017; Poytress et al. 2015; Radtke 1966); (e) (DuBois and Danos 2018; Erickson and Webb 2007; Huff et al. 2011; Lindley et al. 2011; Lindley et al. 2008; Moser and Lindley 2007). Outside of Sac-SJ-SF estuary (e.g. Columbia R., Grays Harbor, Willapa Bay).

Source: National Marine Fisheries Service 2019:113–114.

[3] Full documentation of survival values evaluated by NMFS was provided by Perry et al. (2019).

Table GS2. Temporal Occurrence of Southern Distinct Population Segment Green Sturgeon by Life Stage in the Delta

Relative Abundance	High (▼)	Medium (⊠)	Low (#)	None (-)

Life Stage	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adult [1]	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠
Juvenile [2]	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠
Salvaged [3]	#	#	#	#	#	-	⊠	▼	#	#	#	#

[1]Adult presence was determined to be year round according to information in (California Department of Fish and Game 2008; California Department of Fish and Game 2009; California Department of Fish and Game 2010a; California Department of Fish and Game 2011; California Department of Fish and Game 2012; California Department of Fish and Wildlife 2013a; California Department of Fish and Wildlife 2014a; Lindley et al. 2008; Moyle 2002).
[2]Juvenile presence in the Delta was determined to be year round by using information in (USFWS Delta Juvenile Fish Monitoring Program data), (Moyle et al. 1995; Radtke 1966).

Source: National Marine Fisheries Service 2019:115.

Impacts of TUCP on Green Sturgeon

Juveniles and sub-adult green sturgeon rearing in and utilizing the Delta as part of their habitat are not expected to be greatly affected by the TUCP's modifications to Delta outflow and Delta water quality standards from June through August. In most of the Delta where juvenile green sturgeon are expected to be rearing, flows are tidally dominated and therefore changes in riverine inflow would have minimal to no effect. However, there is low certainty in understanding of the juvenile and sub-adult green sturgeon biological processes affected by flow in the Delta. South Delta exports would be at very low levels during June–August 2021 and recent years have seen minimal salvage of green sturgeon, indicating that very low or zero salvage would be expected under the TUCP.

The NMFS green sturgeon recovery plan suggested that green sturgeon larval abundance and distribution may be influenced by spring and summer outflow, and recruitment may be highest in wet years, making water flow an important habitat parameter (NMFS 2018: 12). As noted by NMFS (2018: 12), there are correlations between white sturgeon year-class strength and Delta outflow, which have previously been used to infer potential impacts on green sturgeon (ICF International 2016: 5-197 to 5-205). However, impacts on green sturgeon as a result of changes in flow under the TUCP may be limited primarily because the largest sturgeon recruitment occurs in wetter years (Fish 2010; Gingras et al. 2013); 2021 would be a drier year regardless of implementation of the TUCP and it is uncertain the extent to which the relatively small difference in drought-year-flows between TUCP and baseline would result in differing impacts to green sturgeon compared to the potential impacts that may occur between much broader ranging hydrological conditions (i.e., different water year types).

Adult green sturgeon will be potentially present in the Delta throughout the TUCP as they migrate into and out of the Sacramento River and possibly forage in the Delta during the summer. The reductions in outflow through multiple distributaries in the North Delta in the TUCP could increase straying and travel time of green sturgeon in this region during

June–August, although this is uncertain. As discussed for winter-run Chinook salmon, differences in temperature and dissolved oxygen between the TUCP and baseline would be expected to be limited based on comparisons of 2014 and 2015 drought years.

Conclusions for Green Sturgeon

Cumulatively, the TUCP's modifications in flow and water quality criteria should not significantly reduce riverine or through-Delta survival of juvenile green sturgeon, although there is some uncertainty in the conclusion given the general lack of information on the species. There would be expected to continue to be little to no salvage of green sturgeon at the south Delta export facilities, consistent with recent years with greater levels of exports than the TUCP.

Central Valley Steelhead

Presence and Life Stages of Central Valley Steelhead

Relative to Chinook salmon, Central Valley steelhead are considerably less well monitored. Few steelhead have been collected in routine monitoring. Historical abundance in surveys shows juvenile peaks in the Delta during late winter/spring (Tables SH1 and SH2). Salvage may continue into June in low numbers and some juveniles are present in low numbers in the Delta in summer. Adults occur in the Delta in July and August (Table SH2).

Table SH1. Temporal Occurrence of Central Valley Steelhead by Life Stage

Relative Abundance	High (▼)								Medium (⊠)						Low (#)						None (-)				
Migration Life Stage: (a) Adult	Month																								
Location	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
[1]Sacramento R. at Fremont Weir	#	#	#	#	#	-	-	-	-	-	-	#	#	#	#	⊠	▼	▼	▼	⊠	#	#	#	#
[2]Sacramento R. at Red Bluff Diversion Dam	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	⊠	⊠	▼	⊠	#	#	#	#
[3]San Joaquin River	▼	▼	⊠	⊠	#	#	-	-	-	-	-	-	#	#	#	#	⊠	⊠	⊠	⊠	⊠	⊠	▼	▼
Migration Life Stage: (b) Juvenile	Month																								
Location	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
[1,2]Sacramento R. near Fremont Weir	#	#	#	#	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	#	#	#	#	#	#	⊠	⊠	⊠	⊠	#	#
[4]Sacramento R. at Knights Landing	▼	▼	▼	▼	⊠	⊠	⊠	⊠	#	#	#	#	-	-	-	-	-	-	-	-	#	#	#	#
[5]Chipps Island (clipped)	⊠	⊠	▼	▼	⊠	⊠	#	#	#	#	-	-	-	-	-	-	-	-	-	-	-	-	#	#
[5]Chipps Island (unclipped)	⊠	⊠	⊠	⊠	▼	▼	▼	▼	▼	▼	⊠	⊠	#	#	-	-	-	-	-	-	-	#	#	#
[6]San Joaquin R. at Mossdale	-	-	#	#	⊠	⊠	▼	▼	▼	▼	#	#							#	#	-	-	-	-

Sources: [1] Hallock et al. (1957); [2]McEwan (2001); [3]California Department of Fish and Game (2007); [4]NMFS analysis of 1998-2018 CDFW data; [5]NMFS analysis of 1998-2018 USFWS data; [6]NMFS analysis of 2003-2018 USFWS data.

Source: National Marine Fisheries Service 2019:100.

Table SH2. Temporal Occurrence of Central Valley Steelhead by Life Stage in the Delta

Relative Abundance	High (▼)				Medium (☒)		Low (#)			None (-)		
Life Stage	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adult [1]	☒	☒	☒	☒	▼	-	#	☒	▼	☒	☒	☒
Juvenile [2]	#	☒	☒	▼	▼	#	#	-	#	-	-	#
Salvaged [3]	☒	▼	▼	☒	#	#	-	-	-	-	#	#

1Adult presence was determined using information in Moyle (2002), Hallock et al. (1961), and California Department of Fish and Wildlife (2015b).
2Juvenile presence in the Delta was determined using Delta Juvenile Fish Monitoring Program data.
3Months in which salvage of wild juvenile steelhead at State and Federal pumping plants occurred; values in cells are salvage data reported by the facilities (He and Stuart 2016).

Source: National Marine Fisheries Service 2019:101.

Impacts of TUCP on Central Valley Steelhead

Juvenile steelhead migrating through the Delta in 2021 could experience similar impacts of the TUCP as previously described for juvenile Chinook salmon, although the main juvenile migration period would be almost entirely completed by June (Table SH2), when differences in operations as a result of the TUCP would begin. Juvenile steelhead could occur in small numbers during the summer months (Table SH2), with potential for small reductions in through-Delta survival as a result of reductions in Delta inflow assuming a similar response suggested modeling for juvenile Chinook salmon (see the analysis for winter-run Chinook salmon). There is uncertainty in the extent of the negative effect given that factors such as through-Delta survival as a function of flow have not been examined in a similar manner as done for Chinook salmon, although as with juvenile Chinook salmon, low survival through the interior Delta relative to the Sacramento River has been observed (Singer et al. 2013). As with juvenile Chinook salmon, low south Delta exports and entrainment risk management under the NMFS (2019) Biological Opinion would limit entrainment risk for juvenile steelhead. As shown in Table SH2, adult steelhead may occur in the Delta during July and August in low to medium numbers. Temperature migration conditions for adult steelhead in these months would likely be stressful based on drought temperature data in 2014–2015 (Figure WR5) being within the suboptimal (20–23°C) or greater range noted by Moyle et al. (2017: 297). During the 2014/2015 drought years, Sacramento River inflow in July was ~9,100 cfs (2014) and ~7,900 cfs (2015) and in August was ~8,500 cfs (2014) and 7,800 cfs (2015). Although 2014 had higher Sacramento River inflow than 2015 in July and August, temperature was not consistently lower, illustrating the importance of atmospheric forcing (see winter-run Chinook salmon discussion). Therefore, it would be expected that there would be little difference in temperature migration conditions between the TUCP (modeled mean July and August 2021 Sacramento River inflow = 8,150 cfs and 7,200 cfs) and baseline conditions (modeled mean July and August 2021 Sacramento River inflow = 8,650 cfs and 7,200 cfs) (see Attachment 3). Similarly, there would be little difference expected between TUCP and baseline for dissolved oxygen based on the relative differences in July and August 2014 and 2015 (Figure WR6). As discussed further for adult winter-run and spring-run Chinook salmon, migration delay or straying of adult steelhead would not be expected to greatly differ for adult steelhead returning to the Sacramento River. Straying of adult steelhead returning to the San Joaquin River basin has not been studied, but if results for fall-run Chinook salmon indicating potential importance of San Joaquin River flows and exports also apply to steelhead, there would not be expected to be a difference in straying because July and August San Joaquin inflow and south Delta exports would be the same under TUCP and baseline (see Attachment 3 "*Delta Summary*").

Conclusions for Steelhead

In the Delta, there is the potential for slightly less through-Delta survival of juvenile steelhead as a result of less Delta inflow under the TUCP, although this would be limited to few individuals as the main migration period for spring 2021 would be complete by the time of changes in TUCP operations (June–August) and the main period of juvenile migration would not recommence until 2022. Entrainment would be low as a result of low south Delta exports under the TUCP and continued implementation of entrainment risk management under the NMFS (2019) Biological Opinion. Temperature migration conditions for steelhead adults occurring in July and August would be poor under both TUCP and baseline conditions and reflect atmospheric conditions rather than operational differences.

Delta Smelt

Presence and Life Stages of Delta Smelt

The 2020 fall midwater trawl abundance index of delta smelt was zero for the third year in a row. Very few delta smelt are currently being collected in sampling (e.g., none were collected during the first four Spring Kodiak Trawl surveys during January–April 2021), with the most recent Enhanced Delta Smelt Monitoring and 20mm surveys showing small numbers of larvae and juveniles in the Sacramento Deep Water Ship Channel (Figure DS1) and Lower Sacramento stratum based on the most recent survey information (figure not yet available). The TUCP period (June–August) would overlap the late spring/summer portion of the juvenile rearing period. As of late April/early May 2021, no delta smelt were salvaged by the CVP/SWP south Delta export facilities. The most recently available risk assessment[4] for delta smelt entrainment undertaken as part of CDFW (2020) ITP implementation concluded that based on distribution patterns over the past decade and rare detections in this water year, delta smelt are unlikely to be prevalent in the south Delta and that the risk of entrainment into the south Delta was low for delta smelt in both the Sacramento River/confluence and central Delta areas.

[4] See https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=192085&inline

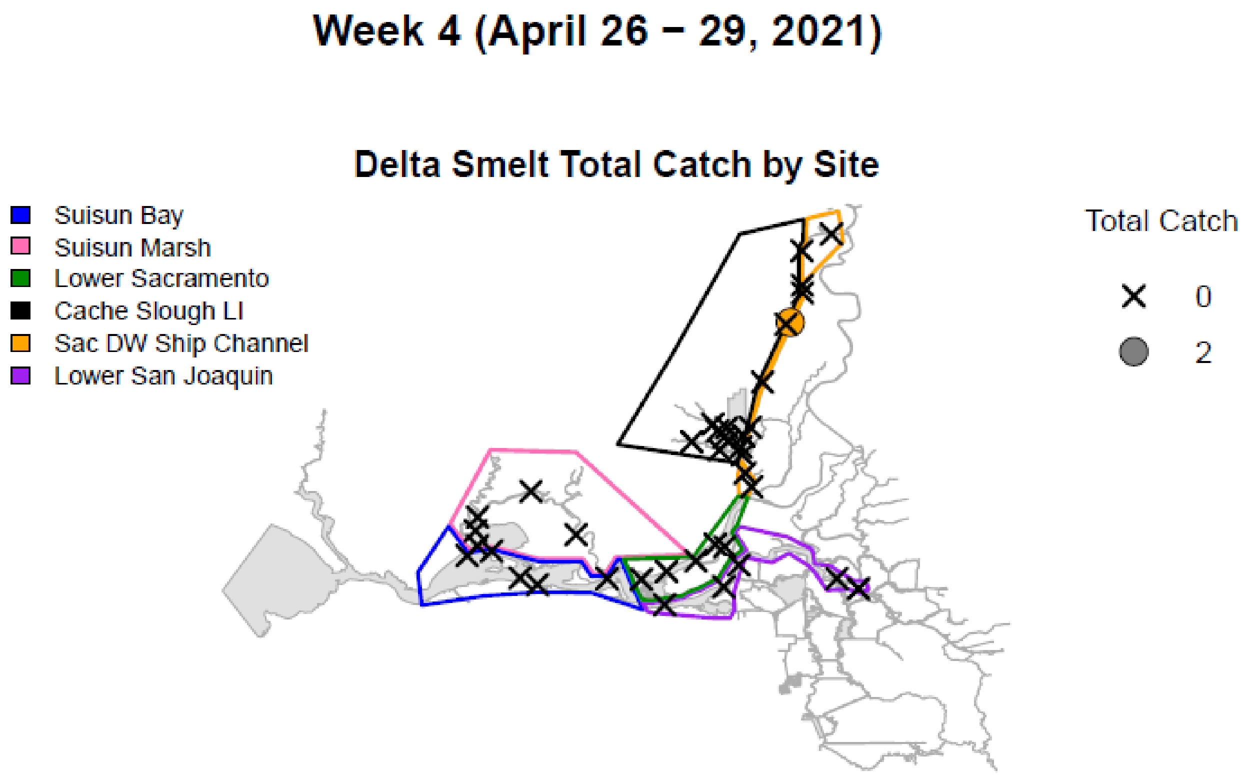


Figure DS1. Catch of Delta Smelt Juveniles in Enhanced Delta Smelt Monitoring Week 4.

Source: https://www.fws.gov/lodi/juvenile_fish_monitoring_program/edsm/Enhanced%20Delta%20Smelt%20Monitoring%20Report%20%28Weekly%20Summary%29/EDSM_report_212_2021_05_07.pdf

As of late April/early May 2021, no delta smelt were salvaged by the CVP/SWP south Delta export facilities. The most recently available risk assessment[5] for delta smelt entrainment undertaken as part of CDFW (2020) ITP implementation concluded that based on distribution patterns over the past decade and rare detections in this water year, delta smelt are unlikely to be prevalent in the south Delta and that the risk of entrainment into the south Delta was low for delta smelt in both the Sacramento River/confluence and central Delta areas.

Impacts of TUCP on Delta Smelt

Risk of juvenile delta smelt entrainment would remain low after the start of operational changes under the TUCP in June 2021 (i.e., reduced Delta outflow and restrictions on south Delta exports). There will be continued risk assessment and, as necessary, operational adjustments as part of USFWS (2019) Biological Opinion and CDFW (2020) ITP implementation to limit entrainment risk until the end of June, when the management period ends because entrainment risk ends.

[5] See https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=192085&inline

The biological review for the 2015 April–September TUCP summarized research presented at the Interagency Ecological Program (IEP) workshop (March 18-20, 2015) which remains relevant in illustrating that drought likely affects delta smelt in a number of ways. This summary is adapted from that account and includes more recent literature. Drought can reduce the area of low salinity habitat used by rearing delta smelt (Feyrer et al. 2011; Bever et al. 2016). Drought can indirectly impact reproductive potential by lowering the number of oocytes females produce (Hammock 2015). This is brought about by the general link between low outflow in drought conditions and elevated water temperature (Jeffries et al. 2016), although note that there can be exceptions (e.g., relatively warm conditions in the wet year of 2017). Warming temperature shortens the spawning window, which causes fewer clutches to be produced per female (Jeffries 2015), and warmer temperature in the summer is correlated with low delta smelt survival into the fall (Brown et al. 2016). Both of these mechanisms combine with low adult abundance to impair population fecundity. Although the general turbidity patterns in the system have been largely driven by a long-term decrease in sediment supply (Schoellhamer et al. 2013) and factors such as wind-driven resuspension are of considerable importance (Bever et al. 2018), lower outflow also delivers less sediment to the Delta (Schoellhamer et al. 2013) and therefore can affect turbidity. Delta smelt use turbid water to avoid predators and also use it as foraging habitat (Hasenbein 2015a, Hasenbein et al. 2016). Furthermore, warm, slow moving water characterized by drought promotes conditions in which parasites like Ich (*Ichthyophthirius multifiliis*) thrive (Lehman et al. 2020a). Ich causes skin lesions to form on a variety of fish and has an increased prevalence among captive delta smelt above 17°C (Frank et al. 2015). *Microcystis* blooms extended into December of 2014 (Lehman 2015; Lehman et al. 2017). This highly toxic cyanobacteria is known to kill phytoplankton, zooplankton and compromise fish health (Acuña et al. 2012). Finally, the abundance of non-native delta smelt predators, such as Mississippi silversides and black bass, increased in the Delta during the 2012–2016 drought (Barnard 2015; Mahardja et al. 2021). The same pattern was found for non-native competitors, such as clams like *Corbicula,* which seem to be expanding throughout the Delta despite the drought (Thompson 2015; see also previous discussion related to *P. amurensis* in *Ecosystem Impacts*).

As noted above, there may be a number of impacts of drought on delta smelt and habitat. As previously discussed above in *Ecosystem Impacts*, abundance indices of silversides, predators of larval delta smelt, are negatively related to Delta inflow (Mahardja et al. 2016[6]; Mahardja et al. 2021) and so silverside abundance could increase as a result of the drought, although it is uncertain to what extent this would occur and whether there would be additional impacts from the TUCP on top of the drought. USFWS (2019: 215) suggested that extended warm, low flow conditions that resulted from the recent drought may be contributing to the proliferation of submerged aquatic vegetation delta smelt habitat within the Cache Slough Complex. As previously noted for winter-run Chinook salmon, Durand et al. (2016) examined factors affecting the submerged aquatic vegetation species and did not find a clear effect of flow (water

[6] Mahardja et al. (2016: 12) cautioned that the relationships are not meant to imply causality, given that the mechanisms could not be identified, and that further investigation is merited.

velocity), noting that factors other than flow may have had a greater effect on long-term increases, including increased water clarity; they also suggested that other important factors that should be considered are the impacts of previous occupancy by the vegetation, increased temperatures, and changing nutrient concentrations. As such, although the TUCP would affect flow, overall drought conditions would be the main driver of changes in submerged aquatic vegetation. As described in *Ecosystem Impacts*, the extent to which the TUCP's changed operations from baseline conditions would affect harmful algal blooms is uncertain given that water temperature is the main driver of bloom intensity (Lehman et al. 2020a). Drought conditions would be expected to reduce the density of the delta smelt prey *P. forbesi* but there is uncertainty in the extent to which this would be affected by the TUCP (see discussion in *Ecosystem Impacts*). Less Delta outflow under drought conditions would move the salinity field upstream (see discussion below), allowing *P. amurensis* to move further upstream and thereby expand its range and overall grazing rate if salinity remains high enough for several months (Kimmerer et al. 2019). As described further below, an upstream shift in X2 of around 2 kilometers or less was modeled to occur (Figure DS2), potentially increasing the upstream range of *P. amurensis* but only to a limited extent relative to overall drought conditions. Water temperature differences in the low salinity zone as a result of the TUCP would be expected to be very small, given that recent studies found a 0.0–0.1°C increase in temperature for a 3-kilometer upstream movement of X2, albeit in a wet but warm year (Anchor QEA 2019). In addition, available data for 2014–2015 show that although June–August Delta outflow was greater in 2014 (monthly means of ~3,400–5,400 cfs) than 2015 (monthly means of ~4,500–4,800 cfs), water temperature in 2015 at Antioch and Rio Vista was comparable to 2014, reflecting the importance of atmospheric forcing (Figure WR5). Thus the TUCP would not be expected to have noticeably different water temperature for delta smelt than baseline. Polansky et al. (2020: Figure 1b) found that post-larval delta smelt survival was positively related with June–August Delta outflow, indicating a potential negative effect of the TUCP relative to baseline, although with appreciable uncertainty based on the width of the credible intervals in their statistical relationship.

The USFWS (2019) Biological Opinion found that the position of X2 should be managed between Carquinez Strait and Threemile Slough on the Sacramento River for rearing habitat. Results from the DSM2 modeling illustrated that reduced outflow during June–August under the TUCP would shift the salinity field upstream around 2 km or less (Figure DS2). In general, movement of the salinity field upstream would reduce the area of low salinity zone habitat which a relatively large proportion of the delta smelt population inhabits as juveniles and subadults, although with low Delta outflow the area of habitat would be considerably limited under both TUCP and baseline scenarios relative to wetter years (Feyrer et al. 2011). Based on the low salinity zone area lookup table provided by Brown et al. (2014: 79), the area of low salinity habitat as a function of X2 is around 11,000–12,500 acres[7] over a range from 82 to 96 km and does not uniformly decrease with increasing X2. This indicates that the TUCP would not

[7] As noted by Brown (2014: 79), the distribution of salinity in the for the same X2 can differ depending on whether X2 is moving seaward or landward and on the exact flow conditions in the year of interest. Therefore, calculated surface areas are to be considered estimates rather than exact values. Note that lookup does not account for the presence of EDB, but the EDB would not result in X2 farther upstream based on DSM2 modeling consistent with conditions documented by California Department of Water Resources (2019a).

necessarily result in a reduction in the area of the low salinity zone and that any change (positive or negative) would be small. As Sommer and Mejia (2013) noted, delta smelt are not confined to a narrow salinity range and occur from fresh water to relatively high salinity, even though the center of distribution is consistently associated with X2 (Sommer et al. 2011). Nobriga et al. (2008) found the probability of occurrence of Delta Smelt was highest at low electrical conductivity (EC) (1,000–5,000 µmhos/cm), and declines at higher EC. This generally corresponds to the habitat affinity results of Hamilton and Murphy (2020), who delineated suitable (470–4,550 µmhos/cm), adequate (300–5,300 µmhos/cm), unsuitable (<150 and >7,800 µmhos/cm), and uninhabitable (>18,750 µmhos/cm) EC ranges. There were differences in modeled EC between the TUCP and baseline along the lower Sacramento River and confluence from Rio Vista to Chipps Island during the TUCP period as a result of the change in the western Delta agriculture compliance point from Collinsville to Emmaton from June 1 to August 15; however, based on the criteria of Hamilton and Murphy (2020), both scenarios resulted in unsuitable EC at Chipps Island (Figure DS3) and Collinsville (Figure DS4), suitable EC at Emmaton (Figure DS5), and suitable or adequate EC at Rio Vista (Figure DS6). EC was also unsuitable under both TUCP and baseline in Montezuma Slough at Beldon's Landing in Suisun Marsh (Figure DS7).

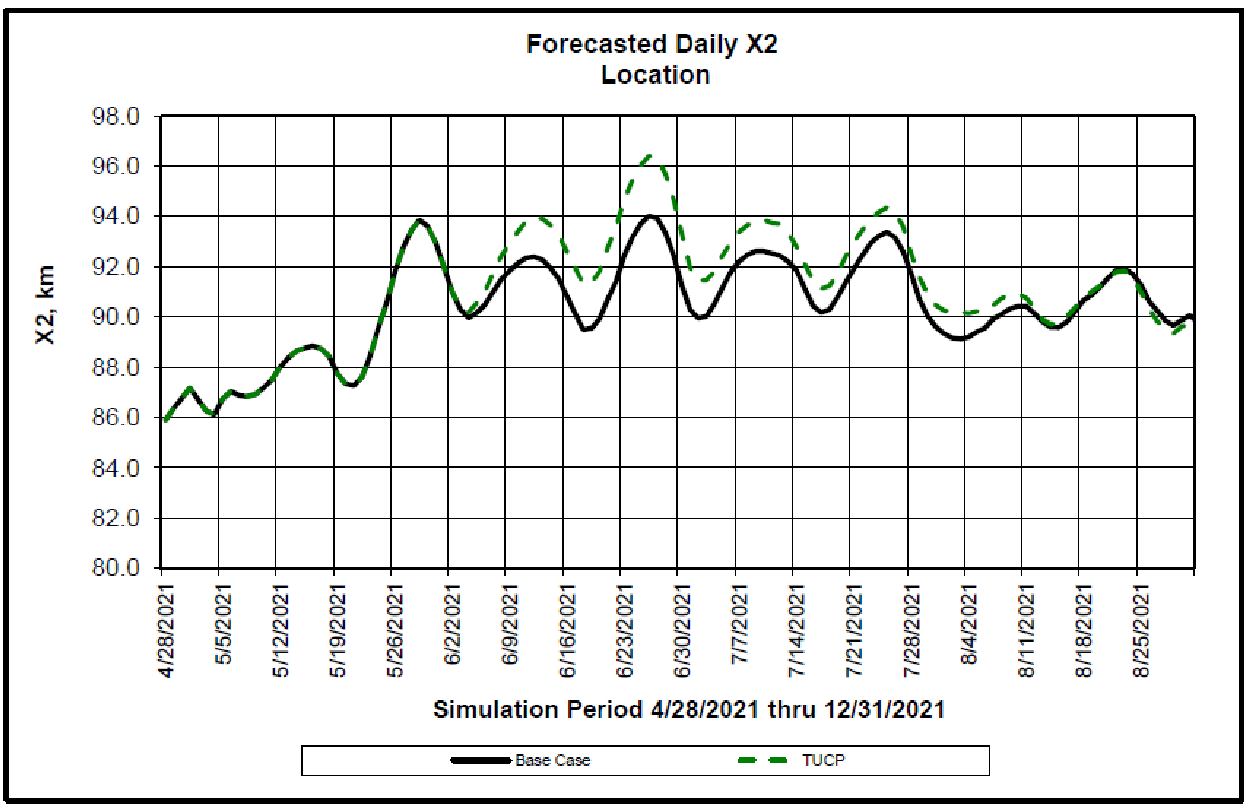


Figure DS2. Daily X2 from DSM2 Modeling.

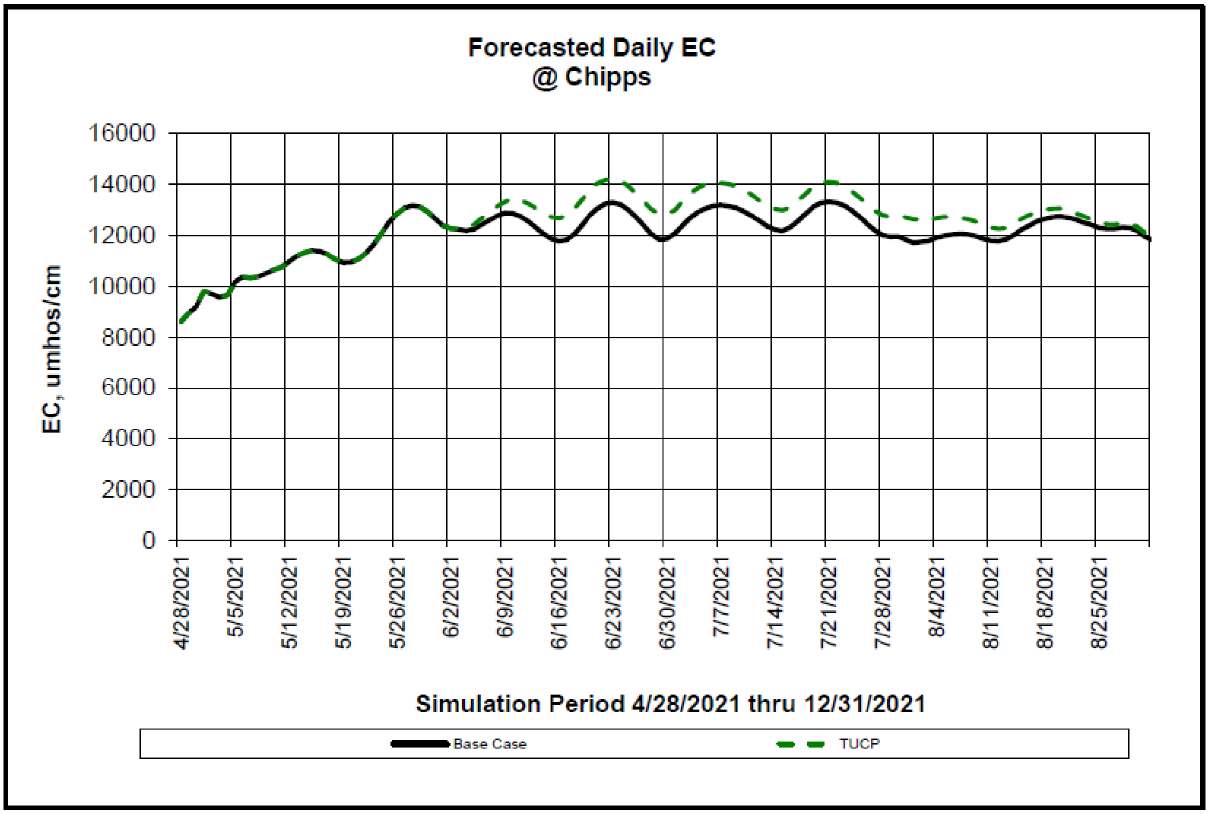


Figure DS3. Daily EC at Chipps Island from DSM2 Modeling.

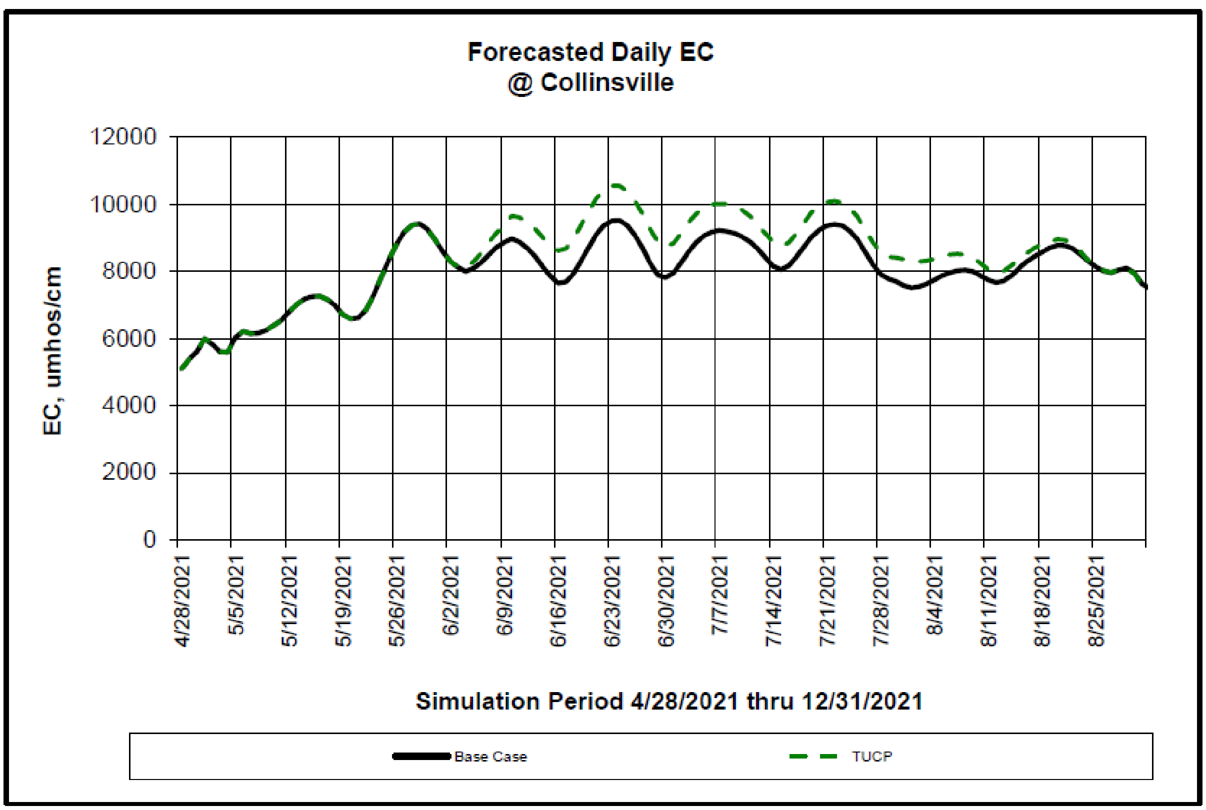


Figure DS4. Daily EC at Collinsville from DSM2 Modeling.

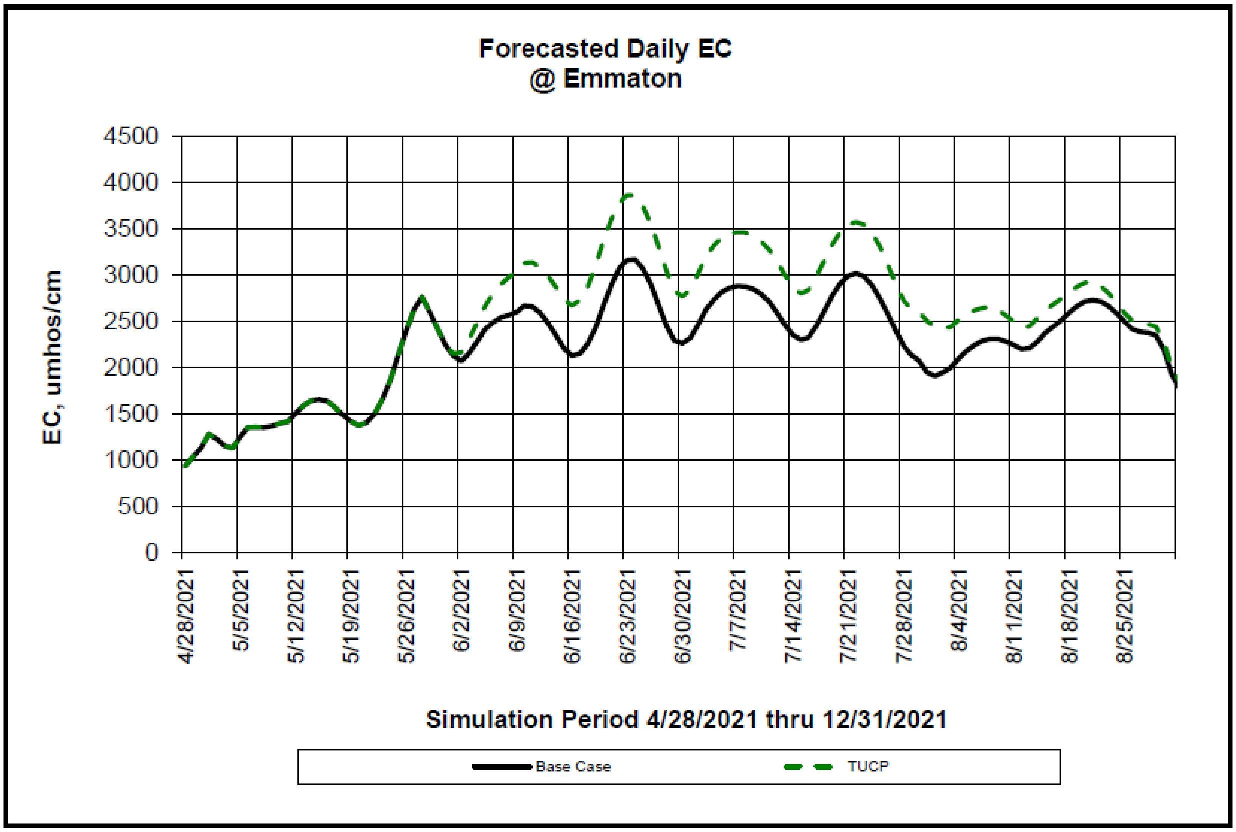


Figure DS5. Daily EC at Emmaton from DSM2 Modeling.

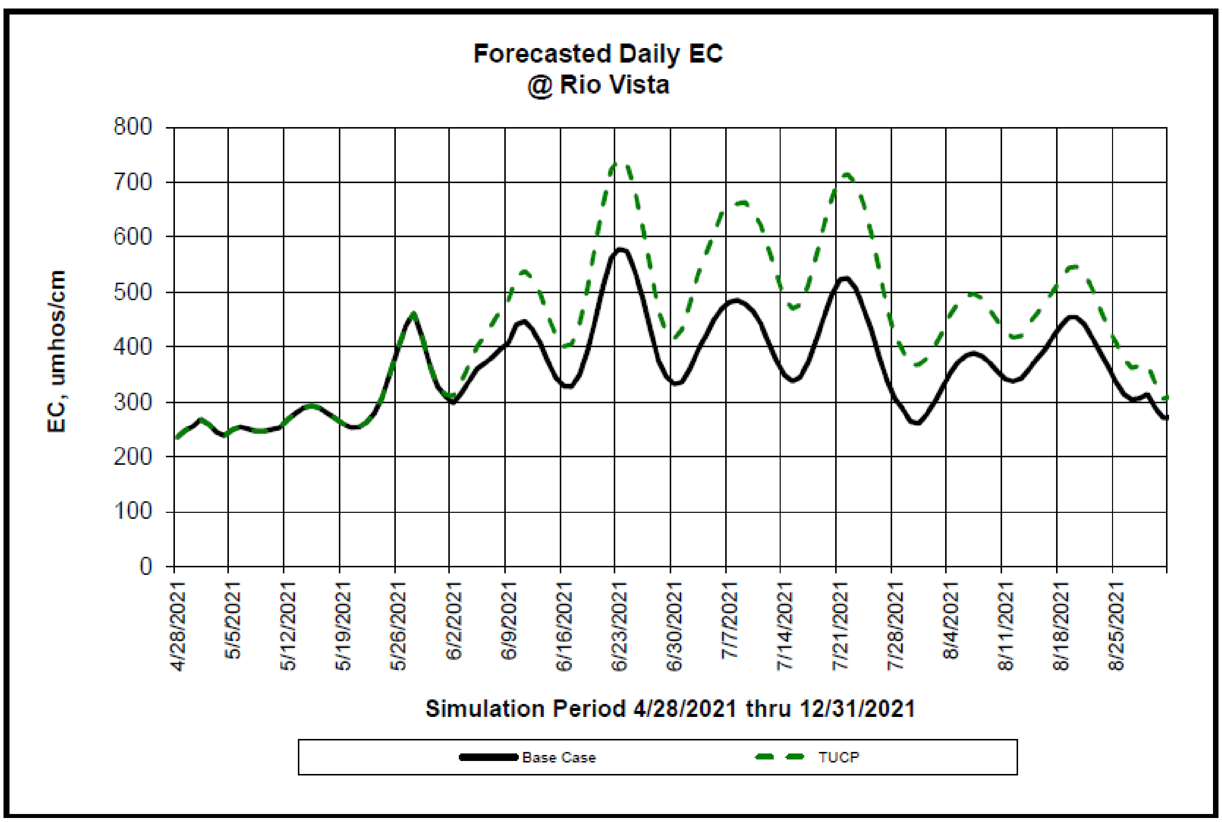


Figure DS6. Daily EC at Rio Vista from DSM2 Modeling.

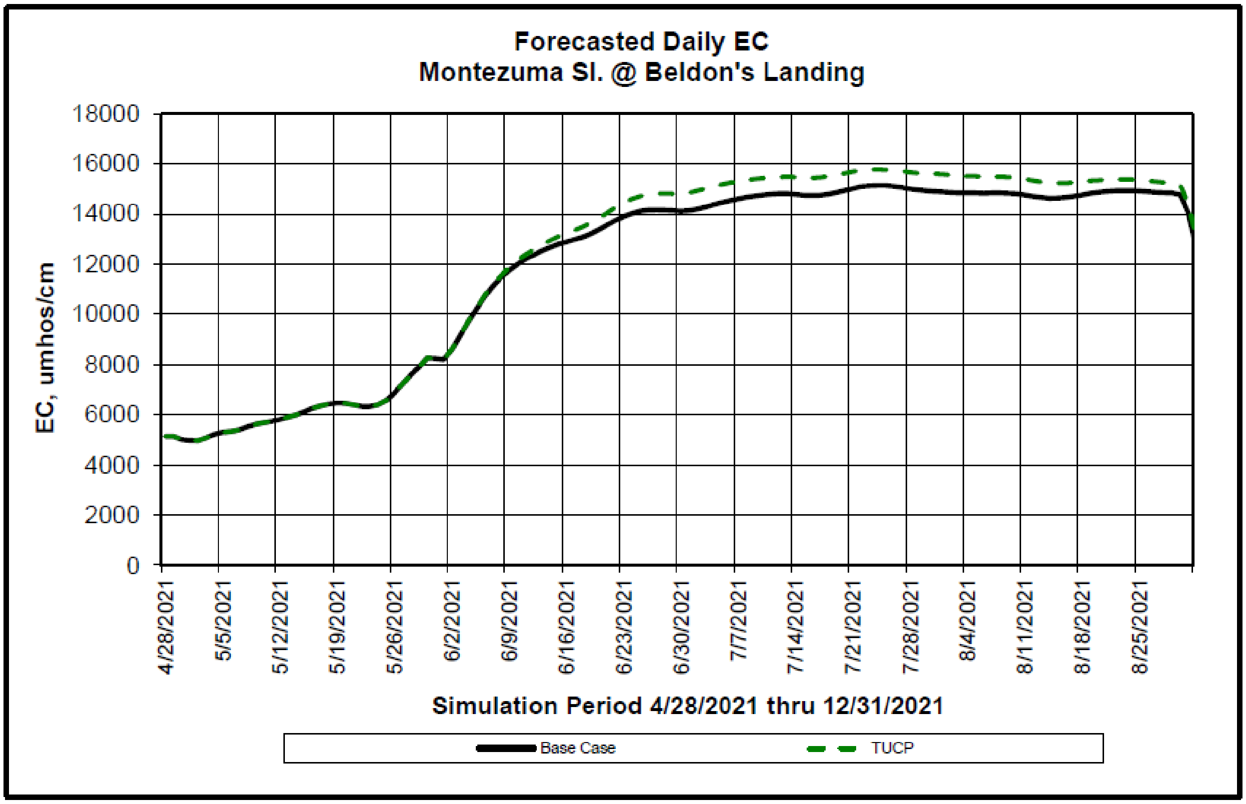


Figure DS7. Daily EC at Montezuma Slough at Beldon's Landing from DSM2 Modeling.

Movement of the salinity field upstream in 2021 could result in the low salinity zone being more likely to overlap areas with less turbidity/higher water clarity as a result of relatively high extents of submerged aquatic vegetation in parts of the Delta (e.g., San Joaquin River/Franks Tract). However, delta smelt tend to be distributed more on the Sacramento River side of the Delta. The USFWS (2019) Biological Opinion recognized that CVP and SWP operations results in an increase in summer and fall outflows over what would occur in the absence of operating the CVP and SWP and considered actions such as the 2015 TUCP, and that similar drought operations could be considered in the future when exceptionally dry conditions return to California. This area is part of the area of primary delta smelt habitat referred to as the “North Delta Arc” from the Cache Slough-Lindsay Slough Complex in the north Delta through the lower Sacramento River and confluence with the San Joaquin River to Suisun Marsh and portions of Suisun Bay (Moyle et al. 2018). Habitat features in this area, such as higher turbidity (Morgan-King and Schoellhamer 2013) and food availability (Hammock et al. 2019), provide important habitat for delta smelt, particularly during drought conditions (Mahardja et al. 2019). Turbidity monitoring data in June–August 2014 and 2015 illustrate generally more suitable turbidity (i.e., >12 NTU/FNU; Sommer and Mejia 2013) on the Sacramento River side of the Delta and considerable overlap between the two years (Figure DS8), indicating little likelihood of difference in turbidity as a result of TUCP vs. baseline.

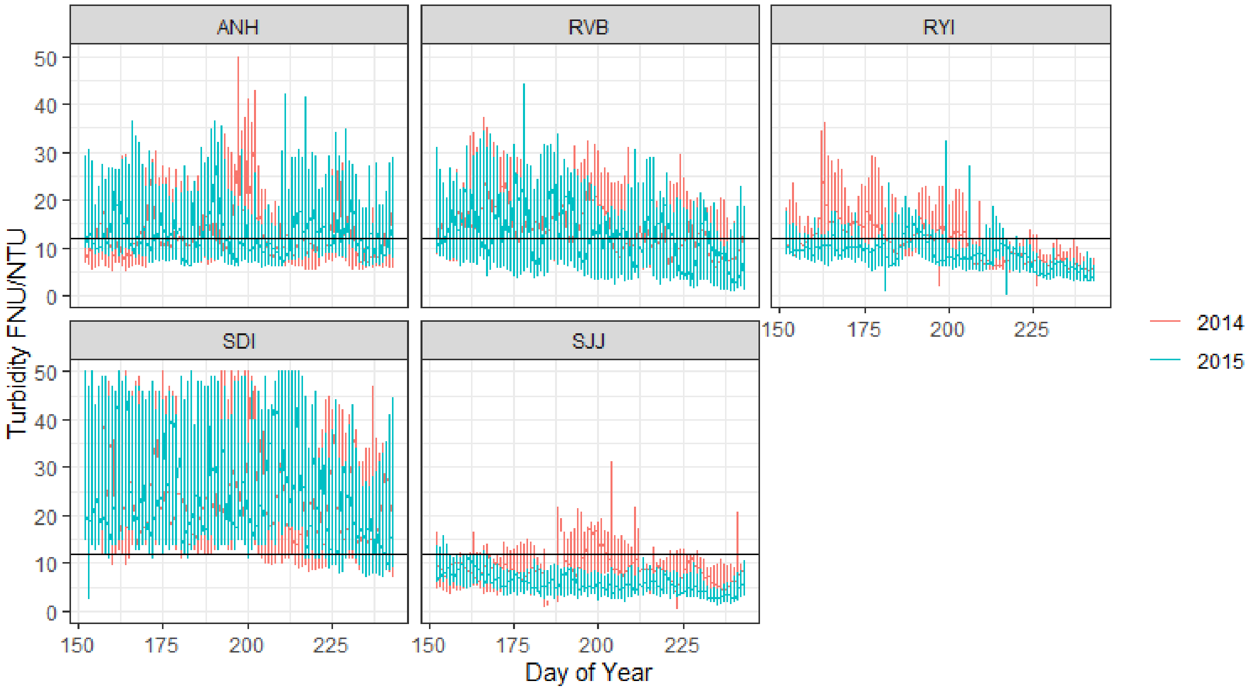


Figure DS8. Hourly Mean Turbidity at Various Monitoring Locations, June–August 2014 and 2015.

Source: California Data Exchange Center (CDEC). Stations are San Joaquin River at Antioch (ANH); Sacramento River at Rio Vista Bridge (RVB); Cache Slough at Ryer Island (RYI); Sacramento River at Decker Island (SDI); and San Joaquin River at Jersey Point (SJJ). June 1 = day 152; July 1 = day 183; August 1 = day 213. Reference line shows 12 Nephelometric Turbidity Units/Formazin Turbidity Units (NTU/FNU).

Conclusions for Delta Smelt

Implementation of the TUCP would give a similarly low entrainment risk to delta smelt as baseline conditions in spring 2021 for juvenile delta smelt because south Delta exports under the TUCP would be restricted to low levels (generally 1,500 cfs) and the existing entrainment risk management under the 2020 Record of Decision and the CDFW (2020) ITP would continue.

Less Delta outflow under the TUCP relative to baseline drought conditions would not lead to materially less low salinity zone habitat because of the general location of the salinity field under drought conditions, although there may be some negative impacts of the TUCP (e.g., predatory silverside abundance and increased *Potamocorbula* range and grazing). TUCP impacts, if any, would be minor relative to overall drought impacts.

Longfin Smelt

Presence and Life Stages of Longfin Smelt

The 2020 CDFW Fall Midwater Trawl abundance index for longfin smelt was 28, the lowest since the drought years of 2014–2016. The most recent CDFW 20 mm survey indicates that juvenile longfin smelt are distributed seaward of the Delta. A small number were collected in the north Delta while none were collected in the south Delta (Figure LFS1). By May and June of most years, juvenile longfin smelt are able to tolerate salinity of 30 parts per thousand and are often found in San Francisco Bay (MacWilliams et al. 2016). Moreover, longfin smelt are now known to occur in a suite of San Francisco Bay tributaries, and in restored Bay wetlands (Lewis et al. 2020).

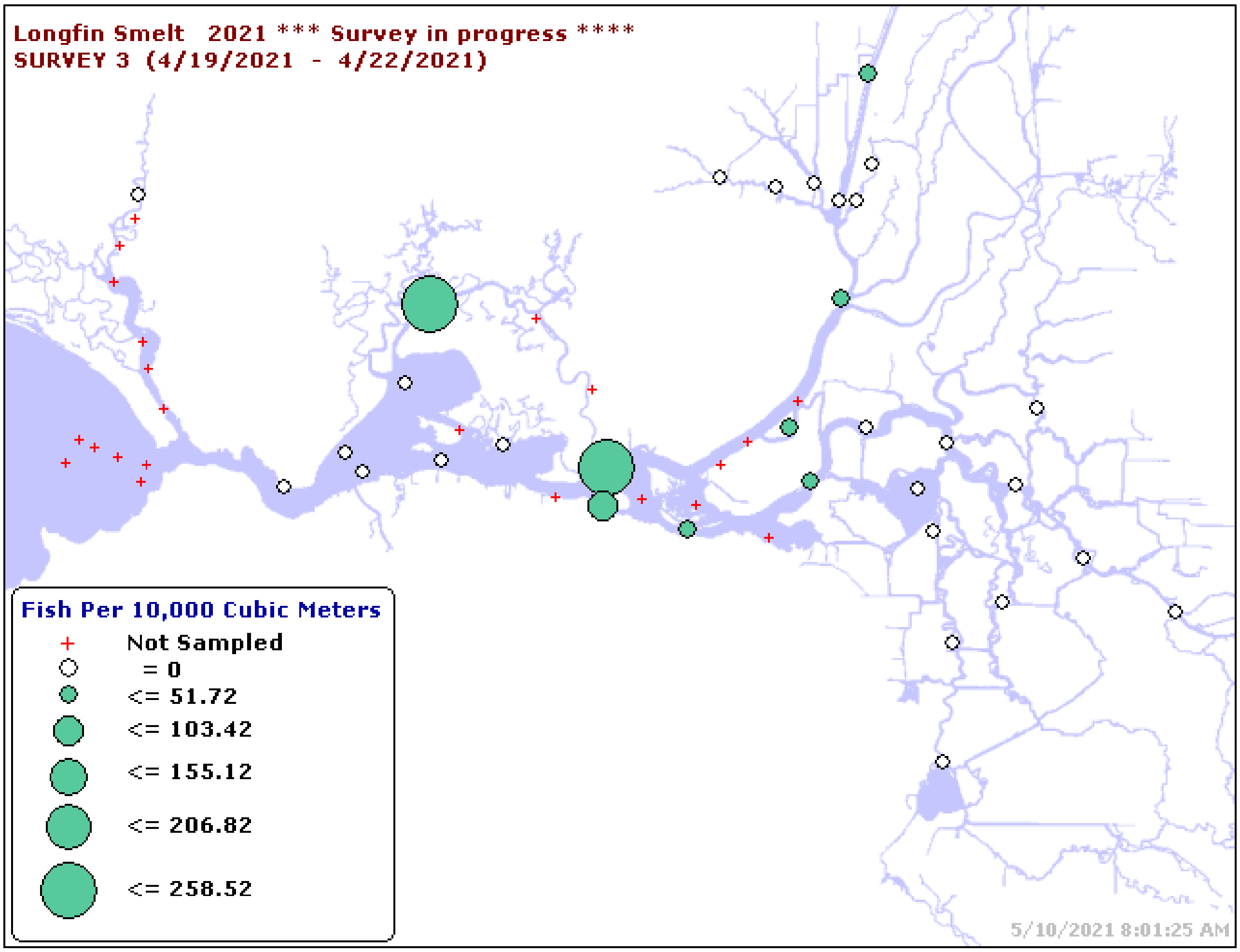


Figure LFS1. Distribution of Longfin Smelt Juveniles in Mid-Late April from 20-mm Survey 3.

Source: https://www.dfg.ca.gov/delta/data/20mm/CPUE_map.asp

Impacts of TUCP on Longfin Smelt

The status of longfin smelt and the impacts of flow and water project operations were recently summarized in the DWR SWP ITP Application under CESA (DWR 2019b). The range of drivers affecting population trends is broad, but it is clear that drought conditions cause major stresses for the population.

The current distribution of longfin smelt juveniles (Figure LFS1), the expected general continued movement downstream toward San Francisco Bay of those currently in or near the Delta (e.g., Baxter et al. 2010, MacWilliams et al. 2016), rising water temperatures in the south Delta, and continued south Delta export operations to meet D-1641 minimum outflow indicate that entrainment risk for juvenile longfin smelt would remain very low with the onset of changes in operations under the TUCP initiating on June 1st (i.e., less Delta outflow and restrictions on south Delta exports).

The TUCP will reduce Delta outflow from June to August as a result of changes in outflow requirements and relocation of the western Delta agriculture compliance point. While there are relatively strong statistically significant relationships between longfin smelt abundance indices and winter-spring Delta outflow or X2 (e.g., Kimmerer et al. 2009; Thomson et al. 2010; Nobriga and Rosenfield 2016), reductions in Delta outflow in June 2021 would be at the end of the winter-spring Delta outflow period that has correlations with longfin smelt abundance indices. Therefore, TUCP reductions would have limited potential for negative impacts to juvenile longfin smelt recruiting in 2021. Differences in Delta outflow between the TUCP and baseline would be very small compared to general hydrological differences (i.e., differences between water year types). As described previously for delta smelt and in the discussion related to *Ecosystem Impacts*, TUCP impacts on prey for smelts (e.g., *P. forbesi* transport to the low salinity zone) would be limited relative to the magnitude of effect from drought conditions.

Seasonal water temperature increases >22°C cue longfin smelt emigration from the Delta (Baxter et al. 2010: 66). Such temperatures are more common in the Delta (see Figure WR5 in the winter-run Chinook salmon analysis) and are generally less frequent in Suisun Bay (Figure LFS2). As previously noted for delta smelt, the inconsistent differences in water temperature between the 2014 and 2015 drought years, for which Delta outflow was higher in the former, indicate that the TUCP would not affect water temperature differently than baseline. EC in Suisun Bay during June–August would not be greatly different under the TUCP and baseline, and well within the range of salinity selected by juvenile longfin smelt based on summer townet survey data (Kimmerer et al. 2009[8]).

[8] The peak resource selection function shown by Kimmerer et al. (2009: Figure 5f) for juvenile longfin smelt abundance in the summer townet survey is at a salinity range of ~5–7 parts per thousand, equivalent to EC of ~9,000–12,300 µmhos/cm based on the conversion from Schemel (2001); EC of 20,000 µmhos/cm is equivalent to just under 12 parts per thousand salinity.

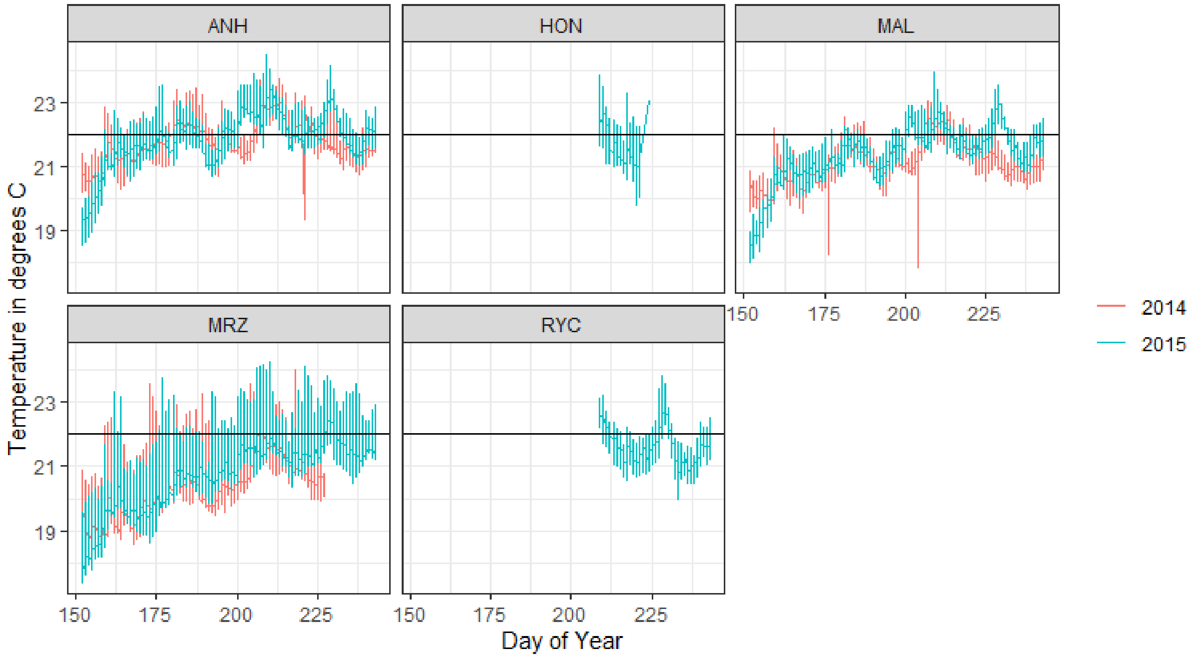


Figure LFS2. Hourly Mean Temperature at Various Monitoring Locations in the Western Delta and Suisun Bay, June–August 2014 and 2015.

Source: California Data Exchange Center (CDEC). Stations are San Joaquin River at Antioch (ANH); Honker Bay (HON); Sacramento River at Mallard Island (MAL); Martinez (MRZ); and Suisun Bay – Cutoff Near Ryer (RYC). June 1 = day 152; July 1 = day 183; August 1 = day 213.

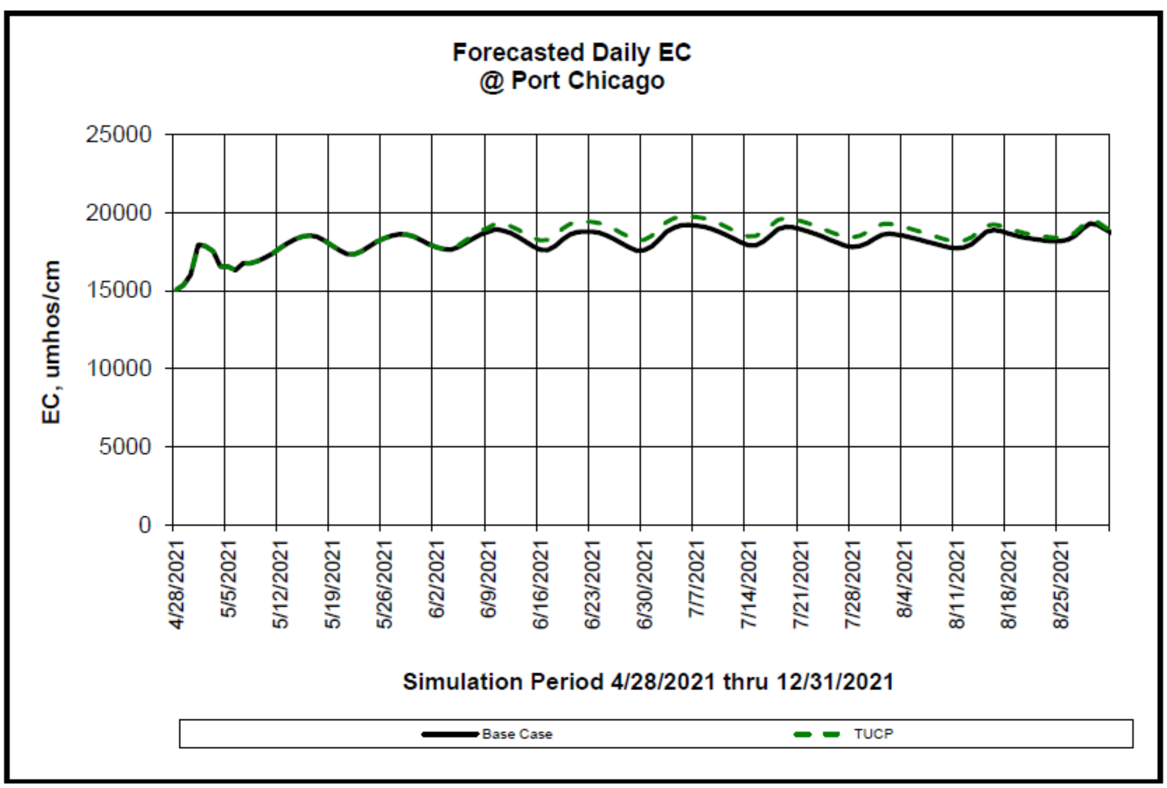


Figure LFS3. Daily EC at Port Chicago from DSM2 Modeling.

Conclusions for Longfin Smelt

Based on historical observations and current hydrology, longfin smelt are likely to experience relatively poor recruitment of juveniles in 2021. The reduction in winter-spring outflow (June 2021) due to the TUCP may have some negative impact on longfin smelt abundance based on observed correlations between abundance indices and Delta outflow, though this effect would be difficult to quantify given the already poor environmental conditions due to the drought and the small differences between TUCP and baseline flows relative to hydrological differences between water years. The TUCP is unlikely to increase entrainment of juvenile longfin smelt in June 2021 at the south Delta export facilities in any substantive manner, as a result of the existing or expected species distribution being largely outside of the south Delta, as well as implementation of restricted exports under the TUCP and restrictions being implemented or that would be implemented under the CDFW (2020) ITP. The TUCP would have only small changes to habitat for longfin smelt downstream of the Delta relative to baseline.

Other Native and Nonnative Species

The Delta is a large network of tidally influenced channels located at the confluence of the Sacramento and San Joaquin rivers that is the most important and complex geographic area in California for anadromous fish production, estuarine fish species, introduced fish species, and distribution of water resources for numerous beneficial uses.

In addition to the rare, threatened, and endangered species described and analyzed above, the Delta provides shallow open-water and emergent marsh habitat for a variety of common, native and nonnative, resident and migratory fish and macroinvertebrates, including several recreationally important fish species. The purposeful and unintentional introductions of nonnative fish, macroinvertebrates, and aquatic plants have contributed to a substantial change in the species composition, trophic dynamics, and competitive interactions affecting the population dynamics of native Delta species.

Water quality variables such as temperature, salinity, turbidity, DO, pesticides, pH, nutrients (nitrogen and phosphorus), dissolved organic carbon, chlorophyll, and mercury may influence habitat and food-web relationships in the Delta. Water quality conditions in the Delta are influenced by natural environmental processes (including floods and droughts), water management operations, and waste discharge practices. Delta water quality conditions can vary dramatically because of year-to-year differences in runoff and upstream water storage releases, and seasonal fluctuations in Delta flows.

Concentrations of materials in inflowing rivers are often related to streamflow volume and season. Transport and mixing of materials in Delta channels are strongly dependent on river inflows, tidal flows, agricultural diversions, drainage flows, wastewater effluents, and exports. Water quality objectives and concerns are associated with each beneficial use of Delta water.

Droughts have broad-scale impacts on aquatic ecosystems and aquatic communities, including changes to the physical environment and biological communities (Bogan et al. 2015). For example, drought conditions can provide opportunities for invasive species to become established in a new system, with cascading impacts on communities even after drought conditions recede (Beche et al. 2009).

Mahardja et al. (2021) examined over five decades of fish monitoring data from the Delta, including 2014 and 2015 TUCP years, to evaluate the resistance and resilience of fish communities to disturbance from prolonged drought events. High resistance was defined by the lack of decline in species occurrence from a wet to a subsequent drought period, while high resilience was defined by the increase in species occurrence from a drought to a subsequent wet period.

Mahardja et al. (2021) found some unifying themes connecting the multiple drought events over the 50-yr period. Pelagic fishes consistently declined during droughts (low resistance), but exhibit a considerable amount of resiliency and often rebound in the subsequent wet years. However, full recovery did not occur in all wet years following droughts, leading to permanently lower baseline numbers for some pelagic fishes over time. In contrast, littoral fishes seem to be more resistant to drought and may even increase in occurrence during dry years.

Impacts of TUCP on Other Native Species

The TUCP period would likely overlap with some juvenile fall-run Chinook salmon rearing and migration through the Delta. Based on the results from the spreadsheet implementation of the Perry et al. (2018) modeling and as discussed for winter-run and spring-run Chinook salmon, less Delta inflow under the TUCP could result in slightly increased (1–2%) juvenile Chinook salmon entry into the low-survival interior Delta through Georgiana Slough and the Delta Cross Channel when open, and slightly reduced through-Delta survival (2–3%). Entrainment at the south Delta export facilities would be expected to be low under the TUCP because of restrictions on south Delta exports. Some adult fall-run Chinook salmon may migrate through the Delta during the June–August TUCP period, although the peak of the overall potential June–December migration period is September/October (Moyle et al. (2017: 47). As described in more detail for winter-run Chinook salmon, available information suggests that relative to baseline the TUCP would not give greatly different migration conditions for adult fall-run based on factors such as temperature, dissolved oxygen, and changes in flows.

As previously discussed for green sturgeon, NMFS (2018: 12) noted that there are positive correlations between white sturgeon and Delta outflow, which have previously been used to infer potential impacts on green sturgeon (ICF International 2016: 5-197 to 5-205). Any impacts on white sturgeon as a result of changes in flow under the TUCP may be limited primarily because the largest sturgeon recruitment occurs in wetter years (Fish 2010); as previously noted for green sturgeon, 2021 would be a drier year regardless of implementation of the TUCP and it is uncertain the extent to which the relatively small difference in drought-year-flows between TUCP and baseline would result in differing impacts to green sturgeon compared to the potential impacts that may occur between much broader ranging hydrological conditions (i.e., different water year types).

Abundance indices of starry flounder and California bay shrimp, two estuarine and coastal taxa occurring in the San Francisco Estuary, have statistically significant negative correlations with X2 (Kimmerer 2002; Kimmerer et al. 2009), indicating a positive relationship with Delta outflow. The correlation for California bay shrimp is with March–May X2, which does not overlap with the TUCP period of changed Delta outflow and therefore indicates no effect of the TUCP would be expected on the species on the basis of that correlation. The X2 averaging period for starry flounder is March–June, which overlaps the TUCP period beginning in June, although the impacts of the TUCP in relation to baseline would be very small in relation to the overall drought conditions under the baseline condition relative to wetter years. In addition, starry flounder distribution is not restricted solely to the San Francisco Estuary and it is not known how abundance in the Estuary—possibly reflecting increased upstream movement and retention with greater Delta outflow (Kimmerer et al. 2009)—relates to the overall species abundance across the species' range from Alaska to southern California.

Resilience to low flow, drought conditions for those species described above and other native fishes, appears to be contingent on the suite of environmental factors critical to each species and how they relate to the increased flow during post-drought periods. Mahardja et al. (2021) found that the Delta-endemic Sacramento splittail demonstrated low resistance to drought, but consistently recovered during subsequent wet years. This is consistent with the current understanding that the relatively long-lived Sacramento splittail (Daniels and Moyle 1983) depend on strong year classes that are recruited during wet years when floodplain habitat is available for spawning (Sommer et al. 1997, Moyle et al. 2004). While the reduction in outflow due to the TUCP may have some negative impact on splittail and other native fish, such as the Sacramento splittail, this effect would be difficult to quantify given the already poor environmental conditions due to the drought and the small differences between TUCP and baseline flows relative to hydrological differences between water years.

Impacts of TUCP on Nonnative Species

According to Mahardja et al. (2021), nonnative pelagic fishes of the Delta (e.g., threadfin shad, American shad, and striped bass) generally exhibited low drought resistance and high resilience during the study period. However, these nonnative pelagic fish species did not demonstrate synchronous decline and rebound throughout every drought cycle. There is a lack of information on the flow-related mechanisms that would affect the abundance and distribution of these species; however, previous studies indicated that availability of suitable freshwater habitat may increase their occurrence during wet years (Feyrer et al. 2007, Kimmerer et al. 2009).

The nonnative littoral fish species included in the Mahardja et al. (2021) analysis (e.g., largemouth bass, bluegill, redear sunfish, and Mississippi silverside) are generally considered warm-water and drought-tolerant species and, as such, they rarely show decline during droughts. Conversely, numbers of largemouth bass, bluegill, and redear sunfish seem to have progressively increased between 1995 and 2011 (Mahardja et al. 2021), possibly due to the expansion of invasive submerged aquatic vegetation in the Delta over the past decade or two that have been associated with drought (Conrad et al. 2016, Santos et al. 2016, Kimmerer et al. 2019). On the other hand, Mississippi silverside appears to have a negative association with freshwater flow that led to a mostly positive drought resistance (Mahardja et al. 2016).

Conclusions for Other Native and Nonnative Species

While the reduction in outflow due to the TUCP may have some negative and/or beneficial impacts on other native and nonnative species, including the migratory, pelagic, and littoral species described above, these impacts would be expected to be small and difficult to quantify/detect given the environmental conditions associated with the drought and the small differences between TUCP and baseline flows relative to hydrological differences between water years.

Coordination with Water Operations and Watershed Monitoring Technical Teams

Reclamation and DWR convene the WOMT and Watershed Monitoring Workgroups for each of the Upper Sacramento, Clear Creek, American, Delta, and Stanislaus watersheds (“Watershed Monitoring Workgroups”). DWR convenes a Feather River Operations Group. Each of the Watershed Monitoring Workgroups are responsible for real-time synthesis of fisheries monitoring information (e.g., Enhanced Delta Smelt Monitoring Program, Summer Townet Surveys, other status and trends monitoring) and providing recommendations on scheduling specific volumes of water and implementing protective measures as specified in the 2020 Record of Decision, ITP, and FERC licenses. The Delta Monitoring Workgroup is responsible for integrating species information across watersheds, including delta and longfin smelt and winter-run Chinook salmon and other salmonids and sturgeon. In addition to Delta Watershed Monitoring Workgroup, the program includes Smelt Monitoring Team and Salmonid Monitoring Team. The Watershed Monitoring Workgroups include technical representatives from federal and state agencies and stakeholders and will provide information to Reclamation and DWR on species abundance, species distribution, life stage transitions, and relevant physical parameters.

The WOMT, comprised of agency managers, coordinates the implementation of water operations under the 2020 Record of Decision, as well as for the 2020 ITP. WOMT oversees the Watershed Monitoring Workgroups, seeks to resolve disagreements within the technical teams, and elevates policy decisions to the Directors of the agencies where necessary. This management-level team was established to facilitate timely decision-support and decision-making. The goal of WOMT is to resolve disagreements between technical staff from each agency; however, the participating agencies retain their authorized roles and responsibilities as set forth in the 2020 Record of Decision and 2020 ITP.

As part of implementation of the TUCP, DWR and Reclamation will coordinate with the Water Board, CDFW, NMFS, and USFWS at WOMT meetings. This process allows the regulatory agencies to stay up to date on information and provide feedback on potential project operations and related impacts on an ongoing basis as the drought is addressed. As a result of this coordination, DWR and Reclamation may submit to the Water Board additional information on developing standards appropriate for operation of the CVP/SWP during the drought. For example, DWR and Reclamation will continue to coordinate with Long-term Operation Agency Coordination working groups to develop a robust drought monitoring program through completion of the 2021 Drought Contingency Plan and Drought Ecosystem Monitoring and Synthesis Plan with updates to WOMT. Summary descriptions of the 2021 Drought Contingency Plan and Drought Ecosystem Monitoring and Synthesis Plan are provided below.

Drought Contingency Plan

The Drought Contingency Plan (DWR and Reclamation 2021) is prepared by DWR and Reclamation in an effort to provide updated information about areas of potential concern given the current dry hydrology of 2021. The Drought Contingency Plan is being submitted by DWR to CDFW in response to Condition 8.21 of CDFW's ITP (CDFW 2020). Concurrently, the Drought Contingency Plan will be shared with the agencies through the LTO Implementation Agency Coordination meetings.

Over the past several months, as part of implementing the action included in the 2019 Biological Opinions and ITP, DWR and Reclamation have worked with CDFW, NMFS USFWS, and the Water Board to identify actions that could potentially be implemented during a drought (not specifically for water year 2021) to manage the State's limited water supplies and protect species. These actions (known as the Drought Toolkit) describes the anticipated coordination, process, planning and potential drought response actions in the event of a drought. DWR and Reclamation are committed to continued development of the Drought Toolkit and will continue to coordinate with the CDFW, NMFS, USFWS, and the Water Board as any actions from that Toolkit are being considered for implementation in WY 2021

Drought Ecosystem Monitoring and Synthesis Plan

The 2021 Drought Contingency Plan will includes ecosystem monitoring to assess the impact of drought and drought actions. The monitoring plan will outline the data collection and analysis that will be implemented to evaluate ecosystem responses to the current drought in the Delta and Suisun Marsh, as well as the impacts of the TUCP. Data collection will rely primarily on existing monitoring, with the addition of a few special studies. Data will be integrated and compared to previous droughts and previous wet periods to detect ecosystem changes. These changes will be compiled and synthesized into a report and be incorporated into updates for the Drought Toolkit to inform future dry year actions.

Monitoring covers the legal Delta and Suisun Marsh (Figures MON1 through MON4). In some cases, it will include limited data collection outside these areas where necessary to describe habitat for anadromous species.

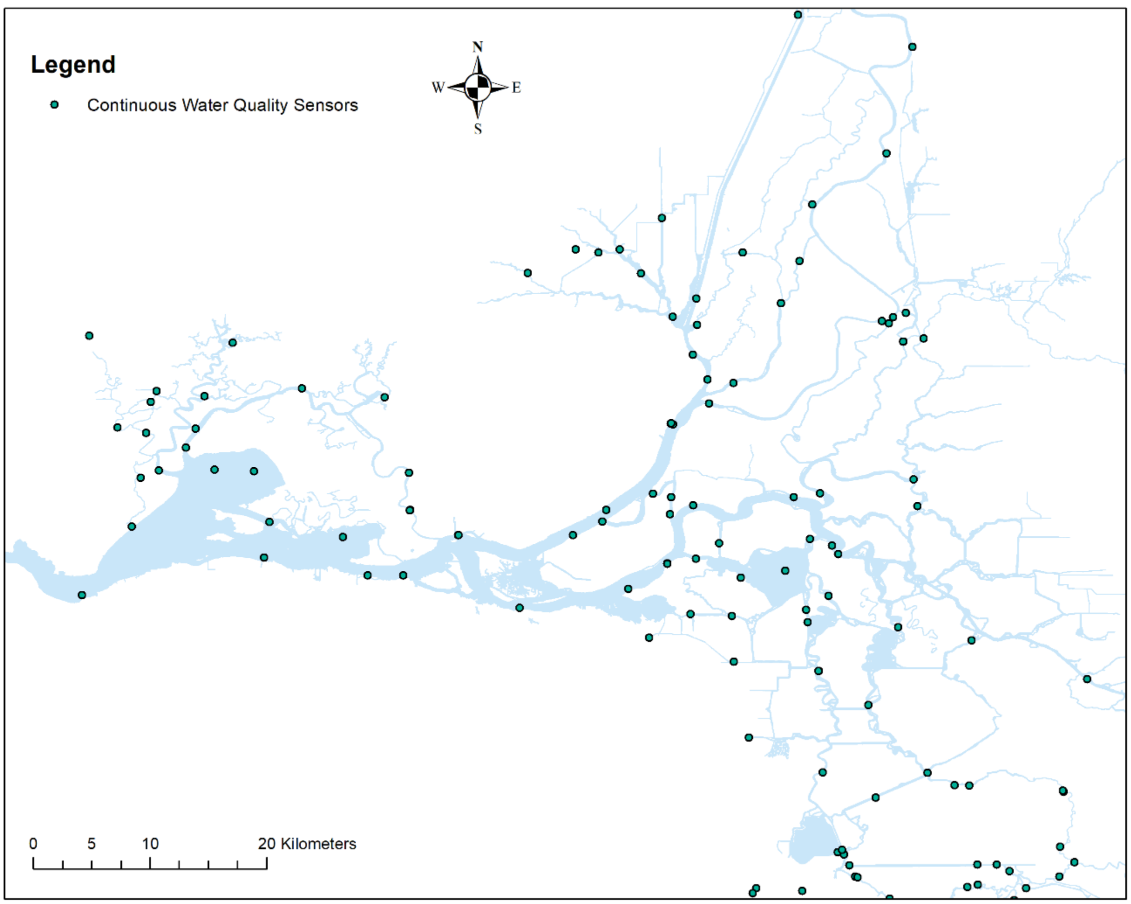


Figure MON1. Continuous water quality sensors in the Delta and Suisun Marsh.
Source: DWR and IEP 2021.

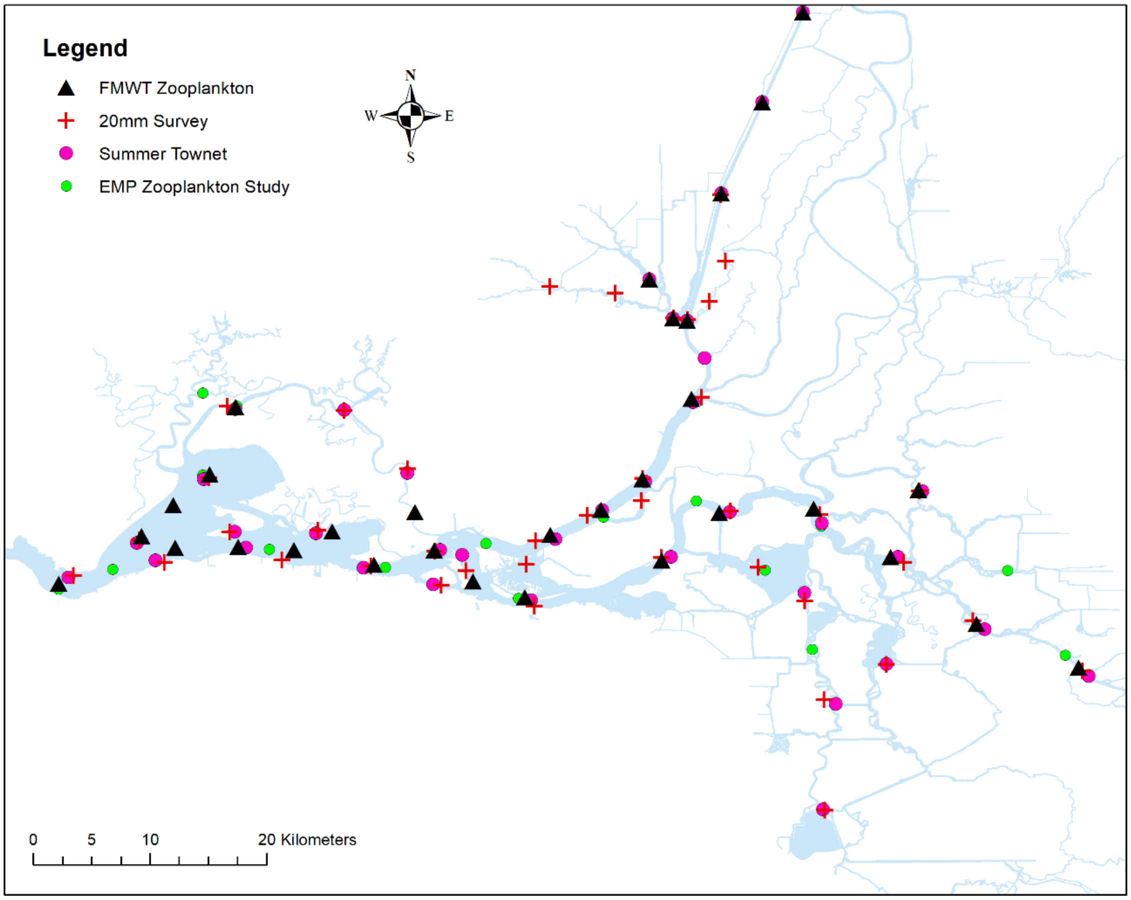


Figure MON2. IEP Zooplankton sample stations in the Delta and Suisun Bay/Marsh. FMWT zooplankton are collected monthly, Sept-December, 20mm area collected twice per month, March-June, Summer Townet samples are collected twice per month (June-August), and EMP samples are collected once per month year round.

Source: DWR and IEP 2021.

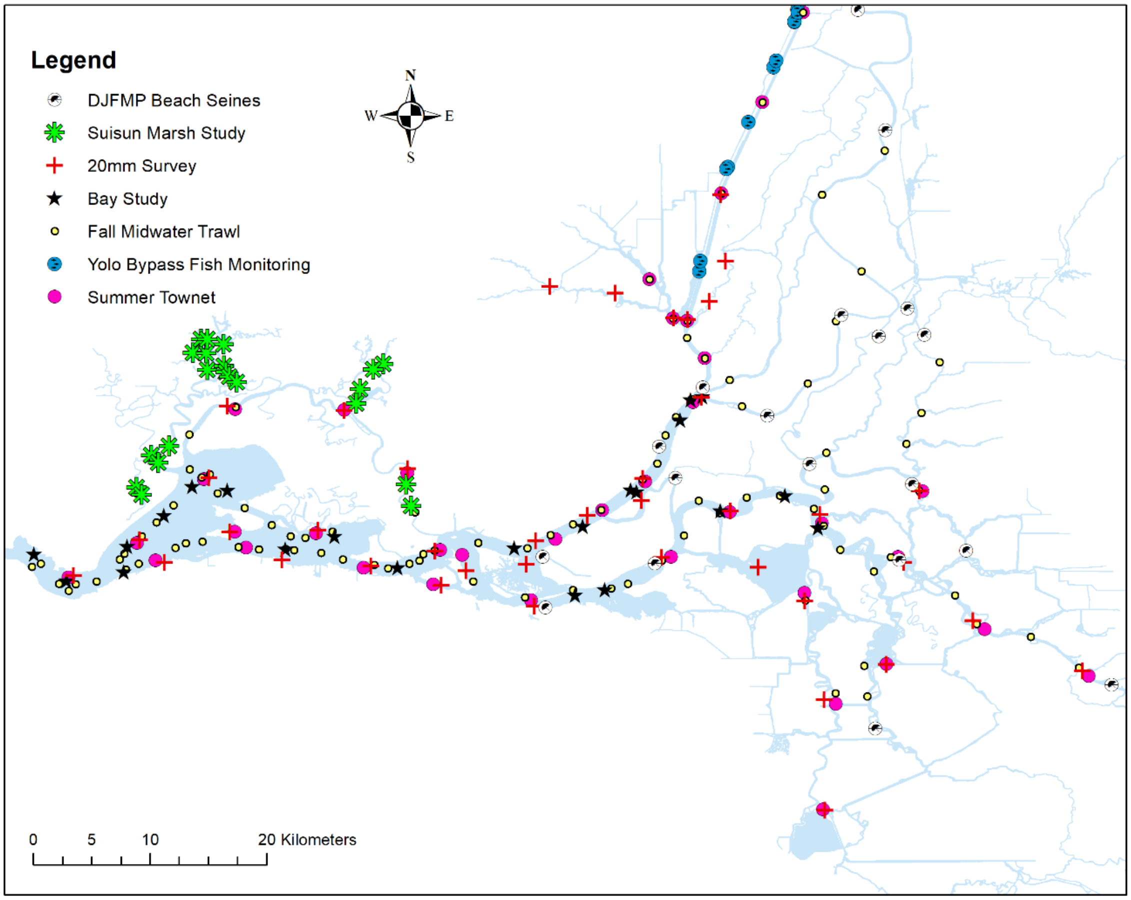


Figure MON3. IEP Fish sample stations in the Delta and Suisun Bay/Marsh. The Enhanced Delta Smelt Monitoring Survey does not have fixed sites, so is not shown here.

Source: DWR and IEP 2021.

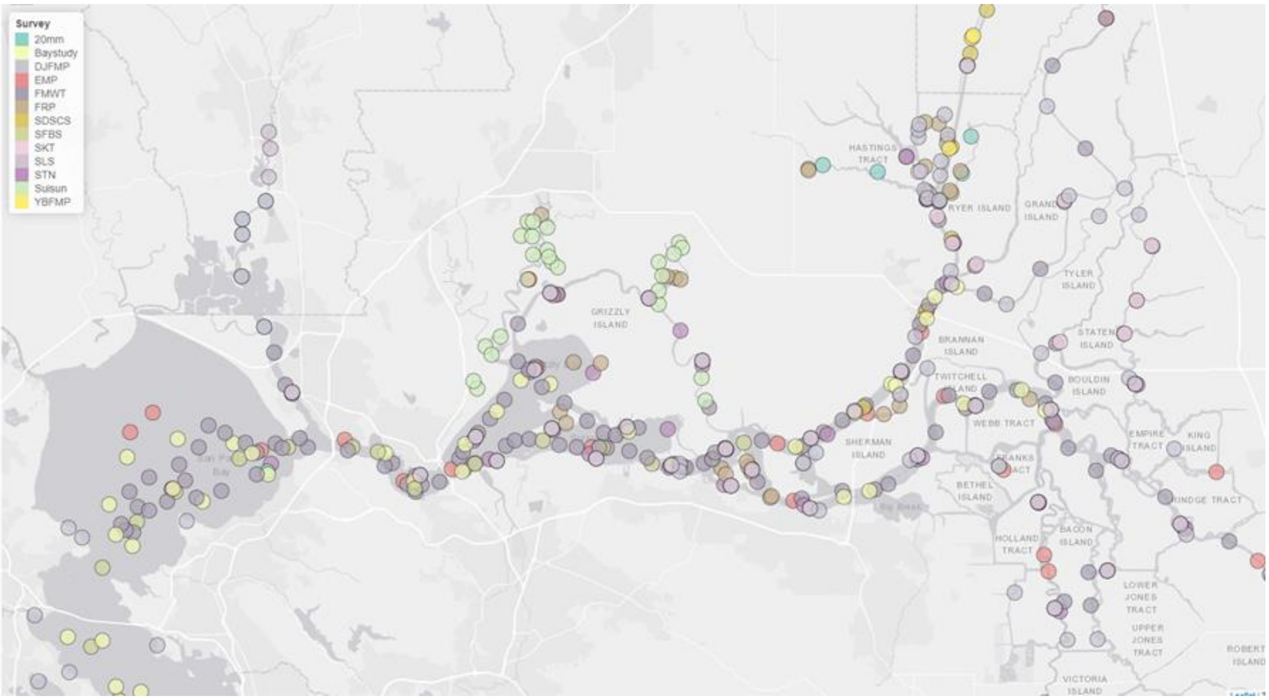


Figure MON4. Zooplankton and Fish sample stations in the Delta and Suisun Bay/Marsh (13 Bay-Delta monitoring programs).

Source: https://deltascience.shinyapps.io/monitoring/.

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Attachment 3
Delta Summary

DELTA SUMMARY (CFS)

	JUNE		JULY		AUGUST	
	Base	With TUCP	Base	With TUCP	Base	With TUCP
Sac River at Freeport	7950	7100	8650	8150	7200	7200
SJ River at Vernalis	650	650	600	600	550	550
Computed Outflow	4000	3150	4000	3500	3000	3000
Combined Project Pumping	1200	1200	1150	1150	1200	1200