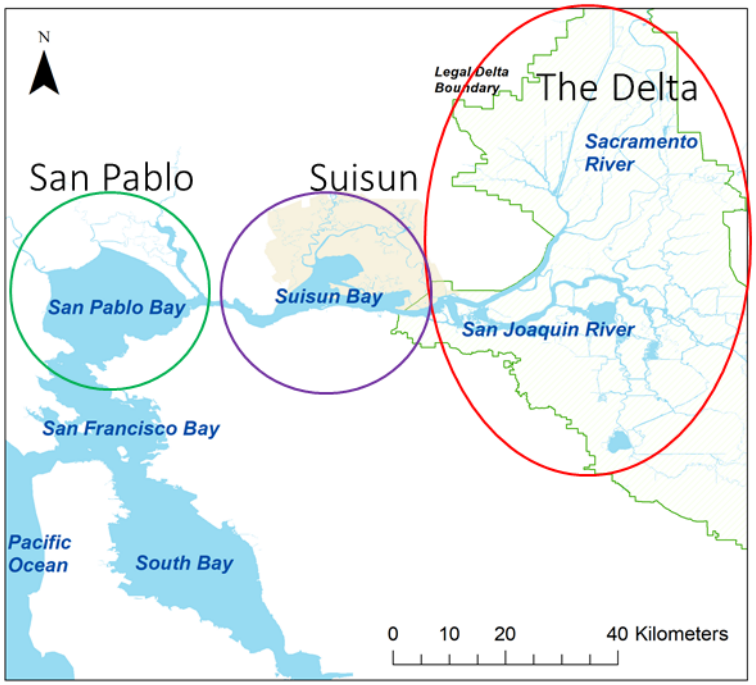
Spring 2018
IEP Seasonal Monitoring Report

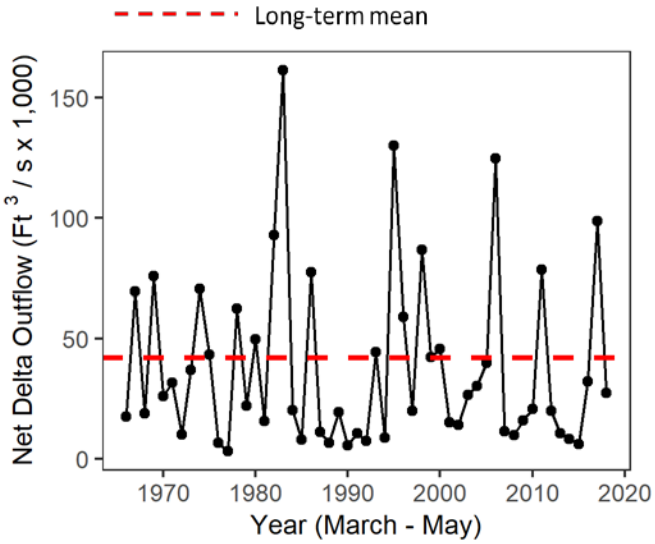
Interagency Ecological Program for the San Francisco Estuary
This report shows trends in water quality, plankton, and fish across multiple IEP surveys for March, April, and May of 2018.

Contents

Regions of the Estuary



Delta Outflow



- Freshwater flow influences water quality, plankton, and fish populations.
- Spring flow is driven primarily by rainfall, snowmelt, and upstream dam releases.
- The spring of 2018 had slightly lower outflow than normal.

For questions, comments, or corrections, contact Rosemary Hartman – Rosemary.Hartman@water.ca.gov

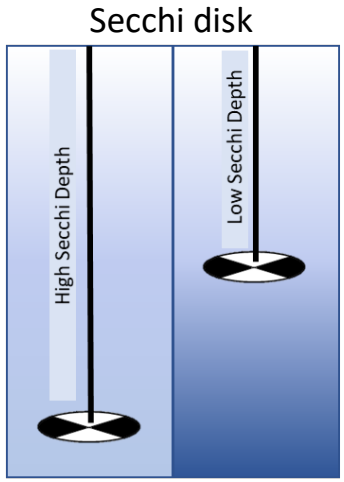
Interagency Ecological Program 2018 Spring Season Report

Secchi Depth

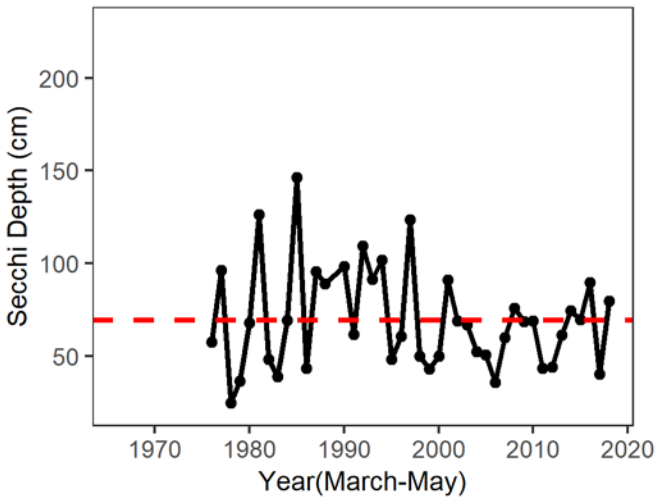
Background

- Organisms in this ecosystem are adapted to high turbidity conditions, and reductions in turbidity can have many negative ecological effects.
- Higher values for Secchi depth indicate lower turbidity.
- Secchi depth is measured monthly by DWR's Environmental Monitoring Program by dropping a black-and-white disk in the water until it disappears.

For more information, see: Schoellhamer, D. H. 2011. Sudden clearing of estuarine waters upon crossing the threshold from transport to supply regulation of sediment transport as an erodible sediment pool is depleted: San Francisco Bay, 1999. Estuaries and Coasts 34(5):885-899.

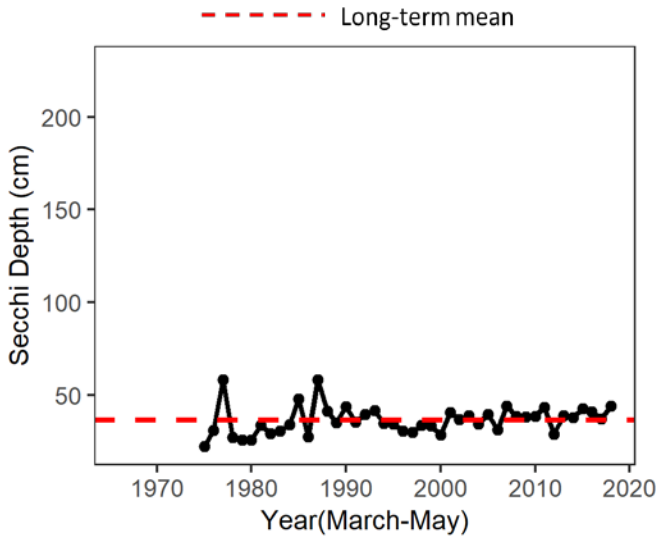


San Pablo Bay



In 2018, San Pablo bay was close to the long-term average.

Suisun Bay



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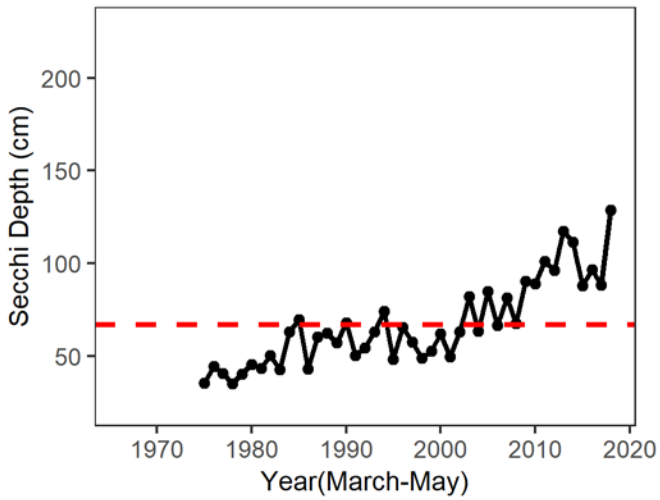
In 2018, Suisun Bay was also close to the long-term average

The Delta



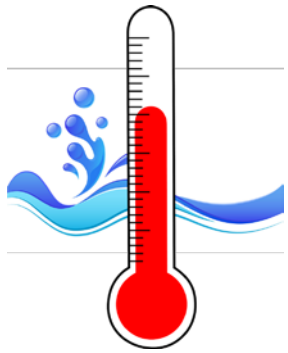
In 2018, the Delta was much clearer than average, the clearest Spring on record.

Water Temperature

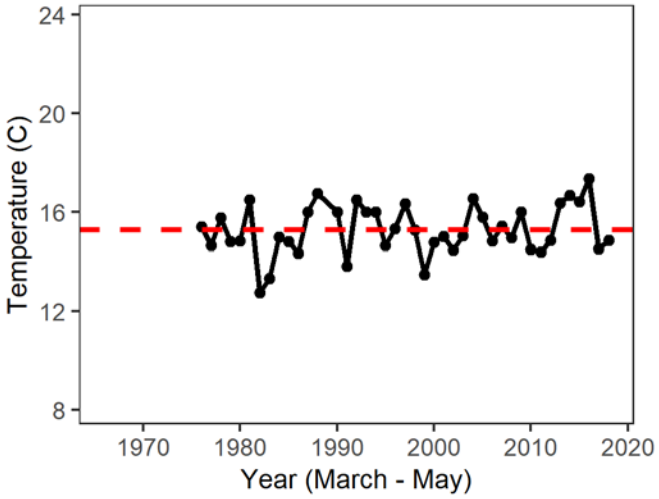
Background

- Water temperature is monitored monthly by DWR's Environmental Monitoring Program
- Fish growth and reproduction is highest in certain temperature ranges.
- Increasing Spring temperatures may lower Delta Smelt reproduction.
- Temperatures tend to be similar between regions in the spring.

For more information see: Jeffries, et al.. 2016. Effects of high temperatures on threatened estuarine fishes during periods of extreme drought. The Journal of Experimental Biology 219(11):1705-1716.

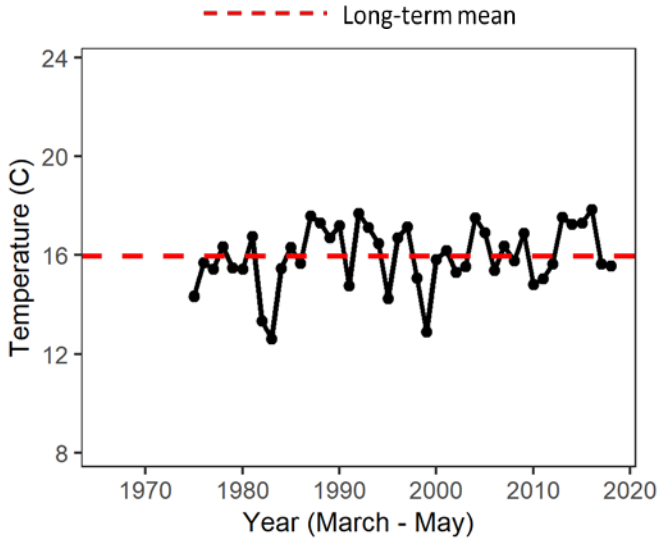


San Pablo Bay



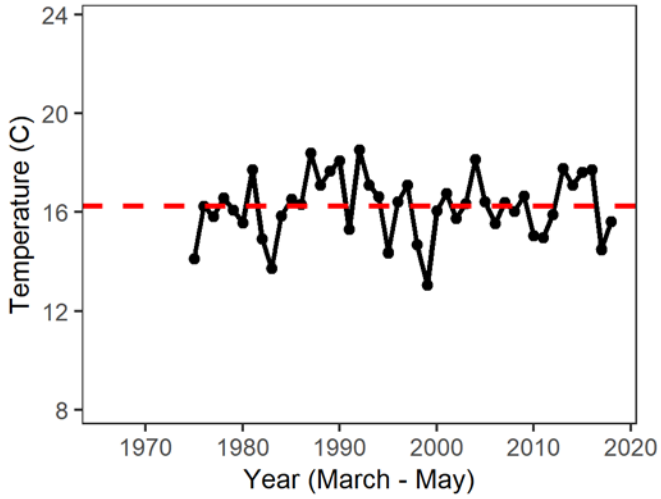
In 2018, San Pablo Bay temperatures were similar to the long-term average.

Suisun Bay



In 2018, Suisun Bay was similar to the long-term average.

The Delta



In 2018, the Delta was slightly cooler than average.

Chlorophyll

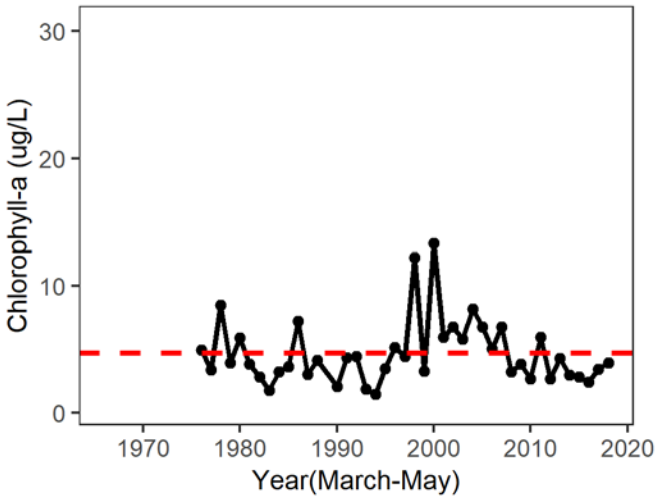
Background

- Chlorophyll is an indicator of phytoplankton production, which is low during the Spring.
- Phytoplankton are the base of the pelagic food web. It is sampled monthly by DWR's Environmental Monitoring Program.
- The invasion of the clam *Potamocorbula amurensis* caused a decline in phytoplankton and zooplankton after 1986 – especially in Suisun Bay.

For more information see: Cahoon, T. and T. Brown. 2018. Phytoplankton, Chlorophyll-a and Pheophytin-a Status and Trends 2017. IEP Newsletter 32(1):14-20.

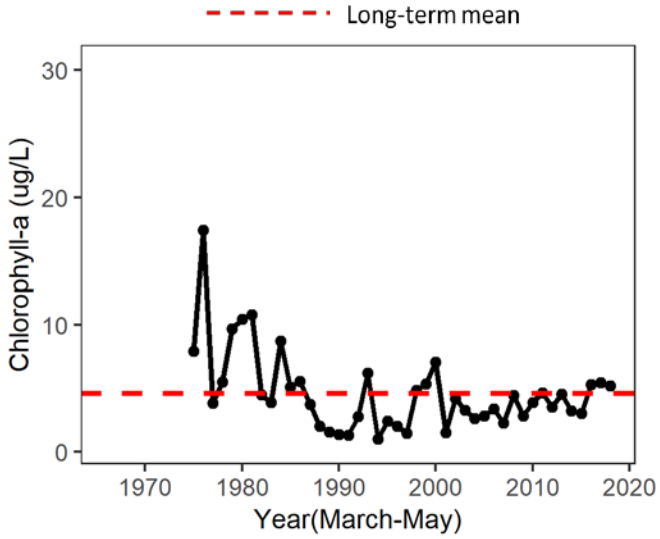
Phytoplankton

San Pablo Bay



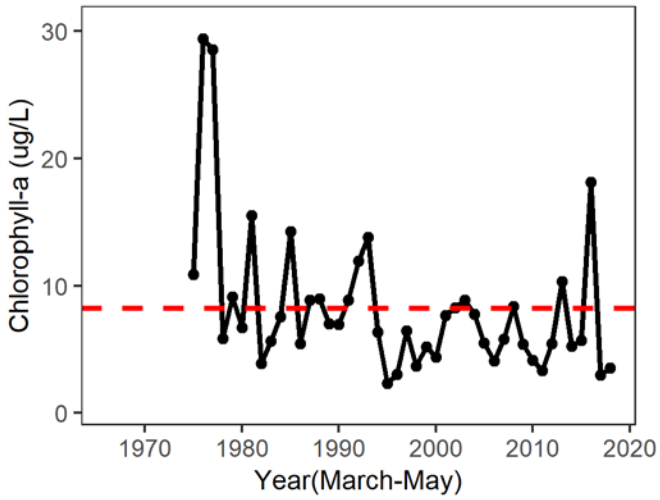
In 2018, San Pablo Bay chlorophyll was about average.

Suisun Bay



In 2018, Suisun Bay chlorophyll was also about average.

The Delta



In 2018, the Delta has slightly lower than average chlorophyll.

Zooplankton

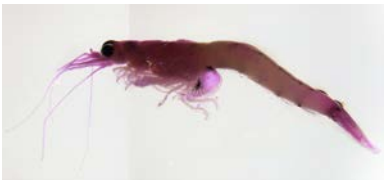
Background

- Zooplankton is sampled monthly by the CDFW/DWR Environmental Monitoring Program, but sampling in San Pablo Bay did not begin until 1998.
- Zooplankton are an important food source for pelagic fish.
- Calanoid copepods and mysids are particularly good fish food. Cyclopoid copepods are not as good for fish food.
- Biomass in Spring tends to be higher than Winter, but lower than Summer.

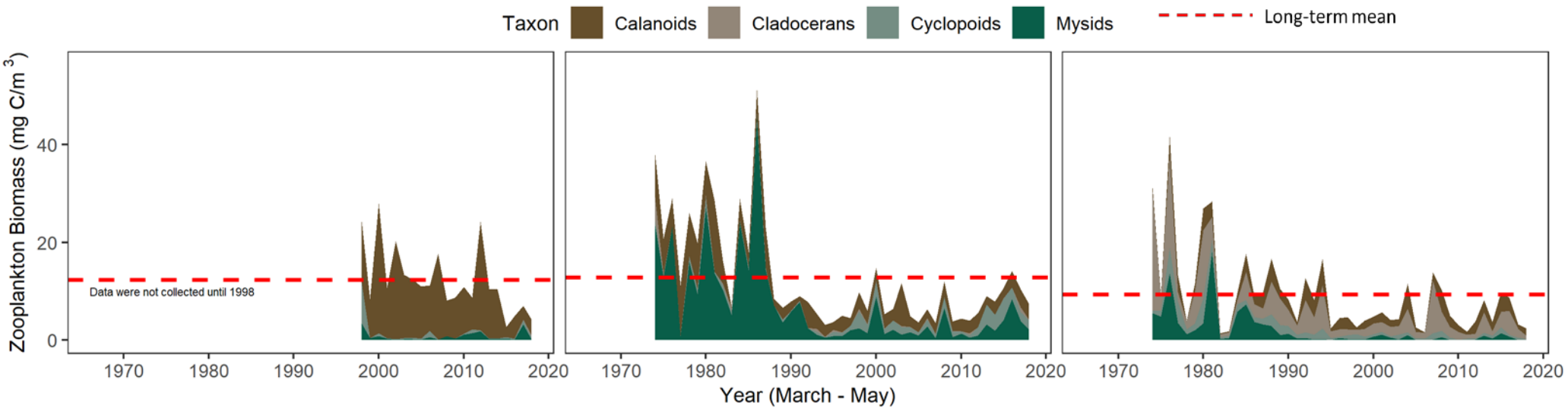
For more information see: Hennessy, A. 2018. Zooplankton Monitoring 2018. IEP Newsletter 32(1):21-32.

Copepod

Mysid



San Pablo Bay | **Suisun Bay** | **The Delta**



In 2018, San Pablo Bay had much lower than average biomass, mostly calanoid copepods

In 2018, Suisun Bay also had much lower than average total biomass.

In 2018, the Delta also had much lower than average total biomass.

Interagency Ecological Program 2018 Spring Season Report

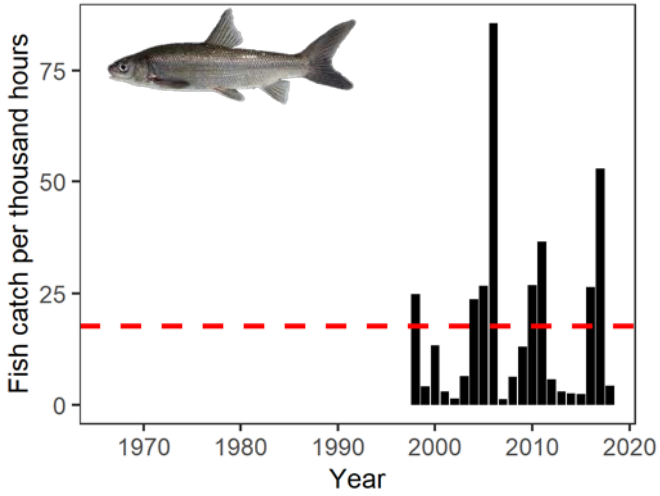
Fish

Background

- Splittail are a native minnow that spawn on floodplains, so have high reproduction during high flow years when floodplains are inundated with water. They are sampled by DWR's Yolo Bypass Monitoring Program.
- Spring-run Adult salmon returns return from the ocean during the spring. Populations are calculated by CDFW based on redd counts, carcass surveys, fish entering hatcheries, and live fish counts.
- Juvenile Winter-Run Chinook Salmon out-migrate to the ocean in spring, and are sampled by the USFWS's Chipps Island Trawl, located at the confluence of the Sacramento and San Joaquin Rivers.

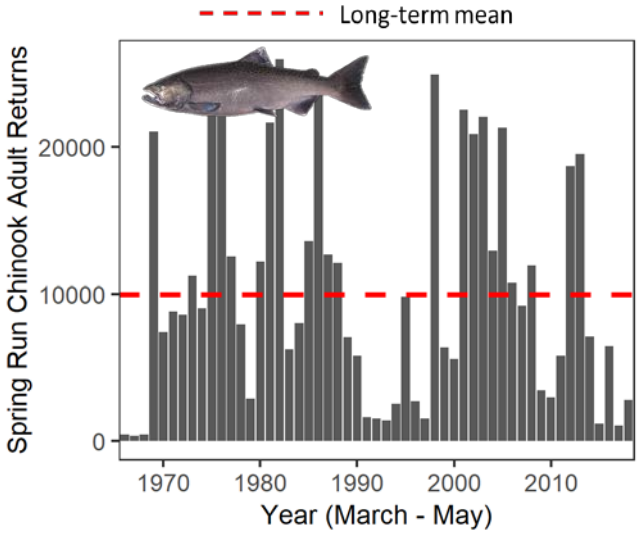
For more information, see: Kwan, N., J. Jenkins, C. Stuart, A. Shakya, and B. Schreier. 2019. 2011-2016 Yolo Bypass Fisheries Monitoring Status and Trends Report. IEP Newsletter 36(1):27-36.

Yolo Bypass Juvenile Splittail



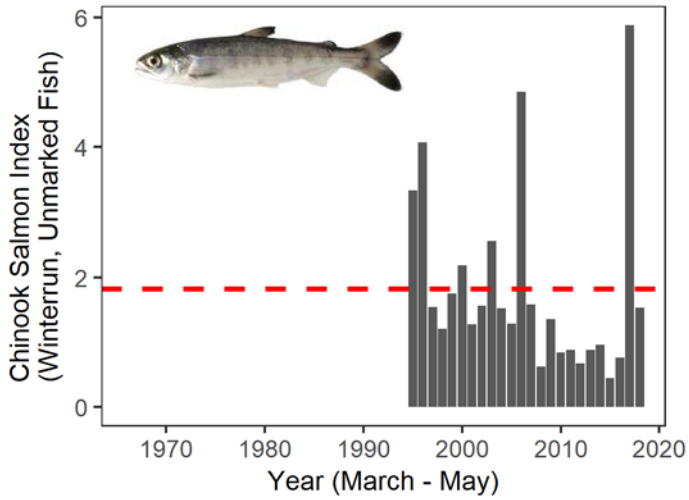
2018 did not have substantial Yolo Bypass flooding, and catch was in line with other similar years

Spring-Run Chinook Adult Returns



In 2018, adult Chinook returns were lower than average

Juvenile Winter-Run Chinook (Chipps Island)



In 2018, juvenile winter-run salmon survival was about average.

Interagency Ecological Program 2018 Spring Season Report

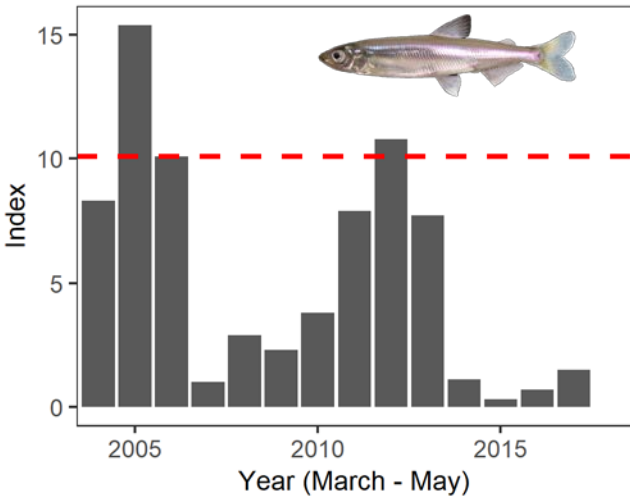
Fish: 2004-2018

Background

- Delta Smelt and Longfin Smelt have been in decline since the early 2000s. The CDFW 20mm Survey was designed to sample post-larval and juvenile Delta Smelt, and samples in San Pablo, Suisun, and the Delta.
- Longfin Smelt frequently spawn further downstream than Delta Smelt, so the 20 mm Survey does not cover their entire range, but still provides an indication of population-level trends.
- Juvenile Chinook Salmon are sampled by the USFWS's Chipps Island Trawl, located at the confluence of the Sacramento and San Joaquin Rivers.

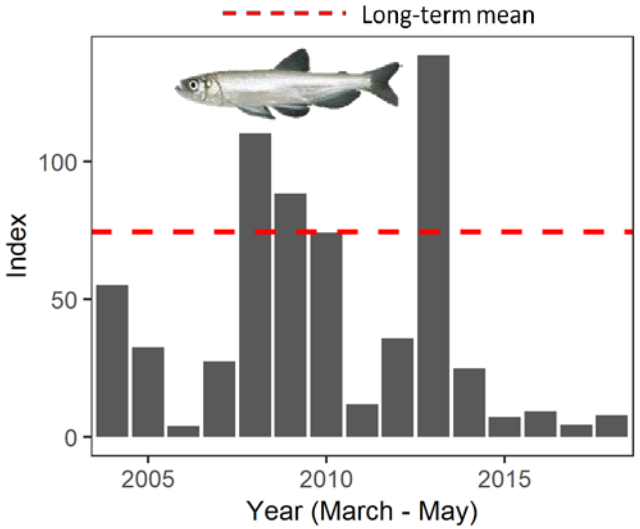
For more information, see: Tempel, T. 2017. Evaluation of Adding Index Stations in Calculating the 20-mm Survey Delta Smelt Abundance Index. IEP Newsletter 30(1):21-23.

Delta Smelt



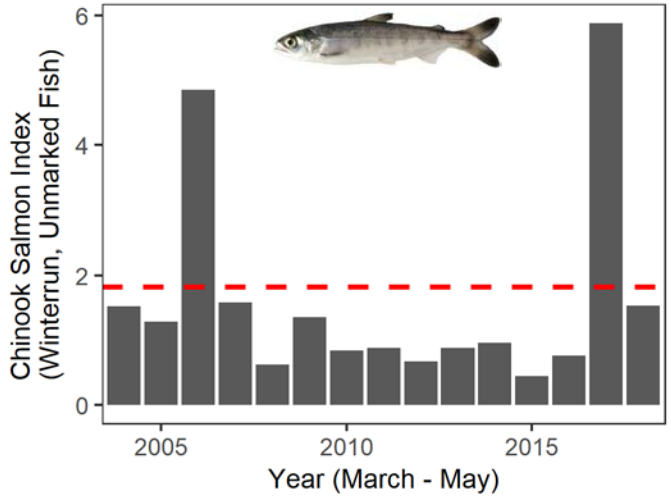
The Delta Smelt 20mm index was zero in 2018, the lowest index on record.

Longfin Smelt



The Longfin smelt index in 2018 was much lower than the long-term average.

Juvenile Winter-Run Chinook (Chipps Island)



In 2018, Juvenile winter-run Chinook had slightly lower survival than the long-term average, but better than many recent years.

Interagency Ecological Program Seasonal Monitoring Report

Metadata for Spring 2018

Version: 1.0

Last Updated: 2020-03-09

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Overview

Long-term ecological surveys have been a core function of the Interagency Ecological Program (IEP) since the program's inception in the 1970s. The IEP Seasonal Monitoring Report presents the full time series for selected water quality, plankton, and fisheries surveys conducted by IEP in a single graphical report. While the report is not a comprehensive view of all the data collected by IEP, it is intended to provide a general overview of the longevity and breadth of IEP survey work. A major goal of this report is to illustrate the scope of IEP surveys and emerging trends in the San Francisco Bay-Delta ecosystem to the public, potential science collaborators, and IEP and other resource agency managers and directors. The report is generated on a quarterly basis, with different set of ecosystem variables and surveys highlighted in each season. The report is developed by IEP scientists (including leads for monitoring surveys and the IEP Lead Scientist) and is reviewed by the IEP Science Management Team and Coordinators before online publication.

General Information

Season Definitions

This report covers a suite of key IEP data sets relevant to the spring season, which we defined as the months of March, April, and May. For data sets collected throughout the year, such as water temperature, we only used data from this three-month period to generate graphs. For data sets that are season-specific, we include the entire sampling period, even if it does not overlap exactly with our

season definition (for example, the 20mm Survey index includes data from March-July). Data from other times of year will be featured in the corresponding future seasonal reports (i.e., winter, summer, fall). The other seasons (for future reports) are defined as follows: Summer = June to August, Fall = September to November, and Winter = December to February.

Geographic Region Definitions

Many of the data sets in the report are represented by a panel of three plots, one for each of three geographic regions: San Pablo Bay, Suisun Bay, and the Sacramento-San Joaquin Delta. This subdivision of data sets is designed to facilitate comparison among major regions that differ in a variety of characteristics. San Pablo Bay includes data collected east of Point San Pablo and west of the Carquinez Straight. Suisun Bay includes data collected east of the Carquinez Straight and west of the town of Collinsville. The Delta includes data east of Collinsville. Data sets are represented as a single graph when the data are only collected within a single region (e.g., Net Delta Outflow) and for wide-ranging organisms that frequent multiple regions (e.g., Delta Smelt).

Year Ranges

Most of the graphs in the report have an x-axis range from 1966 to 2018. This start year was selected because it is the year of initiation for the Fall Midwater Trawl survey, one of the longest-running surveys. Standardizing the year range on the x-axis facilitates visual comparison across data sets. The entire time series for nearly all data sets fits within this time range. Data sets that started before 1966 were truncated in this report, for purposes of consistency within the report. The graphs in the Recent Trends section of the Spring report range from 2004 to 2018.

Calculations for Data Points

The points plotted on the graphs represent mean values. Means are generated by averaging data over the three months of the spring season for a given year (March-May) and across sites within a given region where relevant (e.g., water quality and plankton data sets). The dotted horizontal line indicates the average value over the entire period of record.

Data Sets

Flow

Data Source: Department of Water Resources, Environmental Planning and Information Branch

Metric Used: Net Delta Outflow Index, which is estimated using a summation of river inflows, precipitation, agricultural consumptive demand, and project exports.

Year Range: 1966-2018. The entire data set includes 1929-2019 but was truncated to conform to the year range of the rest of the data sets in the report.

Additional Information: https://www.water.ca.gov/Programs/Environmental-Services/Compliance-Monitoring-And-Assessment/Dayflow-Data

Water Quality: Secchi depth, Temperature, Chlorophyll-a

Data Source: Department of Water Resources, Environmental Monitoring Program

Metric Used: Monthly discrete water quality data

Year Range: 1975 – 2018

Stations by Region

San Pablo: Stations = 4, years: 1975-2018

Suisun: Stations = 11, years: 1975-2017

Delta: Stations = 29, years: 1975-2017

Additional Information: https://water.ca.gov/Programs/Environmental-Services/Water-Quality-Monitoring-And-Assessment

Zooplankton: Biomass of Calanoids, Cyclopoids, Cladocerans, and Mysids

Data Source: California Department of Fish and Wildlife, Zooplankton Study

Metric Used: Biomass of zooplankton (milligrams of carbon per cubic meter) based on monthly surveys.

Year Range: 1975 – 2018

Stations by Region

San Pablo: Stations = 2, years: 1998-2018. Note: One station sampled consistently since 1998 and the other one since 2003.

Suisun: Stations = 6, years: 1975-2018

Delta: Stations = 8, years: 1975-2018

Additional Information: https://www.wildlife.ca.gov/Conservation/Delta/Zooplankton-Study

Juvenile Winter-run Run Chinook: Chipps Island Trawl

Data Source: US Fish and Wildlife Service, Lodi Field Office, Delta Juvenile Fish Monitoring Program

Metric Used: Mean catch per unit effort estimates for Winter-run Chinook. The calculation method is similar to that used by DJFMP staff for reporting.

Year Range: 1995-2017.

Note: Although sampling at Chipps Island started in 1976, this year range was chosen for consistency with the range most recently reported on by DJFMP staff.

Stations: 1

Additional Information: https://www.fws.gov/lodi/juvenile_fish_monitoring_program/jfmp_index.htm

Adult Spring-run Run Chinook: GrandTab

Data Source: CDFW's Grand Tab database as queried from SacPass.
http://www.cbr.washington.edu/sacramento/data/query_adult_grandtab.html

Metric Used: The CDFW Fisheries Branch Anadromous Resource Assessment Unit compiles annual population estimates of Chinook salmon, *Oncorhynchus tshawytscha*, in the Sacramento San Joaquin River system. The GrandTab report is a compilation of sources estimating the late-fall, winter, spring, and fall-run Chinook salmon total populations for streams surveyed. Estimates are based on counts of fish entering hatcheries and migrating past dams, carcass surveys, live fish counts, and ground and aerial redd counts. Estimates are provided by the California Department of Fish and Wildlife, the US Fish and Wildlife Service, the California Department of Water Resources, the East Bay Municipal Utilities District, the US Bureau of Reclamation, the Lower Yuba River Management Team, and the Fisheries Foundation of California.

Year Range: 1960-2018

Additional Information: https://wildlife.ca.gov/Conservation/Fishes/Chinook-Salmon/Anadromous-Assessment

Splittail: Yolo Bypass Screw Trap

Data Source: DWR's Yolo Bypass Monitoring Study

Metric Used: Catch per unit effort (fish per hour), computed as the annual catch for the season divided by the rotary screw trap operational time.

Year Range: 1998 - 2018

Stations: 1

Additional Information: https://portal.edirepository.org/nis/mapbrowse?packageid=edi.233.2