

Winter 2017-2018 IEP Seasonal Monitoring Report

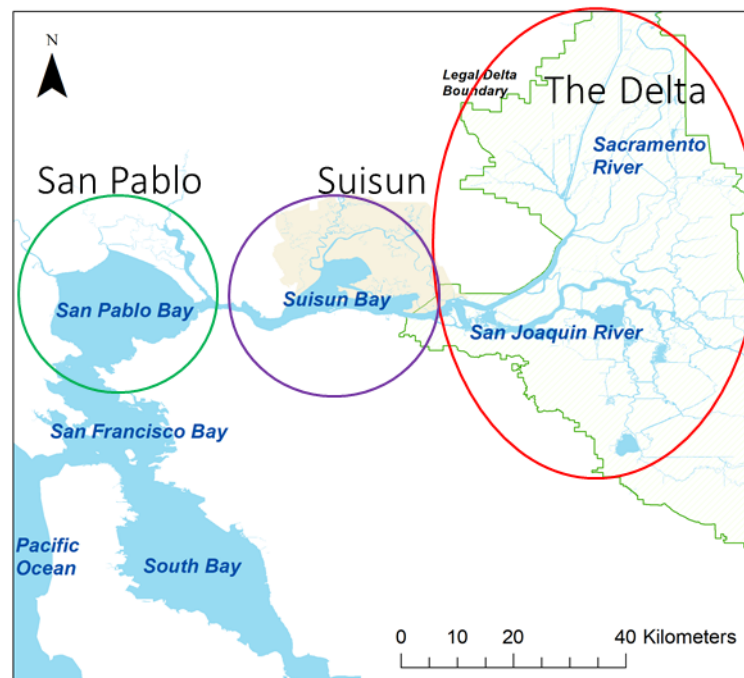
Interagency Ecological Program for the San Francisco Estuary
This report shows trends in water quality, plankton, and fish across multiple IEP surveys for December of 2017, January and February of 2018.

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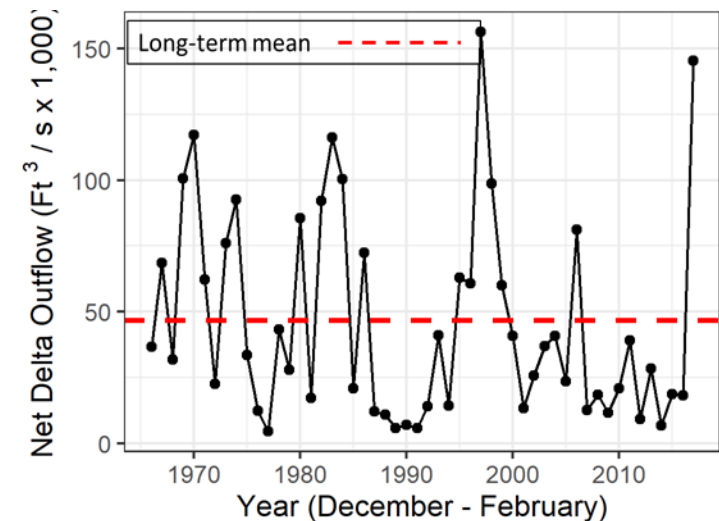
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Metadata

Regions of the Estuary



Delta Outflow



- Freshwater flow influences water quality, plankton, and fish populations.
- Winter flow is driven primarily by rainfall and upstream dam releases.
- The winter of 2017-2018 had much higher outflow than average.

Disclaimer: While substantial efforts are made to ensure the accuracy of these data, complete accuracy of data sets cannot be guaranteed. This report was developed by the IEP Synthesis Team.

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

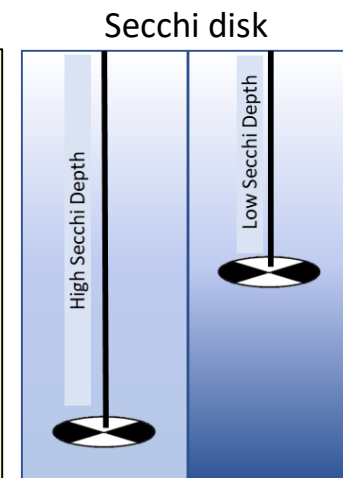
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Secchi Depth

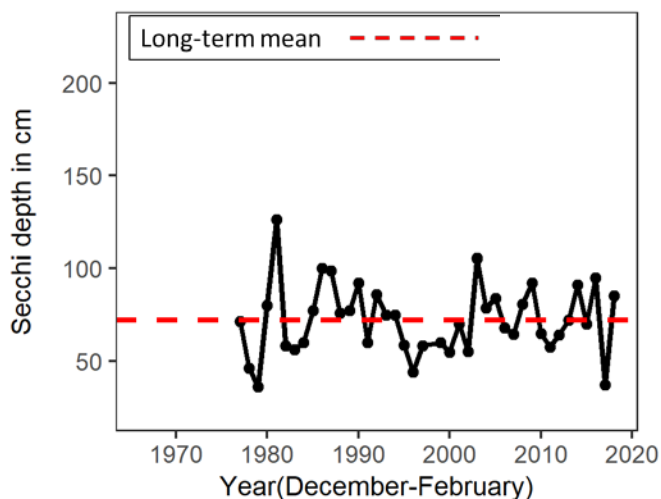
Background

- 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.

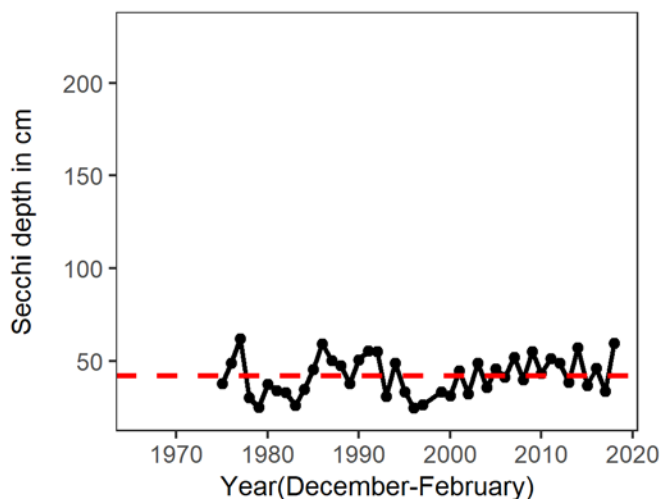


San Pablo Bay



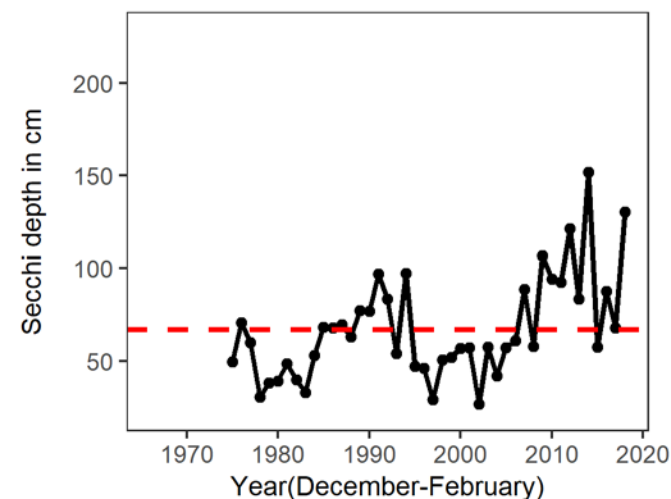
In 2017, San Pablo bay was clearer than the long-term average.

Suisun Bay



In 2017, Suisun Bay was slightly clearer than the long-term average.

The Delta



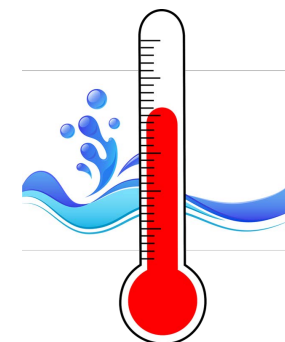
In 2017, the Delta was much clearer than average, the second clearest winter on record.

Water Temperature

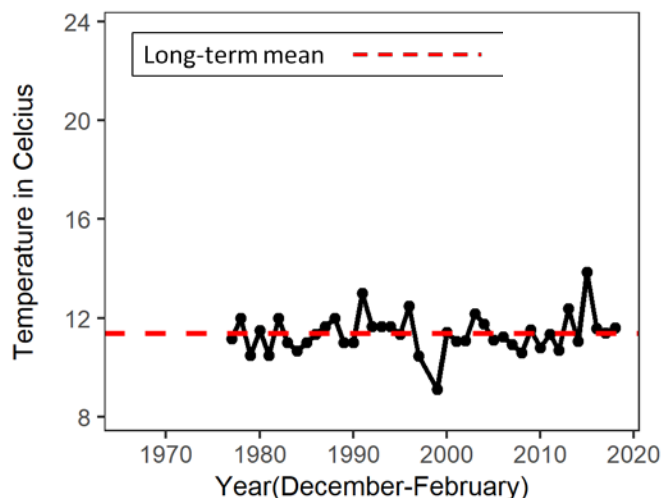
Background

- Temperature is monitored monthly by DWR's [Environmental Monitoring Program](#).
- Fish growth and reproduction is highest in certain temperature ranges.
- Increasing winter temperatures may lower Delta Smelt reproduction.
- Winter temperatures are higher closer to the ocean and lower in the Delta.

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.

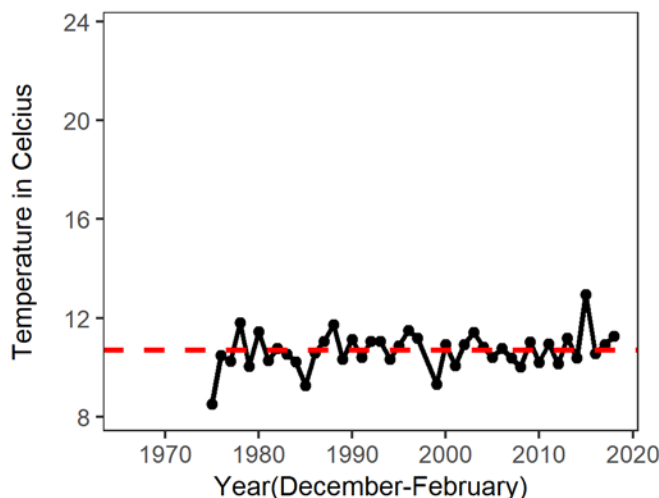


San Pablo Bay



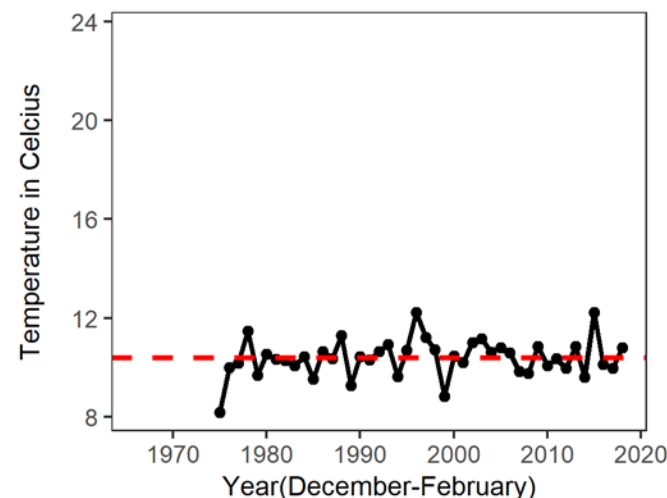
In 2017, San Pablo Bay temperatures were similar to the long-term average.

Suisun Bay



In 2017, Suisun Bay was slightly warmer than average.

The Delta



In 2017, the Delta was also slightly warmer than average.

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Chlorophyll

Background

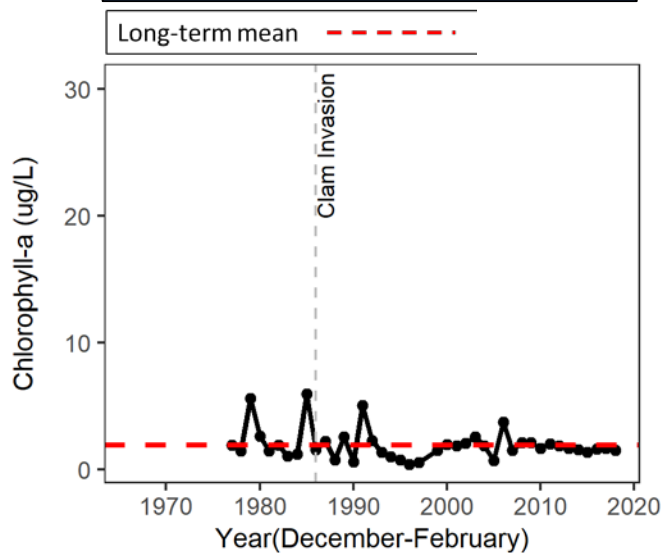
- Chlorophyll is an indicator of phytoplankton production, which is low during the winter.
- Phytoplankton are the base of the pelagic food web. It is sampled monthly by DWR's [Environmental Monitoring Program](#).
- The invasive clam *Potamocorbula amurensis* caused a decline in phytoplankton and zooplankton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

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

Phytoplankton

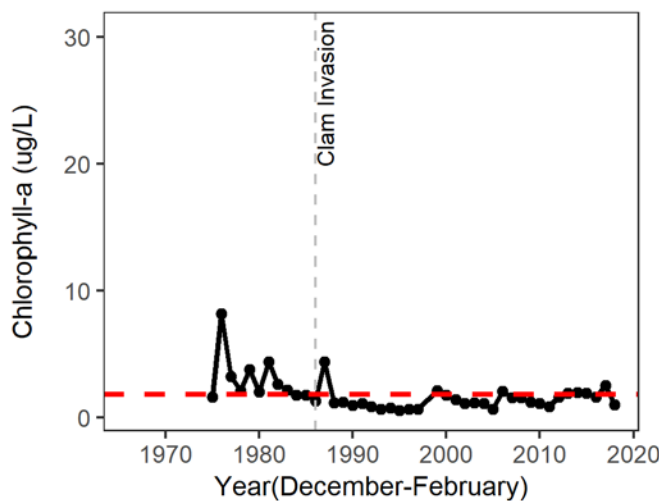


San Pablo Bay



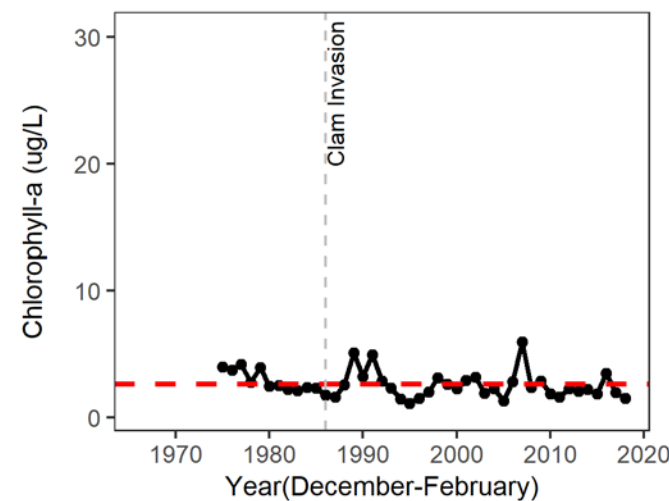
In 2017, San Pablo Bay chlorophyll was about average.

Suisun Bay



In 2017, Suisun Bay chlorophyll was lower than the long-term average.

The Delta



In 2017, the Delta has slightly lower than average chlorophyll.

Zooplankton

Background

- Zooplankton is sampled monthly by the CDFW/[DWR Environmental Monitoring Program](#), but sampling in winter did not begin until 1995.
- 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 tends to be low in the winter across all regions.

For more information see: Hennessy, A. 2018. Zooplankton Monitoring 2017. IEP Newsletter 32(1):21-32.

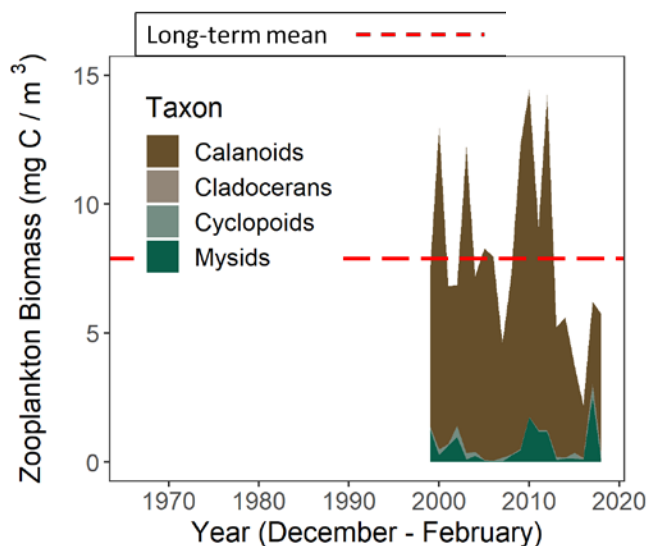
Copepod



Mysid

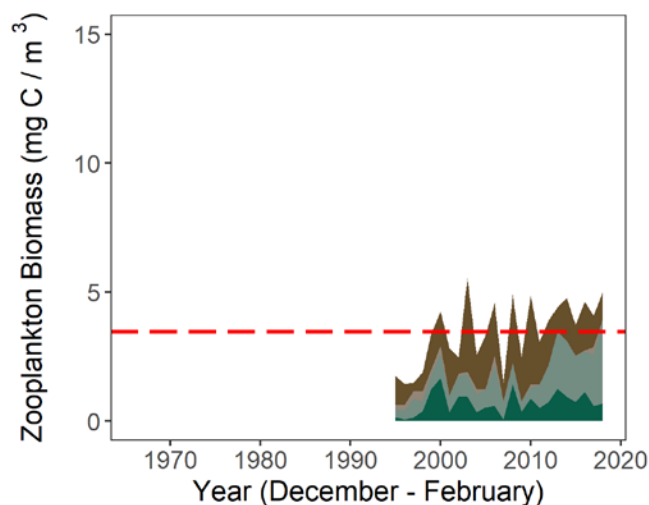


San Pablo Bay



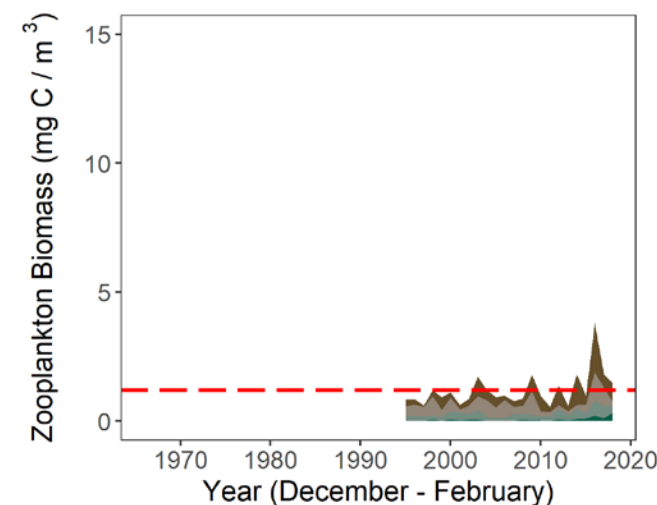
In 2017, San Pablo Bay had about average biomass, mostly calanoid copepods.

Suisun Bay



In 2017, Suisun Bay had higher than average total biomass, mostly cyclopoid copepods.

The Delta



In 2017, the Delta had about average total biomass.

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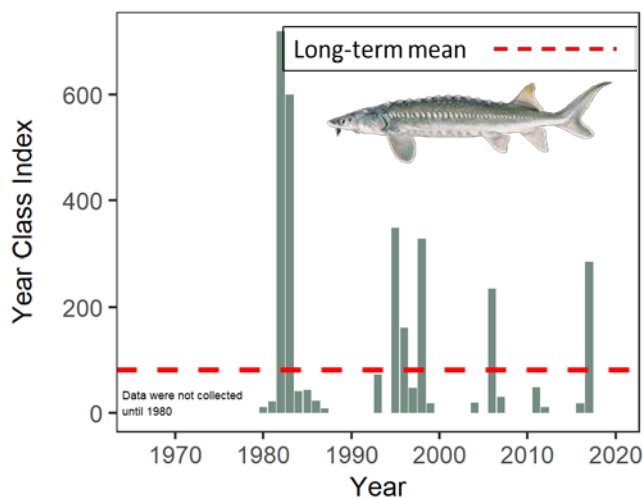
Fish

Background

- White sturgeon support a recreational fishery. Juvenile sturgeon are sampled by in the [CDFW Bay Study](#) otter trawl, which samples throughout the San Francisco Bay, Suisun Bay, and the Delta.
- Longfin Smelt are listed as Threatened under the California Endangered Species Act. Spawning adults are sampled in winter by the [CDFW Bay Study](#) midwater trawl.
- Juvenile Winter-Run Chinook Salmon are sampled by the [USFWS's Chipps Island Trawl](#), located at the confluence of the Sacramento and San Joaquin Rivers.

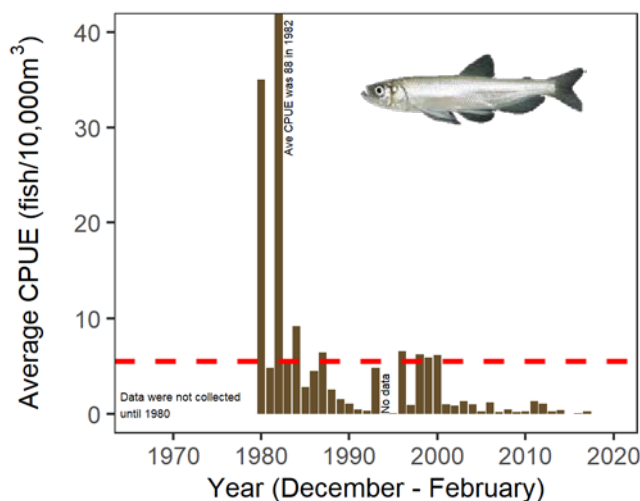
For more information, see: Hieb, K., J. Bautista, and J. Giannetta. 2018. Bay Study Fishes Status and Trends Report for the San Francisco Estuary, 2012–2016. IEP Newsletter 31(2):3-43.

White Sturgeon



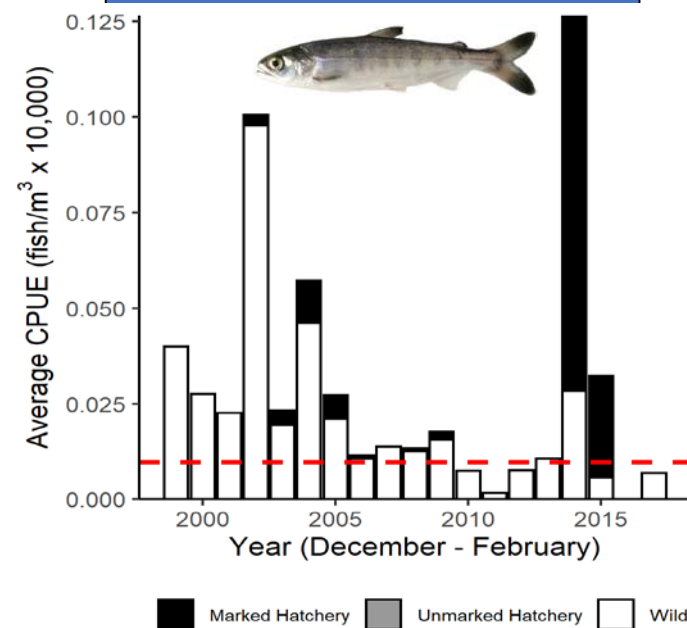
2017 was a very strong year for young-of-year sturgeon.

Longfin Smelt



Adult Longfin Smelt catch has been low for the past twenty years.

Chipps Island Winter-Run Chinook



In 2017, wild Chinook survival was low.

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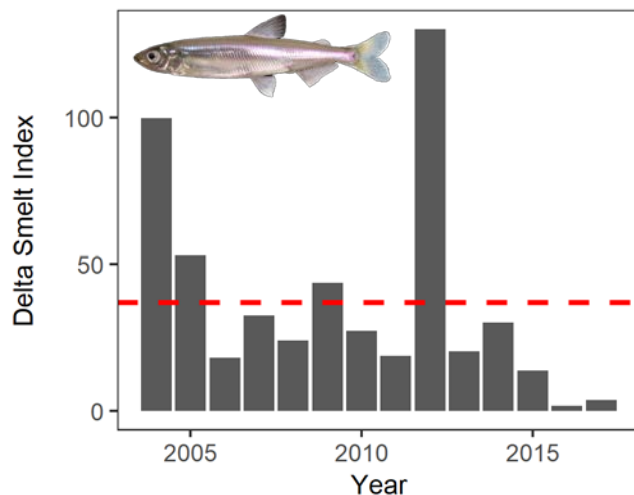
Fish: 2003-2017

Background

- Delta Smelt and Longfin Smelt have been in decline since the early 2000s. The [CDFW Spring Kodiak Trawl](#) was designed to sample spawning Delta Smelt, and samples in San Pablo, Suisun, and the Delta.
- Longfin Smelt frequently spawn further downstream than Delta Smelt, so are better sampled by the [CDFW Bay Study](#). The Bay Study samples throughout the San Francisco Bay, Suisun Bay, and the Delta.
- Juvenile Chinook pass [Red Bluff Diversion Dam](#) on the upper Sacramento as they migrate from spawning grounds to the ocean.

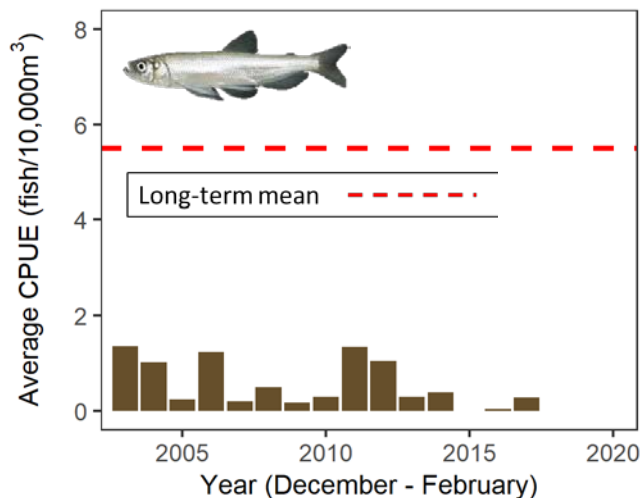
For more information, see: Tempel, T. 2019. 2018 Spring Kodiak Trawl Summary. IEP Newsletter 34(1):22-24.

Delta Smelt



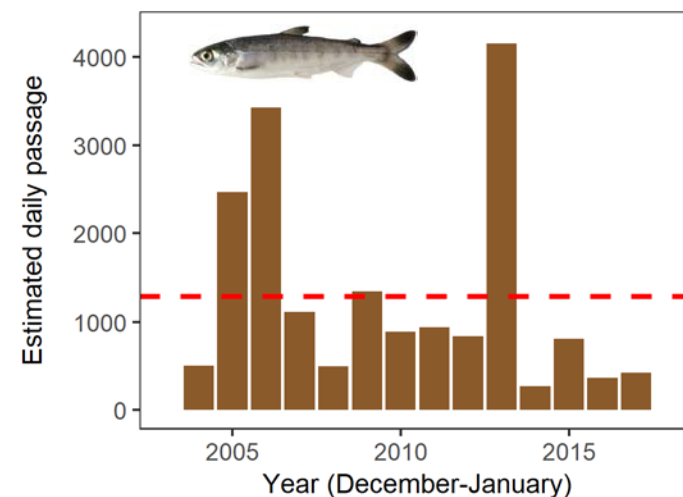
The Delta Smelt SKT index was the second-lowest index on record. (mean line is from 2004-2017)

Longfin Smelt



Adult Longfin smelt abundance in 2017 was much lower than the long-term average.

Red Bluff Winter-Run Chinook



Juvenile winter-run Chinook Salmon had a much lower passage rate in winter of 2017-2018 than the historical average.

Interagency Ecological Program Seasonal Monitoring Report

Metadata for Winter 2017-2018

Version: 1.0

Last Updated: 2019-10-29

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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 winter season, which we defined as the months of December, January, and February. 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 Spring Kodiak Trawl index includes data from January-April). Data from other times of year will be featured in the corresponding future seasonal reports (i.e., spring, summer, fall). The other seasons (for future reports) are defined as follows: Spring = March to May, Summer = June to August, Fall = September to November.

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 Strait. Suisun Bay includes data collected east of the Carquinez Strait 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., Sturgeon).

Year Ranges

Most of the graphs in the report have an x-axis range from 1967 to 2017 (with 2017 including data from January and February of 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. The data set for Net Delta Outflow, which was initiated in 1929, represents the sole exception and is truncated in this report to only data since 1967, for purposes of consistency within the report. The graphs in the Recent Trends section of the winter report range from 2003 to 2017.

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 winter season for a given year (December—February) 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: 1967-2017. The entire data set includes 1929-2017 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 – 2017

Stations by Region

San Pablo: Stations = 4, years: 1976-2017

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: 1995 – 2017

Note: while the EMP survey has been collecting zooplankton in the estuary since 1974, the survey did not start sampling during the winter months until 1995.

Stations by Region

San Pablo: Stations = 2, years: 1998-2017. Note: One station sampled consistently since 1998 and the other one since 2003.

Suisun: Stations = 6, years: 1995-2017

Delta: Stations = 8, years: 1995-2017

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

Longfin Smelt

Data Source: California Department of Fish and Wildlife, San Francisco Bay Study (Region 3, Bay Delta)

Metric Used: Average catch per unit effort (CPUE) for adult (Age 1+) Longfin Smelt is derived from Bay Study's Midwater trawl, which samples pelagic fishes and retrieved obliquely such that all depths are sampled equally.

Year Range: 1980-2017

Stations: 52

More Information: <https://www.wildlife.ca.gov/Conservation/Delta/Bay-Study>

White Sturgeon

Data Source: California Department of Fish and Wildlife, San Francisco Bay Study (Region 3, Bay Delta)

Metric Used: Year-class index (YCI) calculated by methods described in [Fish 2010](#)

Data source: Fish CPUE and Index calc_July2019.accdb (standalone database, copy received from Bay Study personnel)

Year Range: 1980-present. Annual survey conducted monthly in the bays, estuary, & delta. Deploys otter & mid-water trawls. Sturgeon YCI calculated using otter trawl only ([Fish 2010](#)).

Stations: 52

Additional Information: <https://www.wildlife.ca.gov/Conservation/Delta/Bay-Study>

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: 2003-2017.

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

Winter-run Run Chinook: Red Bluff Diversion Dam

Data Source: Red Bluff US Fish and Wildlife Service

Metric Used: Estimated number of juvenile outmigrants passing the Red Bluff Diversion Dam based on catches from rotary screw traps. Since winter Chinook spawning ground lie almost exclusively above the dam, this provides an estimate of salmon production from the upper reaches of the river.

Year Range: 1999 – 2003-2017.

Note: Although sampling at Chipps Island started in 1976, this Data were truncated year range was chosen for consistency with the range most recently reported on by DJFMP staff. at 2003 to focus on the more recent trends. Data are also available for 1994-2000.

Stations: 4 screw traps across the river

Additional Information: https://www.fws.gov/redbluff/rbdd_jsmp.html

Delta Smelt

Data Source: Spring Kodiak Trawl

Metric Used: Annual abundance indices are calculated by grouping index stations into 3 spatial regions, calculating mean catch per 10,000 m³ of water sampled by region, and summing the 3 regional means. Only data collected from January – April are used in the calculations. This method was chosen for consistency with the index calculated by the California Department of Fish and Wildlife.

Year Range: 2004 – 2017. Note: Indices are not calculated for 2002 or 2003 because Spring Kodiak Trawl methods were standardized starting in 2004. Also, the month range of the index deviates from the standard December – February definition of winter in this report.

Stations: 39

Additional Information: <https://www.wildlife.ca.gov/Conservation/Delta/Spring-Kodiak-Trawl>