Yolo Bypass Fish Monitoring Program: Drift Invertebrate Metadata

Dataset Title

Interagency Ecological Program: Drift invertebrate catch and water quality from the Sacramento River channel, and Sacramento River floodplain and tidal slough, collected by the Yolo Bypass Fish Monitoring Program, 1998-2022.

Short name or nickname you use to refer to this dataset:

IEP-YBFMP-Drift-Invertebrate

Abstract

Largely supported by the Interagency Ecological Program (IEP), California Department of Water Resources (DWR) has operated a fish monitoring program in the Yolo Bypass, a seasonal floodplain and tidal slough, since 1998.

The objectives of the Yolo Bypass Fish Monitoring Program (YBFMP) are to:

1. Collect baseline data on water quality, chlorophyll, lower trophic level biota, and fish in the Yolo Bypass to monitor spatial and temporal changes in trends and abundance.

2. Analyze and communicate Yolo Bypass data with interested parties and the scientific and management communities to address pertinent management-related questions.

3. Provide technical expertise on Yolo Bypass aquatic ecology and monitoring and sampling methods.

Aquatic and terrestrial insects are an important component in the diet of juvenile and adult fishes within the San Francisco Estuary, including two important native fishes: juvenile Chinook Salmon and Sacramento Splittail. The YBFMP collects drift invertebrates year-round from two sites. Currently, samples are collected biweekly (every other week) to weekly (during floodplain inundation) using a rectangular aquatic drift net that sits at the surface of the water. Invertebrates are identified and enumerated by contractors (currently EcoAnalysts, Inc.). The goals of the monitoring program are to compare the seasonal variations in densities and species trends of aquatic and terrestrial insects/non-insects within the Sacramento River channel and the Yolo Bypass, the river's seasonal floodplain.

Key findings to date include: (1) Chinook Salmon sampled in the floodplain had diets comprised of 90% Dipterans and zooplankton, with Chironomidae being the dominant Diptera family (Sommer et al., 2001), (2) The floodplain of the Yolo Bypass contains significantly higher densities of Diptera (Diptera densities being positively associated with flow) and terrestrial invertebrates than the adjacent Sacramento River (Sommer et al. 2001b: Sommer et al. 2004: Sommer et al. 2007), (3) A major portion of the diet of juvenile Sacramento Splittail are chironomid larvae (Kurth and Nobriga 2001, Moyle et al. 2004, Sommer et al. 2007), and (4) The Yolo Bypass was the site of the discovery of a new aestivating and winter emerging chironomid; *Hydrobaenus saetheri* (Cranston et al. 2007).

Commented [NK1]: Adjusted for consistency with our new language/fish data pub

Investigators

First Name	Middle Initial	Last Name	Organization	e-mail address	ORCID ID (optional)	Role in project
		Interagency Ecological Program (IEP)				Creator
Lisa		Vance	California Department of Water Resources	lisa.vance@water.ca.gov	0000-0007-6954-1103	Creator, field crew, Data contact

Other personnel names and roles

Field crew, associate, data entry etc. with e-mail addresses, organization and ORCID ID.

First Name	Middle Initial	Last Name	Organization	e-mail address	ORCID ID (optional)	Role in project
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Mackenzie		Miner	California Department of Water Resources	Mackenzie.miner@water.ca.gov		Field crew
James		Casby	California Department of Water Resources	James.casby@water.ca.gov		Field crew
Jesse		Adams	California Department of Water Resources	Jesse.Adams@water.ca.gov	0000-0002-0739-8782	Creator, Field crew
Luke		Olson	California Department of Water Resources	Luke.olson@water.ca.gov		Field crew, data entry
Naoaki		Ikemiyagi	California Department of Water Resources			Field crew

Commented [NK2]: Took myself off

Commented [NK3]: I am always confused by who should be here...do we 1) just include current staff + past creators/associates, 2) include staff that worked on the project in the period of the newly updated data, or 3) include everyone and keep adding to the list with each update. Do you know if the DUWG has guidance for this? I feel like #1 or 2 would be the simplest but don't want to slight anyone if it's standard to have really long lists.

Commented [NK4R3]: I did just go ahead and bump current staff up higher in the list because that felt right

Allison		Brady	California Department of Water Resources			Field crew, Data entry
Mallory		Bedwell	California Department of Water Resources		0000-0001-9553-6032	Field crew
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License

Keywords

Yolo Bypass, San Francisco Estuary, Sacramento-San Joaquin Delta, **Yolo Bypass Fish Monitoring Program**, California Department of Water Resources, **Interagency Ecological Program**, lower trophic monitoring. [LTER controlled vocabulary] aquatic ecosystems, freshwater, ecology, estuaries, rivers, floodplain, seasonality, long term, communities, food webs, surveys, weather, turbidity, pH, electrical conductivity, water temperature, water quality, macroinvertebrates, aquatic invertebrates, crustaceans

Funding:

Funding is provided by the State Water Project.

Permitting of this work:

PI First Name	PI Middle Initial	PI Last Name	Permitting Agency and Permit Type	Permit Number	Brief Description
Nicole	M.A.	Kwan	CDFW Scientific Collecting Permit, Specific Use (SCP)	S-182970002-19100-001-01	The SCP covers all sampling activities and take of non-listed species.
Kelsey		Kelley/IEP	NMFS Scientific Research Permit	1440-3R	The National Marine Fisheries Service (NMFS) requires that the YBFMP have an Endangered Species Act (ESA) permit for

PI First Name	PI Middle Initial	PI Last Name	Permitting Agency and Permit Type	Permit Number	Brief Description
					the take of federally listed salmonids (winter and spring run Chinook Salmon and Central Valley Steelhead) and Green Sturgeon. This permit is coordinated through the Interagency Ecological Program (IEP).
Kelsey		Kelley/IEP	USFWS Delta Smelt Take		The US Fish and Wildlife Service (FWS) requires that the YBFMP have an ESA permit for the take of federally listed Delta Smelt. The FWS ESA permit for YBFMP is coordinated through IEP.
Kelsey		Kelley/IEP	NMFS Marine Mammal Protection Act		NMFS requires the YBFMP to have a MMPA permit to cover the potential take or harassment of marine mammals by our sampling activities. The sole usage of this permit for YBFMP is for the event that a sea lion gets trapped in our fyke trap. The MMPA permit for YBFMP is coordinated through IEP.
Nicole		Kwan	CDFW CESA MOU	2021-0006-R3_Kwan	DFW requires the YBFMP to have a CESA MOU to cover the take of state listed salmonids (winter and spring run Chinook Salmon) and osmerids (Delta and Longfin Smelt).

Timeframe

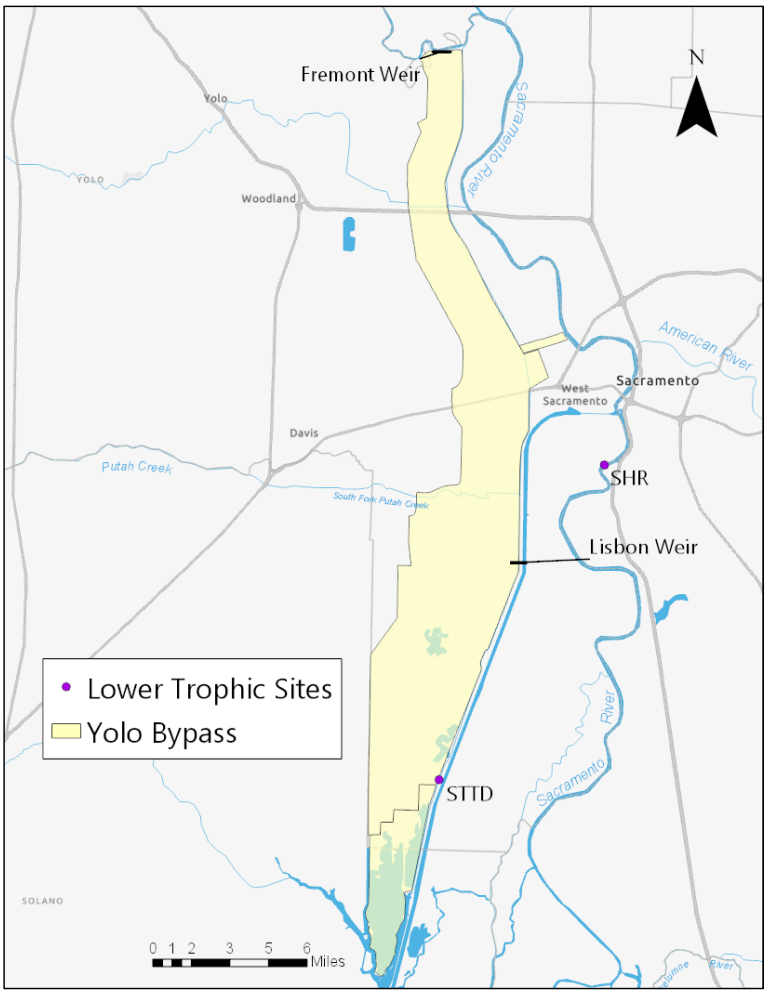
- Begin date: 1998-02-03
- End date: 2022-12-31
- Data collection: ongoing

Geographic location

- Yolo Bypass tidal slough and seasonal floodplain and Sacramento River at Sherwood Harbor in West Sacramento, California, USA.
- North bounding coordinates (decimal degrees): 38.531881
- South bounding coordinates (decimal degrees): 38.353383
- East bounding coordinates (decimal degrees): -121.527912
- West bounding coordinates (decimal degrees): -121.643181

Station Name	Station Code	Latitude	Longitude
SHR	Sacramento River at Sherwood Harbor	38.53188	-121.528
STTD	Screw Trap in Toe Drain	38.35338	-121.643

Map of Sampling Sites



Taxonomic species or groups

[Phylum]: Annelida, Arthropoda, Chordata, Cnidaria, Ectoprocta, Mollusca, Nematoda, Nemertea, Platyhelminthes

[Class}: Actinopterygii, Arachnida, Bivalvia, Branchiopoda, Clitellata, Diplopoda, Enopla, Enoplea, Gastropoda, Hexanauplia, Hydrozoa, Insecta, Malacostraca, Ostracoda, Polychaeta, Turbellaria

[Order]: Aciculata, Amphipoda, Anthoathecatae, Araneae, Archaognatha, Arhynchobdellida,

Atheriniformes, Basommatophora, Blattodea, Branchiobdellida, Calanoida, Canalipalpata, Clupeiformes, Coleoptera, Collembola, Crassiclitellata, Cyclopoida, Cyclopoida, Cypriniformes, Cypriniformes, Cyprinodontiformes, Decapoda, Dermaptera, Diplostraca, Diptera, Dorylaimida, Embioptera, Enchytraeida, Ephemeroptera, Geophilomorpha, Hemiptera, Heterostropha, Hoplonemertea, Hydrachnida, Hygrophila, Hymenoptera, Isopoda, Isoptera, Julida, Lepidoptera, Lithobiomorpha, Littorinimorpha, Lumbiculida, Mermithida, Mysida, Neuroptera, Odonata, Opiliones, Opisthopora, Orthoptera, Perciformes, Plecoptera, Podocopida, Pseudoscorpiones, Psocoptera, Rhynchobdellida, Scorpaeniformes, Siluriformes, Stylommatophora, Tanaidacea, Thysanoptera, Thysanura, Trichoptera, Trombidiformes, Tubificida, Veneroida

Methods

I. Field Collection Methods

Water Quality

Commented [NK5]: See ichthyo edits/comment

Water quality parameters are recorded at the start of each sampling event. Water temperature (degrees Celsius), electrical conductivity (microSiemens/cm), specific conductance (microSiemens/cm), pH, dissolved oxygen (mg/L), and turbidity (FNU) are sampled with a YSI ProDSS handheld meter. Turbidity values are averaged over three readings. Secchi depth is measured in the shade. Tide, condition of sampling (condition code), Microcystis level, vegetation rank, and weather are also recorded with water quality parameters.

Drift Invertebrate Collection

A fixed aquatic drift net is used to collect drift invertebrate samples from the Yolo Bypass at the base of the Toe Drain and the Sacramento River at Sherwood Harbor. The net is held at the surface of the water, with approximately two-thirds of the net submerged and one-third of the net above water. Buoys on each side of the net frame hold the net in position (see photos below), and a pole attached to the net is used to help keep the net in place.

Samples are collected on an ebb tide, either on a biweekly or weekly basis (during floodplain inundation). In the Yolo Bypass, samples are collected year-round from or adjacent to the YBFMP rotary screw trap, which is anchored in the middle of the Toe Drain channel. At the Sacramento River site, nets are deployed dockside during periods of higher flows (typically January-June), and from a boat at 2-3 mph when

downstream flows are insufficient (e.g. <2 fps, typically July-December). The net is fished for 10 minutes, though sampling times may be shortened when high levels of debris interfere with sample collection. Tow times are recorded with each sampling event. Samples are washed down with deionized water and preserved in 5% Formalin with Rose Bengal dye to aid in separating organisms from detritus and algae.

Dimensions of the net: 500 micron net, 0.46m x 0.3m rectangular mouth, 0.91m in length, tapering to 0.076m at the cod-end, which is screened with 500 micron mesh. Buoys are attached to the rectangular frame on each side, and are 5.25 inches (13.3cm) long, 3 inches (7.52cm) in diameter, with approximately a 14 inch (35.6cm) circumference. General Oceanics flow meters (Model 2030R) are used to measure water volume. However, due to the drift net being only partially in the water, the flow meter was instead attached to a 500 micron egg & larval net that is deployed at the same time as the drift net until 2021. In 2021, the drift net received its own flowmeter that is attached external to the submerged portion of the net.

Commented [NK6]: Update to include when it got its own flowmeter

II. Sample Processing and Tracking

Sample Tracking

Samples are tracked on an excel spreadsheet. A chain of custody (COC) listing sample number, date, time, location, type, and study/project is sent to contractors, who check that all samples are accounted for. Signatures are required of both the person responsible for sending the sample package, and the person receiving it. Once the sample is sent, the contractor is notified of approximate date of delivery.

Sample transfer

After being stored for a minimum of two weeks in 5% formalin, invertebrate samples are rinsed through a 250 micron sieve. Large debris (leaves, sticks, etc.) are carefully rinsed and removed. The remaining sample is retained for identification and transferred to 70% ethanol. Samples are securely packaged to prevent leakage and breakage. Samples are then shipped to contractors for taxonomic identification. The contractors return the samples to DWR after completing analyses.

Contractor

EcoAnalysts, Inc.
1420 South Blaine Street, Suite 14
Moscow, Idaho 83843
208-882-2588
https://www.ecoanalysts.com/

Identification and Enumeration

Drift invertebrate samples are rinsed and passed through a 500micron sieve and processed under a lighted, stereoscopic microscope with a minimum magnification of 10X. Material remaining on the sieve is processed by removing all organisms from the sample for identification. All aquatic insects and non-insects are identified to the family level and counted, and all terrestrial insects and non-insects are identified to the order level and counted. All organisms are identified to life-history stage (nymph, larvae, pupae, emergent, or adult), sorted for counts per life-stage, and both wet and dry weights (to 0.0001g) are quantified for each life-stage group.

Sample Archive

Samples are stored by the contractor for up to 90 days, then returned to DWR for storage.

III. Quality Assurance and Control

Calibrations

YSIs are calibrated for pH, turbidity, dissolved oxygen (DO), and electrical conductivity (EC) following the DWR Quality Assurance Program guidance. Percent dissolved oxygen is also calibrated daily to local barometric pressure before use in the field. pH is checked two weeks after calibration to see if drift in readings is occurring. If drift has occurred, pH is recalibrated.

Sample Identification

Contractors re-identify 10% of samples to ensure 90% similarity.

Data Quality Control

Four levels of quality control are conducted on data:

1) Field data are checked by someone other than the data recorder prior to leaving each field site,
2) Datasheets are checked while being entered into the Microsoft Access/Excel database, which has customized error-checking and data validation checks,
3) A separate DWR staff member compares data from original field sheets to data entered into the database,
4) Prior to data publication, data are examined and visualized in R to look for outliers by station, year, and month. Values that are out of range are flagged, and select values are modified and/or re-calculated (see table below for more information). Water quality data are overlaid on real-time sonde data from Lisbon (data obtained from the California Data Exchange Center or CDEC) to ensure values are within range.

Notes on Data Quality

Flowmeter: There are known issues with the flowmeter data, and flowmeters generally. Flowmeter values are key to calculating CPUE, so QC efforts were conducted to try to account for some of these inaccuracies.

- Historically for the drift net, readings from another net's flowmeter (egg & larval) were used. Because these nets are different shapes and are often deployed on opposite sides of the trap/boat, values may be consistent, but not completely accurate. In 2021, the drift net received its own flowmeter
- Before 2012, low-flow flowmeters were not consistently used under low flows, sampling at Sherwood Harbor often was done from shore even under low flows, and sampling was not always at a consistent tide. At flows that are too low, or during a switching tide, flowmeter values are not accurate. Samples noted to have had very low flows, or that were taken during a high tide, were flagged, but these comments may not have always been recorded.

Taxonomist changes: There have been changes in taxonomists throughout the years, which may influence the direct comparability of data from different contractors. Additionally, some samples were taken during

Commented [NK7]: Include update that this is no longer the case

years, but sent to contractors much later, and thus samples may have been in poorer condition if maintenance of preservatives was not conducted.

IV. Data Storage

Data Management and Archiving

Field data are collected and recorded on paper datasheets by DWR personnel, then entered into a Microsoft Access database. Currently the data is entered into Microsoft Excel. Paper datasheets are archived in binders that are stored at the West Sacramento DWR office, and electronic copies are archived on DWR/AES Network drives.

Taxonomic results are received from the contractor via email in an Excel spreadsheet. Data are printed and entered into the Excel database by DWR personnel. Hard copies of the data are printed and stored in binders at the West Sacramento DWR office. Electronic copies of results for taxonomic analyses are archived on DWR/AEU Network drives.

V. Calculations and Analysis

Catch Per Unit Effort (CPUE)

The catch per unit effort (CPUE; count per cubic meter) taken in the aquatic drift net was calculated using the following equation:

$$\boldsymbol{CPUE} = \frac{C}{V}$$

C: the total number of a taxon counted for the sample
V: the volume of water sampled through the net (m3)

Calculations for volume of water sampled through the net is specific to the General Oceanics Flowmeter model 2030R, and is calculated as follows (General Oceanics Inc.):

$$\boldsymbol{V} = \frac{(Flowmeter\ count\ end - Flowmeter\ count\ start) * R}{999999} * Net\ Mouth\ area$$

R: Rotor constant, specified in the General Oceanics Flowmeter 2030R manual. Depends upon which the flowmeter rotor was used during each sampling event, which is identified in the sampling database: Regular flow = 26873, Low flow = 57560

VI. Historical Changes

Equipment

- **Physical Water Quality:** Prior to 2011, YSI 63, and possibly others. Between 2011-October 2016, a YSI 556 was used. Starting October 2016, a YSI ProDSS was used.
- **Turbidity:** February 2012-October 2016: Glass vials of water were collected and analyzed with Hach 2100Q portable turbidimeter. Starting in late October 2016, the YSI ProDSS was used. Thus, units shift from NTU to FNU. Although these units are not exactly the same and cannot be standardized,

Commented [NK8]: Maybe a good spot to re-mention the flowmeter net switch

they are very close to each other (Memo, DWR, 2020), so we have decided to keep all turbidity readings in one column for ease of analyzing data.

- **Net:** Buoys were added to the drift net later in sampling to help keep the net partially above the water, but is uncertain in which year. In 2021, the drift net received its own flowmeter.

Methods

Field Sampling

- **2001:** Drift invertebrate sampling conducted at least once monthly from January-June (previously conducted once monthly from February-April).
- **2002:** Conductivity starts being collected.
- **May 2008:** Specific Conductivity, pH, Dissolved Oxygen start being collected.
- **2011 – Present:** Drift invertebrate sampling conducted year-round weekly-biweekly.
- **February 2012:** Turbidity starts being collected.
- **2012-Present:** During low flows (usually June-January) Sherwood samples are collected from a boat (rather than from shore) to ensure sufficient flow for adequate sample collection.
- **March 2020 – December 2020**: Sampling suspended due to COVID-19.
- **April 2021**: Sampling restarted, drift and ichthyoplankton flowmeter now separate
- **February 2022**- current: new samplealtered, flow direction variables from recommendations from Interagency Ecological Program Data Utilization Working Group, and stopped recording region

Commented [NK9]: Spell out acronym

Lab

Wet and dry weights start being measured during 2018-2021 contract.

Contractors/Taxonomists

Commented [NK10]: Deleted notes column

Year	Drift Invert
1998	Uncertain
1999	Wayne Fields, Hydrozoology
2000	Wayne Fields, Hydrozoology
2001	Wayne Fields, Hydrozoology
2002	Wayne Fields, Hydrozoology
2003	Wayne Fields, Hydrozoology
2004	Wayne Fields, Hydrozoology
2005	Wayne Fields, Hydrozoology/ possibly EcoAnalysts
2006	Wayne Fields, Hydrozoology
2007	Wayne Fields, Hydrozoology
2008	Wayne Fields, Hydrozoology/ EcoAnalysts
2009	Possibly Wayne Fields
2010	Possibly Wayne Fields
2011	EcoAnalysts

2012	EcoAnalysts
2013	EcoAnalysts
2014	EcoAnalysts
2015	EcoAnalysts
2016	EcoAnalysts
2017	EcoAnalysts
2018	EcoAnalysts
2019	EcoAnalysts
2020	EcoAnalysts
2021	EcoAnalysts
2022	EcoAnalysts

Data Tables

Table Description: Drift invertebrate catch and water quality from the Yolo Bypass Fish Monitoring Program

Column name	Description	Unit or code explanation or date format	Empty value code
Event_id	Unique Event identifier	Station_datetime	
Datetime	Date and time of sample	yyyy-mm-dd hh:mm:ss (24 hr format)	
Station	Sample Site	STTD = Screw Trap at Toe Drain, SHR = Sherwood Harbor	
WY	Water Year	Water Year	
WYClass	Water year class	W = wet D = dry A = average	NA
Inundation	Did overtopping occur	True = yes False = no	
WeatherCode	Weather at time of water quality sample	CLR = Direct sunlight RAN = Precipitation CLD = Overcast/Cloud cover >50% FOG = Foggy NIT = Night	NA
Tide	Tidal stage	Ebb, Flood, High	NA

MicrocystisVisualRank	Visual rating of Microcystis in sampled body	1 = Microcystis absent 2 = Low-widely scattered colonies 3 = Medium-adjacent colonies 4 = High-contiguous colonies 5 = Very high-concentration of contiguous colonies forming mats and scum	NA
WaterTemperature	Temperature of water	celsius	NA
Secchi	Secchi depth sample collected	meters	NA
Conductivity	Electrical conductivity of water	microSeimenPerCentimeter	NA
SpCnd	Specific conductivity of water	microSeimenPerCentimeter	NA
pH	Total pH of water	dimensionless	NA
DO	Dissolved oxygen concentration	milligramsPerLiter	NA
Turbidity	Turbidity of water	nephelometricTurbidityUnit	NA
SetTime	Amount of time drift net was set	minutes	NA
FlowMeterSpeed	Flowmeter speed (2 types of flowmeters)	Low = used for low flow, Regular = used for all other flows	NA
FlowMeterStart	Starting flowmeter value		NA
FlowmeterEnd	End flowmeter value		NA
Flowdiff	Original calculated flowmeter difference	FlowmeterEnd minus FlowmeterStart	NA
FlowdiffAdj	Replaced flowmeter difference values, accounting for QC as described above		NA
Volume	Total volume of water sampled in net	liters	
VolumeAdj	Edited volume sampled based on replaced flowdiff	liters	
ConditionCode	Condition of gear during sample such as high debris	1 = Good/normal 2 = Fair (partial block, etc.) 3 = Poor (total block) 4 = No sample taken	NA
FieldComments	Field comments		NA
LabComments	Comments from contractor		NA

Category	Type of invertebrate	Aquatic or terrestrial	
OrganismID	In-house organism ID	Used to connect to taxonomic table	
TaxonRank	Rank of lowest taxon determined		NA
TaxonName	Lowest taxon determined		NA
CommonName	Common name of organism		NA
LifeStage	Life stage determined		NA
Count	Number of inverts enumerated		
CPUE	Catch per unit effort	Count/cubic meter	
CPUEAdj	Re-calculated CPUE, accounting for QC as described above	Count/cubic meter	
FlagPhys	Flag for Physical data QC		
CommentPhys	Comment for Physical data QC (described above)		NA
FlagSamp	Flag for Sampling QC (as described above)		NA
CommentSamp	Comment for Sampling QC		NA
FlagLab	Flag for Lab QC (described above)		NA
CommentLab	Comment for Lab QC		NA
FlagFM	Flag for Flowmeter QC (described above)		NA
Comment_Samp	Comment for Flowmeter QC2		NA
Flag_CPUE	Flag for CPUE QC3 (described above)		
Comment_CPUE	Comment for QC3		NA
QCFlags	Summary of QC flags		NA
QCComments	Summary of QC flag comments		NA

Table description: Drift Invertebrate Taxonomic Tree

Column name	Description	Unit or code explanation or date format	Empty value code
OrganismID	In-house organism ID	Used to connect to catch and water quality table	
Kingdom	Taxonomic Kingdom		NA
Phylum	Taxonomic Phylum		NA
Subphylum	Taxonomic Subphylum		NA
Class	Taxonomic Class		NA
Subclass	Taxonomic Subclass		NA
Infraclass	Taxonomic Infraclass		NA
Superorder	Taxonomic Superorder		NA
Order	Taxonomic Order		NA
Suborder	Taxonomic Suborder		NA
Infraorder	Taxonomic Infraorder		NA
Superfamily	Taxonomic Superfamily		NA
Family	Taxonomic Family		NA
Genus	Taxonomic Genus		NA
Species	Species designation		NA
TaxonName	Lowest taxon determined		
TaxonRank	Rank of lowest taxon determined		
LifeStage	Life stage determined		NA
CommonName	Common name of taxa		

Table description: Drift invertebrate sampling station locations

Column name	Description	Unit or code explanation or date format	Empty value code
StationCode	Sampling Station	STTD = Screw Trap at Toe Drain, SHR = Sherwood Harbor	
StationName	Station name		
Latitude	Latitude of sample location	Decimal degree	
Longitude	Longitude of sample location	Decimal degree	

Articles

Article DOI or URL (DOI is preferred)	Article title	Journal title
https://doi.org/10.1002/aqc.620	Effects of flow variation on channel and floodplain biota and habitats of the Sacramento River, California, USA	Aquatic Conservation: Marine and Freshwater Ecosystems
https://doi.org/10.1002/tafs.10028	Effects of Extreme Hydrologic Regimes on Juvenile Chinook Salmon Prey Resources and Diet Composition in a Large River Floodplain	Transactions of the American Fisheries Society
https://doi.org/10.1139/f00-245	Floodplain rearing of juvenile chinook salmon: evidence of enhanced growth and survival	Canadian Journal of Fisheries and Aquatic Sciences
	2011-2016 Yolo Bypass Lower Trophic Monitoring Status and Trends Report	IEP Newsletter, Volume 36, Number 1, 2019

Scripts/code (software)- Optional

List any software scripts/code you would like to archive along with your data. These may include processing scripts you wrote to create, clean, or analyze the data.

File name	Description	Scripting language
https://github.com/AEU-DISE/drift-ichthyo-publish	All code and files used for publication	
Drift_QAQC.rmd	Script for cleaning and QC of drift invertebrate data	R
LTPhysicalData_QAQC.rmd	Script for cleaning physical data for lower trophic sampling	R

Data provenance

Dataset title	Dataset DOI or URL	Creator (name & email)	Contact (name & email)

Notes and Comments

Versioning History

Version number	Date created	Description of changes	Justification for change	Version editor	Contact info
1.0	1/14/2021	Finalized metadata using Yolo Bypass template	Standardized and elaborated on metadata documents for YBFMP internal review, based on template from EDI and IEP	Catarina Pien	Catarina.Pien@water.ca.gov
1.1	3/30/2021	Added Alli to the list, changed permitting table to remove some columns,	About to publish Drift data. Will update this document further to only address up through 2019.	Catarina Pien	Catarina.Pien@water.ca.gov
1.2	12/5/2024	Updated document for publishing to EDI, updated staff, added methodology notes/flowmeter notes	Publishing update to EDI and addressing changes up to the end of calendar year 2022.	Lisa Vance	lisa.vance@water.ca.gov

Commented [NK11]: Update with your edits to version 1.2

Appendix

Field Datasheet

LOWER TROPHIC SAMPLING – YOLO BYPASS STUDY upd. 2/8/2023

StationCode: | Recorder: | Field Check: | Crew: | YSI#:

Date: | Time: | WeatherCode: | Microcystis Rank (1-5): | Vegetation Rank (1-4):

Secchi: m | Water Temp: °C | DO: mg/L | SpCnd: µΩ | EC: uS/cm | pH:

YSI Turbidity: Take reading every 30 sec ① FNU ② FNU ③ FNU Mean YSI Turb: FNU

Tide: | Flow Dir: U N D | Comments:

Light Attenuation

Surface Irradiance (in **air** avg): µmol

① 0.75 = µmol
② 0.50 = µmol
③ 0.25 = µmol
④ 0.01 = µmol

	Depth:	Subsurface Irradiance (in **water** avg):	
①	m	µmol	75%
②	m	µmol	50%
③	m	µmol	25%
④	m	µmol	1%

Comments:

Drift Sample

Set Time: min

Flow Meter Speed: REG / LOW | Condition Code: | Sampling Altered:

Start Meter: | End Meter: | Revs: | Comments:

Ichthyoplankton Sample

Set Time: min

Flow Meter Speed: | Condition Code: | Sampling Altered:

Start Meter: | End Meter: | Revs: | Comments:

Zooplankton Sample

Flow Meter Speed: REG / LOW

150µm

Condition Code: | Sampling Altered: | Comments:

150 Set Time: min

Start Meter: | End Meter: | Revs:

50µm

Condition Code: | Sampling Altered: | Comments:

50 Set Time: min

Start Meter: | End Meter: | Revs:

	Yes	No	Replicate
Chlorophyll Sample :			
Phytoplankton Sample :			
Nutrient Sample :			

WDL SAM Code:

Filtered: _____mL @ 0.35 bar Time Filtered: _____

Comments:

Entered by :_____ Date:_____ Checked by :_____ Date:_____

Tide Codes

EBB Moving from high to low
FLD Moving from low to high
HIGH 30 mins before or after high
LOW 30 mins before or after low
OB Water at site is over the bank

Flow Direction

During overtopping,

U Upstream: North (to the right if facing toe drain)
D Downstream: South (to the left)
N Neutral: neither or can't tell

Condition Code

1 Good (normal sample)
2 Fair (sample partially compromised; less than 50% loss in effort or catch)
3 Poor (sample majorly compromised; 50%+ loss in effort or catch)
4 No sample taken 100% loss of effort/sample

Sampling Altered

Y Includes alteration of sampling location, time, methods, not necessarily related to quality.
N Normal sample

Vegetation Code

1 No veg present
2 Veg present but no impact to sample
3 Veg present and impact to sample
4 Veg present and prevented sample

Procedures in Brief

1. Assess the site for safety.
2. Record site and field crew information.
3. Collect **Water Quality** measurements.
4. Triple rinse water collection bottles (1L) and **collect water** for chlorophyll, nutrients and phytoplankton using Van Dorn..
    - Be sure to collect water quality and water samples closely together.
5. Put water samples directly on ice.
6. Conduct Light Attenuation.
    - Procedure is located in the back of the pelican case.
7. Prepare nets for tows.
8. Conduct tows for **Ichthyoplankton** and **Drift Invertebrate** simultaneously. Ichthyoplankton should be on the **port** side of the trap/boat. Drift should be on the **starboard** side of the trap/boat.
    - Ichthyoplankton tow only collected at the Screw Trap site (STTD).
    - Tows typically 10 min, but may be shortened if conditions require (e.g., high turbidity or debris set times can be halved or more.
9. Conduct 150 and 50 um **zooplankton** tows simultaneously. Zoop-150 should be on the **starboard** side of the trap/boat. Zoop-50 should be on the **port** side of the trap/boat.
    - Tows conducted at both STTD and SHR.
    - The 150 um tow is for 5 min and 50 um for 2 min, unless conditions require shorted durations.
10. Transfer tow samples to the respectively labelled collection bottle. Use DI water to rinse specimens into the bottle and add 2 parts Formalin (use PPE).
11. Collect temperature data from HOBO logger (if able).
12. Upon returning to the lab, bring the datasheet with you while filtering water samples to record the water volume filtered (mL) and vacuum pressure used (bar).

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