Summer Townet Survey Access Database Metadata File

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Contents

Introduction

The purpose of this metadata file is to create a complete and comprehensive content description of the California Department of Fish and Wildlife (CDFW) Summer Townet Survey (STN) relational database (database). The tables within the database fit into two categories: 1) data tables, which contain variables measured during sampling (e.g. fork lengths, catch and water temperature) and 2) look up tables which house codes and other information needed to retrieve and interpret the data (e.g. species and tide codes). Notes regarding relationships between tables and field methods are included where relevant. A brief description of the queries included in the public database is also included.

Refer to the Summer Townet Field protocol, website and FTP site for more information.

Website:

https://www.wildlife.ca.gov/Conservation/Delta/Townet-Survey

FTP site:

ftp://ftp.dfg.ca.gov/TownetFallMidwaterTrawl/TNS%20MS%20Access%20Data/TNS%20data/

Data Tables

Sample

Table Description: Main repository of field sampling and environmental data. Use in conjunction with ***Catch*** and ***Length*** tables for data relating to number and lengths of organisms collected.

Field Descriptions:

SampleRowID: Primary key for ***Sample*** table

SampleDate: Date on which sampling occurred, dd/mm/yyyy

StationCode: Numeric code assigned to the physical location of individual sampling sites. Station locations are specific to Summer Townet Survey and are not interchangeable with those used by other surveys. This field relates to the *StationCodeSTN* field in the ***luStation*** table.

UserName: User name of CDFW employee that initially created record.

Survey: Grouping variable for each series of field-sampling days required to sample the entire station list. Surveys are numbered in sequence each year (1-6). The number of surveys conducted each year varies until 2003 when effort was standardized to 6 surveys per year.

TemperatureTop[1]*:* Water temperature in degrees Celsius. Sample is retrieved from the top 0.5 meter of the water column during the first tow at a station.

TemperatureBottom[1]: Water temperature in degrees Celsius. Sample is retrieved from the bottom of the water column just prior to the first tow at a station, using a Van Dorn water sampler.

Secchi: Depth, in cm, at which a 20 cm diameter black and white Secchi disk is no longer visible. Secchi depth is currently measured in the shadow of the research vessel to the nearest cm, just prior to the first tow at a station. Prior to 1980, Secchi depth was measured on the sunny side of the research vessel. See Summer Townet Field Protocol, Appendix 13: Log of Historic Survey Changes for more information.

[1] Beginning in 2007 Water Temperature and Specific Conductance were measured using a handheld Yellow Springs Instruments YSI 30 or YSI Pro 30 accurate to ± 0.2°C and ± 1.0% of reading or 1 µS/cm, whichever is greater, for temperature and Specific Conductance, respectively. See Appendix 13, Log of Historical Changes, Summer Townet Field Protocol for a list of previously used instruments.

Conductivity Top[1]**:** Specific conductance (25°C) reported in µS/cm. Sample is retrieved from the top 0.5 meter of the water column during the first tow at a station.

Conductivity Bottom[1]: Specific conductance (25°C) reported in µS/cm. Sample is retrieved from the bottom of the water column just prior to the first tow at a station, using a Van Dorn water sampler.

Tide Code: Numeric variable indicating the tidal direction observed prior to the first tow at a station. 1 = High Slack, 2 = Ebb, 3 = Low Slack, 4 = Flood.

DepthBottom: Depth in feet measured just prior to the first tow at station using a depth sounder mounted on the research vessel.

CableOut: Length of line deployed, in feet, based on colored cording woven into the mainline at 25 ft intervals. Distance is measured from main block on the A-frame on the research vessel to the bridle attached to the sled. Amount of line is determined based on depth being sampled. See Summer Townet Survey Field Protocol for more information.

SampleComments: Text field for notes and observations that are not recorded in other fields.

TowDirection: Numeric code used to indicate direction the research vessel is traveling in relation to the current while sampling. Equivalent to *TowDirectionID* field in ***luTowDirection*** table. 1 = With Current, 2 = Against Current, 3 = Unknown.

WindDirection: Direction of prevailing wind determined just prior to beginning of first tow at a station. Standard abbreviations for the four cardinal directions and four intercardinal directions are used.

Microcystis: Numeric rank indicating absence or density of single-celled blue green alga, *Microcystis aeruginosais*. Rank is determined based on visual inspection of surface water upon arrival at a station. 1 = Absent; 2 = Low, widely scattered colonies; 3 = Medium, adjacent colonies; 4 = High, contiguous colonies; 5 Very High, concentration of contiguous colonies forming mats/scum. See Summer Townet Field Protocol for more details. A visual representation(Figure 1) is included in the ***luMicrocystis*** table notes below.

TurbidityTop: Turbidity of surface water reported in Nephelometric Turbidity Units (NTUs). Sample is retrieved from the top 0.5 meter of the water column at the beginning of the first tow at a station and measured using a Hach 2100Q[2]

[2] Hach 2100Q turbidimeters are accurate to ±2% of measurement plus stray light from 0 to 1000 NTUs. See Hach 2100Q user manual for more information.

portable turbidity meter. Measurements began during the first survey of 2010 and continue to the present.

Weather: Numeric rank indicating weather conditions observed upon arrival at a station. 1 = 0 – 33% cloud cover; 2 = 33 – 66 % cloud cover; 3 = 66 – 100% cloud cover; 4 = rain.

Waves: Numeric ranking indicating severity of waves. Observations are made just prior to the first tow at a station. 1 = Calm; 2 = Waves without white caps; 3 = Waves with whitecaps.

StartLatDegrees, *StartLatMinutes, StartLatSeconds*[3]: Latitudinal global positioning system (GPS) coordinates recorded just after the net has been deployed for the first tow at a station.

StartLongDegrees, StartLongMinutes, StartLongSeconds: Longitudinal GPS coordinates recorded just after the net has been deployed for the first tow at a station.

EndLatDegrees, EndLatMinutes, EndLatSeconds: Latitudinal GPS coordinates recorded as the net is being retrieved at the end of the first tow at a station.

EndLongDegrees, EndLongMinutes, EndLongSeconds: Longitudinal GPS coordinates recorded as the net is being retrieved at the end of the first tow at a station.

[3] Coordinates are determined with a Garmin GPSMAP 78 using the WGS 1984 datum and recorded in Degrees, Minutes and Seconds.

TowEffort

Table Description: Contains tow numbers, start and end times and additional comments specific to individual sampling events (tows). Use in conjunction with ***Sample*** and ***Catch*** tables. This table also contains flowmeter data used to calculate the distance towed volume of water sampled.

Notes: In 2003, Summer Townet Survey began using General Oceanics flowmeters to estimate the amount of water sampled during each tow. The values reported in the *MeterIn, MeterOut* and *MeterDifference* fields are reported in meter counts which can be converted to distance traveled using the equation below.

Distance traveled in meters = Difference in Counts X Rotor Constant/999999, where the Rotor Constant provided by General Oceanics is 26,873.

Prior to 2003, a generic tow volume of 735 m^3 is reported.

Field Descriptions:

TowRowID: Primary key for ***TowEffort*** table. Relates ***TowEffort*** and ***Catch*** tables

SampleRowID: Primary key for ***Sample*** table. Relates ***TowEffort*** and ***Sample*** tables

TowNumber: Grouping variable for each series of sampling events, i.e., tows, conducted at a station. Tow numbers are ordered in sequence (1-4) for each time a station is visited within a survey. The field protocol requires 2 tows with a third conducted if any fish are caught during either of the first two tows. There are exceptions for station 323 and non-index stations in the Sacramento Deep Water Ship Channel (SDWSC) and Cache Slough. Three tows are conducted at station 323 and two tows are conducted in SDWSC and Cache Slough, regardless of catch.

TimeStart: Time at which sampling begins. Time is recorded after the net and the appropriate amount of line have been deployed and the net begins actively fishing. It is reported using a 12-hour clock format.

TimeStop: Time at which sampling ends. Time is recorded when the is at the stern of the boat and is no longer actively fishing. It is reported using a 12-hour clock format.

MeterSerial: Serial number of General Oceanics flowmeter deployed during sampling. Use in conjunction with ***Web_Local_Meter_Corrections*** table.

MeterIn: Initial meter count, recorded just prior to beginning of sampling. **Note: A zero in this field indicates that the *MeterDifference* value is an estimate.**

MeterOut: Final meter count recorded at end of sampling

MeterDifference: Calculated difference between *MeterOut* and *MeterIn* fields. **Note:** Negative values sometimes appear in this column and are the result of meter turnover. The query ***CPUE_Step 2*** accounts for meter turnover in the *MeterDiffCalc* field by adding 1,000,000 to the *MeterOut* field when *MeterOut* – *MeterIn* results in a negative value.

TowComments: Text field for comments and observations specific to a single tow.

MeterEstimate: Not currently in use. This field was added to flag estimated flow meter values, however, it has not been put into use. A zero in the *MeterIn* column indicates that the flowmeter value is an estimate.

Catch

Table Description: Supplemental table containing catch data organized by species code. Use in conjunction with ***Sample***, ***TowEffort*** and ***luOrganism*** tables

Field Descriptions:

CatchRowID: Primary key for ***Catch*** table. Relates ***Catch*** and ***Length*** tables.

TowRowID: Primary key for ***TowEffort*** table. Relates ***Catch*** and ***TowEffort*** tables.

OrganismCode: Numeric code for species, equivalent to *OrganismCodeSTN* on ***luOrganism*** table. When developing queries, this field must be linked to *OrganismCodeSTN* in ***luOrganism*** table to retrieve *CommonName*, *Species*, etc…These codes are specific to Summer Townet Survey.

Catch: Total catch of one species resulting from one tow.

Length

Table Description: Supplemental table containing length and length frequency data for fish collected. Use in conjunction with ***Catch***, ***TowEffort***, ***Sample***, and ***LengthSupplement*** tables.

Field Descriptions:

LengthRowID: Primary key for ***Length*** table. Relates ***Length*** and ***LengthSupplement*** tables.

CatchRowID: Primary key for ***Catch*** table. Relates ***Length*** and ***Catch*** tables.

ForkLength: Length of fish collected, measured from the most anterior part of the fish to the median caudal fin rays (Murphy 1996). Fork length is measured to the nearest mm immediately after fish are collected.

LengthFrequency: Number of fish collected during a tow with a specific fork length. **Note:** A zero in the *ForkLength* field indicates that one or more fish was/were not measured, and the number in the *LengthFrequency* field depicts the “plus count” of fishes not measured. This usually occurs when catch of a single species in a tow exceeds 50, the number of fish that the Protocol requires to be measured. In rare instances, a zero in the *ForkLength* field is reported when an individual cannot be accurately measured.

MarkCode: Text field used to describe any marks used to distinguish hatchery salmonids, e.g. adipose fin clip.

Dead: Text field (Y/N) used to describe if a fish was released alive after capture.

LengthSupplement

Table Description: Supplemental table containing serial numbers used to track fish that have been individually preserved and in some cases transferred to other institutions for additional analysis. Use in conjunction with ***Length***, ***Catch***, ***TowEffort*** and ***Sample*** tables.

Notes: Beginning in 2005, CDFW began collecting fish for researchers from the University of California, Davis (UCD). These fish were initially decapitated and heads and bodies preserved separately. In more recent years, whole fish were flash frozen immediately after collection by immersion in liquid nitrogen. In both cases, body parts or bodies were assigned a serial number and year for tracking purposes. Delta Smelt and age-0 Striped Bass make up the majority of fish that have been transferred to UCD, however, Threadfin Shad, American Shad and Longfin Smelt have also been transferred.

Field Descriptions:

SupplementID: Primary key for ***LengthSupplement*** table

*LengthRowID***:** Primary key for ***Length*** table. Relates ***LengthSupplement*** and ***Length*** tables.
SerialYear: Year in which fish were collected

SerialNumber: Unique four digit code assigned to each fish at time of collection.

Weight: Not in use.

CBSample

Table Description: Supplemental table containing flowmeter values and other data related to the Clark-Bumpus (CB) net used for zooplankton sampling. Use in conjunction with ***TowEffort*** and ***Sample*** tables.

Notes: In 2005, STN began sampling pelagic zooplankton with a CB net mounted on top of the Townet sled. It consists of a 73 cm long cone with a 12.5 cm diameter mouth opening. The cone is constructed out of 160µm netting and is mounted at the end of a 19 cm long, 12.5 cm diameter, clear acrylic tube. The cone terminates in a 250 mL polyethylene cod-end jar with a 3 1/8" X 2 1/2" rectangular opening on one side that is covered with a 140 µm screen. A General Oceanics flowmeter is mounted on a metal bracket that bisects the mouth of the acrylic tube.

Field Descriptions:

CBSampleID: Primary key for ***CBSample*** table

TowRowID: Primary key for ***TowEffort*** table. Relates ***CBSample*** and ***TowEffort*** tables.

CBMicrocystis: Binary numeric code indicating the presence (1) or absence (0) of microcystis in the CB cod-end jar when viewed on the boat. Sporadic observations began in 2007 but were not consistently made until 2010. They were discontinued in 2013 and reinstated in 2015.

CBMeterSerial: Serial number corresponding to General Oceanics flowmeter mounted in CB net opening

CBMeterIn: Initial meter count recorded prior to net deployment. **Note:** A zero in this field indicates that flowmeter values are estimates.

CBMeterOut: Final meter count recorded after net is retrieved.

CBMeterDifference: Difference between *CBMeterOut* and *CBMeterIn*. **Note:** Negative values sometimes appear in this column and are the result of meter turnover. This can be compensated for by adding 1,000,000 to the *CBMeterOut* value in cases where *CBMeterIn* is close to 1,000,000 and *CBMeterOut* is less than 30,000.

CBComments: Text field for entering comments and observations related to the CB net or CBSample.

CBMeterEstimate: Not in use. This field was intended to flag estimated *CBMeterDifference* values. **Note:** A zero in the *CBMeterIn* field indicates that the *CBMeterDifference* field is an estimate.

CBTowCode: Code used to indicate status of CB sample. A = Valid sample. B = Sample invalidated in field. C = Sample invalidated in laboratory

Crew

Table Description: Supplemental table containing crew, vessel and net information. Use in conjunction with ***Sample*** and ***luCrew*** tables.

Notes: This table came into use during the 2015 field season and does not contain records for prior years. Initials in *BoatOpID*, *FieldLeadID*, *Crew1, Crew2* and *Crew3* fields correspond to the *CrewID* field in the ***luCrew*** table. Create a relationship between appropriate field in the ***Crew*** table and the *CrewID* field of the ***luCrew*** table to retrieve full name and position. Positions listed are not regularly updated and may not accurately reflect promotions or transfers.

Field Descriptions:

CrewRowID: Primary key for ***Crew*** table.

SampleRowID: Primary key for ***Sample*** table. Relates ***Sample*** and ***Crew*** tables.

BoatOpID: Initials of boat operator. Boats are piloted by a CDFW employee with a Fish and Game Vessel Mate or Fish and Wildlife Technician classification.

FieldLeadID: Initials of field lead. Science field crew are lead by a CDFW employee with an Environmental Scientist or Senior Laboratory Assistant classification.

Crew1, Crew2, Crew3: Initials of additional field crew members.

GuestName: Name or initials of guests or observers.

VesselName: Name of CDFW research vessel used for sampling

NetNumber: Serial number of main sampling net.

CBNetNumber: Serial number of Clark-Bumpus net mounted on Townet sled.

Look Up Tables

luOrganisms

Table Description: Contains scientific and common names of organisms collected for Summer Townet and Fall Midwater Trawl Surveys as well as additional phylogenetic information. Use in conjunction with ***Catch*** table to retrieve species and common names.

Notes: Species codes are specific to Summer Townet Survey and are not interchangeable with those in use by other studies. Create a relationship between the *OrganismCode* field in the ***Catch*** table and the *OrganismCodeSTN* field in the ***luOrganism*** tables to retrieve species, common names and other information. Scientific and common names as well as taxonomic classifications conform to those found in the American Fisheries Society publication, "*Common and Scientific Names of Fishes from the United States, Canada and Mexico"* (Page 2013).

Field descriptions:

OrganismRowID: Primary key for ***luOrganism*** table.

OrganismCodeMaster: Not in use.

CommonNameMaster: Not in use.

OrganismCodeSTN: Unique numeric codes assigned to species or lowest taxonomic level identified by Summer Townet Survey. **Note:** Create a relationship between this field and the *OrganismCode* field in ***Catch*** table to retrieve species, common names and other information.

FieldNameSTN: Truncated common name of species or lowest taxonomic level identified by Summer Townet Survey.

OrganismCodeFMWT: Unique numeric code assigned to species or lowest taxonomic level identified by Fall Midwater Trawl Survey. **Note**: These codes are unique to Fall Midwater Trawl survey and are not interchangeable with codes used by other surveys.

FieldNameFMWT: Truncated common name of species or lowest taxonomic level identified by Fall Midwater Trawl Survey.

OrganismSymbol: Alpha-numeric code assigned to species or lowest taxonomic group identified by either Summer Townet or Fall Midwater Trawl Surveys.

Active: Binary numeric field indicating if an organism code is currently (-1) or no longer (0) in use.

CommonName: Accepted common name of species or groups of organisms collected by Summer Townet and Fall Midwater Trawl Surveys.

Phylum, Class, Order and *Family*: Taxonomic categories of species or groups of organisms. Phylogenies conform to those accepted by the American Fisheries Society (Page 2013).

Genus and *Species*: Accepted scientific names for genera and species of organisms.

luStations

Table Description: Look up table containing current and historic station descriptions, coordinates and supplemental information. Use in conjunction with ***Sample*** table.

Notes: Station coordinates presented here represents reference point that ideally will be passed through while sampling. Actual sampling locations may vary slightly. Refer to the start and end coordinates contained in the ***Sample*** table for actual sampling locations. All coordinates are reported in Degrees, Minutes, Seconds using the WGS 1984 projection.

Field Descriptions:

StationRowID: Primary key for ***lustation*** table.

StationCodeSTN: Numeric code assigned to the physical location of individual sampling sites. Station locations are specific to Summer Townet Survey and are not interchangeable with those used by other surveys. This field creates a relationship with the *StationCode* field in the ***Sample*** table.

Active: Binary numeric field indicating a station is currently (-1) or no longer (0) sampled.

Core: No longer in use. Binary numeric code indicating whether a station is included in regular sampling. This field has been replaced by the *Active* and *Index* fields.

Index: Binary numeric code indicating whether a station is included (1) or not included (0) in age-0 Striped Bass and Delta Smelt index calculations.

Region: Geographic region in which stations are located.

Location: Physical description of station locations.

LatD, LatM, and *LatS*: Degrees, Minutes and Seconds components of latitudinal global positioning system (GPS) coordinates for station locations.

LonD, LonM, and *LonS*: Degrees, Minutes and Seconds components of longitudinal GPS coordinates for station locations.

RKI: River Kilometer Index (RKI) code associated with station location.

AreaCode: Grouping variable used for internal analysis.

TNSDietArea: Grouping variable used internally for diet analysis.

Comments: Notes and observations not captured elsewhere.

STRArea: Grouping variable used to group stations into geographic regions for presenting data in the Interagency Ecological Program Newsletter article: Status and Trends Report for Pelagic Fishes of the Upper San Francisco Estuary.

WeightingFactor: Volumetric estimate used when calculating annual abundance indices for age-0 Striped Bass and Delta Smelt. Volumes are reported in Acre-ft X 10^3. See Summer Townet Field Protocol, Appendix 14: Age-0 Striped Bass and Delta Smelt Index Calculation for more information.

YearAdded: Year in which a station was first sampled.

YearEliminated: Last year in which a station was sampled.

luTowDirection

Table Description: Look up table containing definitions for numeric tow direction codes listed in the ***Sample*** table.

Field Descriptions:

TowDirectionID: Primary key for ***luTowDirection*** table. Equivalent to tow direction codes listed in the *TowDirection* field in the ***Sample*** table.

TowDirection: Direction that the research vessel is towing, relative to the current.

luWeather

Table Description: Look up table containing definitions for numeric weather code in the *Weather* field of the ***Sample*** table.

Field Descriptions:

WeatherID: Primary key for ***luWeather*** table. Equivalent to the numeric code in *Weather* field of the ***Sample*** table.

WeatherDescription: Weather conditions observed upon arrival at a station.

luWaves

Table Description: Look up table containing definitions for numeric wave codes in the *Waves* field of the ***Sample*** table.

Field Descriptions:

WavesID: Primary key for ***luWaves*** table. Equivalent to the numeric ranks contained in the *Waves* field of the ***Sample*** table.

WavesDescription: Severity of waves observed upon arrival at a station.

luTide

Table Description: Look up table of definitions for numeric codes contained in the *TideCode* field of the ***Sample*** table.

Field Descriptions:

TideRowID: Primary key for ***luTide*** table. Equivalent to numeric code contained in the *TideCode* field of the ***Sample*** table.

TideDesc: Direction of tide observed prior to the first tow at a station.

luCrew

Table Description: Look up table for crew initials contained in the ***Crew*** table.

Field Descriptions:

CrewID: Primary key for ***luCrew*** table. Equivalent to initials in *BoatOpID, FieldLeadID, Crew1, Crew2 and Crew3* field of the ***Crew*** table.

CrewLastName and *CrewFirstName*: Full name of crew member.

Position: Crew member classification. Positions listed are not regularly updated and may not accurately reflect promotions or transfers.

EmploymentStart and *EmploymentEnd*: Not in use.

luMicrocystis

Table Description: Look up table containing definitions for numeric ranks contained in the *Microcystis* field of the ***Sample*** table.

Field Descriptions:

MicrocystisID: Primary key for ***luMicrocystis*** table. Equivalent to numeric rank contained in the *Microcystis* field of the ***Sample*** table.

MicrocystisDesc: Numeric rank indicating absence or density of single-celled blue green alga, *Microcystis aeruginosais*. Rank is determined by visual inspection of surface water upon arrival at a station and is based on the descriptions and densities depicted in the figure below.

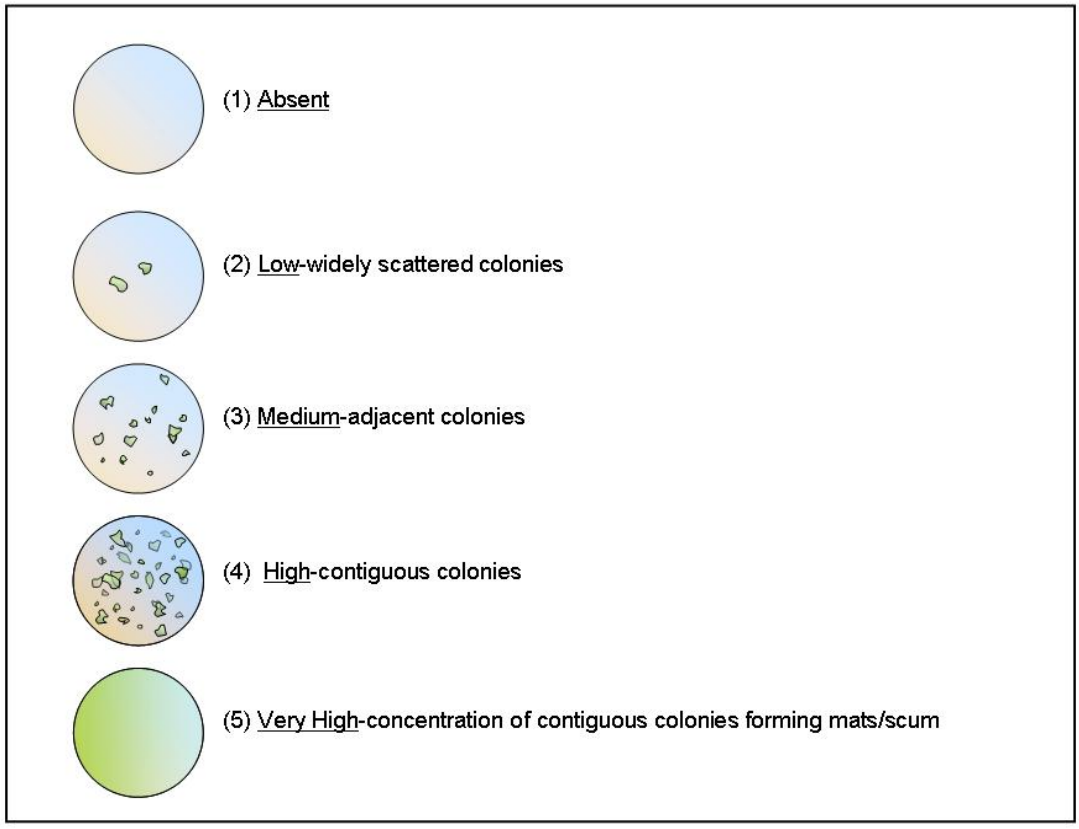

Figure 1. Visual representation and description of microcystis density ranking.

luVessel

Table Description: List of vessels used in field sampling

Notes: This table only contains one field.

Web_Local_Meter_Corrections

Table Description: This table contains correction factors for the General Oceanics flowmeters used to estimate volume sampled. These correction factors were calculated by CDFW staff beginning in 1996.

Notes: See the Queries section for more information on how flowmeters are used to calculate volume.

Field Descriptions:

RowID: Primary key for ***Web_Local_Meter_Corrections*** table.

StudyYear: Year in which meter was used

Meter Serial: Unique five digit number used to identify individual flowmeters. Serial numbers are printed on each flowmeter by General Oceanics.

CalibrationDate: Date on which flowmeter was calibrated by CDFW staff. Formatted as mm/dd/yyyy.

k factor: Corrected value as calculated by CDFW staff. The k factor provided by General Oceanics is 0.026873.

Notes: Comments and observations regarding calibration and corrected k factors.

Administrators

Table Description: Contains names and user names of CDFW staff with administrative privileges.

Field Descriptions:

AdministratorRowID: Primary key for ***Administrators*** table.

AdministratorID: Username of administrator.

Administrator: Full name of CDFW employee with administrator privileges.

Queries

The public database contains nine queries. The first set consists of three queries that calculate adjusted length frequencies for instances when all fish are not measured. The second set consists of five queries that calculate Catch Per Unit Effort (CPUE) and reports it as individuals per 10,000 m^3 of water filtered. The final query counts all tows and reports them by Year, Survey, and Station.

Adjusted Length Frequency

If more than 50 individuals of a species are collected in a single tow the first 50 are measured and the remaining fish are counted. The length frequency of these unmeasured fish can be extrapolated based on the length frequencies of those that were measured. This is accomplished using the set of queries described below. It is not necessary to open all three queries. To complete the calculation, simply open the third query, *AdjLFDoNotAlter_Step3*, and enter the appropriate species code. Refer to the ***luOrganism*** table for species codes.

AdjLF_Step1: Returns a record for each tow in which the selected species was collected and filters out unmeasured fish (*ForkLength* = 0).

AdjLF_Step2: Sums length frequency of the selected species for each tow (i.e., sums fish measured).

AdjLF_Step3: Calculates adjusted length frequency by multiplying the frequency at length by total catch divided by sum measured.. This assumes that the measured fish are a representative subset of total catch.

Catch per Unit Effort

The set of queries described below calculates Catch per Unit Effort (CPUE) and reports it as individuals of a species collected per 10,000 m^3 of water sampled. The calculations can be carried out by opening the final query, *CPUE_Step5*.

CPUE_Step1: Returns a record for each tow as well as meter counts and serial numbers

CPUE_Step2: Calculates volume sampled for each tow. A generic volume of 735 m^3 is reported for tows conducted before 2003.

CPUE_Step3: Calculates CPUE for each species collected during a single tow.

CPUE_Step4: Calculates average CPUE for each station sampled during a survey.

CPUE_Step5: Organizes CPUE by year, survey, station and tow. Includes environmental data and sample date.

Tows Completed

TowsCompleted: Reports the total number of tows conducted at a station within a survey. Organizes data by year, survey and station number.

Murphy, B. R. a. D. W. W., Ed. (1996). Fisheries Techniques. Bethesda, Maryland, American Fisheries Society, Education Section.

Page, L. M., Hèctor Espinoza-Pèrez, Lloyd T. Findley, Carter R. Gilbert, Robert N. Lea, Nicholas E. Mandrak, Richard L. Mayden, and Joseph S. Nelson (2013). Common and Scientific Names of Fishes from the United States, Canada and Mexico. Bethesda, Maryland, American Fisheries Society.