**2015 Seacat Data Documentation – 4D Edge**

**Data submission to NOAA/PMEL 6/8/16**

**Section 1. Contributor Identification**

|  |  |
| --- | --- |
| 1. Name of contributor  Lauri Sadorus | 5. Telephone  206-634-1838 x7677 |
| 2. Organization name  International Pacific Halibut Commission | 6. Email  lauri@iphc.int |
| 3. Mailing address  2320 West Commodore Way, Suite 300 | 7. Fax  206-632-2983 |
| 4. City, State, Zip, Country/Province  Seattle, WA, 98199-1287 | 8. Alternate contact name and phone  Jay Walker 206-634-1838 x7684 |

**Section 2. General Dataset Description**

|  |  |
| --- | --- |
| 1. Dataset Title: IPHC Oceanographic dataset | |
| 2. Dataset Abstract: The IPHC conducts an annual longline fish survey on a 10x10 nautical mile grid from southern Oregon north to the Gulf of Alaska, out along the Aleutian Island chain, and into the Bering Sea in depths ranging from 30 to 500 m. Beginning in 2000, the IPHC conducted a pilot project looking at the practicality of collecting oceanographic profile data alongside fishery data at the longline survey stations. The project was expanded to stations off Oregon in 2007 and coastwide starting in 2009. A Northern California area was added in 2013. Profiles were taken at each station immediately prior to hauling the longline gear so that oceanographic data collection is coincident with the haul. The data collected are surface to depth profiles of pressure (depth), temperature, salinity, dissolved oxygen, pH, and chlorophyll *a* concentration. | |
| 3. Dataset purpose/general description: Surface to depth profiles are collected at each of about 1200 longline fishing stations in the IPHC survey. The geographic range of the survey allows the IPHC to take an oceanographic “snapshot” each summer of conditions along the continental shelf in the north Pacific and parts of the Bering Sea that are useful to researchers worldwide as the time series builds. Furthermore, collecting these data coincident with longline survey fishing enable stock assessment scientists to examine the role of oceanographic conditions in relation to distributions of commercially caught groundfish. | |
| 4. Dataset collection dates  First day of data collection: 7/16/2015  Last day of data collection: 8/16/2015 | |
| 5. Dataset location  Northernmost latitude: 59o50.10 N  Southernmost latitude: 56o21.12 N  Easternmost longitude: 171o19.24 W  Westernmost longitude: 178o36.74 W  IPHC Survey region: 4D Edge (4DE) | 9. Vessel name and type  F/V Kema Sue (abbreviation: KSU)  80’ longline fishing vessel |

|  |  |
| --- | --- |
| 6. Instruments used to collect these data:  We use SBE19plus and SBE19plusV2 water column profilers made by Seabird Electronics Inc. in Bellevue, WA, outfitted with auxiliary sensors to measure dissolve oxygen (SBE43), pH(SBE18), and chlorophyll a concentration (WETLabs – ECO-FLRTD). | 10. Trip/cruise number  Trips 4, 5, 6 |
| 7. Parameters measured  Pressure, temperature, conductivity (for salinity calculation), dissolved oxygen, pH, chlorophyll *a* concentration | 11. Station number range  7050-7099 |
| 8. Number and type of files/casts transferred  43 total casts – each cast provided in csv (comma-separated text values) and NetCDF formats. | 12. Description of file names  NetCDF and text filenames have this prefix: IPHC2015 (Organization and year), 3-letter Vessel (see Section 2.9), 4-digit Area/station, cast (set) number cNNN (c and three digits).  Suffix is .nc (NetCDF) or .csv |

**Section 3. Scientific Content of Dataset**

|  |  |  |  |
| --- | --- | --- | --- |
| Name of measured parameter | Unit of measure used for parameter | Observation method and instrument used | Data processing techniques |
| Pressure  Temperature  Salinity  Dissolved O2  pH  Chlorophyll *a*  Sigma-T  oxygen | Strain gauge (db)  ITS-90 oC  psu  ml/L  pH  µg/l  kg/m3  % saturation | SBE19plusV2  SBE19plusV2  SBE19plusV2  SBE43  SBE18  Wetlabs ECO-FL(RT)D (fluorometer, real-time, 6000-m rating)  calculated value  calculated value | All data are processed from raw using SeaBird “SEASOFT SBE Data Processing” software, and  a configuration (\*.con) file that includes integrated instrument serial numbers and calibration coefficients. Data are averaged to 1-meter from downcast, with occasional upcast fill if problems. Salinity is calculated from conductivity, temperature and pressure using the 1978 Practical Salinity Scale (PSS, IEEE Journal of Oceanic Engineering, V. OE-5, No.1, Jan.1980, p.14). Calculated values (2) are: sigma-T (density-1000) and % Oxygen concentration. |

**Section 4. File Format of Dataset**

Each station has one profile (referred to as cast or set) data file presented in two formats: comma-separated text (csv) and NetCDF (nc). All times are GMT. Data files include all downcast data, with occasional upcast information filling in if data problems occur in downcast and if substitution is reasonable. Nine data variables, as noted in section 3, are included with each cast.

NetCDF files: “classic” NetCDF format using PMEL-EPIC conventions. Files are readable using software with NetCDF capability including Ferret, Matlab, Unidata ncdump (NCO tools), and add-ons to R, Python and Perl. Missing or bad data are designated as 1.0e+35.

Axes (longitude, latitude, depth, time), and Attributes (meta information) are inherent in the NetCDF file format. These attributes are in each NetCDF file:

Latitude: North latitude 0-90° in decimal degrees, labeled “degree\_north”.

Longitude: positive decimal degrees, 0-180°, for Longitude West, negative decimal degrees for Longitude East (east of dateline), all labeled “degree\_west”.

VSLCDE: IPHC vessel code (3-letter) is designated in section 2.9 of this document.

SETNO: Set number is also called cast number and designates a single cast.

STNNO: 4-digit station number defining point location where data were collected.

TRPNO: Trip Number is designated in section 2.10 of this document.

REGION: Code for named region in Survey area is designated in section 2.5 of this document.

DATA\_CMNT: indicates original SeaSoft filename which includes set, station and year.

WATER\_DEPTH: Bottom depth which is measured by vessel instruments or estimated, and is useful as a rough estimate of true bottom depth.

CSV (text) files:

Files have 17 columns of data with a 1-line header of data-columns labels and units. Each line of data includes time and location. Missing data are designated as 999999

Data columns are:

Year, Latitude(deg), Longitude(deg), Station, VesselCode, Cast, WaterDepth(m), CastDate, Pressure(db), Temperature(C), Oxygen(ML/L), pH, Chlorophyll (micrograms/L), Salinity, Oxygen(microMol/kg), Oxygen(%Saturation), Sigma-T(kg/m\*\*3).

Latitudes: degrees N

Longitudes: 0 to 180 degrees, with negative for western and positive for eastern hemisphere.

Time of data collection: column 8 = 2-digit day, 3-character month, 4-digit year connected by dash characters as dd-mmm-yyyy

**Section 5. Instrument Calibration**

Configuration file 6192\_15.xmlcon.

Water samples necessary for calibration of variables cannot be taken in this type of data-collection circumstance. In more usual situations, bottle samples are collected, and slope and offset calibration values are applied to profile data, including salinity and oxygen.  Lacking water samples, Winkler titrations were not performed and oxygen data are not calibrated, though SeaBird SBE-43 (dissolved oxygen) sensors are considered very reliable. Calibration corrections are generally small for low values of oxygen concentration, and larger for higher values.  Oxygen concentrations greater than 100% (supersaturation) are not unusual.  This can be due to variations in temperature and salinity due to heating rates and ventilation of the water column, wind and turbulence at the surface, and biological influences (photosynthesis).  Oxygen data should be used with the consideration that water samples were not collected and corrections have not been applied.  Data are useful as an indicator of variations in spatial patterns, but are not exact.

Chlorophyll-*a* data values < 0 have been retained. The values are within reasonable range of the instrument. Below-zero values occur due to use of generalized standards in factory calibration. Water samples were not collected for chlorophyll fluorescence calibration.

pH calibrations were conducted at sea and applied to pH data per SeaBird protocol and software during initial conversion of data for processing. pH data quality is usually good, and ranges are usually reasonable.

**Section 6. Other**

Data quality ok.

Surface edits or removal of data points on all files, 1-10 m, due to speed of descent and spikes.

Oxygen and pH values are low or bad on many casts, and removed as needed.