Summary:
This document contains metadata for the discrete carbon and nutrient data subsets (samples collected in the upper 10 m of the water column) used in the manuscript by Fassbender et al., which are described in Tables 1 and 2 of the manuscript. The complete discrete datasets and metadata for these and subsequent cruises will be submitted for archival in the National Centers for Environmental Information's (NCEI) Ocean Carbon and Acidification Data repository (https://www.nodc.noaa.gov/oceanacidification/). Data subsets are provided here for accelerated public access; however, data users are encouraged to download these data from NCEI once they are available (https://www.nodc.noaa.gov/oceanacidification/stewardship/data_portal.html).

Metadata for the University of Washington Oceanic Remote Chemical/Optical Analyzer (ORCA) buoy observations used by Fassbender et al., including the temperature and salinity data from the Dabob Bay and Twanoh moorings, are not provided here. Quality control protocols applied to the ORCA mooring data are outlined in the Quality Assurance Project Plan (http://nwem.ocean.washington.edu/ORCA_QAPP.pdf; Newton and Devol, 2012).

References:
Fassbender, A.J., Alin, S.R., Feely, R.A., Sutton, A.J., Newton, J.A., Krembs, C., Bos, J., Keyzers, M., Devol, A., Ruef, W., and Pelletier G.: Seasonal carbonate chemistry variability in marine surface waters of the Pacific Northwest, submitted to *Earth System Science Data*.

Newton, J. A., & Devol, A. H. (2012). *Quality Assurance Project Plan: Long-term, High Resolution Marine Water Quality Monitoring in Puget Sound using Profiling Buoys. 2012-2013 Activities.* Retrieved from http://nwem.ocean.washington.edu/ORCA_QAPP.pdf

No	Metadata element name	Your input
1	Submission Date	
2	Accession no. of related data sets	
3	Investigator-1 name	Simone R. Alin
4	Investigator-1 institution	NOAA Pacific Marine Environmental Laboratory
5	Investigator-1 address	7600 Sand Point Way NE, Building 3, Seattle, WA 98115
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8	Investigator-1 researcher ID	1: 0000-0002-8283-1910, 2: J-6836-2017
9	Investigator-1 ID type (ORCID, Researcher ID, etc.)	1: ORCID; 2: Researcher ID
10	Investigator-2 name	Jan Newton
11	Investigator-2 institution	University of Washington Applied Physics Laboratory
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15	Investigator-2 researcher ID	1: 0000-0002-2551-1830, 2: T-6555-2017

16	**Investigator-2 ID type (ORCID, Researcher ID, etc.)**	1: ORCID; 2: Researcher ID
17	**Investigator-3 name**	Richard A. Feely
18	**Investigator-3 institution**	NOAA Pacific Marine Environmental Laboratory
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20	**Investigator-3 phone**	206-526-6214
21	**Investigator-3 email**	Richard.A.Feely@noaa.gov
22	**Investigator-3 researcher ID**	
23	**Investigator-3 ID type (ORCID, Researcher ID, etc.)**	
24	**Data submitter name**	
25	**Data submitter institution**	
26	**Data submitter address**	
27	**Data submitter phone**	
28	**Data submitter email**	
29	**Data submitter researcher ID**	
30	**Data submitter ID type (ORCID, Researcher ID, etc.)**	
31	**Title**	Inorganic carbon, oxygen, nutrient, and CTD measurements from cruises in Washington state marine waters.
32	**Abstract**	The cruise time-series data submitted here represent collaborative efforts between NOAA Pacific Marine Environmental Laboratory's Marine Carbon Program (PMEL-MCP) and outside partners, including the University of Washington (UW) and NOAA's Northwest Fisheries Science Center (NWFSC). Stations occupied in the Salish Sea (UW-led) and Washington coastal waters (includes both UW-led cruises and NWFSC-led PacOOS cruises) have been reoccupied over various intervals since 1998 or more recently (depending on cruise type). Each cruise was designed to obtain a synoptic snapshot of key carbon, physical, and other biogeochemical parameters as they relate to ocean acidification (OA) in Washington's estuarine and coastal environments. At all sampling stations, CTD casts were conducted to measure temperature, conductivity, pressure, and oxygen concentrations using CTD and oxygen sensors. Discrete water samples were collected throughout the water column at all stations in Niskin bottles. Laboratory analyses were run to measure dissolved inorganic carbon (DIC), oxygen, and nutrient concentrations and total alkalinity. More information--including a map of the stations occupied during these cruises, full-resolution CTD downcast data for all stations sampled, chlorophyll and phaeopigment concentrations, and other sensor data--can be found at nvs.nanoos.org/CruiseSalish by exploring the Map, Data, and Plots tabs (for Salish cruises). This effort was conducted in support of the estuarine and coastal monitoring and research objectives of the PRISM, NANOOS, PacOOS, and PMEL-MCP and conforms to monitoring guidelines of the Global Ocean Acidification Observing Network (goa-on.org) and the U.S. National Oceanic and Atmospheric Administration's Ocean Acidification Program.

33	**Purpose**	The major objectives of the cruise were: 1) To characterize ocean acidification (OA) conditions in the Salish Sea and adjoining coastal waters; 2) To conduct inter-calibration measurements near other OA observing assets, including moorings, in the study area, allowing inter-calibration of these autonomous assets with high-quality, ship-based measurements; 3) To provide calibration data needed to develop and validate predictive models for aragonite saturation state, pH, and other important OA indicators in the Salish Sea and adjoining coastal waters, based on widely measured parameters such as salinity, temperature, and oxygen concentration; 4) To examine relationships between processes leading to OA and hypoxia in estuarine and coastal ecosystems; 5) To conduct biological measurements in conjunction with physical and chemical OA measurements; and 6) To provide scientific information on OA conditions and trends for resource management and decision support.
34	**Start date**	
35	**End date**	
36	**Westbd longitude**	
37	**Eastbd longitude**	
38	**Northbd latitude**	
39	**Southbd latitude**	
40	**Spatial reference system**	WGS 84
41	**Geographic names**	Salish Sea, Puget Sound, Strait of Juan de Fuca, U.S. West Coast, California Current System, Washington
42	**Location of organism collection**	
43	**Funding agency name**	
44	**Funding project title**	Not applicable
45	**Funding project ID (Grant no.)**	Not applicable
46	**Research projects**	
47	**Platform-1 name**	
48	**Platform-1 ID**	
49	**Platform-1 type**	
50	**Platform-1 owner**	
51	**Platform-1 country**	
52	**Platform-2 name**	
53	**Platform-2 ID**	
54	**Platform-2 type**	
55	**Platform-2 owner**	
56	**Platform-2 country**	
57	**Platform-3 name**	
58	**Platform-3 ID**	
59	**Platform-3 type**	
60	**Platform-3 owner**	
61	**Platform-3 country**	
62	**EXPOCODE**	
63	**Cruise ID**	
64	**Section**	
65	**Author list for citation**	

66	**References**	
67	**Supplemental information**	
68	**DIC: Variable abbreviation in data files**	DIC_UMOL_KG
69	**DIC: Observation type**	Discrete dissolved inorganic carbon concentration measurements from samples collected on CTD casts
70	**DIC: In-situ observation / manipulation condition / response variable**	In-situ observation
71	**DIC: Manipulation method**	Not applicable
72	**DIC: Variable unit**	micromoles per kilogram of seawater (umol/kg-SW)
73	**DIC: Measured or calculated**	Measured
74	**DIC: Calculation method and parameters**	Not applicable
75	**DIC: Sampling instrument**	Niskin bottle
76	**DIC: Analyzing instrument**	Two systems consisting of a coulometer (UIC Inc.) coupled with a Dissolved Inorganic Carbon Extractor (DICE) or SOMMA inlet system. DICE was developed by Esa Peltola and Denis Pierrot of NOAA/AOML and Dana Greeley of NOAA/PMEL to modernize a carbon extractor called SOMMA (Johnson et al. 1985, 1987, 1993, and 1999; Johnson 1992).
77	**DIC: Detailed sampling and analyzing information**	PLEASE NOTE: DIC may be referred to as TCO_2, TCARBN, or C(sub)T in other data sets. All of these abbreviations refer to the total dissolved inorganic carbon concentration (i.e., the combined concentration of dissolved CO_2, bicarbonate ion, and carbonate ion). Samples for DIC measurements were drawn according to procedures outlined in the 2007 PICES Special Publication, Guide to Best Practices for Ocean CO_2 Measurements, from Niskin bottles into ~0.5 L borosilicate glass flasks using silicone tubing. The flasks were rinsed once and filled from the bottom with care not to entrain any bubbles, overflowing by at least one-half volume. The sample tube was pinched off and withdrawn, creating a small headspace, and 0.2 mL of saturated $HgCl_2$ solution was added as a preservative. The sample bottles were then sealed with glass stoppers lightly covered with Apiezon-L grease. DIC samples were collected from variety of depths with approximately 10% of these samples taken as duplicates. Sample bottles were inverted several times to ensure mixing of the $HgCl_2$ throughout the sample. The accuracy of the DICE measurement is determined with the use of standards (Certified Reference Materials (CRMs), consisting of filtered and UV-irradiated seawater) supplied by Dr. Andrew Dickson of Scripps Institution of Oceanography (SIO). The CRM accuracy is determined manometrically on land in San Diego. DIC data reported to the Ocean Carbon and Acidification Data Portal have been corrected to the appropriate certified batch value.
78	**DIC: Field replicate information**	Duplicate samples were collected from approximately 10% of the Niskins sampled, as a check of our precision. These replicate samples were interspersed throughout the station analysis for quality assurance and integrity of the coulometer cell solutions. No systematic differences among replicates collected in deep water (>20 m depth) were observed. However, among replicate samples collected near the surface, strong stratification of the water column can result in significant differences among replicates from the same Niskin.
79	**DIC: Standardization technique description**	Each coulometer was calibrated by injecting aliquots of pure CO_2 (99.999%) by means of an 8-port valve (Wilke et al. 1993) outfitted with two calibrated sample loops of different sizes (~1 mL and ~2 mL). The instruments were each separately calibrated at the beginning of each cell with a minimum of two sets of these gas loop injections and then again at the end of each cell to ensure no drift during the life of the cell.

80	**DIC: Frequency of standardization**	1) Gas loops were run at the beginning of each cell; 2) CRM's supplied by Dr. A. Dickson of SIO, were measured near the beginning; and 3) Duplicate samples were typically run throughout the life of the cell solution.
81	**DIC: CRM manufacturer**	Dr. Andrew Dickson (Scripps Institution of Oceanography)
82	**DIC: Batch number**	
83	**DIC: Poison used to kill the sample**	Saturated mercuric chloride solution
84	**DIC: Poison volume**	0.12 mL
85	**DIC Poisoning correction description**	The DIC values were corrected for dilution by 0.2 mL of saturated $HgCl_2$ used for sample preservation. The average total water volume of the sample bottles was 540 mL. The correction factor used for dilution was 1.00037.
86	**DIC: Uncertainty**	±0.1%
87	**DIC: Data quality flag description**	DIC_FLAG_W, WOCE quality control flags are used: 2 = good value, 3 = questionable value, 4 = bad value, 5 = value not reported, 6 = mean of replicate measurements, 9 = sample not drawn. QC flags refer to quality of laboratory analysis, but do not account for field sampling aberrations.
88	**DIC: Method reference (citation)**	Dickson, A.G., C.L. Sabine, and J.R. Christian (eds.). 2007. Guide to best practices for ocean CO2 measurements. PICES Special Publication 3, 191 pp. Johnson, K.M., A.E. King, and J. McN. Sieburth. 1985. Coulometric DIC analyses for marine studies: An introduction. Mar. Chem., 16, 61–82. Johnson, K.M., P.J. Williams, L. Brandstrom, and J. McN. Sieburth. 1987. Coulometric total carbon analysis for marine studies: Automation and calibration. Mar. Chem., 21, 117–133. Johnson, K.M. 1992. Operator's manual: Single operator multiparameter metabolic analyzer (SOMMA) for total carbon dioxide (CT) with coulometric detection. Brookhaven National Laboratory, Brookhaven, N.Y., 70 pp. Johnson, K.M., K.D. Wills, D.B. Butler, W.K. Johnson, and C.S. Wong. 1993. Coulometric total carbon dioxide analysis for marine studies: Maximizing the performance of an automated continuous gas extraction system and coulometric detector. Mar. Chem., 44, 167–189. Johnson, K.M., Kortzinger, A.; Mintrop, L.; Duinker, J.C.; and Wallace, D.W.R. 1999. Coulometric total carbon dioxide analysis for marine studies: Measurement and internal consistency of underway surface TCO2 concentrations. Marine Chemistry 67(1):123-144.
89	**DIC: Researcher Name**	Dana Greeley, Julian Herndon, and Morgan Ostendorf; PIs: Simone Alin and Richard Feely
90	**DIC: Researcher Institution**	Pacific Marine Environmental Laboratory, National Oceanic and Atmospheric Administration; and Joint Institute for the Study of the Atmosphere and Ocean, University of Washington
91	**TA: Variable abbreviation in data files**	TA_UMOL_KG
92	**TA: Observation type**	Discrete total alkalinity measurements from samples collected on CTD casts
93	**TA: In-situ observation / manipulation condition / response variable**	In-situ observation
94	**TA: Manipulation method**	Not applicable
95	**TA: Variable unit**	micromoles per kilogram of seawater (umol/kg-SW)
96	**TA: Measured or calculated**	Measured

97	**TA: Calculation method and parameters**	Not applicable
98	**TA: Sampling instrument**	Niskin bottle
99	**TA: Analyzing instrument**	Custom instrument, built at PMEL in 2006 and modeled after an earlier generation of those made in Dr. Andrew Dickson's laboratory at Scripps Institution of Oceanography.
100	**TA: Type of titration**	Two-stage, potentiometric, open-cell titration using coulometrically analyzed hydrochloric acid
101	**TA: Cell type (open or closed)**	Open
102	**TA: Curve fitting method**	Non-linear least squares
103	**TA: Detailed sampling and analyzing information**	PLEASE NOTE: TA may be referred to as TALK, ALKALI, or A(sub)T in other data sets. All of these abbreviations refer to the total alkalinity. Samples were collected in the same bottles as DIC samples, so collection and preservation methods are described in the DIC section above. The samples were subsequently analyzed for TA according to SOP3b of "The Guide to Best Practices for Ocean CO2 Measurements" (Dickson et al., 2007), using an open cell titration system built by the Dickson Lab in 2016 at Scripps Institution of Oceanography, University of California San Diego. Sample and analysis cell temperatures were controlled and sample size was measured gravimetrically. The instrument was controlled and alkalinity determined by LabVIEW software written by the Dickson Lab. Instrument accuracy was monitored at regular intervals using Certified Reference Materials (CRMs), consisting of filtered and UV irradiated seawater supplied by the Dickson Lab (SIO-UCSD). Precision was monitored by analyzing replicate samples. All samples were run ashore, with time between collection and analysis ranging from a few to several months.
104	**TA: Field replicate information**	Replicate samples were collected from approximately 10% of the Niskins sampled. No systematic differences among replicates collected in deep water (>20 m depth) were observed. However, among replicate samples collected near the surface, strong stratification of the water column can result in significant differences among replicates from the same Niskin.
105	**TA: Standardization technique description**	Analytical accuracy was assessed by periodic analysis of Certified Reference Materials (CRMs). No corrections were made for the offset between the certified and measured CRM values. Precision was monitored by analyzing replicates drawn from approximately 10% of the Niskins sampled.
106	**TA: Frequency of standardization**	Approximately every 24 samples.
107	**TA: CRM manufacturer**	Dr. Andrew Dickson's lab at Scripps Institute of Oceanography
108	**TA: Batch Number**	
109	**TA: Poison used to kill the sample**	Saturated mercuric chloride solution
110	**TA: Poison volume**	0.2 mL
111	**TA: Poisoning correction description**	The TA values were corrected for dilution by 0.2 mL of saturated HgCl2 used for sample preservation.
112	**TA: Magnitude of blank correction**	Not applicable
113	**TA: Uncertainty**	±0.1%
114	**TA: Data quality flag description**	TA_FLAG_W, WOCE quality control flags are used: 2 = good value, 3 = questionable value, 4 = bad value, 5 = value not reported, 6 = mean of replicate measurements, 9 = sample not drawn.
115	**TA: Method reference (citation)**	Dickson, A.G, Sabine, C.L. and Christian, J.R. (Eds.) 2007. "Guide to Best Practices for Ocean CO2 Measurements." PICES Special Publication 3, 191 pp.
116	**TA: Researcher Name**	Morgan Ostendorf and Julian Herndon; PIs: Simone Alin and Richard Feely

117	**TA: Researcher Institution**	Pacific Marine Environmental Laboratory, National Oceanic and Atmospheric Administration; and Joint Institute for the Study of the Atmosphere and Ocean, University of Washington
118	**pH: Variable abbreviation in data files**	
119	**pH: Observation type**	
120	**pH: In-situ observation / manipulation condition / response variable**	
121	**pH: Manipulation method**	
122	**pH: Measured or calculated**	
123	**pH: Calculation method and parameters**	
124	**pH: Sampling instrument**	
125	**pH: Analyzing instrument**	
126	**pH: pH scale**	
127	**pH: Temperature of measurement**	
128	**pH: Detailed sampling and analyzing information**	
129	**pH: Field replicate information**	
130	**pH: Standardization technique description**	
131	**pH: Frequency of standardization**	
132	**pH: pH values of the standards**	
133	**pH: Temperature of standardization**	
134	**pH: Temperature correction method**	
135	**pH: at what temperature was pH reported**	
136	**pH: Uncertainty**	
137	**pH: Data quality flag description**	
138	**pH: Method reference (citation)**	
139	**pH: Researcher Name**	
140	**pH: Researcher Institution**	
141	**pCO2A: Variable abbreviation in data files**	
142	**pCO2A: Observation type**	
143	**pCO2A: In-situ observation / manipulation condition / response variable**	
144	**pCO2A: Manipulation method**	
145	**pCO2A: Variable unit**	

146	**pCO2A: Measured or calculated**	
147	**pCO2A: Calculation method and parameters**	
148	**pCO2A: Sampling instrument**	
149	**pCO2A: Location of seawater intake**	
150	**pCO2A: Depth of seawater intake**	
151	**pCO2A: Analyzing instrument**	
152	**pCO2A: Detailed sampling and analyzing information**	
153	**pCO2A: Equilibrator type**	
154	**pCO2A: Equilibrator volume (L)**	
155	**pCO2A: Vented or not**	
156	**pCO2A: Water flow rate (L/min)**	
157	**pCO2A: Headspace gas flow rate (L/min)**	
158	**pCO2A: How was temperature inside the equilibrator measured.**	
159	**pCO2A: How was pressure inside the equilibrator measured.**	
160	**pCO2A: Drying method for CO2 gas**	
161	**pCO2A: Manufacturer of the gas detector**	
162	**pCO2A: Model of the gas detector**	
163	**pCO2A: Resolution of the gas detector**	
164	**pCO2A: Uncertainty of the gas detector**	
165	**pCO2A: Standardization technique description**	
166	**pCO2A: Frequency of standardization**	
167	**pCO2A: Manufacturer of standard gas**	
168	**pCO2A: Concentrations of standard gas**	
169	**pCO2A: Uncertainties of standard gas**	
170	**pCO2A: Water vapor correction method**	
171	**pCO2A: Temperature correction method**	
172	**pCO2A: at what temperature was pCO2 reported**	
173	**pCO2A: Uncertainty**	

174	**pCO2A: Data quality flag description**	
175	**pCO2A: Method reference (citation)**	
176	**pCO2A: Researcher Name**	
177	**pCO2A: Researcher Institution**	
178	**pCO2D: Variable abbreviation in data files**	
179	**pCO2D: Observation type**	
180	**pCO2D: In-situ observation / manipulation condition / response variable**	
181	**pCO2D: Manipulation method**	
182	**pCO2D: Variable unit**	
183	**pCO2D: Measured or calculated**	
184	**pCO2D: Calculation method and parameters**	
185	**pCO2D: Sampling instrument**	
186	**pCO2D: Analyzing instrument**	
187	**pCO2D: Storage method**	
188	**pCO2D: Seawater volume (mL)**	
189	**pCO2D: Headspace volume (mL)**	
190	**pCO2D: Temperature of measurement**	
191	**pCO2D: Detailed sampling and analyzing information**	
192	**pCO2D: Field replicate information**	
193	**pCO2D: Manufacturer of the gas detector**	
194	**pCO2D: Model of the gas detector**	
195	**pCO2D: Resolution of the gas detector**	
196	**pCO2D: Uncertainty of the gas detector**	
197	**pCO2D: Standardization technique description**	
198	**pCO2D: Frequency of standardization**	
199	**pCO2D: Temperature of standardization**	
200	**pCO2D: Manufacturer of standard gas**	
201	**pCO2D: Concentrations of standard gas**	

202	**pCO2D: Uncertainties of standard gas**	
203	**pCO2D: Water vapor correction method**	
204	**pCO2D: Temperature correction method**	
205	**pCO2D: at what temperature was pCO2 reported**	
206	**pCO2D: Uncertainty**	
207	**pCO2D: Data quality flag description**	
208	**pCO2D: Method reference (citation)**	
209	**pCO2D: Researcher Name**	
210	**pCO2D: Researcher Institution**	
211	**Var1: Variable abbreviation in data files**	CTDPRS_DBAR
212	**Var1: Full variable name**	Hydrostatic pressure recorded from CTD at the depth where the sample is taken
213	**Var1: Observation type**	Water column profile
214	**Var1: In-situ observation / manipulation condition / response variable**	In-situ observation
215	**Var1: Variable unit**	dbars (=decibars)
216	**Var1: Measured or calculated**	Measured
217	**Var1: Calculation method and parameters**	Not applicable
218	**Var1: Sampling instrument**	Sea-Bird Scientific SBE 9plus CTD
219	**Var1: Analyzing instrument**	
220	**Var1: Duration (for settlement/colonization methods)**	
221	**Var1: Detailed sampling and analyzing information**	This file contains the upcast data collected using the CTD package and any additional sensors attached to a rosette cage deployed on a research vessel. The upcast data correspond to when the bottles on the rosette cage were fired and water samples were collected. All upcasts during the cruise are contained in this file and are sorted by station. CTD data were processed using Sea-Bird's proprietary data processing software using the Data Conversion and Bottle Summary modules. Data Conversion converts raw data from the CTD to engineering units, storing the converted data in a .ros file. Bottle Summary reads the .ros file created by Data Conversion, derives dependent variables and writes a bottle data summary to a .btl file.
222	**Var1: Field replicate information**	
223	**Var1: Uncertainty**	Pressure: initial accuracy = ± 0.015% of full scale range; typical stability = 0.02% of full scale per year; master clock error contribution = Pressure 0.3 dbar
224	**Var1: Data quality flag description**	No data flags were applied to CTD data
225	**Var1: Method reference (citation)**	Sea-Bird Scientific web site: http://www.seabird.com/sbe911plus-ctd
226	**Var1: Biological subject**	
227	**Var1: Species Identification code**	

228	**Var1: Life stage of the biological subject**	
229	**Var1: Researcher Name**	Jan Newton
230	**Var1: Researcher Institution**	University of Washington Applied Physics Laboratory
231	**Var2: Variable abbreviation in data files**	CTDTMP_DEG_C_ITS90
232	**Var2: Full variable name**	Temperature recorded from CTD at the sampling depth with the scale of ITS-90
233	**Var2: Observation type**	Water column profile
234	**Var2: In-situ observation / manipulation condition / response variable**	In-situ observation
235	**Var2: Variable unit**	degrees Celsius, ITS-90 scale
236	**Var2: Measured or calculated**	Measured
237	**Var2: Calculation method and parameters**	
238	**Var2: Sampling instrument**	Sea-Bird Scientific SBE 9plus CTD
239	**Var2: Analyzing instrument**	
240	**Var2: Duration (for settlement/colonization methods)**	
241	**Var2: Detailed sampling and analyzing information**	This file contains the upcast data collected using the CTD package and any additional sensors attached to a rosette cage deployed on a research vessel. The upcast data correspond to when the bottles on the rosette cage were fired and water samples were collected. All upcasts during the cruise are contained in this file and are sorted by station. CTD data were processed using Sea-Bird's proprietary data processing software using the Data Conversion and Bottle Summary modules. Data Conversion converts raw data from the CTD to engineering units, storing the converted data in a .ros file. Bottle Summary reads the .ros file created by Data Conversion, derives dependent variables and writes a bottle data summary to a .btl file.
242	**Var2: Field replicate information**	
243	**Var2: Uncertainty**	Temperature: initial accuracy = ± 0.001 degrees Celsius; typical stability = 0.0002 degrees Celsius per month; master clock error contribution = 0.00016 degrees Celsius
244	**Var2: Data quality flag description**	No data flags were applied to CTD data
245	**Var2: Method reference (citation)**	Sea-Bird Scientific web site: http://www.seabird.com/sbe911plus-ctd
246	**Var2: Biological subject**	
247	**Var2: Species Identification code**	
248	**Var2: Life stage of the biological subject**	
249	**Var2: Researcher Name**	Jan Newton
250	**Var2: Researcher Institution**	University of Washington Applied Physics Laboratory
251	**Var3: Variable abbreviation in data files**	CTDSAL_PSS78
252	**Var3: Full variable name**	Salinity calculated from conductivity recorded from CTD at the sampling depth
253	**Var3: Observation type**	Water column profile

254	**Var3: In-situ observation / manipulation condition / response variable**	In-situ observation
255	**Var3: Variable unit**	1978 Practical Salinity Scale
256	**Var3: Measured or calculated**	Calculated from conductivity measurements.
257	**Var3: Calculation method and parameters**	
258	**Var3: Sampling instrument**	Sea-Bird Scientific SBE 4 Conductivity Sensor
259	**Var3: Analyzing instrument**	
260	**Var3: Duration (for settlement/colonization methods)**	
261	**Var3: Detailed sampling and analyzing information**	This file contains the upcast data collected using the CTD package and any additional sensors attached to a rosette cage deployed on a research vessel. The upcast data correspond to when the bottles on the rosette cage were fired and water samples were collected. All upcasts during the cruise are contained in this file and are sorted by station. CTD data were processed using Sea-Bird's proprietary data processing software using the Data Conversion and Bottle Summary modules. Data Conversion converts raw data from the CTD to engineering units, storing the converted data in a .ros file. Bottle Summary reads the .ros file created by Data Conversion, derives dependent variables and writes a bottle data summary to a .btl file.
262	**Var3: Field replicate information**	
263	**Var3: Uncertainty**	Conductivity: initial accuracy = ± 0.0003 S/m; typical stability = 0.0003 S/m per month; master clock error contribution = 0.00005 S/m
264	**Var3: Data quality flag description**	No data flags were applied to CTD data
265	**Var3: Method reference (citation)**	Sea-Bird Scientific web site: http://www.seabird.com/sbe911plus-ctd
266	**Var3: Biological subject**	
267	**Var3: Species Identification code**	
268	**Var3: Life stage of the biological subject**	
269	**Var3: Researcher Name**	Jan Newton
270	**Var3: Researcher Institution**	University of Washington Applied Physics Laboratory
271	**Var4: Variable abbreviation in data files**	PHOSPHATE_UMOL_L
272	**Var4: Full variable name**	Concentration of phosphate (PO_4--) measured from discrete bottles
273	**Var4: Observation type**	Discrete measurements from samples collected in Niskin bottles on CTD casts
274	**Var4: In-situ observation / manipulation condition / response variable**	In-situ observation
275	**Var4: Variable unit**	micromoles per liter of seawater (umol/L or uM)
276	**Var4: Measured or calculated**	Measured
277	**Var4: Calculation method and parameters**	
278	**Var4: Sampling instrument**	Niskin bottle
279	**Var4: Analyzing instrument**	Seal Analytical AA3

280	**Var4: Duration (for settlement/colonization methods)**	
281	**Var4: Detailed sampling and analyzing information**	A 60 mL HDPE syringe was prepared by removing the plunger and attaching a Nalgene filter (surfactant-free cellulose, 25 mm, 0.45-micron pore size). The plunger and the inside of the syringe were rinsed three times using seawater from the Niskin bottle. The syringe was then filled with sample water from the Niskin. The plunger was inserted. About 1 mL of sample water was filtered through the filter, then about 5-10 mL of sample was dispensed into the 60 mL HDPE sample bottle to rinse the bottle and cap, with the rinse water then discarded. This rinsing was repeated three times. Then about 45 mL of sample was filtered into the sample bottle, such that it was ~2/3 full. The cap was secured and the bottle frozen upright until analyzed. Analyses and calibration followed the protocols of the WOCE Hydrographic Program using a Seal Analytical AA3 (UNESCO 1994).
282	**Var4: Field replicate information**	No replicate samples were collected or analyzed.
283	**Var4: Uncertainty**	Accreditation codes and detection limits: EPA 365.5_1.4_1997, NELAC Code WM920270, MDLs 0.014uM, 0.0004mg/L (from https://www.ocean.washington.edu/story/Marine+Chemistry+Laboratory).
284	**Var4: Data quality flag description**	Data have not been quality controlled after laboratory analysis. Laboratory quality assurance procedures were followed, as detailed in UNESCO (1994).
285	**Var4: Method reference (citation)**	UNESCO (1994). Protocols for the joint global ocean flux study (JGOFS) core measurements. Vol. 29.
286	**Var4: Biological subject**	
287	**Var4: Species Identification code**	
288	**Var4: Life stage of the biological subject**	
289	**Var4: Researcher Name**	Kathy Krogsland
290	**Var4: Researcher Institution**	University of Washington School of Oceanography
291	**Var5: Variable abbreviation in data files**	SILICATE_UMOL_L
292	**Var5: Full variable name**	Concentration of silicate ($Si(OH)_4$, H_4SiO_4, SiO_2, Sil) measured from discrete bottles
293	**Var5: Observation type**	Discrete measurements from samples collected in Niskin bottles on CTD casts
294	**Var5: In-situ observation / manipulation condition / response variable**	In-situ observation
295	**Var5: Variable unit**	micromoles per liter of seawater (umol/L or uM)
296	**Var5: Measured or calculated**	Measured
297	**Var5: Calculation method and parameters**	
298	**Var5: Sampling instrument**	Niskin bottle
299	**Var5: Analyzing instrument**	Seal Analytical AA3
300	**Var5: Duration (for settlement/colonization methods)**	

301	**Var5: Detailed sampling and analyzing information**	A 60 mL HDPE syringe was prepared by removing the plunger and attaching a Nalgene filter (surfactant-free cellulose, 25 mm, 0.45-micron pore size). The plunger and the inside of the syringe were rinsed three times using seawater from the Niskin bottle. The syringe was then filled with sample water from the Niskin. The plunger was inserted. About 1 mL of sample water was filtered through the filter, then about 5-10 mL of sample was dispensed into the 60 mL HDPE sample bottle to rinse the bottle and cap, with the rinse water then discarded. This rinsing was repeated three times. Then about 45 mL of sample was filtered into the sample bottle, such that it was ~2/3 full. The cap was secured and the bottle frozen upright until analyzed. Analyses and calibration followed the protocols of the WOCE Hydrographic Program using a Seal Analytical AA3 (UNESCO 1994).
302	**Var5: Field replicate information**	No replicate samples were collected or analyzed.
303	**Var5: Uncertainty**	Accreditation codes and detection limits: EPA 366, NELAC Code WM920240, MDLs 0.23uM, 0.0063mg/L (from https://www.ocean.washington.edu/story/Marine+Chemistry+Laboratory).
304	**Var5: Data quality flag description**	Data have not been quality controlled after laboratory analysis. Laboratory quality assurance procedures were followed, as detailed in UNESCO (1994).
305	**Var5: Method reference (citation)**	UNESCO (1994). Protocols for the joint global ocean flux study (JGOFS) core measurements. Vol. 29.
306	**Var5: Biological subject**	
307	**Var5: Species Identification code**	
308	**Var5: Life stage of the biological subject**	
309	**Var5: Researcher Name**	Kathy Krogsland
310	**Var5: Researcher Institution**	University of Washington School of Oceanography
311	**Var6: Variable abbreviation in data files**	NITRATE_UMOL_L
312	**Var6: Full variable name**	Concentration of nitrate (NO_3-) measured from discrete bottles
313	**Var6: Observation type**	Discrete measurements from samples collected in Niskin bottles on CTD casts
314	**Var6: In-situ observation / manipulation condition / response variable**	In-situ observation
315	**Var6: Variable unit**	micromoles per liter of seawater (umol/L or uM)
316	**Var6: Measured or calculated**	Measured
317	**Var6: Calculation method and parameters**	
318	**Var6: Sampling instrument**	Niskin bottle
319	**Var6: Analyzing instrument**	Analyses and calibration follow the protocols of the WOCE Hydrographic Program using a Seal Analytical AA3.
320	**Var6: Duration (for settlement/colonization methods)**	
321	**Var6: Detailed sampling and analyzing information**	A 60 mL HDPE syringe was prepared by removing the plunger and attaching a Nalgene filter (surfactant-free cellulose, 25 mm, 0.45-micron pore size). The plunger and the inside of the syringe were rinsed three times using seawater from the Niskin bottle. The syringe was then filled with sample water from the Niskin. The plunger was inserted. About 1 mL of sample water was filtered through the filter, then about 5-10 mL of sample was dispensed into the 60 mL HDPE sample bottle to rinse the bottle and cap, with the rinse water then discarded. This rinsing was repeated three times. Then about 45 mL of sample was filtered into the sample bottle, such that it was ~2/3 full. The cap was secured and the bottle frozen upright until analyzed. Analyses and calibration

		followed the protocols of the WOCE Hydrographic Program using a Seal Analytical AA3 (UNESCO 1994).
322	**Var6: Field replicate information**	No replicate samples were collected or analyzed.
323	**Var6: Uncertainty**	Accreditation codes and detection limits: EPA 353.4_2_1997, NELAC Code 10068209, MDLs 0.288uM, 0.0040mg/L (from https://www.ocean.washington.edu/story/Marine+Chemistry+Laboratory).
324	**Var6: Data quality flag description**	Data have not been quality controlled after laboratory analysis. Laboratory quality assurance procedures were followed, as detailed in UNESCO (1994).
325	**Var6: Method reference (citation)**	UNESCO (1994). Protocols for the joint global ocean flux study (JGOFS) core measurements. Vol. 29.
326	**Var6: Biological subject**	
327	**Var6: Species Identification code**	
328	**Var6: Life stage of the biological subject**	
329	**Var6: Researcher Name**	Kathy Krogsland
330	**Var6: Researcher Institution**	University of Washington School of Oceanography
331	**Var7: Variable abbreviation in data files**	NITRITE_UMOL_L
332	**Var7: Full variable name**	Concentration of nitrite (NO_2-) measured from discrete bottles.
333	**Var7: Observation type**	Discrete measurements from samples collected in Niskin bottles on CTD casts
334	**Var7: In-situ observation / manipulation condition / response variable**	In-situ observation
335	**Var7: Variable unit**	micromoles per liter of seawater (umol/L or uM)
336	**Var7: Measured or calculated**	Measured
337	**Var7: Calculation method and parameters**	
338	**Var7: Sampling instrument**	Niskin bottle
339	**Var7: Analyzing instrument**	Seal Analytical AA3
340	**Var7: Duration (for settlement/colonization methods)**	
341	**Var7: Detailed sampling and analyzing information**	A 60 mL HDPE syringe was prepared by removing the plunger and attaching a Nalgene filter (surfactant-free cellulose, 25 mm, 0.45-micron pore size). The plunger and the inside of the syringe were rinsed three times using seawater from the Niskin bottle. The syringe was then filled with sample water from the Niskin. The plunger was inserted. About 1 mL of sample water was filtered through the filter, then about 5-10 mL of sample was dispensed into the 60 mL HDPE sample bottle to rinse the bottle and cap, with the rinse water then discarded. This rinsing was repeated three times. Then about 45 mL of sample was filtered into the sample bottle, such that it was ~2/3 full. The cap was secured and the bottle frozen upright until analyzed. Analyses and calibration followed the protocols of the WOCE Hydrographic Program using a Seal Analytical AA3 (UNESCO 1994).

342	**Var7: Field replicate information**	No replicate samples were collected or analyzed.
343	**Var7: Uncertainty**	Accreditation codes and detection limits: EPA 353.4_2_1997, NELAC Code 10068209, MDLs 0.011uM, 0.0002mg/L (from https://www.ocean.washington.edu/story/Marine+Chemistry+Laboratory).
344	**Var7: Data quality flag description**	Data have not been quality controlled after laboratory analysis. Laboratory quality assurance procedures were followed, as detailed in UNESCO (1994).
345	**Var7: Method reference (citation)**	UNESCO (1994). Protocols for the joint global ocean flux study (JGOFS) core measurements. Vol. 29.
346	**Var7: Biological subject**	
347	**Var7: Species Identification code**	
348	**Var7: Life stage of the biological subject**	
349	**Var7: Researcher Name**	Kathy Krogsland
350	**Var7: Researcher Institution**	University of Washington School of Oceanography
351	**Var8: Variable abbreviation in data files**	AMMONIUM_UMOL_L
352	**Var8: Full variable name**	Concentration of ammonium (NH_4+) measured from discrete bottles
353	**Var8: Observation type**	Discrete measurements from samples collected in Niskin bottles on CTD casts
354	**Var8: In-situ observation / manipulation condition / response variable**	In-situ observation
355	**Var8: Variable unit**	micromoles per liter of seawater (umol/L or uM)
356	**Var8: Measured or calculated**	Measured
357	**Var8: Calculation method and parameters**	
358	**Var8: Sampling instrument**	Niskin bottle
359	**Var8: Analyzing instrument**	Seal Analytical AA3
360	**Var8: Duration (for settlement/colonization methods)**	
361	**Var8: Detailed sampling and analyzing information**	A 60 mL HDPE syringe was prepared by removing the plunger and attaching a Nalgene filter (surfactant-free cellulose, 25 mm, 0.45-micron pore size). The plunger and the inside of the syringe were rinsed three times using seawater from the Niskin bottle. The syringe was then filled with sample water from the Niskin. The plunger was inserted. About 1 mL of sample water was filtered through the filter, then about 5-10 mL of sample was dispensed into the 60 mL HDPE sample bottle to rinse the bottle and cap, with the rinse water then discarded. This rinsing was repeated three times. Then about 45 mL of sample was filtered into the sample bottle, such that it was ~2/3 full. The cap was secured and the bottle frozen upright until analyzed. Analyses and calibration followed the protocols of the WOCE Hydrographic Program using a Seal Analytical AA3 (UNESCO 1994).
362	**Var8: Field replicate information**	No replicate samples were collected or analyzed.
363	**Var8: Uncertainty**	Accreditation codes and detection limits: EPA 349, NELAC Code WM920220, MDLs 0.047uM, 0.0007mg/L (from https://www.ocean.washington.edu/story/Marine+Chemistry+Laboratory).
364	**Var8: Data quality flag description**	Data have not been quality controlled after laboratory analysis. Laboratory quality assurance procedures were followed, as detailed in UNESCO (1994).

365	**Var8: Method reference (citation)**	UNESCO (1994). Protocols for the joint global ocean flux study (JGOFS) core measurements. Vol. 29.
366	**Var8: Biological subject**	
367	**Var8: Species Identification code**	
368	**Var8: Life stage of the biological subject**	
369	**Var8: Researcher Name**	Kathy Krogsland
370	**Var8: Researcher Institution**	University of Washington School of Oceanography
371	**Var9: Variable abbreviation in data files**	CTDOXY_MG_L
372	**Var9: Full variable name**	Dissolved oxygen measured from oxygen sensors mounted on the CTD
373	**Var9: Observation type**	Water column profile
374	**Var9: In-situ observation / manipulation condition / response variable**	In-situ observation
375	**Var9: Variable unit**	milligrams per liter (mg/L)
376	**Var9: Measured or calculated**	Measured
377	**Var9: Calculation method and parameters**	Not applicable
378	**Var9: Sampling instrument**	Sea-Bird Scientific SBE43 Dissolved Oxygen Sensor
379	**Var9: Analyzing instrument**	
380	**Var9: Duration (for settlement/colonization methods)**	
381	**Var9: Detailed sampling and analyzing information**	This file contains the upcast data collected using the CTD package and any additional sensors attached to a rosette cage deployed on a research vessel. The upcast data correspond to when the bottles on the rosette cage were fired and water samples were collected. All up casts during the cruise are contained in this file and are sorted by station. CTD data were processed using Sea-Bird's proprietary data processing software using the Data Conversion and Bottle Summary modules. Data Conversion converts raw data from the CTD to engineering units, storing the converted data in a .ros file. Bottle Summary reads the .ros file created by Data Conversion, derives dependent variables and writes a bottle data summary to a .btl file.
382	**Var9: Field replicate information**	
383	**Var9: Uncertainty**	Initial accuracy = ± 2% of saturation; typical stability = 0.5% per 1000 hours of deployed time (clean membrane)
384	**Var9: Data quality flag description**	CTD_OXY_flag, WOCE quality control flags are used: 2 = good value, 3 = questionable value, 4 = bad value, 5 = value not reported, 6 = mean of replicate measurements, 9 = sample not drawn.
385	**Var9: Method reference (citation)**	Sea-Bird Scientific web site: http://www.seabird.com/sbe43-dissolved-oxygen-sensor
386	**Var9: Biological subject**	
387	**Var9: Species Identification code**	
388	**Var9: Life stage of the biological subject**	
389	**Var9: Researcher Name**	Jan Newton
390	**Var9: Researcher Institution**	University of Washington Applied Physics Laboratory

391	**Var10: Variable abbreviation in data files**	OXYGEN_MG_L_1, OXYGEN_MG_L_2, OXYGEN_MG_L_3
392	**Var10: Full variable name**	Dissolved oxygen measured from discrete bottles
393	**Var10: Observation type**	Water column profile
394	**Var10: In-situ observation / manipulation condition / response variable**	In-situ observation
395	**Var10: Variable unit**	milligrams per liter (mg/L)
396	**Var10: Measured or calculated**	Measured
397	**Var10: Calculation method and parameters**	We followed the calculations of Carpenter (1965), as described by Codispoti: https://www.ioos.noaa.gov/wp-content/uploads/2016/04/codispoti1988_oxygenprotocol_a.pdf
398	**Var10: Sampling instrument**	Niskin bottle
399	**Var10: Analyzing instrument**	Brinkman Dosimat automated titrator
400	**Var10: Duration (for settlement/colonization methods)**	
401	**Var10: Detailed sampling and analyzing information**	A tygon tube was attached to the Niskin bottle and flushed so no air remained. A 125-mL iodine flask was inverted over the upward-pointing tube and flushed, rinsing and reverting the bottle to allow it to fill, overflowing three times its volume. The tube was withdrawn without turbulence, maintaining an overfull bottle. A repipettor was used to dispense 1 mL of $MgCl_2$ and 1 mL of NaOH-NaI with Azide added. The flask was capped without introducing a bubble, inverted and mixed thoroughly, about a dozen times. The bottle was allowed to settle, then remixed, and a bead of DI water added to the lid for an airtight seal. The analysis method is based upon the Carpenter (1965) whole flask titration of iodine, which is produced by an equivalent amount of dissolved oxygen. An automated titrator (Brinkman Dosimat) uses an amperometric end-point detection as described by Culberson and Huang (1987) and modified for IBM-PC computers by Knapp et al. (1990). The nominal 125-mL iodine flasks are used for sampling are pre-calibrated so their volumes are precisely known. Samples were titrated within a day or two of being collected, allowing the samples to come to room temperature where the titration occured. Discrete oxygen samples were used to validate sensor O2 observations on the CTD package.
402	**Var10: Field replicate information**	We collected and analyzed replicate samples from approximately 10% of the Niskins sampled. * The number at the end of the variable abbreviation refers to the replicate number.
403	**Var10: Uncertainty**	Precision of 1% calculated as average SD of triplicate analyses
404	**Var10: Data quality flag description**	OXYGEN_FLAG_W, WOCE quality control flags are used: 2 = good value, 3 = questionable value, 4 = bad value, 5 = value not reported, 6 = mean of replicate measurements, 9 = sample not drawn. Please see note under CTDOXY_UMOL_KG_ADG on how these QC flags were applied to oxygen data.

405	**Var10: Method reference (citation)**	Carpenter, J.H. 1965. The accuracy of the Winkler method for dissolved oxygen. Limnology and Oceanography 10: 135-140. Codispoti, L. 1988. One man's advice on the determination of dissolved oxygen in seawater. https://www.ioos.noaa.gov/wp-content/uploads/2016/04/codispoti1988_oxygenprotocol_a.pdf Culberson, G.H. and S. Huang. 1987. Automated Amperometric Oxygen titration. Deep-Sea Research 34: 875-880. Knapp, G.P., M.C. Stalcup, and R.J. Stanley. 1990. Automated oxygen titration and salinity determination. Report WHOI-90-35. Woods Hole Oceanographic Institution, Woods Hole, MA (https://darchive.mblwhoilibrary.org/bitstream/handle/1912/1020/WHOI-90-35.pdf?sequence=1).
406	**Var10: Biological subject**	
407	**Var10: Species Identification code**	
408	**Var10: Life stage of the biological subject**	
409	**Var10: Researcher Name**	Jan Newton
410	**Var10: Researcher Institution**	University of Washington Applied Physics Laboratory
411	**Var11: Variable abbreviation in data files**	CTDOXY_UMOL_KG_ADJ
412	**Var11: Full variable name**	Dissolved oxygen concentration measured by CTD sensors and adjusted for an offset from bottle oxygen values. Units converted to umol/kg.
413	**Var11: Observation type**	Water column profile
414	**Var11: In-situ observation / manipulation condition / response variable**	In-situ observation
415	**Var11: Variable unit**	micromoles per kilogram of seawater (umol/kg-SW)
416	**Var11: Measured or calculated**	Calculated from bottle and SBE 43 sensor dissolved oxygen measurements.
417	**Var11: Calculation method and parameters**	Units for both bottle and CTD oxygen concentration measurements were first converted to micromoles per kilogram. Average values for bottle oxygen measurements were used, where replicates were taken. Then CTD oxygen concentrations were adjusted on the basis of their offset from Winkler titration oxygen measurements from discrete bottle samples. The correction was done by way of a linear regression after outliers were excluded (all outliers were flagged as below). All methods for doing these adjustments were described in greater detail in Alin et al. Earth System Data Science, 2018.
418	**Var11: Sampling instrument**	SBE 43 sensor details described under Var9 above.
419	**Var11: Analyzing instrument**	Winkler bottle oxygen details described under Var10 above.
420	**Var11: Duration (for settlement/colonization methods)**	
421	**Var11: Detailed sampling and analyzing information**	Described in sections above on CTDOXY_MG_L and OXYGEN_MG_L_#.
422	**Var11: Field replicate information**	Described in sections above on CTDOXY_MG_L and OXYGEN_MG_L_#.
423	**Var11: Uncertainty**	

424	**Var11: Data quality flag description**	NOTE: Oxygen flags were not generally assigned based on factors present at the time of analysis, although in some cases, notes were taken on problems encountered at the time of analysis (e.g., bubbles in titrator or running out of reagent) and these are among the samples flagged with 3s or 4s. Rather oxygen data were QC'ed during the course of adjusting the slope and intercept of CTD oxygen data to the bottle data by way of a linear regression. As such, the QC flags have a slightly different meaning in this context. We applied a QC flag of 3, denoting questionable values, strictly on the basis that the CTD-bottle oxygen data pair was an outlier in the regression. In many cases the data may be fine and simply reflect the strong stratification in surface conditions in Puget Sound. In other cases, one value or the other may not be good. For those oxygen data flagged 4 (bad values), the bottle oxygen data were recognized to be bad, for reasons that may include bubbles or reagent issues or perhaps a Niskin closing at the wrong depth. The 4s were identified on the basis of being samples from subsurface waters (>25 m depth) with concentrations that appeared to be from a substantially different depth within a given profile (whether the value was substantially too low or too high). All other samples were presumed to be of QC level 2, although future data analyses may determine additional values to be questionable.
425	**Var11: Method reference (citation)**	Alin et al. A decade-long biogeochemical cruise time-series from the northern California Current System and southern Salish Sea, North America, from 2008 to 2017. In prep for submission to Earth System Data Science.
426	**Var11: Biological subject**	
427	**Var11: Species Identification code**	
428	**Var11: Life stage of the biological subject**	
429	**Var11: Researcher Name**	Simone R. Alin
430	**Var11: Researcher Institution**	NOAA Pacific Marine Environmental Laboratory
431	**Var12: Variable abbreviation in data files**	SIGMATHETA_KG_M3
432	**Var12: Full variable name**	Potential density anomaly, also known as sigma theta, referenced to 0 db pressure
433	**Var12: Observation type**	Water column profile
434	**Var12: In-situ observation / manipulation condition / response variable**	In-situ observation
435	**Var12: Variable unit**	kilograms per cubic meter (kg/m3)
436	**Var12: Measured or calculated**	Calculated
437	**Var12: Calculation method and parameters**	Calculated within Sea-Bird Scientific's SeaSAVE or SBE Data Processing software using EOS-80 equations (per web site: http://www.seabird.com/software/sbe-data-processing).
438	**Var12: Sampling instrument**	
439	**Var12: Analyzing instrument**	
440	**Var12: Duration (for settlement/colonization methods)**	
441	**Var12: Detailed sampling and analyzing information**	The potential density anomaly is related to potential density by this equation: potential density = sigma theta + 1000.
442	**Var12: Field replicate information**	
443	**Var12: Uncertainty**	
444	**Var12: Data quality flag description**	

445	**Var12: Method reference (citation)**	http://www.oc.nps.edu/nom/day1/parta.html, http://www.seabird.com/software/sbe-data-processing
446	**Var12: Biological subject**	
447	**Var12: Species Identification code**	
448	**Var12: Life stage of the biological subject**	
449	**Var12: Researcher Name**	Jan Newton
450	**Var12: Researcher Institution**	University of Washington Applied Physics Laboratory
451	**Var13: Variable abbreviation in data files**	LONGITUDE_DEC
452	**Var13: Full variable name**	Longitude in decimal degrees East (negative for Western Hemisphere)
453	**Var14: Variable abbreviation in data files**	LATITUDE_DEC
454	**Var14: Full variable name**	Latitude in decimal degrees North (negative for Southern Hemisphere)
455	**Var15: Variable abbreviation in data files**	STATION_NO
456	**Var15: Full variable name**	Station number, corresponds to the numerical value after the P in PRISM Station numbers found at http://nvs.nanoos.org/CruiseSalish
457	**Var16: Variable abbreviation in data files**	NISKIN_NO
458	**Var16: Full variable name**	Niskin bottle number. The sequence of trip depths starts with deepest bottle trip = 1.
459	**Var17: Variable abbreviation in data files**	YEAR_UTC
460	**Var17: Full variable name**	Calendar year in Coordinated Universal Time (UTC)
461	**Var18: Variable abbreviation in data files**	MONTH_UTC
462	**Var18: Full variable name**	Calendar month in Coordinated Universal Time (UTC)
463	**Var19: Variable abbreviation in data files**	DAY_UTC
464	**Var19: Full variable name**	Calendar day in Coordinated Universal Time (UTC)
465	**Var20: Variable abbreviation in data files**	TIME_UTC
466	**Var20: Full variable name**	Time in the format of hh:mm in Coordinated Universal Time (UTC).