

Instructions: Please try not to change the order of Rows No. 1 through No. 410, as the information will be read by a computer computer program later on. Starting from No. 411, please first append the additional variable sections, then the non-measured variable sections, then the additional principal investigator sections (if there are more than three PIs), and then the platform sections (if there are more than 3 platforms). Please do not use special characters.

No	Metadata element name	Your input	Help reference no.
1	Submission Date	5/13/2019	1
2	Accession no. of related data sets		2
3	Investigator-1 name	Rik Wanninkhof	3.1
4	Investigator-1 institution	Atlantic Oceanographic and Meteorological Laboratory, National Oceanic and Atmospheric Administration (NOAA)	3.2
5	Investigator-1 address	4301 Rickenbacker Causeway, Miami, FL 33149, USA	3.3
6	Investigator-1 phone	(305) 361-4379	3.4
7	Investigator-1 email	Rik.Wanninkhof@noaa.gov	3.5
8	Investigator-1 researcher ID		3.6
9	Investigator-1 ID type (ORCID, Researcher ID, etc.)		3.7
10	Investigator-2 name	Leticia Barbero	3.1
11	Investigator-2 institution	Atlantic Oceanographic and Meteorological Laboratory, National Oceanic and Atmospheric Administration (NOAA)	3.2
12	Investigator-2 address	4301 Rickenbacker Causeway, Miami, FL 33149, USA	3.3
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14	Investigator-2 email	Leticia.Barbero@noaa.gov	3.5
15	Investigator-2 researcher ID		3.6
16	Investigator-2 ID type (ORCID, Researcher ID, etc.)		3.7
17	Investigator-3 name	Donald Christopher Melrose	3.1
18	Investigator-3 institution	NOAA Northeast Fisheries Science Center	3.2
19	Investigator-3 address	28 Tarzwell Drive, Narragansett, RI 02882	3.3
20	Investigator-3 phone	401-782-3350	3.4
21	Investigator-3 email	Chris.Melrose@NOAA.gov	3.5
22	Investigator-3 researcher ID		3.6
23	Investigator-3 ID type (ORCID, Researcher ID, etc.)		3.7
24	Data submitter name	Charles Featherstone	4.1
25	Data submitter institution	Atlantic Oceanographic and Meteorological Laboratory, National Oceanic and Atmospheric Administration (NOAA)	4.2
26	Data submitter address	4301 Rickenbacker Causeway, Miami, FL 33149, USA	4.3
27	Data submitter phone	(305) 361-4453	4.4
28	Data submitter email	Charles.Featherstone@noaa.gov	4.5
29	Data submitter researcher ID		4.6
30	Data submitter ID type (ORCID, Researcher ID, etc.)		4.7
31	Title	Monitoring of Water Column DIC, TALK, and pH on the Northeast U.S. Shelf and the Development of Ocean Acidification Indicators to Inform Marine Resource Management	5
32	Abstract	Increasing amounts of atmospheric carbon dioxide from human industrial activities are causing changes in global ocean carbon chemistry ultimately resulting in a reduction in pH, a process termed ocean acidification. Studies have demonstrated adverse effects on calcifying organisms, particularly some invertebrates, corals, sea urchins, pteropods, and coccolithophores, but also on species of commercial interest such as oysters or crabs. In support of the coastal monitoring and research objectives of the NOAA Ocean Acidification Program (OAP), the Ecosystem Monitoring Cruises (ECOMON) are utilized to collect water samples to measure water column inorganic carbon and hydrographic parameters including nutrients. Samples are collected at three depths (surface, mid-depth and near bottom) at select stations on a quarterly basis in the northeastern Atlantic continental shelf region off the United States. Water samples are sent to and analyzed by scientists at the Atlantic Oceanographic & Meteorological Laboratory (AOML) for To measure key carbon, physical and biogeochemical parameters in coastal waters of the US in relation to Ocean Acidification and monitor changes over time.	6
33	Purpose		7
34	Start date	5/23/2018	8.1
35	End date	6/5/2018	8.2
36	Westbd longitude	-73.39	9.1
37	Eastbd longitude	-65.445	9.2
38	Northbd latitude	43.3983	9.3

39	Southbd latitude		39.0217	9.4
40	Spatial reference system	WGS 84		10
41	Geographic names	Gulf of Maine, Georges Bank, Mid-Atlantic Bight		11
42	Location of organism collection			12
43	Funding agency name	NOAA's Ocean Acidification Program East and Gulf Coast Ocean Acidificati0on Observing Support.		13.1
44	Funding project title	Monitoring of Water Column DIC, TAlk, and pH on the Northeast U.S. Shelf and the Development of Ocean Acidification Indicators to Inform Marine Resource Management		13.2
45	Funding project ID (Grant no.)			13.3
46	Research projects	none		14
47	Platform-1 name	Henry Bigelow		15.1
48	Platform-1 ID	33HH		15.2
49	Platform-1 type	Research Vessel		15.3
50	Platform-1 owner	NOAA, U.S. Government		15.4
51	Platform-1 country	United States		15.5
52	Platform-2 name			15.1
53	Platform-2 ID			15.2
54	Platform-2 type			15.3
55	Platform-2 owner			15.4
56	Platform-2 country			15.5
57	Platform-3 name			15.1
58	Platform-3 ID			15.2
59	Platform-3 type			15.3
60	Platform-3 owner			15.4
61	Platform-3 country			15.5
62	EXPCODE	33HH20180523		16
63	Cruise ID	HB1803		17
64	Section	none		18
65	Author list for citation	Barbero, Leticia, Wanninkhof, Rik, Pierrot, Denis; Melrose, Donald Christopher; Paula Fratantoni; Harvey Walsh; David W. Townsend; Maura Thomas; Chris Taylor		19
66	References			20
67	Supplemental information	Please consult Readme file for additional information on analysis of carbon parameters. The most up to date version of this dataset is available at http://www.aoml.noaa.gov/ocd/gcc/shortcruises.htm		21
68	DIC: Variable abbreviation in data files	DIC		22.1
69	DIC: Observation type	Profile/underway (flow through)		22.2
70	DIC: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)	In-situ observation		22.3
71	DIC: Manipulation method (SPECIAL USE ONLY) (SPECIAL USE ONLY)			22.4
72	DIC: Variable unit	micro-mol/kg		22.5
73	DIC: Measured or calculated	Measured		22.6
74	DIC: Calculation method and parameters			22.7
75	DIC: Sampling instrument	Niskin bottle / flow through system		22.8
76	DIC: Analyzing instrument	Two systems consisting of a coulometer (UIC Inc.) coupled with a Dissolved Inorganic Carbon Extractor (DICE) 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) samples for total dissolved inorganic carbon (DIC) measurements were drawn according to procedures outlined in the Guide to best practices for ocean CO2 measurements (Dickson et al., 2007) from Niskin bottles into cleaned 294-ml glass bottles. Bottles were rinsed and filled from the bottom, leaving 6 ml of headspace; care was taken not to entrain any bubbles. After 0.2 ml of saturated HgCl2 solution was added as a preservative, the sample bottles were sealed with glass stoppers lightly covered with Apiezon-L grease and were stored at room temperature to be sent back to the lab for analysis after the cruise. The analysis was done by coulometry with two analytical systems (AOML3 and AOML4) used simultaneously. In the coulometric analysis of DIC, all carbonate species are converted to CO2 (gas) by addition of excess hydrogen ion (acid) to the seawater sample, and the evolved CO2 gas is swept into the titration cell of the coulometer with pure air or compressed nitrogen, where it reacts quantitatively with a proprietary reagent based on ethanolamine to generate hydrogen ions. In this process, the solution changes from blue to colorless, triggering a current through the cell and causing coulometrical generation of OH minus ions at the anode. The OH ions react with the H+ and the 83 samples each 500-ml, 8 sets of duplicate samples.		22.9
77	DIC: Detailed sampling and analyzing information			22.10
78	DIC: Field replicate information			22.11

79	DIC: Standardization technique description	The coulometers were calibrated by injecting aliquots of pure CO ₂ (99.99%) by means of an 8-port valve outfitted with two sample loops with known gas volumes bracketing the amount of CO ₂ extracted from the water samples for the two AOML systems.	22.12.1
80	DIC: Frequency of standardization	The stability of each coulometer cell solution was confirmed three different ways: two sets of gas loops were measured at the beginning; also the Certified Reference Material (CRM), supplied by Dr. A. Dickson of UCSD, were measured at the beginning; and the duplicate samples at the beginning, middle, and end of each cell solution. The coulometer cell solution was replaced after 25 mg of carbon was titrated, typically after 9 to 12 hours of continuous use.	22.12.2
81	DIC: CRM manufacturer	Dr. A. Dickson of UCSD	22.12.3.1
82	DIC: Batch number	Batch 173	22.12.3.2
83	DIC: Poison used to kill the sample	saturated HgCl ₂	22.13.1
84	DIC: Poison volume	0.2 ml	22.13.2
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 total water volume of the sample bottles was 288 ml (calibrated by Esa Peltola, AOML). The correction factor used for dilution was 1.00037.	22.13.3
86	DIC: Uncertainty		22.14
87	DIC: Data quality flag description	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.	22.15
88	DIC: Method reference (citation)	DICKSON, A.G., SABINE, C.L. and CHRISTIAN, J.R. (eds.) 2007. Guide to best practices for ocean CO ₂ measurements. PICES Special Publication 3, 191 pp.	22.16
89	DIC: Researcher Name	Johnson, K.M., Körtzinger, A., Middelburg, J.J., Dülk, J.C. and Wallace, D.W.B. (1999). Coulometric total carbon dioxide analysis for Rik Wanninkhof	22.17.1
90	DIC: Researcher Institution	Atlantic Oceanographic and Meteorological Laboratory, National Oceanic and Atmospheric Administration (NOAA)	22.17.2
91	TA: Variable abbreviation in data files	TAik	23.1
92	TA: Observation type	Profile/underway (flow through)	23.2
93	TA: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)	In-situ observation	23.3
94	TA: Manipulation method (SPECIAL USE ONLY)		23.4
95	TA: Variable unit	micro-mol/kg	23.5
96	TA: Measured or calculated	Measured	23.6
97	TA: Calculation method and parameters		23.7
98	TA: Sampling instrument	Niskin bottle / flow through system	23.8
99	TA: Analyzing instrument	Semi-automatic titration systems, System 1 consists of a Metrohm 765 Dosimat titrator, a pH meter (Orion 720A, ThermoScientific), a ROSS half cell pH glass electrode (Orion 9101BN, ThermoScientific) and a reference electrode (Orion 900200, ThermoScientific).	23.9
100	TA: Type of titration	Full Titration	23.10
101	TA: Cell type (open or closed)	Open	23.11
102	TA: Curve fitting method	Least-Square Analysis	23.12
103	TA: Detailed sampling and analyzing information	All of the samples were run using leftover water from the same sample bottles used for DIC and pH. Please refer to DIC for detailed information on sampling and conservation of samples. For each measurement, approximately 200 ml of water sample were titrated with an HCl solution provided by Dr. Andrew Dickson of UCSD (0.25175 moles per kilogram-solution). Please consult the accompanying Readme file for additional details.	23.13
104	TA: Field replicate information	83 samples each 500-ml, 8 sets of duplicate samples.	23.14
105	TA: Standardization technique description	2 CRM samples were run daily on each cell, before and after the seawater samples. The Total Alkalinity for the water samples was corrected using the daily averaged ratios between the certified and measured values of the 2 CRMs run on each cell. This TA titration system has a precision of 0.1 %. All the TA values were directly measured with reference to Certified Reference Material. The accuracy after correction is 0.1%. Please check attached pdf for more details.	23.15.1
106	TA: Frequency of standardization	All values were directly measured with reference to Certified Reference Material (Dickson, UCSD). 2 CRM samples were run daily on each cell.	23.15.2
107	TA: CRM manufacturer	Dr. A. Dickson of UCSD	23.15.3.1
108	TA: Batch Number	CRM batch: 173	23.15.3.2
109	TA: Poison used to kill the sample	saturated HgCl ₂	23.16.1
110	TA: Poison volume	0.2 ml	23.16.2
111	TA: Poisoning correction description		23.16.3
112	TA: Magnitude of blank correction		23.17

113	TA: Uncertainty	The precision of this method is better than 0.1% and accuracy is 0.1%.	23.18
114	TA: Data quality flag description	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.	23.19
115	TA: Method reference (citation)	Millero, F. J., Zhang, J. Z., Lee, K., & Campbell, D. M. (1993). Titration alkalinity of seawater. <i>Marine Chemistry</i> , 44(2), 153-165.	23.20
116	TA: Researcher Name	Rik Wanninkhof	23.21.1
117	TA: Researcher Institution	Atlantic Oceanographic and Meteorological Laboratory, National Oceanic and Atmospheric Administration (NOAA)	23.21.2
118	pH: Variable abbreviation in data files	pH	24.1
119	pH: Observation type	Profile/underway (flow through)	24.2
120	pH: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)	In-situ observation	24.3
121	pH: Manipulation method (SPECIAL USE ONLY)		24.4
122	pH: Measured or calculated	Measured	24.5
123	pH: Calculation method and parameters		24.6
124	pH: Sampling instrument	Niskin bottle / flow through system	24.7
125	pH: Analyzing instrument	Agilent 8453 spectrometer setup with a custom-made temperature-controlled cell holder	24.8
126	pH: pH scale	Total	24.9
127	pH: Temperature of measurement	20 (+/- 0.05) degrees Celsius The same sample bottle was used for pH, DIC and Talk analyses, with pH being analyzed first. The samples were fixed with HgCl ₂ (refer to DIC for more information on sampling and storage). Samples were thermostated at 20 (+/- 0.05) degrees Celsius in a water bath. Approximately 80 ml of sample were extracted from each DIC sample bottle by syringe before DIC analysis to determine the pH. Temperature for each sample was measured before analysis using a Hart Scientific Fluke 1523 reference thermometer. Absorbance blanks were taken for each sample and 10 micro liter of purified m-cresol purple (10 mmol kg ⁻¹) were added for the analysis. The equations of Liu et al, 2011 formulated using the purified m-cresol purple indicator were used to determine pH of the samples. pH samples were analyzed at 20C. Please check accompanying readme file for additional details. 83 samples each 500-ml, 8 sets of duplicate samples.	24.10
128	pH: Detailed sampling and analyzing information		24.11
129	pH: Field replicate information		24.12
130	pH: Standardization technique description	The pH is calibration-free.	24.13.1
131	pH: Frequency of standardization		24.13.2
132	pH: pH values of the standards		24.13.3
133	pH: Temperature of standardization		24.13.4
134	pH: Temperature correction method		24.14
135	pH: at what temperature was pH reported	20 degrees Celsius	24.15
136	pH: Uncertainty	Please check attached pdf for more details	24.16
137	pH: Data quality flag description	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.	24.17
138	pH: Method reference (citation)	Liu, X.; Patsavas, M.C.; and Byrne, R. H. (2011). Purification and characterization of meta-cresol purple for spectrophotometric seawater pH measurements. <i>Environmental Science and Technology</i> , 45(11), 4862-4868. doi: 10.1021/es200665d	24.18
139	pH: Researcher Name	Rik Wanninkhof	24.19.1
140	pH: Researcher Institution	Atlantic Oceanographic and Meteorological Laboratory, National Oceanic and Atmospheric Administration (NOAA)	24.19.2
141	pCO ₂ A: Variable abbreviation in data files		25.1
142	pCO ₂ A: Observation type		25.2
143	pCO ₂ A: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)		25.3
144	pCO ₂ A: Manipulation method (SPECIAL USE ONLY)		25.4
145	pCO ₂ A: Variable unit		25.5
146	pCO ₂ A: Measured or calculated		25.6
147	pCO ₂ A: Calculation method and parameters		25.7
148	pCO ₂ A: Sampling instrument		25.8
149	pCO ₂ A: Location of seawater intake		25.9
150	pCO ₂ A: Depth of seawater intake		25.10
151	pCO ₂ A: Analyzing instrument		25.11

152	pCO2A: Detailed sampling and analyzing information	25.12
153	pCO2A: Equilibrator type	25.13.1
154	pCO2A: Equilibrator volume (L)	25.13.2
155	pCO2A: Vented or not	25.13.3
156	pCO2A: Water flow rate (L/min)	25.13.4
157	pCO2A: Headspace gas flow rate (L/min)	25.13.5
158	pCO2A: How was temperature inside the equilibrator measured .	25.13.6
159	pCO2A: How was pressure inside the equilibrator measured.	25.13.7
160	pCO2A: Drying method for CO2 gas	25.14
161	pCO2A: Manufacturer of the gas detector	25.15.1
162	pCO2A: Model of the gas detector	25.15.2
163	pCO2A: Resolution of the gas detector	25.15.3
164	pCO2A: Uncertainty of the gas detector	25.15.4
165	pCO2A: Standardization technique description	25.16.1
166	pCO2A: Frequency of standardization	25.16.2
167	pCO2A: Manufacturer of standard gas	25.16.3.1
168	pCO2A: Concentrations of standard gas	25.16.3.2
169	pCO2A: Uncertainties of standard gas	25.16.3.3
170	pCO2A: Water vapor correction method	25.17
171	pCO2A: Temperature correction method	25.18
172	pCO2A: at what temperature was pCO2 reported	25.19
173	pCO2A: Uncertainty	25.20
174	pCO2A: Data quality flag description	25.21
175	pCO2A: Method reference (citation)	25.22
176	pCO2A: Researcher Name	25.23.1
177	pCO2A: Researcher Institution	25.23.2
178	pCO2D: Variable abbreviation in data files	26.1
179	pCO2D: Observation type	26.2
180	pCO2D: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)	26.3
181	pCO2D: Manipulation method (SPECIAL USE ONLY)	26.4
182	pCO2D: Variable unit	26.5
183	pCO2D: Measured or calculated	26.6
184	pCO2D: Calculation method and parameters	26.7
185	pCO2D: Sampling instrument	26.8
186	pCO2D: Analyzing instrument	26.9
187	pCO2D: Storage method	26.10
188	pCO2D: Seawater volume (mL)	26.11
189	pCO2D: Headspace volume (mL)	26.12
190	pCO2D: Temperature of measurement	26.13
191	pCO2D: Detailed sampling and analyzing information	26.14
192	pCO2D: Field replicate information	26.15
193	pCO2D: Manufacturer of the gas detector	26.16.1
194	pCO2D: Model of the gas detector	26.16.2
195	pCO2D: Resolution of the gas detector	26.16.3
196	pCO2D: Uncertainty of the gas detector	26.16.4
197	pCO2D: Standardization technique description	26.17.1
198	pCO2D: Frequency of standardization	26.17.2
199	pCO2D: Temperature of standardization	26.17.3
200	pCO2D: Manufacturer of standard gas	26.17.4.1

201	pCO2D: Concentrations of standard gas		26.17.4.2
202	pCO2D: Uncertainties of standard gas		26.17.4.3
203	pCO2D: Water vapor correction method		26.18
204	pCO2D: Temperature correction method		26.19
205	pCO2D: at what temperature was pCO2 reported		26.20
206	pCO2D: Uncertainty		26.21
207	pCO2D: Data quality flag description		26.22
208	pCO2D: Method reference (citation)		26.23
209	pCO2D: Researcher Name		26.24.1
210	pCO2D: Researcher Institution		26.24.2
211	Var1: Variable abbreviation in data files	Depth_station	27.1
212	Var1: Full variable name	Depth of water at station	27.2
213	Var1: Observation type	Profile	27.4
214	Var1: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)	Surface underway and profile	27.5
215	Var1: Variable unit	meters	27.7
216	Var1: Measured or calculated	Measured or calculated	27.8
217	Var1: Calculation method and parameters	Calculated from ETOPO1 global relief (http://www.ngdc.noaa.gov/mgg/global/global.html) when sounder or altimeter data not available	27.9
218	Var1: Sampling instrument	Sounder or altimeter, models vary	27.10
219	Var1: Analyzing instrument		27.11
220	Var1: Duration (for settlement/colonization methods) (SPECIAL USE ONLY)		27.12
221	Var1: Detailed sampling and analyzing information	Ship based sounder used when available. Depth from an altimeter on the CTD may also be used. Where neither of these sources were available (typically due to water depth exceeding sounder's detection limit), depth may be estimated using the ETOPO1 bathymetry.	27.13
222	Var1: Field replicate information		27.14
223	Var1: Uncertainty	Uncertainty varies with source	27.15
224	Var1: Data quality flag description	-999 indicates bad or missing data	27.16
225	Var1: Method reference (citation)		27.17
226	Var1: Biological subject (SPECIAL USE ONLY)		27.18
227	Var1: Species Identification code (SPECIAL USE ONLY)		27.19
228	Var1: Life stage of the Biological subject (SPECIAL USE ONLY)		27.20
229	Var1: Researcher Name	Dr. Christopher Melrose	27.21.1
230	Var1: Researcher Institution	NOAA Northeast Fisheries Science Center	27.21.2
231	Var2: Variable abbreviation in data files	Depth_sampling	27.1
232	Var2: Full variable name	Depth of water at sample collection	27.2
233	Var2: Observation type	Profile	27.4
234	Var2: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)	In-situ observation	27.5
235	Var2: Variable unit	meters	27.7
236	Var2: Measured or calculated	Measured	27.8
237	Var2: Calculation method and parameters		27.9
238	Var2: Sampling instrument	SBE 911plus CTD	27.10
239	Var2: Analyzing instrument		27.11
240	Var2: Duration (for settlement/colonization methods) (SPECIAL USE ONLY)		27.12
241	Var2: Detailed sampling and analyzing information		27.13
242	Var2: Field replicate information		27.14
243	Var2: Uncertainty	plus or minus 1 meter (data has also been vertically binaveraged to 1 decibar bins)	27.15
244	Var2: Data quality flag description	-999 indicates bad or missing data	27.16
245	Var2: Method reference (citation)		27.17
246	Var2: Biological subject (SPECIAL USE ONLY)		27.18

247	Var2: Species Identification code (SPECIAL USE ONLY)		27.19
248	Var2: Life stage of the Biological subject (SPECIAL USE ONLY)		27.20
249	Var2: Researcher Name	Dr. Christopher Melrose	27.21.1
250	Var2: Researcher Institution	NOAA Northeast Fisheries Science Center	27.21.2
251	Var3: Variable abbreviation in data files	CTDPRS	27.1
252	Var3: Full variable name	Water pressure	27.2
253	Var3: Observation type	Profile	27.4
254	Var3: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)	In-situ observation	27.5
255	Var3: Variable unit	decibars	27.7
256	Var3: Measured or calculated	Measured	27.8
257	Var3: Calculation method and parameters		27.9
258	Var3: Sampling instrument	SBE 911plus CTD	27.10
259	Var3: Analyzing instrument		27.11
260	Var3: Duration (for settlement/colonization methods) (SPECIAL USE ONLY)		27.12
261	Var3: Detailed sampling and analyzing information		27.13
262	Var3: Field replicate information		27.14
263	Var3: Uncertainty	plus or minus decibar (data has also been vertically binaveraged to 1 decibar bins)	27.15
264	Var3: Data quality flag description	-999 indicates bad or missing data	27.16
265	Var3: Method reference (citation)		27.17
266	Var3: Biological subject (SPECIAL USE ONLY)		27.18
267	Var3: Species Identification code (SPECIAL USE ONLY)		27.19
268	Var3: Life stage of the Biological subject (SPECIAL USE ONLY)		27.20
269	Var3: Researcher Name	Dr. Christopher Melrose	27.21.1
270	Var3: Researcher Institution	NOAA Northeast Fisheries Science Center	27.21.2
271	Var4: Variable abbreviation in data files	CTDTMP	27.1
272	Var4: Full variable name	Water temperature	27.2
273	Var4: Observation type	Profile	27.4
274	Var4: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)	In-situ observation	27.5
275	Var4: Variable unit	degrees celsius (ITS-90)	27.7
276	Var4: Measured or calculated	Measured	27.8
277	Var4: Calculation method and parameters		27.9
278	Var4: Sampling instrument	SBE 911plus CTD	27.10
279	Var4: Analyzing instrument		27.11
280	Var4: Duration (for settlement/colonization methods) (SPECIAL USE ONLY)		27.12
281	Var4: Detailed sampling and analyzing information		27.13
282	Var4: Field replicate information		27.14
283	Var4: Uncertainty	plus or minus 0.001 degrees celsius	27.15
284	Var4: Data quality flag description	-999 indicates bad or missing data	27.16
285	Var4: Method reference (citation)		27.17
286	Var4: Biological subject (SPECIAL USE ONLY)		27.18
287	Var4: Species Identification code (SPECIAL USE ONLY)		27.19
288	Var4: Life stage of the Biological subject (SPECIAL USE ONLY)		27.20
289	Var4: Researcher Name	Dr. Christopher Melrose	27.21.1
290	Var4: Researcher Institution	NOAA Northeast Fisheries Science Center	27.21.2

291	Var5: Variable abbreviation in data files	CTDSAL	27.1
292	Var5: Full variable name	Salinity	27.2
293	Var5: Observation type	Profile	27.4
294	Var5: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)	In-situ observation	27.5
295	Var5: Variable unit	practical salinity scale of 1978	27.7
296	Var5: Measured or calculated	Seasave 7, calculated from temperature and conductivity	27.8
297	Var5: Calculation method and parameters		27.9
298	Var5: Sampling instrument	SBE 911plus CTD	27.10
299	Var5: Analyzing instrument		27.11
300	Var5: Duration (for settlement/colonization methods) (SPECIAL USE ONLY)		27.12
301	Var5: Detailed sampling and analyzing information	CTD Salinity values were validated using water samples collected during profiles. Corrections were applied when needed.	27.13
302	Var5: Field replicate information		27.14
303	Var5: Uncertainty	plus or minus 0.01 PSS-78	27.15
304	Var5: Data quality flag description	-999 indicates bad or missing data	27.16
305	Var5: Method reference (citation)		27.17
306	Var5: Biological subject (SPECIAL USE ONLY)		27.18
307	Var5: Species Identification code (SPECIAL USE ONLY)		27.19
308	Var5: Life stage of the Biological subject (SPECIAL USE ONLY)		27.20
309	Var5: Researcher Name	Dr. Christopher Melrose	27.21.1
310	Var5: Researcher Institution	NOAA Northeast Fisheries Science Center	27.21.2
311	Var6: Variable abbreviation in data files	Sigma-Theta	27.1
312	Var6: Full variable name	Potential density at surface pressure	27.2
313	Var6: Observation type	Profile	27.4
314	Var6: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)	In-situ observation	27.5
315	Var6: Variable unit	kilograms per cubic meter minus 1000	27.7
316	Var6: Measured or calculated	Calculated	27.8
317	Var6: Calculation method and parameters	SeaBird Seasave 7 from measured temperature, conductivity and pressure	27.9
318	Var6: Sampling instrument	SBE 911plus CTD	27.10
319	Var6: Analyzing instrument		27.11
320	Var6: Duration (for settlement/colonization methods) (SPECIAL USE ONLY)		27.12
321	Var6: Detailed sampling and analyzing information		27.13
322	Var6: Field replicate information		27.14
323	Var6: Uncertainty	plus or minus 0.01 kilograms per cubic meter	27.15
324	Var6: Data quality flag description	-999 indicates bad or missing data	27.16
325	Var6: Method reference (citation)		27.17
326	Var6: Biological subject (SPECIAL USE ONLY)		27.18
327	Var6: Species Identification code (SPECIAL USE ONLY)		27.19
328	Var6: Life stage of the Biological subject (SPECIAL USE ONLY)		27.20
329	Var6: Researcher Name	Dr. Christopher Melrose	27.21.1
330	Var6: Researcher Institution	NOAA Northeast Fisheries Science Center	27.21.2
331	Var7: Variable abbreviation in data files	CTDOXYmg	27.1
332	Var7: Full variable name	Dissolved Oxygen	27.2
333	Var7: Observation type	Profile	27.4
334	Var7: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)		27.5
335	Var7: Variable unit	milligrams per liter	27.7

336	Var7: Measured or calculated	Measured	27.8
337	Var7: Calculation method and parameters		27.9
338	Var7: Sampling instrument	SBE-43 dissolved oxygen sensor	27.10
339	Var7: Analyzing instrument		27.11
340	Var7: Duration (for settlement/colonization methods) (SPECIAL USE ONLY)		27.12
341	Var7: Detailed sampling and analyzing information		27.13
342	Var7: Field replicate information		27.14
343	Var7: Uncertainty	plus or minus 2 percent of saturation	27.15
344	Var7: Data quality flag description	-999 indicates bad or missing data	27.16
345	Var7: Method reference (citation)		27.17
346	Var7: Biological subject (SPECIAL USE ONLY)		27.18
347	Var7: Species Identification code (SPECIAL USE ONLY)		27.19
348	Var7: Life stage of the Biological subject (SPECIAL USE ONLY)		27.20
349	Var7: Researcher Name	Dr. Christopher Melrose	27.21.1
350	Var7: Researcher Institution	NOAA Northeast Fisheries Science Center	27.21.2
351	Var8: Variable abbreviation in data files	CTDOXY	27.1
352	Var8: Full variable name	Dissolved Oxygen	27.2
353	Var8: Observation type	Profile	27.4
354	Var8: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)		27.5
355	Var8: Variable unit	micromoles per kilogram	27.7
356	Var8: Measured or calculated	Measured	27.8
357	Var8: Calculation method and parameters		27.9
358	Var8: Sampling instrument	SBE-43 dissolved oxygen sensor	27.10
359	Var8: Analyzing instrument		27.11
360	Var8: Duration (for settlement/colonization methods) (SPECIAL USE ONLY)		27.12
361	Var8: Detailed sampling and analyzing information		27.13
362	Var8: Field replicate information		27.14
363	Var8: Uncertainty	plus or minus 2 percent of saturation	27.15
364	Var8: Data quality flag description	-999 indicates bad or missing data	27.16
365	Var8: Method reference (citation)		27.17
366	Var8: Biological subject (SPECIAL USE ONLY)		27.18
367	Var8: Species Identification code (SPECIAL USE ONLY)		27.19
368	Var8: Life stage of the Biological subject (SPECIAL USE ONLY)		27.20
369	Var8: Researcher Name	Dr. Christopher Melrose	27.21.1
370	Var8: Researcher Institution	NOAA Northeast Fisheries Science Center	27.21.2
371	Var9: Variable abbreviation in data files	SILCAT	27.1
372	Var9: Full variable name	Silicic acid concentration	27.2
373	Var9: Observation type	Profile/underway (flow through)	27.4
374	Var9: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)	In-situ observation	27.5
375	Var9: Variable unit	micromoles per kilogram	27.7
376	Var9: Measured or calculated	Measured	27.8
377	Var9: Calculation method and parameters		27.9
378	Var9: Sampling instrument	SeaBird 32 Carousel Water Sampler	27.10
379	Var9: Analyzing instrument	The samples are analyzed using a Bran-Luebbe Autoanalyzer 3	27.11
380	Var9: Duration (for settlement/colonization methods) (SPECIAL USE ONLY)		27.12

381	Var9: Detailed sampling and analyzing information	Water samples collected during vertical CTD profiles, analysis of Samples performed by Maura Thomas, University of Maine	27.13
382	Var9: Field replicate information		27.14
383	Var9: Uncertainty	0.22 micromolar detection limit	27.15
384	Var9: Data quality flag description	-999 indicates bad or missing data	27.16
385	Var9: Method reference (citation)	Whitledge, T.E., D.M. Veidt, S.C. Mallow, C.J. Patton, C.D. Wirick. 1986. Automated nutrient analyses in seawater. Brookhaven National Laboratory, Publication BNL 38990, 177 p.	27.17
386	Var9: Biological subject (SPECIAL USE ONLY)		27.18
387	Var9: Species Identification code (SPECIAL USE ONLY)		27.19
388	Var9: Life stage of the Biological subject (SPECIAL USE ONLY)		27.20
389	Var9: Researcher Name	David Townsend and Maura Thomas	27.21.1
390	Var9: Researcher Institution	University of Maine	27.21.2
391	Var10: Variable abbreviation in data files	NITRIT+NITRAT	27.1
392	Var10: Full variable name	Nitrate and Nitrite total concentration	27.2
393	Var10: Observation type	Profile/underway (flow through)	27.4
394	Var10: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)	In-situ observation	27.5
395	Var10: Variable unit	micromoles per kilogram	27.7
396	Var10: Measured or calculated	Measured	27.8
397	Var10: Calculation method and parameters		27.9
398	Var10: Sampling instrument	SeaBird 32 Carousel Water Sampler	27.10
399	Var10: Analyzing instrument	The samples are analyzed using a Bran-Luebbe Autoanalyzer 3	27.11
400	Var10: Duration (for settlement/colonization methods) (SPECIAL USE ONLY)		27.12
401	Var10: Detailed sampling and analyzing information	Water samples collected during vertical CTD profiles, analysis of Samples performed by Maura Thomas, University of Maine	27.13
402	Var10: Field replicate information		27.14
403	Var10: Uncertainty	0.12 micromolar detection limit	27.15
404	Var10: Data quality flag description	-999 indicates bad or missing data	27.16
405	Var10: Method reference (citation)	Whitledge, T.E., D.M. Veidt, S.C. Mallow, C.J. Patton, C.D. Wirick. 1986. Automated nutrient analyses in seawater. Brookhaven National Laboratory, Publication BNL 38990, 177 p.	27.17
406	Var10: Biological subject (SPECIAL USE ONLY)		27.18
407	Var10: Species Identification code (SPECIAL USE ONLY)		27.19
408	Var10: Life stage of the Biological subject (SPECIAL USE ONLY)		27.20
409	Var10: Researcher Name	David Townsend and Maura Thomas	27.21.1
410	Var10: Researcher Institution	University of Maine	27.21.2
411	Var11: Variable abbreviation in data files	AMMONIA	28.1
412	Var11: Full variable name	Ammonia concentration	28.2
413	Var11: Observation type	Profile/underway (flow through)	27.4
414	Var11: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)	In-situ observation	27.5
415	Var11: Variable unit	micromoles per kilogram	27.7
416	Var11: Measured or calculated	Measured	27.8
417	Var11: Calculation method and parameters		27.9
418	Var11: Sampling instrument	SeaBird 32 Carousel Water Sampler	27.10
419	Var11: Analyzing instrument	The samples are analyzed using a Bran-Luebbe Autoanalyzer 3	27.11
420	Var11: Duration (for settlement/colonization methods) (SPECIAL USE ONLY)		27.12
421	Var11: Detailed sampling and analyzing information	Water samples collected during vertical CTD profiles, analysis of Samples performed by Maura Thomas, University of Maine	27.13

422	Var11: Field replicate information		27.14
423	Var11: Uncertainty	0.14 micromolar detection limit	27.15
424	Var11: Data quality flag description	-999 indicates bad or missing data	27.16
425	Var11: Method reference (citation)	Whitledge, T.E., D.M. Veidt, S.C. Mallow, C.J. Patton, C.D. Wirick. 1986. Automated nutrient analyses in seawater. Brookhaven National Laboratory, Publication BNL 38990, 177 p.	27.17
426	Var11: Biological subject (SPECIAL USE ONLY)		27.18
427	Var11: Species Identification code (SPECIAL USE ONLY)		27.19
428	Var11: Life stage of the Biological subject (SPECIAL USE ONLY)		27.20
429	Var11: Researcher Name	David Townsend and Maura Thomas	27.21.1
430	Var11: Researcher Institution	University of Maine	27.21.2
431	Var12: Variable abbreviation in data files	PHSPHT	28.1
432	Var12: Full variable name	Phosphate concentration	27.4
433	Var12: Observation type	Profile/underway (flow through)	27.5
434	Var12: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)	In-situ observation	27.7
435	Var12: Variable unit	micromoles per kilogram	27.8
436	Var12: Measured or calculated	Measured	27.9
437	Var12: Calculation method and parameters	SeaBird 32 Carousel Water Sampler	27.10
438	Var12: Sampling instrument	The samples are analyzed using a Bran-Luebbe Autoanalyzer 3	27.11
439	Var12: Analyzing instrument		27.12
440	Var12: Duration (for settlement/colonization methods) (SPECIAL USE ONLY)	Water samples collected during vertical CTD profiles, analysis of Samples performed by Maura Thomas, University of Maine	27.13
441	Var12: Detailed sampling and analyzing information		27.14
442	Var12: Field replicate information	0.17 micromolar detection limit	27.15
443	Var12: Uncertainty	-999 indicates bad or missing data	27.16
444	Var12: Data quality flag description	Whitledge, T.E., D.M. Veidt, S.C. Mallow, C.J. Patton, C.D. Wirick. 1986. Automated nutrient analyses in seawater. Brookhaven National Laboratory, Publication BNL 38990, 177 p.	27.17
445	Var12: Method reference (citation)		27.18
446	Var12: Biological subject (SPECIAL USE ONLY)		27.19
447	Var12: Species Identification code (SPECIAL USE ONLY)		
448	Var12: Life stage of the Biological subject (SPECIAL USE ONLY)		27.20
449	Var12: Researcher Name	David Townsend and Maura Thomas	27.21.1
450	Var12: Researcher Institution	University of Maine	27.21.2
451	Var13: Variable abbreviation in data files	Niskin_nuts	28.1
452	Var13: Full variable name		27.4
453	Var13: Observation type	Profile	27.5
454	Var13: In-situ observation / manipulation condition / response variable (SPECIAL USE ONLY)		27.7
455	Var13: Variable unit		27.8
456	Var13: Measured or calculated		27.9
457	Var13: Calculation method and parameters		27.10
458	Var13: Sampling instrument	SeaBird 32 Carousel Water Sampler	27.11
459	Var13: Analyzing instrument	The samples are analyzed using a Bran-Luebbe Autoanalyzer 3	27.12
460	Var13: Duration (for settlement/colonization methods) (SPECIAL USE ONLY)		27.13
461	Var13: Detailed sampling and analyzing information	Niskin bottle from where nutrients were sampled, often different from Niskin used for CO2 parameteres, but tripped at the same depth.	27.14
462	Var13: Field replicate information		27.15
463	Var13: Uncertainty		27.16

464	Var13: Data quality flag description		27.17
465	Var13: Method reference (citation)		27.18
466	Var13: Biological subject (SPECIAL USE ONLY)		
467	Var13: Species Identification code (SPECIAL USE ONLY)		27.19
468	Var13: Life stage of the Biological subject (SPECIAL USE ONLY)		27.20
469	Var13: Researcher Name		27.21.1
470	Var13: Researcher Institution		27.21.2
471	Investigator-4 name	Denis Pierrot	3.1
472	Investigator-4 institution	Atlantic Oceanographic and Meteorological Laboratory, National Oceanic and Atmospheric Administration (NOAA)	3.2
473	Investigator-4 address	4301 Rickenbacker Causeway, Miami, FL 33149, USA	3.3
474	Investigator-4 phone	(305) 361-4443	3.4
475	Investigator-4 email	Denis.Pierrot@noaa.gov	3.5
476	Investigator-4 researcher ID		3.6
477	Investigator-4 ID type (ORCID, Researcher ID, etc.)		3.7
478	Investigator-5 name	Christopher Taylor	3.1
479	Investigator-5 institution	NOAA Northeast Fisheries Science Center	3.2
480	Investigator-5 address	28 Tarzwell Drive, Narragansett, RI 02882	3.3
481	Investigator-5 phone		3.4
482	Investigator-5 email	Chris.1.Taylor@NOAA.gov	3.5
483	Investigator-5 researcher ID		3.6
484	Investigator-5 ID type (ORCID, Researcher ID, etc.)		3.7
485	Investigator-6 name	Paula Fratantoni	3.1
486	Investigator-6 institution	NOAA Northeast Fisheries Science Center	3.2
487	Investigator-6 address	28 Tarzwell Drive, Narragansett, RI 02882	3.3
488	Investigator-6 phone		3.4
489	Investigator-6 email		3.5
490	Investigator-6 researcher ID		3.6
491	Investigator-6 ID type (ORCID, Researcher ID, etc.)		3.7
492	Investigator-7 name	Harvey Walsh	3.1
493	Investigator-7 institution	NOAA Northeast Fisheries Science Center	3.2
494	Investigator-7 address	28 Tarzwell Drive, Narragansett, RI 02882	3.3
495	Investigator-7 phone		3.4
496	Investigator-7 email		3.5
497	Investigator-7 researcher ID		3.6
498	Investigator-7 ID type (ORCID, Researcher ID, etc.)		3.7
499	Investigator-8 name	David W. Townsend	3.1
500	Investigator-8 institution	University of Maine	3.2
501	Investigator-8 address	341 Aubert Hall, Orono, ME 04469-5707	3.3
502	Investigator-8 phone	207-581-4367	3.4
503	Investigator-8 email	davidt@umaine.edu	3.5
504	Investigator-8 researcher ID		3.6
505	Investigator-8 ID type (ORCID, Researcher ID, etc.)		3.7
506	Investigator-9 name	Maura Thomas	3.1
507	Investigator-9 institution	University of Maine	3.2
508	Investigator-9 address	454 Aubert Hall, Orono, ME 04469-5707	3.3
509	Investigator-9 phone	207-581-4314	3.4
510	Investigator-9 email	mthomas@umaine.edu	3.5
511	Investigator-9 researcher ID		3.6

