



Standard Operating Procedures
Phytoplankton Monitoring Program

April 1, 2008

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Report No. UNHMP-M-SG-08-06

Great Bay Coast Watch

Mission Statement:

The Great Bay Coast Watch is citizen volunteers working within the UNH Cooperative Extension/NH Sea Grant Program, protecting the long-term health and natural resources of New Hampshire's coastal waters and estuarine systems through monitoring and education projects.

Acknowledgements:

The volunteer phytoplankton monitors in the Great Bay Coast Watch must be recognized and gratefully acknowledged for it is through their efforts that we all better understand and appreciate the Great Bay Estuarine System and the New Hampshire Atlantic Coast. The volunteer monitors for 2007 were:

Terry Smith	Lyn Beattie	Don Chamberland
Pete Richardson	Linda Coe	Tony Bower
Wally Fries	Dorothy Kilcoyne	Bev Hollingsworth-
Connie Skully	Steve Cooper	Nancy Donovan
Clif Horrigan	Michele Wensman	Renae Brodrick

This publication was supported by the National Sea Grant College Program of the US Department of Commerce's National Oceanic and Atmospheric Administration under NOAA Grant No. NA16RG1035 to the NH Sea Grant College Program. The views expressed herein do not necessarily reflect the views of any of these organizations.

The University of New Hampshire's Cooperative Extension has also provided funding in support of the Great Bay Coast Watch's work and the publishing of this manual. The University of New Hampshire Cooperative Extension is an equal opportunity educator and employer, US Department of Agriculture and NH counties cooperating.

This report was also supported by a grant from the Office of Energy and Planning, New Hampshire Coastal Program, as authorized by the National Oceanic and Atmospheric Administration (NOAA), Grant No. NA03N054190091.



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1.0 INTRODUCTION

1.1 Purpose

Thank you for taking part in this volunteer-based phytoplankton monitoring project. With your help, Great Bay Coast Watch (GBCW) and the University of New Hampshire Cooperative Extension hope to obtain baseline and continuing information on the toxic phytoplankton present in Gulf of Maine waters. This information will be used to provide data on algae blooms and, in turn, further aid the New Hampshire Department of Environmental Services (NHDES) in their management of shellfish resources.

You will be collecting and monitoring water samples to determine whether any of the two toxic or potentially toxic phytoplankton species (*i.e.*, *Alexandrium spp.*, and *Pseudonitzschia spp.*) are present and in what quantity. *Alexandrium spp.* causes Paralytic Shellfish Poisoning (PSP) and *Pseudonitzschia spp.* is associated with Amnesic Shellfish Poisoning (ASP). These toxic or potentially toxic cells will be referred to as target cells throughout the procedures contained in this manual.

In addition to monitoring for the presence of the two potentially toxic species, you will be observing and recording the occurrence of other phytoplankton species in your sample. These data will be used to build a long term record noting species presence and abundance in our region.

1.2 Getting to the Sampling Sites

Phytoplankton monitoring is conducted at five sites in coastal New Hampshire:

- Hampton Harbor
- Parson's Creek, Rye
- Coastal Lab, New Castle
- Rte. 1A, Seacoast Science Center
- Star Island, Isles of Shoals

These sites are primarily near shellfish growing areas or sampling stations currently used weekly by the NHDES Shellfish Monitoring program, and have historically been good locations for indicating early the presence of initial, low-level toxins when they exist. We will provide you with maps and/or instructions on how to locate these stations. Monitoring should be conducted at the same sites weekly March through October at or near high slack tide. You may be asked by GBCW to change your designated site if a more representative site is discovered.

1.3 Safety

Although collection of samples at scheduled times is important, your safety and health are more important. If weather conditions are such that collecting the samples might cause injury or illness, reschedule your sampling run for later in the week. Remember to dress

appropriately for the current weather and be prepared for unexpected bad weather. On wet, cold days avoid wearing cotton clothing as cotton offers little thermal protection when wet. On hot, sunny days be sure to have plenty of fluids to avoid dehydration and sunscreen to prevent burning. Always have a first aid kit either with you or in the car.

If sampling from a dock be sure to wear appropriate footwear to reduce risk of falling and always be sure to steady yourself when working near the edge of the dock. If sampling from a boat, be sure to follow all federal and state safety procedures. Additionally, be careful when reaching over the side of the boat to collect the sample. Although we want you to collect the samples and have fun, the most important thing is your safety.

2.0 GETTING READY TO SAMPLE

2.1 Data Sheets

Data sheets have been provided for recording your observations and sampling results. A sample data sheet is included in Appendix A for you to refer to as you review the procedures in this manual. Note that various environmental factors are listed on the data sheets (e.g., recent weather events, current, wind speed and direction, water temperature, transparency, salinity, dissolved oxygen). These observations will help indicate what conditions existed at sampling time that may have enhanced or deterred the development of a bloom.

Note: It is very important that you <u>completely</u> fill in the data sheet
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2.2 Preparation

Before beginning the observation and sampling procedures described below, first enter the Site Name, assigned Site Number, and Date on the first line of the Data Sheet, followed by the names of the Samplers participating in the testing. Then enter the following parameters on your data sheet:

- Recent Weather Events – Note any recent weather events (i.e., storms, wind, heavy runoff) or unusual environmental factors.
- Water Current – Observe the water current at the location where you will be collecting your phytoplankton sample (If this is difficult to observe, it may be easier to estimate the current when using the Secchi disk.) Enter 0 for no current, L for a current of one to two knots, M for a current of three to four knots, or H for a current of five knots or greater.
- Wind Speed – Enter wind speed in knots (i.e., use Beaufort scale to estimate speed as explained in Appendix B) and wind direction.
- Time – Enter current time in military format (i.e., 24 hour format).

3.0 MEASURING THE WATER AND AIR TEMPERATURE

3.1 Required Equipment:

- Air Temperature Thermometer
- Armored Thermometer
- Water Sampling Bucket

3.2 Step-by-Step Procedure:

1. Check both thermometers for continuous fluid - no breaks.
2. Hang the air thermometer in a location above ground and out of the sun for at least three (3) minutes.
3. Rinse sampling bucket twice by filling it halfway and disposing of contents in an area **downstream** and **away from the sampling spot**. Let water flow through the tube in order to rinse it out and then clamp tube shut.
4. Take water sample with bucket at a depth of one to two feet, hang armored thermometer in bucket, and note the temperature reading after waiting at least three but no more than five minutes. Record the temperature value **to the nearest half degree using one decimal place** (e.g., 12.0 and 13.5 are OK – 12 is not). When reading the armored thermometer make sure the bottom of the thermometer remains in the water.
5. Record air temperature reading on the data sheet **to the nearest degree using no decimal points** (e.g., 16 or 18 is OK – 16.5 is not). Make sure to use the Celsius scale. If you have a thermometer that reads in Fahrenheit, you must convert Fahrenheit to Centigrade. To do this, first subtract 32 degrees from the Fahrenheit reading; then divide this result by 9 and multiply by 5.

4.0 MEASURING THE WATER TRANSPARENCY

4.1 Required Equipment:

- Secchi disk with line marked every five centimeters

4.2 Step-by-Step Procedure:

1. Take transparency readings at the same spot each time. If possible, stand with your back to the sun to shade the sampling spot. Do not wear a hat or sunglasses when taking these readings.
2. Lower the Secchi disk into the water until it just goes out of sight. Note depth to the closest five centimeters. Then raise the Secchi disk until it just reappears. Again, note the depth to the closest five centimeters. Record the average of the two depths to the nearest centimeter under Water Transparency on the data sheet. If the disk hits bottom and is still visible, record the water depth to the nearest five centimeters under Water Transparency. (In this case Water Depth and Water Transparency will be the same value.)
3. Lower the Secchi disk into the water until it hits bottom (i.e., the rope will go slack at this point) and note the water depth to the nearest five centimeters. Record this value under Water Depth on the data sheet.

5.0 MEASURING THE SALINITY

5.1 Required Equipment:

- Armored thermometer
- Hydrometer
- Hydrometer jar (500 mL cylinder)
- Hydrometer case with cork stopper

5.2 Step-by-Step Procedure:

1. Using water from the sampling bucket, fill the 500 mL cylinder to approximately one inch below the rim.
2. Hang the armored thermometer in the jar.
3. **Gently** insert the hydrometer with a twisting motion. This removes any air bubbles. Be sure not to drop the hydrometer into the jar because it could hit the bottom of the jar too hard and break.

Note: The water temperature measured in the “Measuring Water and Air Temperature” procedure cannot be used for this test as it may have changed. You must measure the water temperature in the cylinder just before you read the

4. Level the cylinder so that the hydrometer is vertical and not touching the sides. Try to keep it out of the wind.
5. After three minutes, read the thermometer to the nearest 0.5° C and record on the data sheet using one decimal place (e.g., 12.5 and 14.0 are OK – 12 or 14 are not). Make sure the bottom of the thermometer remains in the water.
6. Remove the thermometer.
7. Read the density using the scale on the hydrometer, taking care to read at the bottom of the curve formed where the water rises slightly as it touches the sides of the hydrometer. (A magnifying glass may be helpful.) This curve is called the meniscus.
8. On your data sheet, show where the meniscus is by marking the “Reading the Hydrometer” diagram. Record the density reading on your field data sheet.
9. To determine the salinity use the five-page salinity table (see Appendix C). Locate your density reading in the left hand column and your recorded temperature across the top of the appropriate page. Then read down to the appropriate salinity value and record the result on your field data sheet using one decimal place.

Note: If you find the density or temperature reading to be a value ending in five, you will need to interpolate the result on the table. This is done by taking the average of the values immediately above and below the reading. For example, if the hydrometer read 1.0135, you would then take the salinity values for 1.0130 and 1.0140 and average them. Record the average using one decimal place and round the average value as necessary.

6.0 MEASURING THE DISSOLVED OXYGEN

6.1 Required Equipment:

- 2 graduated burettes
- 2 glass rods
- 2 glass marbles
- 2 glass Wheaton DO/BOD bottles with stoppers
- 1 100 mL graduated cylinder
- 1 box manganese sulfate pillows (pillow #1)
- 1 box iodide-azide pillows (pillow #2)
- 1 bag sulfamic acid pillows (pillow #3)
- 1 pair scissors or clippers
- 1 bottle starch solution
- 1 dropper bottle sodium thiosulfate
- 1 plastic beaker
- 1 transfer pipette (optional)

6.2 Step-by-Step Procedure:

1. Insert flow tube from sample bucket into the BOD bottle, all the way to the bottom of bottle. Then let the water flow into the bottle by opening the clamp on the sampling bucket.
2. Keep track of the amount of time it takes to fill the bottle to the point of overflow (counting as it fills will be fine), and allow enough time for the bottle to have filled three times. Remove the flow tube from the bottle slowly before stopping the flow of water from the bucket. This ensures the bottle is full to the brim.
3. Examine sample to make sure no bubbles are trapped inside. Don't splash water out. Repeat step 2 until there are no bubbles. Temporarily replace glass stopper if carrying sample away from water's edge to do the procedure. Once a satisfactory sample has been collected, proceed to steps 4, 5, and 6.
4. Cut open the manganese sulfate powder (pillow # 1) and add to sample.

Note: Should powder stick to the neck of the bottle as a result of step 4 or 5 below, use the stopper to wet the neck and gently mix the powder in. Once you insert the stopper (some liquid will overflow), do not remove it until step 7.

5. Cut open the alkaline iodide-azide powder (pillow #2) and add to sample.
6. Carefully add a small marble to the bottle. Replace the stopper while twisting it 1/4 turn to get a good seal. Place finger on top to hold the stopper on the bottle. Swirl bottle gently several times, using a circular wrist motion, to mix the reagents with water. A precipitate will form. Place sample aside and allow precipitate to settle to bottom half of bottle. Once precipitate has settled, repeat the mixing and settling process once to ensure the chemical reaction is complete.

Note: Addition of the marble in step 6 has two benefits. It tops off the level of the liquid in the bottle, preventing formation of the air bubble can sometimes form between the liquid and the stopper. Also, the marble helps to mix the powdered reagents when the bottle is swirled. The marble should be clean and added gently to prevent the possibility of introducing air into the bottle.

After finishing step 6, go on to your other tests while the precipitate is settling. Now that step 6 is complete, contact between the water sample and the atmosphere will not affect the test result. Once the sample has been “fixed” in this manner, it is not necessary to perform the actual test procedure immediately. Thus, several samples can be collected and “fixed” in the field, and then carried back to a testing station or laboratory where the titration procedure (steps 7 through 16 below) is to be performed. Make certain samples are kept cool if titrating later; however, the titration procedure must be completed within eight hours.

7. Cut open the sulfamic acid (pillow #3) and add to sample. Replace stopper and swirl to mix until all powdered reagents have dissolved. Look at the bottom of the bottle to see if there are crystals that look like grains of sugar. Continue to mix until all crystals are dissolved. A clear yellow to brown-orange color will develop, depending on the oxygen content of the sample.
8. Pour 100 mL of the sample carefully into the clean 100 mL graduated cylinder. Tilt the cylinder and pour the sample carefully down the inside wall to avoid mixing bubbles into the sample. (The bubbles will not add dissolved oxygen to the water at this point, but can displace water and give you an incorrect measurement.) Tap the cylinder to remove any bubbles and make sure the meniscus is at 100 mL. If necessary, you may use a transfer pipette to obtain an exact volume of 100 mL. Then pour the sample from the cylinder into the test beaker by carefully pouring down the inside wall of the beaker.
9. Fill burette to above the zero mark with sodium thiosulfate titrant and clear bubbles out of burette. Tap the burette to get rid of bubbles above the bead valve. Point the tip over your waste container and tap or squeeze the bead valve to remove the bubbles below the bead valve. Make sure liquid fills burette from tip to the zero mark. Refill to zero mark if necessary.
10. Slowly add sodium thiosulfate titrant to the test beaker containing the 100 mL sample, stirring as titrant is added. Stop titrating when the amber-colored solution in beaker begins to lighten to a light hay color. Place white paper under beaker to watch for the test color change in step 12.
11. Add eight drops of starch solution to beaker. Sample will turn a medium blue color.
12. Continue the titration process with the sodium thiosulfate remaining in the burette until test sample becomes colorless. Do not add any more titrant than is necessary to produce the color change. Be sure to stir sample after each drop is added.
13. Using the scale on the side of the burette, count the total number of mL of sodium thiosulfate used in the titration. Enter this number in the space provided on your data sheet.
14. Rinse out the beaker and repeat steps 8 through 13 on a second sample.

15. Record results of the second titration in the space provided on your data sheet.
16. Add the results of the two titrations (mL = mg/l) and enter the value on your data sheet.

Note: These duplicate titrations are run to guard against analysis errors. If the DO result in the second titration is greater than 0.3 mL different from the first titration, a third titration must be performed. If less than 100 mL of the sample remains for the third titration, use 50 mL of the sample and double the result. Record all three results; however, add only the two results that are within 0.3 mL.

17. Once the DO testing has been completed, rinse the BOD bottle thoroughly. Also make sure glass marbles are cleaned and stored to prevent loss.

7.0 COLLECTING THE PHYTOPLANKTON SAMPLE

Note: You will be filtering a total of ten liters of water in collecting your sample. Each kit has two containers: one blue bucket (with rope attached) marked on the inside in both liters and gallons and one small collection container, there is also a 5" PVC pipe sleeve with 20 micron filter fabric inside.

1. **Filter the first five liters.** Using the blue bucket, collect the first five liters of surface seawater. (Be certain you are using the liter markings.) Place the 20 micron PVC sieve in the small collection container and pour one liter of the collected seawater through the sieve saving the filtered water in the small container. This filtered seawater will be used in step 3 below to wash the sample from the 20 micron mesh. You can now set the sieve on the deck or ground and continue to pour the water through until the blue bucket is emptied. If by this point the sieve is so clogged it will no longer drain easily, move on to step three. (IMPORTANT: if you move directly to step three, remember to record on the phytoplankton data sheet that you only filtered five liters.)
2. **Filter the second five liters:** Refill the blue bucket again with five liters of seawater and continue to pour through the sieve. Once the full ten liters of seawater have been poured through the sieve, the phytoplankton sample has been retained on the mesh in the 20 micron PVC sieve and will need to be backwashed into the 100 mL graduated cylinder.
3. **Backwash the sample:** Fill the spray bottle using the filtered sea water collected in step 1. Put the sieve upside down into the funnel and the funnel end into the 100 mL graduated cylinder. Spray the 20 micron mesh at close range for several pumps until the collected volume in the graduated cylinder equals 15 mL. This is your sample!

8.0 ANALYZING THE PHYTOPLANKTON SAMPLE

1. **Prepare the field microscope for use.** You will find instructions for the use and care of your microscope both in the microscope box and in your notebooks. Briefly, when setting up your scope you should:
 - Pull out eyepiece tube flange fully and twist it to the right to lock it into position.
 - If you need illumination, install the illuminator bracket as illustrated and insert the "Mini Mag-Lite". (You will certainly need illumination when working at 400X.)
 - Be sure that all screws are tightened securely, but not too securely.The filters have been positioned for you. In many of the scopes, there will be a small piece of paper visible near the filter. Please do not remove it, as this has been used to prevent the filter from falling out.
2. **Prepare a capillary tube for examination.** The collected 15 mL sample should first be gently swirled to resuspend any material that has settled out. Submerge the end of a capillary tube in the sample until it fills with sample material. Check to be certain the tube is filled between the marked lines. Then clip the tube to the microscope stage for examination.
3. **Using 100X magnification, examine the capillary tube and record results on the phytoplankton counting sheet.** First scan between the lines to identify and record the actual number of *Alexandrium* spp. and *Pseudonitzschia* spp. cells observed. Then scan the tube again

for non-target cells and record for each non-target species observed either (1) the actual number of cells observed OR (3) the relative abundance observed using the following abundance index:

- R (rare): < 1%
- P (present): $\geq 1\%$ but < 10 %
- C (common): $\geq 10\%$ but < 50%
- A (abundant): $\geq 50\%$

(Note: To increase the accuracy of the observations, at least two samplers should collaborate and record a consensus of opinion on the phytoplankton counting sheet after each makes his or her own observations.

4. **Repeat steps 2 and 3 for three additional tubes.**
5. **Summarize results on the phytoplankton data sheet:** Once results for all four tubes have been recorded on the phytoplankton counting sheet, enter the target species data for each of the four tubes and the totals on the phytoplankton data sheet. Also record counts and totals OR the abundance index for each of the three most common non-target species. For species names use the two-letter ID from the counting sheet. Table I on the next page shows a sample completed phytoplankton data sheet.
6. **Record additional comments.** Record on the phytoplankton data sheet comments about any unusual observations. If you have seen unidentified species, include a description or drawing.

Note: To identify particular species, use the color key sheet in Appendix D and or the key sheet on the back of the data sheet. It will take some time before you become familiar with the different species and you will certainly see more than those shown on the key sheets. Certain species will be more prevalent than others depending on the time of year. You will probably switch to 400X to help you in identifying certain species. Don't forget to switch back to 100X to do your counting.

Table I. Example data sheet entry for phytoplankton observations.

Sampling Counts:	Tube 1	Tube 2	Tube 3	Tube 4	Total
<i>Alexandrium spp.</i>	5	8	5	3	21
<i>Pseudonitzschia spp.</i>	6	2	0	4	12
1. TL	A	C	A	C	
2. RH	C	P	C	C	
3. SK	4	3	5	7	19

- a) Note that actual counts are always used for the target species (i.e., *Alexandrium* and *Pseudonitzschia*).
- b) Note that you can use a count for some non-target species and an abundance index for others.
- c) Note that if the abundance index is used there is no total specified.

8.2 Determining abundance levels:

Abundance levels (%) are not determined by looking at the total plankton in the sample tube but rather in the volume of the sample, i.e. if you were to only consider the percent that a plankton species physically covers on the slide/tube then you would only be giving the phytoplankton composition of that specific sample. The one we should be determining is the one which will give the relative abundance in the water. This will be more important in determining bloom conditions and changes in composition over time.

Imagine grouping the species you are counting pushed to one side, not overlapping, and determine how much physical space they cover- this would be the index % one would choose. Another way would be to look at the sample at 40 X which would give a better view of the percent of coverage the phytoplankton species takes up on the slide/tube. Thinking about it that way now look at the index.

- R (rare): < 1%
- P (present): $\geq 1\%$ but < 10 %
- C (common): $\geq 10\%$ but < 50%
- A (abundant): $\geq 50\%$

8.3 Sample transportation and Preservation

You may wish to transport your samples back to the lab or classroom for further identification.

Samples should be kept cold and cross contamination should be avoided. If samples are going to be stored for a long period, buffered Lugol's iodine solution has been provided as a preservative. Use the glass storage bottle and add enough Lugol's to turn the sample a pale tea color. Glass containers are used for long term storage to protect the silica casings the diatoms. Please be careful when handling the Lugol's solution. Use in a well ventilated open area and avoid direct skin contact.

Important: If you have noted potentially toxic target species or an abrupt increase in the level of previously reported target cells, contact the coordinator (see below for contact info) as soon as possible so that the need for more intense monitoring can be evaluated.

Congratulations! This completes the sampling process. Please note the time and mileage for each sampler at the bottom of the data sheet. As soon as practical, send the data sheet and the counting sheet by mail to Candace Dolan, 129 Kensington Rd, Hampton Falls, NH 03844 or leave at Kingman Farm. If any target cells are observed, call 603-828-4701 or e-mail: candace.dolan@unh.edu



Phytoplankton Data Sheet

Great Bay Coast Watch, UNH Kingman Farm, Durham, NH 03824 Phone: 603-749-1565; Fax 603-743-3997

Site Name: _____ Site #: _____ Date: _____

Recent storm, wind event, or runoff? Yes No Excessive foam in water? Yes No

Any noticeable color change in water? Yes No If Yes, note color of water _____

Water Current (0, L, M, H)	Wind Speed/Direction (knots) speed direction	Time (military)	Air Temp (°C)	Water Transparency (cm)	Water Depth (cm)	Water Temp (°C)

Water Temp in Cylinder (°C)	Water Density (g/cc)	Salinity From Chart (ppt)	Flow Volume [Enter 10 L (pre-ferred) or 5 L]	Dissolved Oxygen (ppm)			
				Test 1	Test 2	Test 3	Total

Sampling Counts:	Tube 1	Tube 2	Tube 3	Tube 4	Total
Alexandrium spp.					
Pseudonitzschia spp.					
1.					
2.					
3.					

Enter three most dominant species as 1, 2 and 3 above. Enter actual cell counts, or abundance index as follows:

R (rare): < 1% P (present): ≥ 1% but < 10% C (common): ≥ 10% but < 50 % A (abundant): ≥ 50 %

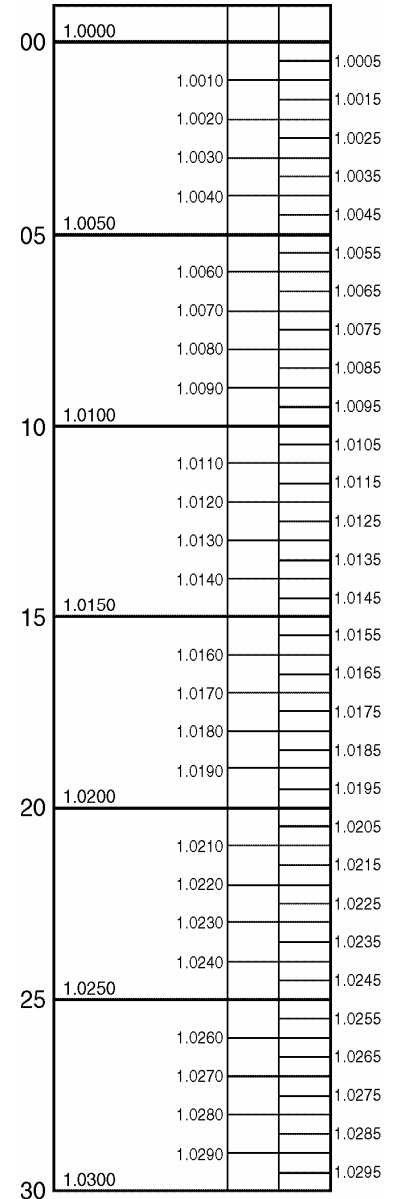
Comments: _____

Time & Mileage Sampler 1 – name _____ time _____ mileage _____

Statistics: Sampler 2 – name _____ time _____ mileage _____


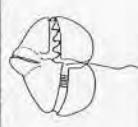


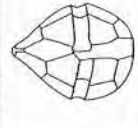
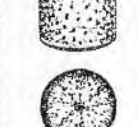






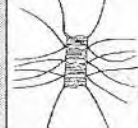



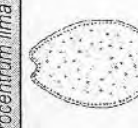



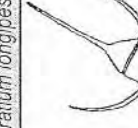
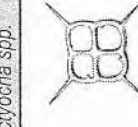
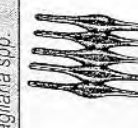





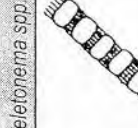
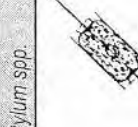
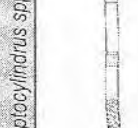

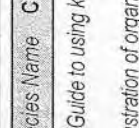

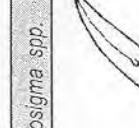



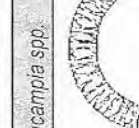
Sampler 3 – name _____ time _____ mileage _____

Reading the Hydrometer

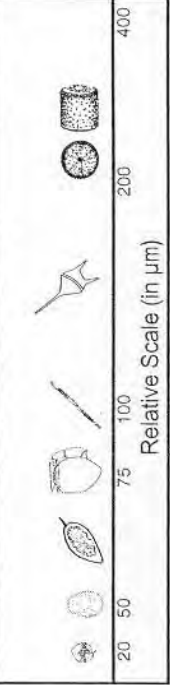


COMMON PHYTOPLANKTON KEY

OTHER COMMON PLANKTON (non-phyto)

Alexandrium spp. AL  25-46 µm	Gymnodinium spp. GY  24-50 µm	Gonyaulax spinifera GS  25-50 µm	Protoperidinium spp. PT  50-95 µm	Scorpsiella spp. SC  20-37 µm	Coccinodiscus spp. CO  40-500 µm	Odontella spp. OD  45-70 µm	Larval Clam LC  Generally Large
Dinophysis norvegica DN  48-80 µm	Dinophysis acuminata DA  40 - 50 µm	Dinophysis tripos DT  40 - 120 µm	Asterionellopsis spp. AS  30-150 µm	Chaetoceros spp. CH  10 - 53 µm	Chaetoceros socialis CS  3-15 µm	Biddulphia spp. BD  60 - 160 µm	Rotifer spp. RO  Generally Large
Prorocentrum lima PL  31-47 µm	Prorocentrum micans PM  35-70 µm	Gerathium fusus CF  200-540 µm	Ceratum lineatum CL  100-130 µm	Ceratum longipes CP  150-250 µm	Dictyocha spp. DO  10-45 µm	Fragiaria spp. FR  10 - 70 µm	Pollen Grain PG  Generally Large
Pseudonitzschia PS  64-117 µm	Thalassionema spp. TA  16 - 90 µm	Thalassiosira spp. TL  12-39 µm	Nitzschia spp. NZ  60 - 125 µm	Skeletonema spp. SK  2-21 µm	Ditylum spp. DM  80 - 130 µm	Leptocylinidrus spp. LP  30 - 75 µm	Crab Zoea CZ  Generally Large
Species Name CODE (Guide to using key) Illustration of organism	Rhizosolenia spp. RH  25-57 µm	Gyrodinium spp. GY  110 - 175 µm	Navicula spp. NV  32-49 µm	Melosira spp. ML  10-50 µm	Guinardia spp. GN  60 - 160 µm	Eucampia spp. EU  10-33 µm	Tintinnid spp. TN  Generally Large
Size Range (in µm)							

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20 50 75 100 200 400
Relative Scale (in µm)

Appendix B The Beaufort Scale

The Beaufort scale was originally devised in order to estimate wind speeds while at sea without the necessity of instruments. This is done by noting the condition of the sea and using this observation to approximate the wind speed. The following table relates sea state to wind speed.

Beaufort Force No.	Wind Speed (knots)	Description of Sea Conditions
0	<1	Calm, sea like a mirror.
1	1-3	Light air, ripples only.
2	4-6	Light breeze, small wavelets (0.2 m). Crests have a glassy appearance.
3	7-10	Gentle breeze, large wavelets (0.6 m), crests begin to break.
4	11-16	Moderate breeze, small waves (1 m), some white horses.
5	17-21	Fresh breeze, moderate waves (1.8 m), many white horses.
6	22-27	Strong breeze, large waves (3 m), probably some spray.
7	28-33	Near gale, mounting sea (4 m) with foam blown in streaks downwind.
8	34-40	Gale, moderately high waves (5.5 m), crests break into spindrift.
9	41-47	Strong gale, high waves (7 m), dense foam, visibility affected.
10	48-55	Storm, very high waves (9 m), heavy sea roll, visibility impaired. Surface generally white.
11	56-63	Violent storm, exceptionally high waves (11 m), visibility poor.
12	64+	Hurricane, 14 m waves, air filled with foam and spray, visibility bad.

Salinity Table 1 (Temperatures -1.0 - 33.0 °C)

Observed Reading	Temperature of Water in Graduated Cylinder (°C)																						
	-1.0	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	
0.9980																							
0.9985																							
0.9990																							
0.9995																							
1.0000																							
1.0005																							
1.0010	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.5	0.5	0.5	
1.0015	1.3	1.3	1.2	1.2	1.1	1.1	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.1	1.1	1.2	
1.0020	1.9	1.9	1.9	1.8	1.7	1.6	1.6	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.7	1.8
1.0025	2.6	2.5	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.5	
1.0030	3.2	3.1	3.0	2.9	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.9	2.9	2.9	2.9	3.0	3.1	
1.0035	3.8	3.7	3.6	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.6	3.6	3.6	3.7	3.8	
1.0040	4.4	4.2	4.2	4.2	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.2	4.2	4.2	4.2	4.3	4.4	
1.0045	5.1	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.9	4.9	5.0	
1.0050	5.7	5.5	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.3	5.3	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.5	5.5	5.5	5.5	
1.0055	6.3	6.2	6.1	6.1	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.2	6.2	6.2	
1.0060	6.8	6.8	6.8	6.7	6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	
1.0065	7.5	7.4	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.4	7.4	7.5	7.5	7.5	
1.0070	8.1	8.0	8.0	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8.0	8.0	8.1	8.1	8.1	8.1	
1.0075	8.7	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.7	8.8	
1.0080	9.3	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.4	9.4	
1.0085	9.9	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.9	9.9	9.9	9.9	9.9	10.0	10.0	10.0	10.0	10.1	
1.0090	10.5	10.5	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.5	10.5	10.5	10.5	10.6	10.6	10.6	10.6	10.7	10.7	
1.0095	11.2	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.2	11.2	11.2	11.2	11.3	11.3	11.4	
1.0100	11.8	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.8	11.8	11.8	11.8	11.9	11.9	12.0	12.0	
1.0105	12.4	12.4	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.4	12.4	12.4	12.4	12.5	12.5	12.5	12.5	12.6	12.6	12.7	
1.0110	13.0	13.0	12.9	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.9	13.0	13.0	13.0	13.1	13.1	13.1	13.1	13.2	13.2	13.3	13.4	
1.0115	13.7	13.6	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.6	13.6	13.7	13.7	13.7	13.7	13.8	13.8	13.9	14.0	14.1	
1.0120	14.3	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.2	14.3	14.3	14.3	14.4	14.4	14.5	14.5	14.6	14.7	
1.0125	14.9	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.9	14.9	15.0	15.0	15.1	15.1	15.2	15.2	15.3	
1.0130	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.5	15.5	15.6	15.7	15.7	15.8	15.8	15.8	15.8	
1.0135	16.1	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.1	16.1	16.1	16.2	16.3	16.3	16.4	16.4	16.4	16.4	16.5	
1.0140	16.7	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.7	16.7	16.7	16.7	16.8	16.9	17.0	17.0	17.0	17.0	17.1	17.1	
1.0145	17.3	17.3	17.3	17.3	17.3	17.3	17.3	17.3	17.3	17.3	17.3	17.3	17.3	17.4	17.4	17.5	17.5	17.6	17.6	17.7	17.7	17.8	

NOTE: This table is designed for use with 60°/60°F hydrometer.

Salinity Table 1 (Temperatures -1.0 - 33.0 °C)

Observed Reading	Temperature of Water in Graduated Cylinder (°C)																					
	-1.0	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
1.0150	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	18.0	18.0	18.0	18.0	18.1	18.2	18.3	18.3	18.4	18.4
1.0155	18.6	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.6	18.6	18.6	18.6	18.7	18.7	18.7	18.8	18.9	18.9	19.0	19.0	19.1
1.0160	19.2	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.2	19.2	19.2	19.2	19.3	19.3	19.3	19.3	19.4	19.5	19.6	19.6	19.7	19.7
1.0165	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.9	19.9	19.9	19.9	20.0	20.1	20.2	20.2	20.3	20.3	20.4
1.0170	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.5	20.5	20.5	20.5	20.6	20.6	20.7	20.8	20.9	20.9	21.0	21.0
1.0175	21.1	21.1	21.0	21.0	21.0	21.0	21.0	21.1	21.1	21.1	21.1	21.1	21.1	21.2	21.2	21.3	21.4	21.5	21.5	21.6	21.6	21.7
1.0180	21.7	21.7	21.7	21.6	21.6	21.6	21.7	21.7	21.7	21.7	21.7	21.7	21.8	21.8	21.9	22.0	22.1	22.1	22.2	22.2	22.3	22.3
1.0185	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.4	22.4	22.4	22.4	22.5	22.6	22.7	22.7	22.8	22.8	22.9	22.9	23.0
1.0190	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	23.0	23.0	23.0	23.0	23.1	23.1	23.2	23.3	23.4	23.4	23.5	23.5	23.6	23.6
1.0195	23.6	23.6	23.5	23.5	23.5	23.6	23.6	23.6	23.6	23.6	23.6	23.7	23.7	23.7	23.8	23.9	23.9	24.0	24.1	24.1	24.2	24.2
1.0200	24.2	24.2	24.1	24.0	24.1	24.2	24.2	24.2	24.2	24.2	24.3	24.3	24.3	24.3	24.4	24.4	24.5	24.6	24.7	24.7	24.8	24.8
1.0205	24.8	24.8	24.7	24.7	24.7	24.8	24.8	24.9	24.9	24.9	24.9	25.0	25.0	25.0	25.0	25.1	25.2	25.3	25.3	25.4	25.4	25.5
1.0210	25.3	25.3	25.3	25.3	25.3	25.3	25.4	25.5	25.5	25.5	25.6	25.6	25.6	25.6	25.7	25.7	25.8	25.9	26.0	26.0	26.1	26.1
1.0215	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.1	26.1	26.2	26.2	26.2	26.2	26.3	26.3	26.4	26.5	26.6	26.6	26.7	26.7	26.8
1.0220	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.7	26.8	26.8	26.8	26.9	26.9	27.0	27.0	27.1	27.2	27.3	27.3	27.4	27.4
1.0225	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.3	27.3	27.4	27.4	27.5	27.5	27.6	27.6	27.7	27.8	27.9	27.9	28.0	28.0	28.1
1.0230	27.8	27.8	27.8	27.8	27.8	27.8	27.9	27.9	27.9	27.9	28.0	28.1	28.2	28.2	28.3	28.3	28.4	28.5	28.6	28.6	28.7	28.7
1.0235	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.6	28.7	28.8	28.8	28.9	28.9	28.9	29.0	29.2	29.2	29.3	29.3	29.4
1.0240	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.3	29.4	29.5	29.5	29.5	29.5	29.7	29.8	29.9	29.9	30.0	30.0
1.0245	29.7	29.7	29.7	29.7	29.7	29.8	29.8	29.8	29.8	29.9	30.0	30.0	30.1	30.1	30.1	30.2	30.3	30.4	30.4	30.5	30.6	30.7
1.0250	30.3	30.3	30.3	30.3	30.4	30.4	30.4	30.4	30.5	30.6	30.6	30.6	30.7	30.7	30.8	30.8	30.9	30.9	31.0	31.1	31.2	31.3
1.0255	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.1	31.1	31.2	31.2	31.3	31.3	31.4	31.4	31.5	31.5	31.6	31.7	31.8	31.9	32.0
1.0260	31.6	31.6	31.6	31.6	31.6	31.6	31.7	31.7	31.7	31.7	31.8	31.9	32.0	32.0	32.1	32.1	32.2	32.2	32.3	32.4	32.5	32.6
1.0265	32.2	32.2	32.2	32.3	32.3	32.3	32.3	32.3	32.3	32.4	32.5	32.6	32.6	32.7	32.7	32.8	32.8	32.9	33.0	33.1	33.2	33.3
1.0270	32.8	32.8	32.9	32.9	32.9	32.9	32.9	32.9	33.0	33.0	33.1	33.2	33.3	33.3	33.4	33.4	33.5	33.5	33.6	33.7	33.8	33.9
1.0275	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.6	33.6	33.7	33.8	33.9	33.9	33.9	34.0	34.1	34.1	34.2	34.3	34.4	34.4	34.5
1.0280	34.1	34.1	34.1	34.1	34.1	34.1	34.2	34.2	34.3	34.3	34.4	34.5	34.5	34.5	34.6	34.7	34.8	34.8	34.9	35.0	35.1	35.1
1.0285	34.7	34.7	34.7	34.8	34.8	34.8	34.8	34.9	34.9	34.9	35.0	35.1	35.1	35.2	35.2	35.3	35.4	35.5	35.6	35.7	35.7	35.8
1.0290	35.2	35.2	35.3	35.4	35.4	35.4	35.5	35.5	35.5	35.5	35.6	35.6	35.7	35.8	35.9	35.9	36.1	36.2	36.3	36.3	36.4	36.4
1.0295	35.9	35.9	35.9	36.0	36.0	36.1	36.1	36.1	36.1	36.2	36.2	36.3	36.4	36.5	36.5	36.6	36.7	36.8	36.9	37.0	37.0	37.1
1.0300	36.5	36.5	36.5	36.5	36.6	36.7	36.7	36.7	36.8	36.8	36.9	36.9	37.0	37.1	37.2	37.2	37.3	37.3	37.5	37.6	37.7	37.7
1.0305	37.1	37.1	37.1	37.2	37.2	37.3	37.3	37.4	37.4	37.5	37.5	37.6	37.7	37.8	37.8	37.9	37.9	38.0	38.1	38.3	38.3	38.4
1.0310	37.7	37.7	37.8	37.8	37.8	37.8	37.9	38.0	38.1	38.1	38.2	38.2	38.3	38.4	38.5	38.5	38.6	38.6	38.8	38.9	39.0	39.0

NOTE: This table is designed for use with 60°/60°F hydrometer.

Salinity Table 1 (Temperatures -1.0 - 33.0 °C)

Observed Reading	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0	21.5	22.0	
0.9980																									
0.9985																									
0.9990																								0.0	0.1
0.9995																								0.6	0.8
1.0000												0.0	1.0	2.0	1.2	0.3	0.5	0.6	0.7	0.8	1.0	1.1	1.2	1.4	
1.0005												0.6	1.2	1.8	1.4	1.0	1.2	1.3	1.4	1.5	1.7	1.8	1.9	2.0	
1.0010	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.9	1.0	1.1	1.2	1.4	1.5	1.6	1.6	1.8	1.9	2.0	2.1	2.3	2.4	2.5	2.5	
1.0015	1.2	1.3	1.3	1.3	1.4	1.4	1.5	1.6	1.6	1.7	1.8	1.9	2.0	2.2	2.2	2.3	2.5	2.6	2.7	2.8	3.0	3.1	3.2	3.3	
1.0020	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.3	2.4	2.4	2.5	2.5	2.7	2.8	2.9	2.9	3.1	3.2	3.3	3.4	3.6	3.7	3.8	4.0	
1.0025	2.5	2.6	2.6	2.7	2.7	2.8	2.9	3.0	3.0	3.1	3.1	3.2	3.3	3.5	3.5	3.6	3.8	3.9	4.0	4.1	4.3	4.4	4.5	4.7	
1.0030	3.2	3.2	3.3	3.3	3.4	3.4	3.5	3.6	3.7	3.7	3.8	3.8	4.0	4.1	4.2	4.2	4.4	4.5	4.6	4.8	4.9	5.0	5.1	5.3	
1.0035	3.8	3.9	3.9	4.0	4.0	4.1	4.2	4.3	4.3	4.4	4.4	4.5	4.6	4.8	4.8	4.9	5.1	5.2	5.3	5.5	5.6	5.7	5.8	6.0	
1.0040	4.5	4.5	4.6	4.6	4.7	4.8	4.9	4.9	5.0	5.0	5.1	5.1	5.3	5.4	5.5	5.5	5.7	5.8	5.9	6.1	6.2	6.3	6.4	6.6	
1.0045	5.0	5.1	5.2	5.2	5.3	5.4	5.5	5.6	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.8	6.9	7.0	7.1	7.3	
1.0050	5.6	5.7	5.8	5.8	5.9	5.9	6.1	6.2	6.3	6.3	6.5	6.6	6.7	6.7	6.9	7.0	7.1	7.1	7.2	7.4	7.5	7.6	7.7	7.9	
1.0055	6.3	6.4	6.4	6.5	6.5	6.6	6.7	6.9	6.9	7.0	7.1	7.3	7.3	7.4	7.5	7.7	7.8	7.8	8.0	8.1	8.2	8.4	8.5	8.6	
1.0060	6.9	7.0	7.1	7.1	7.2	7.2	7.4	7.5	7.6	7.6	7.8	7.9	8.0	8.0	8.2	8.3	8.4	8.5	8.7	8.8	8.9	9.1	9.2	9.3	
1.0065	7.6	7.7	7.7	7.8	7.8	7.9	8.0	8.2	8.2	8.3	8.4	8.6	8.6	8.7	8.8	9.0	9.1	9.2	9.4	9.5	9.6	9.8	9.9	10.0	
1.0070	8.2	8.3	8.4	8.4	8.5	8.5	8.7	8.8	8.9	8.9	9.1	9.2	9.3	9.3	9.5	9.6	9.7	9.8	10.0	10.1	10.2	10.4	10.5	10.6	
1.0075	8.9	9.0	9.0	9.1	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.9	9.9	10.0	10.1	10.3	10.4	10.5	10.7	10.8	10.9	11.1	11.2	11.3	
1.0080	9.5	9.6	9.7	9.7	9.8	9.8	9.9	10.0	10.1	10.2	10.4	10.5	10.6	10.6	10.8	10.9	11.0	11.1	11.3	11.4	11.5	11.7	11.8	11.9	
1.0085	10.2	10.3	10.3	10.4	10.4	10.5	10.6	10.7	10.8	10.9	11.0	11.2	11.2	11.3	11.4	11.6	11.7	11.8	12.0	12.1	12.2	12.4	12.5	12.6	
1.0090	10.8	10.9	11.0	11.0	11.1	11.1	11.2	11.3	11.4	11.5	11.7	11.8	11.9	11.9	12.1	12.2	12.3	12.4	12.6	12.7	12.8	13.0	13.1	13.2	
1.0095	11.5	11.6	11.6	11.7	11.7	11.8	11.9	12.0	12.1	12.2	12.3	12.5	12.5	12.6	12.7	12.9	13.0	13.1	13.3	13.4	13.5	13.7	13.8	13.9	
1.0100	12.1	12.2	12.3	12.3	12.4	12.4	12.5	12.6	12.7	12.8	13.0	13.1	13.2	13.2	13.4	13.5	13.6	13.7	13.9	14.0	14.1	14.3	14.4	14.5	
1.0105	12.8	12.9	12.9	13.0	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.8	13.8	13.9	14.0	14.2	14.3	14.4	14.6	14.7	14.8	15.0	15.1	15.3	
1.0110	13.5	13.5	13.6	13.6	13.7	13.7	13.8	13.9	14.0	14.1	14.3	14.4	14.5	14.5	14.7	14.8	14.9	15.0	15.2	15.3	15.4	15.6	15.7	16.0	
1.0115	14.1	14.2	14.2	14.3	14.3	14.4	14.5	14.6	14.7	14.8	14.9	15.1	15.1	15.2	15.3	15.5	15.6	15.7	15.9	16.0	16.1	16.3	16.4	16.7	
1.0120	14.8	14.8	14.9	14.9	15.0	15.0	15.1	15.2	15.3	15.4	15.6	15.7	15.8	15.8	16.0	16.1	16.2	16.3	16.5	16.6	16.7	17.0	17.1	17.3	
1.0125	15.3	15.4	15.5	15.6	15.6	15.7	15.8	15.9	16.0	16.1	16.2	16.4	16.4	16.5	16.6	16.8	16.9	17.0	17.2	17.3	17.4	17.7	17.8	18.0	
1.0130	15.9	16.0	16.1	16.2	16.3	16.3	16.4	16.5	16.6	16.7	16.9	17.0	17.1	17.1	17.3	17.4	17.5	17.7	17.8	17.9	18.0	18.3	18.4	18.6	
1.0135	16.6	16.7	16.8	16.9	16.9	17.0	17.1	17.2	17.3	17.4	17.5	17.7	17.8	17.9	18.0	18.1	18.2	18.4	18.5	18.6	18.8	19.0	19.1	19.3	
1.0140	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.8	17.9	18.0	18.2	18.3	18.5	18.6	18.7	18.7	18.8	19.0	19.1	19.3	19.5	19.6	19.7	19.9	
1.0145	17.9	18.0	18.1	18.2	18.3	18.4	18.4	18.5	18.6	18.7	18.8	19.0	19.1	19.3	19.3	19.4	19.5	19.7	19.8	20.0	20.2	20.3	20.4	20.6	

NOTE: This table is designed for use with 60°/60°F hydrometer.

Salinity Table 1 (Temperatures -1.0 - 33.0 °C)

Observed Reading	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0	21.5	22.0
1.0150	18.5	18.6	18.7	18.8	18.9	19.0	19.1	19.1	19.2	19.3	19.5	19.6	19.8	19.9	20.0	20.0	20.1	20.4	20.5	20.6	20.8	20.9	21.0	21.2
1.0155	19.2	19.3	19.4	19.5	19.6	19.7	19.7	19.8	19.9	20.0	20.1	20.3	20.4	20.6	20.6	20.7	20.8	21.1	21.2	21.3	21.5	21.6	21.7	21.9
1.0160	19.8	19.9	20.0	20.1	20.2	20.3	20.4	20.4	20.5	20.6	20.8	20.9	21.1	21.2	21.3	21.3	21.4	21.7	21.8	22.0	22.1	22.2	22.3	22.5
1.0165	20.5	20.6	20.6	20.7	20.8	21.0	21.0	21.1	21.2	21.3	21.4	21.6	21.7	21.9	21.9	22.0	22.2	22.4	22.5	22.7	22.8	22.9	23.0	23.2
1.0170	21.1	21.2	21.3	21.3	21.5	21.6	21.7	21.7	21.9	22.0	22.1	22.2	22.4	22.5	22.6	22.7	22.9	23.0	23.1	23.3	23.4	23.5	23.6	23.8
1.0175	21.8	21.9	21.9	22.0	22.1	22.3	22.3	22.4	22.5	22.7	22.8	22.9	23.0	23.2	23.3	23.4	23.6	23.7	23.8	24.0	24.1	24.2	24.3	24.5
1.0180	22.4	22.5	22.6	22.6	22.8	22.9	23.0	23.0	23.2	23.3	23.4	23.5	23.7	23.8	23.9	24.0	24.2	24.3	24.4	24.6	24.7	24.8	24.9	25.2
1.0185	23.1	23.2	23.2	23.3	23.4	23.6	23.6	23.7	23.8	24.0	24.1	24.2	24.3	24.5	24.6	24.7	24.9	25.0	25.1	25.3	25.4	25.5	25.7	25.9
1.0190	23.7	23.8	23.9	23.9	24.1	24.2	24.3	24.3	24.5	24.6	24.7	24.8	25.0	25.1	25.2	25.3	25.5	25.6	25.7	25.9	26.0	26.1	26.4	26.5
1.0195	24.3	24.5	24.5	24.6	24.7	24.9	24.9	25.0	25.1	25.3	25.4	25.5	25.6	25.8	25.9	26.0	26.2	26.3	26.4	26.6	26.7	26.8	27.1	27.2
1.0200	25.0	25.1	25.2	25.2	25.4	25.5	25.6	25.6	25.8	25.9	26.0	26.1	26.3	26.4	26.5	26.6	26.8	26.9	27.0	27.2	27.3	27.4	27.7	27.8
1.0205	25.6	25.8	25.8	25.9	26.0	26.2	26.2	26.3	26.4	26.6	26.7	26.8	26.9	27.1	27.2	27.3	27.5	27.6	27.7	27.9	28.0	28.2	28.4	28.5
1.0210	26.3	26.4	26.5	26.5	26.7	26.8	26.9	26.9	27.1	27.2	27.3	27.4	27.6	27.7	27.8	27.9	28.1	28.2	28.3	28.5	28.6	28.9	29.0	29.1
1.0215	26.9	27.1	27.1	27.2	27.3	27.5	27.5	27.6	27.7	27.9	28.0	28.1	28.2	28.4	28.5	28.6	28.8	28.9	29.0	29.2	29.3	29.6	29.7	29.8
1.0220	27.6	27.7	27.8	27.8	28.0	28.1	28.2	28.2	28.4	28.5	28.6	28.7	28.9	29.0	29.1	29.2	29.4	29.5	29.6	29.8	30.0	30.2	30.3	30.4
1.0225	28.2	28.3	28.4	28.5	28.6	28.8	28.8	28.9	29.0	29.2	29.3	29.4	29.5	29.7	29.8	29.9	30.1	30.2	30.3	30.5	30.7	30.9	31.0	31.1
1.0230	28.8	28.9	29.0	29.1	29.3	29.4	29.5	29.5	29.7	29.8	29.9	30.0	30.2	30.3	30.5	30.6	30.7	30.8	30.9	31.2	31.3	31.5	31.6	31.7
1.0235	29.5	29.6	29.7	29.8	29.9	30.0	30.1	30.2	30.3	30.5	30.6	30.7	30.8	31.0	31.1	31.3	31.4	31.5	31.6	31.9	32.0	32.2	32.3	32.5
1.0240	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	31.0	31.1	31.2	31.3	31.5	31.6	31.8	31.9	32.0	32.1	32.2	32.5	32.6	32.8	32.9	33.2
1.0245	30.8	30.9	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.8	31.9	32.0	32.1	32.3	32.4	32.6	32.7	32.8	33.0	33.2	33.3	33.5	33.6	33.9
1.0250	31.4	31.5	31.6	31.7	31.8	31.9	32.0	32.1	32.3	32.4	32.5	32.6	32.8	32.9	33.1	33.2	33.3	33.4	33.7	33.8	33.9	34.1	34.2	34.5
1.0255	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	33.1	33.2	33.3	33.4	33.6	33.7	33.9	34.0	34.1	34.4	34.5	34.6	34.8	34.9	35.2
1.0260	32.7	32.8	32.9	33.0	33.1	33.2	33.3	33.4	33.6	33.7	33.8	33.9	34.1	34.2	34.4	34.5	34.6	34.7	35.0	35.1	35.2	35.4	35.6	35.8
1.0265	33.4	33.5	33.6	33.7	33.8	33.9	34.0	34.1	34.2	34.4	34.5	34.6	34.7	34.9	35.0	35.2	35.3	35.5	35.7	35.8	35.9	36.1	36.3	36.5
1.0270	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.9	35.0	35.1	35.2	35.4	35.5	35.7	35.8	35.9	36.2	36.3	36.4	36.5	36.7	36.9	37.1
1.0275	34.6	34.8	34.9	35.0	35.1	35.2	35.3	35.4	35.5	35.7	35.8	35.9	36.0	36.2	36.3	36.5	36.6	36.9	37.0	37.1	37.2	37.4	37.6	37.8
1.0280	35.3	35.4	35.5	35.6	35.7	35.8	35.9	36.0	36.2	36.3	36.4	36.5	36.7	36.8	37.0	37.1	37.2	37.5	37.6	37.7	37.8	38.1	38.2	38.4
1.0285	35.9	36.1	36.1	36.2	36.3	36.5	36.6	36.7	36.8	37.0	37.1	37.2	37.3	37.5	37.6	37.8	37.9	38.2	38.3	38.4	38.5	38.8	38.9	39.1
1.0290	36.6	36.7	36.8	36.8	37.0	37.1	37.2	37.3	37.5	37.6	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.8	38.9	39.0	39.1	39.4	39.5	39.7
1.0295	37.2	37.4	37.4	37.5	37.6	37.8	37.9	38.0	38.1	38.3	38.4	38.5	38.6	38.8	38.9	39.1	39.3	39.5	39.6	39.7	39.9	40.1	40.2	40.4
1.0300	37.9	38.0	38.1	38.1	38.3	38.4	38.5	38.6	38.8	38.9	39.0	39.1	39.3	39.4	39.6	39.7	39.9	40.1	40.2	40.3	40.6	40.7	40.8	41.0
1.0305	38.5	38.7	38.7	38.8	38.9	39.1	39.2	39.3	39.4	39.6	39.7	39.8	39.9	40.1	40.2	40.4	40.6	40.8	40.9	41.1	41.3	41.4	41.5	41.7
1.0310	39.2	39.3	39.4	39.4	39.6	39.7	39.8	39.9	40.1	40.2	40.4	40.5	40.6	40.7	40.9	41.0	41.2	41.4	41.5	41.8	41.9	42.0	42.1	42.3

NOTE: This table is designed for use with 60°/60°F hydrometer.

Salinity Table 1 (Temperatures -1.0 - 33.0 °C)

Observed Reading	22.5	23.0	23.5	24.0	24.5	25.0	25.5	26.0	26.5	27.0	27.5	28.0	28.5	29.0	29.5	30.0	30.5	31.0	31.5	32.0	32.5	33.0
0.9980								0.0	0.1	0.2	0.3	0.6	0.7	0.8	1.1	1.2	1.5	1.6	1.9	2.0	2.3	2.4
0.9985								0.6	0.8	0.9	1.1	1.3	1.4	1.6	1.8	1.9	2.2	2.3	2.6	2.7	3.0	3.1
0.9990	0.2	0.3	0.5	0.6	0.7	0.8	1.0	1.2	1.4	1.5	1.8	1.9	2.0	2.3	2.4	2.5	2.8	2.9	3.2	3.4	3.6	3.8
0.9995	0.9	1.0	1.2	1.3	1.4	1.5	1.7	1.9	2.1	2.2	2.5	2.6	2.7	3.0	3.1	3.3	3.5	3.7	3.9	4.1	4.3	4.5
1.0000	1.5	1.6	1.8	1.9	2.0	2.1	2.4	2.5	2.7	2.9	3.1	3.2	3.4	3.6	3.7	4.0	4.1	4.4	4.5	4.8	4.9	5.1
1.0005	2.1	2.2	2.4	2.5	2.6	2.8	3.0	3.2	3.4	3.6	3.8	3.9	4.1	4.3	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.8
1.0010	2.7	2.8	2.9	3.1	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.5	4.8	4.9	5.1	5.1	5.4	5.5	5.8	5.9	6.2	6.4
1.0015	3.4	3.5	3.7	3.9	4.0	4.2	4.3	4.5	4.7	4.9	5.1	5.2	5.5	5.6	5.8	5.9	6.1	6.3	6.5	6.7	6.9	7.2
1.0020	4.1	4.2	4.4	4.6	4.8	4.9	5.0	5.1	5.4	5.5	5.7	5.9	6.1	6.3	6.4	6.6	6.8	7.0	7.2	7.5	7.6	7.9
1.0025	4.8	4.9	5.1	5.3	5.5	5.6	5.7	5.9	6.1	6.2	6.4	6.6	6.8	7.0	7.1	7.3	7.5	7.7	7.9	8.2	8.4	8.6
1.0030	5.4	5.5	5.8	5.9	6.1	6.2	6.3	6.6	6.7	6.8	7.1	7.2	7.4	7.6	7.7	8.0	8.1	8.4	8.5	8.8	9.1	9.2
1.0035	6.1	6.3	6.5	6.6	6.8	6.9	7.0	7.3	7.4	7.6	7.8	7.9	8.1	8.3	8.5	8.7	8.9	9.1	9.3	9.5	9.8	9.9
1.0040	6.7	7.0	7.1	7.2	7.4	7.5	7.7	7.9	8.0	8.3	8.4	8.5	8.8	8.9	9.2	9.3	9.6	9.7	10.0	10.1	10.4	10.5
1.0045	7.4	7.7	7.8	7.9	8.1	8.2	8.4	8.6	8.7	9.0	9.1	9.3	9.5	9.6	9.9	10.0	10.3	10.4	10.7	10.8	11.1	11.2
1.0050	8.1	8.3	8.4	8.5	8.7	8.9	9.1	9.2	9.3	9.6	9.7	10.0	10.1	10.2	10.5	10.6	10.9	11.0	11.3	11.5	11.7	11.9
1.0055	8.8	9.0	9.1	9.2	9.4	9.6	9.8	9.9	10.0	10.3	10.4	10.7	10.8	11.0	11.2	11.3	11.6	11.7	12.0	12.2	12.4	12.6
1.0060	9.4	9.6	9.7	9.8	10.1	10.2	10.4	10.5	10.7	10.9	11.0	11.3	11.4	11.7	11.8	12.0	12.2	12.4	12.6	12.8	13.1	13.2
1.0065	10.1	10.3	10.4	10.6	10.8	10.9	11.1	11.2	11.4	11.6	11.7	12.0	12.1	12.4	12.5	12.7	12.9	13.1	13.3	13.5	13.8	14.0
1.0070	10.7	10.9	11.0	11.3	11.4	11.5	11.7	11.9	12.0	12.2	12.4	12.6	12.8	13.0	13.1	13.4	13.6	13.7	14.0	14.1	14.4	14.7
1.0075	11.4	11.6	11.7	12.0	12.1	12.2	12.4	12.6	12.7	12.9	13.1	13.3	13.5	13.7	13.8	14.1	14.3	14.5	14.7	14.9	15.1	15.4
1.0080	12.0	12.2	12.4	12.6	12.7	12.8	13.0	13.2	13.4	13.6	13.7	13.9	14.1	14.3	14.5	14.7	14.9	15.2	15.3	15.6	15.7	16.0
1.0085	12.7	12.9	13.1	13.3	13.4	13.5	13.7	13.9	14.1	14.3	14.4	14.6	14.8	15.0	15.2	15.4	15.6	15.9	16.0	16.3	16.4	16.7
1.0090	13.4	13.6	13.7	13.9	14.0	14.1	14.4	14.5	14.7	14.9	15.0	15.3	15.4	15.7	15.8	16.1	16.2	16.5	16.6	16.9	17.1	17.3
1.0095	14.1	14.3	14.4	14.6	14.7	14.9	15.1	15.2	15.4	15.6	15.8	16.0	16.1	16.4	16.5	16.8	16.9	17.2	17.3	17.6	17.8	18.0
1.0100	14.8	14.9	15.0	15.2	15.3	15.6	15.7	15.8	16.1	16.2	16.5	16.6	16.7	17.0	17.1	17.4	17.5	17.8	18.0	18.2	18.4	18.7
1.0105	15.5	15.6	15.7	15.9	16.0	16.3	16.4	16.6	16.8	16.9	17.2	17.3	17.5	17.7	17.9	18.1	18.3	18.5	18.7	18.9	19.1	19.4
1.0110	16.1	16.2	16.3	16.5	16.7	16.9	17.0	17.3	17.4	17.5	17.8	17.9	18.2	18.3	18.6	18.7	19.0	19.1	19.3	19.6	19.7	20.0
1.0115	16.8	16.9	17.0	17.2	17.4	17.6	17.7	18.0	18.1	18.3	18.5	18.6	18.9	19.0	19.3	19.4	19.7	19.8	20.0	20.3	20.5	20.7
1.0120	17.4	17.5	17.7	17.9	18.0	18.2	18.3	18.6	18.7	19.0	19.1	19.3	19.5	19.6	19.9	20.1	20.3	20.5	20.6	20.9	21.2	21.3
1.0125	18.1	18.2	18.4	18.6	18.7	18.9	19.0	19.3	19.4	19.7	19.8	20.0	20.2	20.3	20.6	20.8	21.0	21.2	21.4	21.6	21.9	22.0
1.0130	18.7	18.8	19.1	19.2	19.3	19.5	19.7	19.9	20.0	20.3	20.4	20.6	20.8	21.0	21.2	21.4	21.6	21.8	22.1	22.2	22.5	22.7
1.0135	19.4	19.5	19.8	19.9	20.0	20.2	20.4	20.6	20.7	21.0	21.1	21.3	21.5	21.7	21.9	22.1	22.3	22.5	22.8	22.9	23.2	23.4
1.0140	20.0	20.1	20.4	20.5	20.6	20.9	21.0	21.2	21.4	21.6	21.8	22.0	22.2	22.3	22.6	22.7	23.0	23.1	23.4	23.6	23.8	24.0
1.0145	20.7	20.9	21.1	21.2	21.3	21.6	21.7	21.9	22.1	22.3	22.5	22.7	22.9	23.0	23.3	23.4	23.7	23.9	24.1	24.3	24.5	24.7

NOTE: This table is designed for use with 60°/60°F hydrometer.

Salinity Table 1 (Temperatures -1.0 - 33.0 °C)

Observed Reading	22.5	23.0	23.5	24.0	24.5	25.0	25.5	26.0	26.5	27.0	27.5	28.0	28.5	29.0	29.5	30.0	30.5	31.0	31.5	32.0	32.5	33.0
1.0150	21.3	21.6	21.7	21.8	22.0	22.2	22.3	22.5	22.7	22.9	23.1	23.3	23.5	23.6	23.9	24.0	24.3	24.6	24.7	24.9	25.2	25.3
1.0155	22.0	22.3	22.4	22.6	22.7	22.9	23.0	23.2	23.4	23.6	23.8	24.0	24.2	24.4	24.6	24.8	25.0	25.3	25.4	25.6	25.9	26.1
1.0160	22.7	22.9	23.0	23.3	23.4	23.5	23.6	23.9	24.0	24.3	24.4	24.7	24.8	25.1	25.2	25.5	25.6	25.9	26.1	26.3	26.5	26.8
1.0165	23.4	23.6	23.7	24.0	24.1	24.2	24.4	24.6	24.7	25.0	25.1	25.4	25.5	25.8	25.9	26.2	26.3	26.6	26.8	27.0	27.2	27.5
1.0170	24.0	24.2	24.3	24.6	24.7	24.8	25.1	25.2	25.3	25.6	25.7	26.0	26.1	26.4	26.5	26.8	27.0	27.2	27.4	27.7	27.8	28.1
1.0175	24.7	24.9	25.0	25.3	25.4	25.5	25.8	25.9	26.1	26.3	26.5	26.7	26.9	27.1	27.2	27.5	27.7	27.9	28.1	28.4	28.5	28.8
1.0180	25.3	25.5	25.6	25.9	26.0	26.1	26.4	26.5	26.8	26.9	27.2	27.3	27.6	27.7	27.9	28.1	28.3	28.5	28.7	29.0	29.2	29.4
1.0185	26.0	26.2	26.3	26.6	26.7	26.9	27.1	27.2	27.5	27.6	27.9	28.0	28.3	28.4	28.6	28.8	29.0	29.2	29.4	29.7	29.9	30.1
1.0190	26.6	26.8	27.0	27.2	27.3	27.6	27.7	27.8	28.1	28.2	28.5	28.6	28.9	29.0	29.2	29.5	29.6	29.9	30.0	30.3	30.6	30.8
1.0195	27.3	27.5	27.7	27.9	28.0	28.3	28.4	28.5	28.8	28.9	29.2	29.3	29.6	29.7	29.9	30.2	30.3	30.6	30.8	31.0	31.3	31.5
1.0200	27.9	28.2	28.3	28.5	28.6	28.9	29.0	29.2	29.4	29.6	29.8	30.0	30.2	30.4	30.6	30.8	30.9	31.2	31.5	31.6	31.9	32.1
1.0205	28.6	28.9	29.0	29.2	29.3	29.6	29.7	29.9	30.1	30.3	30.5	30.7	30.9	31.1	31.3	31.5	31.7	31.9	32.2	32.3	32.6	32.8
1.0210	29.2	29.5	29.6	29.8	30.0	30.2	30.3	30.6	30.7	30.9	31.1	31.3	31.5	31.7	32.0	32.1	32.4	32.5	32.8	33.0	33.3	33.4
1.0215	30.0	30.2	30.3	30.5	30.7	30.9	31.0	31.3	31.4	31.6	31.8	32.0	32.2	32.4	32.7	32.8	33.1	33.2	33.5	33.7	34.0	34.1
1.0220	30.7	30.8	30.9	31.2	31.3	31.5	31.7	31.9	32.0	32.2	32.5	32.6	32.9	33.0	33.3	33.4	33.7	33.9	34.1	34.3	34.6	34.8
1.0225	31.4	31.5	31.6	31.9	32.0	32.2	32.4	32.6	32.7	32.9	33.2	33.3	33.6	33.8	34.0	34.1	34.4	34.6	34.8	35.0	35.3	35.5
1.0230	32.0	32.1	32.2	32.5	32.6	32.8	33.0	33.2	33.4	33.5	33.8	33.9	34.2	34.5	34.6	34.8	35.0	35.2	35.5	35.6	35.9	36.2
1.0235	32.7	32.8	33.0	33.2	33.3	33.5	33.7	33.9	34.1	34.3	34.5	34.7	34.9	35.2	35.3	35.5	35.7	35.9	36.2	36.4	36.6	36.9
1.0240	33.3	33.4	33.7	33.8	33.9	34.2	34.3	34.5	34.7	35.0	35.1	35.4	35.5	35.8	35.9	36.2	36.4	36.5	36.8	37.1	37.2	37.5
1.0245	34.0	34.1	34.4	34.5	34.6	34.9	35.0	35.2	35.4	35.7	35.8	36.1	36.2	36.5	36.6	36.9	37.1	37.2	37.5	37.8	37.9	38.2
1.0250	34.6	34.7	35.0	35.1	35.2	35.5	35.6	35.9	36.0	36.3	36.4	36.7	36.8	37.1	37.2	37.5	37.7	37.8	38.1	38.4	38.6	38.8
1.0255	35.3	35.4	35.7	35.8	36.0	36.2	36.3	36.6	36.7	37.0	37.1	37.4	37.5	37.8	37.9	38.2	38.4	38.6	38.8	39.1	39.3	39.5
1.0260	35.9	36.0	36.3	36.4	36.7	36.8	36.9	37.2	37.3	37.6	37.7	38.0	38.2	38.4	38.6	38.8	39.0	39.3	39.4	39.7	39.9	40.2
1.0265	36.6	36.8	37.0	37.1	37.4	37.5	37.7	37.9	38.1	38.3	38.4	38.7	38.9	39.1	39.3	39.5	39.7	40.0	40.1	40.4	40.6	40.9
1.0270	37.2	37.5	37.6	37.8	38.0	38.1	38.4	38.5	38.8	38.9	39.1	39.3	39.5	39.8	39.9	40.2	40.3	40.6	40.8	41.0	41.2	41.5
1.0275	37.9	38.2	38.3	38.5	38.7	38.8	39.1	39.2	39.5	39.6	39.8	40.0	40.2	40.5	40.6	40.9						
1.0280	38.5	38.8	38.9	39.1	39.3	39.4	39.7	39.8	40.1	40.2	40.5	40.7	40.8	41.1	41.2	41.5						
1.0285	39.2	39.5	39.6	39.8	40.0	40.1	40.4	40.5	40.8	40.9	41.2											
1.0290	39.9	40.1	40.2	40.5	40.6	40.8	41.0	41.2	41.4	41.6	41.8											
1.0295	40.6	40.8	40.9	41.2	41.3																	
1.0300	41.2	41.4	41.6	41.8	41.9																	
1.0305	41.9																					
1.0310	42.5																					

NOTE: This table is designed for use with 60°/60°F hydrometer.



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Common Gulf of Maine Phytoplankton (page 1 of 4)

<p>Alexandrium tamarensis (AL) (400x)</p>	<p>Gymnodinium sanguineum (GY) (400x)</p>	<p>Gonyaulax spinifera (GS) (400x)</p>	<p>Protoperdinium sp (PT) (400x)</p>	<p>Scripsiella sp (SC) (400x)</p>
<p>Dinophysis norvegica (DN) (400x)</p>	<p>Dinophysis acuminata (DA) (400x)</p>	<p>Dinophysis tripos (DT)(400x)</p>	<p>Prorocentrum lima (PL) (400x)</p>	<p>Prorocentrum micans (PM) (400x)</p>
<p>Ceratium fusus (CF) (100x)</p>	<p>Ceratium lineatum (CL) (100x)</p>	<p>Ceratium longipes (CP) (100x)</p>	<p>Phaeocystis sp (PC) (100x)</p>	<p>Chaetoceros socialis (CS) (100x)</p>

Note: Species with light yellow shading around potentially produce harmful toxins.



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Common Gulf of Maine Phytoplankton (page 2 of 4)

<p>Pseudonitzschia sp (PS) (100x)</p>	<p>Pseudonitzschia delicatissima (PS) (400x)</p>	<p>Cylindrotheca closterium (NZ) (400x)</p>	<p>Rhizosolenia sp (RH) (100x)</p>	<p>Rhizosolenia end (400x) Rhizosolenia junction (400x)</p>
<p>Coscinodiscus sp (CO) (400x) valve view</p>	<p>Thalassiosira sp (TL) (400x) girdle view(tp)/valve view(btm)</p>	<p>Thalassionema nitzschioides (TA) (400x)</p>	<p>Skeletonema costatum (SK) (400x)</p>	<p>Stephanopyxis sp (SP) (400x)</p>
<p>Chaetoceros sp (CH) (100x)</p>	<p>Chaetoceros sp (CH) (100x)</p>	<p>Chaetoceros sp (CH) (100x)</p>	<p>Biddulphia sp (BD) (400x)</p>	<p>Odontella sp (OD) (400x)</p>

Note: Species with light yellow shading around potentially produce harmful toxins.





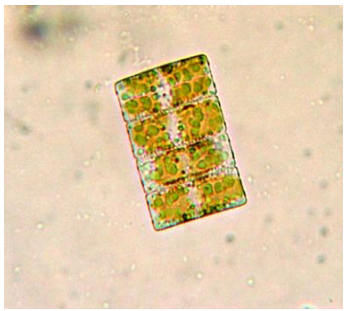
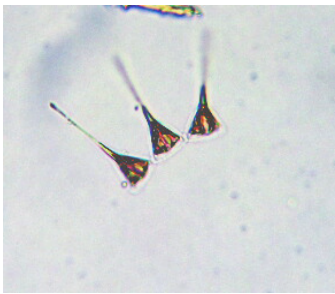
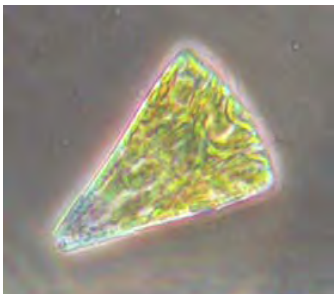
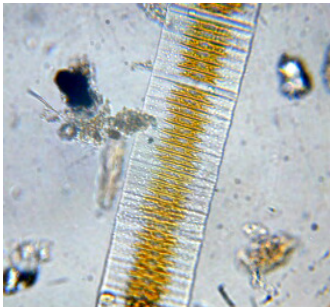
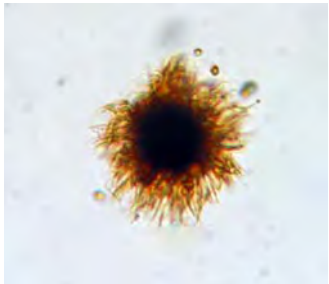


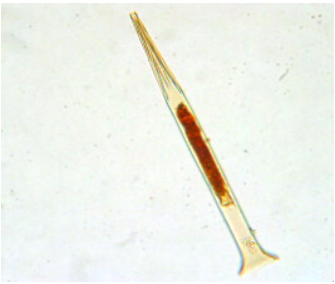
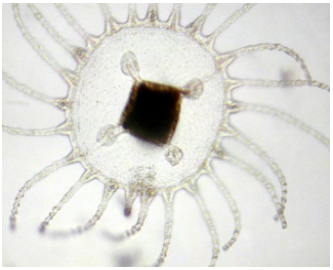

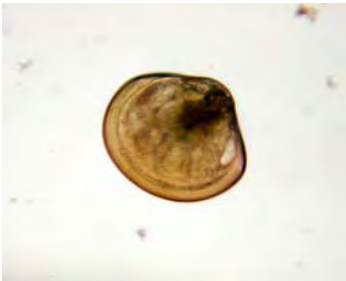


Common Gulf of Maine Phytoplankton (page 3 of 4)

<p>Leptocylindrus danicus (LP) (400x)</p>	<p>Leptocylindrus minimus (LP) (400x)</p>	<p>Melosira sp (ML) (400x)</p>	<p>Guinardia flaccida (GN) (400x)</p>	<p>Ditylum brightwelli (DM) (100x)</p>
<p>Navicula sp (NV) (400x)</p>	<p>Navicula sp (NV) (400x)</p>	<p>Navicula sp (NV) (400x)</p>	<p>Bacillaria paradoxa (BP) (400x)</p>	<p>Pleurosigma sp (PG) (400x)</p>
<p>Grammatophore sp (GM) (400x)</p>	<p>Dictyocha sp (DY) (400x)</p>	<p>Paralia sulcata (PS) (400x)</p>	<p>Corethron sp (CR) (400x)</p>	<p>Eucampia sp (EU) (400x)</p>



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Common Gulf of Maine Phytoplankton (page 4 of 4)

				
Dactyliosolen sp (DS) (400x)	Detonula sp (DL) (400x)	Fragilariopsis sp (FR) (400x)	Asterionellopsis sp (AS) (400x)	Licmophora sp (LC) (400x)
				
Fragilariopsis sp (FR) (400x)	Mesodinium rubrum (MR) (400x)	Trichome (not plankton) (TC) (100x)	Pollen (not plankton) (PO) (100x)	Tintinid (zooplankton) (ZT) (100x)
				
Obelia (zooplankton) (OB) (100x)	Copepod nauplius (zooplankton) (ZN) (100x)	Bivalve larva (zooplankton) (ZC) (100x)	Copepod sp - side view (zooplankton) (CO) (100x)	Copepod sp - top view (zooplankton) (CO) (100x)

Photos by S. Cooper except: C. Coudre (LP1), C. Dolan (OB, TC, ZC), K. Embleton (SC), A. Godhe (GS), S. Hedrick (GY), Rebecca Jones (CO), B. Karlson (DT, LP2), L. Maranda (PL), J. Parmentier (CS), B. Trow (MR), M. Webber (LC), Unknown (BD, CR, EU, ML, PM)

Phytoplankton Counting Sheet (page 1)

Date _____

Site _____

Genus/Species	Abr	Tube 1	Tube 2	Tube 3	Tube 4
Dinoflagellates:					
Alexandrium spp.	AL				
Ceratium fusus	CF				
Ceratium lineatum	CL				
Ceratium longipes	CP				
Dinophysis acuminata	DA				
Dinophysis norvegica	DN				
Dinophysis tripos	DT				
Gonyaulax spinifera	GS				
Gymnodinium spp.	GY				
Prorocentrum lima	PL				
Prorocentrum micans	PM				
Protoperidinium spp.	PT				
Scrippsiella spp.	SC				
Unidentified dinofl.	UF				

Abundance index: **R** (rare): < 1%

P (present): ≥ 1% but < 10 %

C (common): ≥ 10% but < 50%

A (abundant): ≥ 50%

Use this space to make notes or drawings about dinoflagellates or diatoms you've seen today:

Phytoplankton Counting Sheet (page 2)

Date _____

Site _____

Genus/Species	Abr	Tube 1	Tube 2	Tube 3	Tube 4
Diatoms:					
Asterionellopsis spp.	AS				
Bacillaria paradoxa	BP				
Biddulphia spp.	BD				
Chaetoceros socialis	CS				
Chaetoceros spp.	CH				
Corethron spp.	CR				
Coscinodiscus spp.	CO				
Dactyliosolen spp.	DS				
Detonula spp.	DL				
Ditylum spp.	DM				
Eucampia spp.	EU				
Fragilaria spp.	FR				
Grammatophore spp.	GM				
Guinardia spp.	GN				
Gyrosigma spp.	GY				
Leptocylindrus spp.	LP				
Licmophora spp.	LC				
Melosira spp.	ML				
Navicula spp.	NV				
Nitzschia spp.	NZ				
Odontella spp.	OD				
Paralia sulcata	PS				
Phaeocystis spp.	PC				
Pleurosigma spp.	PG				
Pseudo-nitzschia spp.	PS				
Rhizosolenia spp.	RH				
Skeletonema spp.	SK				
Stephanopyxis spp.	SP				
Thalassionema spp.	TA				
Thalassiosira spp.	TL				
Unidentified diatom	UD				

Abundance index: **R** (rare): < 1%

P (present): ≥ 1% but < 10 %

C (common): ≥ 10% but < 50%

A (abundant): ≥ 50%