Standard Operating Procedures

Phytoplankton Monitoring Program

March 2006

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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.

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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 four toxic or potentially toxic phytoplankton species *(i.e., Alexandrium spp., Dinophysis spp., Prorocentrum lima, and Pseudonitzschia spp.)* are present and in what quantity. *Alexandrium spp.* causes Paralytic Shellfish Poisoning (PSP), *Dinophysis spp.* and *Prorocentrum lima* are associated with Diarrhetic Shellfish Poisoning (DSP), 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.

1.2 Getting to the Sampling Sites

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

- Seabrook Harbor
- 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 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 high slack tide. You may be asked by GBCW to change your designated site if a more representative site is discovered.

1.3 Safety

PLEASE NEVER COLLECT SAMPLES ALONE

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 completely fill in the data sheet

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, and heavy runoff) or unusual environmental factors.
- Water Current – Observe the water current at the location where you will be towing the phytoplankton net. (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.)
1. 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:

Note: The water temperature you measured in the sampling bucket 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 hydrometer.

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 hygrometer into the jar because it could hit the bottom of the jar too hard and break.
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 0.5º 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. 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. Do not 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.
5. Cut open the alkaline iodide-azide powder (pillow #2) 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.

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 powered reagents when the bottle is swirled. The marble should be clean and added gently to prevent the possibility of introducing air into the bottle.

7. 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.
8. 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.
9. 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.
10. 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.
11. 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.
12. Add eight drops of starch solution to beaker. Sample will turn a medium blue color.

13. 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.
14. 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.
15. Rinse out the beaker and repeat steps 8 through 13 on a second sample.
16. Record results of the second titration in the space provided on your data sheet.
17. 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.

18. 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

7.1 Required Equipment:

> Note: There are two types of nets, one with an open end and one with a collection jar taped to the end

- Plankton net with nylon rope marked in meters
- Canvas bag for storage of net
- Rubber bands
- Sturdy zip-lock plastic bags labeled with Site ID information

7.2 Step-by-Step Procedure:

> Note: The video CD provided with this manual shows you the proper techniques for collecting the phytoplankton sample.

1. If you have a net with the collection jar on the end, a rubber band around the outside of the bottle and the elasticized cuff will provide extra security. If you have a net with no collection jar, secure the end of the net by folding it back once and securing with a rubber band.
2. Submerge the net in the water and begin the tow. In order to get the net to "swim" properly, all air must be removed from the net. To do this, place the narrow end of the net in the water and let it sink slowly. As it sinks, it will force air out. If you try to put the open-end of the net under first you will trap air in the net. When the net gets close to being submerged, turn it sideways and let the open end sink towards the bottom.
3. You will know the water depth from the Secchi disk measurement. Using this value, let the head of the net sink to within one-half meter of the bottom then start to gently swim the net slowly to the surface.. (Sampling too close to the bottom will add an abundance of diatoms and sediment to your sample.) Just before reaching the surface (i.e., within the top one foot of the water column), relax pressure on the rope and allow the net to once again swim to within one-half meter of the bottom. (Be careful not to let the net break the surface, as this will cause air to get trapped and prevent the net from sinking properly.)
4. Continue the tow for three to five minutes by swimming the net up and down as described in the previous step. Although three minutes has been selected as the preferred sampling time, at different times of the year you will see varying amounts of collected sample in this length of time.
5. If you are using a net without a collection bottle: Once you have towed the net for three minutes, slowly pull the net out of the water. Place the cod-end inside a correctly labeled zip-lock plastic bag while there is still enough water in the net to fill the bag with about one inch of water. (Do not despair! This will become easier to estimate as you gain more experience.) Gently rinse the cod end in the collected water.

6. If you are using a net with a collection bottle: Once you have towed the net for three minutes, slowly pull the net out of the water. Turn the net inside out to gain access to the sample container, being careful to retain the contents. Pour the sample from the container into a correctly labeled zip-lock bag. You may need an extra pair of hands for this part.

> Note: The collected sample should be examined immediately, if at all possible. (Fresh, live samples are the easiest to identify.) If the sample can't be examined immediately, it must be placed in a cooler for transport and examination at a later time.

8.0 ANALYZING THE PHYTOPLANKTON SAMPLE

8.1 Required Equipment:

- Field microscope with penlight
- Flat capillary tubes with container for storage
- Collected sample in zip-lock bag
- Blank data sheets and color identification sheets (see Appendices A and B)
- Identification book
- Bottle of Lugol's preservative
- Glass storage bottle for transporting Lugol's preserved sample
- Small cooler for transporting sample

8.2 Step-by-Step Procedure:

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 under the microscope. The collected sample in zip-lock bag should first be gently swirled to re-suspend any material that has settled out. Submerge the end of a capillary tube in the sample until it fills with sample material. Wipe off the surface of the tube with a clean cloth or tissue then clip the tube to the microscope stage for examination.
3. Examine the contents of the tube by looking at three random fields of view using a magnification of 100X. Move the tube to the right or left under the microscope clips to obtain the three different fields of view. (The magnifications available with your field microscope are 40X, 100X, and 400X.) If there are too many phytoplankton cells to count at 100X, you may count using 400X but please note this on the data sheet.
4. For each field of view examined, first note and record on the data sheet the total number of phytoplankton cells you observe. Then, note and record the total number of target cells you observe. Finally note and record the total number of each target cell type you observe. To increase the accuracy of the recorded observations, each sampler should make his or her own observations and keep the results confidential until everyone has examined the sample. After everyone has read the capillary tubes, discuss your results and record a consensus of opinion on the field sheet.

Note: To identify particular species, use the color key sheets 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 in 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.

5. Repeat steps 2 through 4 for another capillary tube sample.
6. Once all six fields of view have been examined and the results have been recorded, enter the totals for the six fields of view in the right hand column. Table I on the next page shows a sample completed data sheet for phytoplankton observations.
7. Note on the data sheet the dominant species observed. You may now scan the tubes to look for interesting species. Also, there is space for you to add additional comments about any unusual observations including if you observe any target species outside the field of view. If you have seen unidentified species, include a description or drawing.

Table 1 Example data sheet entry for phytoplankton observations.

Phytoplankton Sampling Counts	Tube 1			Tube 2			Grand Total
	View 1 100 400	View 2 100 400	View 3 100 400	View 1 100 400	View 2 100 400	View 3 100 400	
Total (all cells)	***9***	***7***	***11***	***7***	***12***	***8***	***54***
Total (target cells only)	***3***	***1***	***5***	***2***	***6***	***2***	***19***
Alexandrium spp.	***0***	***0***	***0***	***0***	***0***	***0***	***0***
Dinophysis acuminata	***2***	***0***	***3***	***1***	***3***	***2***	***11***
Dinophysis norvegica	***1***	***0***	***0***	***0***	***1***	***0***	***2***
Prorocentrum lima	***0***	***0***	***0***	***0***	***0***	***0***	***0***
Pseudonitzschia spp.	***0***	***1***	***2***	***1***	***2***	***0***	***6***

1. In view one of the first tube, note that there were nine cells observed of which three were target cells. All three target cells were Dinophysis species.
2. In view two of the first tube, there were seven cells observed of which one was a target cell. This target cell was a Pseudonitzschia species.
3. Continuing over to the Grand Total column, note that there were a total of 54 cells observed of which 19 were target cells. Of the 19 target cells, 13 were Dinophysis spp. and six were Pseudonitzschia species.

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 next page for contact info) as soon as possible so that the need for more intense monitoring can be evaluated.

Reminders:

1. Before drawing some of the collected sample into the capillary tube, make sure you gently mix the sample in the bag.
2. Make sure that your three capillary tube sample views are randomly chosen, i.e., do not purposefully select views that have interesting cells.
3. Once you have selected a random view, do not "expand" the view by moving the tube up or down

Congratulations! This completes the official sampling process. You may now scan the tubes to look for interesting species. Please note the time and mileage for each participating sampler at the bottom of the data sheet. Once the sheet has been completed, either fax it or deliver it to Kingman Farm as soon as is practical.

8.3 Sample Transport and Preservation

You may wish to transport your samples back to the lab or classroom for further identification. Samples should be kept cool and cross-contamination should be avoided. If samples are 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 of the diatoms. Please be careful when handling the iodine solution. Use it in a well-ventilated area avoiding direct skin contact.

Again – thank you for your help! For information, please contact either of the below named persons:

Candace Dolan, Phytoplankton Program Coordinator
Work: 749-1565; Home: 603-926-7171; Cell: 603-828-4701
E-mail: candace.dolan@unh.edu

Ann Reid, GBCW Program Director
Work: 749-1565; Home: 749-3880
E-mail: ann.reid@unh.edu

9.0 MAINTAINING THE EQUIPMENT

Capillary tubes, nets, buckets, bottles and all sample containers should be thoroughly rinsed between sampling events. Capillary tubes can and should be reused. It is much easier to clean the tubes if you keep them wet until they can be washed. If you note a buildup of algae or dirt in one or more tubes, it will help to soak them in a weak bleach solution for a few minutes.

After sampling has been completed for the day, please rinse your nets thoroughly with fresh water and allow them to dry. Wipe down the microscope to prevent contaminants and salt spray from drying on the exposed surfaces.

Never store the microscope in your kit near wet equipment!!!

Before closing up the kit for future use, inventory the contents so that any necessary replacement parts, fresh batteries, capillary tubes, chemicals, etc. can be obtained prior to the next sampling event.

Phytoplankton Data Sheet

Appendix A

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)	Tow Depth (m)	Tow Duration (min)	Dissolved Oxygen (ppm) Test 1	Test 2	Test 3	Total

Phytoplankton Sampling Counts:	Tube 1						Tube 2						Grand Total
	View 1		View 2		View 3		View 1		View 2		View 3		
	100	400	100	400	100	400	100	400	100	400	100	400	
Total (all cells)													
Total (target cells only)													
Alexandrium tamarense													
Dinophysis acuminata													
Dinophysis norvegica													
Prorocentrum lima													
Pseudonitzschia spp.													

Dominant Species: _____

Comments: _____

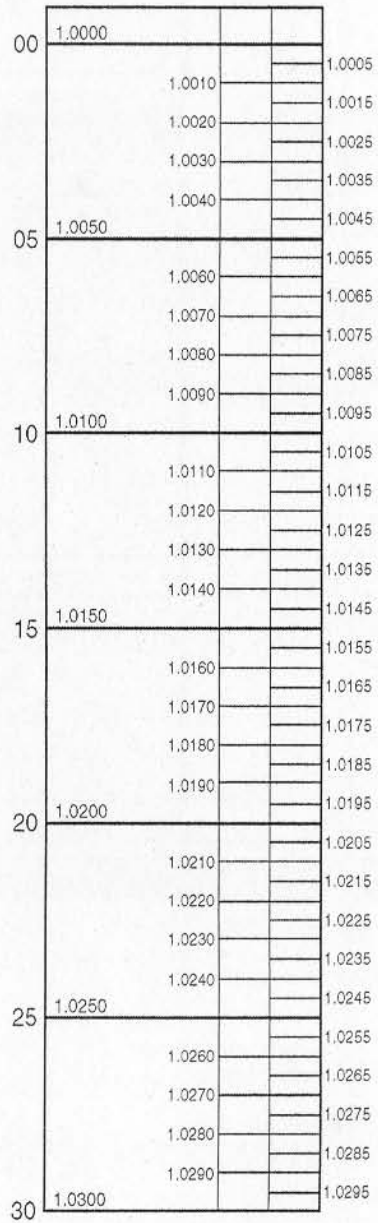
Time & Mileage Statistics:

Sampler 1 – name _____ time _____ mileage _____

Sampler 2 – name _____ time _____ mileage _____

Sampler 3 – name _____ time _____ mileage _____

Reading the Hydrometer

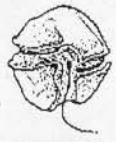
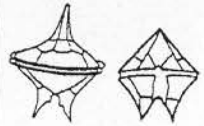
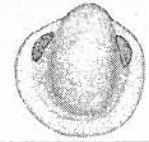


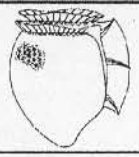
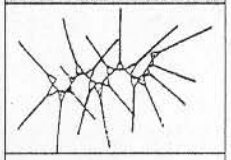
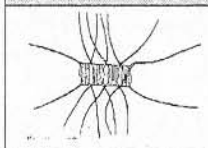
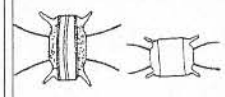
Revised 4/20/04

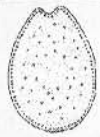
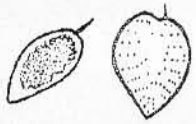
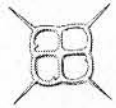
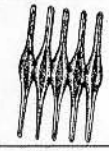
Target Species

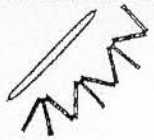
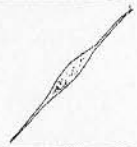
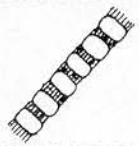
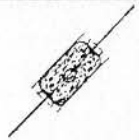
COMMON PHYTOPLANKTON KEY

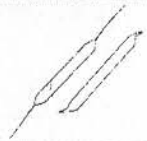
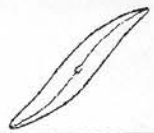
OTHER COMMON PLANKTON (non-phyto)

Alexandrium spp. AL	*Gymnodinium spp.* GY	*Gonyaulax spinifera* GS	*Protoperidinium spp.* PT	*Scripsiella spp.* SC	*Cocinodiscus spp.* CO	*Odontella spp.* OD	*Larval Clam* LC
							
25-46 µm	24-50 µm	25-50 µm	50-95 µm	20-37 µm	40-500 µm	45-70 µm	Generally Large

Dinophysis norvegica DN	*Dinophysis acuminata* DA	*Dinophysis tripos* DT	*Asterionellopsis spp.* AS	*Chaetoceros spp.* CH	*Chaetoceros socialis* CS	*Biddulphia spp.* BD	*Rotifer spp.* RO
							
48-80 µm	40 - 50 µm	40 - 120 µm	30-150 µm	10 - 53 µm	3-15 µm	60 - 160 µm	Generally Large

Prorocentrum lima PL	*Prorocentrum micans* PM	*Ceratium fusus* CF	*Ceratium lineatum* CL	*Ceratium longipes* CP	*Dictyocha spp.* DO	*Fragilaria spp.* FR	*Pollen Grain* PG
							
31-47 µm	35-70 µm	200-540 µm	100-130 µm	150-250 µm	10-45 µm	10 - 70 µm	Generally Large

Pseudonitzschia PS	*Thalassionema spp.* TA	*Thalassiosira spp.* TL	*Nitzschia spp.* NZ	*Skeletonema spp.* SK	*Ditylum spp.* DM	*Leptocylindrus spp.* LP	*Crab Zoea* CZ
							
64-117 µm	16 - 90 µm	12-39 µm	60 - 125 µm	2-21 µm	80 - 130 µm	30 - 75 µm	Generally Large

Species Name CODE	*Rhizosolenia spp.* RH	*Gyrosigma spp.* GY	*Navicula spp.* NV	*Melosira spp.* ML	*Guinardia spp.* GN	*Eucampia spp.* EU	*Tintinnid spp.* TN
(Guide to using key) *illustration of organism*							
Size Range (in µm)	25-57 µm	110 - 175 µm	32-49 µm	10-50 µm	60 - 160 µm	10-33 µm	Generally Large

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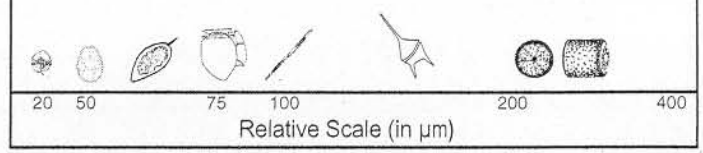

Appendix B The Beaufort Scale

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	1.7	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	6.6	6.7	6.7	6.7	6.7	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	9.8	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	15.4	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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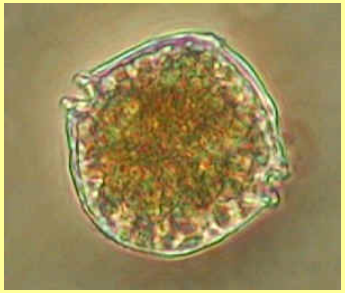
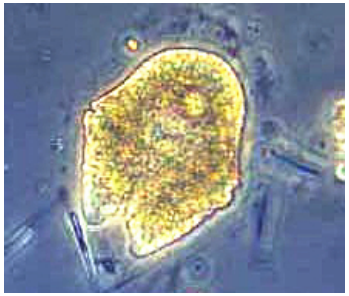
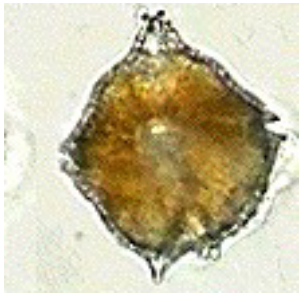
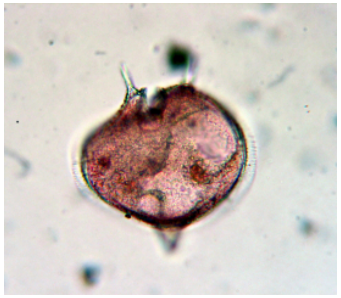
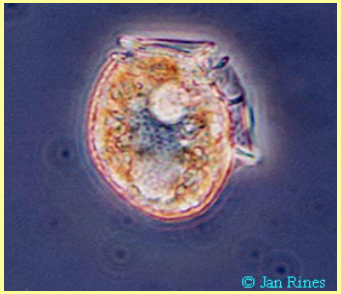
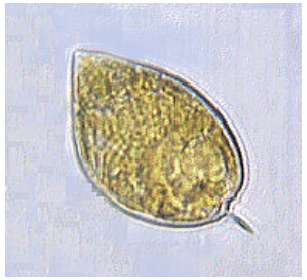
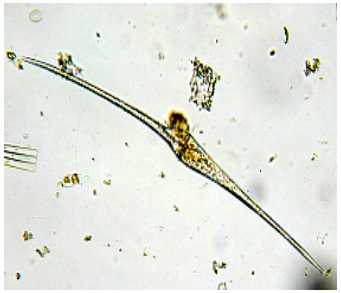
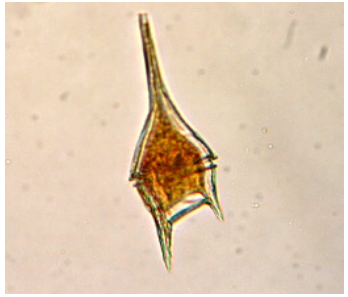
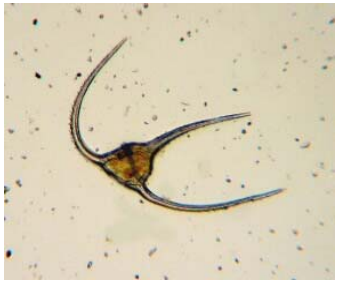
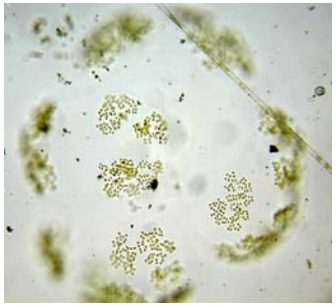
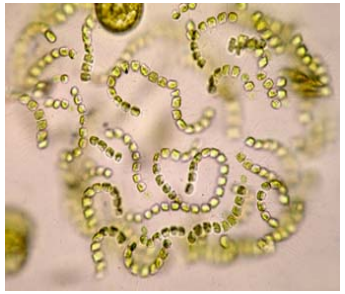
 **Alexandrium tamarense (AT) (400x)**	 **Gymnodinium sanguineum (GS) (400x)**	 **Gonyaulax spinifera (GP) (400x)**	 **Protoperidinium spp (PP) (400x)**	 **Scrippsiella spp (SS) (400x)**
 **Dinophysis norvegica (DN) (400x)**	 **Dinophysis acuminata (DA) (400x)**	 **Dinophysis tripos (DT)(400x)**	 **Prorocentrum lima (PL) (400x)**	 **Prorocentrum micans (PM) (400x)**
 **Ceratium fusus (CF) (100x)**	 **Ceratium lineatum (CL) (100x)**	 **Ceratium longipes (CP) (100x)**	 **Phaeocystis spp (PC) (100x)**	 **Chaetoceros socialis (CS) (100x)**

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

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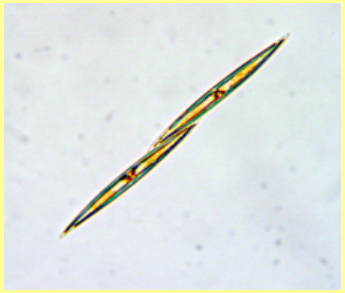
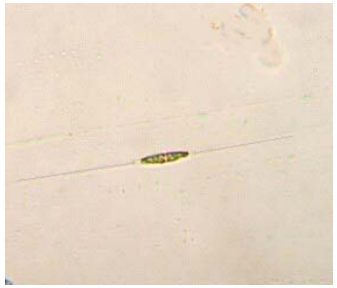
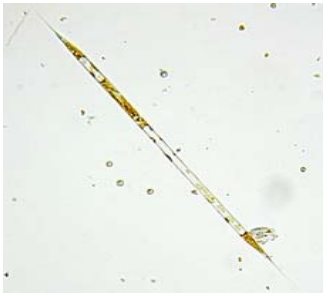
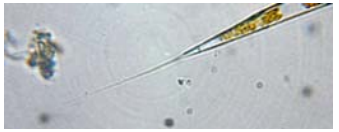
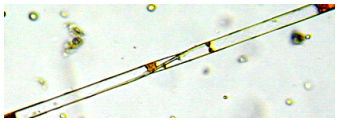
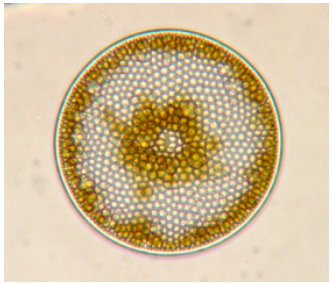
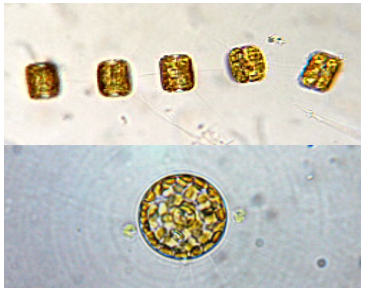
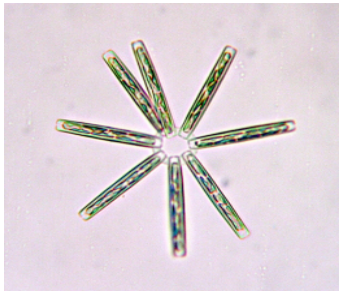
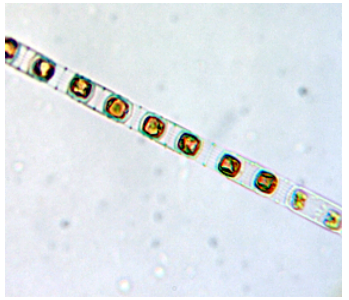
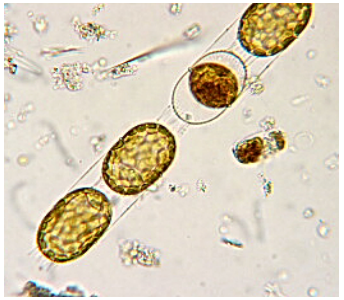
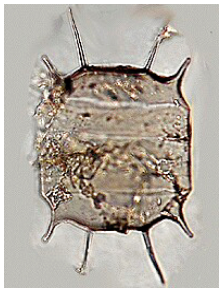
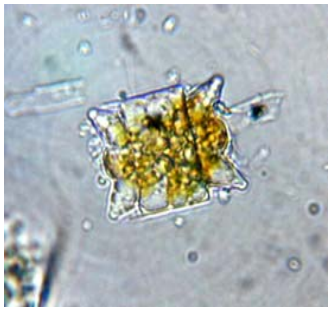
 **Pseudonitzschia spp (PN) (100x)**	 **Pseudonitzschia delicatissima (PD) (400x)**	 **Cylindrotheca closterium (CY) (400x)**	 **Rhizosolenia spp (RH) (100x)**	 **Rhizosolenia end (400x)**  **Rhizosolenia junction (400x)**
 **Coscinodiscus spp (CD) (400x) valve view**	 **Thalassiosira spp (TS) (400x) girdle view(tp)/valve view(btm)**	 **Thalassionema nitzschiodes (TN) (400x)**	 **Skeletonema costatum (SC) (400x)**	 **Stephanopyxis spp (SP) (400x)**
 **Chaetoceros spp (CC) (100x)**	 **Chaetoceros spp (CC) (100x)**	 **Chaetoceros spp (CC) (100x)**	 **Biddulphia spp (BD) (400x)**	 **Odontella spp (OD) (400x)**

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

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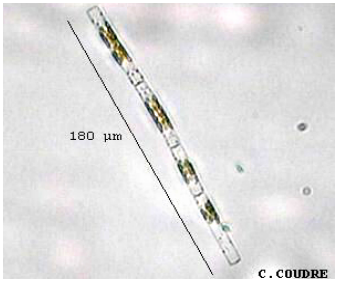
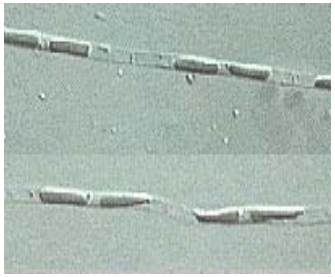
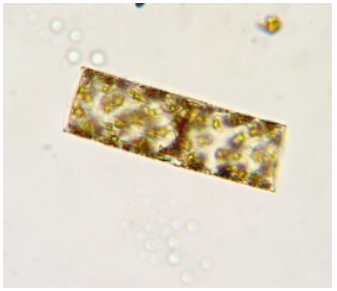
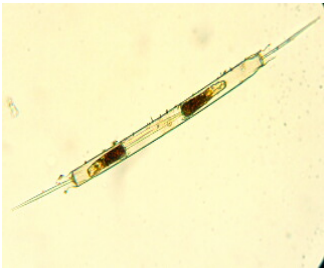
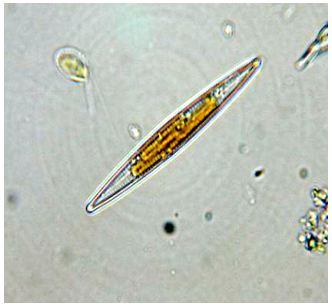
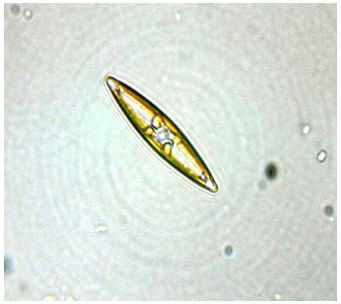
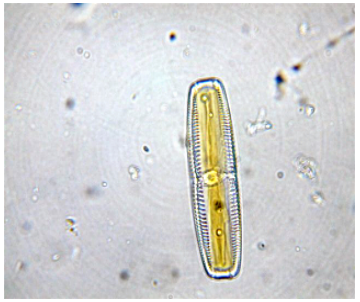
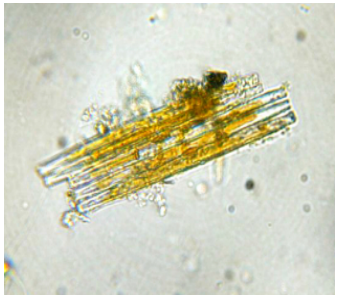
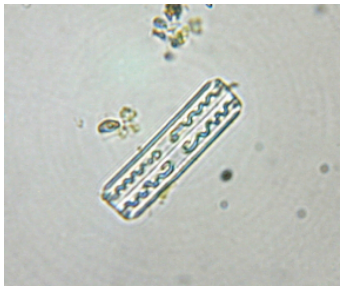
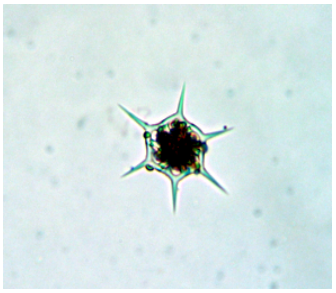
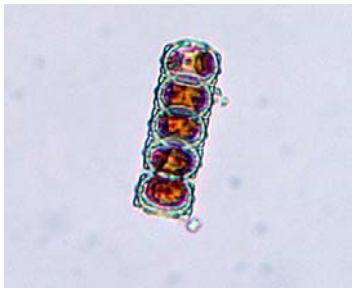
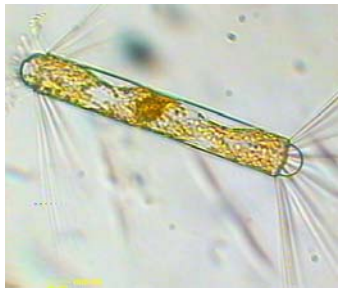
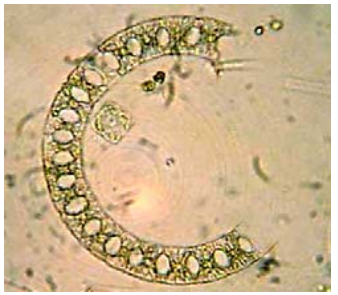
 **Leptocylindrus danicus (LD) (400x)**	 **Leptocylindrus minimus (LM) (400x)**	 **Melosira spp (MS) (400x)**	 **Guinardia flaccida (GF) (400x)**	 **Ditylum brightwelli (DB) (100x)**
 **Navicula spp (NC) (400x)**	 **Navicula spp (NC) (400x)**	 **Navicula spp (NC) (400x)**	 **Bacillaria paradoxa (BP) (400x)**	 **Pleurosigma spp (PG) (400x)**
 **Grammatophore spp (GM) (400x)**	 **Dictyocha spp (DY) (400x)**	 **Paralia sulcata (PS) (400x)**	 **Corethron spp (CR) (400x)**	 **Eucampia spp (EC) (400x)**

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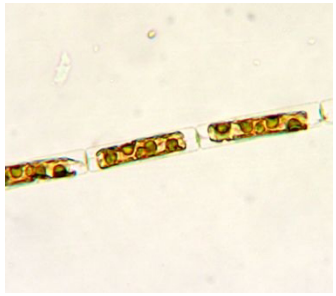
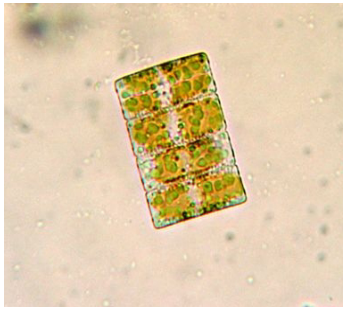
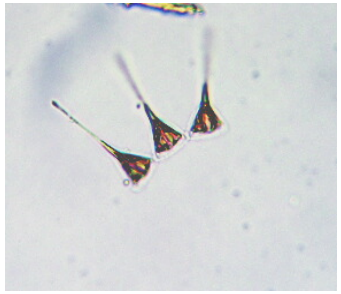
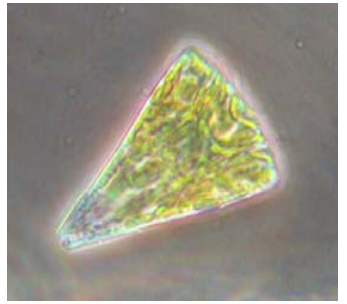
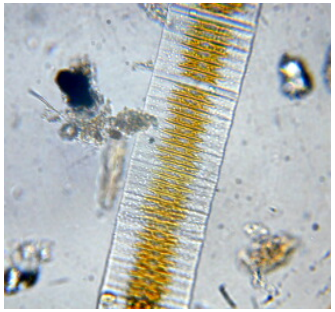
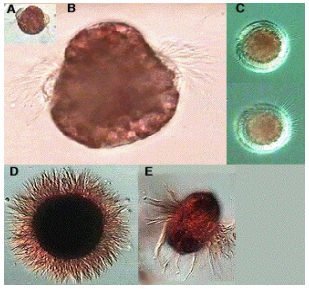
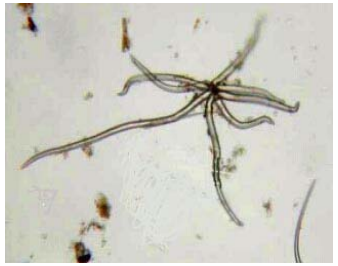
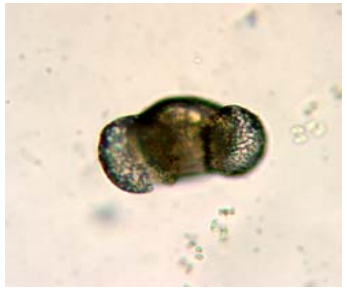
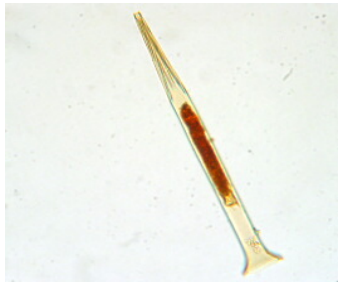
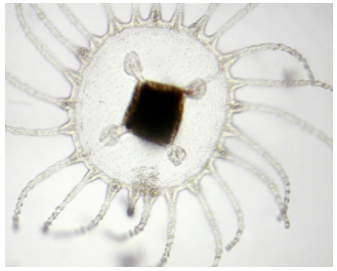
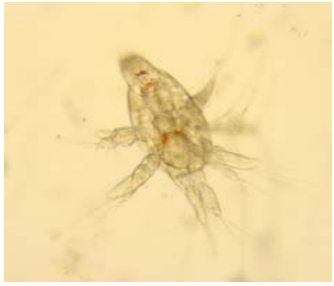
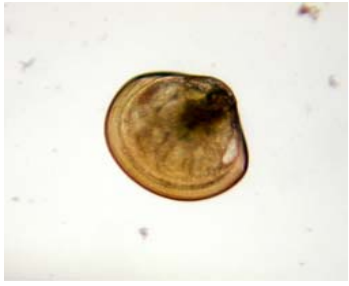
 **Dactyliosolen spp (DS) (400x)**	 **Detonula spp (DL) (400x)**	 **Fragilariopsis spp (FG) (400x)**	 **Asterionellopsis spp (AS) (400x)**	 **Licmophora spp (LC) (400x)**
 **Fragilariopsis spp (FG)(400x)**	 **Mesodinium rubrum (MR) (400x)**	 **Trichome (not plankton) (TC) (100x)**	 **Pollen (not plankton) (ZP) (100x)**	 **Tintinid (zooplankton) (ZT) (100x)**
 **Obelia (zooplankton) (OB) (100x)**	 **C. nauplii (zooplankton) (ZN) (100x)**	 **Bivalve larva (zooplankton) (ZC) (100x)**	 **Copepod – side view (zooplankton) (CO) (100x)**	 **Copepod – top view (zooplankton) (CO) (100x)**

Photos by S. Cooper except: C. Coudre (LD), C.Dolan (ZC,OB,TC), K. Embleton (GS,SS), A. Godhe (GP), S. Hedrick (GS), Rebecca Jones (CO), B. Karlson, (DT,LM,MR), G. Larsen (AT), L. Maranda (PL), J. Parmentier (CS), J. Rines (DA), M. Webber (LC), Unknown (BD,CO,CR,EC,PM)

3/22/2006