Let's Go Fishing!

A volunteer's guide to sampling fish on intertidal oyster reefs

DNR

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Grab your gear!

Gill netting:
- Gloves
- Scissors and/or a knife
- A camera
- A Clip board for the data
- Pencils (bring extra)
- A measuring board
- Water quality kit
- A depth measure
- A cooler if you plan on taking samples
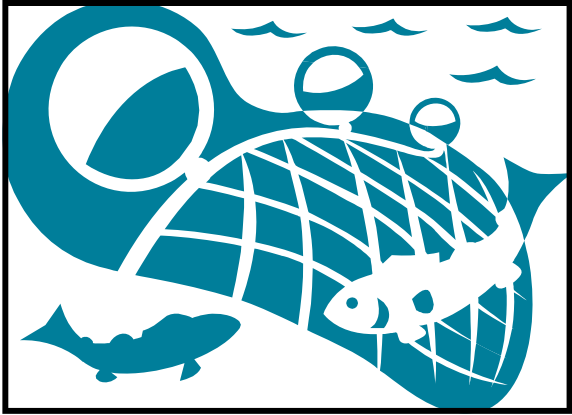- A watch

Seine netting:
- Gloves
- A camera
- A Clipboard for the data
- Pencils
- A measuring board
- A ruler
- A pan
- An aerator
- A small net
- A watch

Know your fish parts!
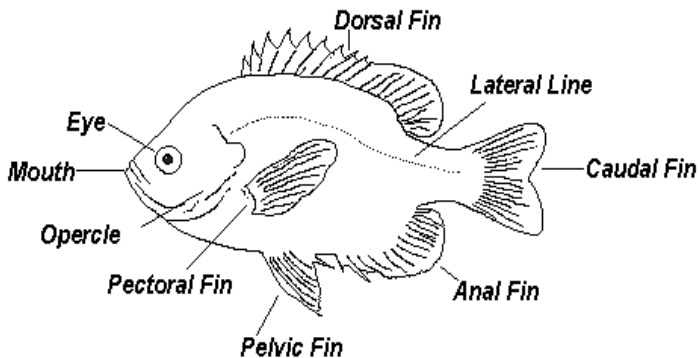
These are important parts of the fish to know as they will be used to help differentiate fish species.

GILLNETS

What is a gillnet?

Gill Net
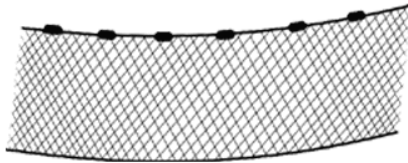
The picture above is a simple illustration of a gillnet. It suspends itself vertically in water because of two different lines in the net. The top line (float line) has rope wrapped around foam so that it remains on the waters surface. The bottom line (lead line) sinks straight to the bottom and remains there. The name "gillnet" illustrates how the fish are caught in the net. When swimming, the fish will try to squeeze through the monofilament openings in the net, unable to do this they then try to back out thus causing the monofilament to enter the gills, trapping the fish like the picture below.
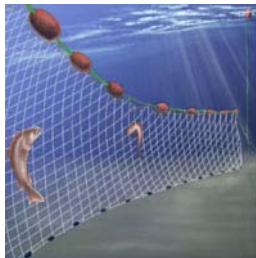
When to gillnet

Your best catch in a gill net will be on an incoming tide, the fish are riding the tide in to feed. The tide will have to be relatively high while you gill net or the net will bunch up in the shallow water. Water depth should be approximately 50 centimeters or 1.5 feet at the start of gillnetting and 120 centimeters or 4 feet at the conclusion. Gillnetting will work on an outgoing tide, but you may not catch as many fish.

Three people are needed for a successful gillnetting trip. One person will be in charge of recording data and taking pictures. The other two will check the net at appropriate intervals, measure fish, and relay data for the recorder.

Tips For gillnetting

- If fishing on a reef, surround the reef with two nets leaving a gap between the two to allow the fish to enter and exit the area.
- Place the net at a diagonal with the shore so that it intercepts fish that are swimming along the shore.
- Always be near the net, so that if something large gets caught, you are ready to get to the net, however don't stand too close to the net, your movements will scare the fish away!
- Large fish may pull part of the float line under water—this is a good indication that you have caught something.
- Sometimes a caught fish won't be obvious, so check the net every 20-30 minutes
- Be sure to pull the net up all the way to check along the lower line, also be sure to pull up the weights, fish occasionally get stuck around these areas.
- When removing fish from the net, use caution not to pull the net line into the fish's gill cavity—this may cause a deadly cut.
- Many fish have spines so wear gloves to prevent injury to hands.
- Routinely pull the fish through the water so that it can breathe while you try to get it out of the net.
- Bring scissors or a knife with you when gill netting in case a fish becomes irrevocably caught in the net. Cut the net as little as possible to release the fish.
- When releasing the fish try and place them as far away as possible from the net and facing the opposite direction.

Lift the net high to check for fish that may be hard to see.

Wear gloves, many of the fish have spines.

Be sure that you are prepared to check the net, but that you are not too close to it.

Gillnet catch

You may catch fish of all sizes in a gill net. Hog chokers (pictured top left), at about 8 cm, are usually the smallest fish, while Bonnet heads (pictured right) can be as long as a meter. Because of this, you must always be prepared for what could be in the net. The average size of the fish that you will catch in the gill net is 25 centimeters (pictured bottom left).

Fish Catch	Avg. Size
Atlantic Croaker	19 cm
Atlantic Menhaden	20 cm
Southern Flounder	33 cm
Summer Flounder	30 cm
Smooth Butterfly Ray	31 cm
Striped Mullet	24 cm
Spot	17 cm
Pinfish	20 cm
Sheepshead	28 cm
Blue crab	14 cm
Red Drum	26 cm
Bonnet Head Shark	115 cm
Sharp-nose Shark	32 cm
Cow-nose ray	105 cm
Atlantic Stingray	28 cm
Spotted Sea Trout	27 cm
Southern Kingfish	28.5 cm
Lady Fish	54 cm

Identifying your gillnet catch

Data is a very important part of fishing. SCORE is trying to figure out what species of fish use the reefs as a feeding ground, nursery, or simply a place to hide. Certain data values are needed from each fish you catch. The following are data that you need to make sure you record.

- Your best guess as to what species the fish is. If you can't identify the fish be sure to get a picture and you can look it up later. Fish face left in pictures, make sure its mouth is to the left and the tail is to the right.
- The total length (TL) of the fish (from the mouth to the tip of the tail.)
- The standard length (SL) of the fish (from the tip of the mouth to the beginning of the tail; the fleshy part of the fish)
- The time when the fish was caught
- How many pictures were taken

For example:

Species	TL	SL	Time	Pic?
Red Drum	29cm	25cm	3:29pm	3 pics

SEINE NETS
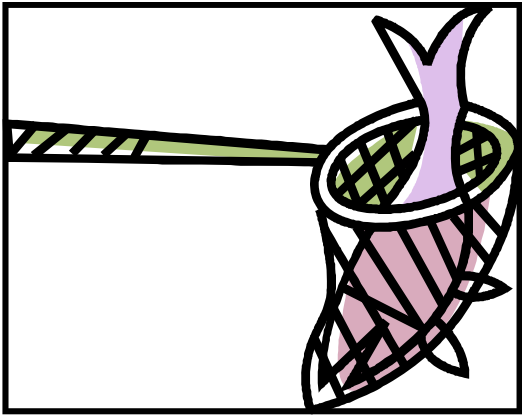
What is a seine net?

A seine net, somewhat similar in the structure to a gillnet, is a net that may be used to catch smaller organisms. As shown in the illustration, it is a net strung between two poles and is pulled through the water. As the net is pulled through the water it forms a bowl shape—the fish become caught in this bowl as a result of the force of being pulled. The mesh size (size of the holes) can range from a few inches to a few centimeters. Obviously, the smaller holes the smaller the organisms you can expect to catch.

OPERATION   IN ACTION
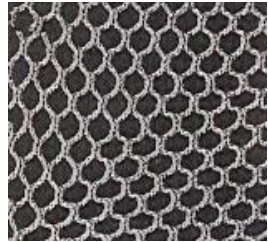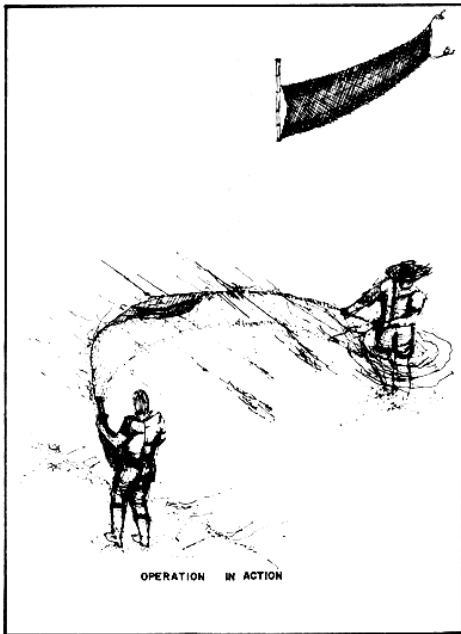
When to seine net

It is best to seine net on a low tide, the water depth should be between 30cm and 100cm (roughly between 2ft and 3ft). It is possible to seine on higher tides but the net becomes quite heavy and hard to pull in deeper water. Seining allows you to catch and learn what species of smaller organisms, including juvenile fish, live on reef. SCORE is interested in knowing what species of fish use oyster reefs as a nursery, so by seining and capturing juvenile fish we can collect data to help answer that question.

A successful seine netting trip will take at least 3 people. Two people are needed to pull the net (one on each pole). In order to get all the fish out of the net and keep them alive three sets of hands are ideal. The third person can also be in charge of recording.

Tips For Seine Netting

- When pulling a seine net near a reef be sure that you walk between the net and the reef so that the net isn't caught or snagged.
- You need to make sure that you are continually pulling the net. If you stop fish will be able to escape. After you are finished pulling the seine net, both people should simultaneously pick up the poles (as pictured on next page) so that they are parallel with the horizon,. this will help keep your catch in the net.
- Allow yourself a flat patch of shore to work from after you have obtained your catch.
- Be sure that you don't drag the net over the shore, this could easily kill a small fish.
- Have a pan of sea water with an aerator in it ready at the end of your pull.
- Place the net flat on the shore, pick all the animals out, and QUICKLY put them in the pan with water and an aerator. The smaller the fish the less time they can be out of water. Shrimp are much heartier and can be dealt with last.
- Routinely change the water in the pan because its temperature will rise on a hot day causing the fish more stress.

Be sure your net doesn't snag on the reef.

Turns the poles parallel to the horizon after you have finished pulling.

Be sure to life the net up all the way so it doesn't drag on the shore.

Collect all the fish out of the net after you have laid it flat on the shore.

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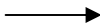
Seine Net Catch

Typically you do not have to worry about catching large fish or sharks in a seine net. By seining in relatively shallow water you will limit your catch to primarily small fish (between 1cm and 15cm), shrimp, and crabs. An average seine net catch has numerous bay anchovies (left), silversides (right), and shrimp (typically grass, white, and brown shrimp but occasionally you will catch a few pink shrimp depending on the time of year.) These all range from about 4 to 12 centimeters long.
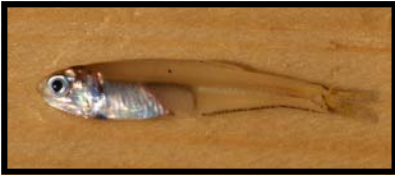
Fish Catch	Avg. Size.
White Shrimp	6.5 cm
Brown Shrimp	6.5 cm
Silverside	5 cm
Bay Anchovy	4 cm
Silver Perch	4 cm
Pipefish	7.5 cm
Leatherjacket	4 cm
Hog choker	8 cm
Tonguefish	4 cm
Squid	4 cm
Striped Burr Fish	2-3 cm
Spadefish	2 cm

Identifying your seine net catch

You will often bring in a lot of seaweed that may disguise some of the organisms (see picture below) so make sure you do a thorough sweep of the net. After collecting and depositing all the organisms from your pull in the aerated pan, you can begin to collect data. Because of the large volume of small fish you may catch in a seine net, it is not necessary to measure each organism. If you catch a larger organism (e.g. blue crab or a flounder) it is good to collect size data. Otherwise the data you need to collect on your seine net catch is:

- Your best guess as to the species of fish. Make sure before you begin seining you are familiar with the differences between anchovies, silversides, and other small fish. This way you will be able to quickly identify them correctly. If you aren't sure of the species, however, it is best to take a picture of the fish to be identified later.

- Number of each species caught. This can be kept in a tally. For example:

Silverside   III
Bay Anchovy   IIIII IIIII IIIII I
Shrimp   IIII
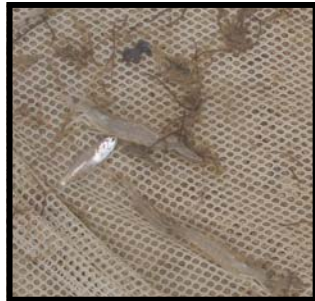
WATER QUALITY

Why worry about the water?

Just as we are affected by changes in the air temperature or quality, fish are affected by water quality. Though different species of fish prefer different water temperatures, salinities (saltiness), and clarities, we have a general idea of what conditions are normal in our area and thus what conditions fish in our area are accustomed to. Changes to these norms may cause fish to hide out in deeper water (where temperature changes are less dramatic), migrate, or even die. These changes in fish behavior can impact the ecosystem as well as fishermen in the area. By understanding water quality parameters we can better predict where different species of fish will be and we can know what fish we expect to catch.

What's in a water quality kit?

- A tide chart
- A thermometer
- A refractometer
- A dissolved oxygen kit
- A water sampler
- A bottle of fresh water
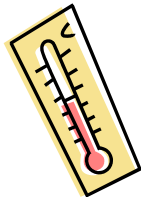
Water quality steps

1. Record the time and the position (incoming, high, outgoing, or low) of the tide.
2. Place the thermometer in a shady spot so that it can record the air temperature.
3. Take the beaker that is given to you in the water quality kit and fill it with sea water.
4. Open the dissolved oxygen (DO) kit (make sure that it is in the shade), fill the beaker to 25mL., break the ampoule in the water, replace the ampoule inside the kit, and close the kit (Specific instructions on following pages).
5. While allowing the DO kit to sit and react, check the thermometer and record the air temperature.
6. Place the thermometer in the largest beaker of sea water (don't put it in the small dissolved oxygen beaker)
7. Take out your refractometer and check the salinity, then be sure the refractometer gets back in its case. (Specific instructions on the following pages)
8. Check the thermometer and record the water temperature
9. Next use the ampoule and DO key to determine the amount of dissolved oxygen in the water and record (specific instructions following).

What is dissolved oxygen?

Dissolved oxygen is the amount of oxygen gas molecules that are dissolved in water. It is important because marine organisms rely on dissolved oxygen to breathe just like us. Colder water has more dissolved oxygen. Dissolved oxygen is a very important parameter to measure because when dissolved oxygen becomes too low fish can die. Previously in South Carolina there have been problems with low dissolved oxygen leading to large fish kills.

How to test dissolved oxygen

The Dissolved Oxygen kit is very sensitive to light and should be kept closed while working outside. The first step is filling the tiny beaker that comes inside the kit to the mark at 25mL with ocean water. It is important not to cause a lot of bubbles while filling the tube because that will affect your data. Remove one of the ampoules from the box and place it with the tip in the water. Push the tip of the ampoule into the bottom of the beaker until the tip breaks off filling the rest of the ampoule with the sample water. Next remove the ampoule from the beaker and turn it upside down a few times just to make sure the chemicals and water mix; put it in the kit and close the lid. Wait two minutes. After two minutes, remove the ampoule and the dissolved oxygen key (pictured below) Move the ampoule stepwise through the key until you find the blue that it most closely matches. Read the number below the tube that matches your ampoule most closely and record it. The reading is in milligrams per liter.

What's a refractometer?

A refractometer measures the amount of salt in water. Salinity is measured on a scale of 0 to 100 ppt (parts per thousand) with fresh water being 0 ppt. On average ocean water is 35 ppt.
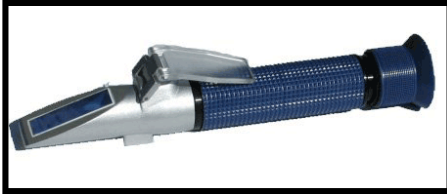
This is your refractometer
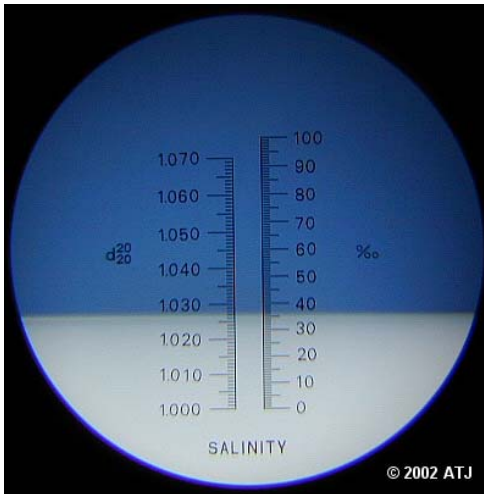
This is the scale that you will see when looking through the lens. The ppt scale is on the right. The white space indicates how high the salinity is, in this particular screen, the sample is right at 35 ppt

How to use a refractometer

Indented area;
fill water here

Plastic screen

Adjustable screw.
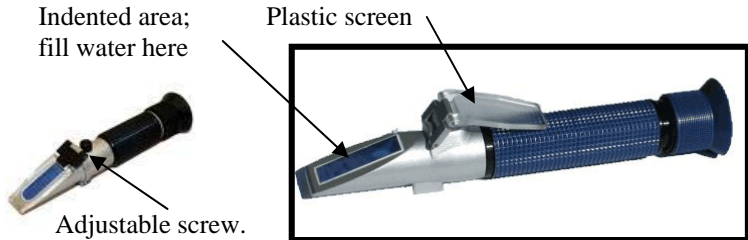
      You will first need to calibrate the refractometer. We know that fresh water is 0ppt, so we will use fresh water for the calibration. Using a pipette fill the indented area at the end of the refractometer with *fresh* water. After the indented area is filled, slowly depress the plastic screen over the water. The water should adhere to the device and spread out evenly with no bubbles, if not try again. Next look through the lens of the device and make sure the refractometer reads 0ppt. If not adjust the screw located on top of the device while looking at the scale until the line white space ends right at 0ppt. When you finish dump the water and wipe it off.

      Once the device is set to 0ppt, apply sea water with the pipette. This time, however, when you look through the device record the number that the white space indicates (i.e. 28 ppt) After your salinity has been recorded clean the indented area with fresh water once more and place the refractometer back in its case.

      TIP: when looking through the lens of a refractometer is best to look away from the sun because too much sunlight can make it very difficult to distinguish a number.

When you're finished

- After you've completed you're day of fish sampling make sure all of your equipment is thoroughly rinsed with fresh water.
- Make sure your data is entered into a database (if applicable) or turned over to whomever is responsible for it.
- All pictures should be uploaded on a computer, named, and dated. Keeping files organized originally, helps eliminate confusion in the future.
- If any specimens were collected they should be properly preserved in an ethanol solution immediately.
- Identify all fish that you were not sure about in the field. Details will be fresher in your head, take the time to do it right away.

Fish-sampling Data

Date: _____ **Start time:** _____ **End Time:** _____

Weather

  Tide: _____ Time of High Tide: _____ Cloud cover: _____

  Water current: _____ Wind: _____ Air temperature: _____^{o}C

Water Data

  Water temperature: _____^{o}C   Salinity: _____ppt   DO: _____mg/L

Reef

  Net 1: _____ocean/marsh Starting depth: _____cm End depth: _____cm

  Net 2: _____ocean/marsh Starting depth: _____cm End depth: _____cm

  Net 3: _____ocean/marsh Starting depth: _____cm End depth: _____cm

  Net 4: _____ocean/marsh Starting depth: _____cm End depth: _____cm

Fish Data

Time	Species	Standard (cm)	Total (cm)	Pic?

Atlantic Silverside
Menidia menidia

Notable silver stripe down the side of fish helps distinguish this fish

- Similar to anchovy except mouth is much smaller on the Silverside and is located in the middle of the head.
- Pointy snout

Anchovy
Anchoa sp.

Stubbier snout and larger mouth than Silverside

- Dorsal fin originates over the origin of the anal fin
- Sides with silvery lateral band scarcely as wide as the pupil of eye.

American Silver Perch
Bairdiella chrysoura

Dark lateral line

- Silvery
- May have faint dark stripes running horizontally on the body
- Juveniles will have peach colored fins (as pictured above)

Leatherjacket
Oligoplites saurus

Dorsal spines contain a small amount of toxin so handle with care.

- Often have blue, green, and or yellow coloring on back
- Lateral line nearly straight.
- Fins, especially anal and dorsal, are yellow.

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