Saltwater Fish Camps Program
Florida Fish and Wildlife Conservation Commission
Division of Marine Fisheries Management
Outreach and Education
(850) 487-0554

Program Goals
Create responsible marine resource stewards by teaching children the vulnerability of Florida’s marine ecosystems, teach fundamental saltwater fishing skills while emphasizing ethical angling techniques for resource conservation and provide children with a positive fishing experience.

Program Funding
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Fisheries Conservation

Activity Overview

This activity teaches participants techniques for catching and releasing a fish safely. Skills include how to remove the hook from the fish, how to handle a fish safely, how to measure a fish, and how to revive a fish (if needed) before release. The activity also covers the importance of and procedure for disposing of discarded fishing line. The primary goal of the Saltwater Fishing Camp is to promote conservation stewardship to young anglers.

Objectives

1. Learn to identify fish and determine whether or not to keep the fish.

2. Learn the importance of catch and release and practice proper fish handling techniques.

3. Learn how to protect fishing habitats.

4. Learn how to read and understand regulations and why they are sometimes necessary (to conserve natural resources and allow for safe and sustainable human use of fish and wildlife).

5. Become an informed, supportive and active citizen to sustain Florida’s fish and wildlife.

Background Information

The Florida Fish and Wildlife Conservation Commission (FWC)’s mission is to manage fish and wildlife resources for their long-term well-being and the benefit of people. A healthy future for our fisheries in Florida is up to all of us. This involves fisheries conservation and the protection of our natural fish stocks. Fisheries conservation includes the practice of catch-and-release fishing and using circle hooks, de-hooking tools, proper fish-handling techniques, and other components.
Regulations are an important aspect of fisheries conservation. Regulations are set by fisheries managers based on scientific data and public input to help maintain fish populations for the future. Without law-abiding anglers, highly-valued species such as red drum and spotted seatrout would not maintain sustainable populations.

Common types of fishing regulations:

- **Bag limit** – Sets a limit on the number of fish harvested at one time.
- **Size limit** – Protects fish so they can reach a size that allows them to spawn.
- **Slot limit** – Includes a lower size limit and an upper size limit, which allows fish to reach maturity before being harvested and protects large females that produce massive numbers of viable eggs.
- **Season** – Protects fish during spawning or limits the number of fish taken in heavily fished waters.

**Measuring Your Fish**

Most finfish size limit regulations of the Florida Fish and Wildlife Conservation Commission (FWC) use either fork length or total length.

Total length is measured from the most forward point of the head with the mouth closed, to the farthest tip of the tail with the tail compressed or squeezed, while the fish is lying on its side and the measuring tape is underneath the fish (not over top the fish) in a flat, straight line.

Fork length is measured from the tip of the jaw or tip of the snout with closed mouth to the center of the fork in the tail, while the fish is lying on its side and the measuring tape is underneath the fish (not over top the fish) in a flat, straight line.

Buying a fishing license is also important and required for anglers between the ages of 16 and 65, unless exempt. The money collected from saltwater fishing licenses is used for stock enhancement, artificial reefs, marine fisheries research and management, law enforcement, and public education on marine resources.

**Proper fish handling** is critical if the angler must touch or hold a fish that is to be released.
• Leave fish in the water during release and when taking photos, if possible.
• If a fish must be removed from the water, use wet hands to reduce the amount of protective slime removed from the fish. The slime protects the fish from infection and aids in movement.
• A knotless, rubber-coated landing net is ideal when handling a fish since it supports the fish’s body weight and protects the fish’s slime layer.
• A landing tool that grips the jaw can also be used to help control fish.
• If you want to take a picture of your catch, hold the fish horizontally and support its weight with both hands to decrease internal damage.
• Always avoid lifting a fish by the gills, eyes or tail if it is to be released.
• Only gaff a fish when you intend to keep it.
• In general, handle the fish as little as possible and release quickly.
• Large fish such as billfish, tunas, sharks, and tarpon should be brought alongside the boat as quickly as possible.
• Do not bring large fish aboard – this is dangerous to both the fish and the crew.
• To reduce physiological stress and damage to both internal and external organs, do not drag a large fish over the gunwale or side of the boat.

Hooks

Use non-offset circle hooks to reduce the chance of gut-hooking a fish. Circle hooks most often catch in the corner of a fish’s mouth, are easier to remove, reduce internal harm, decrease dehooking time, and increase the likelihood of hook removal.
Avoid using multi-hook rigs or lures. If you do use them, remove one or two of the hooks. When using treble hooks, remove one or more of the points and flatten the remaining barbs.
Using **barbless hooks**, or hooks with a flattened barb, is one of the most important things an angler can do to minimize internal damage to the fish and make release quicker and easier.

![Barbless Hooks](image)

Use **non-stainless steel** hooks because these hooks will rust away if they happen to remain in the fish after it is released.

**Leave the hook** if the fish is caught deep enough that the hook is not visible; cut the line as close to the fish’s mouth as possible.

**Match tackle** to the species of fish anglers are targeting, to quickly land and minimize tiring out the fish. Using tackle that is too light and playing the fish to exhaustion depletes its energy reserves, which can put the fish at risk of death by predation and physiological stress.

**Dehooking tools** are used to remove a hook from a fish’s mouth with little or no handling or while the fish is still in the water. There are many types of de-hooking tools; use the tool that works the best for the fish you are releasing. Dehooking tools minimize the removal of the slime coat of a fish, which protects the fish from parasites and diseases.

**Barotrauma** - When fish are pulled up from deep water (typically depths greater than 50 feet), the reduced pressure causes gases in the swim bladder to expand, resulting in a condition called barotrauma. Fish suffering from barotrauma are less likely to swim properly when released and may not survive due to exposure or predation.
Signs of barotrauma:
   1. Stomach protruding from mouth
   2. Bulging eyes
   3. Distended intestines
   4. Bloated belly

If a fish needs to be released and shows any or all of these signs, venting tools and descending devices may increase the fish’s chance of survival after release.

Venting a fish is a method of puncturing the swim bladder of a fish using a sharpened, hollow instrument to release the expanded air which will allow the fish to return to deeper water. The swim bladder is a hollow, gas-filled balance organ that allows a fish to maintain neutral buoyancy in water. Species of fish that do not possess a swim bladder sink to the bottom if they stop swimming.

To vent a fish, insert the venting tool’s hollow-tipped needle into the fish at a 45-degree angle, under a scale approximately 1 to 2 inches from the base of the pectoral fin, just deep enough to release trapped gases.

Descending devices are used as an alternative to venting by reversing the effects of barotrauma without puncturing the body cavity.

These devices descend fish back down to a depth where increased pressure from the water will recompress swim bladder gases, allowing the fish to swim away. Many different styles of descending devices can be purchased from stores or made at home.
Reviving Fish

- If the fish doesn’t immediately swim away and is lethargic or erratic, some resuscitation may be needed.
- Revive exhausted but otherwise healthy fish by first placing the fish in the water, one hand under the belly and the other hand holding the bottom lip or tail.
- If the vessel is anchored, point the fish head-first into the current to gently force water through the mouth and over the gills.
- If the vessel is not anchored or there isn’t a current, hold the fish in the water alongside the boat and gently nudge the boat into gear, forcing water through the gills of the fish.
- If you are fishing from a non-motorized vessel such as a kayak, place the fish in the water, hold its front lip (use a gripping tool if the fish has teeth) and move the fish in a “figure-eight” motion.
- Never move fish backward in the water, since water will not flow properly through the gills.

Protect Fish Habitats

Human actions can positively or negatively impact an ecosystem, and thus its sustainability. Protecting, maintaining, and improving freshwater and saltwater habitats provides the necessary resources for sustainable marine fish populations. Rivers, streams, estuaries, mangroves, salt marshes, and seagrasses are just a few of the ecosystems that plants and animals utilize (no habitat = no fish). Anglers can aid in the protection of these habitats by putting trash in garbage cans and recycling appropriate items (don’t teach your trash to swim), by minimizing impacts to natural areas such as grass flats and artificial reefs, and by passing along knowledge and experience (share what you know to help fishing grow). Monofilament recycling and recovery bins are located at boat ramps, piers, docks and other locations to encourage anglers to recycle their monofilament and fluorocarbon fishing line. If you are using non-recyclable line, cut your line into small pieces (less than 3 inches) and place in a lidded trash can.

If you hook a bird, do not cut the line. **Reel in the bird, remove the hook and line and release the bird if it is not severely injured or has not swallowed the hook. If a bird is injured or swallowed the hook, contact the FWC wildlife hotline to find a local rehabilitator (1-888-404-3922).**

Fisheries conservation also includes angler safety. Anglers need to protect themselves from the elements by wearing polarized sunglasses, a wide-brimmed
hat, sun block, and staying hydrated. While boating, an angler should always wear a Personal Floatation Device (PFD).

All of these fisheries conservation concepts are ways in which anglers can help the FWC to manage and protect Florida’s marine fish resources. Ultimately, conserving and protecting our marine resources is up to all of us.

**Conservation Stewardship**

1. Use effective catch-and-release techniques for fish that won’t be kept.
2. Whether one is keeping a fish or not, remove the hook in a manner that respects the fish.
3. When handling a fish, do so in a way that doesn’t harm its slime coat or internal organs.
4. As necessary per fishing regulations, measure a fish to determine whether it is legal to keep.
5. Revive an exhausted fish before releasing it.
6. Protect fish habitat by returning all discarded fishing line to a recycling bin or safe disposal site.

**Key Terms**

**Catch-and-release** – The act of catching a fish, then returning it to the water in a manner that provides the fish with the best possible chance for survival.

**Dehooking tool** – A tool used to remove a hook from the mouth of a fish.

**Circle hook** – A fishing hook designed and manufactured so that the point is turned perpendicularly back to the shank to form a circular or oval shape.

**Knotless landing nets** – Nets that use netting material that is flat to the touch; no knots stick above the netting. These can be made entirely of rubber or rubber-coated nylon netting. These nets reduce the amount of slime removed from a fish.

**Proper fish handling** – This term describes techniques that are used to handle a fish when it is removed from the water. The main points are to hold the fish horizontally and support the weight of the fish.
**Venting** – The insertion of a hollow, sharply-pointed device into a fish to relieve the gas built up in the body cavity. This condition occurs when fish are brought up from depths of 50 feet or greater. Signs that indicate this internal stress include bulging eyes, stomach protruding from the mouth, a distended belly or intestines coming out of the fish. After venting the fish correctly, the fish has a greater chance of survival and returning to the bottom easier.

**Gripping tool** – Instrument used to aid the angler in landing a fish or handling a fish by gripping the jaw of the fish.

**Sling** – A device with mesh or other material designed to limit the removal of fish slime. The mesh is strung between two poles in the shape of a sling to aid the angler in properly lifting a fish out of the water. This device can be used when weighing a fish.

**Gaff** – An instrument that impales a fish to land it, usually in the shape of a hook. The use of a gaff is not recommended if the fish may be released or will be released.

**Swim bladder** – A hollow, gas-filled balance organ that allows a fish to conserve energy by maintaining neutral buoyancy in water. Fish caught from very deep water sometimes need to have air removed from their swim bladder before they can be released, due to the difference in atmospheric pressure at the water's surface. Species of fish that do not possess a swim bladder sink to the bottom if they stop swimming.

**Materials**

- 5 Various dehooking tools
- Various non-stainless steel, barbless, circle hooks, sizes 2/Ø - 5/Ø, offset and non-offset, one larger J-hook
- 1 Rubber-coated, knotless landing net
- 1 nylon fishing net (not rubber-coated)
- 30 *Florida Saltwater Recreational Fishing Regulations* booklets
- 5 three foot lengths of 30# monofilament fishing line with 6/ Ø circle hooks attached
- 1 Large plastic saltwater fish
- 5 Ruff Dawgs (rubber fish)
- 30 *Fishing Lines* field guides
- 2 Venting tools (keep covered until ready to use - **sharp**!)
- 1 Fish sling
- 2 Gripping tools, such as a lip grip
- 1 Gaff
- 1 Personal floatation device (PFD)
- 1 Throw bag and “O” ring
- 1 Dive flag
- 1 Monofilament recovery and recycling bin
- 30 Monofilament recovery and recycling bin stickers
- 30 Measuring tapes
- 30 Laminated images of different saltwater fish found in Florida
- 30 Plastic, empty tennis ball containers with lids (ask students to bring them in)

**Procedure**

Review the information in the background section with the students doing the following activities as each activity is covered.

**Fish Measuring and Regulations**
1. Divide the students into 4 or 5 groups or, if possible, allow each student to work independently.
2. Give each group or student the following: one laminated saltwater fish image, one tape measure, one copy of the *Florida Saltwater Recreational Fishing Regulations*, and one copy of the *Fishing Lines* field guide.
3. Ask the groups/students to determine their species of fish, any important characteristics about their fish, and the current regulations pertaining to their fish based on its correct measurement.
4. Have each group/student take turns as they share their information about the fish with the other groups/students.

**Dehooking a Fish**
1. Students will practice dehooking a fish by using a Ruff Dawg (rubber fish) *after* the instructor demonstrates the proper technique.
2. Use one Ruff Dawg and one de-hooking tool per group or table so that each student may practice de-hooking. This involves using about 4 feet of fishing line with a circle hook attached to one end using any one of a variety of knots. The hook is hooked into the hole on the rubber fish’s mouth.
3. The student should use their non-dominant hand to practice holding the fishing line, which is attached to a circle hook that is hooked in a fish’s mouth.
4. They hold the dehooking tool with their dominant hand and carefully slide the end of the device down the fishing line until it reaches the hook in the fish’s mouth.
5. The fishing line and the dehooking tool are pulled taut horizontally so that the student may carefully lift the dehooking tool while lowering the fishing line and use a quick downward jerking motion of the tool to release the hook from the fish’s mouth.

6. The rubber fish will fall to the floor, dehooked. (The same procedure is followed for dehooking a live fish except the fish is released into the water, usually tail first.)

Reviving a Fish

Demonstrate reviving a fish:

1. If a fish needs revived, hold its head in the water current to promote the flow of water over its gills until it is able to swim away.

2. Also, inform the students that whenever they are holding a fish in the water (reviving, photographing, dehooking, etc.) they should be aware of their surroundings, i.e. look for predators that may be lurking in the area. Remember, you may have just fought a fish and that commotion could have attracted large predators. Encourage the students to practice CPR: Catch their fish, quickly take a Picture of it, and Release it promptly into the water.

Venting a Fish (grade 6th – 8th)

1. To properly vent a fish, use your wet hands to carefully retrieve the fish and lay it on a flat, wet, cool surface on the boat.

2. Place your non-dominant hand over the fish’s head and use your dominant hand to take the venting tool and carefully insert it into the fish approximately 2 to 3 inches from the base of the pectoral fin, under a scale at a 45-degree angle.

3. Insert the venting tool until you hear the gas release, then stop inserting it.

4. Remove the venting tool when you do not hear gas release, and secure the venting tool.

5. Then, using both hands, pick up the fish with one hand under the fish’s head and the other hand supporting the lower half of the fish’s body as you release the fish head first into the water.

Other Conservation Tools (grade 6th – 8th)

1. Mention to the students that other tools can be used to land a fish.

2. One type is a gripping tool that allows the angler to grip the jaws of the fish. Fish grippers are instruments used to aid the angler in landing a fish or in
catching a fish by gripping the jaw of the fish. Show the students the different types and explain each of them.

3. A fish sling is also another tool that students may use to aid in landing a fish. Review how to use it with the students.

4. Finally, mention to the students that a gaff aids the angler in landing a fish but it is not recommended if the fish is to be released.

5. Show the students the gaff and explain how to use it.

6. Review the other fisheries conservation items with the students: dive flag, life jacket, throw bag and “o” ring, polarized sunglasses, sun block, a wide-brimmed hat, a first aid kit, a float plan, and how important it is to stay hydrated while outdoors.

Monofilament Recovery and Recycling

1. Hold up the demo monofilament recovery and recycling bin and explain how used monofilament should be placed into the bin so that it will prevent fishing line from entangling animals, as well as prevent it from being left in or around our marine habitats.

2. Talk about how the used monofilament can be easily recycled back into useful fishing items.

3. Pass out one empty tennis ball container with lid to each student.

4. One pair of scissors per table or group.

5. 1 set of monofilament recovery and recycling bin stickers per student.

6. 1 zip tie per student.

7. Explain to the students how to carefully cut a circle into the top of the tennis ball lid and side of the container.

8. Run the zip tie through each hole to create a lid leash.

9. Apply the stickers.

10. Each student has created their own mini monofilament recovery and recycling bin that they can now take fishing with them.

Discussion

- Can you think of other ways to safely release fish?

- Why do we need to have fishing regulations, dehooking devices, and practice catch and release? How do you benefit from these things?
Why is it important to know how to use these techniques when fishing other than catch and release?

Why do we need to vent a fish’s swim bladder when the stomach is protruding from its mouth?

**Florida Standards Grades 3rd - 5th**

- LAFS.3.RL.1.1
- LAFS.3.RI.1.1
- LAFS.3.RI.3.7
- LAFS.3.SL.1.1
- LAFS.3.SL.1.2
- LAFS.3.SL.1.3
- LAFS.3.L.3.6
- MAFS.3.MD.2.4
- PE.3.C.2.2:
- PE.3.C.2.4
- PE.3.R.5.3
- LAFS.4.RL.1.1
- LAFS.4.RI.1.1
- LAFS.4.RI.3.7
- LAFS.4.SL.1.1
- LAFS.4.L.3.6
- SC.4.E.6.6
- SC.4.L.17.4
- SC.4.E.6.3
- PE.4.C.2.2
- PE.4.C.2.4
- PE.4.C2.8
- LAFS.5.RL.1.1
- LAFS.5.RI.1.1
- LAFS.5.RI.3.7
- LAFS.5.SL.1.1
- LAFS.5.L.3.6
- PE.5.M.1.1
- PE.5.C.2.5
- PE.5.R.5.2

**Florida Standards Grades 6th - 8th**
Florida Standards Grades K - 12th

- MAFS.K12.MP.5
- MAFS.K12.MP.6.1
- LAFS.K12.L.3.6
- LAFS.K12.R.1.1
- LAFS.K12.R.2.4
- LAFS.K2.R.1.1
- LAFS.K12.SL.1.2
- LAFS.K12.SL.1.1
- LAFS.K12.R.3.7
Saltwater Fish Measurement

Fish species regulated by **Total Length** are measured from the most forward point of the head with the mouth closed to the farthest tip of the tail with the tail squeezed.

Fish species regulated by **Fork Length** are measured from the most forward point of the jaw or snout with the mouth closed to the center fork of the tail.

Visit MyFWC.com for more information
Rods and Reels

Activity Objective

Students will learn about several different types of rods and reels and how to operate them.

Objectives

1. Learn the different types of fishing rods and reels.
2. Learn how to set the drag on different reels.
3. Learn how to maintain different rods and reels.

Background Information

There are many types of rods and reels that are designed for different kinds of fishing. Deciding which type of rod and reel to use is an important factor in your fishing experience.

Cane poles are a simple fishing rod you can use to catch freshwater or saltwater fish. A piece of fishing line (the same length as the cane pole) is attached, along with a float and a hook. Instead of casting, the line is simply swung out into the water by holding the end of the pole in one hand and the line just above the hook in the other. While facing the water near the bank, hold the pole at about a 45 degree angle and let go of the line so it swings out over the water. At the farthest end of the swing, drop the end of the pole, thus dropping the bait and bobber into the water. Do not let campers overhead cast the cane pole, for safety reasons.

Spin-casting rods and reels are a very simple combo that will enable you to cast to fish. The reel has a push-button control for releasing the line off the covered spool. These reels are good to use in freshwater and require regular maintenance if used in saltwater to prevent corrosion. The spin-cast is also known as closed face reel or the push button reel. Spin-casting reels eliminate backlash tangles because the spool doesn’t move. During a cast, line is pulled off the fixed spool through a hole in the top of the reel by the weight of the lure. The spin-casting drag is set by turning the small wheel on the front to either the left or right (each reel is marked with – or + to show which direction to turn the wheel). The reel and guides are on top when the rod is held correctly.

Spinning rods and reels are designed for use in either freshwater or saltwater. They are available in a wide range of sizes, depending on where you want to use them. The reel and guides are on the bottom when the rods is held correctly. These
rods and reels have a bail that winds the fishing line onto the reel. To cast, lift the bail, hold the fishing line between your finger and the rod, and cast while letting go of the fishing line. The spinning reel is also known as the open face reel.

The drag is usually the knob on top of the reel, however there are some spinning reels with rear drag. To set the drag correctly, first start by releasing the drag tension. Then, as you pull line from the reel, slowly increase the drag tension to the proper setting. The best way to measure the setting is to use a fish scale tied to the line, but you can also simply use your experience in feeling how much tension is best as you pull on the line. Remember, you should always be able to pull line through the tension of the drag to prevent line breakage.

**Bait-casting rods and reels** can be used in either freshwater or saltwater. They are designed so the spool rotates when casting or retrieving line. These rods and reels are available in a wide variety of sizes and styles for use in many situations. Some of these reels have a guide to wind the line neatly onto the spool. The reel and guides are on top when the rod is held correctly.

To set the drag on bait-casting reels, turn the star drag counterclockwise to loosen and clockwise to tighten the tension.

When casting, place your thumb on the spool to prevent line from tangling. Flip the release lever down. Bring the rod back and then forward in one swift motion, releasing your thumb from the spool during the forward motion, allowing the bait to be cast. Stop the spool with your thumb as the bait enters the water. Now flip the release lever up to the engaged position and slightly turn the handle to put some pressure on the spool, ensuring it is fully engaged. Preventing backlash and tangles takes practice! Slightly tightening the tension knob will apply resistance to the spool and allow for better cast control.

**Conventional rods and reels** are generally used to catch large fish in offshore waters. Most conventional rods and reels are not casted and are used for trolling or bottom-fishing. However, some newer models are light enough to cast large baits. Like bait-casting reels, conventional reels are designed so the spool holding the line rotates when casting and retrieving. Conventional reels can have two types of drag systems, either star drag or lever drag. The star drag is located between the handle and the spool. The knob looks like a star. For a star drag, turn the star counterclockwise to loosen and clockwise to tighten the tension. Lever drag can be easily slid forward to apply more drag or backward to release.

**Fly rods and reels** use the weight of the line to carry the lure to the fish. Lures for fly-fishing are very light and are made from feathers, fur, and fiber. Fly-fishing requires training and lots of practice to cast properly.

**Rod and Reel Maintenance:**
All rods and reels need to be lightly rinsed with freshwater after each use. Avoid excessive water from a high pressure source as this may push salt and/or debris inside the reel. Wipe down reels with a rag or towel after rinsing. Then lightly oil and grease the easily accessible moving parts. Lubricate the following on the spinning reel: line roller, bail hinge, crank handle knobs and shaft, beneath the anti-reverse switch, and where the center shaft exits the top of the reel. This is good practice after every fishing trip.

**Key Terms**

Reel seat – Where the reel attaches to the pole.

Handle – Where you hold the rod; it is usually made of cork or foam.

Guide/eye – Circular eyes used to guide the fishing line down the length of the pole to the water.

Reel casing – Contains the spool of fishing line.

Line – The line attached to the reel which follows down the eyes of the pole and attaches to a hook or lure. Fishing line comes in many different types, including braided and monofilament, colors, and weights.

Reel handle – This is turned to retrieve the fishing line.

Drag – Increases or decreases resistance on the fishing line inside the reel; drag, when used correctly, can prevent line breakage and help land a fish quickly.

Rod – Rods come in many lengths and widths and are the base for attaching the reel and eyelets. A rod may be considered the “foundation” of your fishing gear. They are mostly made from graphite.

Button release – Pushed, held, and released during each cast.

Bail – The piece of metal found on spinning reels that winds the fishing line onto the reel.

**Materials**

- Cane pole
- Spin-cast rod and reel
- Spinning rod and reel
- Fly rod and reel
- Conventional rod and reel
- Bait-casting rod and reel
- Fly, spin-cast, and spinning reel for maintenance lesson plan, if available
- Image of corroded spinning reel

**Procedure**
1. Show the students the different types of rods and reels.
2. Discuss what each type of rod is for, how it is used, and basic functions of each part.
3. Discuss how drag is set and why.
4. Discuss the differences of where the guides are located, the length of the pole, and what each pole is used for.
5. Show how to hold and cast the rods and reels.
6. Discuss rod and reel maintenance and storage.

For 6th - 8th graders
1. Divide the students into two groups, one group will cast each rod and reel and the other group will learn reel maintenance.
2. Rotate groups so each student will complete each station.
3. At the casting station, allow each student to practice a cast. The goal is to get each student familiar with casting each rod.
4. At the rod and reel maintenance station, allow each student to explore the fly, spin-cast, and spinning reels and take each reel apart if desired. Point out what a corroded reel looks like (if available) compared to a well-kept reel.
5. Show where the washers and gears are located on each reel and what parts need to be lubed.
6. Describe basic troubleshooting when line is tangled inside a reel.
7. Discuss the pros and cons of drag.
8. Discuss how to store your fishing poles when not in use (rinsing, loosening the drag, and stored upright, not leaning against a wall).
9. Rods can be stored horizontally with multiple supports along the rod.

Discussion
- Why would different rods be important for different types of fishing?
- What is the benefit of using gear heavy enough to quickly land a fish?
- Why is it important to rinse gear after saltwater fishing?
- How should a rod and reel be stored when not in use?

Florida Standards Grades 3rd - 5th
• LAFS.3.RL.1.1
• LAFS.3.RI.1.1
• LAFS.3.RI.3.7
• LAFS.3.SL.1.1
• LAFS.3.SL.1.2
• LAFS.3.SL.1.3
• LAFS.3.L.3.6
• PE.3.C.2.2
• LAFS.4.SL.1.1
• LAFS.4.L.3.6
• PE.4.C.2.2
• LAFS.5.SL.1.1
• LAFS.5.L.3.6.
• PE.5.M.1.1
• PE.5.R.5.2

Florida Standards Grade 6th - 8th

• LAFS.6.RI.3.7
• LAFS.6.SL.1.2
• LAFS.6.SL.1.1
• LAFS.6.L.3.6
• PE.6.R.5.2
• PE.6.R.5.4
• PE.6.R.5.5
• LAFS.7.SL.1.1
• LAFS.7.L.3.6
• PE.7.M.1.7
• PE.7.R.5.2
• PE.7.R.5.3
• PE.7.R.5.5
• LAFS.8.SL.1.1
• LAFS.8.L.3.6
• PE.8.R.5.4.
• PE.8.R.5.5

Florida Standards Grades K - 12th

• MAFS.K12.MP.5
• MAFS.K12.MP.6.1
• LAFS.K12.L.3.6
• LAFS.K12.L.3.6
• LAFS.K12.SL.1.2
• LAFS.K12.SL.1.1
• LAFS.K12.R.3.7
<table>
<thead>
<tr>
<th>Cane Pole</th>
<th>Spin Casting</th>
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![Cane Pole](image1.png) ![Spin Casting](image2.png) ![Spinning](image3.png) ![Bait Casting](image4.png) ![Conventional](image5.png) ![Fly](image6.png)
Spin-Casting Reel Parts and Proper Hold

The proper hold for a spin-caster while casting left handed is with index and middle fingers above the pistol grip, ring and pinky finger behind, and thumb on the thumb button.
The proper hold for a spinning rod while casting left handed is with index, middle fingers above the reel arm and ring and pinky finger behind the reel arm, and thumb wrapped around the rod.
Bait-Casting Reel Parts and Proper Holding

The proper hold for a bait-caster while casting left handed is with index and middle fingers above the pistol grip and ring and pinky finger behind and thumb on the spool.
Conventional Reel Parts and Proper Holding

The best way to hold the rod while fighting a fish is to have your hand that is not on the reel handle hold the rod above the reel and to use a fighting belt or chair (if needed) so your whole body can bring in a big fish.
Fly Reel Parts

- Spool Release
- Reel Handle
- Reel Seat
- Drag
Knot Tying

Activity Overview

Students will learn how to tie the improved clinch knot, the uni-knot, the end-loop knot, and the Albright special knot.

Objectives

1. Learn when to use different knots.
2. Practice tying knots for basic fishing.

Safety

Although the provided hooks have been dipped in plastic, the tips can still be sharp and should be treated as live hooks.

Background Information

Fishing knots allow you to properly tie your line to your hook, lure, and other tackle. Each knot has a specific purpose.

Knot Tying Tips

- Knots have their own terminology. The "tag end" (sometimes called the "working end") is the end of the line used to tie the knot. The "standing line" is the part of the line coming from your fishing reel.
- Leave a foot or more of the "tag end" of line for tying knots so that you can tie them properly.
- Pull on all ends when tightening the knot. With some knots this will be only the standing end and tag end; with other knots it might be three or four ends.
- Pull knots tight to prevent slippage.
- Wet knots as you pull them tight. This prevents damage to the line and allows the knot to pull tight.
- Trim knots closely with a nail clipper or line cutter. A good knot, pulled tight, will not come loose.
- Close trimming prevents the knot from catching snags or weeds. Do not burn the tag end – heat damages the line and knot.
- Knots are rarely as strong as the line.

Key Terms

Tag end – The loose end of the fishing line.
Hook – Curved or angular piece of metal or other hard substance for catching, pulling, holding, or suspending something.

Hook eye – Opening on the hook where fishing line is passed through.

Standing line – The end of the fishing line attached to the reel.

Shank – Portion of the hook connecting the eye and the point, backbone of the hook.

Point – Sharp end that penetrates the fish.

Barb – The projection that extends backwards from the point and is used to keep the bait on the hook.

Improved clinch knot – A knot used for tying line to a hook, swivel, and some artificial lures.

Uni-knot – A knot used for tying line to the hook, tying light line to heavy line, and many other applications.

End-loop knot – A knot used for tying leader to lures that require freedom of movement like jigs and plugs.

Albright special knot – A knot used to tie light line to heavier line such as a leader.

Materials

- 30 20/Ø hooks with sharp points dipped in rubber
- 30 Rope pieces, each ~ 3 feet long
- 4 Laminated knot signs: uni, improved clinch, end loop, and the Albright Special knots
- 30 Kids’ Fishing Activity (Fishing Florida) books
- 5 pliers or line clippers
- 30 Lengths of 30 lb test monofilament ~ 4 feet long
- 30 2/Ø Circle hooks

Procedure

1. Give each student one 20/Ø hook, a length of rope, one 2/Ø circle hook, and one length of the 30 lb monofilament.
2. Demonstrate how to tie the improved clinch knot using the appropriate knot sign.
3. Give the students time to practice first with the rope and once they master the knot, they can use the 2/Ø circle hook and length of monofilament to practice.
4. Demonstrate how to tie the uni-knot using the corresponding knot sign.
5. Give the students time to practice first with the rope and once they master the knot, they can use the 2/Ø circle hook and length of monofilament to practice.

6. For 6th - 8th graders, demonstrate how to tie the end loop and Albright special using the corresponding knot signs.

7. Give the students time to practice first with the rope and once they master the knot, they can use the 2/Ø circle hook and length of monofilament to practice.

Discussion

- Why is it important to know how to tie the improved clinch knot?
- Why is it important to know how to tie the uni-knot?
- Can you think of and possibly demonstrate for the class, another type of knot and explain how it would be helpful during fishing?
- Can these knots be used to tie fishing line to other terminal tackle?

Florida Standards Grades 3rd - 5th

- PE.3.C.2.2
- PE.4.C.2.2
- PE.5.R.5.2

Florida Standards Grades 6th - 8th

- PE.6.M.1.12
- PE.7.M.1.7
- PE.8.R.5.5

Florida Standards Grades K - 12th

LAFS.K12.L.3.6
Improved Clinch Knot

Put the tag end of the line through the eye of the hook and bring it back toward the line.

Make five twists around the standing line.

Take the tag end back toward the hook and push it through the first loop nearest the eye.

Bring the end back through the big loop.

Carefully hold the hook and the line, pull the knot tight until it looks like the knot above.
The Uni-Knot

Run line through eye of the hook at least 6” and fold to make two parallel lines. Bring the end of the line back in a circle towards the hook.

Make six turns with the tag end around the double line and through the circle.

Hold the double line at the point where it passes through the eye and pull the tag to snug up turns.

Pull the standing line to slide the knot tight against the eye. Trim the tag end flush with the closest coil of the knot.
End-Loop Knot

Tie a simple overhand knot in the line several inches from the end, do not tighten the knot at this point.

Insert the line through the lure eye, turn and insert the end of the line through the wide portion of the overhand knot.

Loop size is determined at this point by moving the overhand knot the desired distance from the lure eye. Make a simple half-hitch with the tag end around the standing part of the line ABOVE the overhand knot.

Pull tight on the lure and on the line to cinch the knot.
Albright Special Knot

Make a loop with the heavier line. Pass about 10-12 inches of the lighter line through the loop.

Wrap the lighter line around the base of the loop, opposite the side of the loop where the line came out.

Wrap the light line back over itself and the doubled leader line. Make 10-15 turns.

Insert the light line back through the loop in the same direction it was previously inserted into the loop.

Pull gently on the standing part of the line to remove slack; then pull gently on the tag end of the leader. Finally, pull the tag end of the line as tight as possible and then pull the standing line tight.
Casting

Activity Overview

Students will learn how to properly perform an overhand cast with a spin-cast (push button or close face) and a spinning (open face) rod and reel.

Objectives

1. Students will learn how to properly cast.

2. Students will learn how to practice aiming their cast.

3. Students will learn how to properly carry their rod and reels.

Background Information

A good cast is an integral part of fishing. Without a good cast, it can be difficult to place your baited hook where you want it. This activity is designed to teach the basic over-hand method of casting. A successful cast has six steps: grip, stance, aim, cast, release and follow-through.

How to cast a push button spin-cast rod and reel (3rd-5th grade)
The rod should be held firmly in your dominant hand with your forefinger on the rod handle trigger and your elbow bent at a right angle (the reel should be above the rod). You should face your target with your feet shoulder-width apart. Aim by pointing the rod at the target and keeping your eyes on the target as you cast. To cast, push and hold the button. The casting plug should begin hanging about 1 inch below the rod tip.

Look behind you to make sure the area is clear. Bring the rod over your shoulder in a straight line until the rod is parallel to the ground and the reel is beside your ear.

Swing the rod forward until the rod is at a 90-degree angle with the ground; the rod tip should be pointing over your head. At this point, release the button. This movement should be a smooth motion. If the lure hits the ground in front of you, the button was released too late. If it lands behind you, the button was released too early.
Follow through the casting motion until your rod is parallel to the ground and your rod tip is pointed at your target.

**How to cast a spinning rod and reel (6th - 8th grade)**

Hold the rod with your dominant hand. The reel should be below the rod. The reel foot usually goes between your middle finger and your ring finger, but if it feels more balanced between other fingers, go with that.
Hold the line against the rod with the crook of your index finger.

Open the bail with your other hand.

Cast the rod the same as with a spin-cast rod. Point the rod at the target. Look behind you to make sure the area is clear. Bring the rod over your shoulder in a straight line until the rod is parallel to the ground and the reel is beside your ear.

Swing the rod forward until the rod is at a 120-degree angle (11:00) with the ground; the rod tip should be pointing over your head. At this point, release the line held by your finger. This movement should be a smooth motion. If the lure hits the ground in front of you, the line was released too late. If it lands behind you, the line was released too early.

Follow through the casting motion until your rod is parallel to the ground and your rod tip is pointed at your target.
Close the bail with your free hand or turn the handle.

**Key Terms**

Reel seat – This is where the reel attaches to the rod.

Handle – The location of where you hold the rod. It is usually made of cork or foam.

Guides – Circles attached to a rod which are used to guide the fishing line down the length of the pole.

Reel casing – The container that houses the spool of fishing line.

Line – Fishing line comes in many different forms including braided and monofilament.

Reel handle – A handle that is turned to retrieve the fishing line.

Drag – The increase or decrease of the tension on the fishing line. If used correctly, line breakage will rarely occur.

Rod – Rods come in many lengths and widths and are mostly made from graphite.

**Materials**

- 10 Traffic cones
- 15 Spinning rods and reels (rigged with casting weights)
- 15 Spin-casting rods and reels (rigged w/casting weights)
- 10 Backyard bass
- 5 Hula hoops

**Procedure**

1. Arrange the 10 traffic cones in a straight line with approximately 5-6 feet separating each of them. This marks the line where the students should stand as they practice casting.

2. Set up the backyard bass and hula hoops at least 10 feet in front of the traffic cones in a large area away from the flow of traffic, trees, or any other obstructions.

3. Lay out one spin-cast rod and reel at each traffic cone and select 10 students to line up behind one cone each.

4. The instructor and volunteers teach the students how to properly cast, *stressing safety at all times*. Remind students to always look behind them before each cast, as
there will most likely be someone else in the area where they are casting. The phrase “always look behind you!” should be a very familiar phrase by the end of this activity.

5. The goal is for the students to hit inside a hula hoop or reel their line in with the casting plugs on the end of the line snagging a backyard bass.

6. Once each of the 10 students has had a chance to cast at least three times, have them reel in the line and place the rod and reel next to the cone. Have the next group repeat the casting activity and so forth until all students have casted.

7. Once all the students have had a chance to cast with the spin-cast rods and reels, repeat the sequence and instruction with the spinning rods and reels.

8. The students should also be taught how to safely walk with a rod (rod pointing straight up, never sticking out forward or backwards; and the casting plug or hooks should be secured, never left swinging lose).

9. The proper use of the drag system on the reels should be reviewed. Explain how the drag should be tightened to increase the resistance for larger fish and loosened for smaller fish.

10. *Provide each student with a rod rigged with a casting plug only after they have been instructed on proper casting technique.

Discussion

- What are the potential consequences of not looking behind you when you cast?

- What is the purpose of the drag on the reel? How do you set the drag?

Florida Standards Grades 3rd - 5th

- LAFS.3.RL.1.1
- LAFS.3.RI.1.1
- LAFS.3.RI.3.7
- LAFS.3.SL.1.1
- LAFS.3.SL.1.2
- LAFS.3.SL.1.3
- LAFS.3.L.3.6
- PE.3.C.2.2
- LAFS.4.SL.1.1
- LAFS.4.L.3.6
- PE.4.C.2.2
- LAFS.5.SL.1.1
- LAFS.5.L.3.6
- PE.5.M.1.1
Florida Standards Grades 6th - 8th

- LAFS.6.RI.3.7
- LAFS.6.SL.1.2
- LAFS.6.SL.1.1
- LAFS.6.L.3.6
- PE.6.R.5.2
- PE.6.R.5.4
- PE.6.R.5.5
- LAFS.7.SL.1.1
- LAFS.7.L.3.6
- PE.7.M.1.7
- PE.7.R.5.2
- PE.7.R.5.
- PE.7.R.5.
- LAFS.8.SL.1
- LAFS.8.L.3.6
- PE.8.R.5.4
- PE.8.R.5.5

Florida Standards Grades K - 12th

- MAFS.K12.MP.5
- MAFS.K12.MP.6.1
- LAFS.K12.L.3.6
- LAFS.K12.SL.1.2
- LAFS.K12.SL.1.1
- LAFS.K12.R.3.7
Tackle

Activity Overview

Students will learn about common types of tackle used for saltwater fishing and the items that should be in every tackle box.

Objectives

1. To understand the important items that should be inside a tackle box.

2. To have a basic understanding of how and why each item is used.

Background information

Anglers should be prepared for each fishing trip with important details such as the fishing location, supplies needed for the trip, methods for rigging tackle, common species caught, regulations for targeted species and proper catch-and-release techniques. Anglers will have many items in a tackle box to take fishing, and in most cases the tackle box will contain a few lures, spare parts, and fish-handling gear.

Angler health and safety is vital and items to protect oneself from the elements should be in your tackle back. Theses include bug spray, sunscreen, wide-brimmed hat, sunglasses, water, and first aid kit. Before handing out always check the weather. If out on a boat a personal flotation devices ought to be worn, a float plan should be left with a reliable person and all US Coast Guard required safety equipment needs to be on board.

Anglers use lures or natural bait to attract their catch. There are many lures (plugs, spoons, jigs) and a tackle box keeps them organized. It is important to know when and where to use lures and gear while fishing. Other important items for a tackle box are spare monofilament, weights, circle hooks, measuring tape. Every tackle box should have: the anglers’ license, copy of current regulations, first aid kit, sunscreen, bug spray, measuring tool, pliers and knife.

Monofilament connects your hook and bait to your reel or cane pole and enables you to reel the fish in, or land it. Over time monofilament may break, become weak, or get snagged while fishing, so it’s important to bring extra along with you. You should inspect your fishing line prior to fishing and replace it if necessary. Monofilament is made to handle the pressure from fighting a fish and is made in various weight classes. The weight classes of fishing line are measured in pound test. For example, 10-pound fishing line is designed to hold up to 10 or 12 pounds of pull before the line breaks. Six to 12 pound test is basic fishing line for fishing.
inshore. Leaders (used when fishing for large fish such as sharks or for fish with teeth) can be larger in pound test.

Sinkers or weights are used to hold line on the bottom when the current is strong or to get the hook to the bottom faster. There are many different styles of sinkers. Split shot sinkers can quickly be added to your line; pyramid sinkers are designed to anchor into bottom sediments (for instance when fishing in the surf at beaches), and egg weights are snag resistant and roll along the bottom.

Hooks are used with natural bait, artificial bait, and are attached to lures and various rigs. Circle hooks are designed to hook a fish in the mouth over 90% of the time, versus a “J” hook that is often swallowed by a fish causing internal injury or possibly killing the fish. Therefore, circle hooks are recommended when using natural bait. Corrosive hooks (non-stainless steel) are recommended because these hooks will rust away if they happen to remain in the fish after it is released.

Dehooking tools are useful devices to remove a hook from a fish’s mouth with little or no handling of the fish or while the fish is still in the water. It prevents the removal of the slime layer of a fish which protects it from parasites and diseases. If the angler must touch or hold a fish that is to be released, it should be done with wet hands and not a wet towel or rag. There are many different kinds of de-hooking tools: some float, some are very long, and even a pair of pliers can be used to remove a hook. If a fish swallows a hook (called “gut hooking”), the line should be cut as close to the hook as possible. If the hook is non-stainless steel, it will rust out of the fish.

Fishing regulations are important to have in possession while fishing and are used to found out when a fish may be harvested, how many fish, and what length the fish must be in order to keep it. Any angler 16 years or older must have a fishing license.

Clippers, or a pair of needle-nosed pliers are great for trimming and cutting extra line.

A knife, with supervision or parental consent, can be a handy tackle box tool to cut bait, line, and fillet the day’s catch.

Measuring tapes help anglers determine the length of their catch and by referring to the regulations, it can be decided if the fish is legal to keep.

**Types of Fishing Line**

Monofilament fishing line (mono): The most commonly used line and most versatile. It is a single strand of nylon. It typically holds knots better, is easy to cast, has low visibility, shows some abrasion resistance and is less expensive than other fishing
lines. But, it can stretch out over time and deteriorate from ultraviolet light exposure. Mono does stretch under pressure, which may be both good and bad depending upon your needs. Stretch may weaken the strength of a line but it also gives you more reaction time when a fish runs or jumps. Mono is available in many different colors which are appropriate to different water conditions. Typically, anglers pick a color that will be least visible in the water; there are times when fluorescent lines may be best. A good all-around fishing line to use in many different situations.

Fluorocarbon: Single strand of polyvinylidene fluoride. It has very low visibility and stretch, resistance to abrasion and ultraviolet light, good knot strength and it sinks to the bottom. However, it can be very stiff to tie and is more expensive than monofilament.

Braid: Fused or braided strands of polyethylene. It has a smaller diameter, further casting distance, low stretch and exhibits resistance to ultraviolet light and abrasions. Braid lines are more sensitive to vibrations and are thinner than traditional mono lines. These attributes allow for anglers to detect “pick-ups” from a fish while also allowing for increased line capacity on a reel. But, only certain knots (such as the uni knot) should be used with braid, it is highly visible in the water and it costs more than monofilament. Use when fishing near structure or on the bottom and while using lures that spin

Leader: Material attached between the fishing line and the hook. Leaders can be made of low-visibility fluorocarbon, hard monofilament, steel, titanium or other materials depending on the target species. They provide increased protection from sharp edges and are less visible than most fishing line. Use when targeting large or toothy fish and when fishing near sharp structure.

Wire and monel line: These specialized lines are often used for trolling in strong currents because they sink quickly. Wire is prone to kinking, so take care when letting this line out or reeling in. Monel, or lead-core lines, are more flexible and less likely to tangle than wire line but still offers the same weight. Both lines are optimal for conventional reels with extra line capacity (to handle the wider diameter lines) and chromed-bronze spools for corrosion resistance.

What to know before you buy: Know the size of your target species and use appropriate tackle. Some lines work best with certain tackle or a particular type of fishing.

**Key Terms**

**Gripping tools** – A tool that helps an angler grip the fish without having to grab a fish by the gills, eyes, etc.
Snap – A piece of metal that can be attached to a swivel and a lure. This helps an angler switch lures quickly.

Swivel – A piece of metal that attaches leader to line and spins/rotates at the leader. This keeps kinks and twists out of the main line.

Split shot sinker – A type of weight that can be pinched on monofilament and add weight to a lure quickly.

Pyramid sinker – A sinker that is shaped like a pyramid and is used when fishing from the shoreline and in strong currents to keep bait on the bottom.

Jig bodies – Attach to a jig head and come in a variety of shapes, sizes, and colors.

Jig heads – A weighted hook and is used with a jig body. The weight usually has a false eye painted on it.

Feather jigs – A weighted hook with a small jig body covered in colorful feathers.

Plugs – Constructed from hollow plastic or wood to resemble baitfish or other prey. They have two or three treble hooks. These lures can be fished at almost any depth and some are made to float, dive or both. Includes: crankbaits, jerkbaits, surface plugs, floating or diving plugs, rattling plugs and poppers.

Spoon – Used in trolling and has a curved shape like a spoon, comes in different sizes and has a hook already attached.

Divers – These are deep running plugs and have an extra long lip that makes them dive at a fast rate the harder the angler reels the lure in.

Artificial lure – A lure that mimics live bait.

Leader – Monofilament/wire- used when targeting fish with sharp teeth or fishing around sharp habitats such as oyster bars.

Egg weights – A type of weight that is shaped like an egg and is used on a fish-finder rig.

Circle hooks – A hook with the point turned perpendicular to the shank. This hook catches a fish in the mouth more than a “j” hook and should be used when fishing catch and release.

“J” hooks – A hook shaped like a “j” and should not be used when fishing catch and release. These hooks often come on a jig or lure.

Float or bobber – A float that bobs at the surface and indicates a fish is biting the hook when pulled underwater.

Popping cork – A type of float that has weights and beads. When the float is jerked, it makes a “popping” sounds that attracts fish.

Line clippers – Used to clip tag lines after completing a knot.
**Dive flag** – Used to alert boaters that there are people in or underwater when diving or snorkeling.

**Measuring tape** – Is used to measure the length of a fish. Metal styles may corrode.

**Weather forecast** – Should always be checked before going fishing or on a boat.

**Angling guide** – Shows public boat ramps, water depths, and seagrass beds.

**Landing net** – A rubber landing net supports the weight of the fish while protecting the slime layer.

**Pliers** – Can be used to remove a hook or to crimp down a weight.

**Fish sling** – A rubber sling that supports the weight of the fish and can be useful when weighing a fish.

**Gaff** – A large hook that is hooked into the body or a mouth of a fish that is intended for harvest. This tool helps lift fish on board a boat.

**Pound test** – The weight at which the line would break at a direct, straight pull.

**Knot strength** – The percent of the fishing line’s original strength after the knot is tied. This is as important as using the proper type of knot.

### Materials

Need one of each item.

- Piece of monofilament leader
- Piece of wire leader
- Snap
- Swivel
- Split shot sinker
- Pyramid sinker
- Jig bodies
- Jig heads
- Feather jigs
- Spoon
- Plug
- Diver
- Artificial lure
- Jig with a pre-attached body
- Gripping tool
- Egg weight
- Circle hook
- J hook
- Float
- Popping cork
- Tackle worksheets 1 per camper
- Tackle box (to store lures)
- Pencils

**Procedure**

1. Hand out a tackle worksheet and a pencil to each student
2. Present each tackle item to the group in the order they are on the worksheet.
3. Explain what each item is used for and what it does to attract fish.
4. Highlight what habitat each lure would be used in (seagrass beds, dark water, etc.) and identify a fish that might strike each lure.
5. Allow time for students to take notes on the worksheet.
6. Show students how to work different types of lures and allow them time to try.

**Discussion**

- What lure would be most useful when fishing around ledges or rocks?
- What does “jigging” mean?
- What is a benefit to using an artificial lure over live bait?
- What makes a diver crankbait dive?
- What type of sinker would you use when surf fishing?

**Florida Standards Grades 3rd - 5th**

- LAFS.3.RI.3.7
- LAFS.3.RI.1.1
- LAFS.3.RI.2.4
- LAFS.3.SL.1.2
- LAFS.3.SL.1.3
- LAFS.5.SL.1.2
- PE.3.C.2.2
- PE.3.C.2.5
- PE.4.C.2.2
- PE.4.M.1.1
- PE.5.R.5.2
Florida Standards Grades 6th - 8th

- LAFS.6.SL.1.2
- PE.6.M.1.12
- PE.6.R.5.3
- PE.6.R.5.5
- PE.7.M.1.4
- PE.7.M.1.7
- PE.7.R.5.3
- PE.8.R.5.4
- PE.8.R.5.5

Florida Standards Grades K – 12th

- LAFS.K12.L.3.6
- LAFS.K12.SL.1.2
Circle Hook: A fishing hook that has the point sharply curved back to the shank to form a circular shape. The curve shape causes the hook to catch in the corner of the fish’s mouth. Do not set these hooks.

“J” Hook: A fishing hook that has the point straight and looks like the letter “J”. The hook has to be set with a quick yank.

Worm Hook: A “J” hook with a 90 degree bend or notch at the top of the hook that aids in keeping plastic baits on the hook.

Kahle Hook: This hook looks similar to a circle hook, but there is a subtle difference in shape. In kahle hooks, the barb is pointed toward the hook eye instead of toward the shank of the hook. The distance is also much greater between the point and the shaft. This may lead to an increased rate of gut-hooking.

Treble Hook: A three-pronged hooks used often on artificial lures.

Jig Head: Pre-weighted hooks with the weight sometimes painted in various colors and eyes in a contrasting color. Are used often with soft body lures.

Split Shot: A type of weight that can be pinched on monofilament and add weight to a lure quickly.
Pyramid Weight: 3 to 4 sided weight that comes in different sizes and is used to keep bait on the bottom in waves and currents.

Egg Weight: A type of weight that is shaped like an egg with a hole in the center and are used to roll over rocks and rubble.

Dipsy/Swivel Weight: A weight used for multi-directional trolling or for bottom fishing with live bait.

Bank Sinker/Weight: Bell-shaped weight made to stay on the bottom without getting stuck.

Popping Cork: A type of float that has weights and beads. When the float is jerked, it makes a “popping” sounds that attracts fish.

Float/Bobber: A float that bobs at the surface to suspend your bait in the water. They serve as a good indicator of a fish strike when the float disappears underwater.

Wire Leader: Thin wire used with terminal tackle when the targeted species of fish has sharp teeth, when trolling offshore, and when fishing around sharp habitats such as oyster bars.
Monofilament Fishing Line: The most commonly used line and most versatile. Mono stretches under pressure, which may be both good and bad depending upon your needs. Stretch may weaken the strength of a line but it also gives you more reaction time when a fish runs or jumps.

Snap: A piece of metal that can be attached to a swivel and a lure. This helps an angler switch lures quickly.

Swivel: A piece of metal that attaches leader to line and spins/rotates at the leader. This keeps kinks and twists out of the main line.

Spoon: Artificial lure with a concave shape that causes it to wobble creating a darting motion. The metallic finish provides flashing to attract fish.

Plug: Lure constructed from hollow plastic to resemble baitfish or other prey. They have two or three treble hooks. These lures can be fished at almost any depth, as some are made to float, dive or both. Types plugs include: crankbaits, jerkbaits, surface plugs, floating/diving plugs, rattling plugs and poppers.

Crankbait/Diver: These are deep running plugs and have an extra long lip that makes them dive at a fast rate the harder the angler reels the lure in. They also can have a tight wiggle and have a wide side to side wobble depending upon the lip or bill shape.

Soft Body Lures/ Jig Body: Bait molded of soft plastic made to imitate natural bait and used with a jig hook. They come in countless shapes, colors and lengths.
Artificial Shrimp: Soft body lure made to look like a natural shrimp. Also available in many different colors, shapes and sizes.

Flies: A single hook, dressed with feathers or soft material to mimic an insect. Used in fly fishing.

Feather Jig: A single hook molded into a lead head and dressed with feathers or soft material to mimic a tail.

Dehooking Tools: Tools that allow the hook to be secured and the barb shielded without re-engaging or re-hooking the fish when the hook is removed.

Fish Sling: A rubber sling that supports the weight of the fish horizontally and can be useful when weighing a fish.

Gripping Tools: Tools that help anglers grip the fish without having to grab by the gills, eyes, mouth, or other sensitive parts.
Knotless Rubber Coated Landing Net: A knotless rubber landing net supports the weight of the fish while preventing the fish’s protective slime coating from being removed.

Venting Tools: A sharpened, hollow instruments that help release expanded gases from the fish’s body cavity enabling the fish to swim back to capture depth.

Descending tools: Tools used to descend deep-water fish without having to puncture the body cavity.

Gaff: A large hook that is used to help lift fish intended for harvest onto a boat. This tool is hooked into the body or the mouth of a fish.

Line Clippers: Used to clip fishing line after completing a knot.

Dive Flag: A flag used to alert boaters that there are people in or underwater
Measuring Tape: used to measure length of fish to determine if it is legal to keep.

Angling guide: Shows where public boat ramps, water depths and marine habitats are.

Weather Forecast: Weather should be checked before all fishing and boating trips.

Tide Chart: Show the daily predictions of times and heights of high water and low water, for a particular location.
Fish Morphology

Activity Overview

Students will gain an understanding of fish adaptations and learn why the development of these adaptations helps to ensure fish survival. Students will learn how to use the morphology of a fish to determine how and what it may eat, where it lives, and how it protects itself based on the visual clues given.

Objectives

1. Name the different body, mouth and tail shapes and how these affect fish.
2. Identify different types of coloration and why fish have these.
3. Name the fish’s sensory organs.

Background Information

Morphology is the study of the form and structure of organisms. Studying the morphology of fishes allows us to understand their life history and how and why they survive in their habitat. This includes the physical characteristics such as the fins, mouth, body shape, and coloration.

Most bony fish have scales and are covered in a slime coat. This slime coat is very important because it is a barrier against diseases and lessens their resistance to water as they swim through it.

Fish also have fins, gills, and a lateral line. The lateral line allows the fish to feel the difference in water pressure around it and to sense movement; this is how fish in schools move as one unit.

Some adaptations determine how and when fish feed. Does the fish have large eyes? If so, it is most likely a visual predator, whereas if the fish has small eyes, it most likely uses another sense to help it in feeding. Knowing these adaptations will aid the angler in choosing the right type of lure or bait for a specific fish as well as when and where to fish.

By examining the different types of fish fins, body shapes, the types of coloration, and the types of mouths, we can learn a good deal about how fish have adapted to their environment.

Types of Fish Fins

Caudal Fin – Also called the tail fin, provides the power for moving the fish forward. There are five types of caudal fins: tapered (slow swimmers such as...
moray eels); rounded (capable of short bursts of speed; usually ambush predators such as flounder); squared (very maneuverable ambush predators such as grouper); forked (fast, continuous swimmers such as anchovy); and lunate (fastest swimmers, maximum speed with minimum effort such as blue marlin). Many fish fall into a combination of these categories. However, this is a good guide to understanding the relative speed of a fish.

Dorsal Fin – This fin is located on the back of the fish and is used for stabilization, preventing it from rolling over and assisting in turning. The dorsal fin is sometimes comprised of two parts: the anterior (forward) dorsal fin, which is made of hard spines, and the posterior (further back) dorsal fin, which is made of soft rays. Sometimes a fish may have two separate dorsal fins.

Anal Fin – This fin is also used to stabilize the fish while swimming.

Pelvic Fins – These are paired fins (there is one on either side of the fish). They assist the fish in moving up and down, turning, and stopping in the water.

Pectoral Fins – These are paired fins located on either side of the fish that assist with turning and lifting the fish through the water. They can be highly modified in some fish and be used for walking or gliding.

Types of Fish Body Shapes

Sphere – Rounded like a ball, these fish are very slow swimmers. They may attract prey using lights or lures. Because they are slow swimmers, these fish often have other adaptations to protect themselves.

Compressed – Flattened side to side, these fish are very maneuverable and make quick bursts in short distances.

Filiform (ribbon-like) – Long and thin, these fish hide easily among rocks and in crevices and slither like a snake.

Fusiform (football-shaped) – Streamlined and cylindrical, these fish are tapered at both ends, allowing them to swim very fast and for long distances.

Depressed – Flattened from top to bottom like a pancake, these fish are often ambush predators that will bury themselves in the sand. They flip their fins up and down like a bird.

Types of Coloration and Pattern

Camouflage – These fish match their surroundings to blend in and hide.

Disruptive – These fish have spots and stripes to break up their outline.

Counter-shading – These fish have a dark back, which blends in with the ocean bottom when viewed from above. Their light belly blends with the sky when viewed from below.

Deceiving – False eyespots and mimicry help confuse predators.
Types of Fish Mouths

Superior – The orientation of this mouth is upwards, which allows the fish to eat at the surface or take prey that is above it in the water. The bottom jaw is longer than the upper jaw.

Terminal – The orientation of this mouth is straight forward, which allows the fish to eat prey in the water column in front of it. Both jaws are the same length.

Inferior – The orientation of this mouth is downward, which allows the fish to take prey located below it. The upper jaw is longer than the lower jaw.

Special Modifications – Some fish have specially-modified jaws that allow them to do special things. Billfish, for example, have a long sword-like piece on their upper jaw used to stun their prey. Goblin sharks are able to extend their jaws outward and downward to catch prey below them.

Teeth – The shape and location of teeth can help us understand what type of prey the fish eats. Fish with sharp, pointed teeth are piscivorous (meaning they eat other fish). Fish that have hard, crushing plates (such as pufferfish) tend to eat things that are hard (such as crustaceans). Red drum and other crustacean eaters have pharyngeal teeth that are located further back in the throat and are used to crush food. It is interesting to note that the teeth of sharks are continuously replaced and are the only part of the shark that is made of bone. (The rest of the shark’s skeletal structure is cartilage).

Sensory Organs

Eyes – The location and size of the eyes can tell us a lot about how the fish hunts and where they live. If a fish has large, centrally-located eyes, the fish is most likely a visual predator that lives in the middle of the water column or moves throughout the water column. If the eyes are small or absent, chances are the fish has other sensory organs that they use to locate their prey. If the eyes are located on the top of the head, it’s most likely the fish lives toward the bottom of the water column, as it needs to see above itself while lying on the bottom.

Lateral Line – A line of sensory organs located on fish that allows for detection of movement and vibration in the surrounding water. This is how schooling fish know how to move together.

Ampullae of Lorenzini – These special sensory organs are found almost exclusively in cartilaginous fishes (although a few bony fishes do have them, such as sturgeon). These organs are found in pores near the nostrils, around the head and on the underside of the snout of sharks and allow the fish to sense electrical fields in the water. This allows sharks to feel the electrical fields put out by other animals due to their muscle movement.

Otoliths – Otoliths are a small bone found in the inner ear of fishes. These bones allow the fish to determine up and down and keep themselves oriented in the
water. Otoliths can be used by scientists to determine the age of the fish and the water quality where the fish was living. Like a tree trunk, these bones grow yearly rings that can be counted for aging.

Gills – Fish should never be lifted by the gills. While not a sensory organ, it is important to understand the function of the gills. Gills are made of many small filaments held on a larger bony piece called the gill raker. Fish use their gills to separate oxygen from the water. Bony fish have a hard covering to protect their gills, called the operculum (this is where many people incorrectly lift the fish). This gill cover allows fish to pull water through their gills in the proper direction by creating a vacuum inside the fish when it closes its mouth. Sharks lack an operculum and must use other means to keep water flowing over their gills, such as ram ventilation and buccal pumping. Gills are also used to help fish regulate the amount of salt found in their bodies. This process is called osmoregulation and involves the uptake or discharge of salt ions.

**Types of Scales**

Placoid Scales – These scales are found in cartilaginous fishes. They are physically formed in the same way as vertebrate teeth, having a pulp cavity surrounded by a layer of dentine. They do not grow in size as the fish grows, but instead more scales must be added.

Ganoid Scales – These scales are diamond shaped and connected by peg and socket joints.

Ctenoid and Cycloid Scales – These scales are found in most teleost (bony) fishes. Cycloid scales have smooth edges, while ctenoid scales have tiny teeth giving them a rough texture. These scales overlap like shingles on a roof, which makes them flexible. They grow in size through additions to their edges, creating bands of seasonal growth. Like the rings in a tree, these bands can be used to age the fish.

**Key Terms**

**Morphology** – The study of the form and structure of organisms

**Teleost** – The bony fishes (all fishes other than sharks and rays)

**Lateral Line** – System of sensory pores on the sides of fish that detect changes in water currents, vibrations in the water, and pressure changes

**Adaptation** – A change in the form, function, or structure of an organism to allow it to better survive in its environment

**Operculum** – Hard, bony flap that covers and protects the gills of bony fishes

**Materials**

- 6 pictures of fish
- 1 fish anatomy poster
- 24 cards of various fish traits
- 20 fish traits handout charts
- 6 *Saltwater Recreational Fishing Regulations*
- 6 *Fishing Lines* field guides
- 1 large plastic fish (snook or red drum)
- 5 small plastic fish showing different adaptations (flyingfish, pufferfish, blue-spotted stingray, green moray eel and tuna)
- 2 morphology adaptation posters
- 5 adaptation question sheets
- 5 dry erase markers
- Jars of otoliths, gills, scales, and teeth if available

**Procedure**

1. Discuss the background information with the campers using the anatomy and adaptation posters.
2. Hang the six fish pictures up around the room, and put a *Saltwater Recreational Fishing Regulations* booklet and a *Fishing Lines* field guide by each one.
3. Show the students the large plastic fish. Ask them to define some of the characteristics of the fish.
4. Explain how the different parts of a fish tell us different things about it.
5. Give each student one of the fish traits handouts.
6. Hand out one of the small laminated fish trait cards to each student.
   Instruct the students to find a fish on their fish traits handout that matches the trait listed on their card.
7. Then they are to locate one of the six fish posters in the room that their fish trait applies to and walk over to stand in front of or by the poster of that fish.
8. There can only be one student per fish with that particular trait.
9. Once they have all found their fish, have the students work as a group to identify the fish on the poster using the *Fishing Lines* field guide and look up the regulations for that species.
10. When all the groups have completed the task, each group gives a presentation on their fish, paying close attention to what the physical traits of the fish tell us.

**Second Program**

1. Hand out a plastic fish to each group of children, along with a question sheet, dry erase marker, and *Fishing Lines* field guide.
2. Have each group fill out the question sheet.
3. When each group has completed their sheet, have them present their findings to the other groups.

Discussion

- How have fish adapted their morphology to allow them to survive in their aquatic habitat?
- Why is the slime coating on a fish important?
- Why is a fish identification booklet important when you are fishing?
- Why do fish have adaptations? Why are fish not all the same?

Florida Standards Grades 3rd - 5th

- SC.3.N.1.1
- SC.3.N.1.6
- SC.3.L.15.1
- LAFS.3.RI.3.7
- LAFS.3.RI.1.1
- LAFS.3.RI.2.4
- LAFS.3.L.3.6
- LAFS.3.SL.1.1
- LAFS.3.SL.1.3
- LAFS.3.W.1.2
- SC.4.L.16.2
- SC.4.N.1.1
- LAFS.4.L.3.6
- LAFS.4.RI.1.1
- LAFS.4.RI.2.4
- LAFS.4.RI.3.7
- LAFS.4.SL.1.1
- LAFS.4.W.1.2
- SC.5.L.17.1
- SC.5.N.1.1
- LAFS.5.L.3.6
- LAFS.5.RI.2.4
- LAFS.5.RI.3.7
- LAFS.5.SL.1.1
- LAFS.5.SL.1.2
- LAFS.5.W.1.2
Florida Standards Grades 6th - 8th

- LAFS.68.RST.1.1
- LAFS.68.RST.2.4
- LAFS.68.RST.3.7
- LAFS.68.WHST.1.2
- LAFS.6.L.3.6
- LAFS.6.RI.1.1
- LAFS.6.RI.2.4
- LAFS.6.RI.3.7
- LAFS.6.SL.1.1
- LAFS.6.SL.1.2
- LAFS.6.W.1.2
- LAFS.7.L.3.6
- LAFS.7.RI.2.4
- LAFS.7.SL.1.1
- LAFS.7.SL.1.2
- LAFS.7.W.1.2
- LAFS.8.L.3.6
- LAFS.8.RI.2.4
- LAFS.8.SL.1.1
- LAFS.8.SL.1.2
- LAFS.8.W.1.2

Florida Standards Grades K - 12th

- LAFS.K12.L.3.6
- LAFS.K12.R.1.1
- LAFS.K12.SL.1.2
- LAFS.K12.SL.1.1
- LAFS.K12.R.3.7
Key for the First Program

Puffer: Round tail, spherical body shape, terminal mouth, disruptive coloration

Sheepshead: Forked tail, fusiform body, terminal mouth, disruptive coloration

Gag Grouper: Square tail, fusiform body, superior mouth, disruptive coloration

Southern Stingray: Tapered tail, depressed body, specially adapted mouth, camouflage coloration
Gulf Flounder: Rounded tail, compressed body, superior mouth, camouflage coloration, deceiving coloration

Longbill Spearfish: Lunate tail, fusiform Body, inferior mouth, counter-shading
Secondary Program Question Sheet

Use the chart provided to answer questions about the fish you have caught.

What body shape does your fish have? Do you think it swims fast or slow?
____________________________________________________________________
____________________________________________________________________

What tail shape does your fish have? What does this tell you about the fish?
____________________________________________________________________
____________________________________________________________________

What type of coloration does your fish have? Where do you think this fish might live?
____________________________________________________________________
____________________________________________________________________

What type of mouth does your fish have? Where do you think it gets its’ food?
____________________________________________________________________
____________________________________________________________________

Does your fish have any special adaptations? What are they?
____________________________________________________________________
____________________________________________________________________
Key for the Second Program

Flyingfish: Fusiform; forked/lunate tail; counter-shading; superior mouth
Fun Facts: The “wings” of the flying fish are actually modified pectoral fins. The fish avoid predators by leaping from the water and using the pectoral fins to glide through the air. They feed mainly on crustaceans and planktonic animals.

Pufferfish: Sphere body; rounded tail; disruptive/deceiving Coloration; terminal mouth
Fun Facts: Pufferfish use their beak-like jaws to eat small fish, barnacles, snails, crabs, and clams. They live in seagrass beds. Pufferfish use water to inflate their bodies when they feel threatened, which deters most predators.

Blue-spotted Stingray: Depressed body, tapered tail; disruptive coloration; inferior mouth
Fun Facts: The blue-spotted stingray feeds on mollusks, worms, shrimp, and crabs in shallow sandy areas during high tide. They are ovoviviparous, meaning they give birth to live young (up to 7 at one time) that hatched from egg cases inside the female.
Green Moray Eel: Filiform (ribbon-like) body; tapered/compressed tail; camouflage coloration; terminal mouth

**Fun Facts:** Green moray eels are actually brown. The yellow tint of the mucus that covers their skin combines with the brown skin color to give the fish its uniform green color. They are ambush predators with very strong teeth and they feed mostly at night on fish, crab, shrimp, octopus, and squid.

Goliath Grouper: Fusiform body; round tail; disruptive coloration; terminal mouth

**Fun Facts:** The Goliath grouper can reach 800 pounds and 8 feet in length. Goliath grouper are relatively long-lived, with a maximum known age to be at least 37 years old but may have the ability to live over 50 or even 100 years.
Fishing Journal

Activity Overview

Students will learn the importance of keeping a journal of their fishing activities.

Objectives

1. Practice writing important fishing information for future fishing tips.

Background Information

Keeping track of your fishing habits will allow you to learn which types of bait work best for catching certain species of fish and at what time of year. By charting the information from each trip, you will establish a pattern that will help you be more successful and enable you to better enjoy your time fishing.

Materials

- Fishing journal sheets (1 per student) for each day of fishing, print more as needed
- Pencils

Procedure

1. Discuss the importance of keeping a fishing journal with the students.
2. At the end of the fishing activity each day, hand out the fishing journal sheets and have each student begin to fill in their journal.

Discussion

- Why is a fishing journal important?
- What other entries can you add to your journal?
- What patterns might you notice looking back at older entries?
- Are there any other benefits to keeping a fishing journal?

Florida Standards Grades 3rd – 5th

- SC.3.N.1.3
- SC.3.N.1.6
- SC.4.N.1.6

**Florida Standards Grades K – 12th**

- LAFS.K12.W.1.3
- LAFS.K12.W.4.10
Fishing Journal

Location: _________________________________               Date:____________________
GPS coordinates:____________________________________________________________
Habitat:_____________________________________________________________________

Time (circle one):
- Early morning    - Mid-morning    - Early afternoon    - Late afternoon    - Evening

Wind Conditions (circle one):
- Calm           - Gentle breeze             - Occasional gust                 - Strong wind

Weather Conditions (circle one):
- Sunny                  - Cloudy                       - Light rain                     - Stormy

Tides (circle one):
- High                      - Outgoing                      - Low                           - Incoming

Bait or Lures Used:_________________________________________________________
Presentation:_______________________________________________________________
Water Depth:________________________________________________________________

Fish Caught (species and numbers):
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

Notes:_______________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________


Icebreaker: Fish Identification

Activity Overview

To introduce the kids to each other while learning about marine habitats and fish identification.

Objectives

1. Learn how to identify different fishes.
2. Learn about different marine habitats.

Background Information

Fish live in different habitats and have many different adaptations. Understanding where fish live is key in order to target certain species while fishing. For information on the different habitats, see Cereal Box, Habitat and for information on adaptations see Fish Morphology.

Materials

- 4 Habitat posters – estuary, coral reef, pelagic zone, and seagrass bed
- 25 Individual fish cards, laminated with the name of a fish, info about the fish, and strung into a necklace
- Fish identification guides

Procedure

1. Hang the habitat posters on the walls in the classroom.
2. Each participant will need a fish card with yarn attached to the card, similar to a necklace. The instructor will place the card around the neck of each student and hang the card off their back so the student cannot see their own card.
3. Have students walk around and ask questions to other students about their fish.
4. Once they have their fish identified, they can stand by the habitat where they think that fish lives.
5. Once all students are by a habitat, let them look at their fish cards and share if they are in the correct habitat and what habitats the fish could use during different times in its life cycle. Use the fish identification guides if needed.

Florida Standards Grades 3rd - 5th
• SC.3.N.1.1
• SC.4.L.16.4
• SC.4.N.1.1
• SC.5.L.17.1

**Florida Standards Grades 6th - 8th**

• SC.6.E.6.2

**Florida Standards Grades K – 12th**

• LAFS.K12.SL.1.1
• LAFS.K12.SL.1.2
Icebreaker: Fishy Communication

Activity Overview

The object of this activity is for each participant to find their corresponding partner to complete their compound word.

Objectives

1. Practice proper communication skills.
2. Learn about compound words.

Background Information

Effective and clear communication is important in any situation. Anglers communicate information about the weather, tides, fishing tips, and fishing locations to other anglers.

One challenging aspect of this game is getting students to listen to other students while vocalizing at the same time. If there is a student who yells their word nonstop and doesn't stop to listen for their partner, they could be lacking essential communication skills. If a student whispers their word, they may not be heard, and if a student yells their word, they make it extremely difficult for others to hear. Occasionally, students will have the same word, such as “fishing” pole and “fishing” line. Now you have two students saying “fishing.” This is a critical time for each student to learn the art of communicating - speaking clearly while listening attentively to others.

Materials

- 30 Bandanas
- Large room or open field

Procedure

1. Ask students to provide an example of when a situation wasn’t communicated properly between two or more individuals, i.e. a verbal disagreement ensued. What happened? Conversely, can the students give an example of a situation
in which good communication occurred? What is good communication? Why is it important?

2. Divide the students in groups of two and have each group stand facing each other.

3. Have them line up for ease of instruction where each participant is shoulder to shoulder with someone else but facing or across from their partner.

4. Explain what a compound word is (two words joined together; e.g. fishing line, tackle box).

5. Ask the students to think of a compound word that is fishing related and assign one part of the word to each person. For example, if person A and person B are a team and their word is “fishing pole,” then person A would be “fishing” and person B would be “pole.”

6. Once the word is decided between the pairs, have all the A’s go to one side of the room/field and all the B’s go to the other side of the room/field.

7. Have both groups turn around so their backs are to each other.

8. Give each participant a bandana and ask them to blindfold themselves.

9. Once everyone has their blindfold on, they can turn around and only say their assigned part of the compound word and find their partner.

**Discussion**

- What aspects of this activity did you enjoy?
- What aspects of this activity did you find difficult?
- What could you do to make this activity better?
- How important is it to trust your partner? Why?

**Florida Standards Grades 3rd - 5th**

- LAFS.3.SL.1.3
- LAFS.3.SL.1.2

**Florida Standards Grades K -12th**

- LAFS.K12.SL.1.1
Icebreaker: Jigsaw Fish Identification

Activity Overview

This ice breaker is intended for the instructor to gauge the students’ understanding of fish identification and allow students to make friends by getting to know someone new in the group.

Objectives

1. Practice proper communication skills.

2. Learn how to use field guides to identify different species.

Background Information

Fish identification is important when attempting to catch fish for a meal. Properly identifying fish allows anglers to follow the fishing regulations and to fish within the law.

To identify fish, one should look at the shape of the body, tail fin, dorsal fin, pectoral fins and mouth. Coloration can be tricky since fish can change their coloration as they age. However, fish have spots, stripes, and other unique coloration that can still help with identification.

Materials

- 30 Fish pictures cut in half and laminated
- 15 *Fishing Lines* field guides
- Field guides
- 15 *Saltwater Recreational Fishing Regulations* booklets
- 15 Measuring tapes

Procedure

1. Mix up the fish pictures and hand out half a picture to each student, making sure the matching fish pictures are not right next to each other.

2. Ask the students to walk around looking for their match.

3. Once the students find their match, have them answer the questions on the back of the cards together.
4. Once they have matched up, give them a copy of *Fishing Lines* field guide and fishing regulations. Have them identify their fish and its habitat, measure the fish and find its regulations, and come up with an interesting feature about the fish.

5. After a few minutes, have each group introduce themselves and share the information they gathered about their fish.

**Discussion**

- Did you learn about a new species of fish?
- What were some of the habitats mentioned?
- Do any of the fish have a special adaptation that better fits their needs for that habitat?

**Florida Standards Grades 3rd - 5th**

- SC.3.N.1.1
- SC.3.N.1.6
- SC.4.L.16.2
- MAFS.3.MD.2.4
- LAFS.3.RI.3.7

**Florida Standards Grades K - 12th**

- LAFS.K12.SL.1.1
- LAFS.K12.R.1.1
- LAFS.K12.SL.1.2
- MAFS.K12.SL.1.2
- MAFS.K12.MP.5.1
- MAFS.K12.MP.6.1
- LAFS.K12.L.3.6
- LAFS.K12.R.3.7
Icebreaker: Juggling Identification

Activity Overview

This ice breaker reviews common fishing equipment and aids in fish identification. Students are also encouraged to make friends with other students in the class.

Objectives

1. Learn important fishing equipment.
2. Learn common fish species of Florida.

Background Information

Being able to properly identify fishing equipment and fish species is very important.

Materials

- 30 Laminated item cards with pictures on one side and descriptions on the back
- 5 Soft, plastic/tennis balls

Procedure

1. Have students all stand in a large circle and place a card, picture side out, around the neck of each student.
2. Allow the student a few minutes to read and understand the back of the card.
3. Proceed around the circle, allowing each student to briefly explain what the title of their item is and what it is used for.
4. Hand one soft plastic or tennis ball to a student and ask them to say “I am a _____ (whatever their title is) and I’m tossing to _____ (whatever card they can remember the correct name of).
5. The goal is to get each student comfortable with identifying the items on each card.
6. Continue to add a ball into the circle where there are multiple students talking and tossing at one time to other students.
7. At the end of the game, ask if any students want to name ALL the items on each student’s card.
Discussion

- Why is it important to know the items in a tackle box and how they are used?
- Why is it important to know fish identification?
- How does fish identification tie into fisheries conservation?

Florida Standards Grades K - 12th

- LAFS.K12.L.3.6
- LAFS.K12.R.1.1
- LAFS.K12.R.2.4
Icebreaker: My Name and a Fish Name

Activity Overview

The goal of this ice breaker is to encourage the students to try to remember each person’s name and their chosen fish name.

Objectives

1. Learn each other’s names.

Background Information

Help the kids get to know each other and you to get to know them, too. Also, improving one’s ability to remember information is valuable and word association can help.

Materials

- Fish identification guides
- *Fishing Lines* field guide

Procedure

1. Have students use the fish identification guides to find a fish name that starts with the same letter as theirs.
2. Have the students stand in a circle and ask them to introduce themselves to the group and say the fish name they found. Example: my name is Ginger and I’m a Goliath Grouper.
3. Go around the circle asking the person next to the student who went first to say the previous person’s name and fish, and then their name and fish.
4. The last person in the group has to try and say everyone’s name and fish. If they can’t get it, ask others in the group to help out.
5. Allow time at the end for a student(s) to try and name all students in the group.

Florida Standards Grades K - 12th

- LAFS.K12.SL.1.1
Icebreaker: What is Missing?

**Activity Overview**

The goal of this ice breaker is to encourage the students to try to remember each person’s name and their chosen fish name.

**Objectives**

2. Learn each other’s names.

**Background Information**

Help the kids get to know each other and you to get to know them, too. Also, improving one’s ability to remember information is valuable and word association can help.

**Materials**

- Fish identification guides
- *Fishing Lines* field guide

**Procedure**

6. Have students use the fish identification guides to find a fish name that starts with the same letter as theirs.

7. Have the students stand in a circle and ask them to introduce themselves to the group and say the fish name they found. Example: my name is Ginger and I’m a Goliath Grouper.

8. Go around the circle asking the person next to the student who went first to say the previous person’s name and fish, and then their name and fish.

9. The last person in the group has to try and say everyone’s name and fish. If they can’t get it, ask others in the group to help out.

10. Allow time at the end for a student(s) to try and name all students in the group.

**Florida Standards Grades K - 12th**

- LAFS.K12.SL.1.1
Cast Netting

Activity Overview

Students will learn how to throw and practice throwing a cast net.

Objectives

1. Learn the steps to throw a cast net.
2. Learn when to use a cast net.

Background Information

A cast net is a circular net with small weights distributed around the edge. The net is cast or thrown by hand so that it will spread out on the water and sink. A cast net is a useful tool for anglers since it allows them to catch their own live baitfish. Anglers must check the regulations to ensure any fish caught are legal to harvest. Cast nets come in a variety of mesh sizes and net sizes. Mesh size is selected based on the size of the baitfish you are trying to catch.

How to throw a cast net video at https://www.youtube.com/watch?v=9zBMaI0ENOs.

Key Terms

Hand line – The rope attached to the swivel on one end of the cast net. The other end of the hand line is attached to the caster’s wrist.

Horn – A ring with an indentation around the center where the top of the net is tied.

Braille lines – Lines attached to the swivel at one end and to the lead line at the other end. Their function is to gather the net, thus trapping the catch.

Netting – This is made out of nylon or monofilament to form the desired mesh size.

Lead line – A rope with sinkers attached. This rope is located at the outside perimeter of the net to aid in sinking it.

Materials

- 25 plastic/tennis balls
- 1 cast net
- 1 bucket
**Procedure**

1. Set the plastic balls up in an area away from the flow of traffic, trees, or other obstructions.
2. Demonstrate how to throw a cast net, following the steps and images below or another method you know (as long as it does not teach campers to put the lead line in their mouths).
3. Give each student a chance to try catching the balls by throwing the cast net.
Steps to throw a cast net

DO NOT PUT THE LEAD LINE IN MOUTH OR HOLD WITH TEETH

1. Attach the end of the hand line to the wrist of your non-dominant hand by sliding your hand through the loop at the end (do not cinch the loop; it should be loose around the wrist). Coil the rest of the hand line and hold it in the same non-dominant hand.

2. Grab on to the top of the cast net just below the horn (hard, plastic ring at top of cast net) and check for tangles in net.
3. Place horn in non-dominant hand.

4. With your dominant hand, straighten up the net and grab the net about halfway down (near your hip).

5. Take the net webbing that is in your dominant hand and place it in your non-dominant hand.
6. Separate half the net and leads into your dominant hand.

7. Rotate non-dominant hand so your palm is facing down (like you’re checking your watch)

8. Roll the portion of net in your dominant hand over the top of your non-dominant hand (over your watch), going out away from you.
9. Check for two piles, a high and a low, and the transition zone between the piles.

10. Find the transition and with the pinky of your dominant hand, pick up the outside of the transition and toss it over your right shoulder.

11. Your dominant hand should be free of any net at this point. Reach down toward the “high” pile and pick up the outer section of the net with your pinky. Roll all the net that was over your “watch” on your non-dominant hand into your dominant hand.

12. Face so your target area is at a 90 degree angle to your dominant side, with both hands together up at elbow height.

13. Swing the net slightly back to your non-dominant side, while keeping your feet stationary. Make sure not to swing too much (this could cause a tangle).
14. Throw! Use the momentum from your hips to twist towards your target and make sure both hands let go of the net.
15. Use the rope to pull the net in and catch your bait.
16. Place bait in the bucket and sort for any that are too small to use or species that must be released due to regulations.

**Discussion**
- Why is being able to identify your catch important when using a cast net?
- How does a cast net work? Explain how the net can catch fish.
- Explain how mesh size relates to fish caught in the cast net.

**Florida Standards Grades 3rd - 5th**
- PE.3.C.2.2
- PE.4.C.2.2
- PE.5.M.1.1

**Florida Standards Grades 6th - 8th**
- PE.6.R.5.2
- PE.6.R.5.4
- PE.6.R.5.5:
- PE.7.M.1.7
- PE.7.R.5.2
- PE.7.R.5.3
- PE.7.R.5.5
- PE.8.R.5.4

**Florida Standards Grades K - 12th**
- MAFS.K12.MP.5
- MAFS.K12.MP.6.1
- LAFS.K12.L.3.6
- LAFS.K12.SL.1.2
- LAFS.K12.R.3.7
Cereal Box Habitat

**Activity Overview**

This activity is designed to teach students about marine habitats and the organisms that are found in them.

**Objectives**

1. Students should be able to name the different marine habitats.

2. Students should be able to identify different marine organisms found in each habitat.

3. Students should be able to briefly explain a short food web or food chain.

**Background Information**

A habitat is a place where an organism lives and includes food, water, shelter, air and space. Florida's 8,426 miles of tidal shoreline are home to a number of habitats that create a network of abundant productivity. Marine habitats found in Florida include estuaries, beach and surf, open waters (pelagic) and coral reefs.

Most fish spend a part of their lives in one or more marine habitats. Larval fish are found in many areas but are commonly found in mangrove, seagrass, and oyster bar habitats since these provide ample food and protection. Adult fish are found in all habitats hunting, hiding, or spawning.

**Estuaries** are areas where fresh water meets and mixes with saltwater, creating brackish water. They can range from very salty to almost fresh water! This area is a dynamic ecosystem that is always changing based on the weather, water temperature, amount of freshwater discharge, geology, and tides. More than 70 % of Florida’s most important recreational and commercial marine species spend a portion of their lives in these sheltered and fertile waters. That’s why they are also called “the cradle of the ocean.” Estuarine habitats include mangroves, seagrass, oyster bars, salt marshes, mud and sand bottoms, and algae beds.

**Salt marshes** are grassy coastal wetlands, rich in marine life. They are also called tidal marshes since they are heavily influenced by tidal movements.

Mullet, red drum, grouper and other fishes are nurtured in salt marshes as juveniles, but move offshore as adults to spawn. As the eggs develop into larvae,
they are transported from offshore areas into estuarine communities such as salt marshes by tides and currents.

In addition to providing nursery habitat, salt marsh plants have extensive root systems that enable them to withstand storm surges and limit damage to upland areas. Salt marsh grasses slow the erosion of shoreline sediments and offer hiding places for wildlife. Salt marshes also serve as filters, absorbing or trapping pollutants from upland development and reducing the amount of contaminants that enter estuarine waters.

When fishing salt marshes, look for spots that have bottom structure like shells, oysters or rocks. These areas tend to concentrate fish by providing a place to feed and hide. Look and listen for signs of fish, such as birds diving, bait leaping and fish breaking the surface or creating wakes.

**Oyster bars** are located within an estuary and are mounds of oysters that are exposed during a low tide. These shellfish depend upon the fresh water found in the estuary and filter food from the water. If the fresh water that enters the estuary becomes tainted by sewage, runoff, or pesticides, the water becomes harmful to shellfish who cannot swim away.

**Seagrass beds** contain flowering grasses that grow in clear, shallow waters in areas with a current. Seagrass beds are rich with biological diversity and productivity. They provide shelter for a large variety of juvenile fish and shellfish such as gag grouper and bay scallops. They are also a major food source for organisms ranging from manatees and sea turtles to pinfish and sea urchins.

Seagrasses also help keep Florida’s water clear by filtering seawater and slowing down currents, which allows sediments to settle and increases water clarity. Seagrass beds are also a source of oxygen and add nutrients to the water when they decompose.

Florida has seven types of seagrasses: turtle, manatee, widgeon, Cuban shoal, star, paddle, and Johnson’s. When the seagrasses die, mullet feed on the decaying material. Then, the mullet are preyed-upon by gamefishes such as red drum, snook, sailfish, and king mackerel.

One way seagrasses are destroyed is by reckless boating that creates prop scars. A prop scar is created when the propeller of a boat tears through the grass, ripping it up by its roots. It can take several months or longer for seagrass to re-root and fill in the scar. When fishing near seagrass, carefully pole through shallow areas to avoid causing prop scars that can greatly damage these fragile habitats.

**Mangroves**, trees that root in and near saltwater, protect shorelines from erosion by holding sediments around the base of their roots. Mangrove trees have adapted
to their salty environment by turning saltwater into freshwater and pushing the salt out through pores in their leaves and specialized roots. There are three types of mangroves found in Florida: red, white and black.

Red mangroves are also called “walking trees” because they have specialized prop roots growing from their branches down into the water, grasping the bottom. Red mangrove leaves are large, egg-shaped and waxy like a candle. The top of the leaf is dark green while the bottom is light green. The red mangrove produces a special fruit called a propagule, which is long like a pencil. The fruit falls from the tree and can sprout roots right away or be carried away by the tide for up to a year before they root.

Black mangroves usually occupy slightly more upland in shallower water than the red mangrove, living portions of their lives both underwater and exposed to the sun. They have roots that stick up through the ground called pneumatophores, or snorkel roots. The black mangrove has narrow, egg-shaped shaped leaves with pointy ends which are dark green, but can also be whitish. Black mangroves also produce seeds with mangrove saplings. They are small, oval, and float for long periods before the sapling roots into the ground.

White mangroves can be found farthest landward in the intertidal elevations and usually do not have any visible root systems. Their leaves are round at the base and tip and smooth underneath. They are also thick and leathery to help maintain moisture. At the base of each leaf where the stem starts are two bumps called nectaries. Their fruit is small, dry, leathery and ribbed like a prune, and can also float for long periods before the sapling roots.

Mangroves trap and cycle pollutants, chemical elements, and inorganic nutrients and their roots provide attachment surfaces for filter feeders such as barnacles and oysters. In addition, mangroves provide the two most basic requirements for animal survival: food and shelter. The food comes from rich “marine compost” produced when microorganisms consume animal droppings and plant litter that falls from mangrove canopies into the water. Shrimp eat the microlife, small fish eat the shrimp, and so on as the food chain continues. Shelter is provided by tangled prop roots and pneumatophores that extend below the water line. Snook, jacks, snappers, sheepshead and grouper all hide in the roots. Tarpon tend to prowl in the channels just outside the roots of the trees.

Beaches are sand or gravel areas along a body of water. Beach habitats typically boast good water quality and plenty of nutrients from seaweed that has washed up on the shore. For hardy sea creatures, this surf habitat can prove quite hospitable.

Florida pompano, kingfish, bluefish, Spanish and king mackerel, cobia, jacks, tarpon and other prized marine fish can all be found off Florida’s beaches. Beach piers are also a great place to catch a variety of fish species. Fish are often trapped...
in troughs between sandbars or reefs and the beach. Cast a baited surf rig toward these areas for a chance to catch fish as they flow outward from the troughs.

**Coral reefs** are found in warm, clear, tropical waters and are the most colorful marine habitat. Corals are built by millions of tiny animals (coral polyps) and plants (coralline algae). Their skeletons are made of calcium carbonate, the main component of limestone. The animals secrete protective casings cemented together, forming the reef. Thousands of years are required to form a reef only a few yards thick. Corals are fragile and grow best with abundant sunshine, stable water temperature, plenty of oxygen, and a good food supply. The depth at which coral will grow is determined by the clarity of the water. Freshwater, silt, and toxic runoff can destroy coral reefs. Corals come in different shapes and colors and are home to more than 6,000 species of marine organisms such as star fish, urchins, sea fans and crabs. A myriad of fish species are found among coral reef structures and crevices, including permit, amberjack, snapper, grouper, mackerel, barracuda and sharks.

Coral reefs, Florida’s most unique habitat, are gravely threatened by deteriorating water quality and abuse. Boat anchors and traps for fish, sewage, runoff, and deforestation are some of the biggest threats to reefs. Extreme care must be taken when fishing near reefs to avoid damaging the slow-growing coral polyps that create these important ecosystems. Never anchor on coral reefs, but instead, drift-fish or tie your boat to mooring buoys.

**Open Ocean,** often described as “blue water,” can be found off the coast of Florida in both the Gulf of Mexico and Atlantic Ocean, typically near shelf edges. In the Gulf of Mexico, shelf edges come much closer to land near Pensacola and Destin than in the Big Bend and west coast areas. In the Atlantic Ocean off Florida’s east coast, the shelf comes within miles of Fort Lauderdale then gradually moves father from shore as it continues northward.

The north-flowing Gulf Stream originates in the southern Gulf of Mexico, moves north through the Florida Straits, brushes near the coast of Palm Beach, and then swings eastward toward Europe. The Gulf Stream has an important influence on shelf areas and other habitats of Florida’s east coast by moderating temperatures and creating conditions under which hundreds of marine species thrive.

Bluewater areas and the Gulf Stream provide a range of temperatures that are comfortable for virtually all pelagic (open ocean) fish including wahoo, billfish, tunas, dolphinfish and mackerel. Look for visible signs of fish, such as birds hovering or diving into the water and surface commotion that might indicate feeding. Fish are attracted to debris or patches of floating sargassum that collect along current edges. Eddies that break off from the stream are also worth investigating, as are color changes or edges of currents, where two different bodies
of water meet. Mixing currents tend to concentrate debris, which will often prove attractive for many species.

Marine habitats play a critical role in the survival of marine organisms. However, humans have negatively impacted these habitats due to pollution, careless boating and angling, and coastal development. Pollution is considered anything that does not naturally occur, whether it’s chemical, industrial, agricultural, residential, or even invasive organisms. Some examples include plastic bags, water bottles, cigarette butts, and styrofoam.

Fishing line is another source of pollution because it does not naturally occur in the wild. It can take 500 – 600 years for monofilament fishing line to decompose naturally in any environment! Anglers who do not properly recycle their monofilament risk entangling or wounding wildlife such as crabs, fish, marine mammals, and birds.

Monofilament recycling bins located at piers, boat ramps, marinas and tackle shops are places where used fishing line can be properly discarded. Any hooks, pieces of metals, and corks should be removed from the monofilament before disposing of it in the recycling bins. Trash should not be placed in these bins, but put trash in garbage cans. The used fishing line is recycled into other products.

Boaters and anglers have a responsibility to protect marine habitats. Some boaters and anglers may want to fish in shallow marine habitats such as a seagrass bed. When entering shallow habitats, boat motors should be trimmed up or boats should be poled.

Occasionally, boaters and anglers may accidentally damage marine habitats. When a boat hits ground, the bottom, habitats or a reef it’s called running aground. If a boat plows through a shallow seagrass bed and cuts into the seagrass roots with the propeller, it forms what is called a prop scar. Prop scars take several years to repair themselves, if they ever repair at all. It is important to always check the tides, have a boating and angling guide, and stay in channels or deep water so you protect this important marine habitat.

Boaters, anglers, and those that use a beach often contribute to pollution. For example, the wind may blow a lunch bag, bait bag, candy wrapper, or soda can into the water. Animals do not understand that a bait bag is not food and when ingested by marine life it can cause death.

**Key Terms**

**Habitat** – A place where an animal lives and contains sufficient food, water, shelter and space.
**Oyster bar** – A raised area in a salt marsh that mostly contains oysters and/or clams. Usually associated with several crabs and other shellfish as well as the larger fish that feed on these items. Oyster bars are common in an estuary with the right amount of salt and fresh water mixing to provide enough nutrients for the oysters.

**Seagrass** – Grass-like flowering plants that live completely submerged in marine and estuarine waters.

**Salt Marsh** – Grassy coastal wetlands rich in marine life. They are also called tidal marshes because they occur in the zone between low and high tides.

**Mangrove** – Trees that grow in intertidal salty environments because they can tolerate frequent flooding and are able to obtain fresh water from salt water. There are three types of mangroves in Florida, the red, black and white.

**Coral reef** – A mix of soft and hard corals that live in a symbiotic relationship with zooxanthellae (photosynthetic algae).

**Materials**
- 30 cereal boxes
- 30 pairs of scissors
- Various colors of construction paper
- Colored pencils, pens, markers, etc.
- Glue
- String to hang fish inside the cereal box
- 1 *Fishing Lines* field guide
- 1 monofilament recycling bin

**Procedure**
1. Discuss the different types of marine habitats.
2. Have each student create their own marine habitat using a cereal box. The idea is for each student to create a shadow box of one marine habitat.
3. Cut a square out of one side of the cardboard box and let the students create the habitat using any of the materials mentioned.
4. Have them add any particular fish they might find living or interacting there.
5. After habitats are completed, share a few with the class (ask why they picked the habitat, what’s in it and why).

**Discussion**
- What would happen if a habitat was destroyed or polluted? What would happen to the fish? What are some effects to the food chain?
- What are some sources or types of pollution found in a marine habitat?
- If there was no longer a habitat for fish to hide, hunt, or breed in, what would happen to recreational fishing?

- What are some negative human impacts on a habitat?

- What can we do to protect these marine habitats?

**Florida Standards Grades 3rd - 5th**

- LAFS.3.RL.1.1
- LAFS.3.RI.1.1
- LAFS.3.RI.3.7
- LAFS.3.SL.1.1
- LAFS.3.SL.1.2
- LAFS.3.SL.1.3
- LAFS.3.L.3.6
- LAFS.4.RL.1.1
- LAFS.4.RI.1.1
- LAFS.4.RI.3.7
- LAFS.4.SL.1.1
- LAFS.4.L.3.6
- SC.4.E.6.6
- SC.4.L.17.4
- SC.4.E.6.3
- LAFS.5.RL.1.1
- LAFS.5.RI.1.1
- LAFS.5.RI.3.7
- LAFS.5.SL.1.1
- LAFS.5.L.3.6

**Florida Standards Grades 6th - 8th**

- SC.6.E.6.2
- LAFS.6.RL.1.1
- LAFS.6.RI.1.1
- LAFS.6.RI.3.7
- LAFS.6.SL.1.2
- LAFS.6.SL.1.1
- LAFS.6.L.3.6
- LAFS.7.SL.1.1
- LAFS.7.L.3.6
- SC.7.E.6.6
- LAFS.8.SL.1.1
• LAFS.8.L.3.6

**Florida Standards Grades K - 12th**

• LAFS.K12.L.3.6
• LAFS.K2.R.1.1
• LAFS.K12.SL.1.2
• LAFS.K12.SL.1.1
• LAFS.K12.R.3.7
Fashion a Fish

Activity Overview

This activity allows students to use the information from the morphology lesson to build their own fish.

Objectives

1. Students will classify fish according to body shape and coloration using information from the morphology lesson plan.

2. Students will describe adaptations of fish to their environments, describe how adaptations can help them survive in their habitats, and interpret the importance of adaptations in animals.

Background Information

Marine animals are products of countless adaptations over long periods of time. Those adaptations, for the most part, are features that increase the animals’ likelihood of surviving in their habitat.

When a habitat changes, either over time or quickly, the species of animals with adaptations (that allow them many options) are the ones likely to survive. These animals are called generalists. Some species have adapted to a narrow range of habitat conditions; these animals are called specialists and are usually more susceptible to death or extinction from changes than other animals. An example of adaptation is the body shape and function, or morphology, of an animal. Mouth shape, external body markings, size of eyes, and shape of teeth are examples of how a fish has adapted to living in its environment.

Key Terms

**Generalist** – Able to thrive in a wide variety of environmental conditions and can make use of a variety of different resources. Example: toad fish can survive in a wide range of salinity and eat anything that passes by their mouth.

**Specialist** – Can only thrive in a narrow range of environmental conditions or has a very limited diet. Example: ocean sunfish only eat jellyfish or slow moving invertebrates that can be sucked in.

**Morphology** – Branch of biology that deals with the form of living things and relationships between their structures.
Materials

- Construction paper in several different colors
- Markers and/or colored pencils
- Glue sticks
- Scissors
- Dry erase board (optional)
- Dry erase markers (optional)

Procedure

1. Refresh students’ knowledge of fish morphology.
2. Ask them to create a new fish using these outlines: body shape, mouth shape and direction, what habitat and why, what does it eat, and any forms of camouflage.
3. Students must have a reason behind the design of their fish.
4. They must explain the following, using terms from morphology: what function does body shape serves; where in the water column the animal feeds; based off of body size and shape, what habitat the fish lives in (all habitats must be an example covered from the habitat lesson plan); based off of the size and shape of the mouth, what food the fish eats; whether the fish needs camouflage; whether the fish is predator or prey.
5. After students complete the assignment, they will give a presentation explaining their new animal and outlining the topics above. If needed, write the topics on a dry erase board.

Discussion

- Name two fish adaptations in each of the following categories: mouth and feeding, shape, coloration, and body size. Then describe the advantages of each of these adaptations to the survival of fish in their habitats.
- What is one reason why fish have large eyes?
- How does being red aid a fish in camouflage?
- Do all fish have predators?

Florida Standards Grades 3rd - 5th

- SC.3.N.1.1
- SC.3.N.1.6
- SC.3.L.15.1
Florida Standards Grades 6th - 8th

- LAFS.6.RST.1.1
- LAFS.6.RST.2.4
- LAFS.6.RST.3.7
- LAFS.6.WHST.1.2
- LAFS.6.L.3.6
- LAFS.6.RI.1.1
- LAFS.6.RI.2.4
- LAFS.6.RI.3.7
- LAFS.6.SL.1.1
- LAFS.6.SL.1.2
- LAFS.6.W.1.2
- LAFS.7.L.3.6
- LAFS.7.RI.2.4
- LAFS.7.SL.1.1
- LAFS.7.SL.1.2
- LAFS.7.W.1.2
- LAFS.8.L.3.6
- LAFS.8.RI.2.4
• LAFS.8.SL.1.1
• LAFS.8.SL.1.2
• LAFS.8.W.1.2

Florida Standards Grades K - 12th

• LAFS.K12.L.3.6
• LAFS.K2.R.1.1
• LAFS.K12.SL.1.2
• LAFS.K12.SL.1.1
• LAFS.K12.R.3.7
Filleting a Fish

Activity Overview

Students will learn the importance of proper care for fish that are harvested. They will also learn how to keep fish fresh and how to properly fillet a fish.

Objectives

1. Students should be able to fillet a fish.

2. Students should know how to properly store fish.

Background Information

For many anglers, satisfaction comes from being able to harvest and eat their catch. The way fish are handled while on the water will determine how the fish will taste at home. Fish meat is delicate and once the fish dies the muscle tissue begins to decompose and spoil. To preserve fish after harvesting, place them in a cooler with ice or chill them in some manner. Icing fish is the best way to keep meat firm, fresh, and flavorful. Place the fish directly on top of your cooler full of ice or pack ice around fish. Fish that are packed in ice can be stored for several days before cutting out the fillets. All water should be drained from the cooler as the ice melts and the melted ice replaced.

Many people like to fillet their fish before returning home and only ice the fillets. However, while on the water it is often illegal to alter the catch in any way. Disposal of fish carcasses can be considered pollution or become a smelly mess for others. Always dispose of fish carcasses in a trash can; never feed fish carcasses to any wildlife.

Fish filleting requires a sharp knife, a towel, and a cutting surface such as a cutting board. A sharp knife is key; dull knives cut poorly and can cause injury. After the fish has been on ice for a while, it most likely will be dead or not move very much. If the fish is still alive it should be left on the ice for a while longer.

Key Terms

Fillet – A cut or piece of meat.

Fillet knife – A sharpened knife used to cut a piece of meat.

Materials
- Sharpened fillet knife
- Towel
- Cutting board
- Cooler with ice
- Plastic freezer bags
- Source of fresh water to rinse fillets

**Procedure**

1) Place the fish on the cutting board. Grasp the fish’s mouth, then take the knife and position it just behind the pectoral fin. Slice downward about a half inch, keeping the rear of the knife blade up (watch your fingers) until you feel the knife hit the spine. Be careful not to cut into the fish’s backbone.

2) Turn the knife blade toward the tail and continue cutting, staying on top of the spine. You will feel resistance as you cut through the rib cage, but be careful not to cut into the backbone. It’s better to cut too shallow than too deep. Continue your cut toward the tail, almost cutting the scaly fillet off, but not quite.
3) With the fillet barely attached to the tail, flip it away from the fish. Position your knife onto the narrow portion of the fillet closest to the tail. While holding the fish, slice the meat from the fish’s skin. To obtain the maximum meat, cut very close to the skin; but if you want a less “fishy” taste, cut only the upper white meat from the skin, leaving the red meat attached.

4) Flip the fish over and fillet the other side, repeating steps 1 through 3.

5) With the tip of your fillet knife carefully cut out the rib cage of each fillet. To retrieve the most meat, angle your knife and slice close to the ribs.
6) Carefully rinse and dry the fillets and eat them the same day, if possible. Avoid freezing fish for long durations and always check with the Department of Health for consumption advisories and fish handling tips.

Discussion

- Why is it important to properly preserve your catch while on the water?
- Why is it important to not feed fish carcasses to wildlife?

Florida Standards Grades 3rd - 5th

- LAFS.3.L.3.6
- PE.3.C.2.2
- LAFS.4.L.3.6
- PE.4.C.2.2
- LAFS.5.L.3.6
- PE.5.R.5.2

Florida Standards Grades 6th - 8th

- LAFS.6.L.3.6
- PE.6.M.1.12
- PE.6.R.5.5
- LAFS.7.L.3.6
- PE.7.M.1.7
- PE.7.R.5.5
- LAFS.8.L.3.6
- PE.8.M.1.9
- PE.8.R.5.5

Florida Standards Grades K - 12th

- LAFS.K12.L.3.6
- LAFS.K2.R.1.1
- LAFS.K12.SL.1.2
- LAFS.K12.SL.1.1
- LAFS.K12.R.3.7
Food Webs and Human Interaction

Activity Overview

This activity is designed to help students understand the interconnectivity of all living things. It has two distinct sections, beginning with the creation of a food web and ending with a focus on harvest, sustainability, and how fishing regulations affect both concepts.

Objectives

1. Students should be able to explain how organisms are interconnected.

2. They should also be able to define sustainability and discuss how humans impact marine species.

Background Information

A food web is a representation of the relationships in an ecosystem, centering on predator/prey interactions. It allows us to visualize these complex interactions in an easy to understand fashion.

Producers are described as autotrophic, which means they are able to make their own food. Producers in the marine environment convert energy from the sun into food energy through photosynthesis. Phytoplankton are the most abundant and widespread producers in the marine environment. Other producers include seaweeds (a type of macroalgae) and seagrasses (the only flowering plant found in marine environments).

Consumers are described as heterotrophic, which means they are unable to make their own food and rely on consuming other organisms or absorbing dissolved organic material from the water column. Consumers are divided into herbivores and carnivores, and are typically further divided into 1st, 2nd or 3rd level consumers. For example, many zooplankton in the marine environment are herbivorous consumers. They form the 2nd level of the trophic pyramid and consume phytoplankton. Zooplankton are eaten by the 1st level carnivorous consumers, which includes juvenile stages of larger animals like fish and jellyfish, as well as small fish and crustaceans. The 2nd and 3rd level carnivorous consumers include larger fish and some species of squid and octopus. Predators like sharks and dolphins are at the top level of the trophic pyramid. However, not all top marine predators live in the sea. Pelicans are an important predator at the top of the marine food web. Humans are also top-level consumers in the marine food web.
Decomposers exist on every trophic level. They are mainly bacteria that break down dead organisms. This process releases nutrients to support the producers as well as the consumers that feed through absorbing organic material in the water column. This process is very important and means that even top-level consumers are contributing to the food web as the decomposers break down their waste or dead tissue. (From Science Clean).

**Key Terms**

**Sustainability** – Refers to whether or not a species is able to naturally replenish their stocks in a healthy manner

**Food web** – A representation of the relationships of plants and animals in an ecosystem

**Harvest** – The removal of an individual from the breeding population

**Ecosystem** – The biological environment consisting of all components in a specific area

**Primary producer/autotroph** — Organisms, like plants, that produce food (examples: phytoplankton, algae)

**Primary consumer/heterotroph** — An animal that eats primary producers (examples: mussels, oysters, krill, copepods, and shrimp)

**Secondary consumer/heterotroph** — An animal that eats primary consumers (examples: blue crab, lobster, sea star, humpback whale, and silverside)

**Tertiary consumer/heterotroph** — An animal that eats secondary consumers (examples: shark, dolphin)

**Apex predator/heterotroph** — An animal at the top of the food chain (examples: shark, dolphin)

**Decomposer/detritivores** — Organisms that break down dead plant and animal material and waste, releasing it again as energy and nutrients in the ecosystem (examples: bacteria, fungi, worms, and crabs)

**Materials**

- 4 Spotted seatrout cards
- 3 Red drum cards
- 10 Pinfish cards
- 13 Shrimp cards
- 1 Ball of yarn

**Procedure**
FOOD WEB

1. Randomly hand out the cards to the students and ask them to stand in a circle with their card displayed in front of them.

2. Hand the ball of yarn to the first student and ask them to hold onto one end and to lightly throw the remainder of the yarn to someone who is representing an animal their card would either eat or be eaten by.

3. The person who receives the yarn will do the same. Continue this until everyone is holding a bit of the yarn and the instructor ends up with the remainder of the ball of yarn.

4. Ask the students to observe the web they have made.

5. Everyone is interconnected to each other in some way, either directly or indirectly.

6. Ask one of the students to lightly pull on their string. This will cause the hands of the other students holding the other end of the yarn to move. This is a good demonstration showing how the removal of a single individual can cause a ripple effect throughout the ecosystem.

7. Reroll the yard.

HARVEST AND REGULATIONS

1. Ask the students to get into their respective species groups.

2. Once the groups have assembled, have them face each other in a circle.

3. Ask them if they notice anything odd about the numbers of each species. There are more shrimp than any other species. Why is this? Help the students brainstorm possible reasons. Shrimp are the base of this food web and they provide a food source to many different fish. Therefore, there has to be more of them to make sure there are enough left over to breed and replenish the species.

4. Explain to the group that each pinfish is able to eat 1 shrimp each and that each spotted seatrout and red drum are able to eat 2 other organisms (including other red drums and spotted seatrouts).

5. Ask 2 Pinfish to each choose one shrimp to eat. The chosen shrimp will then line up behind their pinfish.

6. Then ask a spotted seatrout to choose 2 organisms to eat, then a red drum to choose 2 organisms to eat. The chosen animals are to line up behind their predator.

7. Have the students observe how the species can decline over time if there are no mature breeding organisms in the population.

8. If there are two or more of a species left, allow them to breed by removing the others that have been eaten.
9. This process can go on forever, therefore these populations are sustainable. Have the students go back to their place in the circle.

10. Now the instructor will act as an angler.

11. Ask the students to imagine that Florida does not have any restrictions or regulations put in place to limit the harvest of pinfish.

12. Our angler decides to remove all the pinfish he or she can catch.

13. Repeat the previous activity of having the spotted seatrouts and the red drums choose other organisms to eat. The students should observe that other species can take over the place of the pinfish but, as time goes on, eventually some of the fish will go hungry.

14. There may also be no fish left to breed and replenish the population. A species collapse could occur and this would be detrimental to our fisheries.

15. Discuss how fishing regulations are put into place to protect fish from harvest until they reach maturity and can breed, which helps maintain a sustainable population. These fishing regulations can of course run the gamut, from seasonal closures due to spawning, etc. as well as the slot limits of red drum and spotted seatrout, which do protect the large spawners.

Discussion

- What does it mean if a population is sustainable?
- How can an angler help protect fish populations?
- What factors influence sustainability of a fish population?
- Why do you think most fish lay so many eggs? Do all of the juveniles make it to adulthood?

Florida Standards Grades 3rd - 5th

- SC.3.N.1.1
- SC.3.N.1.6
- SC.4.E.6.3
- SC.4.L.17.2
- SC.4.L.17.4
- SC.4.N.1.1

Florida Standards Grades 6th - 8th

- SC.7.E.6.6
- SC.7.L.17.1
• SC.7.L.17.3

**Florida Standards Grades K - 12th**

• LAFS.K12.L.3.6
• LAFS.K12.SL.1.1
Habitat and Organism Relationship Investigation

Activity Overview

This activity is designed to use your local marine habitats to allow the students to examine local marine organisms, with a focus on the smaller local organisms. You may find worms, crabs, bivalves, snails, sea stars, sponges, and many more.

Objectives

4. Students should be able to name the different marine habitats.

5. Students should be able to identify different marine organisms.

6. Students should be able to explain the interactions between species and habitat.

Background Information

A habitat is a place where an organism lives and includes food, water, shelter, air, and space. Marine habitats found in Florida include salt marshes, seagrasses, mangroves, oyster bars, estuaries, sandy bottom areas, open (pelagic) waters, beaches and coral reefs. For more information on each habitat, see the Background Information in the Cereal Box Habitat activity.

Everything influencing the life of an organism constitutes its environment. The environment in a habitat is mixed with biotic and abiotic components and the activities of the organisms are influenced by the combined effects of various environmental factors, like food source, amount of sunlight, temperature, water quality and other organisms. The habitat requirements of different organisms varies by species and also with an individual organism’s life cycle. Organisms react to environmental changes to survive. The reactions may be to move (migration) or adapt changes in the body or physiological activities.

Key Terms

Habitat – A place where an animal lives and contains sufficient food, water, shelter, and space.

Oyster bar – A raised area in a salt marsh that contains oysters.

Seagrass – Grass-like flowering plants that live completely submerged in marine and estuarine waters.
Salt Marsh – Grassy coastal wetlands rich in marine life. They are also called tidal marshes because they occur in the zone between low and high tides.

Mangrove – Trees that grow in intertidal salty environments because they can tolerate frequent flooding and are able to obtain freshwater from saltwater.

Coral reef – A mix of soft and hard corals that live a symbiotic relationship with zooxanthellae (photosynthetic algae).

Crustacean – Animals belonging to the class Crustacea, such as crabs, shrimps, lobsters, mole crabs, sand fleas and barnacles.

Algae – Are plant-like organisms that generate oxygen and are photosynthetic but do not have true roots, stems or leaves. Some species live attached to rock or other hard substrate, are known as seaweed. While other species are microscopic and free floating, and are called phytoplankton. Seaweed is a food source for a variety of marine animals such as sea urchins and fishes. While, phytoplankton, along with zooplankton, are the base of marine food web. Seaweed also provide shelter and a home for numerous fishes, invertebrates, reptiles and mammals.

Materials

- Small dip nets
- Viewing boxes
- Magnifying glasses
- Field guides

Procedure

1. Discuss the different types of marine habitats.

2. Take the students out to an area where they can explore the local marine habitat. Good places include pilings, sea walls, and oyster bars, or other places where encrusting organisms can grow.

3. Allow the students to explore the area, collecting specimens to observe.

4. Use the field guide to identify any unknown species.

5. Explain about the habitat, what the organism is, and how the organisms interact with each other.

6. In many areas, you will find algae growing on the pilings. This algae is home to thousands of tiny animals. Pull a bit of this algae off and put it in water in a viewing box. Have the kids stand quietly and watch the algae for a few minutes. As the algae settles, they will see animals begin to emerge. Many of these animals form the base of the food chain.
Discussion

- What type of animals were discovered?
- What size were these animals?
- What do animals need from a habitat to survive?
- What are some negative human impacts on the habitat?
- What can we do to protect these marine habitats?

Florida Standards Grades 3rd – 5th

- LAFS.3.SL.1.3
- SC.3.N.1.1
- SC.3.N.1.6
- SC.3.L.15.1
- LAFS.4.RI.3.7
- SC.4.E.6.6
- SC.4.L.17.4
- SC.4.E.6.3
- LAFS.5.L.3.6

Florida Standards Grades 6th - 8th

- SC.6.E.6.2
- LAFS.6.RI.3.7
- SC.7.E.6.6
- LAFS.8.SL.1.1

Florida Standards Grades K – 12th

- LAFS.K12.L.3.6
- LAFS.K12.SL.1.2
- LAFS.K12.SL.1.1
- LAFS.K12.R.3.7
Internal Anatomy

Activity Overview

Students will learn about, identify, and describe the basic functions of the internal organs of fish and sharks, then compare them to humans.

Objectives

1. Understand which organs fishes, sharks, and humans have in common.

2. Understand which organs differ between fish, sharks, and humans.

Background Information

Humans have similarities and differences with fish and other vertebrates. Internal anatomy refers to the complex mix of organs regulating the biological processes of an organism. There are many internal organs; some remove waste, others pump blood, and other organs help a fish breathe under water. Many of these systems and organs are the same, but there are many differences.

Sharks, which have a cartilaginous skeleton, do not have a swim bladder. Instead, they have a liver which contains oil. This oil provides some degree of buoyancy for sharks, but not enough to keep them buoyant in the water. If they stop swimming they will sink.

Key Terms

Fish Anatomy

- **Skull** – Bony structure in the head that protects the brain and gills.
- **Spine** – The primary structural framework upon which the fish's body is built; connects to the skull at the front of the fish and to the tail at the rear. The spine is made up of numerous vertebrae, which are hollow, house and protect the delicate spinal cord.
- **Spinal Cord** – Connects the brain to the rest of the body and relays sensory information, as well as instructions.
- **Lateral Line** – One of the fish's primary sense organs; detects underwater vibrations and is capable of determining the direction of their source.
- **Stomach and Intestines** – Breaks down (digests) food and absorbs nutrients. Fish such as red drum, which are piscivorous (eat other fish), have short intestines because such food is easy to chemically break down and digest. Fish
such as mullet, which are herbivorous (eat plants), require longer intestines because plant matter is usually tough, fibrous and more difficult to break down into usable pieces.

**Pyloric Caeca** – This organ with fingerlike projections is located near the junction of the stomach and the intestines. Its function is not entirely understood, but it is known to secrete enzymes that aid in digestion and may function to absorb digested food.

**Liver** – Assists in digestion by secreting enzymes that break down fats and serves as a storage area for fats and carbohydrates. The liver is also important in the destruction of old blood cells and in maintaining proper blood chemistry, as well as playing a role in nitrogen (waste) excretion.

**Heart** – Circulates blood throughout the body and has two chambers.

**Blood** – Oxygen and digested nutrients are delivered to the cells of various organs through the blood, and the blood transports waste products from the cells to the kidneys and liver for elimination from the body.

**Ribs** – Protect the fish’s internal organs and are attached to the backbone.

**Kidney** – Filters liquid waste materials from the blood and these wastes are later passed out of the body.

**Urinary bladder** – Collects salts and eliminates waste from the fish.

**Gills** – Absorb oxygen from the water as blood is pumped through the gill filaments. These are very delicate structures and should not be touched if the fish is to be released!

**Swim bladder** – Hollow, gas-filled buoyancy organ that allows a fish to conserve energy by maintaining buoyancy (suspension) in water. Most bony fish have a swim bladder. The swim bladder keeps a fish from sinking to the bottom of the ocean. A fish can control where it wants to be in the water column, including making it neutrally buoyant (doesn’t sink or float). Flat fish like flounder have no swim bladder and sink to the bottom if they stop swimming.

**Brain** – The control center of the fish where both automatic functions (such as respiration) and higher behaviors (“should I eat that critter with the spikes?”) occur. All sensory information is processed here. Fish brains are small, about the size of a large pea.

**Shark Anatomy**

**Spine** – Made of cartilage rather than bone and it extends into the top tail fin.

**Brain** – The control center; it is large and complex in sharks.

**Spiracle** – A vestigial first gill slit that appears as an opening behind the eye. It is absent or reduced in many sharks, especially the fast swimming sharks, but it is usually larger and present in sedentary or bottom-dwelling sharks. The spiracle in sharks is used to provide oxygenated blood directly to the eye and
brain through a separate blood vessel. In the rays, the spiracle is much larger, more developed, and is used to actively pump water over the gills to allow the ray to breathe while buried in the sand.

**Ampullae of Lorenzini** – Small vesicles and pores that form part of an extensive subcutaneous sensory network system. These vesicles and pores are found around the head of the shark, are visible to the naked eye, and appear as dark spots. The ampullae detect weak magnetic fields produced by other fishes, at least over short ranges. This enables the shark to locate prey that are buried in the sand or orient to nearby movement.

**Spiral Valve** – The twisted portion in the intestines used to increase surface area for nutrient absorption.

**Cartilage** – Tough, fibrous substance that may be calcified in parts of the shark, but is not as hard as bone.

**Liver** – Made of three lobes that concentrate and store oils and fatty acids. The main function is energy storage and buoyancy. A shark’s large liver takes up 90% of the space inside the body.

**Kidney** – Maintains salt and water balance and eliminates wastes.

**Rectal Gland** – Assists with removing salt from the blood.

**Clasper** – Used in reproduction and to determine males from females. Only males have claspers.

**Stomach** – Has a J-shape, serves in pre-digestion, and can store food for a prolonged period of time.

**Intestine** – Digests food and absorbs nutrients.

**Gall Bladder** – Stores bile from the liver and is located in the smaller lobe of the liver.

**Pancreas** – Makes pre-stage digestive enzymes that are used in the intestine.

**Spleen** – Serves in the production, degradation, and storage of red blood cells and is integral to the shark's immune system.

**Heart** – Two-chambered heart that pumps blood to the gills, then to body tissue.

**Lateral Line** – Used to sense vibrations or movements in water. Found in both sharks and fish.

**Human Anatomy**

**Stomach** – Secretes acid and digestive juices to break down food into a liquid form.

**Gall bladder** – Stores bile to break down fats.

**Pancreas** – Secretes bile that is stored in the gall bladder.

**Small Intestine** – Absorbs most of the nutrients from what we eat and drink.
**Large Intestine/Colon** – Absorbs water from wastes, creating stool.
**Rectum** – Stores solid waste before it is passed from the body.
**Lungs** – Area of gas exchange and respiration. Oxygen-rich blood moves from the lungs to the body while carbon dioxide is removed from the body.
**Bladder** – An organ that serves as a receptacle for liquid waste.
**Kidneys** – A pair of bean-shaped organs in the back part of the abdominal cavity that form and excrete urine, regulate fluid and electrolyte balance, and act as endocrine glands.
**Heart** – A four-chambered organ situated between the lungs; pumps blood throughout the body.
**Liver** – Filters blood coming from the digestive tract before passing it to the rest of the body. The liver also detoxifies chemicals and metabolizes drugs. As it does so, the liver secretes bile that ends up back in the intestines. The liver also makes proteins important for blood clotting and other functions.

**Materials**

- Fish for dissections (if available)
- Dissection kits
- Large fish, shark and human anatomy posters with blanks
- Laminated fish, shark and human anatomy cards
- Large fish, shark and human anatomy poster with answers
- Fillet knife
- Cutting board, newspaper, or a surface that can get blood on it

**Procedure**

Use the anatomy posters to introduce the internal organs of each species.

**Fish dissection:**

If you have fish or sharks available, allow the students to dissect a fish to see the internal organs.

1. Place the fish on its side in the dissection pan, belly towards you, head pointing to your left. Insert a pair of sharp dissection scissors into the vent and make a shallow cut up to and between the pectoral fins, all the way to where the opercula (gill covers) meet.

2. Cut two vertical lines up the side of the fish, one behind the gills up to the middle of the fish and another from the vent up to the middle of the fish, to open a viewing window.

3. Locate the organs.

**If you do not have fish for dissections:**
1. Display the internal fish anatomy poster without the answers.
2. Mix up the laminated anatomy and anatomy definition cards and hand one to each student, making sure to not hand the word to a student who is standing by a student holding the definition.
3. Once the cards are handed out, ask the students to walk around and complete the word with its matching definition.
4. Once all students have found their partner, go around the group asking them to read their anatomy part, definition, and to point to the organ they have on the poster.
5. If they do not know where the organ goes on the poster, ask if the other students can help.
6. Once all the groups have gone, display the poster with the labeled anatomy parts to check their answers.

Discussion

- What fish organs are similar to humans?
- What organs are not similar to humans?
- What is the purpose of the liver?
- What would a fish be eating if they had a short intestine? A long intestine?
- Can you name an example of a fish with a long intestine and an example of a fish with a short intestine?
- Can you name an organ that is found in a shark, a human, and a fish?

Florida Standards Grades 3rd – 5th

- SC.3.N.1.1
- SC.3.L.15.1
- SC.4.N.1.1
- SC.5.L.14.2
- SC.5.L.17.1
- LAFS.3.SL.1.3
- LAFS.4.SL.1.2
- LAFS.5.RI.3.7

Florida Standards Grades 6th – 8th
• LAFS.68.RST.3.7
• LAFS.6.SL.1.2
• LAFS.7.SL.1.2

Florida Standards Grades K – 12th

• LAFS.K12.L.3.6
• LAFS.K12.SL.1.1
• LAFS.K12.SL.1.2
Intertidal Zone (6th -8th grade only)

Activity Overview

Students will learn about the intertidal zone and the marine organisms that live there.

Objectives

1. Students should be able to read a tide chart.

2. Students should be able to identify zonation of the beach and ocean.

Background Information

The largest ecosystem on the planet is the marine environment. Because of how large the marine environment is, scientists are better able to understand the parts of the ocean if these parts are broken down into general terms.

The beach is divided by tidal effects. The backshore extends above high tide level back to the dunes and is only inundated by extreme high tides or by large waves during storms. The foreshore or intertidal zone is exposed at low tide and submerged at high tide. The shoreline is strictly the water's edge and moves with the tide. The nearshore zone lies between the shoreline and the line where waves begin to break.

Two transitional areas exist, one between the marine environment and the terrestrial environment, and the other between salt water and fresh water. The intertidal zone, which encompasses the shore between extreme high tide and low tide, represents the transitional area from marine to terrestrial environments. Estuaries represent the transition area between marine and fresh water. These two transitional areas represent the smallest section of the ocean, but is the most well-known due to easy access to them.

There are many stressors on the organisms that live in the intertidal zone: changes in temperature and salinity, high wave action, and water loss due to tidal changes. These animals have adapted special features or inhabit a niche that enables them to survive in an ever-changing environment.

When marine organisms are exposed to air during a low tide, they begin to lose water through evaporation. To survive, they must possess a mechanism that reduces or have a body that can tolerate water loss until the incoming tide. The simplest mechanism is to move into a moist crack or crevice, or burrow where water is available like crabs and clams do. Another adaptation is to live in a large group to
help reduce water loss, by reducing one’s surface area exposed to the air. An example would be barnacles, mussels, sea anemones, and some seaweeds. On the other hand, some animals can tolerate water loss during a low tide, such as chitons and limpets.

Other sessile animals, like barnacles, oysters and some gastropods, can seal off their bodies to reduce water loss. Gastropods like periwinkles can seal their bodies off with their operculum, thus trapping water inside their shells and keeping their gills moist.

Many intertidal organisms that are exposed to extreme cold and heat show behavioral and structural adaptations that aid them in maintaining their internal temperature. Many organisms avoid changing body temperatures, by reducing heat gained from the environment or increasing heat loss from their bodies. Heat gain can be reduced by having a relatively large body size. A large body size means less surface area relative to volume and less area for gaining heat and a larger body takes longer to heat up compared to a smaller one. It also helps to be a lighter color than other similar animals because they are able to heat up and cool down slower than darker colored animals.

In Florida, intertidal animals are mostly found along a muddy bottom or sandy beach. Beaches are defined by three factors: waves, slope and sand particle size. The sand’s particle size is important to the distribution and abundance of organisms because particle size effect water retention and the suitability of the sand for burrowing. Fine sand tends to hold more water than coarse, dense sand, which dry out faster during low tide. Animals tend to be more protected from the stress of drying out in finer sand environments.

The slope of the beach is the result of waves and sand particle size. Large, crashing waves tend to pick up and carry away fine sand particles, leaving the heavier sediment to settle out. On beaches with small or no wave action, only surface particles are affected. Because beaches can be affected by waves and currents, marsh grass and benthic animals act as sediment stabilizers.

**Key Terms**

- **Benthic** – Pertaining to the area of the sea bottom or to organisms that occur on the sea bottom.
- **Continental shelf** – The shallow underwater extension of a continent.
- **Desiccation** – The process of losing water.
- **Intertidal zone** – Benthic area lying between the extremes of low and high tide.
- **Sediment stabilizer** – Organisms whose activities bind the substrate particles or otherwise enhance substrate stability.
**Sessile** – Pertaining to an organism that is fixed in place.

**Zonation** – System of prominent horizontal bands of organisms that succeed each other vertically.

**Materials**

- Current tide chart for each student
- Intertidal Zone Student Data Sheet for each student
- 1 Transect line
- 1 Measuring tape with measurements in cm
- 1 Sieve
- 1 Shovel
- 1 Quadrat square
- 1 Water gauge
- 2 Meter sticks
- 1 Clear tube 18 inches long
- Stopwatch
- Large 1 cup measuring cup
- 15 Magnifying glasses/hand lenses
- Level
- Rope

**Procedure**

1. Discuss the zonation of the ocean.
2. Show the students how to read the tide chart for the location.
3. Divide the students into two groups (if you have enough instructors), group 1 and group 2 and work the following stations as a rotation. If you only have one instructor, all the students will stay in one group and move from station one to station two together.

**Station One: Transect line and zonation.**

1. Examine the tide chart and determine the day’s tide looking for a high tide and low tide mark on the beach. Note the height and depth of both tides.
2. Run the transect line from high tide all the way down to low tide.
3. Divide the length of transect line by five, which determines the five locations for the quadрат.
4. Place the quadрат at the determined five locations, alternating sides of the transect line. Working from high tide to low tide, examine the organisms living in each of the quadrats, at the surface.
5. Then use the shovels to dig for organisms. Placing the sand in the sieve to filter out sediment and leave organisms behind.

6. Also note any change in particle size, shape, and color along the transect line.

**Station Two:** Beach slope and percolation.

1. If the beach is flat with a constant slope, layout the transect tape from the bottom of the dune to the water line. If the beach has major slope segments measure each segment.

2. Have one student stand with one of the poles at the dune or start of segment, making sure the pole is vertical (use a small level or fishing weight on a line) and the 0 mark is on the sand.

3. Have a second student stand with one of the poles at the water line or end of the segment, making sure the pole is vertical (use a small level or fishing weight on a line) and the 0 mark is on the sand.

4. Run a piece of string between the poles with a line level suspended from it. When the string is taut and level, record the distance from the top of each of pole to where the string intersects them. These will be measurements m and k.

5. To calculate the change in elevation subtract m from k
   \[ y = m - k \]

6. Measure and record the length of the rope between the two poles. This measurement is the horizontal distance (x).

7. To calculate slope you will use rise over run (slope = \( y / x \)).

**Percolation** is the measurement of how fast water filters through sand.

1. Using the clear tube, place the tube 4 inches into the sand and measure how long it takes a cup of water to filter into the sand.

2. Place the tube 10 inches to either side of the hole just sampled and push the tube into the sand 8 inches. Pour one cup of water down the tube and time how long it takes for the water to filter down.

3. Take two measurements at each of the following locations: backshore, exposed foreshore and water’s edge.

**Whole Group if pilings or rocks are present.**

1. Locate the pilings around a dock or groups of large rocks and make initial observations about what is living on the piling.

2. Explore the pilings or encrusted rocks using magnifying glasses and count how many different species live on a piling or rocks.

3. Determine where the abundance of organisms is located, at the top, middle, or bottom of the piling or rocks.
Discussion

- When were high tide and low tide? How high and low were the tides?
- Describe any zonation of flora or fauna in the quadrats along the transect lines. Was there a difference along the line?
- Why are transect lines and quadrats used in research?
- What does the slope of the beach tell you about the wave action and particle size of the sand?
- Did you notice a difference in particle size at the high tide mark versus the low tide mark?
- How would a high sloping beach affect waves?
- What does percolation mean?
- Was there a difference in percolation along the beach from high tide to low tide?
- Fine sand retains water during a low tide. How does this affect the organisms living in the intertidal zone?

Florida Standards Grades 6th - 8th

- MAFS.6.SP.2.5
- LAFS.68.RST.2.4
- LAFS.68.RST.3.7
- LAFS.6.RI.3.7
- LAFS.7.SL.1.2

Florida Standards Grades K – 12th

- MAFS.K12.MP.2.1
- MAFS.K12.MP.5.1
- MAFS.K12.MP.6.1
- LAFS.K12.L.3.6
- LAFS.K12.R.3.7
## Intertidal Zone Datasheet

Name: ____________  Date: ____________  Location: __________________  Time: ________

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<th>Moon</th>
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</table>

1. When is high tide? _______________ Low tide? ____________________

2. How high is high tide? ___________ How low is low tide? __________

3. What is the depth of the tide when the class started? ______________

4. What is the depth of the tide at the close of class? ____________________

(From the natural capital project)
Station One

1. When is high tide?__________________ Low tide?_______________________________

2. How high is high tide?_____________ How low is low tide?___________________

3. What is the depth of the tide when the class started?________________________

4. What is the depth of the tide at the close of class?___________________________

Transect Line and Quadrats

List all organisms and any vegetation found in the quadrats and describe sand size and color.

Quadrat One-_________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

Quadrat Two-___________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

Quadrat Three-_________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

Quadrat Four-___________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

Quadrat Five-_______________________________________________________________
**Station Two: Slope of the Beach**

From WWF Guidelines for Monitoring Beach Profile

<table>
<thead>
<tr>
<th>Beach Segment</th>
<th>$x$ (length of rope between poles)</th>
<th>$m$ (distance from rope intersection to top of 1st pole)</th>
<th>$k$ (distance from rope intersection to top of 2nd pole)</th>
<th>$y$ (= $m - k$)</th>
<th>slope (= $y / x$)</th>
</tr>
</thead>
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<td>Segment 5</td>
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**Percolation**

How long did it take for the water to percolate through the sand at each site?

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<th>Location</th>
<th>4&quot; of sand</th>
<th>8&quot; of sand</th>
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<td></td>
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<tr>
<td>Exposed foreshore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoreline</td>
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<td></td>
</tr>
</tbody>
</table>

**Piling or Rocks**

1. List the organisms found on the piling or on encrusted rocks.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2. Where were most of the organisms located?

   Bottom, middle, and/or top of the piling or rocks. (Circle one)

   Why?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Kayak Fishing

Activity Overview

Kayak fishing is a recreational activity that allows students to access remote or shallow areas. The information in this section will help students learn how to load and launch a kayak, and choose appropriate fishing gear and places to fish.

Objectives

1. Learn how to become a safe kayak angler.
2. Learn equipment needed for kayak fishing.
3. Explore new fishing areas.
4. Practice ethical angler skills.

Background Information

Fishing has been documented in history since 2,000 BC from Egyptian drawings. Kayaks were first built by Arctic North American Inuit and Aleut tribes. The word kayak means "hunter's boat." Kayaks are ideal for hunting because of their stealthy nature. Fishing from a kayak allows an angler to enter shallow water quietly and sneak up on fish. It’s more affordable than owning a boat, doesn’t require a trailer or gasoline, and allows anglers to be “closer to nature.”

When preparing to go kayak fishing, anglers should always check the weather and tides. This will help prevent the angler from being stranded on the water during a storm or from running out of water during a low tide. Leave a float plan with a trusted person and always bring a cell phone or hand held marine radio on a kayaking trip, in case a call for help is to be made. A personal flotation device (PFD) with a whistle should be worn at all times.

Once weather and tides are checked, it’s time to decide the fishing location, time of day to fish (usually decided by the high and low tides), and targeted fish species. Once you pick a fish to target, review any fishing regulations for the species. As a reminder, kayakers should NEVER paddle alone, even if they submit a float plan to a responsible adult. Now it’s time to load up the kayak and head to the fishing location.

What gear to load depends on the angler; some enjoy fishing with one or two types of bait, a small tackle box, and a live well. Others may bring along three fishing
poles, a large tackle box, cast net, live well, landing net, etc. Once anglers become comfortable fishing from a kayak, this part usually decides itself. Either way, check over the gear. Is the monofilament brittle and in need of replacement? Did the artificial lures shrink and dry up? Are there plenty of circle hooks? Do all the prep work before getting on the water so the majority of the time is spent fishing and not looking for hooks or tying knots.

After checking your gear, consider bringing the following items: landing net, dehooking tool, anchor, GPS, extra sunscreen, hat, non-cotton clothing, and water shoes. Anglers should always bring a packed lunch (you never know how long the fishing trip may last), drinking water, a copy of the fishing regulations, and your current fishing license.

To load a kayak into the water, begin by setting the kayak half in the water, bow first, and half out of the water. Then load in the fishing gear, making sure to tie the anchor line to the kayak and secure the fishing poles and other items that may sink if dropped overboard. Once the gear is loaded and secured, it’s time to launch and begin fishing.

Paddling doesn’t mean you must stay close to shore. Rather, you have the freedom to paddle to a nearby island, up a creek, or explore a new area. Kayaks allow paddlers to explore very shallow areas or to carry the kayak over an area such as a shallow oyster bar to the other side. Anglers can also explore shallow grassbeds without the threat of creating prop scars. Many will also paddle up to mangroves and cast around the prop roots, move under a bridge, or enter almost any place on water that a boat cannot reach. Boats require the use of a ramp or launch, while kayaks can be launched from a beach, a dock, through marsh grass, from a boat, or just about anywhere that is safe for the kayaker and his/her gear.

Once you have reached a desired location, anglers can anchor-up (this is helpful during a breeze or strong current), pull the kayak on the shore of an island and stand to fish, or drift fish by not anchoring. Look for fish jumping or ripples in the water, which might signify that a large fish just surfaced. Drifting over a grassbed is a good way to constantly work the bait and anchoring around oyster bars helps to not snag on the oysters. Casting up current and letting the bait drift back down mimics the movement of a baitfish and will attract larger prey. Be sure to stay quiet in the kayak so the fish aren’t spooked.

Depending on the gear brought and skill level, almost any fish can be caught from a kayak. Sharks, tarpon, dolphinfish, and other large species are caught with heavy rods and reels and may require angling confidence and experience. Smaller inshore fish such as red drum, spotted seartrout and sheephead are common and can be easily caught. Once a fish is landed and is determined to be a legal keeper, it may be best to return to shore and head home. Fish can spoil quickly if not kept in a
cooler or live well, which can be difficult to keep on a kayak. Once at shore, unload and be sure to always rinse down your gear with freshwater and let it air dry before putting it away.

Protecting fisheries and their marine habitats are very important. Kayaking can be low impact on marine environments because they do not emit oil or gas, they produce no or minimal noise, and their potential impact to marine habitats from vessel/habitat collisions is also minimal. Kayaks allow an angler to sneak up on a school of fish, observe other wildlife, and provide the angler with some degree of exercise. Fishing from a kayak also puts the angler closer to his/her quarry and adds a component of skill when fighting a large fish.

**Key Terms**

**Kayak** – A vessel or craft in which a person can either sit inside or sit on top.

**Paddle** – Object with two blades, shaft, and drip rings. It is used to propel a kayak or canoe through water. A blade is the section of the paddle that propels forward, while the shaft is located between the two blades and is where the kayaker’s hands hold the paddle.

**Personal flotation device (PFD)** – A buoyant jacket that should be worn at all times while on the water. It provides extra buoyancy to the wearer if the person ends up in the water. Several different types are available including those that auto-inflate.

**Float plan** – A written agenda of what the person will do for a specified time period while in the kayak. This document includes items such as: time they are departing for the trip, where the paddler is going, how long they will be there, who they are with, phone number, and when they will return.

**Materials**

- Kayaks
- Paddles
- PFD
- Fishing poles
- Bait
- Fishing gear (lures, hooks, weights, etc.)
- Whistles
- Fishing regulations
- Fishing license (if students are 16 and older)
Procedure

1. Briefly explain the benefits of kayak fishing to an angler, such as how cost efficient it is compared to a boat, its ease in accessing shallow locations, and its safety. Outline what sort of fishing gear is needed, the proper safety gear, and the fishing accessories used while paddling (lunch, water, dehooking tool, etc).

2. Show students how to paddle (forward stroke, backward stroke, and turning).

3. Show students how to load and launch a kayak and how to help others launch a kayak from the shore. Also talk about how to get back in a kayak if one should fall out.

4. Outline where they are allowed to fish, where to go to get more bait, and what they do once they have caught a fish.

5. If needed, review with the kayakers how to use the fishing pole, tie knots, dehook a fish, etc.

6. At the close of the program, unload the kayaks and rinse gear down with fresh water.

Discussion

- What components of kayak fishing were difficult to master? Why?
- What components of kayak fishing were easier to master?
- Are there environmental impacts of kayak fishing? If so, what are they?
- What are the benefits of fishing from a kayak?
- What marine habitats are ideal for kayak use?
- Do you need a fishing license when fishing from a kayak?
- Should you kayak fish alone? Why or why not?

Florida Standards Grades 3rd - 5th

- PE.3.C.2.2
- PE.3.C.2.4
- PE.3.C.2.5
- PE.3.M.1.1
- PE.3.R.5.1
- PE.3.R.5.2
- PE.3.R.5.3
Florida Standards Grades 6th - 8th

- PE.6.C.2.21
- PE.6.M.1.12
- PE.6.R.5.3
- PE.6.R.5.4
- PE.6.R.5.5
- PE.6.R.6.2
- PE.7.C.2.2
- PE.7.C.2.5
- PE.7.C.2.8
- PE.7.L.3.5
- PE.7.M.1.4
- PE.7.M.1.7
- PE.7.R.5.3
- PE.7.R.5.4
- PE.7.R.5.5
- PE.8.M.1.1
- PE.8.M.1.9
- PE.8.R.5.4
- PE.8.R.5.5

Florida Standards Grades K - 12th

- LAFS.K12.L.3.6
Ocean Zones

Activity Overview

Students will learn about the zones of the ocean and the marine organisms that live in them.

Objectives

1. Students will learn the five regions of the ocean.

2. Students should be able to identify the zones of the ocean.

3. Students will learn about some deep sea creatures.

Background Information

The ocean covers 71 percent of the Earth. There is one global ocean, that is geographically divided into five distinct regions; the Atlantic, Pacific, Indian, Arctic, and Southern. The open ocean, is also divided both vertically and horizontally. All open water is called the pelagic realm, and pelagic organisms live in the open ocean away from the bottom. While, the sea floor is called the benthic realm, and organisms that live on the sea bottom are called benthic.

The pelagic zone is divided into the neritic zone which, encompasses water that is over the continental shelves, and the oceanic zone, which includes all other open water beyond the continental shelf. The pelagic realm can be further divided into the photic and aphotic zones. The photic zone is the area of water that light penetrates into, which can vary with ocean turbidity. The aphotic zone is below the photic zone where light does not penetrate and photosynthesis does not take place. The pelagic zone is also divided into the epipelagic (surface to 200 m), mesopelagic (200 - 1,000 m), bathypelagic (1,000 - 4,000 m), abyssopelagic (4,000 - 6,000 m), and hadal (6,000 - 10,994 m) at the very bottom.

Key Terms

Abyssopelagic zone – Pelagic aphotic zone lying between the bathypelagic and hadalpelagic zones. This zone, also called the abyssal zone, extends from 4,000 meters to 6,000 meters. It is the pitch-black bottom layer of the ocean. The water temperature is constantly near freezing and only a few creatures can be found at these crushing depths.

Aphotic zone – Water below 200m where there is not enough light for photosynthesis.
**Bathypelagic zone** – Pelagic aphotic zone lying between the mesopelagic and abyssopelagic zones at depths from 1,000-4,000 meters. Due to its constant darkness, this zone is also called the midnight zone. The only light at this depth (and lower) comes from bioluminescence of the animals themselves. The temperature in the bathypelagic zone, unlike that of the mesopelagic zone, is constant. The temperature never fluctuates far from a chilling 39°F (4°C). The pressure in the bathypelagic zone is extreme and at depths of 13,100 feet (4,000 meters), reaches over 5,850 pounds per square inch! Yet, sperm whales can dive down to this zone in search of food.

**Benthic** – Pertaining to the area of the sea bottom or to organisms that occur on the sea bottom.

**Continental shelf** – The shallow underwater extension of a continent.

**Continental slope** – The steeply descending bottom between the edge of the continental shelf and the continental rise.

**Epipelagic zone** – The upper 200 meters of the ocean surface; also known as the photic zone and sunlight zone where photosynthesis can take place. It is in this zone that most of the visible light in the ocean exists. The light provides heat from the sun, which causes wide changes in temperature in this zone, both by latitude and with changing seasons. The sea surface temperatures range from as high as 97°F (36°C) in the Persian Gulf to 28°F (-2°C) near the north pole. Interaction with the wind keeps this layer mixed and allows the heating from the sun to be distributed vertically. At the base of this mixing layer is the beginning of the thermocline. The thermocline is a region where water temperature decreases rapidly with increasing depth and is the transition layer between the mixed layer at the surface and deeper water. The depth and strength of the thermocline varies from season to season and year to year. It is strongest in the tropics and decreases to non-existent in the polar winter season.

**Hadal zone** – Deepest pelagic aphotic zone, lying below the abyssopelagic zone and containing parts of the ocean below 6,000 meters. The temperature is constant at just above freezing. The weight of all the water over head in the Mariana Trench is over 8 tons per square inch. Even at the very bottom life still exists. In 2005, tiny single-celled organisms called foraminiferans, a type of plankton, were discovered in the Challenger Deep Trench southwest of Guam in the Pacific Ocean. The deepest a fish has ever been found was at 8,145 meters in the Mariana Trench.

**Mesopelagic zone** – Below the epipelagic zone, extending from 200 meters to 1,000 meters. The mesopelagic zone is sometimes referred to as the twilight zone or the midwater zone as sunlight this deep is very faint. Temperature changes the greatest in this zone because this zone contains the thermocline. Because of the lack of light, it is within this zone that organisms with bioluminescence begins to appear. Fishes found here have eyes that are generally larger and
directed upward, most likely to see silhouettes of possible prey against the dim light.

**Materials**

- Ocean Zone poster
- Name cards

**Procedure**

1. Review the information in the background section with the students.
2. Display the ocean zone poster without the answers.
3. Mix up the laminated name cards and hand one to each student.
4. Once the cards are handed out, go around the group asking them to read their name card, and to point to the where they should go on the poster.
5. If they do not know where they go on the poster, ask if the other students can help.

**Discussion**

- What morphological differences do deep sea species have compared to photic zone species?
- What happens to light as you go deeper in the ocean?
- What happens to the water temperature as you go deeper?
- What happens to pressure as you go deeper?

**Florida Standards Grades 6th – 8th**

- SC.7.P.10.3

**Florida Standards Grades K – 12th**

- MAFS.K12.MP.2.1
- LAFS.K12.SL.1.2
- LAFS.K12.L.3.6
- LAFS.68.RST.2.4
- LAFS.68.RST.3.7
Five regions of the ocean

From www.worldatlas.com

From www.ck12.org
Seining

Activity Overview

The students will learn how to properly pull a seine net. They will then sample an area of water and identify and discuss the organisms found there.

Objectives

1. Learn how scientists can collect fish for research.
2. Practice identifying fish and other species collected.
3. Practice proper fish handling skills.
4. Practice working together to collect and safely return organisms.

Background Information

Seine nets are one type of gear used by scientists to collect information about the fish living in shallow, nearshore waters. They are designed to be pulled over the bottom and brought to shore where organisms can be identified, counted, and either released or retained for further biological sampling. This data allows biologists to make informed recommendations about management options.

Seine nets are made of a rectangular panel of netting, a weighted lead line along the bottom, and a line of floats along the top. Usually there is a pole attached to each end of the net. They are ideal for sampling the entire water column in a given, shallow area, as long as the water depth does not exceed the height of the seine net. Seine nets should only be pulled through grass, mud or sand areas; never pull a seine net through hardbottom areas, corals, or oyster bars.

Key Terms

Cull — Retain for laboratory sampling.
Float line — Supports the top of the net and has floats attached.
Webbing — Usually ¼ inch or larger, generally creating a net that is 4 feet high and of varied length.
Lead line — Supports the bottom of the net and has lead weights attached.
Poles — Attached to the left and right ends of the net and are used to drag the seine.
Species richness — The number of different species represented in the seining sample.

Materials

- Seine net
- 2 buckets
- Battery operated air pumps and air stones
- Clear plastic containers with lids
- 5 dip nets
- All participants must wear water shoes or old sneakers

Procedure

1. Pulling the seine net (the method you choose may vary according to the site and conditions).
   a. One method is to pull the net parallel to the shoreline for a predetermined time or distance. You might select this method if the water depth drops too quickly, or if the wind is blowing parallel to shore.
   b. A second method involves pulling the net from a selected distance offshore to the shoreline. If this method is used, the pullers should walk in a single file line to the location where the collection pull begins. The single file lines keeps students from scaring fish away from the sampling site.
   c. A third method involves pulling from the shoreline to a designated distance offshore, then looping back to the shoreline.
   d. In all three methods, it is important that no one walk in front of the net while it is being pulled or in the area to be seined, which would scare the fish away. The net should be kept in a half-moon configuration, with the poles and lead line touching the bottom to keep the organisms from escaping under the net. The pole should be angled so that the lead line precedes the float line as the net is pulled. Facing the poles, the students should walk backwards pulling the poles along. The students should make sure to shuffle their feet, in order to avoid rocks or hang-ups that might be in the way. This will also allow them to avoid organisms that can cause them harm, such as stingrays. Students should always wear shoes or sneakers to protect their feet from sharp shells.
Keep the lead line on the bottom. If the lead line comes off the bottom, the catch will escape.

From Delaware Sea Grant

After desired distance, turn the net and drag it toward shore. Keep the lead line on the bottom and drag the net up onto the beach.

2. Once the net is onshore, quickly go through the organisms caught and put ones for discussion (one or two of each species) in the buckets with the aerators, and gently release the others. Crabs and other aggressive organisms should be held in a separate container, away from other organisms that could be harmed.

3. Cull through the organisms caught. There are two ways to do this:
   a. The first way is called the cradle method. This method creates a dip in the net, which allows organisms to remain in the water while collectors are going through the species.
b. The second method is easier to use, but creates high amounts of stress for the fish. The net is pulled onto shore and the students must quickly go through the organisms caught. This may also lead to the net being stepped on, which can damage it and kill organisms. This is a good time to remind the students that marine animals out of the water cannot breathe and must be returned as quickly as possible.

4. The net must be cleaned before discussion or before the next pull.
   a. If the cradle method was used, simply flip the net over in the water and shake a few times to release all organisms.
   b. If the shore method was used, the net must be returned to the water. Take the lead line and the float line in your hand and walk back out into the water. Drop the lead line, then step over it with the float line still in hand. Pull the net towards the shore. This flips the net and allows the organisms to escape and will rinse the net of any sand or mud.

5. Once the net is empty, the organisms kept for discussion can be examined.

6. When field work is complete, the net must be cleaned and rolled for transportation.
   a. Dunk the open net into the water and shake it out both under and above the water.
   b. Fold the net in half and roll it around the two poles.
   c. Once back at the home location, the net must be unfolded, rinsed with freshwater, and allowed to dry completely.
   d. Once dry, fold in half and roll around the two poles for storage.

Discussion

- What types of organisms were found?
- How do these animals eat?
- What type of coloration do they have?
- What can we tell about them from their morphology?
- What factors contribute to the seine net being effective or not effective?
- Does the shoreline vegetation have any impact on the diversity of the organisms collected?
- What was the species richness?
• How does the mesh size effect the size of organisms collected?

**Florida Standards Grades 3rd – 5th**

- SC.3.N.1.1
- SC.3.N.1.3
- SC.3.N.1.6
- SC.3.N.1.7
- SC.3.L.15.1
- SC.4.N.1.1
- PE.3.C.2.2
- PE.3.M.1.1
- PE.3.R.5.1
- PE.3.R.5.2
- PE.3.R.5.3
- PE.4.C.2.2
- PE.4.C.2.4
- PE.4.M.1.1
- PE.4.R.5.3
- PE.5.M.1.1
- PE.5.R.5.2

**Florida Standards Grades 6th – 8th**

- PE.6.M.1.12
- PE.6.R.5.3
- PE.6.R.5.4
- PE.6.R.5.5
- PE.7.C.2.2
- PE.7.C.2.5
- PE.7.C.2.8
- PE.7.M.1.4
- PE.7.M.1.7
- PE.7.R.5.3
- PE.7.R.5.5
- PE.8.M.1.1
- PE.8.M.1.9
- PE.8.R.5.4
- PE.8.R.5.5

**Florida Standards Grades K – 12th**

- MAFS.K12.MP.2.1
• MAFS.K12.MP.5.1
• MAFS.K12.MP.6.1
• LAFS.K12.L.3.6
Swim Bladder

Activity Overview

Using balloons and marbles, students will learn how fishes with swim bladders keep their buoyancy.

Objective

1. Understand how a swim bladder allows a fish to move up and down in the water.

2. Know which species of marine fishes have and do not have swim bladders.

Background Information

Fish use their fins and bodies to steer, stop and propel them through the water. Some fish are really large, such as the ocean sunfish, which can weigh up to 2,200 pounds! Most bony fish have a swim bladder, which is a hollow air-filled sack that helps a fish maintain buoyancy at particular depths in the ocean. Sharks (cartilaginous skeleton) do not have a swim bladder. Instead, they have a liver that contains oil that provides some degree of buoyancy. The swim bladder keeps a fish from sinking to the bottom of the ocean or bobbing at the surface. Fish can control where they want to be in the water column by changing the volume of air in the bladder. They add air to move up the water column and remove air to go deeper and can make themselves neutrally buoyant (doesn’t sink or float).

Much like a scuba diver who has made a deep dive cannot race up to the surface due to the risk of bubbles in the bloodstream expanding with the decrease in pressure, fish also have issues when they are quickly brought from deep waters up to the surface.

When anglers are deep sea fishing, they might catch a fish that has a little “balloon” sticking out of its mouth and its eyes may be large or bulging. These are signs that the swim bladder has fully expanded inside the fish due to fast pressure changes. In doing so, the air bladder has pushed organs forward and caused the stomach to stick out of the mouth. This “balloon” visible in the mouth of the fish is the stomach and should be left alone. If an angler observes the stomach sticking out of the fish’s mouth, bulging eyes, a distended belly, or intestines coming out of the anal vent, then the angler must take measures to assist the fish in returning to the bottom. Fish can either be vented, to release the air in the swim bladder, or an angler can use a descending device to lower the fish back to a depth where increased pressure will recompress the swim bladder gases and allow the fish to swim away.
Key Terms

Swim bladder – Hollow, gas-filled buoyancy organ that allows a fish to conserve energy by maintaining neutral buoyancy (suspending) in water.

Materials

- Liter jar or clear container filled with water
- 2 glass marbles or rocks
- 2 balloons (2-inches long)

Procedure

1. Look at the chart of internal fish anatomy and briefly explain what the swim bladder is and its function.
2. Fill the jar ¾ with water and place one marble inside each balloon. In one of the balloons, tie a knot as close to the marble as possible. Drop the balloon in the jar of water.
3. Slightly inflate the second balloon with air and tie a knot as close to the mouth of the balloon as possible.
4. Drop the balloon in the jar of water. The inflated balloon floats on the surface of the water, but the deflated balloon sinks to the bottom.

Discussion

An object that contains more air will float since it is lighter than water, while an object with less air will sink due to heavier mass. For example, you wouldn’t put a child size life jacket on an adult because it wouldn’t help the adult float. The adult, weighing more than a child, would need a larger life jacket.

- What is a swim bladder used for?
- What would happen to the balloon if we placed more marbles inside without inflating the balloon?
- Would it float or sink?
- What if we placed more marbles inside the balloon and blew the balloon up with a little more air?
- If we caught a fish, what would happen if we released it with a full swim bladder?
• Would it be able to swim back down to the bottom of the ocean where it came from?

Florida Standards Grades 3rd – 5th

• SC.3.N.1.1
• SC.3.L.15.1
• SC.4.N.1.1
• SC.5.L.14.2
• SC.5.L.17.1
• LAFS.3.SL.1.3
• LAFS.4.SL.1.2
• LAFS.5.RI.3.7

Florida Standards Grades 6th - 8th

• LAFS.68.RST.3.7
• LAFS.6.SL.1.2
• LAFS.7.SL.1.2

Florida Standards Grade K - 12th

• LAFS.K12.L.3.6
• LAFS.K12.SL.1.1
• LAFS.K12.SL.1.2
Tackle Box Relay

Activity Overview

Students will use their knowledge of different types of saltwater fishing tackle to assemble items that should be in a tackle box.

Objectives

3. Understand the important items that should be inside a tackle box.

4. Have a basic understanding of how and why each item is used.

Background Information

Anglers will need a travel-sized box to keep their fishing gear together, protected, and easily transportable to a fishing site. Anglers use lures or baits to attract their catch. There are many lures (plugs, spoons, jigs) and artificial baits available, and a tackle box keeps them organized. Other important items for a tackle box are spare monofilament fishing line, weights, circle hooks, measuring tape, fishing regulations, first aid kit, sunglasses, a hat and sunscreen. For information on the tackle items, please see the Tackle activity.

Key Terms

**Tackle box** – A box or container in which to hold most of the gear needed for fishing

**Egg weights** – A type of weight that is shaped like an egg and is used on a fish finder rig

**Circle hooks** – A hook with the point turned perpendicular to the shank of the hook. This hook catches a fish in the mouth more than a “j” hook and should be used when fishing.

“**J**” **hooks** – A hook shaped like a “J” that should not be used when catch-and-release fishing. These hooks often come on a jig or lure.

**Float or bobber** – A float that bobs at the surface and disappears underwater when a fish is caught.

**Popping cork** – A type of float that has weights and beads. When the float is jerked, it makes a “popping” sound that attracts fish.

**Line clippers** - Used to clip tag lines after completing a knot

**Measuring tape** – Best if it doesn’t have metal; it should be laid on a flat surface to measure the length of a fish.
Weather forecast – Should always be checked before going fishing or on a boat

Angling guide – Publication that shows public boat ramps, water depths, and seagrass beds.

Landing net – A rubber landing net supports the weight of the fish while protecting the slime layer.

Pliers - Can be used to remove a hook or to crimp down a weight

Fish sling - A rubber sling that supports the weight of the fish and can be useful when weighing it.

Gripping tools - A tool that helps an angler hold the fish without having to grab it by the gills, eyes, mouth, etc.

Materials

(You will need two of each item to place in two different tackle boxes.)

- De-hooking tool
- Various types of weights (egg, pyramid, split shot, etc.)
- Monofilament 10-12 pound test, small spool
- Circle and “J” hooks (the sharp points dipped in rubber to prevent injury)
- Florida Saltwater Recreational Fishing Regulations
- 2 tackle boxes
- Line clippers (or a laminated picture of one)
- Fillet knife (or a laminated picture of one)
- Fishing license (actual license or a laminated picture)
- First aid kit (actual or a laminated picture)
- Sunscreen (actual or a laminated picture)
- Leader
- Tape measure
- Bug spray (actual or a laminated picture)
- Water bottle (actual or a laminated picture)
- Float plan, laminated
- Boating and Angling Guide for the location closest to the camp
- Weather forecast (actual or a laminated picture)
- Tide chart for the day
- Bobber or popping cork
- Knotless, rubber landing net
- Fish sling
- Fishing Lines field guide
- Pliers
- Artificial lure (top-water plug)
- Swivels, various sizes
- Feather jig
• Orange life jacket
• Laminated name cards of each tackle box item
• Laminated description cards of each tackle box item

**Procedure**

1. Review each item inside the tackle box.
2. Ask the student what each item is called, what they think it is used for, and why.
3. This activity is designed as a relay race.
4. Divide the group evenly between two tackle boxes that have the fishing items placed inside.
5. Place items at the far end of classroom or field, place name cards in the tackle box closest to students, and definition cards in the middle of the classroom or field.
6. The game begins with one student from each team taking a name card, students finding the definition card, finding the item, and bringing all pieces back to the group to discuss the name and function of the item with the other members.
7. Then, the next student goes; this repeats until all items and cards are returned to the tackle box.
8. The first group to correctly identify and describe all the tackle box items wins the relay race.

**Discussion**

• Did some of the equipment seem easier to identify than others? Why?
• Which items are the hardest to identify? Why?
• Which items do you think you will use the most?
• Which items do you think you will use the least?

**Florida Standards Grades 3rd - 5th**

- LAFS.3.RI.3.7
- LAFS.3.RI.1.1
- LAFS.3.RI.2.4
• LAFS.3.SL.1.2
• LAFS.3.SL.1.3
• LAFS.5.SL.1.2
• PE.3.C.2.2
• PE.3.C.2.5
• PE.4.C.2.2
• PE.4.M.1.1
• PE.5.R.5.2

Florida Standards Grades 6th - 8th

• LAFS.6.SL.1.2
• PE.6.M.1.12
• PE.6.R.5.3
• PE.6.R.5.5
• PE.7.M.1.4
• PE.7.M.1.7
• PE.7.R.5.3
• PE.8.R.5.4
• PE.8.R.5.5

Florida Standards Grades K - 12th

• LAFS.K12.L.3.6
• LAFS.K12.SL.1.2
Water Quality: pH, Temperature, Salinity, Turbidity

Activity Overview

The students will perform water quality tests and discuss how water quality affects organisms, both positively and negatively.

Objectives

1. Students will learn how scientists measure water quality.

2. Students will learn how water quality affects where fish choose to live.

Background Information

Knowledge of the composition of seawater allows scientists to determine when a problem develops with the chemical make-up of a marine system. There are many different tests that can be done, and each of these tests comes in a variety of forms. The most basic tests come in strip form, where all that needs to be done is to drop some water on a strip. They can also come in liquid or powder forms. The type of test included in this activity is the API Saltwater Master Kit, which uses liquid chemicals to test pH, nitrate, nitrites, and ammonia.

The chemical makeup of seawater affects all organisms that live there. Certain animals are able to adapt to large ranges of properties, and others can only live within a very narrow margin. Factors such as salinity (the amount of salt dissolved in the water), temperature, turbidity (how cloudy the water is), and pH (how acidic or basic the water is) all play a large role in what organisms can live in certain areas. For instance, some fish (such as snook) can live in areas where salinity ranges from very low (10ppm) to very high (45ppm), like in an estuary. Some fish change where they live throughout their lifetimes, going from freshwater to saltwater or vice versa.

Many factors can affect the chemical composition of saltwater systems. In estuarine areas, freshwater from rivers mixes in with the ocean water, changing the salinity and adding any minerals picked up along the way. Pesticides, herbicides, and fertilizers added to nearshore lands can quickly change the composition of the water and can lead to algal blooms.

Salinity: To test the amount of salt in the water, students will be using a refractometer. The refractometer has a prism, a clear cover plate, mirror tube, adjustment screw, and eyepiece. To take a reading, place a few drops of a water on the measurement prism, making sure the entire prism is covered, then close the
cover plate. Look through the eyepiece while holding the refractometer up to a light source (the sun). The salinity concentration is determined by the intersection of the boundary of the light and dark fields (known as the shadow line) on the printed scale. The left side of the scale indicates the specific gravity and the right side indicates parts per thousand (ppt). If the scale appears out of focus, gently turn the eyepiece either clockwise or counterclockwise until the scale is sharp to your eyes. To read, look for the bottom of the blue line (the picture below reads 45 ppt).

Turbidity: Water clarity and turbidity are directly related, the higher the turbidity, the lower the water clarity will be. Water clarity is measured by a Secchi disk. Secchi disks are used in lakes, oceans, and deep rivers where they are lowered into the body of water until they are no longer visible. Then they are slowly raised back to the last point of visibility, and that depth is recorded. The depth at which visibility is lost is known as the Secchi depth. High Secchi depths are associated with high water clarity and low turbidity, while low Secchi depths indicate high turbidity and low water clarity.

pH: pH is a measure of the acidity or alkalinity of a substance and is one of the stable measurements in seawater. Ocean water has an excellent buffering system with the interaction of carbon dioxide and water, so it is generally always at a pH of 7.5 to 8.5. Neutral water has a pH of 7, while acidic substances are less than 7 (down to 1, which is highly acidic) and alkaline substances are more than 7 (up to 14, which is highly alkaline). Anything either highly acidic or alkaline would kill marine life.
Nitrate, Nitrite and Ammonia: All aquatic organisms excrete wastes and aquatic plants and organisms eventually die, which creates ammonia. Bacteria in the water change ammonia to nitrite, which is then converted to nitrate by other bacteria. Nitrites are also found in the sediment and converted to nitrate by bacteria. High levels of these chemicals indicate large amounts of nutrients in the water. Areas such as salt marshes will have large amounts of nutrients, whereas clear water areas such as tropical regions will have lower levels. They can also be indicative of pollution and runoff. Excess nitrate may cause algae blooms that can kill marine organisms.

Phosphate: All living organisms require phosphorus to maintain life, and phosphate is the most biologically available form. Marine primary production removes phosphate and it is carried up the food web. Phosphate is a main part of fertilizers and when too much fertilizer is used, the excess can run into rivers and oceans, causing high concentrations, which leads to the growth of aggressive nuisance algae that can cause fish kills.

**Key Terms**

**Turbidity** – The measure of the relative clarity of water. The greater the turbidity, the murkier the water. Turbidity increases as a result of suspended solids in the water that reduces the transmission of light.

**Salinity** – The amount of salt dissolved in the water.
**pH** – A measure of the hydrogen concentration of liquids and substances. Each measured liquid or substance is given a pH value on a scale that ranges from 0-14.

**Temperature** – A physical property of water that is very important in water quality because some properties are affected by temperature. For example, the following are affected by temperature: the amount of oxygen that can be dissolved in water; rate of photosynthesis by algae; metabolic rates of marine organisms; and sensitivity of organisms to toxic wastes, parasites, and diseases. Cold water can hold more oxygen than warm water because gases are more easily dissolved in cool water.

**Materials**

- Saltwater test kit
- Thermometers
- Secchi disk
- Refractometer
- Clipboards
- Pencils
- Water Quality Data Sheets
- Eye dropper
- Wash bottle
- Chemical waste container (nalgene bottle)
- Bucket

**Procedure**

1. Bring the students out to an area where they can easily access water, and where there is not a large amount of floating debris.
2. Students should record the site information in their field journal (date, time of day, location, water description, cloud cover, etc.).
3. Using the bucket, have the students scoop some water.
4. Using this water, have the students measure the pH, ammonia, nitrite, nitrate and phosphate and salinity by following the directions supplied with the testing equipment.
5. Have the students take a temperature reading from the same area that they removed the water.
6. The Secchi disk should be used to measure turbidity in the same area.
7. Dispose of the tested water in the chemical waste container.
8. Move to a different area and have the students perform the tests again.
9. Compare the findings from the different test sites.
10. Once back at the home location, the tested water can be poured down the drain.

**Discussion**

- What were the differences between the sites? What was the same?
- What might have caused the differences?
- Could there have been errors in taking the tests? How can this be resolved?
- If the water is turbid, does that mean it’s “dirty” or healthy?
- What is brackish water and how is it created?
- Are there other ways to measure salinity?

**Florida Standards Grades 3rd – 5th**

- SC.3.N.1.1
- SC.3.N.1.3
- SC.3.N.1.6
- SC.3.N.1.7
- SC.4.L.16.2
- SC.4.N.1.1
- SC.4.N.1.6
- SC.4.N.1.7
- SC.5.L.17.1
- LAFS.3.SL.1.3

**Florida Standards Grades 6th – 8th**

- SC.6.E.6.2
- SC.7.E.6.6

**Florida Standards Grades K – 12th**

- MAFS.6.SP.2.5
- MAFS.K12.MP.2.1
- MAFS.K12.MP.5.1
- MAFS.K12.MP.6.1
- LAFS.68.RST.2.4
- LAFS.K12.L.3.6
• LAFS.K12.SL.1.1
• LAFS.K12.SL.1.2
Waves and Currents

Activity Overview

The students will measure wave height, direction and rate.

Objectives

1. Students will learn how waves and currents effect fishing.

Background Information

Wave action and currents both play a big role in the formation of marine habitats. Water can move sand into new areas and form features such as barrier islands. It can also move these islands over time by removing sand from the seaward side and depositing it on the leeward side. The movement of sand and substrate affects the ability of marine plants to anchor and grow in certain areas. Certain plants and animals can only live in areas where there is no wave action while others thrive in heavy waves and currents because of the highly oxygenated water. Many animals rely on currents for breeding, movement and feeding, as the movement of water disperses food particles, larval fish, sperm and eggs.

Anglers benefit from this water motion as well. Bait is carried to areas where fish congregate; fish orient facing the current, allowing anglers to better target their catch. Changing tides move fish species to different locations accessible by different fishing methods.

Waves and currents can have a negative impact as well. During storms, large waves and heavy currents can erode beach sediment, destroy seagrass beds, alter the natural movement of fish species, and have a detrimental effect on other marine habitats. They can cause flooding, capsize boats, and destroy property.

(US Army Corp of Engineers)
Key Terms

Wave – A disturbance on the surface of a liquid body in the form of a moving ridge or swell.

Wave frequency – The number of crests or troughs of a wave that pass a given point in a specified period of time.

Wave height – The vertical distance from the crest of the wave to the trough.

Wave crest – The point of maximum elevation.

Wave trough – The point of minimum elevation.

Current – A large portion of air, water, etc. moving in a certain direction.

Materials

- 3 balls
- Tide measuring stick
- Transect tape
- Waves and currents data sheets
- Clipboards
- Pencils
- Compass
- Stopwatch

Procedure

1. Discuss the importance of waves and currents.

2. To measure the current, start by marking your beginning point with the tide measuring stick. Drop the ball in the water near the tide measuring stick and observe in which direction it travels for one minute.

3. Measure the distance traveled in meters. Divide the distance by 60 seconds to get meters/second.

4. Measure the current three times and average them together (add all three current speeds and divide by 3).

5. Use the compass to determine direction by standing high up on the beach and sighting the compass along the direction from which the waves are coming, which will be at right angles to the wave crests.

6. After you have measured the current, move on to measuring the wave height.

7. Wave height is measured by having an observer with the tide measuring stick walk out into the sea to just seaward of where the waves are breaking. Then the observer notes where the highest and lowest water levels are located on the stick. This is where the wave crest and wave trough are read.
on the measuring stick. The wave height is the difference between the two measurements.

8. Repeat step 7 two more times. Then average together the wave heights to get the final wave height.

9. Now determine wave frequency by measuring the number of wave crests per minute using the stopwatch. Start the timing when the first wave passes the observer and stop after one minute. Repeat two more times. Average together the number of waves to get the final wave frequency.

Discussion

- Why do you take an average of your measurements?
- Why is it important to know which way the current is flowing?
- Does wind affect waves and currents?
- How can an angler use the ocean currents when fishing?
- Do fish use currents? If so how?

Florida Standards Grades 3rd - 5th

- SC.3.N.1.1
- SC.3.N.1.3
- SC.3.N.1.6
- SC.3.N.1.7
- SC.4.L.16.2
- SC.4.N.1.1
- SC.4.N.1.6
- SC.4.N.1.7
- SC.5.L.17.1
- LAFS.3.SL.1.3

Florida Standards Grades 6th - 8th

- SC.6.E.6.2
- SC.7.E.6.6

Florida Standards Grades K – 12th

- MAFS.6.SP.2.5
- MAFS.K12.MP.2.1
• MAFS.K12.MP.5.1
• MAFS.K12.MP.6.1
• LAFS.68.RST.2.4
• LAFS.K12.L.3.6
• LAFS.K12.SL.1.1
• LAFS.K12.SL.1.2