

## Fish Adaptations

## Teacher's Guide

**Subject:** Integrated Science (Life; Earth-Space; Physical)

**Topics:** Physical and Behavioral Adaptations; Traits, Natural Selection

**Summary:** Students will use a trawl to collect fish, observe, measure, record and compare selected structural features of the collected specimens, differentiate between physical and behavioral adaptations, and infer potential beneficial effects of various adaptations especially those that relate to mobility and feeding

After completing the field lab, students will be able to:

- Objective(s):**
1. Identify a variety of fish adaptations
  2. Relate adaptations to fish survival (mobility and feeding)
  3. Observe, measure, record and compare selected structural features of the collected specimens
  4. Differentiate between physical and behavioral adaptations

**Ecosystem(s):** Marine, Ocean Coastal Water, Bays

### Equipment:

- Research vessel and PFDs
- Trawl net
- Ruler and tape measure
- Observation tank
- Digital Camera (optional)
- GPS

### Background:

- **Reference Material:** Adaptation and natural selection; Project WILD Aquatic K-12 (Fashion a Fish)
- **Vocabulary:** Adaptation; Speciation; Variation; Biodiversity; Evolution; Trait (physical structures); Substrate
- **Equipment Training:** Trawl net, GPS

### Field Lab Procedure/Steps

1. Review safety issues with students prior to boarding vessel. Why do fish need to adapt to their environment? How do fish adaptations relate to mobility or feeding habits?
2. Discuss various features of fish using picture guide and traits page. Go over basic mouth types, tail shapes and body shapes explaining functionality of each.
3. Divide students into 4 groups and give each group a fresh mullet that you have kept on ice. Have students fill out column for fish 1 on data sheet using the characteristics of the mullet.
4. Review what they discovered about the mullet as a whole group.
5. Fish 2 and 3 can come from the trawl catch or previously captured live specimens (good idea). Try to use some specimens with unique body forms (i.e., Flounder, cowfish, burrfish, toadfish, etc.).
6. Conduct short trawl to catch live specimens and look at other plant and animal species in the environment.
7. Place live fish in pans with water and pass them out to small groups for observations on data sheets (deep dish pans work well).
8. Have each small group share with whole group about their fish.
9. Go through assessment questions on ride back in, making sure students understand basic concepts.

### Sunshine State Standards

**Science:** SC.F.1.3.7; SC.G.1.3.2; SC.G.2.3.3; SC.H.1.3.4; SC.F.2.3.3; SC.G.1.3.3; SC.G.2.3.4; SC.H.3.3.2;

**Language Arts:** LA.A.1.3.3; LA.B.2.3.1; LA.C.1.3.1;

**Mathematics:** MA.D.1.3.2;

**Social Studies:** SS.B.1.3.1

## Fish Adaptations

## Student Data Sheet

### General Information

Full Name:		Date:	
School (teacher):		Time:	
Latitude:		Longitude:	

### Student Hypothesis and Rationale

If a snake or eel-like body shape is adapted to rocks and crevices, then we will find (more/less) \_\_\_\_\_  
 fish with this body type in a area with a sandy bottom with few rocks an crevices because . . . \_\_\_\_\_

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### Field Observations/Measurements/Data

Trait	Fish 1	Fish 2	Fish 3
Body shape			
Tail shape			
Mouth (location and size)			
Teeth (location and size)			
Location of eyes			
Coloration/Patterns			
Type of fish			

# Fish Adaptations

# Assessment

1. Was there any one trait that was the same for all three fish examined?

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2. Based on its mouth and teeth, where do you think fish #2 might find its food?

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3. What is *countershading*? Would this feature be helpful to a fish that lived in the deepest parts of the ocean?

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4. Do your data support your hypothesis? Whether your hypothesis is supported or not, what can you infer from your observations, measurements, and results?

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5. What was the most interesting thing that you observed or learned on the boat today?

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6. What traits do people look for in fish?

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Fish Adaptations



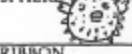

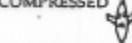
Fish Trait Reference Chart

Some Examples of Fish Adaptations






**TRAITS**








**Body Shape** →

BODY SHAPE	DESCRIPTION	EXAMPLE
 FUSIFORM	streamlined and cylindrical; very fast and can swim continuously for long distances	bonito, mackerel, anchovy
 DEPRESSED	flattened from back to belly like a pancake; ambush prey with short bursts of speed; burrow into sand	skates, rays, goosefish
 SPHERICAL	rounded, globe-like; slow swimmers; may attract prey to them with light and lures	porcupine fish, puffer fish, anglerfish
 RIBBON	snake-like; slow swimmers but easily move through crevices; hide under rocks or in cracks and ambush prey which come too near their hideout	wolf eels, moray eel
 COMPRESSED	flattened side to side; sharp, quick turns and very maneuverable; viewed head-on they almost seem to disappear	surf perch, opaleye, flounder, angelfish

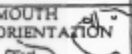
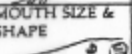

**Tail Shape** →

TAIL SHAPE	DESCRIPTION	EXAMPLE
 LUNATE (fastest)	fastest swimmers, maximum speed with minimum effort over long distances.	marlin, mackerel, dolphinfish
 FORKED	moderately fast, continuous swimmers	anchovy, herring
 SQUARED	very maneuverable, capable of bursts of speed for short distances	rockfish
 ROUNDED	very maneuverable, capable of bursts of speed for short distances	senorita, goby
 TAPERED (slowest)	slow swimmers, use body undulations to swim	moray eel

**Color or Patterns** →

COLOR PATTERNS	DESCRIPTION	EXAMPLE
 CAMOUFLAGE	match surroundings to blend in and hide	flounder, stonefish, cabezon
 DISRUPTIVE COLORATION	spots, stripes and patches of color breakup and diffuse the actual outline	keel fish, sergeant-major
 COUNTER-SHADING	dark back and lighter belly hides fish from predators as sunlight penetrates from above	anchovy
 ADVERTISING	1. warning to stay away from poisons or spines; 2. attract mates, defend territories 3. clean other fish	1. lionfish 2. California Sheephead 3. senorita
 DECEIVING	1. false eyespots confuse predators into attacking the wrong end or miscalculating size/shape of fish; 2. fish resembles objects of no interest to enemies; 3. fish mimics something: a. helpful like a cleaner or b. dangerous like a poisonous seasnake	1. Big Skate, butterfly fish 2. stonefish, sargassum fish 3. a. blenny, b. snake-eel

**Mouth and Teeth** →

MOUTH, TEETH, GILL RAKERS	DESCRIPTION	EXAMPLE
 MOUTH ORIENTATION	1. oriented upwards denotes surface feeder or feeds on prey above it; 2. downwards suggests bottom-grubber	1. stargazer, stonefish 2. goatfish
 MOUTH SIZE & SHAPE	1. large jaws engulf prey; 2. protrusible jaws suck in prey; 3. elongate jaws reach into crevices; 4. elongate lower jaw feeds on prey seen above	1. lingcod 2. trumpetfish 3. butterflyfish 4. halfbeak
 TEETH SIZE & SHAPE	1. fish eaters have pointed, knife-like teeth; 2. snails and clam eaters have plate-like grinders and crushers; 3. choppers on plants and corals have fused, beak-like	1. barracuda 2. bat ray 3. parrotfish

Source: Unknown

# Fish Adaptations













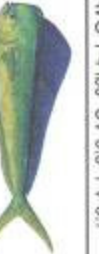

















# Saltwater Fish Reference Chart

## SALTWATER FISH OF FLORIDA

*Sauriwa - Apalachee Edition*

+S+ = Seasons (For closed seasons, legal sizes, bag limits, and 10" ruler, see side 2.)  
 SV = Sport Value 1 to 5 FV = Food Value 1 to 5

**James A. Harris, Jr., CFC**  
 Franklin County Tax Collector  
 P.O. Drawer 188 Apalachicola FL 32329  
 Tel. (850) 653-9323 or 653-8384

 Greater AMBERJACK AVG 5-25 lbs SV 5 FV 4,5	 Crevalle JACK AVG 2-10 lbs SV 4 FV 1	 SAIL CAT AVG 2-6 lbs SV 3,5 FV 3,8	 COBIA AVG 8-20 lbs SV 3,5 FV 4	 BLUEFISH AVG 1-6 lbs SV 4 FV 3,5	 KING (Mackerel ("kingfish")) AVG 4-15 lbs SV 4 FV 3,5
 Spanish MACKEREL AVG 1-4 lbs SV 3,5 FV 3,7	 Black SEA BASS (Blackfish) AVG 1-3 lbs SV 3,5 FV 4,2	 Florida POMPANO AVG 1-4 lbs SV 4,5 FV 5	 TARPON AVG 10-50 lbs SV 4,5 FV 1	 BLUE MARLIN (Billfish) AVG 75-300 lbs SV 4,5 FV 3,5	 Blacktip SHARK AVG 5-40 lbs SV 4,5 FV 4
 DOLPHIN (Mahi Mahi) AVG 3-40 lbs SV 4 FV 4	 BLACK DRUM AVG 2-20 lbs SV 3,7 FV 3,5	 REDFISH (Red Drum) AVG 1-7 lbs SV 3,8 FV 3,8	 SPOTTED SEATROUT +S+ AVG 1-8 lbs SV 3,5 FV 4	 SAND SEATROUT (Sand Trout) AVG 1/2 - 1.5 lbs SV 3 FV 3,3	 RED GROUPEE AVG 1-12 lbs SV 3,5 FV 4
 SPADEFISH AVG 1-8 lbs SV 3,8 FV 3,8	 GRAY ("Mangrove") SNAPPER AVG 1-3 lbs SV 3,8 FV 4	 RED SNAPPER +S+ AVG 1-7 lbs SV 3,5 FV 4	 WHITING (Kingfish) <small>Several Species</small> AVG 1/2-2 lbs SV 3 FV 3,8	 SHEEPSHEAD AVG 1-5 lbs SV 3,8 FV 4	 GAG GROUPEE AVG 2-12 lbs SV 4 FV 4,5
 TRIGGERFISH AVG 1-5 lbs SV 3,5 FV 3,8	 TRIPLETAIL AVG 2-9 lbs SV 3,5 FV 4	 FLOUNDER <small>Several Species</small> AVG 1-5 lbs SV 3 FV 4,0	 HOGFISH AVG 1-5 lbs SV 2,5 FV 4	 STRIPED MULLET +S+ AVG 9 oz - 3 lbs SV 2,5 FV 3,5	 Banded RUDDERFISH AVG 10 oz - 3 lbs SV 3,5 FV 3,5

Fish shown here are commoner species in Florida's Gulf and Atlantic waters. There are many other, less common or popular species that you may encounter.

*Illustrations by Diane Poehler*

Source: Florida Fish and Wildlife Conservation Commission