



The Art and Science of Gyotaku (Japanese Fish Printing)

Name: _____

Introduction:

The flora and fauna of an ecosystem are very important. This lesson combines biology, environmental science, anatomy by teaching students the science of local fish species, testing water quality with Vernier ProBeware technology, constructing a better way to catch fish or engineering devices to improve water quality for the local flora and fauna, as well as use math to calculate changes in water quality readings and recording data to help identify fish species. Japanese fishermen used to make prints to record their catch.

Gyotaku (pronounced ghee-oh-TAH-koo) is the Japanese art of making prints from the bodies of fish (and sometimes other marine or aquatic species). It is a traditional, direct printmaking technique, dating back more than one hundred years. Gyotaku is believed to have first been done in the 1800s as a way of accurately recording the size and features of prized Japanese fishing catches. The beauty of gyotaku prints comes from capturing the delicate body structures of the fish, such as fins and scales, in a realistic manner on paper or fabric using ink or thinned paint.

The process of gyotaku printmaking requires students to work directly with a real fish from the local geographic area in a tactile manner to prepare to make a print, and to experiment with available art materials to obtain the clearest, most distinct print. It is in this observational, experimental process that science skills step in, and work in conjunction with the artistic skills, actually reinforcing each other. This activity can be categorized as a “STEAM” activity, that is, one that spans the realms of Science, Technology, Engineering, Arts, and Math, and is intended for intermediate and middle school grades (although the activity can be adapted to span K-12). Specifically, in addition to the final print obtained of the fish, this activity asks students to obtain metric measurements from both the actual fish and from their final gyotaku print, and to perform a simple data comparison.

Much can be learned about the life history, habitat, trophic level and adaptations of fishes by carefully observing their bodies and specific body parts. Comparisons and contrasts can easily be done by utilizing various fish species in the gyotaku activity. Highlighted in this activity are common fish found in central

Florida waters that represent distinct components of the freshwater fish community, but substitutions of other fishes can be made, depending on availability. Ideally, fish species to be used with this activity would include:

Largemouth bass (*Micropterus salmoides*) – top predator, eats fish, forwardly located large mouth opening for eating large prey, large eyes, streamlined body for quick ambush hunting, camouflage coloration;

Bluegill (*Lepomis macrochirus*) – omnivorous, eats mostly insects/insect larvae; laterally compressed for

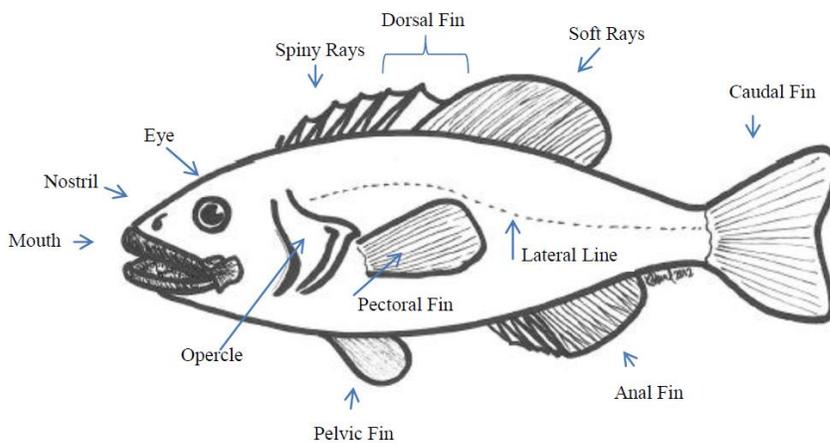
sharp maneuvering, forward-facing and dexterous smaller mouth for plucking food items, camouflage coloration;

Threadfin shad (*Dorosoma petenense*) – plankton filterer; introduced into Florida – now widely distributed; silver-colored for top-water camouflage;

Any of the Tilapia/Cichlid species – omnivorous, exotic (non-native).

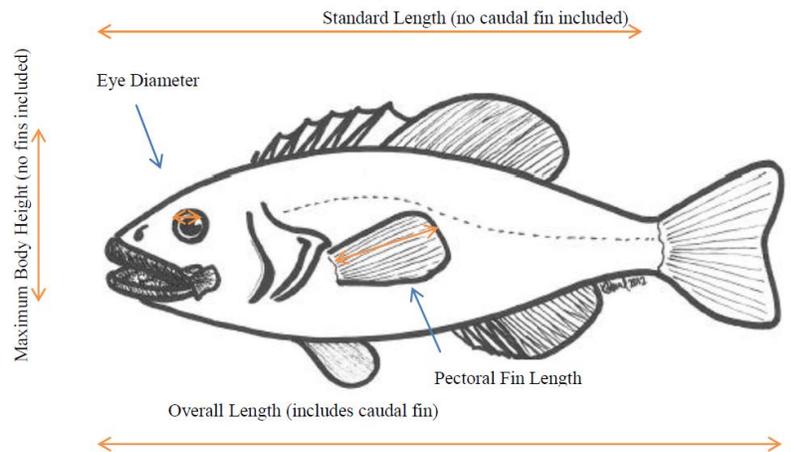
Procedures:

1. Have the students to locate the following specific body parts on their particular fish:



2. Measurements

*In millimeters	From Actual Fish
Overall Length	
Standard Length	
Maximum Body Height	
Pectoral Fin Length	
Eye Diameter	



Procedures:

Print-making Procedure

1. Safety Concerns:
 - a. Ask students if they have any allergies to fish or seafood. (If so, there are artificial fish models that can be obtained from art/hobby suppliers to use in lieu of real fish for students with allergies.)
 - b. Students should be reminded to wash their hands well at the end of the activity.
2. Cover all table areas with newspaper to protect the table surfaces, and to facilitate easy cleanup.
3. Assign fish to students or pairs/groups of students.
4. Position the fish on top of the sand-filled quart zip-top bag. This is done to raise the fish slightly above the level of the table, so as to be able to contour the paper to the body of the fish during the printing process.
5. Use paper towels and white vinegar to remove the mucus coating on the upper side of the fish; discuss the importance of the protective coating mucus (slime) layer to a live fish, and the importance of removing the mucus in the printmaking process.
6. Using paper towels, pat the upper surface of the fish as dry as possible.
7. Use modeling clay to support and hold the fins, the mouth, opercle and other body parts from below in the desired positions for printing.
8. Apply the paint or ink directly to the fish in thin layers. Too much paint/ink is not a good thing! Students are free to choose and apply available colors as they wish. This is part of the experimental process. Please note that some acrylic paints may need to be thinned with water for best use in the printing process. Brushing the paint/ink against the lay of the scales (from tail to head) is sometimes helpful in achieving an “outlined scales” result.
9. For best results, do not apply paint/ink to the eye of the fish. This feature is difficult to achieve a good print result, and is best painted or drawn in by hand, after the direct fish print has dried. Pooled paint/ink in the eye socket can be wiped out using paper toweling prior to printing.
10. Once the fish has been prepared for printing, the paper (or fabric) is laid over the fish body and gently smoothed with hands and fingers so that it contacts all of the upper side. Rice paper is quite thin, and can be easily molded to the contours of the fish. If thicker papers are used, ensure that contact is made. This is best done in a slow and deliberate manner, working from head to tail.

11. When the contact printing is complete, gently and slowly peel off the paper or fabric from the surface of the fish to reveal the gyotaku print. Hang the print from a line or lay flat on a table surface to dry.
12. A second, fainter image can be obtained by printing the fish again on the same, or different, piece of paper or fabric.
13. Remove residual paint/ink from the fish using paper towels, water, and vinegar. Pat dry and the fish can be used again for another gyotaku print process.

Data Analysis:

1. What combination of paint/ink and paper resulted in the most realistic, detailed prints? (E)
2. Do you think that gyotaku is a good method of recording a fish catch? Does the analysis of your measurement data support your answer? (E)
3. Why were the measurements obtained in millimeters? (E)
4. What other methods of recording a catch are there?