Lyn Murphy
Tioga Junior High
Tioga, La.

Grade Level
Middle School (6-8)

Duration
Five 45-minute class periods or additional week of independant work

Subject Area
Inquiry

Materials List
- Computers with Internet access
- Teacher handout (BM #1)
- List of student questions (BM #2)
- Student Web sites (BM #3)
- Rubric (BM #4)

Grade/Standard/GLE
Science
6,7,8/SI-M-A-1/3

BM = Blackline Master

Snagging Paddlefish Information

Focus/Overview:
Students will conduct a Web search to research questions about basic paddlefish biology and ecology. After answering the questions, students will use the collected information to write and present a report that includes a title page with an image of a paddlefish and a bibliography.

Background Information:
See BM #1.

Learning Objective:
Student will:
- Use current literature to write a report about paddlefish biology and ecology.

Procedure:
1. Attention-grabber. Introduce the topic of paddlefish, discussing how the class will be raising paddlefish in the classroom. Ask the students, "Why should we raise paddlefish in our classroom?" Use the discussion generated to determine what, if any, prior knowledge the students have about paddlefish. Challenge students to use the Internet to investigate basic paddlefish biology and threats to paddlefish.

2. Project. Distribute handouts with the requirements for the report that they will write and questions to be researched (BM #2), the Web sites to be used (BM #3) and the rubric that will be used to assess the report (BM #4).

3. Teacher will read the reports then moderate a discussion of the findings to allow all students to benefit from the "unique finds" of students.

   Note: This project can be done in groups or individually, depending on computer access.

Assessment:
See rubric (BM #4).

Resources:
See BM #5.

Blackline Master#1

Teacher Background Information on Paddlefish

Paddlefish (*Polyodon spathula*) are an ancient species of fish. Fossils of this odd-looking fish date back 400 million years. This means paddlefish lived before dinosaurs. They have a unique, paddle-shaped rostrum or nose and bodies that resemble a shark. Like the shark, a paddlefish's skeleton (including its forked, heterocercal tail) is made entirely of cartilage, except for the dentary or jawbone. A paddlefish has very few scales, similar to its close relative, the sturgeon. The paddlefish's few scales are located near the base of its tail fin.

There are only two species of paddlefish in the world, one in China and the other in the United States. Today, these river-dwelling fish are found in large, free-flowing rivers of the Mississippi River basin. They prefer the deep water and slow currents of pools, backwaters, impoundments and tail waters below dams. Historically, paddlefish were found beyond the Mississippi River basin and throughout the Great Lakes and Canada. The fish is now extirpated. In other words, the species is no longer found in Canada and some areas of the United States where it once lived.

Although extirpated and threatened in some areas, paddlefish from stable populations are harvested commercially and as a game fish in some states. The meat is considered flavorful. Even more desirable than the meat are its eggs or roe. Paddlefish roe, similar to caviar, is considered to be a delicacy. It is an expensive dish made up of unfertilized fish eggs from specific fish species. Since paddlefish mature slowly, taking the fish for only its roe has harmed some populations.

The most unique feature of the paddlefish is its rostrum, which is about one-third of its total body length. Scientists once believed that the rostrum was used to dig out food from stream bottoms. They now know that paddlefish are primarily filter feeders, and the rostrum has a sensory function. The rostrum is used to find food, and possibly to balance the fish's body in deep, swift-moving water. A paddlefish feeds by swimming with its large mouth open, using gillrakers to strain plankton from the water.

Although it is fast growing, a paddlefish matures slowly. Both males and females reach sexual maturity relatively late. Males mature at about 7 to 9 years, and females at 10 to 12 years. Though they like to live in deep water with slow currents, paddlefish leave these areas to spawn in cold, swiftly moving water when the water temperature reaches about 13°C (60°F.) Since timing for spawning is dependent upon temperature, spawning occurs at different times in different places, depending upon latitude. For example, spawning usually occurs in February in Louisiana and June in Montana — whenever the water temperature is right. Once fertilized, the eggs become sticky and settle to the bottom. Paddlefish prefer gravel bars for spawning so that their eggs will attach to the gravel surface. In Louisiana, there are few gravel bars, therefore, the fish spawn over hard surfaces. Paddlefish sometimes travel 100 to 200 miles to find an ideal habitat for spawning.

Blackline Master #1 (page 2)

The (0.08 - 0.12 in) eggs hatch about a week after the spawn. When first hatched, the young do not swim well, do not have a rostrum and have few defenses against predators. Perhaps the key to their survival is that the fish grow very quickly. Young paddlefish grow up to 2.5 cm (1 in) per week under ideal conditions.

Within a few weeks, fingerlings reach lengths of 10 to 13 cm (5 in) and develop a rostrum. Adult paddlefish can weigh up to 91 kg (200 lbs) reach lengths of up to 7 feet and live to be 30 years old, although the average lifespan is about 15 years.

For more than 100 years, many factors related to changes and destruction of habitat and overharvesting led to serious population declines of paddlefish. Human activities to improve flood control and navigation included dredging of rivers and the construction of levees, locks and dams. These actions helped industry and enabled people to live in flood-prone areas. However, these activities altered flow patterns and reduced the water flow (volume) of the Mississippi River and its tributaries, blocking movement of the fish and preventing them from reaching their spawning grounds. Pollution from industry and agriculture further degraded water quality and the remaining paddlefish habitat. Overharvesting for roe provided additional stress on the declining population.

Paddlefish have been extirpated in Canada, New York, Pennsylvania, Maryland and Virginia. In many other states, strict laws protect the population. In Minnesota, Nebraska, North Carolina, Ohio, Texas, West Virginia and Wisconsin, paddlefish populations are threatened, endangered or considered species of critical imperil, so laws were established to protect them. In Louisiana and Alabama, paddlefish are protected, and their population is stable. Several states, including Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Mississippi, Missouri, Montana, North Dakota, Oklahoma, South Dakota and Tennessee, have stable paddlefish populations that can continue to support commercial and/or game fishing.

Many programs have been developed in the United States to restore the paddlefish population throughout its natural range. State fish hatcheries, including Louisiana's, are playing a very important role to re-establish wild paddlefish populations. Tagging programs monitor populations and determine how well the fish are doing. Stocking programs aim to collect adult fish to artificially fertilize eggs, raise young paddlefish from eggs to fingerlings and return hundreds of thousands of fingerlings to natural habitat. Programs are also working to educate the public on the impaired status of this species. Teachers and students are learning about paddlefish, too. With our help, populations might be stablized or re-established in states where they are threatened or extirpated.

Blackline Master #2

Name _____

Snagging Paddlefish Information

Your job today is to find out some basic information about paddlefish that might help you understand why we want to raise them. You will begin by using the Web sites listed to answer the questions. Then, take the information you have collected and write a report about paddlefish. You will need to have a title page (with a picture of a paddlefish that is at least 4 x 4 inches), a body and a bibliography page with at least three Web sites correctly cited. You will be graded using the attached rubric.

Hint: Use its scientific name to get more results: *Polyodon spathula*.

1. Describe the paddlefish.
2. What fish are its closest relatives? What class is it in?
3. How and what do paddlefish eat?
4. How do paddlefish reproduce? How old must they be to reproduce?
5. In what states are paddlefish found? Describe the habitat of the paddlefish.
6. What kinds of problems threaten the paddlefish?
7. Are paddlefish threatened everywhere?
8. What problems does the paddlefish face in Louisiana?
9. How are paddlefish caught? Can they be caught legally in Louisiana?
10. What are we doing in Louisiana to help the paddlefish?
11. How do biologists raise paddlefish?

** Include in your report any other interesting facts that you discover in your reading.

Examples:
• Where do they live in Louisiana?
• How long can they live?
• How big do they grow?

Blackline Master #3 (page 1)

Student Resources:

American caviar – Paddlefish caviar. 1-800-caviar.com.
http://www.1-800-caviar.com/paddle-fish.html. Accessed July 22, 2003.
Commercial site that sells paddlefish roe, includes pricing and description of the taste of paddlefish roe.

Commonwealth of Pennsylvania, Fish and Boat Commission. *Question of the Week*.
http://sites.state.pa.us/PA_Exec/Fish_Boat/qpadl.htm. Accessed July 22, 2003.
Paddlefish restoration in Pennsylvania.

DeVries, Dennis. *Restoration of the Paddlefish in Alabama*. Auburn University Department of Fisheries and Allied Aquaculture and Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries.
http://www.ag.auburn.edu/fisheries/peak/paddlefish/. Accessed July 22, 2003.
Describes Alabama paddlefish studies.

Division of Fisheries U.S. Fish and Wildlife Southwest Region. *Facts About Fish in the Southwest – paddlefish.*
http://southwest.fws.gov/fishery/species/paddlefish.htm. Accessed June 11, 2004.
Includes paddlefish biology, and describes legal catch of paddlefish in Iowa.

Hatch, Jay and Nicole Paulson. *All About Paddlefish*. Minnesota Pollution Control Agency.
http://www.pca.state.mn.us/kids/fish/paddlefish.html. Accessed July 22, 2003.
Designed for kids. Paddlefish biology and distribution in Minnesota.

Tennessee Aquarium and the IMAX 3-D Theater. *Amazing Animals-Fish: Paddlefish*.
http://www.tnaqua.org/Animals/Fish.asp#. Accessed June 15, 2004.
Pictures and reasons that paddlefish are threatened, and brief descriptions of paddlefish biology.

Helfrich, Lou. *The Virtual Aquarium*. Virginian Polytechnic Institute and State University.
http://www.cnr.vt.edu/efish/families/polyodontidae.html. Accessed July 20, 2003.
Excellent pictures and an outline of paddlefish biology and discussion of the threats to the paddlefish.

Iowa Department of Natural Resourses. *Fishes of Iowa*.
http://www.iowadnr.com/fish/iafish/pad-card.html. Accessed June 15, 2004.
Includes paddlefish biology and describes legal catch of paddlefish in Iowa.

Koncilya, Linda. *Paddlefish!* Glendive Chamber of Commerce.
http://www.midrivers.com/~chamber/pfish.htm. Accessed July 22, 2003.
How to catch and cook Montana paddlefish, as well as information about the paddlefish.

Louisiana Department of Wildlife and Fisheries. *Fishing Regulations 2002.*
http://www.wlf.state.la.us/apps/netgear/page1.asp. Accessed July 22, 2003.
Status of paddlefish protection in Louisiana.

Blackline Master #3 (page 2)

Mims, Steve. *Paddlefish Polyculture*. Kentucky State University Aquaculture Program. http://www.ksuaquaculture.org/index.htm. Accessed July 22, 2003.
Aquaculture of paddlefish with catfish. Includes a video on paddlefish feeding.

Montana River Action. *Paddlefish*. http://www.montanariveraction.org/paddlefish.html. Accessed July 22, 2003.
Information on Montana fishing and roe, along with concerns for overfishing.

Paulson, Nicole and Jay Hatch. *Paddlefish,* Polyodon spathula. Minnesota Department of Natural Resources and U.S. Fish and Wildlife Service. http://www.gen.umn.edu/research/fish/fishes/paddlefish.html. Accessed July 22, 2003.
Discusses the fishes of Minnesota. The site was designed for educational purposes and includes pictures, biology and reasons for paddlefish decline.

Springer, Craig. *Paddlefish Make a Comeback in Oklahoma*. Native Fish Conservancy. http://www.nativefish.org/Articles/spoonbill.htm. Accessed July 22, 2003.
Paddlefish restoration efforts in Oklahoma.

Truman Info Guide. *Spoonbill* - (Paddlefish=Polyodon spathula). http://www.trumaninfoguide.com/GeneralDoc/paddleFish.cfm. Accessed June 15, 2004.
Distribution of paddlefish in Missouri and fishing for paddlefish in Missouri.

Texas Parks and Wildlife. *Texas Freshwater Fishing: Paddlefish.* www.tpwd.state.tx.us/fish/infish/species/pad/pad.htm. Accessed June 11, 2004.
Biology of paddlefish, life cycle, habitat and threats to paddlefish in Texas.

U.S. Fish & Wildlife Service. *Natchitoches National Fish Hatchery.* http://natchitoches.fws.gov/WHAT.HTML. Accessed June 11, 2004.
Describes hatchery propagation of paddlefish and other fish. Photographs of hatching jars and paddlefish information about visiting the hatchery.

TEACHER REFERENCES:

Publications

Reed, Bobby C., et al. 1992. “Growth, Fecundity, and Mortality of Paddlefish in Louisiana.” *Transactions of the American Fisheries Society*. 121:378-384.
A comprehensive study of paddlefish in Louisiana.

Williamson, D.F. 2003. *Caviar and Conservation: Status, Management and Trade of North American Sturgeon and Paddlefish*. TRAFFIC North America: Washington D.C. Electronic edition of the report available at http://www.traffic.org.

Multimedia

Wills, Betty. *The Paddlefish: An American Treasure* (video). Earthwave Society: Fort Worth, Texas.
This video addresses all facets of the life of paddlefish in the United States. It includes information on ongoing conservation efforts and methods, as well as the reasons for the decline of the population and current laws. Summary and ordering information at http://www.earthwave.org/paddlefish.htm. Cost $24.95 plus shipping and handling.

Internet sources

Species at Risk. Canadian Wildlife Service-Environment Canada.
http://www.speciesatrisk.gc.ca/search/speciesDetails_e.cfm?SpeciesID=63.
Accessed July 23, 2003.
Paddlefish information site. Includes biology, habitat and photos.

Blackline Master #4

Name _____ Date_____

Rubric – Snagging Paddlefish Data Report

Read this rubric, and use it to see exactly how you will be graded.

Category	1	2	3	4
Grammar, spelling and formatting	Numerous errors > 5 errors	3 - 5 errors	1 error	No errors
Content questions answered correctly	More than 5 incorrect answers	3 - 5 incorrect	1 - 2 incorrect	All correctly answered
Analysis of answers	No analysis done	1 detailed conclusion	2 detailed conclusions	More than 2 conclusions
Information gathering and bibliography	Information from 1 site only	2 Web sites or incorrectly cited	3 Web sites most correctly cited	4 or more Web sites correctly cited
Your total points =				

Students may get bonus points for including information from printed materials.

Note: Turn in this sheet with your report!

A = 15-16 points
B = 14 points
C = 12-13 points
D = 11 points
F = 10 or fewer points