

Humboldt State University Fish Hatchery Elementary Education Program



Rosalinda Gonzalez
Sarah Johnson
Rachael Wiltrout

Environmental Science Practicum

Spring 2010

Table of Contents

Problem Statement.....	3
Problem Background.....	3
Project Goals & Objectives	10
Weighing Alternatives.....	11
Implementation Strategies.....	13
Monitoring & Evaluation Plan	18
References.....	20
Appendices.....	23
Reflections	23
Color a Fish! (K-1 st lesson plan)	24
Color a Fish! Worksheet	26
Color a Fish! Example	27
Can you find that fish? (1 st -2 nd lesson plan).....	28
Can you find that fish? Worksheet.....	30
Can you find that fish? Example	31
Life Cycle of a Trout (3 rd -4 th lesson plan)	32
Life Cycle of a Trout Worksheet	34
Life Cycle of a Trout Instructors Copy	38
Fish Anatomy (5 th -6 th lesson plan)	42
Fish Anatomy Worksheet	44
Fish Anatomy Instructors Copy	48
Request for “Right to Reprint” from Project WILD.....	52
Permission to Reprint from Project WILD	53
Project WILD “Fashion a Fish” Lesson Plan	54
Supplemental Tour Guide.....	59
Revised Hatchery Log-in Sheets (monitoring)	61
Lesson Plan Evaluation Survey (evaluation)	62
Time Sheets	63
First Draft of paper	66

Problem Statement

There is a lack of awareness of Humboldt State University's on-campus freshwater fish hatchery. This facility is a valuable asset to the campus. However, it is currently under utilized and largely unrecognized by the campus and surrounding communities.

Problem Background

Located to the south of the Wildlife and Fisheries building, HSU's freshwater fish hatchery provides an on-campus facility for graduate and under-graduate studies in Fisheries Biology and related fields. The purpose of the school's hatchery is to provide students with a wet lab facility for teaching and research activities (Department of Fisheries Biology, 2010). It also provides an opportunity for elementary and high school students to engage in activities focused on understanding and interpretation of environmental science (Jew, 2010). The site houses a 3,000 square foot building containing a small laboratory, rearing tanks, and egg incubators. The facility also includes raceways, pumps, water storage and filtration, and a large brood pond (Department of Fisheries Biology, 2010). The facility provides the ability to rear fish from eggs to broodstock. The school raises rainbow trout, cutthroat trout and steelhead within the hatchery (Jew, 2010). The water that the hatchery uses is provided from Fern Lake, a reservoir located within the Arcata Community Forest (Jew, 2010).

This facility provides a valuable resource to our campus community. The hatchery strives to increase education through providing hands-on learning and research opportunities. The fish hatchery enhances six classes offered at HSU by providing a place for research and

teaching (Department of Fisheries Biology, 2010). It helps to reiterate lessons learned in the classroom and apply them to living aquatic organisms. It also provides a unique opportunity to local elementary and high school students to gain hands-on experience. The fish hatchery also aids in attracting new students to HSU because it is one of a few campuses nation-wide with an on-site fish hatchery. However, there is little knowledge about this vital resource within the campus and local communities. It is located in an area where it is visible to a diverse group of people passing by (e.g. students, basketball game attendees, church goers, elementary school students, disc golf players, etc.). Bringing more attention to the hatchery, increasing public knowledge, and strengthening the facility's educational programs will aid in reducing questions from the public and students about site operations, uses, and benefits. It will further increase utilization of the fish hatchery and benefit educational outreach to the surrounding community.

Background research on what other communities, campuses, and organizations have done to raise awareness has provided us with many options to aid in solving our problem.

Of the few college campuses with on-site fish hatcheries, efforts to raise awareness varied in effectiveness. At Mississippi State University, the fish hatchery held a press release in 2003 during the hatchery's dedication. They also briefly (approximately one paragraph) mention the hatchery on their University website. However, after the 2003 press release and news coverage little was done to promote the hatchery. The University of Washington has an outreach and educational link on their website. This link has information about the operations of the hatchery as well as tour information. They have a specific site for teaching and research

hatchery tours, which provides the public with a calendar of tour dates and times, an online reservation form, and a frequently asked questions link. This website inspired us to consider the possibility of creating a virtual tour of the hatchery. After making contact with the University of Washington's aquatic lab manager, Jon Wittouck, we learned that the program had encountered funding difficulties with the economic down fall of the US. The hatchery cut their outreach programs like salmon in the classroom and other activities designed for elementary students. Various other campuses utilized hatcheries for aquaculture classes. However, they only advertise them on their campus websites.

Educational research engines also list possible top fisheries schools within the United States. An example of these websites is educational-portal.com, which lists good schools for Fisheries Biology majors to attend. A possibility for increasing awareness of the HSU hatchery would be to list the school as a campus with an on-site fish hatchery on one of these search engines.

In South Dakota, the South Dakota Coalition members implemented measures to increase public awareness surrounding domestic and sexual violence on American Indian lands. Nine American Indian reservations are located throughout the state. South Dakota is the fourth ranking state in the U.S. for total Native American population. However, South Dakota is also a land that has been scarred by a legacy of Manifest Destiny and colonization. The establishment of reservations and boarding schools has created a division between native and non-native people in the state. This tension has led to relatively high crime rates. Although

many types of crime have decreased in South Dakota, the occurrence of violence against women has remained high or even, in some cases, increased. For this reason, the South Dakota Coalition decided to raise public awareness about domestic and sexual violence in hopes that more women would report violence and seek safety, and that community entities would respond appropriately to incidents of violence. The coalition produced posters, public service announcements, and an updated version of the domestic violence handbook for Lakota communities. They also created a directory for advocates, which included courts, the criminal justice system, and the media. The coalition organized the state-wide display of an exhibit entitled, "Silent Witness National Initiative." They also organized South Dakota participation in the national March to End Silence. This project was effective in obtaining its goals, which were; (1) increase the amount and type of public education resources and materials available to advocates; (2) develop universal symbols to be used in domestic violence prevention campaign materials that would have meaning and appeal to both Native and rural non-Native South Dakotans; and (3) create a more unified and consistent approach to public education that was inclusive, reasonable and specific to the local region (Artichoker and Gullickson, 2003). This project was also helpful in laying the groundwork for future collaborations, strengthen existing relationships, and bring native and non-native peoples closer. However, it was not possible to find specific data pertaining to the campaign's effectiveness in reducing the occurrence of domestic violence in the region.

The annual incidence of traumatic brain injuries in the United States is more than those of breast cancer, multiple sclerosis, spinal cord injuries, and HIV/AIDS combined. However,

public recognition of brain injuries has not been high because the effects are not easily discernible. Increasing public awareness of brain injuries can help to create better services, support, and quality of life for those people touched by brain injuries. It can also help to educate people who do not have brain injuries on how to avoid them. The Brain Injury Association of New Jersey has developed several programs to raise awareness about brain injuries. The Walk for Thought is an annual event in which people walk, cycle, and roll in order to bring attention and raise money for brain injuries. The Brain Injury Awareness Month (March) in New Jersey includes various events and activities that help to bring attention to the subject. The association also utilizes public service announcements that are broadcast over the radio and on television. The group has also put on workshops and seminars to educate the public about brain injury prevention. There is no data to suggest that this program has reduced the number of brain injuries in the United States. However, it has helped to train hundreds of brain injury and vocational rehabilitation coaches as well as assist people with brain injuries obtain employment ("Raising Public Awareness," 2010).

The Kostanay Region of Kazakhstan lies within a migrational route for millions of waterbirds, including the Siberian Crane. After a study indicated that over 99% of the local peoples were unaware of the ecological significance of the area in which they lived, the Siberian Crane Wetland Project was created to raise public awareness. The project involved the creation of training workshops for college and secondary school teachers. These workshops were designed to educate the region's teachers and give them the tool that they need to pass the knowledge along to the area's youth. Crane Celebrations have also been implemented to

raise awareness of biodiversity conservation. These events include many different stakeholders including school children, local farmers and business owners, and non-governmental organizations. The celebrations include art exhibits, dances and plays about the Siberian Crane. These events and workshops have been effective in raising awareness and in cultivating a regional sense of pride.

The recent international outbreak of the H1N1 virus ("swine flu") has launched several public awareness campaigns in countries around the world. The purpose of these campaigns is to increase public knowledge of the virus and educate about prevention. In the United Kingdom, the "Catch it, Bin it, Kill it!" campaign is aimed at reaching the entire UK population through radio, print, and television advertisements. Informational leaflets were also produced and delivered door-to-door.

The "Be Active Eat Well" community program promoted healthier eating habits within the community by providing informational sheets, newsletters (targeting different age groups), emails, school staff notes, and parent workshops. Prior to developing marketing they ran a survey to better understand their target audience and focus their objectives. Marketing included photos, stickers, balloons, stationary and business cards, and banner production. They also had a media/press release to local newspapers when the program was launched. Their advertisements were located in various locations and through various media (e.g. radio and newspaper). Lessons learned by this program were that social marketing is costly (funding came from government agencies), time consuming, and requires a high degree of organization.

They also found that marketing is beneficial because it creates enthusiasm. This is especially beneficial since a major issue with raising community awareness is a lack of knowledge, non-supportive attitudes, and an absence of motivation (McKenzie-Mohr and Smith, 1999).

Concerns surrounding global climate change and anthropogenic influences on greenhouse gases have led to many different efforts to raise public awareness. One major area of concern in the United States is transportation. Currently vehicles account for two-thirds of American oil consumption and are a leading contributor to world-wide greenhouse gas pollution. The Pew Campaign for Fuel Efficiency is aimed at raising public awareness and support for stronger fuel efficiency standards. Their efforts include seeking support in Congress for stronger standards, conducting public education in 15 to 20 U.S. states, and coordinating a national coalition of environmental groups. The campaign also employs media outreach, public opinion polling, and non-partisan research and analysis.

Research on museum advertisement showed that many museums list themselves in magazines and directories as “points of interest” in the local area. Museums in San Francisco, such as the Museum of Modern Art (MOMA), advertise via website and the San Francisco City Pass. Purchasing the City Pass provides discounted entry to three museums in the San Francisco Bay Area and other area attractions. Museums also advertise by displaying signs, banners, and billboards throughout heavily-trafficked areas. They also use media sources such as the television, radio, and internet.

Everyday advertisement used to enhance awareness includes: billboards, bus and bench advertisements, internet pop-ups, blogs, newspapers, and bulletin board flyers. Furthermore, with increasing technological communications, websites such as Facebook, Twitter, MySpace, and other free communication networks can be utilized to increase awareness.

Humboldt State University has many regulations and guidelines to abide by when attempting to implement changes or alterations. Some examples of these guidelines include a required uniform appearance of any signs or displays. Any changes must also be approved by the appropriate campus administration. Doug Kokesh, manager of grounds and landscape services, is available to assist students with campus projects and aids them in implementation. Other campus policies that we could encounter are rules on human subject and surveying. We would also have to abide by institutional animal health and care protocol if we were to handle live animals from the hatchery.

Project Goals & Objectives

Goal

Increase awareness, utilization, and educational programs of Humboldt State University's on-campus freshwater fish hatchery.

Objectives

- Increase visitation by elementary school classes by 25% within one year.
- Increase visitation and facility utilization by 25% within two years.

Weighing Alternatives

Possible Alternatives

1. Create interpretive signs or posters
2. Create elementary education lesson plans
3. Enhance hatchery website
4. Hold/ advertise open house hatchery days
5. Create flyers, a commercial on the campus radio station (KRFH), an advertisement in the Jack

Feasibility and constraints of alternatives

1. After conducting research on the cost and time needed to create interpretive signs we found this option to be unfeasible. The cost of producing a durable sign that meets university requirements was about \$500 per sign. Given only a semester it would be difficult to raise the funding necessary. Another constraint was that it would take the university approximately four weeks to approve signs. It would take another month to coordinate with a graphic design company to create the signs. There is not enough time in the semester to adequately complete this alternative.
2. This option was determined to be the most practical given our time constraint and resources. It requires very little to no money to create and produce lesson plans. The only expense would be creating photocopies and acquiring some art supplies. It also does not take much time to create, edit, and distribute the materials. Furthermore, creating lesson

plans meets our objectives. We have researched lesson plans, best management practices for implementing environmental education, and the California State Elementary School Educational Standards as well as spoke with the hatchery manager Eric Loudenslager. This enabled us to separate lesson plans into k-2nd, 3rd-4th, and 5th- 6th groupings. As part of the lesson plans we may also create a self guided tour that will engage the kids.

3. Enhancing the hatchery websites would require access to the website, permission to alter a school website, and computer website creation skills. This option would also not fulfill our objective as well as other options. Updating the website could generate interests from people who are interested in fisheries at Humboldt State. However, this option does little to aid education to a more general audience who is unaware of the website and does not utilize the hatchery.
4. This option was the least feasible due to lack of space, chaperoning of guests, hazards to the animals, and possible human injuries. It would also require money for food, beverage, and advertising which would require fundraising. Furthermore, volunteers would be needed to hold the open house.
5. Utilizing flyers as a way to raise awareness would not meet our objectives. We would need permission to post flyers and the demographic reached would depend on flyer placement. As for the campus radio station and the jack we would be reaching mostly Humboldt State students. This alternative would also require fundraising to obtain the money necessary to sufficiently advertise. None of these options would meet our objective of increasing elementary school education.

Implementation Strategies

Implementation Timeline

Task	Person Responsible	Due Date
K-2 lesson plans (2)	Rachael Wiltrout	4/15/2010
3-4 lesson plan (1)	Sarah Johnson	4/15/2010
5-6 lesson plan (1)	Rosalinda Gonzalez	4/15/2010
Interactive Tour Guide	Rosalinda, Rachael, and Sarah	4/23/2010
Project paper & presentation	Rosalinda, Rachael, and Sarah	4/30/2010

Implementation Strategies

Our project goal is to increase awareness and utilization of the Humboldt State University on-campus fish hatchery through the creation of educational materials. In order to obtain this goal we have created four lesson plans and one hatchery tour guide.

However it may be necessary to persuade people to implement our lesson plans and supplemental materials. It is possible that people may question the legitimacy of our materials based on our lack of experience within the field of education. We are all Environmental Science majors with only a small amount of experience with environmental education. However, we have completed several steps in order to create credible educational materials. We have researched and incorporated best management practices for creating and implementing environmental education into our materials. We also submitted our draft materials to a HSU elementary education credential student for review. Our draft materials were also reviewed by the hatchery manager Dr. Eric Loudenslager. All edits and suggestions were incorporated into our final materials.

In order to gain a better understanding of how environmental education is most effectively implemented, we research best management practices as outlined by Emily Evan's thesis *Headwaters Forest Reserve Education Curriculum*. This first step in creating successful environmental education curriculum is using a multidisciplinary or transdisciplinary approach. Studies have shown that the use of environment as an integrating concept increases student achievement in a variety of disciplines (Evans, 2002). For this reason, environmental education should not focus solely on topics related to science. It is important to include many subjects into a "tangible whole." The curriculum should be cohesive and embrace a range of disciplines including, math, science, language arts, theater arts, and social studies. We have incorporated this into our lesson plan design. The lessons that we've designed for the hatchery include elements of science, art, language art, and social studies.

It is also desirable to use a place-based approach in environmental education. The curriculum should be specifically designed and implemented to each community and address specific issues that the community faces. This helps the students create an emotional attachment, which leads them to consider the impacts of their behavior and can promote more environmentally responsible behavior (Evans, 2002). The degree to which this attachment is created is influenced by proximity, length of time associated, and the frequency of use. We have incorporated this element of education design by tailoring our curriculum specifically to the HSU fish hatchery. The fish hatchery is located on the Humboldt State University campus in Arcata, California. Its close proximity to highly

populated areas of Humboldt County increases the likelihood of visitation. Through our hatchery curriculum we hope to educate elementary school students about the purpose of fish hatcheries and the issues that our local fisheries are currently facing.

The theory of multiple intelligences is that each person possesses strengths in different areas and, therefore, they learn more effectively when the material is presented in that manner (Evans, 2002). Examples of learning styles include verbal-linguistic, logical, mathematical, musical-rhythmic, bodily-kinesthetic, visual-spatial, interpersonal, intrapersonal, and naturalistic intelligences (Evans, 2002). It is important to keep this in mind when developing environmental education curriculum. The instruction manner should be varied to accommodate for natural differences among students. Our lesson plans integrate the theory of multiple intelligences. Each lesson plan includes multiple learning styles. The main focus of many of our materials is on verbal-linguistic, logical, visual-spatial, interpersonal, and intrapersonal learning styles and presentation methods. By doing this, our educational materials allow more students to enjoy the activities and walk away with new knowledge.

It is important that environmental education curriculum take a thematic approach. The material should have an overarching theme, which provides organization and structure to the program. Environmental education often involves the presentation of multiple concepts, subjects, and facts. It is necessary that these are held together by a theme or broad concept. This cohesion makes it easier for students to understand and apply the concepts (Evans, 2002). Our educational materials all pertain to the theme of fisheries

biology. The material explores fish hatcheries, fish anatomy, and fish life cycles. By creating an overarching theme, we make it easier for the students to connect ideas and to make decisions within the context of real life situations.

Environmental education material needs to be provoking and interesting. It must capture the interest of the audience and promote future learning. Ideally, environmental education increases students' desire to act in an environmentally responsible manner. One way in which educators often gain their students' interest is by using games and activities. Studies have shown that using games promotes participation and results in a reported increase in responsible behavior (Evans, 2002). We have tried to incorporate games and activities into our educational materials to the greatest degree possible. Many of the lesson plans include individual and group activities. The tour guide that we have created also includes questions for students to answer as they tour the hatchery. This is intended to promote participation and foster the pursuit of knowledge.

It is vital that the curriculum is grade-level appropriate. The degree of difficulty of the material must be fitting to the audience. This is essential to creating a positive experience and facilitating understanding. When the material is properly matched to the audience, the students often walk away with a sense of accomplishment and motivation to take responsible action (Evans, 2002). Before we started the process of creating educational materials we consulted Dr. Eric Loudenslager, the manager of the hatchery. He informed us that he wanted to be able to provide the materials to kindergarten through sixth grade classes. Based on this information, we then created lesson plans for three age

groups: kindergarten-second, third-fourth, and fifth-sixth grades. For each group, we used the California Department of Education's standards for science education to create grade-level appropriate lesson plans. In addition to creating lesson plans we also created a tour guide that targets an older audience. Our group also consulted Jennifer Tarlton, a professor of Environmental and Natural Resource Sciences at Humboldt State. She was able to give us information on how to create educational material (signs, brochures, etc.) about natural resources that can be enjoyed and understood by a wider audience. Specifically she mentioned using lots of images and eighth grade level vocabulary. We used this information in creating our tour guide.

The curriculum that we've developed for the HSU fish hatchery also utilizes direct experiences and supplemental instruction. Students need direct experiences outside of the classroom to create meaning and associations with the natural world (Evans, 2002). Field trips help to build student appreciation for nature and other settings. Supplemental instruction is often needed to reinforce the concepts and ideas that the educator is trying to impress on the class. Our materials are meant for use outside of the classroom. They encourage hands-on learning about fish hatcheries and fish species. The activities and exercises that are provided within our materials serve as supplemental instruction to reinforce the concepts learned at the fish hatchery.

Lastly, it is important that all educational curriculums include an assessment. Assessment is defined as "a variety of procedures used to obtain information about student performance" (Evans, 2002). All of our lesson plans include a variety of

assessment tools (individual, group, and informal), which allow the teacher to understand how the students are performing.

Monitoring and Evaluation Plan

Monitoring

In order to monitor the progress of our project we will print out new pages for the fish hatchery visitor log book. They currently have a log book; however, it is not maintained and has no space to record the date of visit. We would edit the existing form to include a date column and reason for visit column. This would allow us to gather data on when people are visiting the hatchery and for what reasons (e.g. class field trip, campus tour, etc.). We will also create and display a sign that says "Welcome to the HSU Fish Hatchery, Please Sign In". This will help to bring attention to the log book and encourage visitors to record their visits. It will also help to bring attention to the tour guides, which will be located adjacent to the log book. We would have Eric Loudenslager calculate the number of visitors at the end of the spring semester every year for at least three years. One of our objectives is to increase elementary school visitation by 25% in one year. Currently, the hatchery receives visits from about six classes a year. We're hoping to increase visits to about eight classes during the 2010-2011 school year. Our other objective is to increase facility visitation and utilization by 25% within two years. There is currently no reliable baseline data about visitation to the hatchery. We would have to analyze our first year's log to compare future visitation numbers. Another method that we will use to monitor the effectiveness of our project is to create teacher surveys, which Eric will hand out with the lesson plans. These surveys will allow elementary school

teachers to provide feedback on the usefulness of our materials.

Evaluation

Partial evaluation of our project will be completed prior to the end of the semester. Currently, Eric Loudenslager is evaluating the lesson plans and tour guide that we have created. We will implement any corrections and suggestions that he makes. Further evaluation will be completed by elementary school teachers who may alter the lesson plans provided by the hatchery. If in the future we find that our visitation numbers are not meeting our objective increase, we will explore alternative methods of raising awareness. We suggest that future Environmental Science Practicum students continue working on hatchery development by creating educational signage within the hatchery and possibly advertising through The Jack and KRFH. If teacher surveys show that they are dissatisfied with the quality of the educational material, future practicum students could also explore incorporating their suggestions into the curriculum to make it more effective. This would continue student efforts to enhance our campus and local community as well as provide a model for other universities.

References

Artichoker, Karen, and Verlaine Gullickson. 2003. *Raising Public Awareness of Domestic Violence in Indian Country*. National Resource Center on Domestic Violence.

"CFR - Department of Wildlife, Fisheries & Aquaculture." *College of Forest Resources* *
Mississippi State University. Web. 18 Feb. 2010.
<<http://www.cfr.msstate.edu/wildlife/careers.asp>>.

Cuttler, Ruth. "Raising Community Awareness." *Be Active Eat Well*, July 2007. Web. Jan.-Feb. 2010.<[http://www.goforyourlife.vic.gov.au/hav/admin.nsf/Images/BAEW_Awareness_Raising_Process_Report.pdf/\\$File/BAEW_Awareness_Raising_Process_Report.pdf](http://www.goforyourlife.vic.gov.au/hav/admin.nsf/Images/BAEW_Awareness_Raising_Process_Report.pdf/$File/BAEW_Awareness_Raising_Process_Report.pdf)>.

Department of Fisheries Biology. "Fisheries Biology | Fish Hatchery." *Humboldt State University*.
<<http://www.humboldt.edu/~fish/facilities/fishhatchery.html>>. Accessed Feb. 18, 2010.

Evans, Emily R.H. *Headwaters Forest Reserve Education Curriculum*. Thesis. Humboldt State University, 2002. Arcata, CA: Humboldt State University, 2002. Pg. 23-34.

"Fish Hatchery Management School Program Information." *Degrees, Schools, Online Courses and Careers - Over 20,000 Articles*. Web. 18 Feb. 2010. <http://education-portal.com/fish_hatchery_management_school.html>.

"Fisheries Biology | Fish Hatchery." *Humboldt State University*. Web. Feb. 2010.
<<http://www.humboldt.edu/~fish/facilities/fishhatchery.html>>.

Inyutina, Vera, and Alexander Belyi. 2008. *Siberian Crane Wetland Project: Education and Raising Public Awareness in Kazakhstan*. Baraboo, WI: Siberian Wetland Project.

Jew, Darrell. Personal communication. Feb. 2, 2010.

McKenzie-Mohr, Doug and William Smith. 1999. *Fostering Sustainable Behavior: An introduction to community-based social marketing*. New Society Publishers. Gabriola Island, B.C.

"Pew Campaign for Fuel Efficiency." *The Pew Charitable Trusts*. The Pew Charitable Trusts, 2010. <http://www.pewtrusts.org/our_work_detail.aspx?id=478>. Accessed Feb. 25, 2010.

"Raising Public Awareness." *Brain Injury Association of New Jersey*. 2010. <<http://www.bianj.org/raising-public-awareness>>. Accessed Feb. 3, 2010.

"San Francisco CityPass." *CityPass*. Web. Feb. 2010. <http://www.citypass.com/city/sanfrancisco.html?cmpid=MSN_city%20pass%20san%20francisco&utm_campaign=2209633195&utm_content=150785399&utm_medium=cpc&utm_source=msn&utm_term=city%20pass%20san%20francisco&id=BzA33u2o>.

"UK Public Told How to Stop Swine Flu Spread." *Sky News* [United Kingdom] 30 Apr. 2009. <<http://news.sky.com/skynews/Home/UK-News/Swine-Flu-Public-Awareness-Campaign-About-Virus-Including-Adverts-On-TV-And-In-Newspapers/Article/200904415272128>>. Accessed Feb 15, 2010.

"Unique fish hatchery opens at Mississippi State (03-10-2003)." *Mississippi Extension Service and Experiment Station - Mississippi State University (MAFES) (MS) (Cooperative)*. Web. 18 Feb. 2010. <http://msucares.com/news/releases/03/030310_fish.html>.

"Unique fish hatchery opens at MSU campus." *Delta Farm Press | Timely, Reliable Information for Sunbelt Agriculture | Cotton, Soybeans, Rice, Corn, Wheat, Ag Legislation, Biofuels | Farm Publications, ag magazines*. Web. 18 Feb. 2010.
<http://deltafarmpress.com/mag/farming_unique_fish_hatchery/>.

"University of Washington Research & Teaching Hatchery." *School of Aquatic and Fishery Sciences at the University of Washington*. Web. 18 Feb. 2010.
<<http://www.fish.washington.edu/hatchery/>>.

Reflections

What we learned

We learned how to communicate and network with faculty, administration, and companies. We also learned how to create effective lesson plans that meet California elementary school standards and how to communicate our message to elementary school kids. In researching how to bring awareness to the Hatchery and increase its utilization we learned about the hatcheries operations and uses. While visiting the hatchery we learned how a hatchery works and how fish are raised from eggs to adults. We also learned various interesting facts about fish such as their ability to absorb extra appendages such as extra heads. In creating lessons on fish we learned about the anatomy, life cycles, and habitat of fish. While researching how to implement our project we learned about campus regulations. In completing our practicum project we became successful at conveying a message clearly.

What we would have done differently

We would have allotted time for implementation. It would have been nice to have seen a group of students use our lesson plans or the brochure. We would have also looked into funding sources to enhance our project and enable us to create interpretive signs. We would have also put the updated sign-in sheets in the hatchery at the beginning of the semester. This would have enabled us to have baseline data on how many visitors the hatchery receives in a semester.

Topic/Lesson Title: Color a Fish!

Grade Level: Kindergarten – First Grade

Content Objectives: Students will be able to visually identify the major structures of fish and describe anatomy and habitat.

Standards Met:

Life Science Standards:

- Kindergarten: 2. Different types of plants and animals inhabit the earth. As a basis for understanding this concept: a) Students know how to observe and describe similarities and differences in the appearance and behavior of plants and animals (e.g., seed-bearing plants, birds, fish, insects). c) Students know how to identify major structures of common plants and animals (e.g., stems, leaves, roots, arms, wings, legs).
- First Grade: 2. Plants and animals meet their needs in different ways. As a basis for understanding this concept: a) Students know different plants and animals inhabit different kinds of environments and have external features that help them thrive in different kinds of places. b) Students know both plants and animals need water, animals need food, and plants need light. c) Students know animals eat plants or other animals for food and may also use plants or even other animals for shelter and nesting. d) Students know how to infer what animals eat from the shapes of their teeth (e.g., sharp teeth: eats meat; flat teeth: eats plants).

Investigation and Experimentation Standards:

4. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:

- Kindergarten: a) Observe common objects by using the five senses. b) Describe the properties of common objects. c) Describe the relative position of objects by using one reference (e.g., above or below). d) Compare and sort common objects by one physical attribute (e.g., color, shape, texture, size, weight). e) Communicate observations orally and through drawings.
- First Grade: a) Draw pictures that portray some features of the thing being described. b) Record observations and data with pictures, numbers, or written statements.

Language Objectives: Students will be able to read instructions and describe their drawing both orally and written.

Key Vocabulary:

- Fish
- Gills
- Fins
- Mouth
- Eyes

Supplemental Materials:

- Blank worksheet (1 per student)
- Art supplies (booklets and crayons, colored pencils, or markers)
- Clipboard or other hard surface to work on
- A completed worksheet for demonstration

Complete Lesson Sequence: Complete Lesson is about 30 minutes**Kindergarten:**

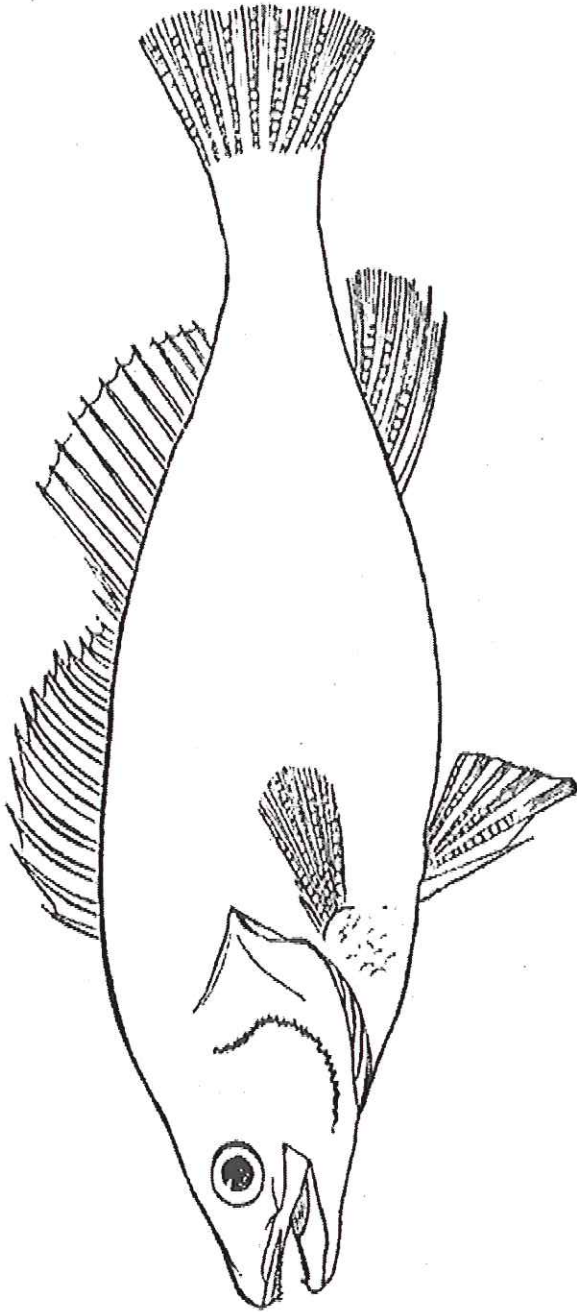
- The teacher will describe to the class the different morphological features (e.g., gills, fins) of a fish using the provided handout.
- The teacher will lead a class discussion on why fish need specialized body parts. For example, “Why do you think fish need fins? How do they help the fish to live?”
- Next, the class will use the handouts and corresponding instructions (included on handout) to color-code the major body parts of the fish.
- The class will reconvene to discuss their drawings. The teacher will encourage the students to describe their fish aloud.

First Grade:

- The teacher will review the major morphological features of a fish (e.g., gills, fins) with the class.
- The teacher will lead a discussion about how the different body parts of a fish help it to survive. Discussion should also include a conversation about what habitat features a fish needs to survive (e.g., food, water, shelter).
- Next, the class will use the handouts and corresponding instructions (included on the handout) to color-code the major body parts of the fish.
- Then the students will draw in habitat features that they think are important and write 1-2 sentences describing their fish.
- Finally, the class will reconvene to share and discuss their drawings.

Assessment:

The artwork, diagramming, that they do will be one of their individual assessments. Discussing their drawings with the teacher will be an individual assessment. Observing the students will be an informal assessment as well.



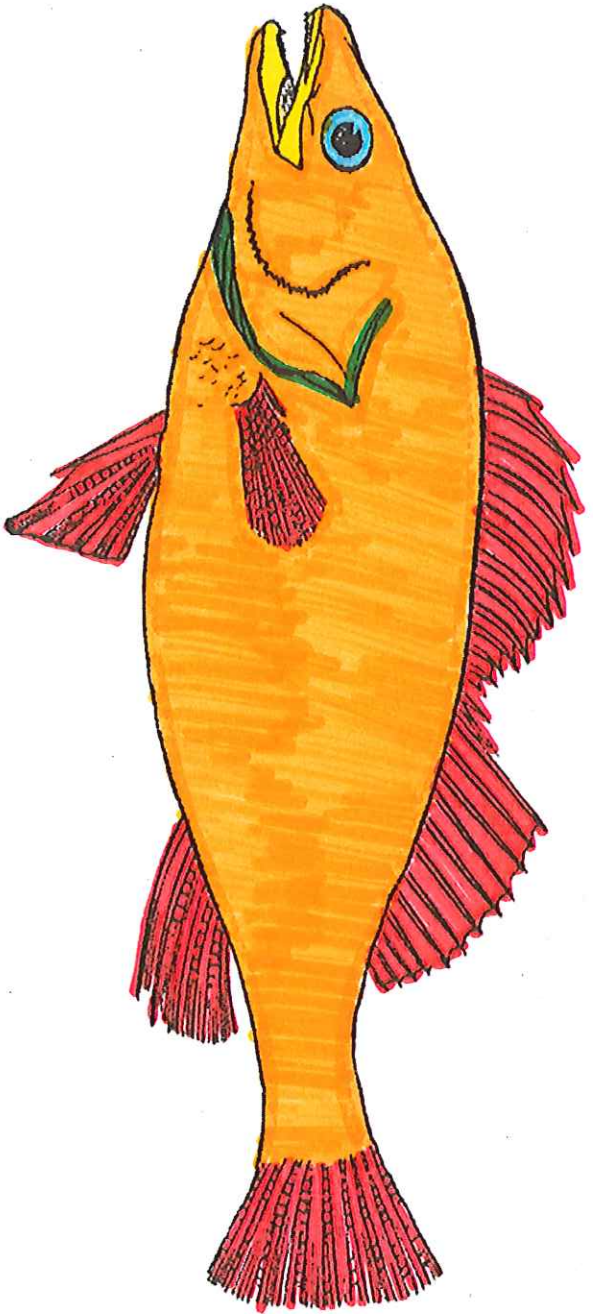
http://etc.usf.edu/clipart/7300/7377/fish_7377.htm

Color a Fish!

1. Color the fins red.
2. Color the eye blue.
3. Color the mouth yellow.
4. Color the gills green.
5. Color the body orange.

Rachael Wilttrout
Environmental Science Practicum
Spring 2010

Example



My fish has sharp teeth and swims fast.

http://etc.usf.edu/clipart/7300/7377/fish_7377.htm

Color a Fish!

1. Color the fins red.
2. Color the eye blue.
3. Color the mouth yellow.
4. Color the gills green.
5. Color the body orange.

Rachael Willtrout
Environmental Science Practicum
Spring 2010

Topic/Lesson Title: Can you find that fish?

Grade Level: First Grade – Second Grade

Content Objectives: Students will be able to distinguish between fish species by identifying morphological differences. They will also understand the concepts of “diversity” and “adaptations”.

Standards Met:

Life Science Standards:

- First Grade: 2. Plants and animals meet their needs in different ways. As a basis for understanding this concept: a) Students know different plants and animals inhabit different kinds of environments and have external features that help them thrive in different kinds of places. b) Students know both plants and animals need water, animals need food, and plants need light. c) Students know animals eat plants or other animals for food and may also use plants or even other animals for shelter and nesting. d) Students know how to infer what animals eat from the shapes of their teeth (e.g., sharp teeth: eats meat; flat teeth: eats plants).
- Second Grade: 2. Plants and animals have predictable life cycles. As a basis for understanding this concept: a) Students know that organisms reproduce offspring of their own kind and that the offspring resemble their parents and one another. c) Students know many characteristics are caused or influenced by the environment. d) Students know there is variation among individuals of one kind within a population.

Investigation and Experimentation Standards:

4. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:

- First Grade: d) Describe the relative position of objects by using two references (e.g., above and next to, below and left of).
- Second Grade: c) Compare and sort common objects according to two or more physical attributes (e.g., color, shape, texture, size, weight).

Language Objectives: Students will be able to read instructions and describe different attributes of fish both orally and written.

Key Vocabulary:

- Diversity
- Adaptations
- Barbels

Supplemental Materials:

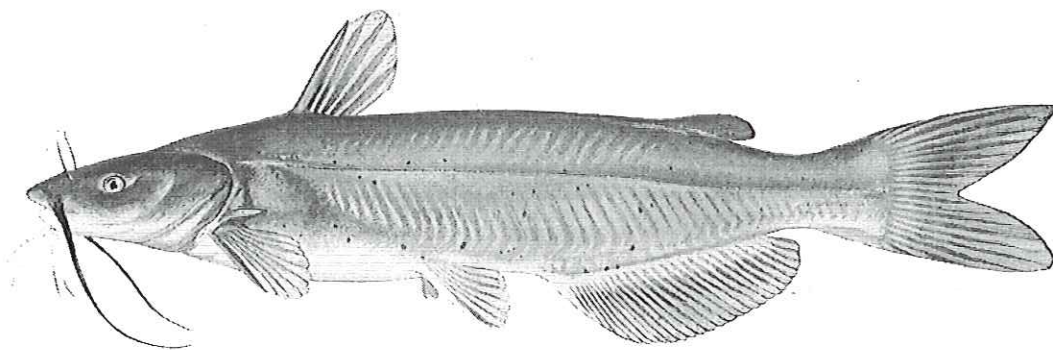
- Blank worksheet (1 per student)
- Art supplies (booklets and crayons, colored pencils, or markers)
- Clipboard or other hard surface to work on
- A completed worksheet for demonstration

Complete Lesson Sequence: Complete Lesson is about 25 minutes

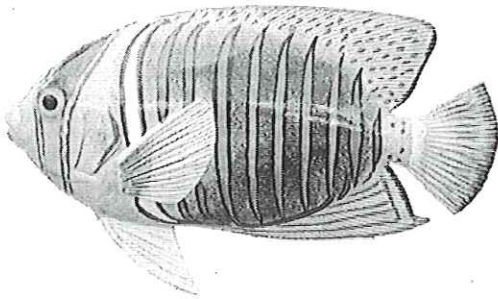
- The teacher will lead a discussion on diversity. This discussion should begin by having the students form a circle and discuss the differences between the shoes that they and their classmates are wearing (e.g., color, brand, or pattern). The teacher will then talk about the “diversity” of shoes that are present and move the discussion into the biological realm (e.g., “So we have a diversity of shoes present. We have many shapes, sizes, and colors. Fish also come in a variety of shapes, sizes, and colors.”).
- The teacher will discuss with the class why all fish do not look the same (they look like their parents and their appearance is suited to their environment).
- Next, the class will individually complete the worksheet by following the instructions (included on the worksheet) to identify the fish species based on their appearance.
- The students will also write a sentence describing an additional attribute of two fish species (from the worksheet). These fish can either be the students’ choice or assigned by the teacher.
- Next, the class will reconvene to review the answers and share their descriptions.
- Finally, the teacher will discuss the different adaptations of the fish (i.e., why they look the way that they do). The teacher should talk about how the features help the fish survive (e.g., camouflage, feeding). For example, “Did you know that the ‘whiskers’ on the catfish are actually called ‘barbels’? They help catfish taste!”

Assessment:

The diagramming and writing that they do will be one of their individual assessments. Discussing their work with the teacher will be an individual assessment. Observing the students will be an informal assessment as well.

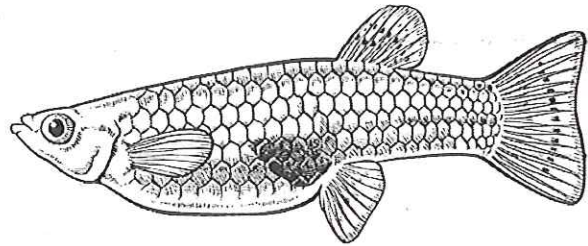


http://www.usbr.gov/mp/cao/newmelones/images/activities_channel_catfish.jpg



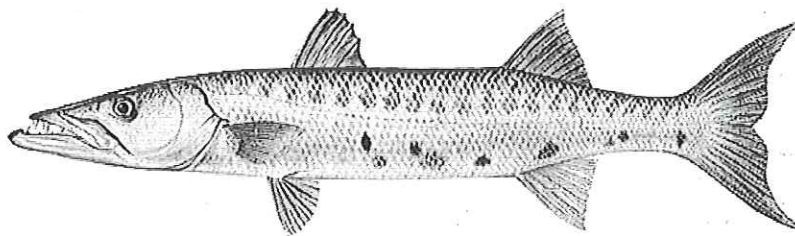
<http://flyingfishshop.com/GMPicts/FishAngelAmericanBlue.jpg>

American Blue Angel Fish



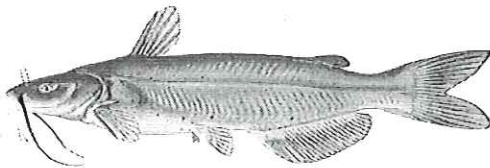
http://www.dpi.qld.gov.au/images/Fisheries_SpeciesIdentification

Mosquito Fish



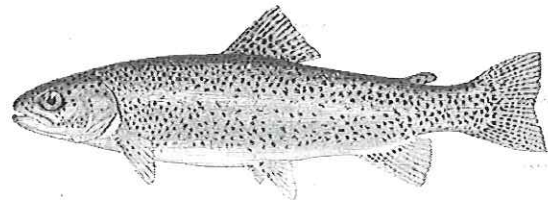
<http://www.landbigfish.com/images/fish/barracuda.jpg>

Barracuda



http://www.usbr.gov/mp/cca0/newmelones/images/activities_channel_catfish.jpg

Channel Catfish



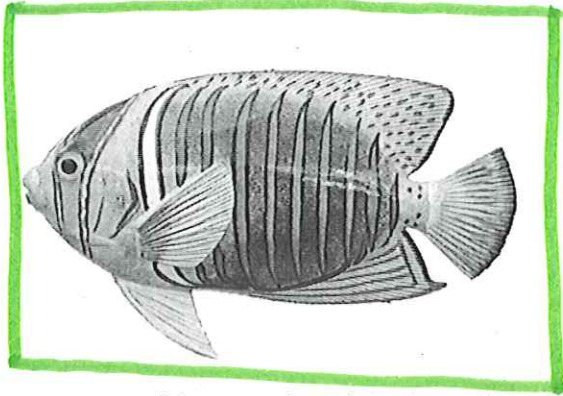
http://www.usbr.gov/mp/cca0/newmelones/images/activities_rainbow_trout.jpg

Rainbow Trout

Can you find that fish?

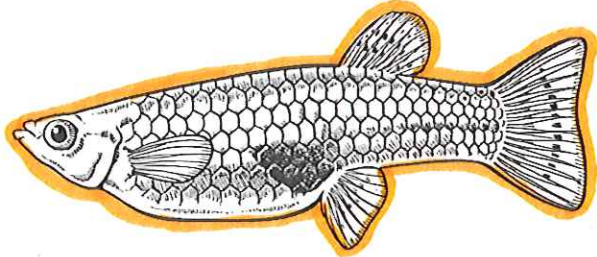
1. Draw a circle around the fish that we saw today at the hatchery.
2. Color the fish with sharp teeth blue.
3. Draw a square around the fish with vertical stripes.
4. Color the fish with an up-wards facing mouth orange.
5. Color the fish with "whiskers" red.

Example



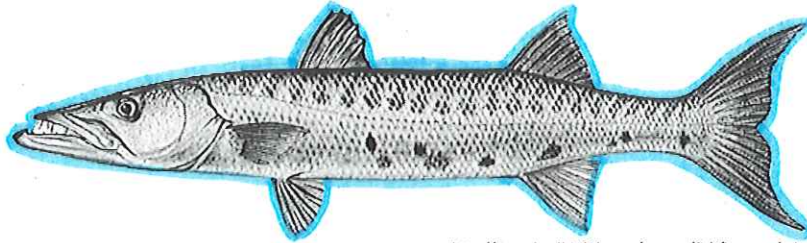
<http://flyingfishshop.com/GMPicts/FishAngelAmericanBlue.jpg>

American Blue Angel Fish



http://www.dpi.qld.gov.au/images/Fisheries_SpeciesIdentification

Mosquito Fish



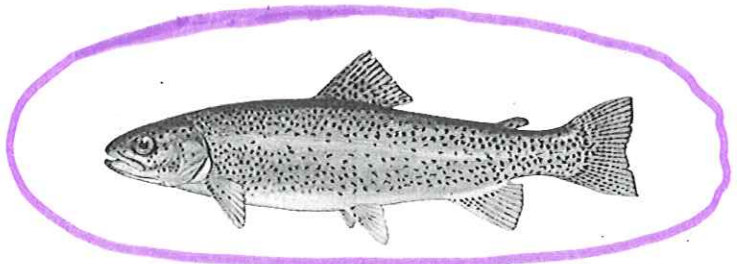
<http://www.landbigfish.com/images/fish/barracuda.jpg>

Barracuda



http://www.usbr.gov/mp/ccao/newmelones/images/activities_channel_catfish.jpg

Channel Catfish



http://www.usbr.gov/mp/ccao/newmelones/images/activities_rainbow_trout.jpg

Rainbow Trout

Can you find that fish?

1. Draw a circle around the fish that we saw today at the hatchery.
2. Color the fish with sharp teeth blue.
3. Draw a square around the fish with vertical stripes.
4. Color the fish with an up-wards facing mouth orange.
5. Color the fish with "whiskers" red.

① The barracuda has a long body.
② The rainbow trout has spots.

Topic/Lesson Title: The Life Cycle of Trout

Grade Level: Third- Fourth Grade

Content Objectives: Students will be able to understand the life stages of trout and key terms that are involved. They will also be able to understand trout's relationship with predators and prey in their ecosystem.

Standards Met

Life Science Standards:

- Third Grade: 3. Adaptations in physical structure or behavior may improve an organism's chance for survival. As a basis for understanding this concept: a.) Students know plants and animals have structures that serve different functions in growth, survival, and reproduction. d.) Students know when the environment changes, some plants and animals survive and reproduce; others die or move to new locations.
- Fourth Grade: 2. All organisms need energy and matter to live and grow. As a basis for understanding this concept: a.) Students know plants are the primary source of matter and energy entering most food chains. b.) Students know producers and consumers (herbivores, carnivores, omnivores, and decomposers) are related in food chains and food webs and may compete with each other for resources in an ecosystem. 3. Living organisms depend on one another and on their environment for survival. As a basis for understanding this concept: b.) Students know that in any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.

Investigation and Experimentation Standards:

Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:

- Third Grade: 5a. Repeat observations to improve accuracy and know that the results of similar scientific investigations seldom turn out exactly the same because of differences in the things being investigated, methods being used, or uncertainty in the observation. e. Collect data in an investigation and analyze those data to develop a logical conclusion.
- Fourth Grade: 6a. Differentiate observation from inference (interpretation) and know scientists' explanations come partly from what they observe and partly from how they interpret their observations. b. Measure and estimate the weight, length, or volume of objects. c. Formulate and justify predictions based on cause-and-effect relationships.

Language Objectives: Students will be able to read instructions and describe their comparisons both orally and in writing.

Key Vocabulary:

- Alevin
- Egg Sac
- Fry
- Insects
- Nutrients

- **Oxygen**
- **Parr Marks**
- **Predators**
- **Prey**
- **Redd**
- **Spawn**
- **Trout**

Supplemental Materials:

- Blank worksheet (1 per student)
- Art supplies (booklets and crayons, colored pencils, or markers)
- Clipboard or other hard surface to work on
- A completed worksheet for demonstration

Complete Lesson Sequence: Complete Lesson is about 30 minutes

Third Grade:

- The teacher can read the short paragraph about the trout life cycle to the children.
- After the paragraph is read the teacher can answer any questions the children have and discuss how the trout relate to other animals they have already studied.
- The teacher can then help the class start on the life stage matching portion of the worksheet.
- The class will then move on to the predator and prey section, where the teacher can add a discussion on the food chain and the relationship between predators and prey.
- Then students will draw a picture of one stage from the trout life cycle in what they think is a good habitat and add either a predator or prey to the picture.
- After they draw their picture that should share with the class and instructor how it's a good habitat and why they chose a certain predator or prey.
- The class can then do a silent word find with the new key terms they learned.

Fourth Grade:

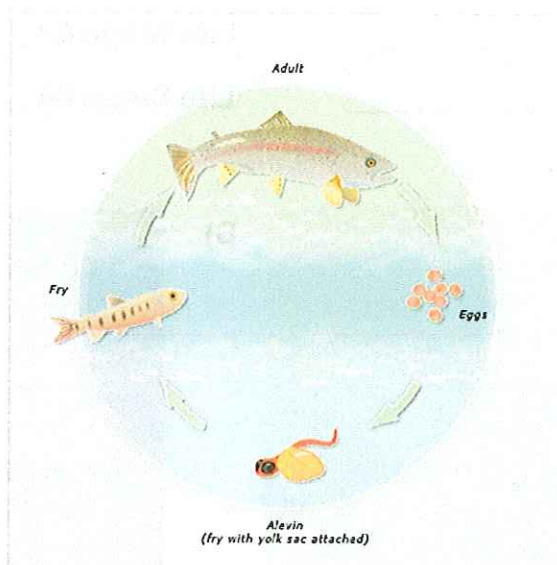
The 4th grade lesson plan is the same as the 3rd grade lesson plan but the instructor can choose to have the class read the paragraph on their own instead of the instructor reading it to them.

Assessment:

The activities, drawings and questions will be an individual assessment. Observing the students will be an informal assessment and reviewing the completed worksheets will be a final assessment.

Humboldt State University Fish Hatchery

The Life Cycle of a Trout



Read the paragraph and answer the questions:

The life cycle of a trout has four main stages. The first stage begins in the egg sac. Adult trout spawn (fertilize and lay eggs) in stream gravel beds called redds (fish nests) where the water temperature is cooler and where it is well oxygenated. Different environmental conditions will affect how long it will take for the eggs to hatch. After hatching the baby trout are called alevin which is the second life stage. Alevin like to live in the dark, shaded places while they are developing. They use their egg sac, which is still attached to them, to absorb nutrients because they are too young and small to find food. The third stage is called fry. Fry eat small insects that fall into the water along with insect nymphs and larvae, as well as plankton. Fry begin to get marks and coloring that help them blend into their surroundings called Parr marks. When the fry get bigger they become juvenile fish which turn into adult trout. The adult trout are the fourth and final stage. They are fully grown and have all their stripes, spots and colorful markings. They will spawn and lay eggs when they reach the end of their life cycle, which will start another generation of trout. The adult trout lay thousands of eggs, but very few grow up to become adults because there are so many things in their environment that can kill them. At all life stages trout face many obstacles that threaten their survival, such as humans and animals that eat them like bears, raccoons and birds of prey. Also environmental changes to their habitat including pollution and climate change are threats to trout.

Life Cycle Matching

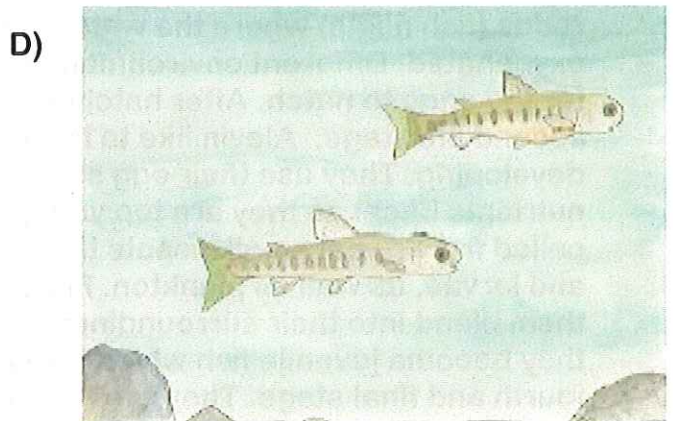
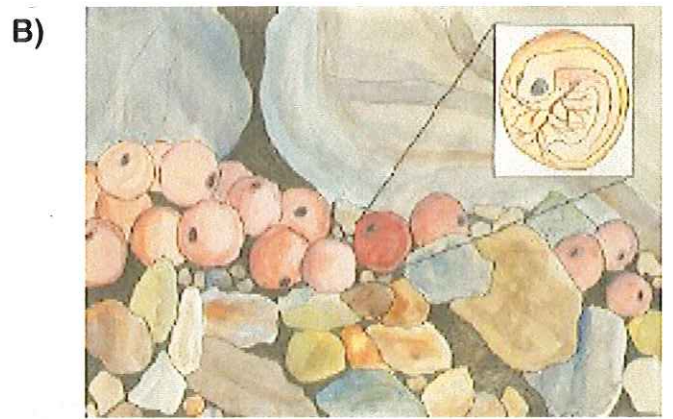
Match the picture below with the correct life stage letter and write the term.

Life Stage #1 _____

Life Stage #2 _____

Life Stage #3 _____

Life Stage #4 _____



Why do fish lay so many eggs?

How do the Parr marks on the fry help them to survive?

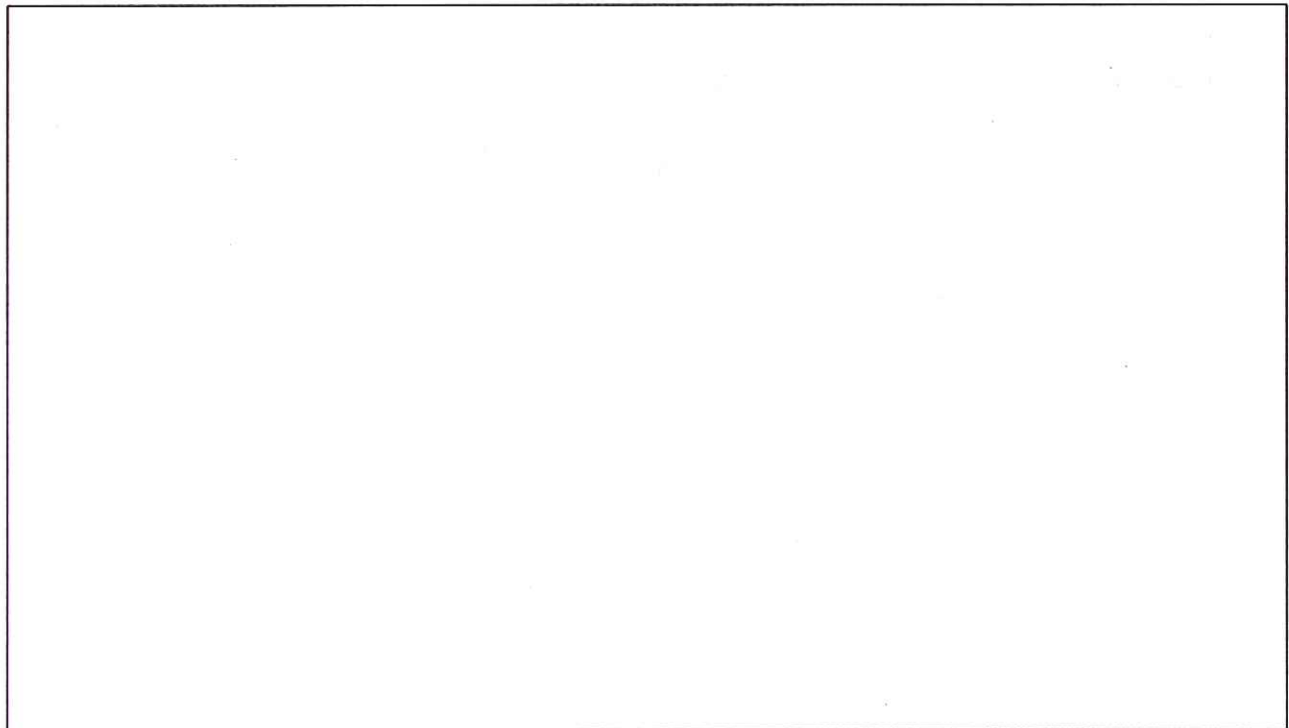
Predator and Prey Relationships

List three things that you think would like to eat fish in the predator's column and then three things that you think fish would like to eat in the prey column.

Predators	Prey
<ul style="list-style-type: none">•••	<ul style="list-style-type: none">•••

Fish Habitat

Pick a stage in the fish life cycle and draw a picture of the fish in a good habitat for it. Include either one predator or one prey for that stage of the fish's life.



Write a sentence or two about why you think that this is a good habitat.

Trout Word Search

Circle the terms that are listed on the right in the word search.

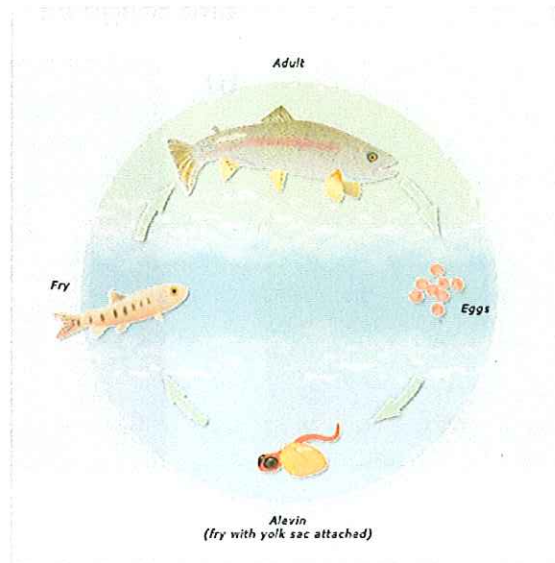
D	I	Y	S	S	P	R	E	Y
C	P	R	E	D	A	T	O	R
O	S	F	D	N	R	E	D	D
S	T	N	E	I	R	T	U	N
P	C	E	G	V	M	R	C	G
A	E	G	G	E	A	O	P	I
W	S	Y	S	L	R	U	O	A
N	N	X	A	A	K	T	S	W
A	I	O	C	T	S	P	E	R

- Alevin
- Egg Sac
- Fry
- Insects
- Nutrients
- Oxygen
- Parr Marks
- Predator
- Prey
- Redd
- Spawn
- Trout

Instructors Copy

Humboldt State University Fish Hatchery

The Life Cycle of a Trout



Read the paragraph and answer the questions:

The life cycle of a trout has four main stages. The first stage begins in the egg sac. Adult trout spawn (fertilize and lay eggs) in stream gravel beds called redds (fish nests) where the water temperature is cooler and where it is well oxygenated. Different environmental conditions will affect how long it will take for the eggs to hatch. After hatching the baby trout are called alevin which is the second life stage. Alevin like to live in the dark, shaded places while they are developing. They use their egg sac, which is still attached to them, to absorb nutrients because they are too young and small to find food. The third stage is called fry. Fry eat small insects that fall into the water along with insect nymphs and larvae, as well as plankton. Fry begin to get marks and coloring that help them blend into their surroundings called Parr marks. When the fry get bigger they become juvenile fish which turn into adult trout. The adult trout are the fourth and final stage. They are fully grown and have all their stripes, spots and colorful markings. They will spawn and lay eggs when they reach the end of their life cycle, which will start another generation of trout. The adult trout lay thousands of eggs, but very few grow up to become adults because there are so many things in their environment that can kill them. At all life stages trout face many obstacles that threaten their survival, such as humans and animals that eat them like bears, raccoons and birds of prey. Also environmental changes to their habitat including pollution and climate change are threats to trout.

Life Cycle Matching

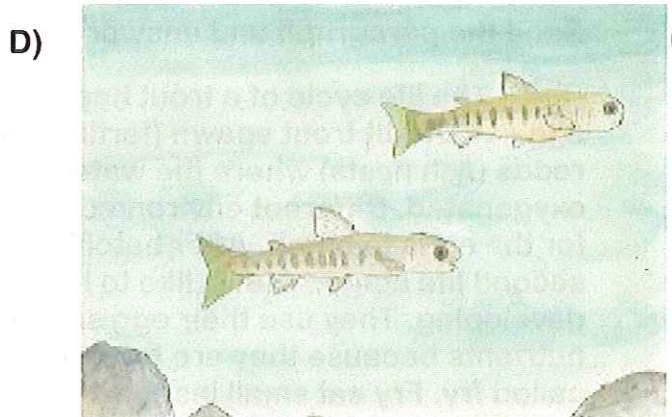
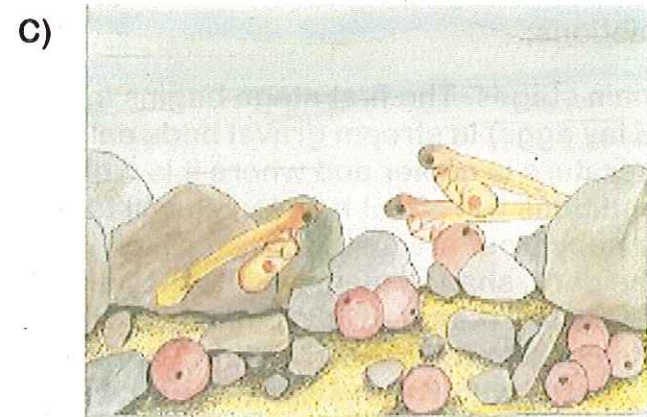
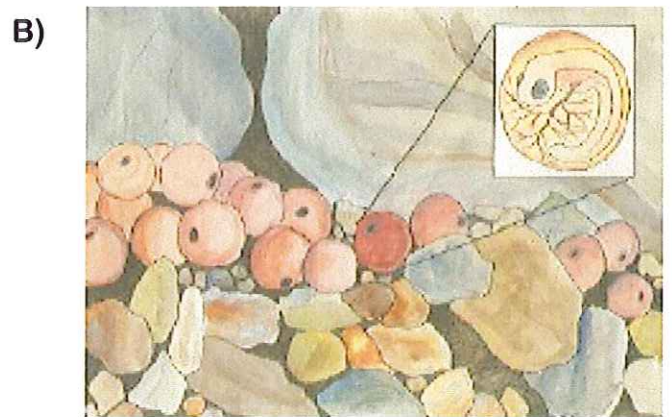
Match the picture below with the correct life stage letter and write the term.

Life Stage #1 (B) Egg Sac

Life Stage #2 (C) Alevin

Life Stage #3 (D) Fry

Life Stage #4 (A) Adult Trout



Why do fish lay so many eggs?

How do the Parr marks on the fry help them to survive?

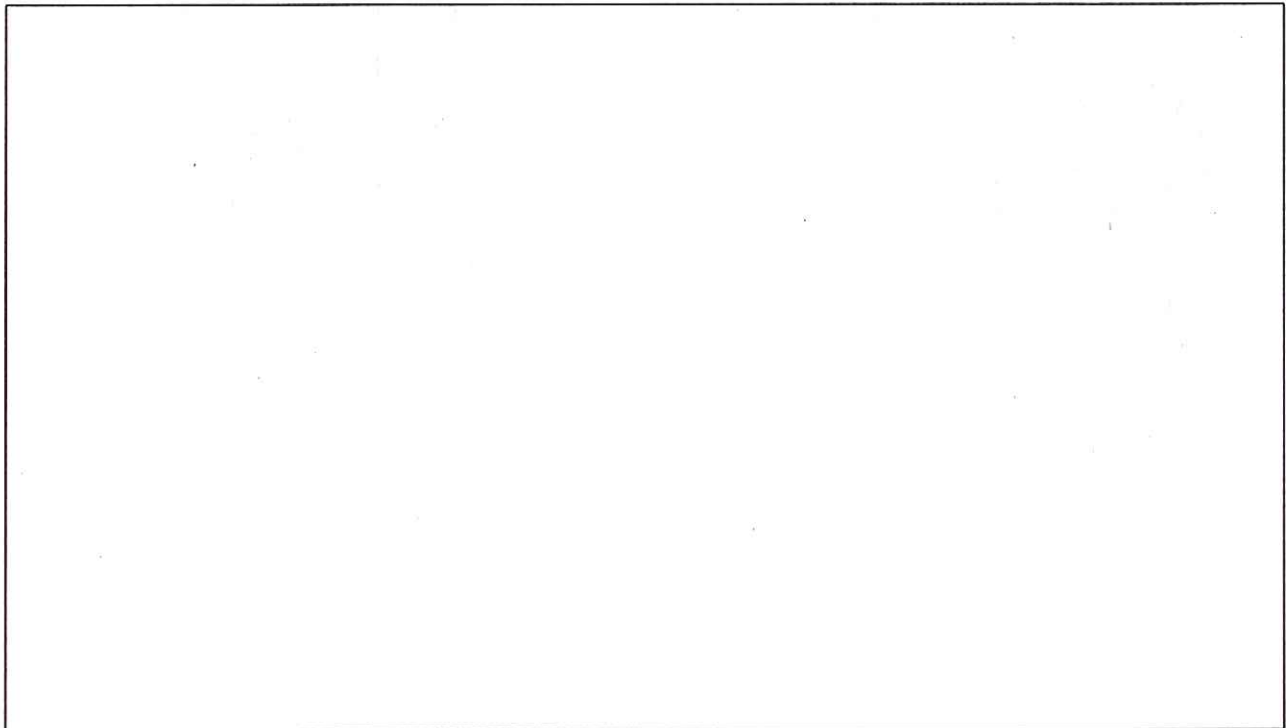
Predator and Prey Relationships

List three things that you think would like to eat fish in the predator's column and then three things that you think fish would like to eat in the prey column.

Predators	Prey
<ul style="list-style-type: none">• Fishermen• Mammals• Birds of Prey	<ul style="list-style-type: none">• Insect nymphs• Insect larvae• Plankton

Fish Habitat

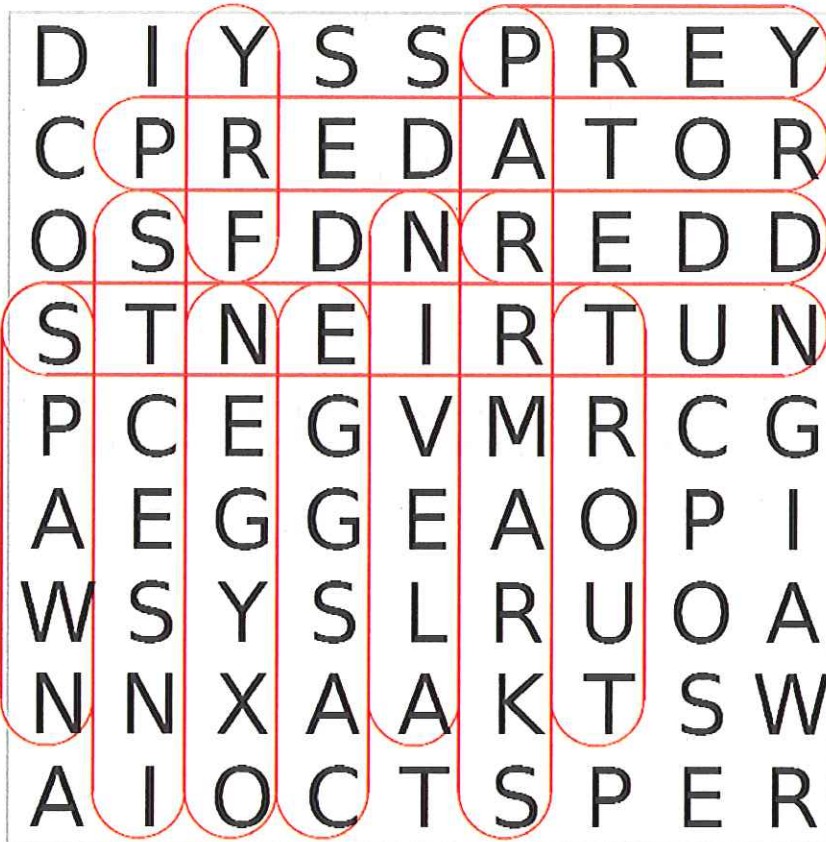
Pick a stage in the fish life cycle and draw a picture of the fish in a good habitat for it. Include either one predator or one prey for that stage of the fish's life.



Write a sentence or two about why you think that this is a good habitat.

Trout Word Search

Circle the terms that are listed on the right in the word search.



- Alevin
- Egg Sac
- Fry
- Insects
- Nutrients
- Oxygen
- Parr Marks
- Predator
- Prey
- Redd
- Spawn
- Trout

Topic/Lesson Title: Fish Anatomy
Grade Level: Fifth- Sixth Grade

Content Objectives: Students will be able to visually identify the major structures of fish anatomy and will make comparisons between human and fish anatomies. Students will make hypothesis about the reason for anatomical differences between humans and fish.

Standards Met

Life Science Standards:

- Fifth Grade: 2. Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials. As a basis for understanding this concept: a) Students know many multicellular organisms have specialized structures to support the transport of materials. b) Students know how blood circulates through the heart chambers, lungs, and body and how carbon dioxide (CO₂) and oxygen (O₂) are exchanged in the lungs and tissues. c) Students know the sequential steps of digestion and the roles of teeth and the mouth, esophagus, stomach, small intestine, large intestine, and colon in the function of the digestive system. d) Students know the role of the kidney in removing cellular waste from blood and converting it into urine, which is stored in the bladder.
- Sixth Grade: 5. Ecology Organisms in ecosystems exchange energy and nutrients among themselves and with the environment. As a basis for understanding this concept: e) Students know the number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors, such as quantities of light and water, a range of temperatures, and soil composition.

Investigation and Experimentation Standards:

Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations.

- Fifth Grade: 6a) Classify objects (e.g., rocks, plants, leaves) in accordance with appropriate criteria. b) Develop a testable question. (why humans and fish have similar or different anatomical body parts) c) Plan and conduct a simple investigation based on a student-developed question and write instructions others can follow to carry out the procedure (e.g. ask how can we keep track of similarities and differences table) h) Draw conclusions from scientific evidence and indicate whether further information is needed to support a specific conclusion. i) Write a report of an investigation that includes conducting tests, collecting data or examining evidence, and drawing conclusions. (is a fishes mouth small for a reason etc.)
- Sixth Grade: 7 a) Develop a hypothesis. d) Communicate the steps and results from an investigation in written reports and oral presentations.

Language Objectives: Students will be able to read instructions and describe their comparisons both orally and in writing.

Key Vocabulary:

- Gills
- Dorsal Fin
- Pelvic fin
- Heart

- Lungs
- Stomach
- Colon
- Kidney
- Mouth
- Eyes
- Nares (Nostrils)
- Anadromous
- Lateral Line

Supplemental Materials:

- Blank worksheet (1 per student)
- Art supplies (booklets and crayons, colored pencils, or markers)
- Clipboard or other hard surface to work on
- A completed worksheet for demonstration

Complete Lesson Sequence: Complete Lesson is about 40 minutes

5th Grade:

- The teacher will read a short description about the fish found in the Humboldt State University hatchery and the natural environments in which they are normally found.
- Then the teacher will hand out worksheets and ask students to draw what body parts they believe are found in a fish and allow students 10 minutes to draw. After students have completed their drawings the instructor will go over the basic anatomy of a fish and ask students to follow along with their worksheet.
- Next the teacher will explain the function of the fish body parts listed in the hand out and ask students to think about if humans have the same body parts. After this the teacher will allow students to finish the worksheet and ask them to make a hypothesis on why human and fish anatomy may differ.
- After the students complete the worksheet the teacher will lead a discussion on the similarities and differences of human and fish anatomy discussed. While doing this the teacher will ask students questions such as why do you think fish have caudal fins? and why do you think humans don't have fins?
- Finally students will write two sentences on how their hypothesis compared to other students and what they learned from the discussion

6th Grade:

The 6th grade lesson plan is the same as the 5th grade lesson plan with one added requirement

- Students will be asked to emphasize what they believe the benefits of fish anatomy are for an organism living in water when doing their comparison.

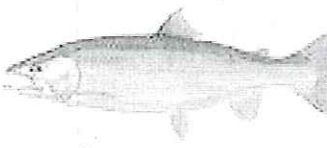
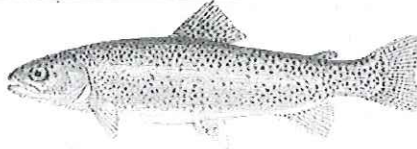

Assessment:

Discussing their drawing of what they think the anatomy of a fish is with the teacher will be an individual assessment. Comparing what they listed as similarities and differences to what the class discusses as similarities and differences between humans and fish will be one of their individual assessments. Observing the students will be an informal assessment and reviewing completion of worksheets will be a final assessment.

Humboldt State University Fish Hatchery

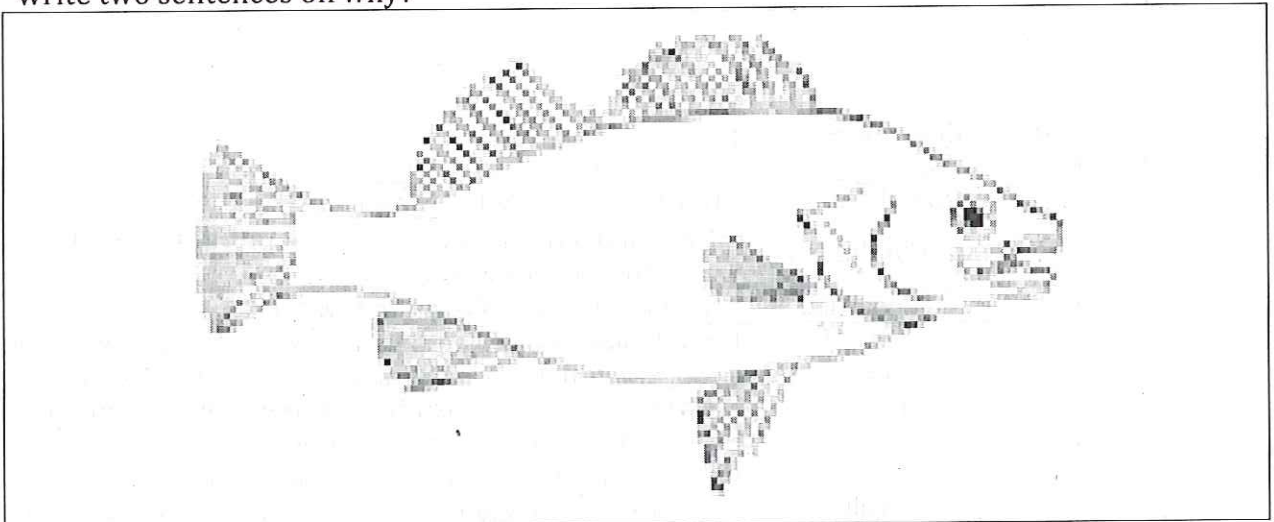
Different Fish Found at the Hatchery

The Humboldt State University Fish Hatchery has three different types of fish: steelhead trout, rainbow trout, and cutthroat trout. All three of these fish are found in Humboldt County. Steelhead is the anadromous (migrating) version of rainbow trout. Steelhead migrate from the ocean into freshwater to spawn, and then can swim back out to the ocean again if they wish. Rainbow trout remain in freshwater throughout their life. Cutthroat trout, like rainbow trout, also have an anadromous (or ocean migrating) form. Adult cutthroat trout that live in freshwater typically live in large pools and the young usually live in riffles of upper tributaries (creeks) of small rivers. While in their estuarine or ocean phase of life, cutthroat trout live in tidal sloughs, marshes, and swamps.

		
Steelhead trout	Rainbow trout	Cutthroat trout

Fish Body

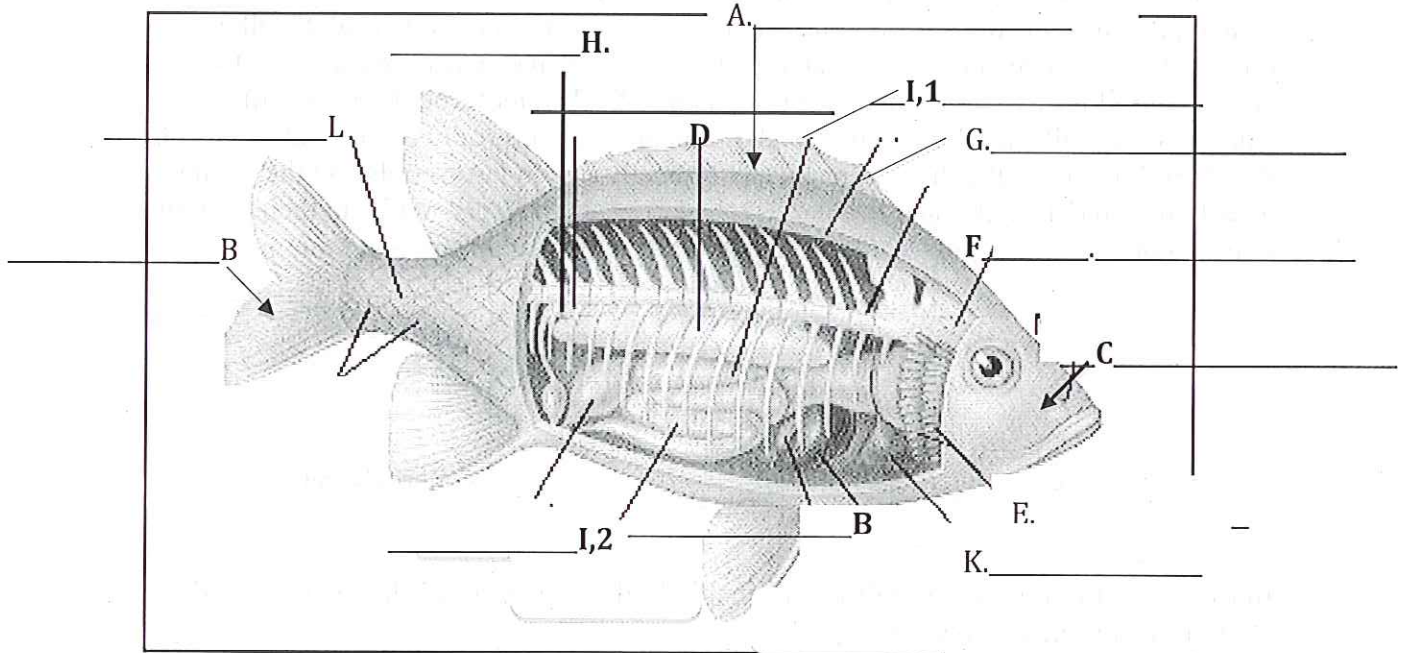
In the space below draw the different inside body parts you think a fish has and write two sentences on why?



Why?

Fish Anatomy

Use the table below to label the fish diagram. As you label the diagram read the function of the body part you are labeling.



Letter on Picture	Fish Body Part	Function
A	Dorsal Fin	Used for stability in swimming
B	Caudal Fin	The Caudal or tail fin is the main propelling fin. It is what the fish uses to move forward.
C	Nostrils	Help the fish in smell in the water
D	Air or Swim bladder	Is a hollow, gas-filled balance organ that allows a fish to conserve energy by maintaining neutral buoyancy (suspending) in water species of fish that do not have a swim bladder sink to the bottom if they stop swimming.
E	Gills	Allow a fish to breathe underwater. Through the gills, fish are able to absorb oxygen and give off carbon dioxide. Like the lungs, the gills have a large surface area for gas exchange.
F	Brain	Is the control center of the fish, where both automatic functions (such as respiration) and higher behaviors occur. All sensory information is processed here.
G	Muscle	Help the fish move through the water by moving the fins. The muscle is also the part of the fish that is usually eaten, and composes the fillet of the fish.

H	Kidney	Removes cellular waste from blood and converting it into urine, which is stored in the bladder. It is also extremely important in regulating water and salt concentrations within the fish's body, allowing certain fish species to exist in freshwater or saltwater, and in some cases both.
I	Stomach (I,1 and Intestine I,2)	Break down (digest) food and absorb nutrients.
J	Liver	Assists digestion by producing substances that break breaking down fats, and also serves as a storage area for fats and carbohydrates. The liver also aids in waste excretion and cleans the blood.
K	Heart	Circulates blood throughout the body. Oxygen and digested nutrients are delivered to the cells of various organs through the blood. The blood transports waste products from the cells to the kidneys and liver for elimination.
L	Lateral line	The lateral line system picks vibrations in the water. It allows fish to detect predators, find food, and navigate more efficiently. (it can be easily seen in fish as a band of darker looking scales running along the side)

Comparing: Can you think of body parts fish and Humans have in common? List the body parts from the table above that you think fish and humans both have (similarities) and the body parts fish have that humans don't have (differences).

Similarities	Differences

Why do you think these similarities or differences between fish and humans exist?

Hypothesis: _____

**Class Discussion on why Differences may occur.
What have you learned?**

Write in two or three sentences something new that you learned, or how your hypothesis changed and if it did not why it stayed the same.

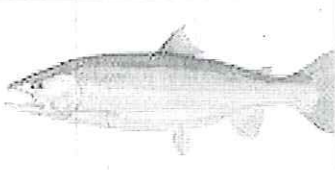
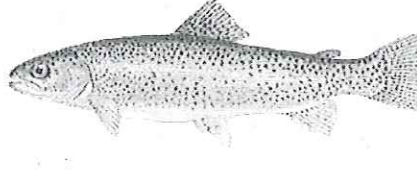
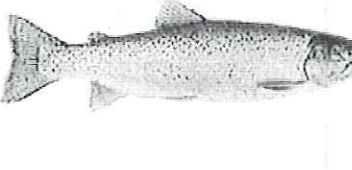
6th Grade

Write down how habitat differences affect the anatomy of a fish?

Humboldt State University Fish Hatchery

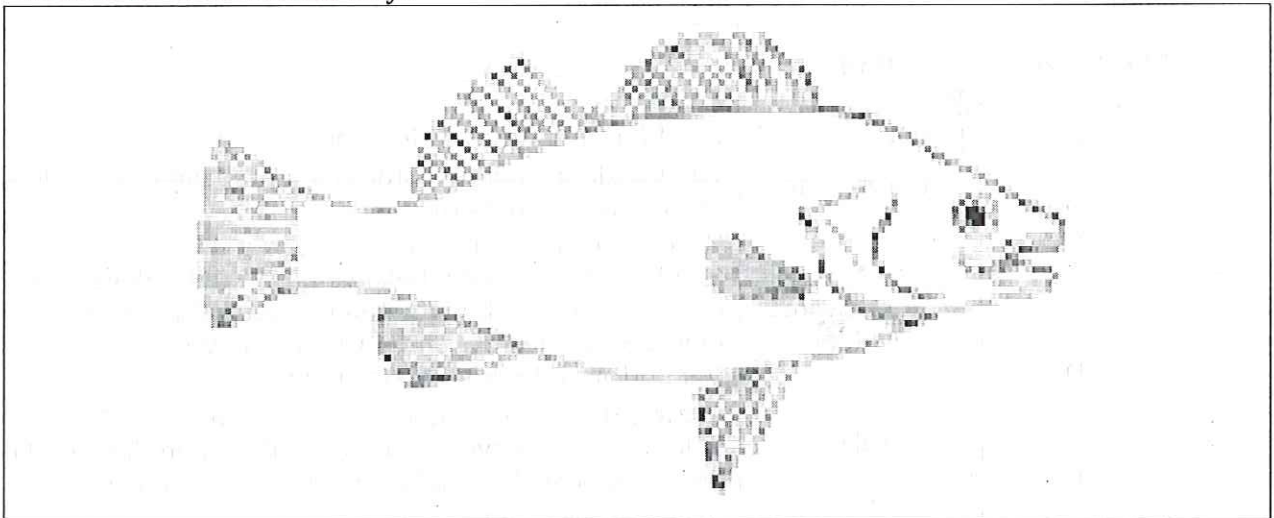
Different Fish Found at the Hatchery

The Humboldt State University Fish Hatchery has three different types of fish: steelhead trout, rainbow trout, and cutthroat trout. All three of these fish are found in Humboldt County. Steelhead is the anadromous (migrating) version of rainbow trout. Steelhead migrate from the ocean into freshwater to spawn, and then can swim back out to the ocean again if they wish. Rainbow trout remain in freshwater throughout their life. Cutthroat trout, like rainbow trout, also have an anadromous (or ocean migrating) form. Adult cutthroat trout that live in freshwater typically live in large pools and the young usually live in riffles of upper tributaries (creeks) of small rivers. While in their estuarine or ocean phase of life, cutthroat trout live in tidal sloughs, marshes, and swamps.

		
Steelhead trout	Rainbow trout	Cutthroat trout

Fish Body

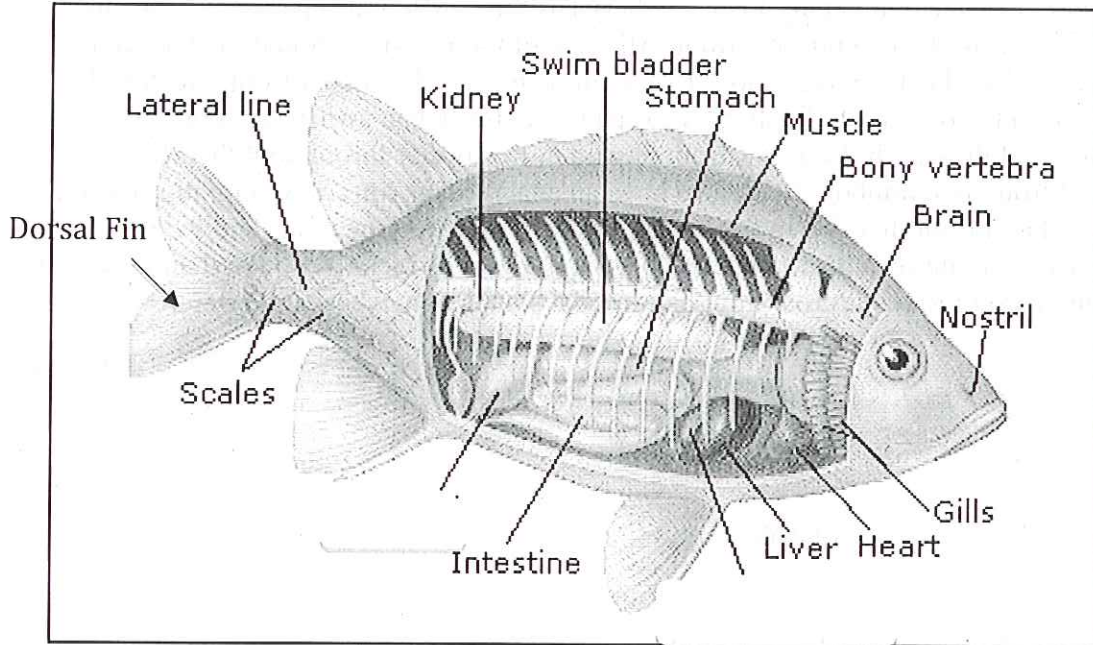
In the space below draw the different body parts you think a fish has inside and write two sentences on why?



Why?

Fish Anatomy

Use the table below to label the fish diagram. As you label the diagram read the function of the body part you are labeling.



Letter on Picture	Fish Body Part	Function
A	Dorsal Fin	Used for stability in swimming
B	Caudal Fin	The Caudal or tail fin is the main propelling fin. It is what the fish uses to move forward.
C	Nostrils	Help the fish in smell in the water
D	Air or Swim bladder	Is a hollow, gas-filled balance organ that allows a fish to conserve energy by maintaining neutral buoyancy (suspending) in water species of fish that do not have a swim bladder sink to the bottom if they stop swimming.
E	Gills	Allow a fish to breathe underwater. Through the gills, fish are able to absorb oxygen and give off carbon dioxide. Like the lungs, the gills have a large surface area for gas exchange.
F	Brain	Is the control center of the fish, where both automatic functions (such as respiration) and higher behaviors occur. All sensory information is processed here.
G	Muscle	Help the fish move through the water by moving the fins. The muscle is also the part of the fish that is usually eaten, and composes the fillet of the fish.
H	Kidney	Removes cellular waste from blood and converting it into urine, which is stored in the bladder. It is also extremely important in regulating water and salt concentrations within the fish's body, allowing certain fish species to exist in freshwater or saltwater, and in some cases both.

I	Stomach and Intestine	Break down (digest) food and absorb nutrients.
J	Liver	Assists digestion by producing substances that break breaking down fats, and also serves as a storage area for fats and carbohydrates. The liver also aids in waste excretion and cleans the blood.
K	Heart	Circulates blood throughout the body. Oxygen and digested nutrients are delivered to the cells of various organs through the blood. The blood transports waste products from the cells to the kidneys and liver for elimination.
L	Lateral line	The lateral line system picks vibrations in the water. It allows fish to detect predators, find food, and navigate more efficiently. (it can be easily seen in fish as a band of darker looking scales running along the side)

Comparing: Can you think of body parts fish and Humans have in common? List the body parts from the table above that you think fish and humans both have (similarities) and the body parts fish have that humans don't have (differences).

Similarities	Differences

Why do you think these similarities or differences between fish and humans exist?

Hypothesis: _____

Humans and fish share organs as the brain, stomach, liver, and kidneys. Other organs appear in different forms in fish than they do in humans. For example, the lungs in humans and the gills in fish both provide the same function of respiration but they are very different. Some organs such as the swim bladder and other body parts such as the lateral line are simply not present in humans.

**Class Discussion on why Differences may occur.
What have you learned?**

Write in two or three sentences something new that you learned, or how your hypothesis changed and if it did not why it stayed the same.

6th Grade

Write down how habitat differences affect the anatomy of a fish?

Project WILD National Office
5555 Morningside Drive, Suite 212
Houston, TX 77005

To Whom It May Concern:

I am writing to request the right to reprint the lesson "Fashion a Fish" printed in your publication Project WILD Aquatic. The lesson appears on pages 56 through 60. I am a student attending Humboldt State University in northern California. As part of my senior project for the Environmental Science program, my group and I are working to put together an elementary education program for our on-campus freshwater fish hatchery. We were very impressed by this lesson and think that it would fit nicely into our program. Our plan is provide template lessons to the fish hatchery manager so that he can distribute them to elementary school classes that visit the facility. We currently have about six classes visiting annually. Our distribution method would be local and very small scale.

Thank you for considering our request. We look forward to hearing back from you.

Sincerely,



Rachael C. Wiltout
Humboldt State University



April 22, 2010

Rachael Wiltrout
Humboldt State University
1 Harpst St
Arcata, CA 95521

Dear Rachael,

We received your request to reprint the following Project WILD Aquatic activity for the elementary school classes that visit the on-campus fish hatchery and wanted to inform you that your request has been granted:

1. Fashion a Fish

Please include the following copyright information on each page of the reprinted activities:

Reprinted with permission from Project WILD, *Project WILD Aquatic K-12 Curriculum & Activity Guide*. © Copyright 2009, 2008, 2007, 2006, 2005, 2004, 2003, 2002, 2001, 2000, 1992, 1985, and 1983 by the Council for Environmental Education. The complete Activity Guide can be obtained by attending a Project WILD workshop. For more information, contact the Project WILD Office in your state. For contact information, please visit our national web site, www.projectwild.org.

You have been granted permission to print 200 copies of this activity in the materials you distribute to the visiting elementary school classes. You will need to submit another reprint request for subsequent printing. Electronic/CD copies are not allowed at this time. The administrative and processing fee has been waived.

We appreciate your support and would like to thank you for including Project WILD in your efforts.

Sincerely,

Grace A. Taupo
Administrative Assistant
Council for Environmental Education
gracetcee@aol.com

5555 MORNINGSDRIVE
SUITE 212
HOUSTON, TEXAS 77005
PHONE 713.520.1936
FAX 713.520.8008

Project WILD, a K-12 supplementary conservation and environmental education program emphasizing wildlife, is administered by the Council for Environmental Education and is co-sponsored by the Western Association of Fish and Wildlife Agencies.

Fashion a Fish



Objectives

Grades K-2

Students will classify fish according to body shape and coloration.

Grades 3-4

Students will (1) describe adaptations of fish to their environments, (2) describe how adaptations can help fish survive in their habitats, and (3) interpret the importance of adaptation in animals.

Method

Students design a fish adapted for various aquatic habitats.

Materials

Grades K-2

Body shape and coloration are the only cards needed for younger students. The first three steps in this activity are optional for younger

students. Steps four through seven can include the adaptation cards for body shape and coloration; reproduction and mouth cards are optional

Grades 3-4

Five cards are needed for each adaptation from the masters provided on pages 59 and 60: mouth, body shape, coloration, reproduction; art materials; paper

Background

Aquatic animals are the 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 slowly or catastrophically, the species of animals with adaptations (that allow them many options) are the ones most likely to survive. Some species have adapted to such a narrow range of habitat conditions that they are extremely vulnerable to change. These species are usually more susceptible than other animals to death or extinction.

In this activity, the students design a fish. Students choose the adaptation that their fish will have; each choice would actually take countless years to develop. As those adaptations become part of the fish's design, the fish becomes better suited to the habitat in which it lives. Because of the variety of conditions within each habitat, many different fish can live together and flourish. Some adaptations of fish are shown on page 59 and 60.

Grade Level: K-4

Subject Areas: Science, Expressive Arts, Environmental Education

Duration: one or two 20-minute sessions for younger students, two 30- to 45-minute sessions for older students

Group Size: any; groups of four students each

Setting: indoors or outdoors

Conceptual Framework Topic Reference: CAIIA1b, CAIIA1c, CAIIB

Key Terms: adaptation, coloration, camouflage, habitat

Appendices: Using Local Resources

Procedure

1. Assign students to find a picture or make a drawing of a species of animal that has a special adaptation. For example, giraffes have long necks for reaching vegetation in tall trees, while owls have large eyes that gather light and aids with night vision.
2. Conduct a class discussion on the value of different kinds of adaptations to animals. As a part of the discussion, ask the students to identify different kinds of adaptations in humans.
3. Collect the students' pictures or drawings of adaptations. Categorize them into the following groups:
 - protective coloration and camouflage,
 - body shape or form,
 - mouth type or feeding behavior,
 - reproduction or behavior, and
 - other (one or more categories the students establish, in addition to the four above that will be needed for the rest of the activity).
4. Divide the adaptation cards into five groups of four cards each: one for coloration, mouth type, body shape, and reproduction.
5. Pass one complete set of cards to each group of students. There might be five groups with four to six students in each group. If the class size is larger than about 30 students, make additional sets of adaptation cards.

Adaptation	Advantage	Examples
Mouth		
Sucker-shaped mouth	Feeds on very small plants and animals	Sucker, carp
Elongated upper jaw	Feeds on prey it looks down on	Spoonbill, sturgeon
Elongated lower jaw	Feeds on prey it sees above	Barracuda, snook
Duckbill jaws	Grasps prey	Muskellunge, pike
Extremely large jaws	Surrounds prey	Bass, grouper
Body Shape		
Torpedo shape	Fast moving	Trout, salmon, tuna
Flat bellied	Bottom feeder	Catfish, sucker
Vertical disk	Feeds above or below	Butterfish, bluegill
Horizontal disk	Bottom dweller	Flounder, halibut
Hump backed	Stable in fast-moving water	Sockeye salmon, chub, razorback
Coloration		
Light-colored belly	Predators have difficulty seeing it from below	Most minnows, perch, tuna, mackerel
Dark upper side	Predators have difficulty seeing it from above	Bluegill, crappie, barracuda, flounder
Vertical stripes	Can hide in vegetation	Muskellunge, pickerel, bluegill
Horizontal stripes	Can hide in vegetation	Yellow and white bass, snook
Mottled coloration	Can hide in rocks and on bottom	Trout, grouper, rockbass, hogsucker
Reproduction		
Eggs deposited in bottom	Hidden from predators	Trout, salmon, most minnows
Eggs deposited in nests	Protected by adults	Bass, stickleback
Floating eggs	Dispersed in high numbers	Striped bass
Eggs attached to vegetation	Stable until hatching	Perch, northern pike, carp
Live bearers	High survival rate	Guppies

6. Ask the students to "fashion a fish" from the characteristics of the cards in the set they receive. Each group could
 - create an art form that represents their fish,
 - name the fish, and
 - describe and draw the habitat for their fish.
7. Ask each group to report on the attributes of the fish they have designed, including identifying and describing its adaptations. Ask the students to describe how this kind of fish is adapted for survival.

Grades 3-4

Ask the students to make inferences about the importance of adaptations in fish and other animals.

Extensions

1. Take an adaptation card from any category, and find a real fish with that adaptation.

NOTE: A collection of books about fish is useful. Do not be as concerned about reading level as much as the accuracy of the illustrations.

2. Look at examples of actual fish. Describe the fish, and speculate on its habitat by examining its coloration, body shape, and mouth.

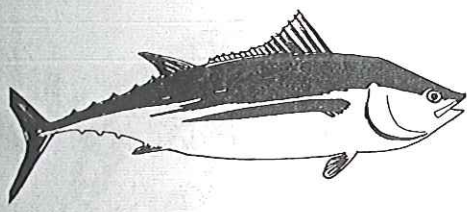
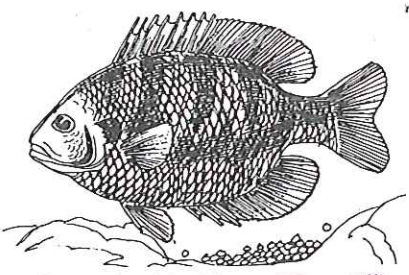
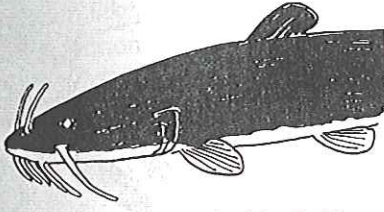
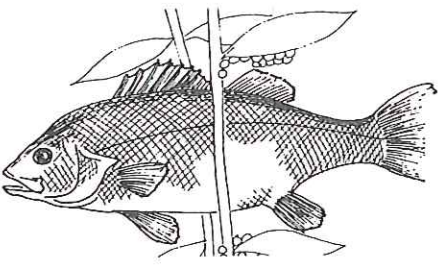
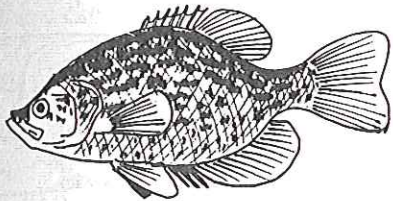
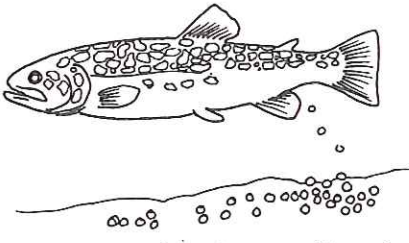
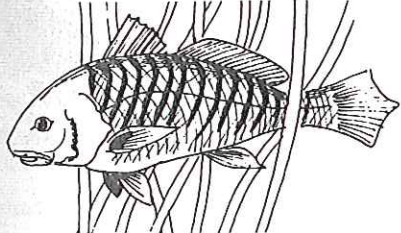
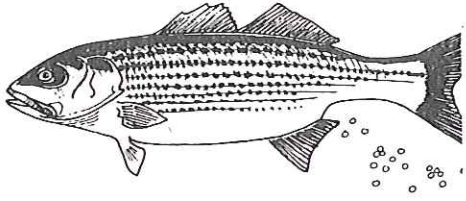
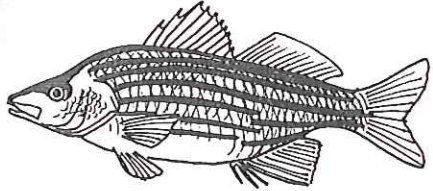
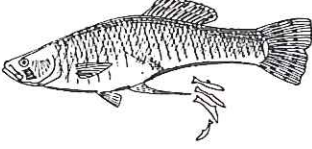
Evaluation*Grades K-2*

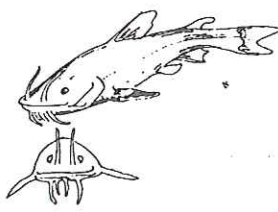
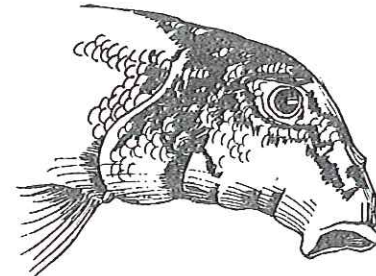
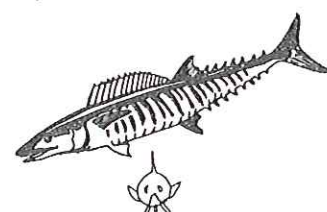
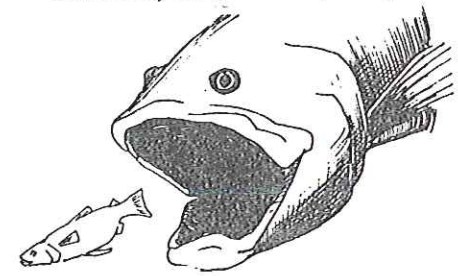
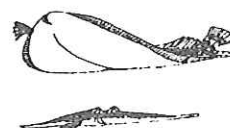
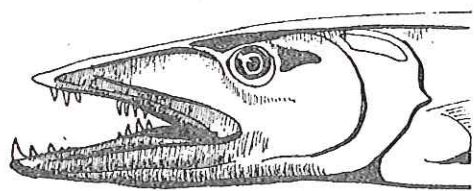
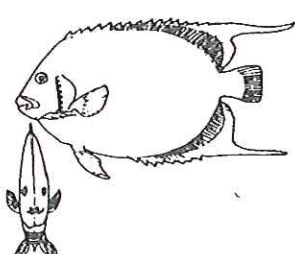
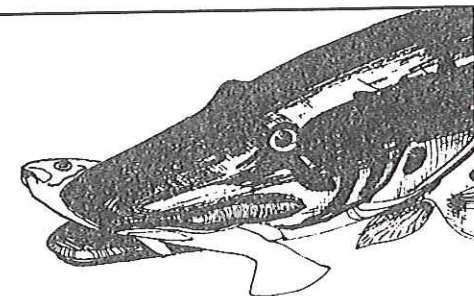
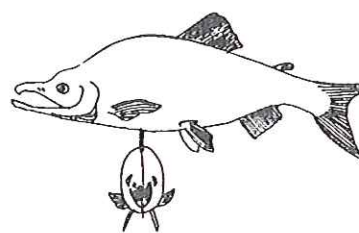
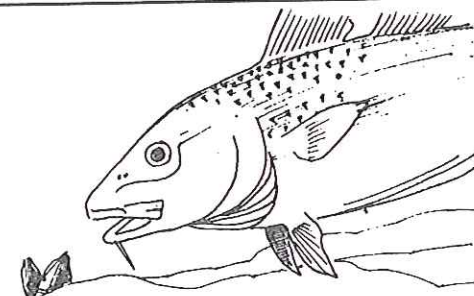
Circle the fish with vertical stripes. Circle the fish with the horizontal, flat shape. Circle the fish that would be difficult to see from above. (Use the masters provided on pages 59 and 60 for drawings of fish.)

Grades 3-4

1. Name two fish adaptations in each of the following categories: mouth and feeding, shape, coloration, and reproduction. Then describe the advantages of each of these adaptations to the survival of the fish in their habitats.
2. Invent an animal that would be adapted to live in your community. Consider mouth, shape, coloration, reproduction, food, shelter, and other characteristics. Draw and describe your animal.



 <p>Light Colored Belly (Albacore)</p>	<p>Coloration</p>  <p>Reproduction</p> <p>Eggs Deposited in Nests (Blue Gill)</p>
 <p>Dark Upper Side (Catfish)</p>	<p>Coloration</p>  <p>Reproduction</p> <p>Eggs Deposited on Vegetation (Yellow Perch)</p>
 <p>Mottled (Crappie)</p>	<p>Coloration</p>  <p>Reproduction</p> <p>Eggs Deposited on Bottom (Trout)</p>
 <p>Vertical Stripes (Croaker)</p>	<p>Coloration</p>  <p>Reproduction</p> <p>Free Floating Eggs (Striped Bass)</p>
 <p>Horizontal Stripes (Yellow Bass)</p>	<p>Coloration</p>  <p>Reproduction</p> <p>Live Birth (Gambusia)</p>

<p>Shape</p> <p>Flat Bellied (Catfish)</p> 	<p>Mouth/Feeding</p> <p>Sucker Shaped Jaw (Sucker)</p> 
<p>Shape</p> <p>Torpedo Shape (Wahoo)</p> 	<p>Mouth/Feeding</p> <p>Extremely Large Jaws (Grouper)</p> 
<p>Shape</p> <p>Horizontal Disc (Halibut)</p> 	<p>Mouth/Feeding</p> <p>Elongated Lower Jaw (Barracuda)</p> 
<p>Shape</p> <p>Vertical Disc (Butterfish)</p> 	<p>Mouth/Feeding</p> <p>Duckbill Jaws (Muskellunge)</p> 
<p>Shape</p> <p>Humpbacked (Sockeye)</p> 	<p>Mouth/Feeding</p> <p>Elongated Upper Jaw (Cod)</p> 

REARING TANKS



After the fish are hatched, they are called alevin or sack fry. When they are first introduced to the rearing tanks, they are negatively phototactic, meaning they move away from light. They are about 1-inch long and cannot swim when they first hatch out of the redd (nest). While in the rearing tanks, the fish receive treatment for gill bacteria, parasites, and other diseases. The fish will remain in the rearing tanks until they are about 4-inches long, at which point they are positively phototactic and can swim.



Rearing tanks

CIRCULAR TANKS

When the fish enter the circular tanks, they are about 4-inches long. They are called yearlings or smolts. They will stay in the tanks for 1 to 2 years, until they are big enough to go into the ocean.



Hatchery manager with circular tank

RACEWAYS

The fish in the raceways are called broodstock. These fish are about 2 to 3 years old and have reached sexual maturity. The water is filtered using biological filtration which utilizes plants to remove nitrogen and phosphorous.



Raceways



Biological filtration in the raceways

REDWOOD TANK



The fish hatchery uses water from Fern Lake, located in the Arcata Community Forest. The water is stored in the redwood water tank. After the water leaves the hatchery, it enters into the storm sewer and into local creeks.



Fern Lake

Questions:

1. What types of fish are at the hatchery?
2. What is "negatively phototactic"?
3. What is the brood pond used for?
4. Where does the water for the fish hatchery come from?
5. When did the fish hatchery at HSU open?

INCUBATOR

Here is where the eggs and the sack fry (Young fish) are located for about 2 months. It takes about one month for the fish to hatch after fertilization. For the first 4 weeks of their lives, the sack fry use their egg sack as food. Water flows through the incubators from the top to the bottom at an angle increasing oxygen in the water. Biological and particulate waste is filtered from the incubators and the water is disinfected using UV light.



Incubator containing cutthroat trout, rainbow trout and steelhead.

BROOD POND

The brood pond is used as a sedimentation pond. The green "stuff" growing on the surface is called duck weed (*Lemna minor*). The duck weed is used to provide shade and prevent algal growth. It is also used to feed the ducks and geese in the game pens.



Created by: Rosalinda Gonzalez,
Sarah Johnson, Rachael Wiltrout
Environmental Science Practicum
Spring 2010



Aquaculture class conducting study

Humboldt State University Fish Hatchery

Supplement Guide



The fish hatchery has provided undergraduates and graduate fisheries biology students a facility to conduct research, observations, and practice techniques since 1956. The hatchery is also a freshwater educational facility for the surrounding community.



Freshwater Fish Hatchery
Department of Fisheries Biology
Humboldt State University
Arcata, CA 95521 USA
Phone: 707-826-3445
Fax: 707-826-4060
Campus location: Wildlife & Fisheries Building,
Hatchery 103

Lesson Plan Evaluation Survey

Evaluator's Name: _____

School: _____

Grade level: _____

Date: _____

Circle the lesson plan you are evaluating:

- Color the Fish (K & 1st)
- Can you find that fish? (1st & 2nd)
- Life cycle of a trout (3rd & 4th)
- Fish Anatomy (5th & 6th)

Did you utilize the supplemental hatchery brochure (circle): yes / no

Did you find this lesson plan appropriate for your students? Why or why not?

Do you have any further comments or suggestions?

Thank you!

Please return completed survey to Eric Laudenslager, fish hatchery manager.

Rachael Wiltrout
ENVS 410 Project Hours

Date	Hours	Activity
26-Jan	1	research
28-Jan	1.5	research
1-Feb	0.5	group brainstorm
2-Feb	1	tour of fish hatchery
4-Feb	1	research (raising awareness)
9-Feb	1.5	research
10-Feb	0.5	research
11-Feb	1.5	problem background
12-Feb	1	meeting w/ Doug Kokesh
18-Feb	4	research & problem statement
22-Feb	2	research & problem statement
23-Feb	2	research & problem statement
25-Feb	2	research & problem statement
1-Mar	1	meeting w/ Eric Loudenslager
2-Mar	0.5	group meeting
4-Mar	2	goals & objectives/problem statement revisions
9-Mar	1	goals & objectives
11-Mar	1.5	research
16-Mar	2	research
17-Mar	1	research
19-Mar	2	research
23-Mar	1	meeting w/ Eric Loudenslager
25-Mar	2	weighing alternatives
30-Mar	0.5	group discussion of alternatives
1-Apr	2	research
6-Apr	2	implementation
7-Apr	1.5	lesson plans
8-Apr	1	lesson plans/group meeting
9-Apr	2	tour w/ Eric & lesson plans
13-Apr	1	group meeting/lesson plans/Project WILD letter
15-Apr	2	research/group meeting/peer review of lesson plans
20-Apr	3	tour guide
22-Apr	3	tour guide
23-Apr	1.5	lesson plans/tour guide
26-Apr	2	implementation
27-Apr	2.5	monitoring & evaluation/lesson plans
28-Apr	3	PowerPoint
29-Apr	3	PowerPoint/paper
30-Apr	3.5	presentation/paper
3-May	4.5	paper/presentation/group meeting

TOTAL HOURS:	71.5
---------------------	-------------

Practicum Hour Log

Date	Hour(s)	Activity
1/27/2010	1	researching possible projects
2/1/2010	0.5	group brainstorm
2/2/2010	1	group tour of the hatchery
2/4/2010	1	research/outreach write up (group)
2/9/2010	1.5	research (CCAT & meeting Professor to talk about posters)
2/10/2010	0.5	emailing/sign research
2/11/2010	1.25	problem statement/ group meeting
2/12/2010	1	meeting with plant operations
2/15/2010	0.5	researching signs & calling companies
2/18/2010	0.5	researching community awareness
2/18/2010	4	group work: writing/g/email eric
2/22/2010	1.5	education outreach seminar. (ideas such as using Facebook for outreach). Research on educating kids
2/24/2010	1.5	educating the public the public about science & assisting a high school student with poster presentation.
2/25/2010	1.5	seminar on communicating through journal writing of scientific papers
2/25/2010	3	looking at different signs & other informative tools presented at the Portland zoo. Talked to the petting zoo about educating people about animals.
22/22-22/25	2	looking at scientific posters evaluating information presented on them for clarity, presentation & informativeness. Spoke to poster presenters to compare what they were discussing & they information they parented on th posters. Found our FedEx prints posters. spoke with my sister about working with children since she works at a teaching center.
	2	
	2	
	2	
3/1/2010	2	meeting with Eric & finished paper. Research children/talked to roommate who is child development major and emailed one of her professors for more information.
3/2/2010	0.5	group work
3/4/2010	2	group work/meeting research, emailing contacts, writing of goals
3/9/2010	1	group work, email YES house, & Eric. Look at teaching standards
3/11/2010	1.5	group work
3/23/2010	1	meeting with Eric
3/25/2010	2	weighing alternatives group work
3/30/2010	0.5	discussion of alternatives
4/1/2010	2	research on books in library
4/6/2010	2	group work , write up, and research
4/13/2010	1	group meeting/lesson plans
4/15/2010	2	research group meeting peer review of teaching children science book, and other books.

4/20/2010	3	tour guide
4/13/2010	4	working on lesson plan
4/14/2010	6	working on lesson plan
4/22/2010	3	creating brochure
4/23/2010	1	meet for brochure
4/27/2010	2	group work: monitoring & evaluation
4/27/2010	1.5	excel of hours and fish hatchery sign in log sheet creation
4/28/2010	3	group work for final presentation and paper edits
5/3/2010	3	group presentation practice/prep
Total hours	72.25	

Sarah Johnson's Date	Environmental Science 410 Project Hours Activity	Hours
January 28, 2010	Research	4
February 2, 2010	Group tour of hatchery	1
February 4, 2010	Research	1
February 9, 2010	Research	1.5
February 11, 2010	Research and Brainstorming	1
February 12, 2010	Meeting with Plant Operations	1
February 18, 2010	Project Statement and Background	4
February 23, 2010	Project Statement and Background	3
February 25, 2010	Project Statement and Background	3
March 1, 2010	Meeting with Eric, Manager of Fish Hatchery	1
March 2, 2010	Group Meeting	0.5
March 4, 2010	Goals and Objective Statement	2
March 9, 2010	Objective and Research	1
March 11, 2010		1.5
March 17, 2010	Research	3
March 22, 2010	Meeting with Eric, Manager of Fish Hatchery	1
March 25, 2010	Weighing Alternatives	2
March 30, 2010	Discussion on Alternatives	0.5
April 1, 2010	Research in Library	2
April 6, 2010	Monitoring	1
April 8, 2010	Implementation and Strategies	1
April 9, 2010	Tour of Fish Hatchery with Eric	2
April 15, 2010	Research	1
April 18, 2010	Work on Lesson Plans	2
April 20, 2010	Work on Brochure	3
April 22, 2010	Work on Brochure	3
April 23, 2010	Work on Lesson Plans	1
April 25, 2010	Work on Lesson Plans	3
April 26, 2010	Work on Lesson Plans	3
April 27, 2010	Monitoring	2
April 28, 2010	Creat Powerpoint	3
April 29, 2010	Creat Powerpoint	3
April 30, 2010	Pre-prepare Paper	3.5
May 3, 2010	Wrap-up paper/ group meeting	4
		69.5

What worked? what didn't? in campaigns

Rosalinda Gonzalez
Sarah Johnson
Rachael Wiltrout
ENVS 410 – Hansis

Problem Background and Statement

Problem Statement

There is a lack of awareness of Humboldt State University's on-campus freshwater fish hatchery. This facility is a valuable asset to the campus. However, it is currently under utilized and largely unrecognized by the campus and surrounding communities.

Problem Background

Located to the south of the Wildlife and Fisheries building, HSU's freshwater fish hatchery provides an on-campus facility for graduate and under-graduate studies in Fisheries Biology and related fields. The purpose of the school's hatchery is to provide students with a wet lab facility for teaching and research activities (Department of Fisheries Biology, 2010). It also provides an opportunity for elementary and high school students to engage in activities focused on understanding and interpretation of environmental science (Jew, 2010). The site houses a 3,000 square foot building containing a small laboratory, rearing tanks, and egg incubators. The facility also includes raceways, pumps, water storage and filtration, and a large brood pond (Department of Fisheries Biology, 2010). The facility provides the ability to rear fish from eggs to broodstock. The school raises rainbow trout, cutthroat trout, steelhead, and a ~~rainbow-cutthroat hybrid~~ within the hatchery (Jew, 2010). The water that the hatchery uses is provided from Fern Lake, a reservoir located within the Arcata Community Forest (Jew, 2010).

What constraints/regulations might the University have for these types of campaigns like is there a lack of awareness (Causality)? 100

This facility provides a valuable resource to our campus community. The hatchery aids in the ^{word choice} expansion of education through hands-on learning and research. The fish hatchery enhances six classes offered at HSU by providing a place for research and teaching (Department of Fisheries Biology, 2010). It helps to reiterate lessons learned in the classroom and apply them to living aquatic organisms. It also provides a unique opportunity to local elementary and high school students to gain hands-on experience. The fish hatchery also aids in attracting new students to HSU because it is one of a few campuses nation-wide with an on-site fish hatchery. However, there is little knowledge about this vital resource within the campus and local communities. It is located in an area where it is visible to a diverse group of people passing by (e.g. students, basketball game attendees, church goers, elementary school students, disc golf players, etc.). Bringing more attention to the hatchery will aid in reducing questions from the public and students about site operations, uses, and benefits.

Is this the only reason?

Background research on what other communities, campuses, and organizations have done to raise awareness has provided us with many options to aid in solving our problem.

Of the few college campuses with on-site fish hatcheries, efforts to raise awareness varied in effectiveness. At Mississippi State University, the fish hatchery held a press release in 2003 during the hatchery's dedication. They also briefly (approximately one paragraph) mention the hatchery on their University website. However, after the 2003 press release and news coverage little was done to promote the hatchery. The University of Washington has an outreach and educational link on their website. This link has information about the operations of the hatchery as well as tour information. They have a specific site for teaching and research

hatchery tours, which provides the public with a calendar of tour dates and times, an online reservation form, and a frequently asked questions link. This website inspired us to consider the possibility of creating a virtual tour of the hatchery. Various other campuses utilized hatcheries for aquaculture classes. However, they only advertise them on their campus websites.

Educational research engines also list possible top fisheries schools within the United States. An example of these websites is educational-portal.com, which lists good schools for Fisheries Biology majors to attend. A possibility for increasing awareness of the HSU hatchery would be to list the school as a campus with an on-site fish hatchery on one of these search engines.

In South Dakota, the South Dakota Coalition members implemented measures to increase public awareness surrounding domestic and sexual violence on American Indian lands. Nine American Indian reservations are located throughout the state. South Dakota is the fourth ranking state in the U.S. for total Native American population. ~~Historically, the land has offered its peoples bountiful crops, fishing, and hunting.~~ However, South Dakota is also a land that has been scarred by a legacy of Manifest Destiny and colonization. The establishment of reservations and boarding schools has created a division between native and non-native people in the state. This tension has lead to relatively high crime rates. Although ~~many~~ ^{many types of} crime ~~rates~~ ^{decreased} have fallen in South Dakota, the occurrence of violence against women has remained high or even, in some cases, increased. For this reason, the South Dakota Coalition decided to raise public awareness about domestic and sexual violence in hopes that more women would report

violence and seek safety, and that community entities would respond appropriately to incidents of violence. The coalition produced posters, public service announcements, and an updated version of the domestic violence handbook for Lakota communities. They also created a directory for advocates, which included courts, the criminal justice system, and the media. The coalition organized the state-wide display of an exhibit entitled, "Silent Witness National Initiative." They also organized South Dakota participation in the national March to End Silence. This project helped to lay the groundwork for future collaborations, strengthen existing relationships, and bring native and non-native peoples closer.

Has the
campaign
reduced
violence?
Are any of
these
effective?

The annual incidence of traumatic brain injuries in the United States is more than those of breast cancer, multiple sclerosis, spinal cord injuries, and HIV/AIDS combined. However, public recognition of brain injuries has not been high ^{because} ~~due to~~ the effects are not easily discernible. Increasing public awareness of brain injuries can help to create better services, support, and quality of life for those people touched by brain injuries. It can also help to educate people who do not have brain injuries on how to avoid them. The Brain Injury Association of New Jersey has developed several programs to raise awareness about brain injuries. The Walk for Thought is an annual event in which people walk, cycle, and roll in order to bring attention and raise money for brain injuries. The Brain Injury Awareness Month (March) in New Jersey includes various events and activities that help to bring attention to the subject. The association also utilizes public service announcements that are broadcast over the radio and on television. The group has also put on workshops and seminars to educate the public about brain injury prevention.

Effectiveness

The Kostanay Region of Kazakhstan lies within a migrational route for millions of waterbirds, including the Siberian Crane. After a study indicated that over 99% of the local peoples were unaware of the ecological significance of the area in which they lived, the Siberian Crane Wetland Project was created to raise public awareness. The project involved the creation of training workshops for college and secondary school teachers. These workshops were designed to educate the region's teachers and give them the tool that they need to pass the knowledge along to the area's youth. Crane Celebrations have also been implemented to raise awareness of biodiversity conservation. These events include many different stakeholders including school children, local farmers and business owners, and non-governmental organizations. The celebrations include art exhibits, dances and plays about the Siberian Crane. These events and workshops have been effective in raising awareness and in cultivating a regional sense of pride.

The recent international outbreak of the H1N1 virus ("swine flu") has launched several public awareness campaigns in countries around the world. The purpose of these campaigns is to increase public knowledge of the virus and educate about prevention. In the United Kingdom, the "Catch it, Bin it, Kill it!" campaign is aimed at reaching the entire UK population through radio, print, and television advertisements. Informational leaflets were also produced and delivered door-to-door.

The "Be Active Eat Well" community program promoted healthier eating habits within the community by providing informational sheets, newsletters (targeting different age groups), emails, school staff notes, and parent workshops. Prior to developing marketing they ran a

survey to better understand their target audience and focus their objectives. Marketing included photos, stickers, balloons, stationary and business cards, and banner production. They also had a media/press release to local newspapers when the program was launched. Their advertisements were located in various locations and through various media (e.g. radio and newspaper). Lessons learned by this program were that social marketing is costly (funding came from government agencies), time consuming, and requires a high degree of organization. They also found that marketing is beneficial because it creates enthusiasm. This is especially beneficial since a major issue with raising community awareness is a lack of knowledge, non-supportive attitudes, and an absence of motivation (McKenzie-Mohr and Smith, 1999).

Concerns surrounding global climate change and anthropogenic influences on greenhouse gases have lead to many different efforts to raise public awareness. One major area of concern in the United States is transportation. Currently vehicles account for two-thirds of American oil consumption and are a leading contributor to world-wide greenhouse gas pollution. The Pew Campaign for Fuel Efficiency is aimed at raising public awareness and support for stronger fuel efficiency standards. Their efforts include seeking support in Congress for stronger standards, conducting public education in 15 to 20 U.S. states, and coordinating a national coalition of environmental groups. The campaign also employs media outreach, public opinion polling, and non-partisan research and analysis.

Research on museum advertisement showed that many museums list themselves in magazines and directories as "points of interest" in the local area. Museums in San Francisco, such as the Museum of Modern Art (MOMA), advertize via website and the San Francisco City

Pass. Purchasing the City Pass provides discounted entry to three museums in the San Francisco Bay Area and other area attractions. Museums also advertise by displaying signs, banners, and billboards throughout heavily-trafficked areas. They also use media sources such as the television, radio, and internet.

Everyday advertisement used to enhance awareness includes: billboards, bus and bench advertisements, internet pop-ups, blogs, newspapers, and bulletin board flyers. Furthermore, with increasing technological communications, websites such as Facebook, Twitter, MySpace, and other free communication networks can be utilized to increase awareness.

→ HSU regulations?
References

Artichoker, Karen, and Verlaine Gullickson. 2003. *Raising Public Awareness of Domestic Violence in Indian Country*. National Resource Center on Domestic Violence.

"CFR - Department of Wildlife, Fisheries & Aquaculture." *College of Forest Resources * Mississippi State University*. Web. 18 Feb. 2010.
<<http://www.cfr.msstate.edu/wildlife/careers.asp>>.

Cuttler, Ruth. "Raising Community Awareness." *Be Active Eat Well*, July 2007. Web. Jan.-Feb. 2010.
<[http://www.goforyourlife.vic.gov.au/hav/admin.nsf/Images/BAEW_Awareness_Raising_Process_Report.pdf/\\$File/BAEW_Awareness_Raising_Process_Report.pdf](http://www.goforyourlife.vic.gov.au/hav/admin.nsf/Images/BAEW_Awareness_Raising_Process_Report.pdf/$File/BAEW_Awareness_Raising_Process_Report.pdf)>.

Department of Fisheries Biology. "Fisheries Biology | Fish Hatchery." *Humboldt State University*.
<<http://www.humboldt.edu/~fish/facilities/fishhatchery.html>>. Accessed Feb. 18, 2010.

"Fish Hatchery Management School Program Information." *Degrees, Schools, Online Courses and Careers - Over 20,000 Articles*. Web. 18 Feb. 2010. <http://education-portal.com/fish_hatchery_management_school.html>.

"Fisheries Biology | Fish Hatchery." *Humboldt State University*. Web. Feb. 2010.
<<http://www.humboldt.edu/~fish/facilities/fishhatchery.html>>.

Inyutina, Vera, and Alexander Belyi. 2008. *Siberian Crane Wetland Project: Education and Raising Public Awareness in Kazakhstan*. Baraboo, WI: Siberian Wetland Project.

Jew, Darrell. Personal communication. Feb. 2, 2010.

McKenzie-Mohr, Doug and William Smith. 1999. *Fostering Sustainable Behavior: An introduction to community-based social marketing*. New Society Publishers. Gabriola Island, B.C.

"Pew Campaign for Fuel Efficiency." *The Pew Charitable Trusts*. The Pew Charitable Trusts, 2010. <http://www.pewtrusts.org/our_work_detail.aspx?id=478>. Accessed Feb. 25, 2010.

"Raising Public Awareness." *Brain Injury Association of New Jersey*. 2010. <<http://www.bianj.org/raising-public-awareness>>. Accessed Feb. 3, 2010.

"San Francisco CityPass." *CityPass*. Web. Feb. 2010. <http://www.citypass.com/city/sanfrancisco.html?cmpid=MSN_city%20pass%20san%20francisco&utm_campaign=2209633195&utm_content=150785399&utm_medium=cpc&utm_source=msn&utm_term=city%20pass%20san%20francisco&id=BzA33u2o>.

"UK Public Told How to Stop Swine Flu Spread." *Sky News [United Kingdom]* 30 Apr. 2009. <<http://news.sky.com/skynews/Home/UK-News/Swine-Flu-Public-Awareness-Campaign-About-Virus-Including-Adverts-On-TV-And-In-Newspapers/Article/200904415272128>>. Accessed Feb 15, 2010.

"Unique fish hatchery opens at Mississippi State (03-10-2003)." *Mississippi Extension Service and Experiment Station - Mississippi State University (MAFES) (MS) (Cooperative)*. Web. 18 Feb. 2010. <http://msucares.com/news/releases/03/030310_fish.html>.

"Unique fish hatchery opens at MSU campus." *Delta Farm Press | Timely, Reliable Information for Sunbelt Agriculture | Cotton, Soybeans, Rice, Corn, Wheat, Ag Legislation, Biofuels | Farm Publications, ag magazines*. Web. 18 Feb. 2010. <http://deltafarmpress.com/mag/farming_unique_fish_hatchery/>.

"University of Washington Research & Teaching Hatchery." *School of Aquatic and Fishery Sciences at the University of Washington*. Web. 18 Feb. 2010. <<http://www.fish.washington.edu/hatchery/>>.

Project Goals and Objectives

Project Goal

Increase awareness, utilization, and educational programs of Humboldt State University's on-campus freshwater fish hatchery.

Project Objectives

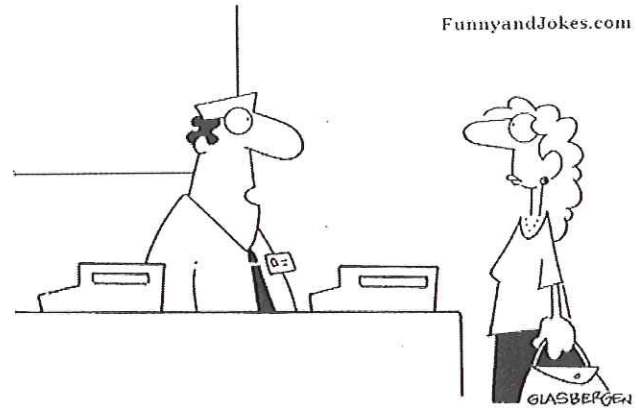
Reach "x" number of elementary students

- Create a minimum of two elementary education lesson plans — Solution
- Increase visitation and facility utilization
- Communicate how a fish hatchery can be utilized

currently
~ 6 classes



Environmental Practicum
Rosalinda Gonzalez
Sarah Johnson
Rachael Wiltrout



Weighing Alternatives

Possible Alternatives:

1. Create interpretive signs or posters
2. Create elementary education lesson plans
3. Enhance hatchery website
4. Hold/ advertise open house hatchery days "
5. Create flyers, a commercial on the campus radio station, a news journal advertisement (on the Jack)

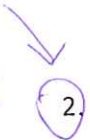
"If you'd like a healthy alternative, we can wrap your cheeseburger, french fries, and fruit pie in a low-fat tortilla."

?

Feasibility and constraints of alternatives:

1. After conducting research on the cost and time needed to create interpretive signs we found this option to be unfeasible. The cost of producing a durable sign that meets university requirements was about five hundred dollars per sign. Given only a semester it would be difficult to raise the funding necessary. Another constraint was that it would take the university approximately four weeks to approve signs. It would take another month to coordinate with a graphic design company to create the signs.
2. This option was determined to be the most practical given our time constraint and resources. Furthermore, creating lesson plans meets our objectives. We researched lesson plans, the California State Elementary School Educational Standards, and spoke with the hatchery manager Eric Loudenslager. This enabled us to separate lesson plans into k-2nd, 3rd-4th, and 5th- 6th groupings. As part of the lesson plans we may also create a self guided tour that will engage the kids.
3. Enhancing the hatchery websites would require access to the website, permission to alter a school website, and computer website creation skills. This option would also not fulfill our objective as well as other options. Updating the website could generate interests from people who are interested in fisheries at Humboldt State. However, this option does little to aid a more general audience unawareness of the website, and does not utilize the hatchery.
4. This option was the least feasible due to space, chaperoning of guest, hazards to the animals, and possible human injuries. It would also require money for food, beverage, and advertising which would require fundraising. Furthermore, volunteers would be needed to hold the open houses.
5. Utilizing flyers as a way to raise awareness would not meet our objectives. Flyers would inform those who read them. We would need permission to post flyers and the demographic reached would depend on flyer placement. As for the campus radio station and the jack we would be reaching mostly Humboldt State students. This would not meet our objective of increasing elementary school education.

Add reasons



Sarah Johnson
Rachael Wiltout
Rosalinda Gonzalez

Implementation Strategies

Task	Person Responsible	Due Date
K-2 lesson plans (2)	Rachael Wiltout	4/15/2010
3-4 lesson plan (1)	Sarah Johnson	4/15/2010
5-6 lesson plan (1)	Rosalinda Gonzalez	4/15/2010
Interactive Tour Guide	Rosalinda, Rachael, and Sarah	4/23/2010
Project paper & presentation	Rosalinda, Rachael, and Sarah	4/30/2010

*We have discussed utilization of lesson plans to educate elementary school students with the hatchery manager, Eric Loudenslager. He has already agreed to implement the lesson plans and tour guide that we develop.

why we are qualified - research, consulted —, etc.
why the lesson plans are worth while

Monitoring and Evaluation Plan

Sarah Johnson
Rosalinda Gonzalez
Rachael Wiltrout

Monitoring

In order to monitor the progress of our project we will print out new pages for the fish hatchery visitor log book. They currently have a log book; however, it is not maintained and has no space to record the date of visit. We would edit the existing form to include a date column and reason for visit column. This would allow us to gather data on when people are visiting the hatchery and for what reasons (e.g. class field trip, campus tour, etc.). We will also create and display a sign that says "Welcome to the HSU Fish Hatchery, Please Sign In". This will help to bring attention to the log book and encourage visitors to record their visits. It will also help to bring attention to the tour guides, which will be located adjacent to the log book. We would have Eric Loudenslager calculate the number of visitors at the end of the spring semester every year for at least three years. One of our objectives is to increase elementary school visitation by 25% in one year. Currently, the hatchery receives visits from about six classes a year. We're hoping to increase visits to about eight classes during the 2010-2011 school year. Our other objective is to increase facility visitation and utilization by 25% within two years. There is currently no reliable baseline data about visitation to the hatchery. We would have to analyze our first year's log to compare future visitation numbers.

Evaluation

Partial evaluation of our project will be completed prior to the end of the semester. Currently, Eric Loudenslager is evaluating the lesson plans and tour guide that we have created. We will implement any corrections and suggestions that he makes. Further evaluation will be completed by elementary school teachers who may alter the lesson plans provided by the hatchery. If in the future we find that our visitation numbers are not meeting our objective increase, we will explore alternative methods of raising awareness. We suggest that future Environmental Science Practicum students continue working on hatchery development by creating educational signage within the hatchery and possibly advertising through The Jack and KFRH. This would continue student efforts to enhance our campus and local community as well as provide a model for other universities.

What
about
how
many
teachers
use
the curriculum

Teacher survey?