

Lesson plan for Final Project: Developing a field guide

Background:

OPIHI students survey and quantify species diversity at intertidal sites. As part of this project, they have had to use field guides to algae, invertebrates, and fish to help them identify the organisms that they have found. The creation of an intertidal field guide that visitors to the intertidal can use to help identify the common species is a good final project that ties together many of the skills learned through OPIHI. This lesson plan describes the process used to develop a field guide. The project ties into OPIHI's goal of disseminating information about the student's research within the community, and demonstrates the importance of communicating scientific information, an OPIHI objective, since no other scientists in Hawaii are currently studying biodiversity in the intertidal.

Goals:

1. Students will develop a useable field guide to intertidal organisms.
2. Students will think critically about how to develop the best possible field guide for users in the community.
3. Students will apply information they have gained on field trips and in class to thoroughly describe the ecology of an intertidal organism.
4. Students will practice and refine research skills while developing their page.

Learning Objectives. Each student will:

1. Produce a field guide page specific to a single intertidal organism.
2. Use correct scientific nomenclature, grammar, and spelling.
3. Write knowledgeably about the ecological niche of their selected organism.
4. Demonstrate critical thinking by explaining or justifying statements they make.
5. Demonstrate research skills by gathering information about the biogeographic range, status, and life history of their organism.

Hawaii Content & Performance Standards addressed:

I.2) Objectivity. Students explain and discuss their ideas about useful field guides with others and modify ideas about what is a good field guide based upon discussion.

I.3) Model. Students develop a model for a useful field guide by establishing systematic criteria for their guides and developing a sample entry based upon an organism they have studied that adheres to those criteria.

I.4) Safety. In field guides, students identify potentially hazardous organisms and describe accident prevention and treatment.

II.4) Unity & Diversity. Students employ the scientific classification system in their field guides, and properly utilize scientific names for organisms.

II.4) Interconnectedness. Students identify trophic links and highlight other ecological relationships for the organisms in their field guides.

Lesson 1: Reviewing Field guides

Warmup Question:

What kinds of things would you expect to find in a good field guide?

Working singly, students will review two field guides, guided by a series of questions. They will identify useful and non-useful aspects of the guides, and must explain their reasoning.

Working in pairs, students will share their reviews with another student that reviewed different field guides. The pair will work together to formulate a general concept of a useful field guide and will identify a set of criteria that they think needs to be in their guides.

As homework, individual students will prepare one sample field guide entry based upon an organism that they have seen on field trips and identified, and feel fairly comfortable with. Their sample entry should adhere to the criteria that they and their partner identified previously.

Working in pairs, with a new partner, students will swap and review sample entries. They must provide constructive criticism on their partner's entry and explain to one another what they liked and did not like about their individual guide structures.

As a group, the class will share their ideas on what needs to be in a field guide, and through discussion we will attempt to develop a common model that we can incorporate to develop our online field guide.

Questions to guide the discussion:

- What did you like most about the field guides you read?
- What is an idea that you had that you really liked?
- What is an idea that someone else had that you really liked?
- What is an idea that you had that you changed? Why?
- What is the most important thing that our field guide entries should have?
- If we were limited to only four things what would they be?
- How long should entries be?
- Does the use or purpose of the guide influence what the entry should look like?

As a result of the lesson, students should know what kinds of information are important to share about organisms in a field guide and how to critique a colleague's work objectively and fairly and to explain their reasoning.

Assessment of student progress is conducted by verbal questioning of students, examination of their answers to review questions in the assignment - answers that lack explanation of reasoning are considered insufficient, and assessment by their peers and by myself of their sample field guide entries. I assess these entries for the following indicators:

1. Proper use of scientific nomenclature
2. Identification of status (native, invasive) and biogeographic range of species
3. Identification of safety issues posed by organism
4. Adherence of sample entry to criteria established by student group for field guide

Lesson 2: Effective writing

Warmup Question:

Describe this picture (a large poster of a seastar taped to the chalkboard).

The goal of this lesson is to have students think about how to make their writing more approachable and engaging, while maintaining accuracy. As students describe the seastar, they invariably use short descriptions, and very dry language. We then read captions from National Geographic Magazine and other sources that highlight some of the techniques used by professional scientific writers to enhance the pictures in the magazines.

Students select a photo from a series that we have taken of intertidal organisms. For the photo they select, they must write three analogies, three scientific fact statements, and three “big picture” statements that connect the organism to the environment at large or to humans.

The next step is to think creatively about the photo by making a mixed media art representation of it. Students may use any graphic medium they choose, and be creative with their use of color, shape, background, etc. as long as their picture highlights some aspect of the organism. They must then select from their statements and compile a paragraph caption for their picture that incorporates at least one analogy, one fact, and one big-picture idea.

Assessment of student progress is conducted by the statements and captions compiled by the students. These written products should be accurate, and target some aspect of biology or ecology that has been covered in class. They should be able to connect their organism to the environment at large and to humans in some way. The drawings should show some creative use of the organism, yet highlight an aspect of its biology. Written products are assessed for the following indicators:

1. Analogies are appropriate to the biology of the organism
2. Scientific facts accurate
3. Big-picture statements focus on ecological connections
4. Drawing highlights some biological aspect of the organism connected to the caption
5. Creative aspect to drawing; e.g. use of color, background, media.

Lesson 3: Developing a field guide page

Warmup Question:

Who will use our field guide?

Students think about who might use their guide as they plan how to write it.

This is an assessment question as well. An answer of “other scientists” is a strong indicator of achievement as students think of themselves as scientists.

Assignment:

Choose 10 organisms you would put in the field guide and explain why you chose each one.

This assignment requires students to think critically about which organisms should be included.

Reasons like “it’s cute” or “it’s pretty”, or “it’s cool” are not sufficient explanations. More appropriate scientific justification for selection of organisms would include reasons like:

It is common; people are likely to see it in the intertidal

We found it at many sites we visited

It is invasive, and people should know to look out for it

It is endemic and found nowhere else

It is dangerous to humans

It is endangered and people need to be aware of it

Students are now responsible for selecting an organism and developing a field guide page for that organism. The information that they must include on their page includes the criteria that the class decided on during the first part of the lesson. Much of it is information that they have already compiled into their data notebooks during their fieldwork, and one of the required tasks is to review the lists of species in their notebooks to determine the distribution of the organism on Oahu, and to look at its habitat requirements based upon physical data we collected during the field trips. Notebooks are compiled over years, so students actually use data from previous years’ classes to help them gather information about their project.

Assessment of student progress is informal throughout the data collection period by questioning students about why they are making statements within their notes. Formal assessment and evaluation is conducted by looking at specific indicators in the student final product, the field guide page:

1. Students use appropriate nomenclature
2. Students provide scientific justification for their selection of organisms to include
3. Students provide accurate information
4. Students make connections to their field work, or describe some aspect of the organism related to observation they made on field trips or during lab work
5. Students form hypotheses about where organisms are likely to be found, based on information from their notebooks about physical features of sites and distribution of species.

Reviewing Field Guides Part 1:

Choose any 2 of the available field guides.

Working on your own:

What are at least two things you could use this field guide for

Describe at least three things that are useful- what are they and why are they useful

What is your favorite thing about this guide- why?

At least three things that are not useful- what are they and why aren't they useful

What is your least favorite thing about this guide- why?

What is at least one thing you would change about the guide- why?

How would you use this guide to identify a completely unknown organism?

Reviewing Field Guides Part 2:

Work with a partner who has chosen 2 different guides:

Share your review with your partner. Describe the field guide you read to them:

Do you agree on everything that constitutes a good field guide?

What do you agree on?

What don't you agree on?

Working together, decide how *YOU* would write a field guide.

What information should it contain?

List the essential elements of the field guide.

Reviewing Field Guides Part 3:

Working on your own:

Choose an organism that you feel you know fairly well, and write a sample entry for your field guide, using the criteria that you and your partner established.

Reviewing Field Guides Part 4:

With a new partner:

Trade sample entries with a new partner (not the one you worked with in part 2).

You will review one another's work.

Is their field guide useful?

Why or why not?

Two things you liked about it.

Two suggestions for improvement- what would you change and why.

Field Guide Project. 50 points.

You will choose one organism for which to write a field guide page . It must be an organism from the group to which you were assigned, and have been collected/seen during our study of the intertidal. Refer to the data notebooks or to the species list to find out which species we've found during our study.

Our guide is limited to 50 pages, so you should choose carefully and explain why you chose the organism that you did.

*Use the note-taking page provided to gather information on your organism. When you have collected the notes you think you need to do a thorough job of writing your page, bring them to me so that I may check them. You should have the note-taking phase of your project completed by **May 2**. When I agree that they are sufficient, I will give you a template for organizing it into page format. You will then be responsible for preparing a final draft of your field guide page. Your formal page will be due on **May 9**, and will be reviewed by a peer in the other class.*

You will be graded on the following criteria:

The product (your page) 30 points:

- ★ Is the page enjoyable to use and interesting to read?
- ★ Is the language clear and understandable?
- ★ Is the page professional, using correct spelling and grammar and appropriate language?
(Remember that we will be putting our field guide online for the public to use)
- ★ Is the page useful for finding out more about the featured organism?
- ★ Does the page relate information about the organism to findings we made during our project?
- ★ Is the page informative and accurate?

*Your page must be written in your own original words. Do not copy things directly out of web pages or books. This is **plagiarism**, and it is stealing, even if you change a few words, but most of it is the same as in the original source. If you plagiarize, you will receive a zero for the assignment. You may be given the option to rewrite it in your own words, but there will be an automatic penalty of 10%.*

Research habits 10 points:

This refers to the behavior you display in the lab. If you are on task and working productively, you are using good research habits. If you are disruptive or off task you are not using good research habits.

Peer evaluation 10 points:

You will be anonymously evaluated by your colleagues in the other period on how well they feel you accomplished the goals of the assignment and on the quality of your work.

Note-Taking page:

Genus species (Family)

Common name

Hawaiian name

Why did you choose this organism?

Write down the file name of the photographs you want to use from our CD of photos:

Description of organism:

Habitat and requirements (Also include where & how to find it):

Where on Oahu did we find it (refer to notebooks and species lists):

Geographic Range (Also include if it is invasive, native, endemic in Hawaii):

Trophic (food web) information:

Safety concerns:

Comments (this includes uses to humans, interesting facts, etc.:

List of resources you used to gather your information: