



**Cabrillo National Monument
Owl Limpet Intertidal Science Sampler
Activity Summary & Lesson Plan**

Summary

Utilizing a three-day structured program with lecture, activity, and field based components, our goal is to provide students with a hands-on, scientific based learning experience. The first stage of this program will consist of an introduction to intertidal environments, an overview of the applicability of the scientific process in these locales, and an activity that integrates these two concepts and prepares students for their visit to the tidepools. In collaboration with Cabrillo National Monument, students will then participate in a field-based activity where they engage in group data collection, wildlife observation, and obtain an in-depth understanding of the ecology of the local region. The third stage of this program will consist of a final classroom visit where data students have collected is analyzed within the context of the larger Cabrillo monitoring program. Students will then be guided to discuss the meaning of their results within a greater context and prompted to consider what next steps they might take regarding their conclusions. Upon completion of this program students should be able to fully understand and incorporate the scientific method, enhance their critical thinking and problem solving skills, and take away a thorough comprehension of local intertidal organisms and their ecology.

Pre-Tidepool Classroom Visit

Objectives:

- Complete online classroom pre-assessment given by teachers
 - Benchmark of student understanding prior to program
 - Assessment Link: <http://goo.gl/forms/Ve2J7RbDP8>
- Lecture:
 - Introduction to Intertidal Zone
 - Owl Limpet/Species Monitoring Background
 - Scientific Process Overview/Real World Application (Observation/Ask a Question, Background Research, Hypothesis, Test)
- Tidepool Activity:
 - What do we measure and how do we do it?
- Activity Integration/Monument Prep
 - What did you learn/observe from activity?
 - What to know and bring prior to monument visit

Materials:

- Computer
- Projector
- Tidepool Activity (5 groups: 5-7 students each)
 - Tidepool (Blue Tarp/Huge)
 - Felt Rocks (10) w/ "Flagging Tape Bolt"
 - Felt Purple and Green and Brown for Algae
 - Beaded Barnacles
 - Laminated Critters w/ Googly Eyes
 - Real carapaces/shells
 - Clip Boards (5)
 - Measuring tapes (5)
 - Calipers/rulers (5)
 - Pencils (10)
 - Laminated Field Guides/ID pages (10)
 - Data Sheets
 - "GPS"
 - Field Kit Bags (5)
 - Large plastic tub for everything

Duration:

- 20 Minute Introductory Lecture
- 8-10 Minute Activity Introduction
- 20 Minute Activity

- 10-15 Minute Activity/Lecture Integration and Monument Prep

Location:

- In classroom (within 2 wks before visit)
- Open Space for tidepool activity

Activity: Tidepool Practice

- Students will divide into 5 groups (5-7 students each): 1 data recorder, 2 people with measuring tape, 2 observers, 2 with Identification documents
- Observe the general area, tidal conditions, and identify any hazards to data collection
- Students will find plots, set transect at midpoint and begin taking observations around circular transect
- Observers will count, measure, and confirm all organisms within transect, noting their distribution, and any other observations (including "tidal height", temperature, GPS coordinates, etc.)
- Identification personnel will confirm that all organism ID's are correct and share descriptions to group.
- Students will complete 3 different transects, compare data, make any other observations
- Overview of data between groups, observations, discussion on different types of data acquisition and their benefits.

Cabrillo National Monument Visit

Objectives:

- Safety Briefing/Introduction
 - Explain general layout of intertidal
 - Safety for students (no running, footwear, wave watch, etc.)
 - Safety for animals and environmental stewardship
- Science Sampler
 - Students complete transects, collect, and record data
- Tidepool Exploration
 - Students allowed to roam tidepool area to ask questions, make observations, identify species, etc.
- Homework integration
 - Assignment Link: <http://goo.gl/forms/FPteXIU9fk>

Materials:

- Clip Boards (5)
- Measuring tapes (5)
- Calipers (5)
- Pencils (10)
- Laminated Field Guides/ID pages (10)
- Waterproof Data Sheets
- "GPS"
- Field Kit Bags (5)
- Tidepool Viewers (10)

Duration:

- 10 Minute Safety Brief
- 30-40 Minute Science Sampler
- 20 Minute Tidepool Exploration
- 10-15 Minute Integration with Homework Explanation (Online Homework)

Location:

- Cabrillo National Monument Tidepools

Activity: Tidepool Science Sampler

- Students will divide into 5 groups (5-7 students each): 1 data recorder, 2 people with measuring tape, 2 observers, 2 with Identification documents
- Observe the general area, tidal conditions, and identify any hazards to data collection

- Students will be designated random plots, set transect at midpoint and begin taking observations around circular transect
- Observers will count, measure, and confirm all organisms within transect, noting their distribution, and any other observations (including “tidal height”, temperature, GPS coordinates, etc.)
- Identification personnel will confirm that all organism ID’s are correct and share descriptions to group.
- Students will complete 3-4 different transects, compare data, make any other observations
- Overview of data between groups, observations, open discussion and exploration.

Post-Tidepool Classroom Visit

Objectives:

- Cabrillo Re-cap
- Analyze Results
 - Look at Classroom Data vs. Long-term Data
- Discussion
 - What do these trends mean? Specifically for study species?
 - Anything you have learned about Owl Limpets and their habitat/co-occurring species explain this data? If not, what else might.
 - Monitoring data and how we can use it to answer questions.
 - What would our next steps be? Further experiments/ observations to be made
 - The Plight of Objectivity
- Ending Sentiments
- Classroom post-assessment given by teachers/homework/online?
 - Benchmark of student understanding prior to program
 - Assignment Link: <http://goo.gl/forms/oP5KEfrerJ>

Materials:

- Computer
- Projector
- Post-it Note Board with Markers or White board/ Or Graph Paper?

Duration:

- 10 Minute Cabrillo Re-cap
- 15 Minute Analyze Results
- 20-25 Minute Discussion

Location:

- In classroom (within 2 wks after visit)

Activity: Data Analysis

- (Prior to visit, calculate and organize student data)
- Discuss with students best ways to visualize data based upon the data itself and the questions being answered.
- Let student volunteers draw graphs on board
- Graph 1: Student data plot all organisms, Bar Graph
- Discuss trends and hypothesize on what might be causing them
- Graph 2: Owl limpets past 10 years, Trend line
- Discuss trends and hypothesize on what might be causing them