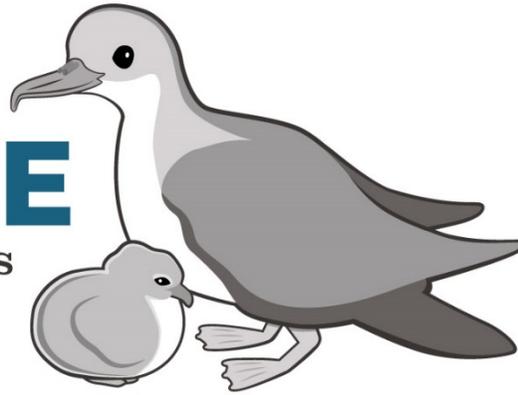


WAY OF THE WEDGIE

Survival Lessons from a Seabird Preserve



The classroom activity package *Way of the Wedgie – Survival Lessons from a Seabird Preserve* is available free online courtesy of Hawaii Audubon Society, Oikonos, and other partners.

www.freemanseabirdpreserve.com

Wedge-tailed shearwaters are impacted by human activities on land and at sea. Restoration of breeding sites and other management actions can help shearwaters survive and thrive in urbanized landscapes. These four lessons comprise activities use inquiry-based science instruction, aligned to new standards for grades 6 – 8 with suggested modifications for grades 9 – 12, to teach students about how biologists and artists work together to study and protect these native Hawaiian seabirds.

Unique features:

- Students will learn about the shearwater life cycle, and study their changing populations.
- Students will use real data to monitor shearwater population trends and survivorship.
- Students will experience the Shearwater Game of Survival.
- Students will design and test different shearwater nesting shelters.

This activity packet is a cohesive unit based on the Hawaii State Science standards for students in Grades 6 – 8. The lessons are also correlated to the Next Generation Science Standards and the Common Core State Standards for English Language Arts/Literacy and Mathematics. While intended to be used as a unit, each lesson may also stand alone.

Each lesson includes:

- **Lesson Plans** with objectives, an outline of necessary materials and preparation, discussion questions and possible answers, and suggestions for expanding the activities.
- **Student Worksheets and Handouts** for computer work, photocopying, and/or projecting.
- **Presentations** with photos and notes to support the lessons.

Lessons

- Lesson 1. Studying Seabirds on Land: Population Monitoring
- Lesson 2. Restoring a Seabird Colony: Habitat Renovation
- Lesson 3: Staying Alive: a Game of Survival
- Lesson 4: Designing a Nest: Conservation Solutions

Grade Levels

Middle School (grades 6-8)

*suggestions for 7-12 adaptations provided

Background

- **Freeman Seabird Preserve – O‘ahu, Hawai‘i**

History: Established in 2007 through a generous donation of coastal land to the Hawaii Audubon Society by Mr. and Mrs. Houghton Freeman

Location: Black Point, O‘ahu; one acre in size it encompasses a flat rocky terrace and a sloping sea cliff composed of large lava rocks on top of the slope and limestone deposits at the water’s edge

Importance: It is home to approximately 600 nesting Wedge-tailed Shearwaters, it is an important surviving remnant of viable shearwater habitat that was once common on O‘ahu and all the main Hawaiian islands

Status: With the help of dedicated volunteers, the Hawaii Audubon Society enhances and maintains the unique native plant and seabird ecosystem to thrive in this dense residential neighborhood.

- **Wedge-tailed Shearwaters**

Scientific Name: *Puffinus pacificus*

Hawaiian Name: ‘Ua’u Kani

Common Name: Wedge-tailed Shearwater, so called because of the shape of the tail and feeding habits of soaring low over the waves in an undulating pattern

Habitat: Nest in colonies along coasts and on offshore islands in sand, soil, rocks and under vegetation

Life Cycle: Adults arrive in March to mate and prepare their burrows, the female lay a single white egg in June and the chicks hatch after a 52-day incubation (by the middle or late August). Chicks fledge and fly out to sea in November

Status: Wedge-tailed Shearwaters like all seabirds are fully protected by both Federal (Migratory Bird Treaty Act) and State law (Wild Bird Law).

Next Generation Science Standards (Middle School Grades 6-8)

Life Sciences

MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

Earth and Space Sciences

MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

Engineering Design

MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

Common Core State Standards: English Language Arts – Science and Technical Subjects (Middle School Grades 6-8)

Key Ideas and Details

CCSS.ELA-LITERACY.RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Craft and Structure

CCSS.ELA-LITERACY.RST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

Hawai‘i Content & Performance Standards III – (Middle School Grade 6-8 Science)

Life and Environmental Sciences: Organisms and the Environment

Benchmark SC.7.3.2 Explain the interaction and dependence of organisms on one another

The Scientific Process

Benchmark SC.8.1.1 Determine the link(s) between evidence and the conclusion(s) of an investigation

Benchmark SC.8.1.2 Communicate the significant components of the experimental design and results of a scientific investigation

Life and Environmental Sciences: Structure and Function in Organisms

Benchmark SC.8.5.1 Describe how changes in the physical environment affect the survival of organisms

Hawai‘i Content & Performance Standards III – (Social Studies)

Geography

Benchmark SS.12G.3.1 Explain ecosystems in terms of their biodiversity and productivity (e.g., food chains, plant and animal communities, grasslands, forests, deserts, tundra, wetlands, coral reefs)

Benchmark SS.12G.5.1 Describe contemporary issues in terms of Earth’s physical and human systems

Hawai‘i Content & Performance Standards III – (Middle School Grade 6-8 Math)

Data Analysis and Probability

Benchmark MA.6.11.1 Analyze how data collection methods and sample size can affect the results of data sets

Benchmark MA.6.11.1 Analyze how data collection methods and sample size can affect the results of data sets

Benchmark MA.6.13.1 Make inferences about a population based on the interpretation of a sample data set

Benchmark MA.7.11.1 Design a study, collect data, and select the appropriate representation (line graph, bar graph, circle graph, histogram, stem and leaf plot, box and whisker plot) to display the data

5-E Model Lesson Plan

Engage

Each lesson plan has an engaging activity that elicits student's prior knowledge and helps an instructor identify any misconceptions they may have on a topic. Each "engaging" portion of a lesson has also been designed to provide new information to students while simultaneously creating curiosity by introducing new problems or questions for them to investigate.

Explore

Each lesson plan has an exploration activity that requires students to apply prior scientific knowledge or practices while investigating new concepts and analyzing data. During this phase of the lesson, instructors act as facilitators for the hands-on student inquiry-based activities.

Explain

Each lesson plan has an opportunity for students and instructors to discuss and explain what they have learned from their "explore" activities. This is the part of the lesson when the class has an opportunity to collaborate, discuss and analyze each other's findings and conclusions. Instructors can also use this time within the lesson to make both informal and formal assessments on student learning.

Elaborate

Each lesson plan provides students with the opportunity to answer some of their unanswered questions for the explore activity. These activities and data should be used to support newly acquired information and provide an opportunity to further explore a slightly different aspects from within the same unit of study.

Evaluate

Each lesson plan has an evaluation component that allows students to demonstrate their knowledge and understanding of new information. These activities can be used as formative or summative assessment pieces depending on how the instructor uses the Freeman Seabird Preserve Curriculum. Evaluation rubrics have been provided for these activities.