



# Hawai'i Audubon Society's Freeman Seabird Preserve Wedge-tailed Shearwater Conservation Curriculum



Introductory Information - <http://www.freemanseabirdpreserve.com/>

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

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

**Location:** Black Point, O‘ahu; one acre in size it encompasses a flat area and a sloping sea cliff composed of aging lava near the top of the slope and limestone deposits at the water’s edge

**Importance:** It is home to approximately 60 to 100 nesting pairs of 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:** the site supports between 78-106 active nests; with the help of dedicated volunteers, the Hawaii Audubon Society is currently working to enhance and restore the unique native ecosystem with a multi-stage landscaping plan

- **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 sandy, soil areas; will nest in crevices in lava flows and under vegetation that offers shade

**Life Cycle:** Adults arrive in March to mate and prepare their burrows, 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). However, they are not a threatened or endangered species

## Grade Levels

Middle School (grades 6-8)

\*suggestions for K-5 and 7-12 adaptations provided in each lesson plan

## Learning Objectives

### 1. Wedge-tailed Shearwater - Population Dynamics

- Students will *graph* Freeman Seabird Preserve wedge-tailed shearwater populations change in growth. They will then *interpret* their data, *compare* it to other biotic and abiotic variable data, and then *explain* how these variables may have affected the birds' population growth.
- Students will also *investigate* the life cycle of the wedge-tailed shearwater by *analyzing* individual members of the population's data.

### 2. Wedge-tailed Shearwaters – A Protected Species

- Students will *identify* and *explore* the various threats to Wedge-tailed Shearwaters through role-playing. They will then *combine* their individual experiences to *construct* an extensive *list* of threats that affect the entire population of birds at Freeman Seabird Preserve.
- Students will also *develop* and *debate* plans for minimizing threats to the wedge-tailed shearwater at Freeman Seabird Preserve.

### 3. Conservation Efforts – Habitat Restoration

- Students will *graph* and *analyze* data of the nesting habits of the Wedge-tailed Shearwaters at Freeman Seabird preserve. They will *compare* the population data of birds nesting in various burrow types and conditions.
- Students will *design* and *construct* a burrow they believe would be most favored by the Wedge-tailed Shearwaters based on given data.

### 4. Protecting Wedge-tailed Shearwaters – Taking Action

- Students will *synthesize* what they have learned to *create* a public service announcement that *educates* and *informs* the public of our responsibility to protect the Wedge-tailed Shearwaters (and seabirds) at the Freeman Seabird Preserve (or another location close to you).

## 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 aspect 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.

## **Brief Description of Lesson Plans**

### **Wedge-tailed Shearwater - Population Dynamics**

- **Engage:** PPT of various stages in the Wedge-tailed Shearwater life cycle
- **Explore:** Freemans Seabird Preserve Population Data – graphing and analyzing nesting data
- **Explain:** Life Cycle and Time at Freemans Seabird Preserve – organizing a timeline of life events in the life cycle of a Wedge-tailed Shearwater at the preserve
- **Elaborate:** Story of One Chick – writing to describe the life cycle of a specific Wedge-tailed Shearwater, story to include parent history, birth at preserve, hatching, growth and development, hunting for food and an account of what life might be like at sea
- **Evaluate:** Analyzing Hatching Data Extension Activity – graphing and analyzing average hatching dates and weights of new born Wedge-tailed Shearwater chicks

### **Wedge-tailed Shearwaters – Protected Species**

- **Engage:** PPT of various threats to Wedge-tailed Shearwaters at the Freeman Seabird Preserve
- **Explore:** Life as a Wedge-tailed Shearwater – students take on the role of a shearwater to experience mating, nesting and hatching success, and encounters with possible predators or humans
- **Explain:** Wedge-tailed Shearwater Class Experience – collecting data on shared experience as Wedge-tailed Shearwaters, identifying threats to as well as ideal environmental conditions for survival
- **Elaborate:** Analyzing Hatching Data and Reproductive Success – analyzing hatching and chick survival
- **Evaluate:** Develop and Debate a Plan to Minimize Threats to Wedge-tailed Shearwaters – developing and debating potential methods of addressing identified threats from activity

### **Conservation Efforts – Habitat Restoration**

- **Engage:** PPT of Freeman Seabird Preserve habitat restoration, including images of a variety of man-made and natural burrows
- **Explore:** Burrow Data Activity – graphing and analyzing burrow preference by Wedge-tailed Shearwaters at the Freeman Seabird Preserve
- **Explanation:** Design a Burrow – identifying and drawing key characteristics of burrows preferred by Wedge-tailed Shearwaters nesting in the Freeman Seabird Preserve
- **Elaboration:** Wedge-tailed Shearwater Population Data Activity – analyzing population data pre- and post-restoration and man-made burrow instillation at the Freeman Seabird Preserve
- **Evaluation:** Design a Burrow Extension Activity – constructing the model burrow drawn in prior activity

### **The Big Picture – Culminating Activity**

#### **Protecting Wedge-tailed Shearwaters – Taking Action**

- Creating a short video public service announcement from all the information learned in each unit. PSAs to be shared on our website.
- Come and volunteer!