Grade 6

GOING MAUKA TO MAKAI

Focus Questions: In what types of habitats do Koloa maoli live? What are effective ways of educating people about the Koloa maoli?

Lesson at a Glance: Students will research the various habitats that Koloa maoli live in through investigation of videos, reports and stories. They will create their own stories through writing, artwork and/or video that highlight the unique behaviors of the Koloa maoli, their challenges and how we can help save them from extinction.

Key Concepts

- Koloa maoli use wetland habitat in lowland as well as upper elevation areas, which is unusual duck behavior.
- Healthy habitats are important for the Koloa and wetlands are at serious threat due to development and invasive species.
- Koloa maoli face many threats – predation by introduced species, loss of habitat, environmental contaminants, avian diseases, hybridization with feral Mallards
- People can change their behavior in order to help save the Koloa maoli but they need to know how.

Objectives

Students will be able to:

- Distinguish between the different types of habitats that Koloa maoli utilize.
- Discover traditional and scientific stories about the Koloa maoli and waterbirds through book and Internet research.
- Think critically about ways the help the species survive.
- Create their own stories about the Koloa maoli through writing, artwork and/or video and share them with others.

Time: three class periods

Subject Areas

language arts, social studies, Hawaiian studies, science, art

Materials and Equipment

- Student worksheet (provided)
- Koloa maoli videos on disk (provided)
- DVD player and monitor
- Computers for Internet research and video editing, if available
- Video cameras, if available

Standards and Benchmarks

Plants and Animals of Hawai‘i Standard 3: Organisms and the Environment—Understand the unity, diversity, and interrelationships of organisms, including their relationship to cycles of matter and energy in the environment

Topic: Interdependence
Benchmark SC.PAH.3.6
Explain how human actions (e.g., conservation, introduction of nonindigenous species, destruction and fragmentation of native habitat, hunting, over harvesting, poor land use practices, stream diversion) have impacted organisms in Hawai‘i since the first Polynesians

Social Studies Standard 2: Historical Understanding: INQUIRY, EMPATHY AND PERSPECTIVE- Use the tools and methods of inquiry, perspective, and empathy to explain historical events with multiple interpretations and judge the past on its own terms

Topic: Historical Inquiry
Benchmark: SS.6.2.1: Frame and answer questions through historical research

Language Arts Standard 1: Reading: CONVENTIONS AND SKILLS: Use knowledge of the conventions of language and texts to construct meaning for a range of literary and informational texts for a variety of purposes

Topic: Locating Sources/ Gathering Information
Benchmark: LA.6.1.2: Use grade-appropriate online and print sources to research a topic

Language Arts Standard 4: Writing: CONVENTIONS AND SKILLS: Use the writing process and conventions of language and research to construct meaning and communicate effectively for a variety of purposes and audiences using a range of forms

Topic: Range of writing
Benchmark: LA.6.4.1: Write in a variety of grade-appropriate formats for a variety of purposes and audiences.

Topic: Citing Sources
Benchmark: LA.6.4.5: Incorporate information from references by quoting, paraphrasing, and/or summarizing

Language Arts Standard 5: Writing: RHETORIC: Use rhetorical devices to craft writing appropriate to audience and purpose

Topic: meaning
Benchmark: LA.6.5.1: Select appropriate details, examples, reasons, and/or facts to support an insight, message, or thesis

Topic: Voice
Benchmark: LA.6.5.5: Adjust voice to suit the audience and situation (e.g., informal note to a peer, business letter to organization, research report)

Standard 6: Oral Communication: CONVENTIONS AND SKILLS: Apply knowledge of verbal and nonverbal language to communicate effectively in various situations: interpersonal, group, and public: for a variety of purposes
Topic: Discussion and presentation
Benchmark: LA.6.6.3: Give short prepared oral presentations to inform and persuade

Topic: Media Comprehension and interpretation
Benchmark: LA.6.6.9: Describe a variety of messages conveyed by visual media

Teacher Background

The Koloa maoli is one of two native duck species found in Hawai‘i (the other is the Laysan Duck that is currently found only in the Northwestern Hawaiian Islands). Koloa maoli is our only native duck in the main Hawaiian Islands. It is an endangered species with an estimated population of only about 2,200 of these waterbirds left on Earth. Most Koloa are now found on the islands of Kauai, Ni‘ihau, and Hawai‘i. On O‘ahu and Maui, most resident ducks are feral Mallards or Mallard-Koloa hybrids.

What makes the Koloa maoli unique among other waterbirds is that they are able to live in a wide variety of wetland habitats ranging from lowland areas to higher areas of elevation such as rain forests. It lives in *makai* (toward the ocean) as well as *mauka* (toward the mountain) areas. A wetland is an area of land that has standing or moving water, such as a swamp, marsh, bog, or riparian zone (river and floodplain). A habitat is a place where a population lives that provides shelter, food and space.

Koloa maoli, Brenda Zaun, USFWS

Koloa maoli are most frequently seen in lowland wetland areas like those found at Hanalei Refuge on Kaua‘i. They have also been seen swimming in the river and flying through the forest in Waipā, Kaua‘i (personal communication with S. Sproat-Beck, 2008). There is an account of Koloa maoli seen “nesting on the twin islands of Mokulua off Lanikai, and returning to O‘ahu carrying or swimming chicks to the Kawainui

swamp at Kailua or in the outlet of the Kaelepulu Pond by Lanikai." (Munro 1944:43).

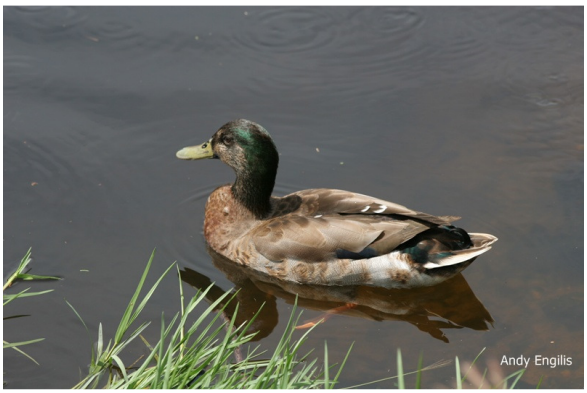
Koloa maoli ducklings, Brenda Zaun, USFWS

Koloa maoli were once plentiful on nearly all of the main Hawaiian Islands but their populations crashed from the combined effects of habitat loss, introduced predators and over-hunting. At one point they were down to roughly 500 birds. Their numbers increased after protection efforts increased. However, the threats to the Koloa maoli continue, including:

- Habitat loss: In the last century, more than 30 percent of coastal plain wetlands have been lost to draining and filling. Most of the wetlands that remain are degraded by altered hydrology, invasive plants and contaminants and not good habitat for Hawaiian waterbirds. A shift from wetland agriculture to other crops also has reduced the amount of wetland habitats.
    - Altered hydrology: Changes to wetland habitats for flood control or to provide municipal water sources can disturb the Koloa maoli habitats.
    - Non-native invasive plants: Several species of invasive plans, including pickleweed, water hyacinth, and mangrove reduce or completely cover open water, mudflats, or shallows which are important Hawaiian waterbird microhabitats.
    - Environmental contaminants: Fuel and oil spills are harmful contaminants
- Introduced predators: Koloa maoli eggs and ducklings are especially vulnerable to predation by dogs, rats, feral cats, mongooses, cattle egrets, barn owls, and non-native predatory fish (e.g., bass).
- Avian Diseases: the most important disease affecting Hawaiian waterbirds is avian botulism (not contagious to people).
- Hybridization: Koloa maoli are interbreeding with a closely related but non-native invasive bird, the feral Mallard.

*feral = domesticated species that has gone wild

Currently, the most serious threat to the Koloa maoli is hybridization with feral Mallards. Hybridization is when two closely related species reproduce to create a crossbreed. This is a problem for the Koloa maoli, because their gene pool is diminishing. The species could become extinct because of hybridization alone in a matter of a relatively short period of time. This unique Hawaiian species that has taken hundreds of thousands of years to evolve, could vanish because of our activities (e.g. releasing and feeding Mallards) in a little over 100 years.



Koloa maoli and Mallard hybrid, Andy Engilis photo

Several solutions are to: protect and enhance their habitat, breed and release additional populations that are safe from threats, and conduct education and awareness programs to address issues of predation by introduced predators as well as hybridization and control of feral Mallards (reduce their population; don't buy, sell, or feed them – and don't release them into the wild).

Teaching Suggestions

Part One:

1) Have the class watch the short videos on the Koloa maoli. Pass out the worksheet and go over the questions beforehand so they know what to look for.

2) Divide the class into groups and ask them to fill out the worksheet together. As a large group, go over the worksheet and clarify any unfamiliar vocabulary, such as hybridization.

3) Divide the class into new groups and have them discuss the questions below:

   Discussion questions:
   A. Where are wetlands on our island? How are habitats for these waterbirds changing?
   B. Why is hybridization of Koloa maoli and Mallards a problem? Will the Koloa maoli species survive there are only hybrids left?
   C. Why should people care if there are no Koloa maoli?
   D. What are people doing to help the Koloa maoli survive? What more can they do?

4) Ask each group to share their thoughts with the class.

Part Two:

1) Have students work individually or in small groups to create a project – a story about the Koloa maoli – with a message about protecting their habitat from *mauka* to *makai* and preventing hybridization. This could involve:

- creating an educational brochure or video
- writing an article for a newspaper
- painting a picture of the Koloa maoli in its habitats
- studying the Koloa maoli's behavior in the midst of hybrids and reporting on it
- creating an educational webpage or
- writing or performing a play about the Koloa maoli's plight.

Let their creativity fly freely!

2) Have students conduct research before embarking on their projects. Ask students to look into Hawaiian traditional stories and scientific reports about the Koloa maoli and other Hawaiian waterbirds. Guide them to learn the history of the Koloa maoli in Hawai'i.

3) Have the students share their stories with the rest of the class.

Assessment

You could assess students by:
- effectiveness in working in teams.
- use of relevant information from a variety of print and on-line resources to research their subject
- content and quality of their projects (e.g. accuracy of facts, creativity, expression)
- proper use of written language
- effectiveness in communicating their projects with others

Resources

Books:

Berger, Andrew, *Hawaiian Birdlife*, 2nd edition, 1981, University of Hawai'i Press, Honolulu

Hawai'i Audubon Society, *Hawaii's Birds*, 6th edition, 2005, Island Heritage Publishing, Honolulu

Websites about the Koloa maoli:

Hawai'i Biodiversity Mapping Program
http://hbmp.hawaii.edu/hbmp/printpage.asp?spp=ABNJB10070

Hanalei National Wildlife Refuge, U.S. Fish and Wildlife Service
http://www.fws.gov/hanalei/koloa.html

ARKive
http://www.arkive.org/hawaiian-duck/anas-wyvilliana/

BirdLife International, Inc.
http://www.birdlife.org/datazone/species/index.html?action=SpcHTMDetails.asp&sid=436&m=0

Websites for waterbirds in general:

http://www.fws.gov/refuges/refugeLocatorMaps/Hawaii.html

http://www.kaelepuluwetland.com/

http://www.kawainuimarsh.com/Site%20Folder/index.html

http://hamakuamarsh.com/

Extended Activities

- Have students present their projects to a larger audience. For example, if it is an educational brochure, see if they can distribute it around areas where the Koloa maoli may live. If it's a play, arrange to have students in other classes attend a performance.

- Create a public awareness campaign in your community for the Koloa maoli that includes elements like videos, presentations and brochures.

- Participate in a service project that improves habitat for Koloa maoli. Contact the State Department of Land and Natural Resources, Division of Forestry and Wildlife offices for ideas:
  808.274.3433 Līhu'e, Kaua'i
  808.587.0166 Honolulu, O'ahu
  808.984.8100 Wailuku, Maui
  808.887.6061 Waimea, Hawai'i
  808.974.4229 Hilo, Hawai'i

  The Hawai'i Nature Center on O'ahu (ph: 808.955.0100) and Maui (808.244.6500) may also have volunteer projects.

Name: _____

Koloa Maoli Video Worksheet
Going *Mauka* to *Makai*

1) Where do the Koloa maoli live? On which islands are they located and in what kinds of habitats?

2) What are some interesting and unique things about the Koloa maoli?

3) How large is the estimated population? Where is the largest population?

4) What are the threats to this species?

5) Which bird is hybridizing with the Koloa maoli? Why is that a problem?

6) What can people do to help the Koloa maoli survive?