

**A Hands-On Guide to
Na Leo o Na Holoholona Maoli:
Invasive Animals of Hawai‘i and their Impact**

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Grade Level: Third Grade

Purpose: By studying invasive animals and their impact on Hawai‘i’s environment, the student will be able to:

- I. Identify levels of community structure (anthropogenic and biological) and how organisms rely on each other for survival.
- II. Classify organisms by means of arrival (native, introduced) to Hawai‘i, and their role in Hawai‘i’s ecosystems.
- III. Assess the impact of invasive animals on humans and other organisms.
- IV. Determine the role humans play in the adverse impacts of invasive animals.
- V. Evaluate the means for control of invasive animals in Hawai‘i.

Hawai‘i Content and Performance Standards (HCPS III):

Science

Standard 1: The Scientific Process: Scientific Investigation: Discover, invent, and investigate using the skills necessary to engage in the scientific process.

Benchmarks

- SC.3.1.1. Pose a question and develop a hypothesis based on observations.
SC.3.1.2. Safely collect and analyze data to answer a question.

Standard 3: Life and Environmental Sciences: Organisms and the Environment: Understand the unity, diversity, and interrelationships of organisms, including their relationship to cycles of matter and energy in the environment.

Benchmark

- SC.3.3.1. Describe how plants depend on animals.

Standard 4: Life and Environmental Sciences: Structure and Function: Understand the structures and functions of living organisms and how organisms can be compared scientifically.

Benchmark

SC.3.4.1. Compare distinct structures of living things that help them to survive.

Standard 5: Life and Environmental Sciences: Diversity, Genetics, and Evolution: Understand genetics and biological evolution and their impact on the unity and diversity of organisms.

Benchmark

SC.3.5.1. Describe the relationship between structure and function in organisms.

Standard 6: Physical, Earth, and Space Sciences: Nature of Matter and Energy: Understand the nature of matter and energy, forms of energy (including waves) and energy transformations, and their significance in understanding the structure of the universe.

Benchmark

SC.3.6.1. Define energy and explain that the sun produces energy in the form of light and heat.

Fine Arts

Standard 1: Visual Arts: Understand and apply art materials, techniques, and processes in the creation of works of art and understand how the visual arts communicate a variety of ideas, feelings, and experiences.

Benchmarks

FA.3.1.2. Use a variety of art and technology media to create an original work of art.

FA.3.1.3. Use observational skills in creating an original work of art.

Standard 3: Drama and Theatre: Understand and apply the skills of acting, design, and technical theatre and understand the role of drama in various cultures throughout history.

Benchmark

FA.3.3.1. Create a dramatization based on a story.

Health

Standard 5: Interpersonal Communication: Use interpersonal communication skills to enhance health.

Benchmark

HE.3-5.5.1. Use appropriate strategies for effective verbal and non-verbal communication in formal and informal settings.

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.

Benchmarks

- LA.3.4.1. Write in a variety of grade-appropriate formats for a variety of purposes and audiences, such as:
- stories with a beginning, middle, and end and poems with sensory details
 - short reports on content area topics
 - pieces related to completing tasks
 - friendly letters
 - responses to literature
 - pieces to reflect on learning and solve problems

Standard 5: Writing: Rhetoric: Use rhetorical devices to craft writing appropriate to audience and purpose.

Benchmarks

- LA.3.5.2. Organize information by introducing it, elaborating on it, and drawing a conclusion about it.

Standard 6: Oral Communication: Conventions and Skills: Apply knowledge of verbal and nonverbal language to communicate effectively in various situation: interpersonal, group, and public: for a variety of purposes.

Benchmark

- LA.3.6.1. Use oral language to obtain information, complete a task, and share ideas and personal opinions with others.

Social Studies

Standard 1: Historical Understanding: Change, Continuity, and Causality: Understanding change and/or continuity and cause and/or effect in history.

Benchmark

SS.3.1.1. Explain cause and effect relationships in stories and historical narratives.

Standard 7: Geography: World in Spatial Terms: Use geographic representations to organize, analyze, and present information on people, places, and environments and understand the nature and interaction of geographic regions and societies around the world.

Benchmarks

SS.3.7.2. Compare the physical and human characteristics of different communities and regions.

SS.3.7.3. Describe the physical and human characteristics that make different regions unique.

SS.3.7.4. Examine the ways in which people modify the physical environment and the effects of these changes.

Topic and Driving Question:

What are invasive animals, why do they negatively impact Hawai‘i, and how can humans control their spread and adverse effects?

Rationale:

Invasive animals are those species that are introduced to native Hawai‘i environments by humans. They negatively impact the native and endemic plants and animals by disrupting the trophic levels of communities. In doing so, invasive animals decimate the biodiversity of terrestrial environments. It is difficult to control invasive animals because of their defense mechanisms against island organisms and their rapid proliferation. Humans are the root cause of invasive animal impact and they are able to develop means of control for the benefit of the island’s native species. This curriculum utilizes inquiry-based activities to introduce the need to maintain natural environments and cultivate social responsibility.

Concept Map for Unit:

See below.

Formative Assessment:

Students will demonstrate continued learning throughout the unit through successful participation in kinesthetic laboratory activities, completion of activity worksheets, and lucid discussion participation at the conclusion of each day.

Summative Assessment:

Students will present their complete knowledge about invasive animals and their effect on Hawai‘i by compiling a booklet of worksheets, activity logs, and mini-projects completed over the course of the curriculum. Students will include a reflection on the curriculum, reflecting on their favorite activity and explaining what they have learned, demonstrating their evolution of thought the process.

Overview of Lessons Chart:

See below

Sources:

The Nature Conservancy (Maoli Nō: Truly Native)

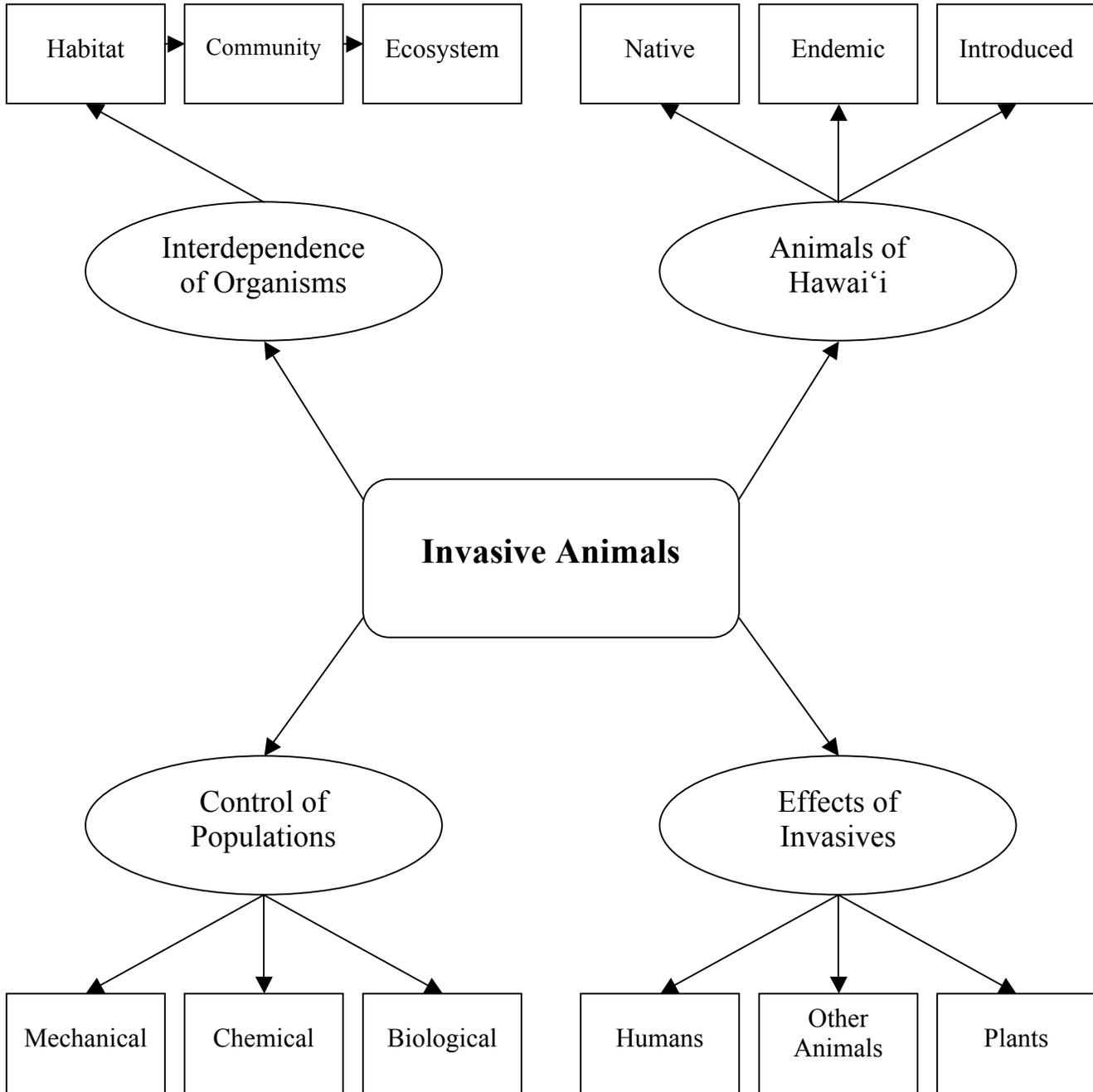
www.nature.org

Green, Y.S. 1999. Hawaiian Plants and Animals Coloring Book. Mineola, NY: Dover.

National Geographic (Hawai‘i: Strangers in Paradise)

www.nationalgeographic.com

Unit Concept Map



Timeline	Lesson and Topic	Concepts	Student Objectives	Activity description	Assessment
<i>Week 1</i> <i>3 (1.5 hour)</i> <i>sessions</i>	Unit Introduction to Invasive Animals of Hawai‘i and their Impact	Hawai‘i’s natural landscape is one that is found nowhere else on Earth. Conservation of such areas is on the forefront of ecosystem preservation.	Students will be able to identify natural habitats on Hawai‘i that are in need of preservation, and provide adequate argument for why the natural habitat is important to Hawai‘i.	Students are introduced to sensory observation and data collection. Students will observe two habitats and communicate personal reasons for habitat preservation.	Observation notes and Conservation haiku
<i>Week 2</i> <i>2 (1 hour)</i> <i>sessions</i>	Community Structure and Interdependence	Every organism relies on another organism for its survival. Communities are built upon interdependence, and an ecosystem can resemble anthropogenic communities.	Students will investigate the characteristics of communities and neighborhoods, and identify the roles of the individuals within. Students will apply that knowledge to a more expansive ecosystem environment.	Students develop examples of community structure (anthropogenic and biological). Students describe how organisms rely on interdependence for survival.	“My community” poster, and Interdependence flowchart
<i>Week 3</i> <i>2 (1 hour)</i> <i>sessions</i>	Energy Flow and the Food Chain	Levels of ecosystem structure are in place for the transfer of energy from one level to the next. Animals rely on plants and/or other animals for survival.	Students will be able to draw connections between different organisms and their food requirements for survival. Students will be able to identify the four basic components of the ecosystem: abiotic environment, producers, consumers, and decomposers.	Students will map a food chain for a Hawai‘i-based species, and identify and describe the four basic components of the given ecosystem.	“A Hawai‘i Food Chain” map
<i>Week 4</i> <i>2 (1 hour)</i> <i>sessions</i>	Animals’ Arrival in Hawai‘i	Not all animal species found Hawai‘i. Some animals were brought to the islands by other means. There are four distinctions of animals on Hawai‘i: native, endemic, introduced, and invasive.	Students will be able to classify animals by means of arrival to Hawai‘i. Students will be able to describe the ways that animals came to the islands, and develop ideas on the spread of species around the world.	Students draw images of native or endemic animals and create stories, based on facts, that describe how a specific animal species arrived and began habitation in Hawai‘i.	Native animal stories
<i>Week 5</i> <i>2 (1 hour)</i> <i>sessions</i>	The Role of Plants	Animals affect the spread and proliferation of plant species. Plants may rely on animals for dispersal. Plants can hitchhike to isolated areas, such as Hawai‘i, and become pests in the new environment.	Students will be able to explain how animals facilitate plant dispersal to isolated land. Students will be able to describe and demonstrate the roles of animals and plants in gas exchange (oxygen and carbon dioxide).	Students will demonstrate how animals facilitate plant dispersal. Students will demonstrate gas exchange through role play.	Seed dispersal data sheet, gas exchange skit participation
<i>Week 6</i> <i>2 (1 hour)</i> <i>sessions</i>	Invasive Animals and their Impacts	Invasive animals are animals introduced to a native environment by humans. They negatively affect food	Students will be able to analyze the impacts of invasive animals on a native biosphere. Students will be able to identify the reasons why	Students will undergo a simulation exercise to experience the human disturbance on native	Simulation activity, “What Invasive Animals are Invasive”

		chains and skew trophic levels. Invasives have defense mechanisms for survival, whereas native and endemic animals do not.	invasive animals are so much better at survival compared to the native animals.	ecosystems. Students will discuss personal emotions of the simulation to identify reasons why invasive species are so negative for Hawai'i.	worksheet, discussion
<i>Week 7</i> <i>2 (1 hour) sessions</i>	The Price of Adaptation	The native and endemic animals of Hawai'i have persisted in their natural ecosystem for millions of years. Only recently have invasive animals threatened their existence, due to the invasive animal's generalist abilities.	Students will identify the ways that native and endemic animals have adapted to Hawai'i's native ecosystem. Students will determine the ways that invasive animals negatively affect these well-developed relationships.	Students will use video clips, coloring book pictures, and outside information to identify natural animal-environment relationships.	Coloring book pictures, "I'iwi, Palila, and Nene" worksheet, and discussion
<i>Week 8</i> <i>2 (1 hour) sessions</i>	Ways to Control Invasive Species in Hawai'i	There are three different designations for invasive animals' population control: biological, chemical, and mechanical. However, there is no one answer for the control of humans as an invasive animal.	Students will be able to analyze the three methods for population control. Students will be able to suggest answers for invasive animal control and synthesize a plan of action for Hawai'i.	Students will question, discuss, and research different methods of population control. Students will begin to develop a plan of action to slow the populations of invasive animals in Hawai'i.	Brainstorm, discussion, and poster presentation
<i>Week 9</i> <i>Duration Varies</i>	What Do We Do Now?: Culminating Activities (Summative Assessment)	Review of all concepts covered in the unit.	Students will demonstrate their cumulative knowledge of Hawai'i's invasive animals and their impact by reviewing their work in the unit and bridging the concepts covered.	Students will create a booklet of all the activities. Students will write a reflection of their favorite activity and what they learned in the unit.	Demonstrates a lucid understanding of all types of animals in Hawai'i and their relationship with the environment.