

# DLNR Virtual Field Trips: Ka'ena Point Natural Area Reserve NGSS, Nā Hopena A'o , and 'Āina Aloha Competencies Alignment for Educators



## Alignment Summary

The Ka'ena Point Natural Area Reserve virtual field trip offers an educational experience that explores some of Hawai'i Island's protected ecosystems. The content presented with this field trip aligns with Next Generation Science Standards (NGSS), the Nā Hopena A'o framework from the Office of Hawaiian Education (OHE), and the competencies from OHE's 'Āina Aloha pilot program. The field trip aligns with NGSS listed below, highlighting Earth's complex systems and the relationship between Earth and human activity. The diverse characteristics and adaptations of native (and non-native) species in Hawai'i are elaborated upon. Within the Nā Hopena A'o framework, our field trips align with the goals of strengthening students' sense of Hawai'i and sense of belonging. Further, the videos found throughout the field trip correspond with 'Āina Aloha competencies, as the speakers educate young learners about how systems work, why conservation efforts are important for the 'āina, and human impacts on ecosystems. The tables below provide specific references to standards, goals, and competencies addressed by this field trip.

## NGSS Alignment

The standard codes below have been hyperlinked to direct you to a description of the standard.

NGSS Code and Link	Discipline	Core Idea	Subitem	Relevant DCIs	Field Trip Connections to DCIs
<a href="#">K-ESS2-2</a>	ESS: Earth and Space Sciences	2: Earth's Systems	2: Construct an argument supported by evidence for how plants and animals	"ESS2.E: Biogeology: Plants and animals can change their environment. ESS3.C: Human Impacts on Earth Systems: Things that people do to live	The land encompassing Ka'ena Point was degraded during the plantation era, as it was used for the transportation of crops. Later

			(including humans) can change the environment to meet their needs	comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things."	it was heavily used as a recreation area, including off-road vehicles. This had major impacts on the area in terms of native plant cover and bird habitat.
<a href="#">K-ESS3-1</a>	ESS: Earth and Space Sciences	3: Earth and Human Activity	1: Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.	"ESS3.A: Natural Resources Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do."	The coastal dunes of Ka'ena provide just the right habitat for plants like naupaka, 'ōhai, naio, and others. These in turn provide just the right habitat for mōlī (Laysan albatross) and 'ua'u kani (wedge-tailed shearwaters).
<a href="#">K-ESS3-3</a>	ESS: Earth and Space Sciences	3: Earth and Human Activity	3: Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.	"ESS3.C: Human Impacts on Earth Systems Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. ETS1.B: Developing Possible Solutions Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (secondary)"	A predator proof fence has been installed across Ka'ena Point to reduce human and invasive species impact on native species such as albatross and monk seals. Students can develop other ideas to detect and reduce invasive species (like rats or mongoose) and protect native animals and plants.
<a href="#">1-LS1-1</a>	LS: Life Sciences	1: From Molecules to Organisms: Structures and Processes	1: Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help	"LS1.A: Structure and Function All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts	Students may consider how the external features of birds and plants at Ka'ena point are suited to their habitat. The plants tend to grow low to the ground in this windy coastal environment with sandy soils, and the birds here

			them survive, grow, and meet their needs.	(roots, stems, leaves, flowers, fruits) that help them survive and grow."	have large, strong wings suited for flying over the ocean.
<a href="#">2-LS2-2</a>	LS: Life Sciences	2: Ecosystems: Interactions, Energy, and Dynamics	2: Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.	"LS2.A: Interdependent Relationships in Ecosystems Plants depend on animals for pollination or to move their seeds around. ETS1.B: Developing Possible Solutions Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (secondary)"	The first stop on this virtual field trip includes a hotspot about the fence surrounding habitat for our native yellow-faced bees. These bees are pollinators of native plants along the trail and are endangered. Follow the link beneath the video to find more information about yellow-faced bees as well as paper crafts students can use to make bee headbands.
<a href="#">2-LS4-1</a>	LS: Life Sciences	4: Biological Evolution: Unity and Diversity	2: Make observations of plants and animals to compare the diversity of life in different habitats.	"LS4.D: Biodiversity and Humans There are many different kinds of living things in any area, and they exist in different places on land and in water."	This coastal dune habitat has a unique collection of species that is very different from high elevation wet forests (see our Pia Valley virtual field trip for an example).
<a href="#">3-LS1-1</a>	LS: Life Sciences	1: From molecules to Organisms: Structures and Processes	1: Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.	"LS1.B: Growth and Development of Organisms Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles."	Reproduction is essential for the continued existence of our native seabirds like mōli and 'ua'u kani. Invasive predators like rats, cats, and mongoose can eat seabirds, their chicks, or their eggs. The predator-proof fence around Ka'ena point keeps these invasive species away from the seabirds, allowing them to nest safely and raise their chicks.
<a href="#">3-LS4-4</a>	LS: Life	4: Biological	4: Make a claim	"LS2.C: Ecosystem Dynamics,	Changes in the environment at

	Sciences	Evolution: Unity and Diversity	about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.	Functioning, and Resilience When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary) LS4.D: Biodiversity and Humans Populations live in a variety of habitats, and change in those habitats affects the organisms living there."	Ka'ena, including recreational use by humans and the introduction of invasive predators, reduced the ability of native plants and seabirds to live in this area. The predator-proof fence and other conservation work at Ka'ena point now make this a safer place for these species to live.
<a href="#">4-LS4-1</a>	LS: Life Sciences	4: Biological Evolution: Unity and Diversity	1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction	"LS1.A: Structure and Function Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction."	Students may consider how the external features of birds and plants at Ka'ena point are suited to their habitat. The plants tend to grow low to the ground in this windy coastal environment with sandy soils, and the birds here have large, strong wings suited for flying over the ocean.
<a href="#">MS-LS1-5</a>	LS: Life Sciences	1: From Molecules to Organisms: Structures and Processes	5: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	"LS1.B: Growth and Development of Organisms Genetic factors as well as local conditions affect the growth of the adult plant."	Local conditions impact the growth of adult plants at Ka'ena. The windy, coastal environment supports shrubby plants like naupaka and 'ōhai.
<a href="#">MS-LS2-2</a>	LS: Life Sciences	2: Ecosystems: Interactions,	2: Construct an explanation that predicts patterns of	"LS2.A: Interdependent Relationships in Ecosystems Similarly, predatory interactions may reduce the number of	The animals living at Ka'ena rely on native plant habitats and are directly impacted by predators.

		Energy, and Dynamics	interactions among organisms across multiple ecosystems.	organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared."	Students can predict patterns in snail populations based on scenarios of whether native plant populations increase or decrease, and whether invasive predator populations increase or decrease.
<a href="#">MS-LS2-4</a>	LS: Life Sciences	2: Ecosystems: Interactions, Energy, and Dynamics	4: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	"LS2.C: Ecosystem Dynamics, Functioning, and Resilience Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations."	Changes in the environment at Ka'ena, including recreational use by humans and the introduction of invasive predators, reduced the ability of native plants and seabirds to live in this area. The predator-proof fence and other conservation work at Ka'ena point now make this a safer place for these species to live.
<a href="#">MS-LS2-5</a>	LS: Life Sciences	2: Ecosystems: Interactions, Energy, and Dynamics	5: Evaluate competing design solutions for maintaining biodiversity and ecosystem services.	"LS2.C: Ecosystem Dynamics, Functioning, and Resilience Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. LS4.D: Biodiversity and Humans Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as	The biodiversity of this area was impacted by human use (recreational vehicle use and the building of a railway) and the introduction of invasive predators. Students may evaluate the impacts to biodiversity anticipated by the solutions employed at this site: predator control, the construction of a predator-proof fence, and native

				ecosystem services that humans rely on—for example, water purification and recycling. (secondary) ETS1.B: Developing Possible Solutions There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (secondary)"	plant restoration.
<a href="#">MS-ESS3-3</a>	ESS: Earth and Space Sciences	3: Earth and Human Activity	3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	"ESS3.C: Human Impacts on Earth Systems Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise."	Ka'ena point has been impacted by human activities, including the introduction of predators, recreational vehicle usage, and other human activities. Students may design solutions to monitor or minimize these impacts.
<a href="#">MS-ESS3-4</a>	ESS: Earth and Space Sciences	3: Earth and Human Activity	4: Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	"ESS3.C: Human Impacts on Earth Systems Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise."	Our native ecosystems are impacted by human activities like deforestation, introduction of invasive species, and climate change. Students may construct an argument about how these impacts are related to human population size in Hawai'i, or to the amount of people/goods arriving in Hawai'i.

<a href="#">HS-LS2-6</a>	LS: Life Sciences	2: Ecosystems: Interactions, Energy, and Dynamics	6: Evaluate claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	"LS2.C: Ecosystem Dynamics, Functioning, and Resilience A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability."	Our native ecosystems are impacted by human activities like deforestation, introduction of invasive species, and climate change. Students may evaluate the changes in stability of our ecosystems over time as human impacts have increased in Hawai'i.
<a href="#">HS-LS2-7</a>	LS: Life Sciences	2: Ecosystems: Interactions, Energy, and Dynamics	7: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	"LS2.C: Ecosystem Dynamics, Functioning, and Resilience Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species. (see link for more)	Our native ecosystems are impacted by human activities like deforestation, introduction of invasive species, and climate change. Students may evaluate the changes in stability of our ecosystems over time as human impacts have increased in Hawai'i. Students may design or evaluate solutions to these impacts, such as invasive plant removal, native plant restoration, installation of hoofed-animal fencing, installation of predator-proof fencing, reductions in mosquito population, or captive animal care.

**Alignment with [Nā Hopena A‘o Statements](#)**

<u>Hopena</u>	<u>Statement</u>
1. Strengthened Sense of Belonging	a. Know who I am and where I am from
	b. Know about the place I live and go to school
2. Strengthened Sense of Hawai‘i	b. Use Hawaiian words appropriate to their task
	c. Learn the names, stories, special characteristics and the importance of places in Hawai‘i
	d. Learn and apply Hawaiian traditional world view and knowledge in contemporary settings
	e. Share the histories, stories, cultures and languages of Hawai‘i
	g. Treat Hawai‘i with pride and respect
	h. Call Hawai‘i home

**‘Āina Aloha Competencies:**

This link will direct you to the Office of Hawaiian Education (OHE) ‘Āina Aloha competencies.

<https://sites.google.com/k12.hi.us/ohehub/hawaiian-studies-program-hsp/%CA%BB%C4%81ina-aloha-a%CA%BBa-choice-board?authuser=0>



<b>Competency</b>	<b>Sub Competency</b>	<b>Competency Highlight</b>
Aina Ulu: Growth Cycle	Kupu	Young and fresh learner
Kuana'ike: Ahupua'a	Pua	Analyzes relationship between systems and aina cycles
Honua: Pono	Hua	Advocates for living pono and contributes to aina well-being
Honua: Kuleana	Pua	Analyzes the impact of one's kuleana