

DLNR Virtual Field Trips: Pu'u wa'awa'a NGSS, Nā Hopena A'o , and 'Āina Aloha Competencies Alignment for Educators



Alignment Summary

The Pu'u wa'awa'a 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 ecosystem functions and relationships as well as the diverse characteristics and adaptations of native (and non-native) species in Hawai'i. The field trip also explores the impacts of human activity on ecosystems. 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

NGSS Code and Link	Discipline	Core Idea	Subitem	Relevant DCIs	Field Trip Connections to DCIs
K-ESS2-2	ESS: Earth and Space Sciences	2: Earth's Systems	2: Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs	"ESS2.E: Biogeology: Plants and animals can change their environment. ESS3.C: Human Impacts on Earth Systems: Things that people do to live comfortably can affect the world around them.	At Pu'u Wa'awa'a we can see human changes including the addition of trails for hiking, and the presence of invasive plants including fire-prone grasses. This has an impact on the plants in the area and the risk of

				But they can make choices that reduce their impacts on the land, water, air, and other living things."	wildfires.
K-ESS3-1	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 plants and animals at Pu'u Wa'awa'a live there because this habitat has what they need: it is a dry forest habitat that is not too wet, and it has the right soil conditions for them.
K-ESS3-3	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)"	At Pu'u Wa'awa'a we can see human changes including the addition of trails for hiking, and the presence of invasive plants including fire-prone grasses. This has an impact on the plants in the area and the risk of wildfires. Students can develop solutions for reducing invasive plants or the risk of wildfires.
1-LS1-1	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 them survive, grow, and meet their needs.	"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 (roots, stems, leaves, flowers, fruits) that help them	Wiliwili trees are an example of a species that uses different body parts to survive. It is adapted to dry environments and is one of the few native species that is deciduous: it drops its leaves in the hot, dry, summer months and grows them again in the winter when there is more moisture.

				survive and grow."	
2-LS2-2	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)"	One native tree we see near this site is the 'ōhi'a tree. The 'ōhi'a tree can be pollinated by insects or birds that visit its lehua flowers for nectar.
2-LS4-1	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."	The dry forests of Pu'u Wa'awa'a are home to plants and animals that are adapted to living in dry areas, like the wiliwili tree. The species found here are largely different from the species found in a wetter forest habitat or a wetland (see our virtual field trips for Pia Valley or Kawaiui Marsh for examples).
3-LS4-2	LS: Life Sciences	4: Biological Evolution: Unity and Diversity	2: Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.	"LS4.B: Natural Selection Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing."	The plants of Pu'u Wa'awa'a are adapted (through natural selection and evolution) to living in dry, hot habitats. An example is the wiliwili tree. It is adapted to dry environments and is one of the few native species that is deciduous: it drops its leaves in the hot, dry, summer months and grows them again in the winter when there is more moisture.

3-LS4-4	LS: Life Sciences	4: Biological Evolution: Unity and Diversity	4: Make a claim 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.	"LS2.C: Ecosystem Dynamics, 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."	Human use and the introduction of invasive species (like fire-prone grasses) have changed the characteristics of Pu'u Wa'awa'a and increased the risk of wildfires in the area. Habitat restoration projects seek to reduce this risk.
4-LS4-1	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."	Wiliwili trees are an example of a species that uses different body parts to survive. It is adapted to dry environments and is one of the few native species that is deciduous: it drops its leaves in the hot, dry, summer months and grows them again in the winter when there is more moisture.
MS-LS1-5	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."	Wiliwili trees are an example of a species that has evolved to suit its local environmental conditions. It is adapted to dry environments and is one of the few native species that is deciduous: it drops its leaves in the hot, dry, summer months and grows them again in the winter when there is more moisture.

MS-LS2-4	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."	Human use and the introduction of invasive species (like fire-prone grasses) have changed the characteristics of Pu'u Wa'awa'a and increased the risk of wildfires in the area. Habitat restoration projects seek to reduce this risk.
MS-LS2-5	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. (see link for more)	Pu'u Wa'awa'a is a Forest Reserve, designated for the management of natural resources. A protective fence has been installed in some areas to allow native plants to be planted and grow safely. Students may evaluate this solution to plant loss and how it impacts biodiversity of this area.
MS-ESS3-3	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	Native dry forests at Pu'u Wa'awa'a have been impacted by human activities, including the introduction of hoofed animals and invasive plants. Students may design solutions to monitor or minimize these impacts.

				involved are engineered otherwise."	
MS-ESS3-4	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.
HS-LS2-6	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.
HS-LS2-7	LS: Life Sciences	2: Ecosystems:	7: Design, evaluate, and refine a solution for reducing the impacts of human activities on	"LS2.C: Ecosystem Dynamics, Functioning, and Resilience Moreover, anthropogenic changes	Our native ecosystems are impacted by human activities like deforestation, introduction of

		Interactions, Energy, and Dynamics	the environment and biodiversity.	(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)	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.
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Alignment with [Nā Hopena A'ō Statements](#)

Hopena	Statement
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>

Competency	Sub Competency	Competency Highlight
Aina Ulu: Growth Cycle	Kupu	Young and fresh learner
Kuana'ike: Ahupua'a	Kupu	Understanding the cycles and how systems of management enable other natural systems to persist
Honua: Pono	Kupu	Understands the importance and significance of conservation efforts
Honua: Kuleana	Pua	Analyzes one's impact