# DLNR Virtual Field Trips: Pouhala Marsh

## NGSS, Nā Hopena A‘o , and ‘Āina Aloha Competencies Alignment for Educators

**Alignment Summary**

The Pouhala Marsh Google Earth trip offers an educational experience that explores some of Hawai’i Island’s protected ecosystems. The content presented with this 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 within the mapped-out sanctuary. 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 text and imagery educate young learners about how systems work, why conservation efforts are important for the ‘āina, and the cultural significance of associated 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 |
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| 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 | "ESS2.E: Biogeology: Plants and animals can change their environment. ESS3.C: Human Impacts on Earth Systems: | This marsh was used as a lo‘i and fish pond by native Hawaiians. This wetland used to be full of fish, crops, and water, but was later partially filled |

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| | | | change the environment to meet their needs | 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." | to be used as a landfill until it was identified as a potential waterbird sanctuary. |
| 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." | Pouhala marsh is a rare wetland habitat, which makes it just the right place for wetland birds that need the specific food and nesting sites found in wetlands, like aeʻo, ʻaukuʻu, ʻalae ula, and others. |
| 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)" | Pouhala marsh has been impacted over time as the town has been built up around it and invasive predators (like cats, rats, and mongoose) have come to Hawaiʻi. Students can develop solutions to reduce impacts of predators and/or human pollution. |
| 1-LS1-1 | LS: Life | 1: From | 1: Use materials to design | "LS1.A: Structure and | How do the external features of birds |

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| | Sciences | Molecules to Organisms: Structures and Processes | 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. | 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 survive and grow." | at Pouhala enable them to live in this habitat? One example is the long legs of the aeʻo, which allow it to walk through watery areas while keeping its head and body well above the water. |
| 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." | This area includes native plants adapted to living in wet soils or in standing water. The animals here include shorebird species like the aeʻo. This collection of species is very different from the species you might find in a dry forest (see our Puʻu Waʻawaʻa virtual field trip) or a high elevation wet forest (see our Pia Valley virtual field trip). |
| 3-LS1-1 | 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 wetland birds like aeʻo, ʻalae ula, and others. Invasive predators like rats, cats, and mongoose can eat these birds, their chicks, or their eggs. Predator control (and sometimes fencing) keeps these invasive species away from the seabirds, allowing them to nest safely and raise their chicks. |
| 3-LS4-4 | LS: Life | 4: Biological | 4: Make a claim about the | "LS2.C: Ecosystem | Hawaiʻi's wetlands have changed over |

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| | Sciences | Evolution: Unity and Diversity | merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. | 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." | time due to human use and the introduction of invasive predators like rats, mongoose, and cats. Native bird species are impacted by these predators. We conduct predator control and in some cases build predator fences to help these birds survive. Native plant restoration at Pouhala also helps these birds. |
| 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." | How do the external features of birds at Pouhala enable them to live in this habitat? One example is the long legs of the aeʻo, which allow it to walk through watery areas while keeping its head and body well above the water. |
| MS-LS2-2 | LS: Life Sciences | 2: Ecosystems: Interactions, Energy, and Dynamics | 2: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. | "LS2.A: Interdependent Relationships in Ecosystems Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so | The animals living at this site rely on native plant habitats and are directly impacted by predators. 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. |

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| | | | | 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." | |
| 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." | Hawai'i's wetlands have changed over time due to human use and the introduction of invasive predators like rats, mongoose, and cats. Native bird species are impacted by these predators. We conduct predator control and in some cases build predator fences to help these birds survive. Native plant restoration at Pouhala also helps these birds. |
| 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) | The biodiversity of this area was impacted by human use (including temporarily using this site as a landfill) and the introduction of invasive predators. Students may evaluate the impacts to biodiversity anticipated by the solutions employed at this site: predator control, invasive plant removal, and native plant restoration. |

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| 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 involved are engineered otherwise." | Hawai'i's wetlands have been impacted by human activities, including the introduction of predators, human uses of these areas, and the introduction of invasive plants. Students may design solutions to monitor or minimize these impacts. |
| 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 | 6: Evaluate claims, evidence, and reasoning that the complex interactions in | "LS2.C: Ecosystem Dynamics, Functioning, and Resilience A complex set of interactions within an | Our native ecosystems are impacted by human activities like deforestation, introduction of invasive species, and climate change. Students may |

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| | | Dynamics | ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem. | 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 (see link for more) | 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: 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**

| **Hopena** | **Statement** |
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| 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 |
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| Aina Ulu: Growth Cycle | Kupu | Young and fresh learner |
| Kuanaʻike: Ahupuaʻa | Kupu | Understanding the significance and importance of stewardship, systems and cycles |
| Honua: Pono | Hua | Advocates for living pono and contributes to aina well-being |