Alignment Summary

The Hōlanikū (Kure Atoll) Virtual Field Trip offers students an educational experience that they simply could not experience on an in-person field trip: a journey to a seabird sanctuary 1,400 miles northwest of the main Hawaiian Islands, filled with ground-nesting seabirds and world-class conservation projects. Students will explore this unique environment, learn about bird and plant species, discover conservation tools used to protect seabirds, and learn directly from field biologists what it takes to be a scientist helping to protect Hawaiʻi's natural resources.

As an educator, you can use this field trip in multiple ways: **Take a trip as a class** by connecting a computer to a large screen in your classroom and journeying through each "stop" on the field trip, clicking on the hotspots to reveal videos, images, and text. Make sure to link a speaker so students can hear the videos. Alternatively, **assign students to explore individually** on their devices at school or at home. If your class has a **virtual reality headset** that has a web browser, you can visually explore these locations (however, the educational hotspots are disabled in VR mode). Note that the hotspots often contain links to species profile pages on the websites of DLNR, University of Hawaiʻi, or Bishop Museum, allowing students to learn more if youʻd like them to research particular species. This field trip contains roughly one hour of video footage, and exploring all of the hotspots, imagery, and text will likely take your class around two hours.

The guiding questions and alignments below are designed to facilitate integration with your curriculum goals. The alignments below are targeted for **Next Gen Science Standards, Nā Hopena Aʻo, and ʻĀina Aloha,** but you may also discover additional connections with Hawaiian Studies, Social Studies, and language curricula.

Guiding Questions

- What geographical and biological factors make Hōlanikū a good place for seabirds to nest?

- How do plants, birds, and fish on Hōlanikū relate to one another?
- What tools and methods do biologists use on Hōlanikū to reduce the impacts of invasive species?
- What is it like to be a biologist working on Hōlanikū, and why do you think biologists choose to do this work?
- Where does marine pollution come from, and how does it impact wildlife? What solutions can students think of to address this problem?

NGSS Alignment

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

NGSS	Discipline & Core Ideas	Subitem	Relevant DCIs	Field Trip Connection 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. But they can make choices that reduce their impacts on the land, water, air, and other living things.	Stop 5 ("The Dunes") discusses the changes plants make to this low-lying island. The roots of naupaka plants hold sand and soil together to form dunes that protect the interior of the island. This creates a safer habitat for ground nesting birds.

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)	Students can review the examples of marine pollution in Stop 11 (South Point). What types of marine pollution come from human activities? What solutions can students think of to address this problem?
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.	Students may compare the different types of birds found on Hōlanikū and discuss the relationship between different body sizes and different activities or diets. They may also consider why ground-nesting seabirds are found mostly on remote islands rather than our main Hawaiian Islands (answer: there are fewer predators like rats, cats, and mongoose).

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.	Students may use the animal and plant species they meet in this field trip to develop models of life cycles. The seabird profiles linked to in the bird hotspots may have information about the time of year that different species nest and lay eggs, as well as information about when they fledge (leave the nest) and begin hunting for their own food at sea, then eventually mate and produce their own eggs.
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.	Students may consider the changes caused to the environment of Hōlanikū when rats, ants, and invasive plants were introduced to the island. They can make a claim about the merit of the solution used by biologists: removing invasive plants with herbicide and physical removal, and removing ants and rats with manual tools (like traps and chemical tools). See stop 6 and the video titled "Keeping invasive pests off Hōlanikū."

5-LS2-1	LS: Life Sciences, 2: Ecosystems: Interactions, Energy, and Dynamics	1: Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.	LS2.A: Interdependent Relationships in Ecosystems The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. LS2.B: Cycles of Matter and Energy Transfer in Ecosystems Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment.	Students may consider the dietary information found in the hotspots about various bird species. Though not specifically highlighted in the virtual field trip, students may consider how guano (bird poop) introduced nutrients to Hōlanikū and its surrounding waters, providing nutrients for marine life (coral, seaweed, etc.). The marine ecosystem provides food for fish, which in turn provide food for the birds.

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.	Students may consider the changes that Hōlanikū has experienced over the years during military occupation and the introduction of rats, ants, and invasive plants. The resilience of Hōlanikū‘s ecosystem can be seen in the health of its populations following the removal of these impacts. Students may also consider the story of koloa pōhaka in discussing ecological resilience, and how this species has been intentionally spread to multiple islands to make it more resilient to ecological disruptions that occur on any one island.
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.	The Stop 6 video "Keeping invasive pests off Hōlanikū" describes human changes to the island, including the installation of military infrastructure and the introduction of invasive species. Students may discuss the changes to Hōlanikū‘s environment, and how conservation work attempts to reduce the impacts of those changes. Students can also review the examples of marine pollution in Stop 11 (South Point). What types of marine pollution come from human activities? What solutions can students think of to address this problem?

HS-LS2-7	LS: Life Sciences, 3: Earth and Human Activity	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. LS4.D: Biodiversity and Humans Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). (secondary) Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (secondary)	The Stop 6 video "Keeping invasive pests off Hōlanikū" describes human changes to the island, including the installation of military infrastructure and the introduction of invasive species. Students may discuss the changes to Hōlanikū‘s environment, and how conservation work attempts to reduce the impacts of those changes. Students may evaluate the efforts used by Kure Atoll Conservancy to restore the island's ecosystems. Students can also review the examples of marine pollution in Stop 11 (South Point). What types of marine pollution come from human activities? What solutions can students think of to address this problem?

1-LS1-2	LS: Life Sciences, 1: From Molecules to Organisms: Structures and Processes	2: Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.	LS1.B: Growth and Development of Organisms Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive.	Many of the bird hotspots describe the number of eggs and whether both parents incubate the eggs. Students may consider the benefits of having both parents incubate an egg.
HS-ESS3-4	ESS: Earth and Space Sciences, 3: Earth and Human Activity	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.	ESS3.C: Human Impacts on Earth Systems Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. ETS1.B: Developing Possible Solutions When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (secondary)	Students can review the examples of marine pollution in Stop 11 (South Point). What solutions could students develop to address the problem of marine pollution?

Alignment with Nā Hopena Aʻo Statements

Hopena	Statement	Field Trip Connection
1. Strengthened Sense of Belonging	a. Know who I am and where I am from	As described in Stop 3, the Northwest Hawaiian Islands are part of Hawaiʻi and are not separate from the main Hawaiian Islands. Though remote, these islands are part of Hawaiʻi.
	b. Know about the place I live and go to school	
2. Strengthened Sense of Hawaiʻi	b. Use Hawaiian words appropriate to their task	The field trip prioritizes ʻōlelo Hawaiʻi names for species and locations throughout
	c. Learn the names, stories, special characteristics and the importance of places in Hawaiʻi	Stop 3 discusses the importance of the realms of Ao and Pō and the human connection to Papahānaumokuākea
	d. Learn and apply Hawaiian traditional world view and knowledge in contemporary settings	Stop 3 discusses Hawaiian perspectives on Ao, Pō, and Papahānaumokuākea
	g. Treat Hawaiʻi with pride and respect	The field trip presents a conservation ethic to students and features biologists working to treat Hawaiian ecosystems with respect
	h. Call Hawaiʻi home	Stop 3 discusses the Northwest Hawaiian Islands as part of Hawaiʻi.

‘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 significance and importance of stewardship, systems and cycles
Honua: Pono	Hua	Advocates for living pono and contributes to aina well-being