DLNR Virtual Field Trips: Keahou Bird Conservation Center

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

Alignment Summary

The Keahou Bird Conservation Center (KBCC) virtual field trip offers an educational experience that explores some the Hawaiian archipelago's protected wildlife. 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 the significance of these species facing complete extinction. Protective management and the diverse characteristics of forest bird species 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
K-ESS2-2	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	Part of the reason these birds are rare is loss of habitat due to deforestation in the early 1800s. Another reason is that

			(including humans) can change the environment to meet their needs	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."	humans introduced mosquitoes to Hawai‘i, which carry diseases that impact our native birds.
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."	In the wild, these birds live in habitats that have what they need. An example is the Hawiian honeycreeper, palila. Palila rely on māmane plants for food. Palila live where their food is available: on the slopes of Mauna Kea. The same is true for the other birds at KBCC. While they are at the center, humans provide the food and habitat the birds need until they can be returned to the wild.
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)"	Part of the reason these birds are rare is loss of habitat due to deforestation in the early 1800s. Another reason is that humans introduced mosquitoes to Hawai‘i, which carry diseases that impact our native birds. Students can develop solutions for reforestation or reduction of mosquitoes.
1-LS1-1	LS: Life Sciences	1: From Molecules to	1: Use materials to design a solution to a human	"LS1.A: Structure and Function All organisms have external parts.	Birds have different body parts to use in their survival, like legs and feet for

		Organisms: Structures and Processes	problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.	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."	grasping branches, wings for flying, and beaks for eating. Different bird species have different beak shapes depending on what they eat. The ʻakikiki has a very different beak from an ʻalalā. What does each bird eat? ʻAkikiki eat small insects that they find by poking around tree bark, lichen, and moss. ʻAlalā each a large variety of food, including larger fruits and even animals like mice.
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)"	Hawaiʻi's forest birds are important pollinators and seed dispersers for our native plants. Make sure to explore the species profiles linked beneath the videos about each bird species you meet. ʻAlalā are important seed dispersers of the plants they feed from (like ʻieʻie), as are palila for māmane plants. The other species in this field trip (ʻakikiki, ʻakekeʻe, kiwikiu) primarily eat insects, so they don't have a big role as seed dispersers. Some native birds are pollinators, but those species tend to be ones that eat nectar (like the ʻiʻiwi).
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."	Forest birds live in different habitats based on their needs for food, temperature, moisture, etc. A prime example from this field trip is the palila, which in the wild lives in the māmane forests of Mauna Kea. In contrast, ʻakikiki and ʻakekeʻe live in native forests on Kauaʻi where they can find

					insects living in bark, lichen, and moss.
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 native forest bird species. Part of the problem in our forests right now is that reproduction is a challenge for our birds because invasive predators like rats eat their eggs. This is part of the reason the birds you meet in this virtual field trip are cared for in a special center where there are no predators and where scientists can check on the health of the eggs. Visit the incubation room to learn more.
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."	Hawaiian forest birds are famous examples of natural selection and evolution. In particular, the group of birds known as the honeycreepers are well-known for evolving from a single ancestor species millions of years ago into over 50 species. These species vary widely in their beak shapes based on what they have evolved to eat. The ʻakikiki has a very different beak from an ʻalalā. What does each bird eat? ʻAkikiki eat small insects that they find by poking around tree bark, lichen, and moss. ʻAlalā each a large variety of food, including larger fruits and even animals like mice.
3-LS4-4	LS: Life Sciences	4: Biological Evolution: Unity and	4: Make a claim about the merit of a solution to a problem caused when the	"LS2.C: Ecosystem Dynamics, Functioning, and Resilience When the environment changes in ways	The forest birds you meet in this field trip are housed at KBCC because their environments have changed. These

		Diversity	environment changes and the types of plants and animals that live there may change.	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."	changes, including warmer temperatures and the arrival of invasive mosquitoes carrying diseases like avian malaria, have caused sharp declines of forest birds in the wild.
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."	Birds have different body parts to use in their survival, like legs and feet for grasping branches, wings for flying, and beaks for eating. Different bird species have different beak shapes depending on what they eat. The ʻakikiki has a very different beak from an ʻalalā. What does each bird eat? ʻAkikiki eat small insects that they find by poking around tree bark, lichen, and moss. ʻAlalā each a large variety of food, including larger fruits and even animals like mice.
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	The birds in this field trip are part of forest food webs. ʻAkikiki, ʻakekeʻe, and kiwikiu eat insects that are found in tree bark, lichen, and mosses. Palila eat māmane seeds. ʻAlalā have varied diets and eat fruits and animals. They process matter through ecosystems by eating food and then releasing bird droppings, which contain nutrients

				and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” (see link for more)	important for soil health and plant growth.
MS-LS1-4	LS: Life Sciences	1: From Molecules to Organisms: Structures and Processes	4: Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.	"LS1.B: Growth and Development of Organisms Animals engage in characteristic behaviors that increase the odds of reproduction. Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction."	The availability of māmame directly impacts the palila's odds of survival. The spread of māmame is directly impacted by a decrease in palila populations.
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 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."	Native forest birds are impacted by predation and rely on native plant and insect species for their survival. As native forest habitats decline or predator populations increase, native bird populations are likely to decrease.

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."	The forest birds you meet in this field trip are housed at KBCC because their environments have changed. These changes, including warmer temperatures and the arrival of invasive mosquitoes carrying diseases like avian malaria, have caused sharp declines of forest birds in the wild.
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)	Avian malaria is a primary source of native forest bird species loss (i.e., a reduction in biodiversity). A solution is the use of mosquito control tools, including the use of bacteria that reduce mosquito reproduction.
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 forests where these birds live have been impacted by human activities, including the introduction of predators and disease carrying mosquitoes, as well as changes in climate. 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."	Many of our native forest bird species have gone extinct or are endangered, in large part due to human activities like deforestation, introduction of invasive species, introduction of disease-carrying mosquitoes, 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."	Many of our native forest bird species have gone extinct or are endangered, in large part due to human activities like deforestation, introduction of invasive species, introduction of disease-carrying mosquitoes, and climate change. Students may evaluate the changes in stability of our forest ecosystems over time as human impacts have increased in Hawai‘i.
HS-LS2-	LS: Life	2:	7: Design, evaluate, and	"LS2.C: Ecosystem Dynamics,	Many of our native forest bird species

7	Sciences	Ecosystems: Interactions, Energy, and Dynamics	refine a solution for reducing the impacts of human activities on the environment and biodiversity.	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)	have gone extinct or are endangered, in large part due to human activities like deforestation, introduction of invasive species, introduction of disease-carrying mosquitoes, and climate change. 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 Aʻo 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	b. Use Hawaiian words appropriate to their task
	c. Learn the names, stories, special characteristics and the

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