

LESSON	Introduction to Limiting Factors in Ecosystems
OBJECTIVE	Students will identify the impact of limiting factors on populations and the role of bioacoustics in monitoring.
OVERVIEW	<ul style="list-style-type: none"> • Introduction to bird songs and their significance in identifying species. • Discussion on types of limiting factors of bird populations using local examples.

STANDARDS

Next Generation Science Standards

MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

HS-LS4-2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

Florida Sunshine State Standards

SC.7.L.17.3 Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.

SC.912.L.17.5 Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.

Key Vocabulary: bioacoustics, abiotic, biotic, habitat, ecosystem, population, species, community, competition, predator, prey, biodiversity, reproduction, rookery, nesting, migration, adaptation, limiting factor, carrying capacity

Websites

All About Birds: <https://www.allaboutbirds.org/news/>

BirdCast: <https://birdcast.info/>

2023 Haikubox Bird of the Year: <https://public.flourish.studio/visualisation/16152927/>

Using Bioacoustics to Improve Conservation: https://www.youtube.com/watch?v=wUn_hL1hPxY

Could an Orca Give a TED Talk?: https://www.ted.com/talks/karen_bakker_could_an_orca_give_a_ted_talk/transcrip

RAFT Writing Strategy: <https://www.readwritethink.org/professional-development/strategy-guides/using-raft-writing-strategy>

ACTIVITIES

ENGAGE

- Think-Pair-Share – Ask students what they know about bird songs.
- Introduce students to the Haikubox and show recent identifications.

EXPLORE

- Play recordings of birds identified with the Haikubox. Have students research the reasons for bird vocalization in groups and report out.
- Show students the video of 2023 Haikubox Bird of the Year: Dark-eyed Junco.
- Find examples of local birds that migrate using the Bird Cast website.

EXPLAIN

- Define bioacoustics and ask students how it might be used by scientists. Show Using Bioacoustics to Improve Conservation.
- Introduce limiting factors to students and a reason for bird migration (nesting sites, prey, predators, competitors, etc.). Have student groups research a local bird and create a list of related limiting factors.

ELABORATE

- Students will work in groups to create a profile of a local bird species of their choice. They can create a poster with the following information (All About Birds website): Common name, scientific name, food, nesting site, mating behaviors, conservation status. Students can also draw and label a food web showing the bird's place in the community.

EVALUATE

- Gallery Walk. During this teaching strategy students around the room and provide feedback using sticky notes. Use Two Stars and a Wish (two positive comments and one constructive comment of question), or spend time discussing how to provide feedback to peers before the activity. Provide students with at least 5 minutes to review each poster. When groups return to their work allow them time to review the feedback and answer questions from their peers.
- Just a Minute – Students will record a video on [Flip](#) for a full minute sharing what they learned about birds. They must speak continuously without repetition.

EXTENSION

- Watch “Could an Orca Give a TED Talk?” and discuss.

LINKS TO OTHER CONTENT AREAS

English and Social Studies: Students research local historical changes impacting bird populations due to human activity. Using the RAFT writing strategy, will write a letter to a local nonprofit, government agency, etc.