BACK BAY SCIENCE CENTER

Bird Survey

ACTIVITY- Bye-Bye Bird, *Flyway* Home

TIME: 35-50 minutes
GRADE LEVEL: 7th-12th
GROUP SIZE: 15 students

Activity at a Glance: As part of the Pacific Flyway, the Upper Newport Bay Ecological Reserve can host nearly 30,000 bird visitors on any one day. Students will have the opportunity to learn practices used in the field to identify different species of birds and their behaviors.

NEXT GENERATION SCIENCE STANDARDS:

PERFORMANCE EXPECTATIONS

MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
MS-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.
HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data • Analyze and interpret data to provide evidence for phenomena (MS-LS2-1). **Constructing Explanations and Designing Solutions** • Construct an explanation that includes qualitative or quantitative relationships between variables that describe phenomena (MS-LS4-4). **Using Mathematics and Computational Thinking** • Use mathematical and/or computational representations of phenomena or design solutions to support explanations (HS-LS2-1).	**LS2.A Interdependent Relationships in Ecosystems** • Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with non-living factors (MS-LS2-1). • In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction (MS-LS2-1). • Growth of organisms and population increases are limited by access to resources (MS-LS2-1). • Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and non-living resources and from such challenges as predation, competition, and disease. […] (HS-LS2-1). **LS4.B: Natural Selection** • Natural selection leads to the predominance of certain traits in a population and the suppression of others (MS-LS4-4).	**Cause and Effect** • Cause and effect relationships may be used to predict phenomena in natural or designed systems (MS-LS2-1, MS-LS4-4). **Scale, Proportion, and Quantity** • The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs (HS-LS2-1).

Ocean Literacy Principle 5: The ocean supports a great diversity of life and ecosystems
I- Estuaries provide important and productive nursery areas for many marine and aquatic species.

BACKGROUND INFORMATION

Newport Beach is located along the Pacific Flyway. Birds migrating north from South America in the Spring (as it gets colder in the Southern Hemisphere), and south from Alaska in the Fall (as it gets colder in the Northern Hemisphere), have to stop along their journey for rest and food. Wetlands supply both resources. Wetlands are used by fish as nurseries protected from the severity of the ocean environment, so birds have a ready food source. The Bay also has several resident populations that do not migrate. A few rare and endangered species can be seen here as well.

The Newport BBSC offers a wonderful opportunity to view a natural ecosystem. The plants and animals found here are particularly well-adapted to our climate, soil conditions and topography. Within the entire ecosystem are several micro-habitats that reveal the biodiversity in our area. During observations, visitors will notice that birds tend to congregate in distinct areas, each with its own food web. Some birds favor the scrub; some the mudflats; others are found along the water line; and others can be found swimming or exploring in the deeper waters. Even in a small area, a tremendous number of birds can co-exist without competition because they are adapted to hunt for different types of food!

Deeper Waters: The egrets and herons have long beaks and legs that allow them to hunt in the deeper waters. Their long beaks are strong and tapering - good for stabbing fish. Their feet have separated toes for steadier walking in the mud.

Mudflats: Birds in the mudflats must have beaks that allow them to dig through the mud. There is a wide variety of species that hunts here, and the beak sizes and shapes are highly adapted to effectively hunting out specific prey. The shorter its legs and beak, the closer to the shoreline a bird will hunt. They also have specific hunting behaviors that have been adapted to hunt particular prey. The Northern Shoveler has a broad beak that can shovel through the mud, straining out the food. Stilts, avocets, willetts, curlews and dowitchers are able to find enough food without competition because of their different beaks and leg lengths. Stilts and avocets have different beaks, and because of their size, hunt at different depths of the mud. Avocets sweep their long bills through the wet mud, and also have partially webbed feet which allow foraging in deeper waters.

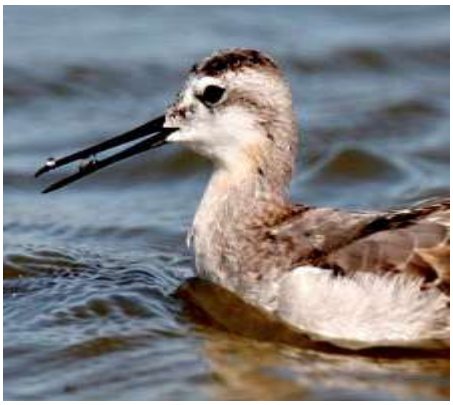
Shoreline: The sanderlings are small and can be seen running quickly along the shore-line. They're actually missing the back toes on their feet – this tilts their body forward and aids momentum as they run towards the receding wave to dig in the sand, and then run away from the next incoming wave.

Swimmers: The 'swimmers' have webbed feet, which can propel them. This is a very diverse group, including gulls, terns, cormorants, teals, mallards, coots and grebes. It may seem curious that such a diversity of species can hunt for food without competition. A more careful look at the beaks of terns and gulls, for example, reveals distinct

differences. The endangered California Least Tern may be seen in this area.

Hunting behaviors also differ. Some of the birds in this group dive deep into the water searching for fish (cormorants and terns) or plants, while others 'dabble' their heads just below the water surface for passing items. Several of the species, such as the Mallard, are opportunistic, with beaks that enable them to catch a wide variety of food, whatever they find.

Scrub: The 'scrub' also has a variety of niches. While the hummingbirds go after nectar, some species shuffle in the dirt for insects, others turn over leaves for larvae, while others are able to break open seeds with their broader beaks. The endangered California Gnatcatcher and Belding's Savannah Sparrow may be seen here.



Raptors: Raptors such as hawks, osprey, harriers and kestrels have a better view of their prey from above. They are commonly seen flying or on a high tree branch. Their beaks and talons are curved, sharp, and strong – for holding onto prey as they eat. The endangered Peregrine Falcon may be seen here.

TYPES OF BIRD FEET:

Perching: One toe pointing backwards allowing bird to grasp onto its perch, seen in phoebes, wrens, swallows.
Climbing: Two toes pointing backwards allowing bird to climb up and down or sideways on tree trunk, seen in woodpeckers.
Webbed: Webbing between toes allows more efficient movement in the water or sand, seen in coots, ducks, cormorants, gulls.
Wading: Long toes distribute weight of bird over a larger are which helps birds walking in mud, seen in herons.
Talons: Hooked claws that can grasp onto a live animal and hold it, seen in raptors such as ospreys, hawks, kestrels and owls.

Resources:
http://newportbay.org/wildlife/birds/
http://www.allaboutbirds.org/
http://www.fernbank.edu/Birding/bird_feet.htm

TEACHER GUIDE – Bird Survey

ACTIVITY: Bye-Bye Bird, *Flyway* home

OBJECTIVES:

Students will be able to:

1. Analyze and interpret data to provide evidence there is competition between varying bird species in the mudflat and the impact it has on their populations.
2. Construct an explanation based on evidence that genetic variations of traits in the bird population (e.g. leg length, beak size and shape, etc.) increase the chances of survival and reproduction in the mudflat.
3. Use mathematical and/or computational representations to support explanations of limited resources and its effect on carrying capacity of the mudflat ecosystem

MATERIALS:

Binoculars for each participant
Spotting scopes
OC Bird Field Guides
Observation Worksheets

KEY TERMS:

adaptation biodiversity competition ecosystem endangered food-web micro-habitat migration mudflat niche opportunistic Pacific Flyway prey raptor resident resource scrub wetland