

LESSON 3 | SPECIES 1

Species: *Lepus americanus* (Snowshoe Hare)

SPECIES INFORMATION

Snowshoe hares are forest-dwellers that prefer the thick cover of brushy undergrowth. They are primarily a northern species that inhabit boreal forests and can range as far north as the shores of the Arctic Ocean. Hares are a bit larger than rabbits, and they typically have taller hind legs and longer ears. Snowshoe hares have especially large, furry feet that help them to move atop snow in the winter.

Snowshoe hares feed on plants such as, grass, ferns and leaves. Their main predators include lynx, foxes, coyotes, raptors and birds of prey. Young hares are frequently eaten by red squirrels. Most hares live less than a year because of predators.

One defense against predators is that snowshoe hares have a snow-white winter coat that turns brown when the snow melts each spring. It takes about ten weeks for the coat to completely change color. Hares switch color in the spring and fall in response to light, when the days get longer or shorter. However, if the snow comes late, the result is white hare on brown ground. Unfortunately the hares still think they are camouflaged and act like predators can't see them and are usually eaten.

CLIMATE CHANGE CHALLENGE

Hares are consistently molting (changing color) at the same time, year after year. However, due to climate change the snowfall comes later and melts earlier resulting more and more times when hares are mismatched with the environment.



A white snowshoe hare against a brown background makes the animal easy prey.

Information from: <http://www.npr.org/2013/09/08/220188619/climate-change-leaves-hares-wearing-the-wrong-colors>

LESSON 3 | SPECIES 2

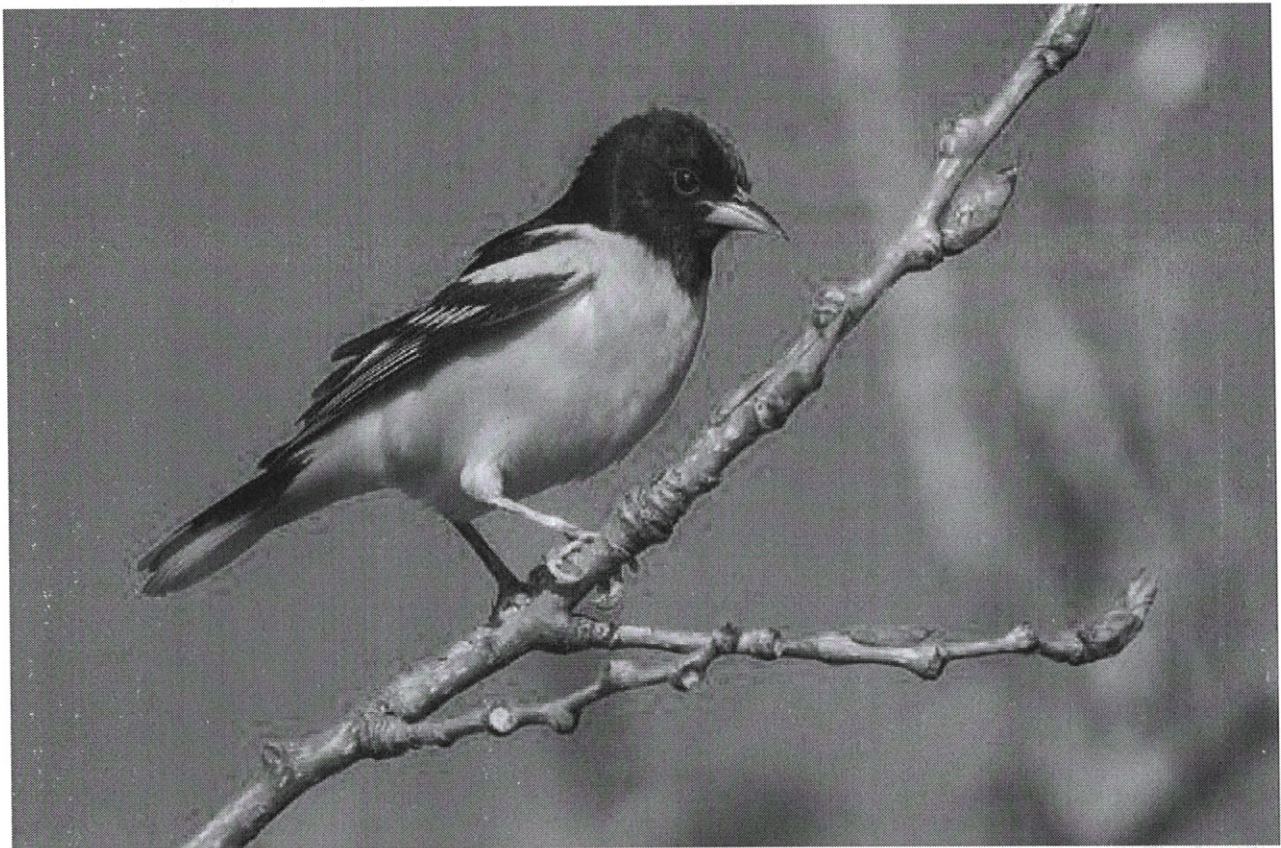
Species: *Icterus galbula* (Baltimore Orioles)

SPECIES INFORMATION

Baltimore Orioles spend summer and winter in entirely different geographic ranges. From early April to late May, flocks arrive in eastern and central North America to breed. These breeding grounds range from Louisiana (31°N) to Canada (50°N) where they prefer open woodland, forest edges, river banks, and small groves of trees. They will also forage for insects and fruits in brush and shrubbery during this time. Post breeding season they begin to migrate to wintering grounds ranging from Florida (25°N) to the Caribbean (15°N). This migration season can begin as soon as July, where they will remain until the next breeding season.

CLIMATE CHANGE CHALLENGE

Due to climate change the Baltimore Orioles limited North American summer breeding range may shrink. Warming will likely harm vegetation that birds rely on for nesting and food in the southern part of the breeding grounds.



Information from: http://www.allaboutbirds.org/guide/Baltimore_Oriole/lifehistory and
<http://climate.audubon.org/birds/balori/baltimore-oriole>

LESSON 3 | SPECIES 3**Species: *Spheniscus magellanicus* (Magellanic penguin)****SPECIES INFORMATION**

The Magellanic penguin is a South American penguin, breeding in coastal Argentina, Chile and the Falkland Islands. Magellanic penguins feed in the water, preying on cuttlefish, squid, krill, and other crustaceans.

Magellanic penguins mate with the same partner year after year. The male reclaims his burrow from the previous year and waits to reconnect with his female partner. The females are able to recognize their mates through their call alone. Both the male and female penguins care for their young, taking turns incubating the eggs and feeding their chicks.

CLIMATE CHANGE CHALLENGE

Weather records show that there is more rainfall and more severe storms occurring in Magellanic penguin breeding grounds. Warmer air temperatures mean not only hotter weather, but also more evaporation from the Atlantic, which puts more moisture in the air and thus creates wetter storms. Juvenile penguins are dying of hypothermia after heavy rain. Chicks are covered in down. Their juvenile plumage doesn't come in to protect them at all until they are older than 40 days.



Magellanic penguins strut their stuff on the rocky shoreline of Argentina's Punta Tombo, home to the largest colony of the birds in the world.

Information from: <http://www.wcs.org/saving-wildlife/birds/magellanic-penguin.aspx> and
<http://www.npr.org/2014/01/30/268908419/changing-climate-in-argentina-is-killing-penguin-chicks>

LESSON 3 | SPECIES 4

Species: Pacific Northwest Shellfish

SPECIES INFORMATION

In North America we eat a few different varieties of bivalves including clams, mussels, oysters, and scallops.

Oysters are filter feeders, drawing water in over their gills through the beating of cilia. Suspended plankton and particles are trapped in the mucus of a gill, and from there are transported to the mouth, where they are eaten, digested, and expelled. Oysters usually reach maturity in one year. They are protandric meaning during their first year they spawn as males by releasing sperm into the water. However, as they grow over the next two or three years and develop greater energy reserves, they spawn as females by releasing eggs.

Scallops are found in all of the world's oceans and are primarily "free-living". Many species are capable of rapidly swimming short distances and even of migrating across the ocean floor. The scallop family is unusual in that some members of the family are dioecious (males and females are separate), while others are simultaneous hermaphrodites (both sexes in the same individual), and a few are protoandrous hermaphrodites (males when young then switching to female).

CLIMATE CHANGE CHALLENGE

As levels of CO₂ continue to rise some of the CO₂ is absorbed by the ocean. When CO₂ combines with water it produces carbonic acid and results in ocean acidification. The Vancouver Aquarium has recorded a steady decrease in water pH in the Pacific Northwest waters, from an average of around 8.1 until 1974 to levels as low as 7.2 in recent years. Acidic waters make it harder for oyster and scallop larvae to form their hard shells. Thinner, more fragile shells make them vulnerable to predators and diseases.



A geoduck (long neck clam) farm near Totten Inlet, Washington.

Information from: <http://www.nature.com/nclimate/journal/v5/n3/full/nclimate2508.html> and <http://www.washingtonpost.com/news/energy-environment/wp/2015/02/24/climate-change-is-really-bad-news-if-you-like-oysters-scallops-and-clams/>

LESSON 3 | SPECIES 5

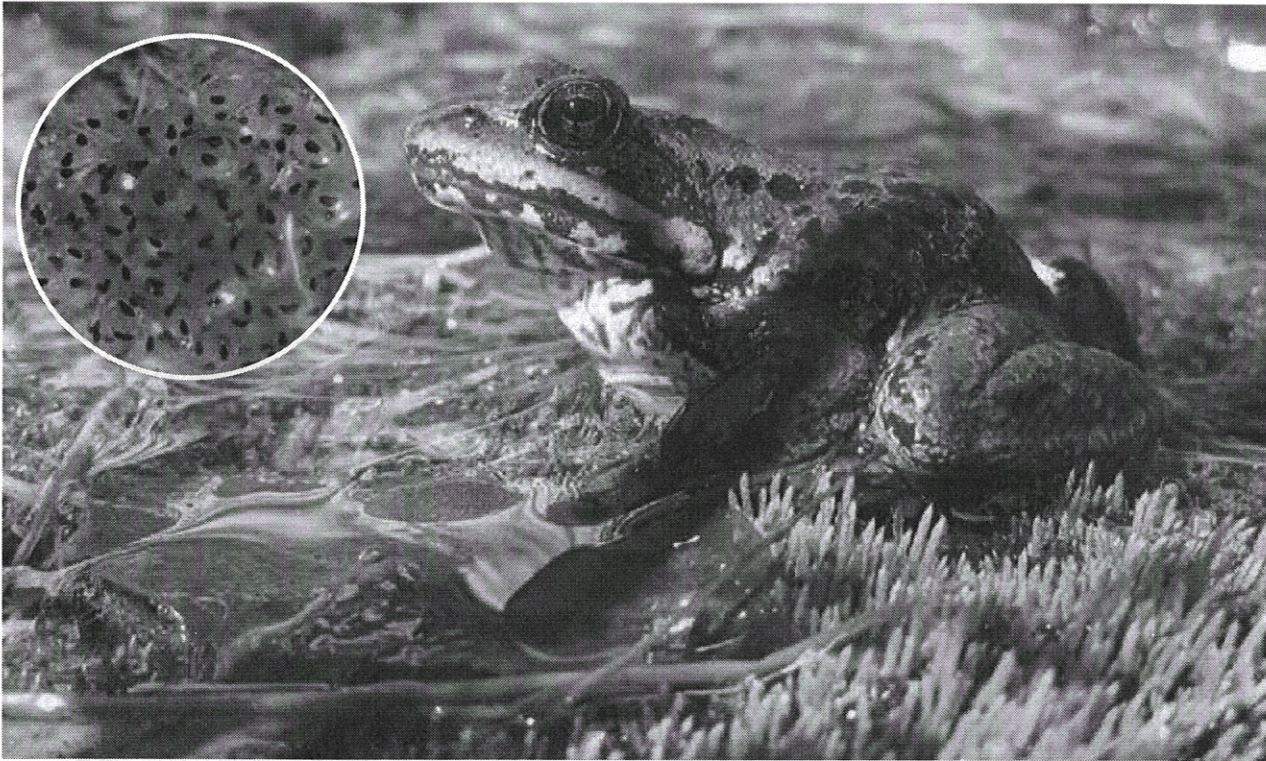
Species: *Rana cascadae* (Cascades Frog)**SPECIES INFORMATION**

Cascades frogs (aka the “chuckle frog”) live in the mountains of the Northwest and thrive in alpine wetlands fed by melting snow. Cascades frogs spend most of the year beneath dozens of feet of snow. But for a few months in the summer, the frogs come to warm sunny ponds produced from snowmelt to feed and mate. Females can only breed once a year. A single female will lay up to 425 eggs at a time, but very few tadpoles will live past their first year. The eggs hatch within eight to 20 days, which immediately begins the “larval period.” Their larval period lasts 80 to 95 days.

Most frogs reach their full size after three years, after which they become fertile and can begin mating. Adults appear to use the same breeding sites for several years. Larvae are thought to be primarily benthic feeders (organisms who obtain energy from the consumption of sedimentary material) and adults are thought to consume a variety of invertebrate prey and will occasionally consume other frogs and tadpoles.

CLIMATE CHANGE CHALLENGE

The Pacific Northwest has lost about 50 percent of its snowpack over the last 50 years. With less snowpack and hotter summers, more egg sacks and tadpoles (aka the larval stage) are stranded out of water and die.



Information from: <http://www.npr.org/2013/08/07/209892263/climate-change-could-spell-final-chuckle-for-alpine-frog>

LESSON 3 | SPECIES 6

Species: *Calidris canutus* (Red Knot)

SPECIES INFORMATION

Red Knots make one of the longest yearly migrations of any bird, flying more than 9,300 miles from south to north every spring; they repeat the trip in reverse every autumn. Red Knots concentrate in huge numbers at traditional staging grounds during migration. Delaware Bay is an important staging area during spring migration, where the Red Knots feed on the eggs of spawning horseshoe crabs. It is estimated that nearly 90 percent of the entire population of the Red Knot subspecies *C. rufa* can be present on the bay in a single day.

CLIMATE CHANGE CHALLENGE

The horseshoe crabs and the birds have to arrive at the same time if the Red Knots are going to make it to the Arctic to nest. This timing is critical since the birds need the energy from consuming the horseshoe crab's eggs to finish the migration. Warming water temperatures could prompt the crabs to lay eggs before the birds arrive. Climate change could throw this critical meeting out of sync. In addition, rising seas and bigger storms are washing away the beaches where the horseshoe crabs come to mate.



At high tide thousands of mating horseshoe crabs gather along the water's edge. Migrating red knots roughly double their body weight in 10 days of gorging on the crabs' fatty eggs.

Information from: <http://www.npr.org/2014/07/28/319092192/shifts-in-habitat-may-threaten-ruddy-shorebirds-survival>