Refuge Explorer

-Change Edition-

Columbian White-tailed Deer and Great Blue Heron Use Bridge
USFWS Photo

Willapa National Wildlife Refuge

Every one of us makes a difference every day. Everyone has a role to play.
Dr. Jane Goodall

Refuge biologist collects pink sandverbena seeds
USFWS Photo

Change Happens

Change happens in and to the web of life. Animal and plant populations rise and fall, natural events such as floods, fires, and windstorms alter habitats, and humans can change habitats through their actions. Change can happen on a local, regional, national, and global scale.

Change is dynamic in Willapa National Wildlife Refuge. Life in the refuge is adapted to daily tides, and seasonal winds and floods. Saltmarsh plants are adapted to salty conditions caused by tides. Red alder trees can grow quickly on post-flood streambanks or forest openings.

Humans have altered the habitats of Pacific County for centuries – not always for the benefit of wildlife. Refuge staff works with other agencies, organizations, tribes, land owners and people, just like you, to make habitat better for plants and animals.

Make a list of natural events or human activities that have changed habitat in your neighborhood. Circle the changes that also affect refuge habitats.

1. _____

_____

2. _____

_____

3. _____

_____

_____

Non-native beach grass on dunes
© Dr. Madeline Kalbach

Wildlife on the Brink

Everything is connected in the web of life. Some species are dependent on specific habitat (food, water, shelter, space) to survive. These specialists can be in grave danger if their habitat changes. Without additional adaptations, the populations of specialists decrease or disappear as their habitats change.

The United States Congress passed the Endangered Species Preservation Act in 1966, and then a more comprehensive law, the **Endangered Species Act** (ESA), in 1973 to help animals and plants. This legislation allows for the identification, protection, and recovery of threatened and endangered birds, insects, fish, reptiles, mammals, crustaceans, flowers, grasses, and trees. Not only are the organisms protected by this law, their habitat is, too!

Under the Endangered Species Act, species may be listed as either endangered or threatened. **Endangered** means a species is in danger of extinction. **Threatened** species are those likely to become endangered within the "foreseeable future." **Candidate Species** are species that have been recommended for listing as threatened or endangered.

Each State has similar laws that protect local populations of species in decline.

Marbled Murrelet
USFWS Photo

Willapa National Wildlife Refuge is home to several species listed as threatened under the federal Endangered Species Act: Eulachon, Green sturgeon, Western snowy plover, Marbled Murrelet, and Streaked horned lark.

Save the Date

Third Saturday in May

Endangered Species Day was created to encourage people to know more about wildlife in trouble.

It has been estimated that a fifth of the world's mammals, birds, reptiles and fish are in danger of becoming extinct.

There are more than 1,300 species listed as threatened or endangered in the United States.

Use this day to help local wildlife!
Create a poster or display about a local threatened or endangered species. Display your project at school or the public library to teach others about the importance of habitat. Don't forget to include what they can do to help this species survive.

For more information:
www.fws.gov/endangered/

Words to Know

Fact: A thing that has actually happened or is actually true; the state of things as they are. Example: I observed a bird on a mudflat.

Inference: The act or process of using the information we know to make an educated guess. Example: Based on my obervation, I infer that the bird finds food on the mudflat.

Experiment: A test with the purpose of discovering something unknown or to support an idea. An example of an experiment based on this inference would be to make a series of observations about how the bird behaves on the mud flat (can I observe it hunting and eating?).

Greater yellowlegs
©Dr. Madeline Kalbach

Variable: Something that may or does change. It is important to note things that may change the results of an experiment. For example the bird may have several different behaviors it uses to find food, the bird may use a habitat to rest or

Spotlight on Science

The U.S. Fish and Wildlife Service is both a wildlife management and conservation agency. It works with others to conserve, protect and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American People. To do this work, refuge staff use science.

Species are observed and recorded to create an **inventory**. This inventory is a list of all species observed within a specific location. The list includes how often the species is seen. Once the refuge knows what species occur on the refuge, they can use techniques to **monitor** the species for changes. Refuge staff use **facts**, including observations, to make an **inference**. Refuge staff and volunteers can **infer** habitat change from **observing** a population increase or decrease. Inferences can be tested through an **experiment**.

When scientists test their inferences, they try to create an experiment to ensure the results accurately reflect what they are testing for. They do this by eliminating or accounting for **variables** (things that may change the results). They also complete the experiment many times to increase the likelihood that the results did not happen by chance.

A Puzzle...

Refuge Biologist Marie Fernandez had a puzzle on her hands. While conducting a stream survey at Willapa National Wildlife Refuge she found lamprey upstream from a culvert. She knew several facts: 1) Lamprey swim upstream from the bay to spawn in fresh water streams. 2) The culvert was above the stream's water level. This made it impossible for the lamprey to travel upstream beyond the culvert.

Marie inferred that these lamprey had lived in the stream their whole life.

Marie tested her inference by closely examining the lamprey she found. She correctly identified them as Western brook lamprey - a new species for the refuge inventory!

Western Brook Lamprey
USFWS Photo

Being a Biologist - Curiosity is Key

Biologists are people who study living organisms. This includes the study of adaptations, and the connections between organisms and their habitats.

William Ritchie is a biologist at Willapa National Wildlife Refuge. He loves his job because he observes interesting things, learns about wildlife and takes action to help plants and animals. He uses facts from his college studies. He also finds facts by reading about experiments and talking with other biologists. Facts make him curious. With these facts he is able to make inferences about wildlife at the refuge and test them through experiments.

His inferences and experiments help Western snowy plovers, Streaked horned larks, Marbled murrelets and waterfowl. He is involved with many projects; most of which enhance habitats that are no longer good homes for these animals. One project is to restore forest habitats. This restoration effort will increase nest sites for marbled murrelets. He is also creating grassland habitat for Oregon silverspot butterflies.

William Ritchie's curiosity about seabirds, like the marbled murrelet, inspired him to become a refuge biologist.
What are you curious about? Write a list below:

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

Preparing to plant early blue violets
USFWS Photo

"I like the challenges posed by habitat restoration. I get to see how resilient plants and animals can be, and how quickly they respond when we start to rebalance the natural systems," says William Ritchie

Creature Feature

Oregon Silverspot Butterfly

The Oregon silverspot butterfly is a specialist. It lives only in coastal grasslands where it can find its food source, the early blue violet. This butterfly once lived in coastal Washington, Oregon and Northern California. It is now found only in four sites in Oregon. Habitat changes caused by land development, livestock grazing, off-road vehicle recreation, invasive plants, pesticide use, and changes in wildfire patterns affect this species. It is listed as a threatened species under the U.S. Endangered Species Act.

Willapa National Wildlife Refuge is working with many partners on grassland habitat restoration. We hope to reintroduce this butterfly to the Long Beach Peninsula.

Learn more:
www.fws.gov/refuge/willapa

A Good Question

Would you like to know more about Willapa National Wildlife Refuge? The Refuge Expedition is an opportunity to answer your questions. All explorers plan before a trip. **Your first step in planning is to make a list of questions below:**

I want to know...

1). Do Roosevelt elk live on Long Island?

2).

3).

4).

5).

Early Blue Violets

This small violet is important habitat for the Oregon silverspot butterfly.

A Good Question, Continued

Pick two of your questions and write all the facts you know about the subject. Use your observations from lessons, information from workbooks, the pocket wildlife guide and the refuge brochure to find facts. You may also use books from the library or the internet if they are available.

Example: Elk are herbivores. Elk are generalists and can eat lots of different plants. Elk leave large tracks, and piles of rounded pellets/scat.

Observing small fish from a refuge stream
USFWS Photo

What's Your Guess?

Make an inference based on the facts you have gathered. Remember an inference is an educated guess based on facts. **Write at least two inferences below.**

Example: I will find evidence that elk live in the forest.

1. _____

_____

2. _____

_____

Roosevelt Elk
©Rollin Bannow

Elk Scat
©Julie Tennis

Your Help is Requested

Now that you have been trained as a Refuge Explorer, the refuge needs your knowledge and skills to help wildife. Think about the inferences you made above. How will testing these inferences help refuge wildlife? **Circle your guess(es) below:**

Species found for inventory

Habitat change observed

Decrease in species population noted

Benefit of habitat enhancement discovered

Increase in species population noted

Idea for habitat enhancement uncovered

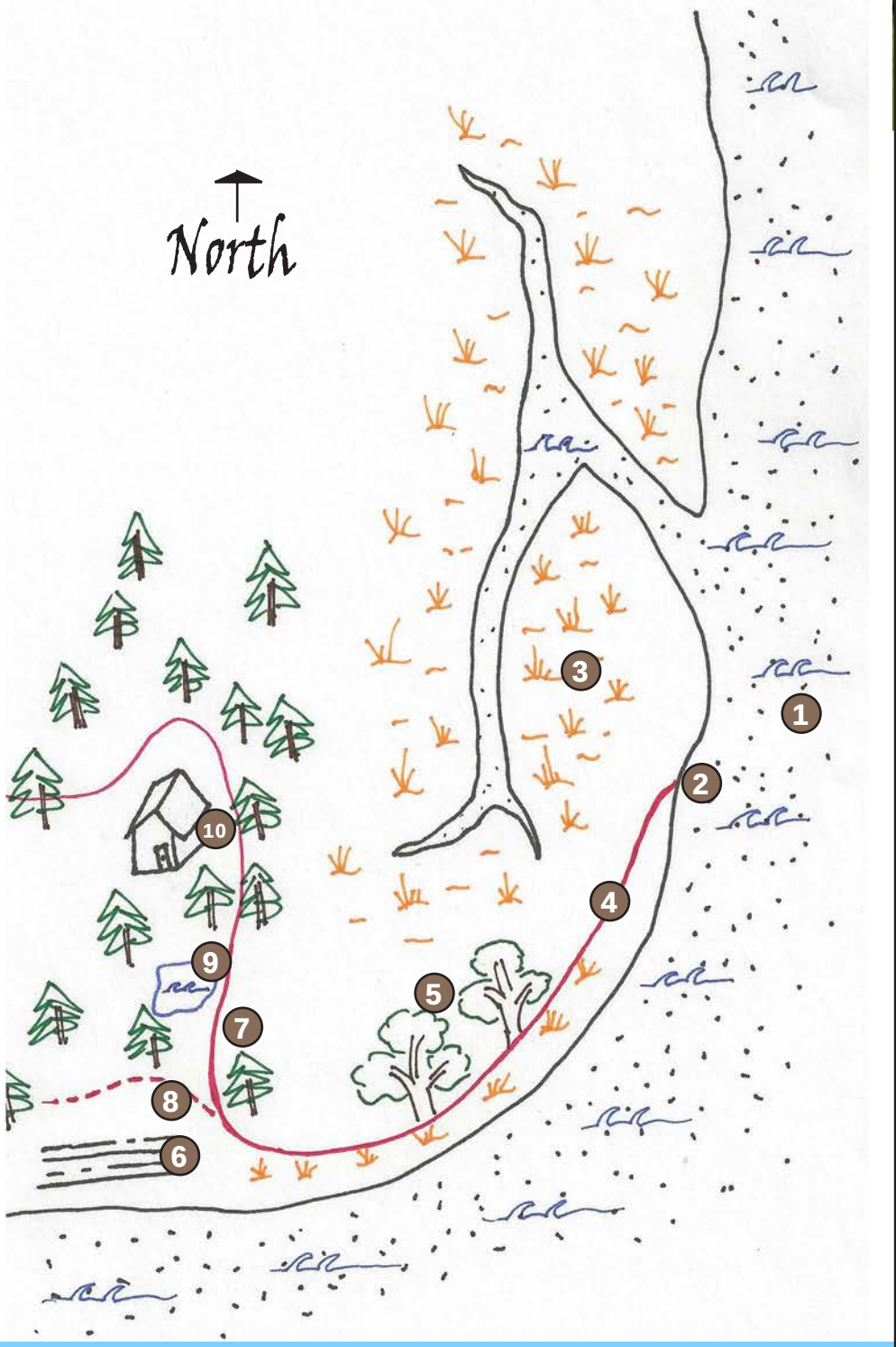
New species adaptation observed

Other: _____

Elk jaw on forest floor
USFWS Photo

Long Island Habitat Map

Where will you experiment? **Look at the habitat map below and choose the best locations to test your inferences.**



1. **Bay & Mudflats**
2. **Boat Landing**
3. **Saltmarsh**
4. **Old Road**
5. **Deciduous Trees & Shrubs**
6. **Cliff Face**
7. **Forest**
8. **Trail**
9. **Freshwater Wetland**
10. **Refuge Building**

"Difference of opinion leads to inquiry, and inquiry to truth."
-- Thomas Jefferson

Refuge Explorers
USFWS Photo

Who? List the members of your Expedition:

How will you do your experiment? Use this space to describe each step of the test.

Example: We will look in the forest habitat for elk scat, tracks, or bones.

1.

2.

3.

4.

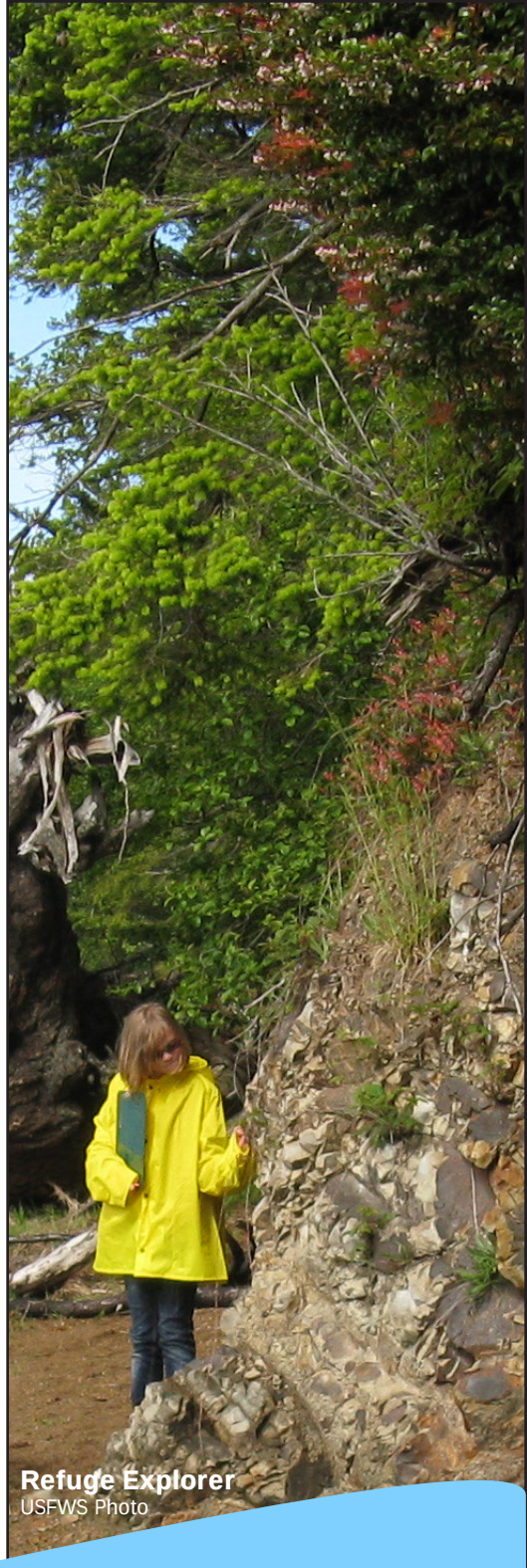
USGS Photo

Where will your experiment take place?

How will you get to this location?

What equipment or tools will you need?

Example: field guide, ruler, notebook, pencil, habitat map of Long Island



Refuge Explorer
USFWS Photo

Earth Detective

Scientists believed this area had an earthquake and tsumani in the year 1700. They inferred that there would be evidence left in soils around Pacific County - especially around the bay and stream edges. They tested by making observations of exposed soils along streambanks.

The photo to the left shows a plant fossil. The scientists infer that is was created by extremely fast moving water (a tsunami?) that pushed it over and quickly covered it in mud. The mud accumulated fast enough to preserve the stems and leaves of the plants. Compare the live plant in the person's hand with the fossil plant in the old layers of saltmarsh soil. Do they look similar?

Volunteers plant trees
USFWS Photo

Take Action for Wildlife!

Refuge Explorers play a key role in helping wildlife. What will you do to guarantee the future of local plants and animals? **Craft your pledge below:**

I promise to...

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

What You Can Do

- Join the Friends of Willapa National Wildlife Refuge
- Participate in refuge-sponsored events to help wildlife
- Teach someone about the refuge and local wildlife
- Record your wildlife observations online using eBird (www.ebird.org) or iNaturalist (www.inaturalist.org)

For more information visit:
www.fws.gov/willapa