



Washington
Department of
**FISH and
WILDLIFE**

Making Space for Wildlife

9-12 grade

Themes: Habitat Connectivity, Wildlife Corridors

Location:

Remote learning modification: Lesson can be taught over Zoom or Google Classrooms.

The PowerPoint, brainstorming, and assessments can be done in the classroom with student computers. If able, try planning a field trip to the Interstate-90 corridor or look for other corridors in your area that students can visit.

Standards:

NGSS

[HS-LS2-7](#)

Design, evaluate and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

[ETS1.B: Developing Possible Solutions](#)

When evaluating solutions it is important to take into account a range of constraints including costs, safety, reliability and aesthetics and to consider social, cultural and environmental impacts.

CCSS

[ELA-Literacy.SL.9-10.1.d](#)

Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.

[WA ESE Standard 2](#)

Students engage in inquiry and systems thinking and use information gained through learning experiences in, about, and for the environment to understand the structure, components, and processes of natural and human-built environments.

Objectives:

Students will...

1. Define what habitat fragmentation is and how it affects biodiversity.
2. Discuss and review possible actions to improve wildlife connectivity and why connectivity is important.
3. Compare different types of connectivity corridors and choose the best type for a given species.
4. Research and develop a map of core habitat and potential wildlife crossings in the Interstate-90 corridor for two to three species.
5. Reflect on how they can help wildlife connectivity in their communities.

Modifications, Adaptations:

For COVID-19 distance learning, or other remote learning modification, look for **Remote learning modifications** throughout the lesson plan.

Materials:

WDFW PowerPoints (3), Snoqualmie Pass I90 PDF, Species in Snoqualmie Pass PDF

Vocabulary:

Anthropogenic: Caused by human activity.

Biodiversity: The full range of life in all its forms. This includes the habitats in which life occurs, the ways that species and habitats interact with each other, and the physical environment and the processes necessary for those interactions.

Biogeography: Study of the distribution of species and ecosystems in geographic space and through geologic time.

Connectivity: The ability of organisms to move among separated patches of suitable habitat.

Core habitat: An area with suitable living conditions for a diverse, extinction-resistant population of species.

Corridor: Any space that facilitates connectivity over time among habitat patches.

Dispersal: The process of individuals leaving their home territory to look for a new place to live. This behavior can occur within and between habitat patches.

Fragmentation: When habitat is separated into smaller patches; correlates with lower overall species richness as well as lower biodiversity of native species

Metapopulation: Group of spatially separated populations of a single species which interact through dispersal or migration.

Migration: Seasonal movements between breeding and non-breeding animal ranges.

Montane: Relating to, growing in, or being the biogeographic zone of relatively moist, cool upland slopes below timberline dominated by large coniferous trees.

Stakeholder: A person or organization with an interest or concern in a topic.

Stepping-stone: Habitats or protected areas that are not physically connected but can facilitate dispersal or migration movements. Stepping-stones support metapopulations that are adapted to human activities and can disperse in fragmented (less specialized) or generalized habitats.

Procedure:

This lesson is designed to be taught over multiple class periods.

Introduction

Open up WDFW Animal Crossing PowerPoint. Make sure presenter notes are on. On the title slide, ask students what they know about wildlife corridors and crossings. Write student answers on board. Then read the "Science of Corridors" brochures.

The second slide provides a [link to a YouTube video](#) that will introduce important concepts for this lesson.

The third slide is a visualization. Have students listen while you read the following story. You may want to stop and introduce bolded vocabulary words as you come across them.



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A vocabulary list could also be given out beforehand.

*Deer State Park is a 600-acre wildlife reserve in Central Washington. A road had to be built through the park to allow traffic to commute between the east and west side of the state. When the road was built through the park, it **fragmented** habitat for the plants and animals who call Deer State Park home.*

Biologists from the Washington Department of Fish and Wildlife (WDFW) wanted to look at the effects of the road on the park's deer populations.

*They conducted a five-year study and found that two **metapopulations** had formed. Deer were still **migrating** and **dispersing** from one part of the park to the other, but otherwise stayed in either part A or B of the park. Biologists are concerned that without a **corridor** for the deer to cross, their population may start to decline or suffer.*

The biologists also noted a high instance in deer-vehicle collisions, particularly in breeding season. Since the road was built, an average of 13 deer per year were hit by vehicle traffic. A few collisions have caused human fatalities.

*As a resident who lives just outside the park, you use the park for recreation. You also use the road to visit family on the other side of the park. You belong to a group of **stakeholders** who are concerned for both motorists' safety and the deer crossing the road. Your stakeholder group is gathering to discuss the issues.*

Group students into three and have them discuss the following questions. They will share their answers with the class. You can choose to group students before you read the story, or after.

- 1) Is it important for animals to have the ability to disperse or migrate? Why or why not?
- 2) What are possible actions to help increase awareness of animals crossing the road?
- 3) What are possible actions to help the deer move more safely to and from the two parts of the park?
- 4) What, if any, complications might arise from these actions (differing viewpoints, funding, etc.)?

When students share their answers, you can write them on slides 4-7.

Remote learning modification: You can present the slides through Google Classroom and Zoom. You can use breakout rooms to have students discuss the questions. You can type their answers into the slides as a class or have them complete the questions as a solo activity via Google Slides.

Habitat connectivity

Have students [read this webpage](#) as an introduction to habitat connectivity. This short article will build on the PowerPoint and familiarize them with common terms and theories of wildlife connectivity.

Open up the WDFW Habitat Connections PowerPoint. Slides 2-5 explain why habitat connectivity is important for biodiversity. Slides 6-7 explain how habitat becomes fragmented and offers pictures of fragmented habitats

in Western and Eastern Washington. If you want more background on these topics, [please read this document pages 2-4](#).

After looking at pictures of fragmented habitat, you will review different types of corridors. Ask students to think about the pros and cons of using a stepping-stone compared to a continuous corridor. What might they want to take into consideration when planning for 1) all species? 2) a specific species?

Slide 9 looks at the original graphic and asks students to identify core habitat zones and what type of corridor they would use in this situation, and why.

Slides 10-13 highlight how WDFW and other agency habitat managers and biologists use connectivity information to make the most informed decisions concerning habitat preservation.

Final project

This project models the I-90 Snoqualmie Pass Project where dozens of stakeholder groups came together to improve safety for motorists and create wildlife crossings.

Students will start with a blank map on a PowerPoint slide. The first two slides show the direction in which wildlife are known to move. One slide has city features and the other does not.

You will explain that biologists are concerned that wildlife in the North Cascades and near Mt. Rainier are unable to cross I-90 like they have historically. The biologists have secured funding to create corridors for up to 10 contiguous miles on I-90. The students will explore Google Earth and identify a stretch of road that would be most suitable for wildlife crossings. Students may choose to use stepping-stone corridors, continuous corridors, overpasses, underpasses, or a combination.

Students will choose two to three species from the list biologists have compiled of known or suspected species in the region. They will research the species' natural history and known information (if any) for the region.

Using their research, they will use their map to identify core habitat for each of the three species. They must then choose what type of corridor they will construct and using best available knowledge of the species, hypothesize how the species may use the corridor for dispersal, territorial movement, or migration.

Students will use this [Google Earth Map](#) and will create a new project. They can zoom in and use 3D features to look at possible suitable connectivity options for their three species. In either a written or an oral report, students will explain their design for corridors. They should highlight their route on the map and draw in their connectivity features. They must consider:

- What types of vegetation, geologic or geographic features should the corridor have that's appropriate for movement of the species?
- What are the habitat requirements for the species?
- Does the animal require a lot of space with large, or little edges?
- What is the species' dispersal distance?



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- Does the species migrate? Where to and why? Is the species currently experiencing island effects or lack of gene flow?
- What other factors might make connection for this species a high priority over other species? (e.g., human use, biological importance, etc.)
- Are there any potential drawbacks to your corridors? Explain.
- What stakeholder groups might want to be involved in this project and why?
- How can we alter the built environment to complement the natural environment?

Have each student share one of their maps with the class. Similarities and unique ideas could be written down on a virtual or physical board. After students have shared their projects, share with them the WSDOT I-90 East map. You can explore this map as a class, noting where stakeholder groups have decided to create corridors.

Finally, this [30-minute documentary](#) summarizes the planning, development and implementation of the Snoqualmie Pass project. It highlights how diverse stakeholders came together. We encourage you to watch with your students, so they realize this work is actually happening in their state. After the video, ask students to brainstorm ways they could become involved in habitat connectivity in their community.

Extensions

Creating connectivity takes a variety of stakeholder groups and individuals to collaborate and come together. We highly recommend including [this Stakeholder Engagement lesson](#) to this unit. Just like the stakeholders of the I-90 Snoqualmie Pass Project, students will practice balancing funding, viewpoints, priorities, and other logistics in this real-world scenario.

-  **Idea:** Show off your students' work! Share student projects from this lesson with WDFW.
Facebook: @WashingtonFishWildlife
Instagram: @TheWDFW
Twitter: @WDFW
#WildWashington #WildWa

Supplemental Activities:

- [Teacher Resources-Conservation Corridor](#)
- [Habitat Fragmentation and Wildlife Corridor Unit- Yellowstone to Yukon](#)

Additional Resources :

More information:

You can use the following resources to build onto this lesson, or share these resources with students.

- [Arid Lands Initiative](#)
- [Washington Wildlife Habitat Connectivity Working Group](#)
 - [Statewide habitat analysis](#)
- [Corridor Concerns- Conservation Corridor](#)
- [I-90 Wildlife Bridges-Conservation Northwest](#)
- [I-90 Corridor- Conservation Northwest](#)
- [Snoqualmie Pass East Project- WSDOT](#)
- [Wildlife Crossing Structures and Research- Parks Canada](#)
- [Wildlife Crossing Success Stories- Center For Large Landscape Conservation](#)