



5TH GRADE

STEAM LESSON





DIVERSITY MAKES US STRONGER

Driving Question:

How is genetic isolation damaging for populations? What solutions can be created to prevent genetic isolation from occurring in urban areas?

Materials Needed:

Sketchbook or science notebook, graph paper, computer, tablet or other technology for research, prototyping materials such as a 3D printer, dirt, clay, paint and glue

In this lesson, students will:

- recognize the detrimental effects of urbanization on wildlife diversity and formulate a plan to help offset those effects.

National Learning Standards:

Science: 3-5-ETS1-2; 5-LS2-1
Social Studies: VIII,a; X,c; X,d; X,g



SPINNING THE COCOON

Divide students into four “populations” of a species and assign each population to a corner of the room. Within each of the populations, assign a quarter of the students the “safety” gene. Explain to students that a sickness has hit the species, and in order for the species to continue successfully, they must procreate with one of the individuals with the safety gene within two mating seasons. Mating can be represented by students giving each other high fives. Individuals can only mate with one other individual per season. The different populations of species will be able to share genes because there are no barriers to mating. Guide students through two seasons of “mating” to see how many offspring will survive. In this simulation, there should be a majority of individuals with surviving offspring.

Repeat the simulation, but put rows of desks between populations and tell the students that they cannot breed with other populations due to geographic barriers. With geographic barriers in place, you should see fewer surviving offspring. Complete the simulation one more time but put the majority of the students with the safety gene in one population together with the geographic barriers in place. At the end of this final simulation, there should be very few successful matings.

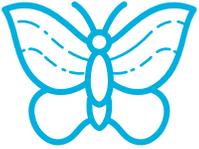
Ask students what would happen if this were real populations of species and roads were built to prevent mating between populations. As a class, discuss how geographic barriers such as roads or the formation of new rivers can change a population of species to the point where they either become extinct or genetically different from

the original population. Ask students for ideas of how barriers might be detrimental to species in other ways and compile a list on the board.



KERNEL OF KNOWLEDGE

In places like Wyoming, there are already several wildlife corridors that provide migration paths for pronghorn, elk and mule deer.



METAMORPHOSIS

Students will identify one of the species in their area that has been disturbed or may be disturbed in the future by urban development. Students should either observe or research the organism in depth to discover its mating and migration patterns. After researching this information, students should determine what urbanization processes may disrupt the ability for different populations of the species to mate and migrate.

After determining the species' patterns as well as possible disruptions to its patterns, students should develop ideas to help minimize such disruptions. After designing on paper, students should create prototypes to test. While students won't be able to test their models on the actual organism, having a 3D model will allow them to see any underlying problems such as disruptions to the human environment or possible design flaws. Students will finish their project with a design report outlining details about the species, where problems may arise with urbanization, and the solutions that they have designed.

THROUGH THE LENS



Students can document the process of creating their wildlife bridge/passageway using a smartphone or tablet. They can talk about the creative decisions that they made in their design as well as why creating these corridors is important. When they have finished recording, they can upload their video to Flipgrid or another app of your choosing.

UPCYCLE

As students look at this from multiple points of view, they will vote on the prototype they believe will do the most good, and attempt to have it put into place. As a class, they will perfect the prototype, outline a budget and present their idea to the city council. Their presentation should include the benefits to the animals, as well as identify how this technology affects people of the city, anticipating how it could create potential problems and roadblocks to installation.



eARTh

- How does our government protect wildlife?
- Why should we create wildlife corridors in the United States and how they can benefit individuals and society?
- In what ways can students gain a voice in protecting various species through establishing wildlife corridors?

To start, allow students to research the U.S. Department of the Interior and its functions. Depending on the technology available in your class, they can do this on computers, tablets or phones. Check their understanding by having a short discussion on the topic. Be sure they understand that it is within the executive branch, and that its purpose is to protect America's natural resources. Once they have a grasp of this agency, have them discuss endangered species and how wildlife corridors could help protect the wildlife around the country. Next, ask students what species could benefit from wildlife corridors.

Have students (individually or in a group) create a short video that evaluates how wildlife corridors could benefit society and how establishing more of these should be a priority of the government. Students may use free stock footage of wildlife from websites such as [videezy](https://www.videezy.com/) or take photos or video of wildlife they see naturally in their surroundings such as squirrels, opossums, rabbits, reptiles and birds.

While the U.S. Department of the Interior is a government agency whose main goal is to protect the nation's natural resources including its wildlife, it is important to note that it is restricted by a budget and legislation. Have students come up with ways to make their voice heard so that more wildlife corridors can be developed to protect wildlife. Have students post their videos to Flipgrid.

Community Garden

- Invite the community to come to a showcase of the bridge/passageway designs that the students create. Have the students present their pieces and discuss the importance of creating such pathways for the safety of animals, and ultimately, the survival of their species as urban development continues.



CAREER CONNECTION

Ecologist - An ecologist studies the interrelationships between organisms and their environments. For example, they may research how the creatures in forests, deserts, wetlands or other ecosystems interact with each other, as well as their environments. A degree in ecology or a related subject such as conservation biology, marine biology, zoology or environmental science is required for this career. A master's or doctoral degree is recommended for teaching or research positions.

Urban Planner - Urban and regional planners develop land use plans and programs that help create communities, accommodate population growth, and revitalize physical facilities in towns, cities, counties and metropolitan areas. Most urban planners have earned a master's degree in urban or regional planning, environmental planning, urban design or geography.

Construction Worker - A construction worker is a tradesperson, laborer or professional employed in the physical construction of the built environment and its infrastructure. A high school diploma or GED along with an apprenticeship, technical certificate, associate or bachelor's degree can be required, depending on the position.



CAREER HIGHLIGHT

James Balog has become a global spokesman on the subject of climate change and human impact on the environment. He founded the Extreme Ice Survey (EIS), the most wide-ranging, ground-based, photographic study of glaciers ever conducted. His film, *The Human Element*, explores how humanity interacts with and affects the Earth.

