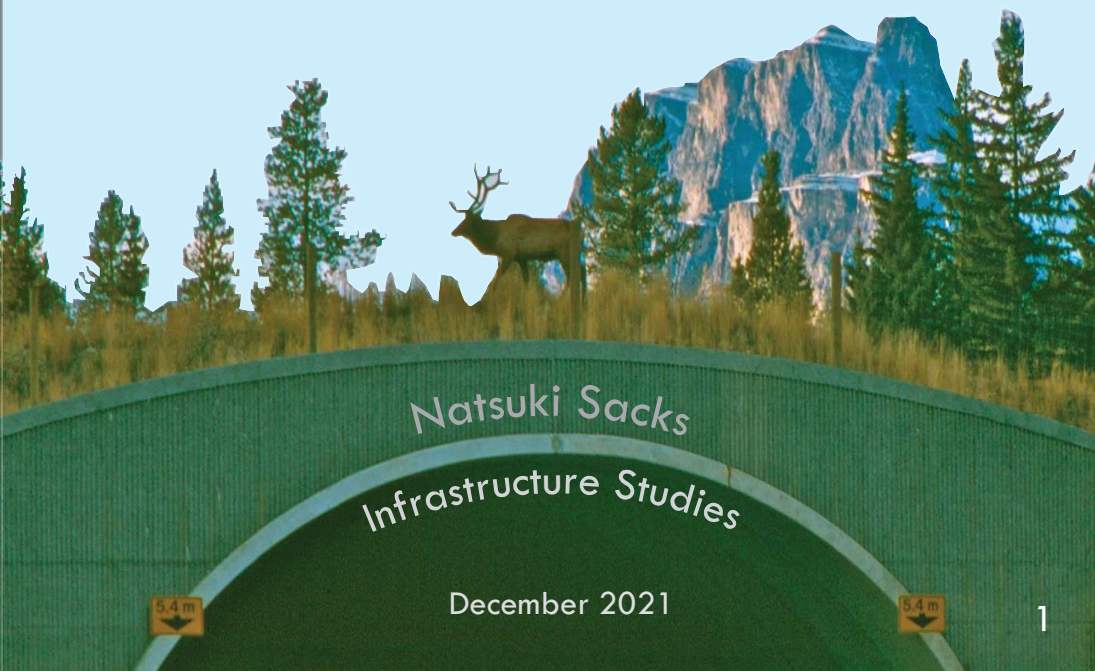


WLDLFE CROSSINGS



WHAT ARE WILDLIFE CROSSINGS?

Wildlife crossings are structures designed to provide safe passage for wildlife above or below a highway (overpasses or underpasses) for motorists' safety, endangered species conservation, and overall animal safety.

WHO ARE THEY THERE FOR?

SMALL

frogs tortoises
salamanders

MEDIUM

foxes badgers
racoons

LARGE

deers moose
bears wolves
...and much more!



Christmas Island, Indian Ocean

At the first rainfall of the wet season, millions of red crabs migrate from the forest to the sea to lay their eggs. Crossings are created to prevent road closures and protect the species from automobiles.

MORE THAN JUST BRIDGES

WILDLIFE CROSSINGS ENCOMPASS A WIDE VARIETY OF STRUCTURES MEANT TO HELP ANIMALS CROSS HUMAN-MADE BARRIERS SAFELY.

THIS INCLUDES:



MATING SALAMANDERS

Amherst, Massachusetts

When the temperature rises above 40 degrees in the spring, hundreds of spotted salamanders emerge from the forest to cross Henry Street. They need to get to vernal pools across the street, where they spend two to three weeks mating. Females lay eggs on plant stems or underwater sticks. They hatch in a month and transform into adults over the summer. These offspring also cross Henry Street to burrow underground for winter.



CANOPY BRIDGES

Hume Freeway, Victoria, Australia

This rope bridge is being used by cockatoos, but was originally designed to help squirrel gliders cross.



UNDERPASSES

Powys, Mid Wales, UK

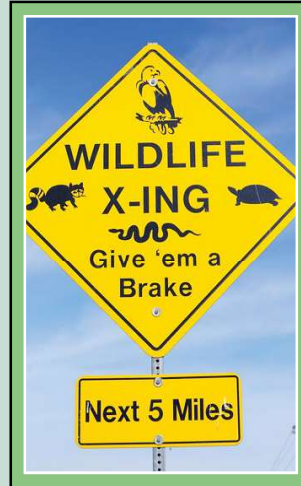
A series of "toad tunnels" allow small animals to cross busy roads safely.

WHAT'S SO IM

Overpasses are one of the most effective ways to reconnect habitats that have been fragmented by roads. They include local vegetation and link habitats by allowing for the increased movement of diverse wildlife.

Localized extinction can occur when populations can't find each other, leading to little genetic variability. Wildlife crossings allow for animals to cross over into other territories and better the chances of good health for future offspring.

Multi-species wildlife crossing sign in Merritt Island, Brevard County, Florida



NOT-SO-FUN FACTS

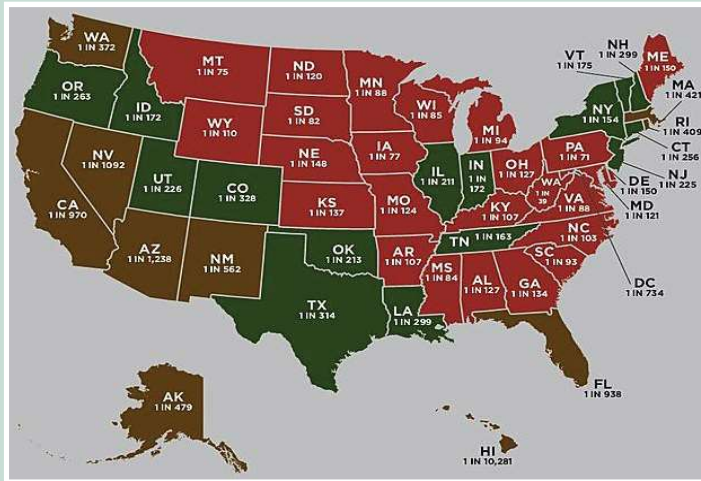
Automobiles kill **more** wild animals than any other form of direct, human-caused mortality (i.e. hunting, oil spills).

Wildlife collisions have increased by **50%** in the past 15 years.

Busy roads decrease habitat amount and quality, increase mortality, cut off resources, and divide populations into vulnerable groups.

IMPORTANT?

DID YOU KNOW?



U.S. Map showing the likelihood of an insurance claim involving a deer.

» KEY: Red = very high Green = middle Brown = low

Montana is the most dangerous at 1:75. Hawaii is the least at 1:10,281.

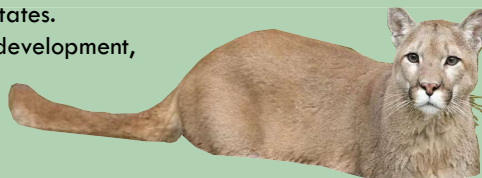
There needs to be more funding for wildlife crossings allocated in the red states. Some of the smaller ones, like Maryland and Delaware, should not require nearly as many crossings as in larger states with more highways running through wildlife-dense areas, like in the Pacific Northwest.

Wildlife collisions could wipe out endangered animals like maned wolves, brown hyenas, and leopards on a **global scale**.

Florida Panthers

The Florida panther is the most endangered cat in North America and is the only sub-species of mountain lion in the eastern U.S. There are only 100 – 160 cats in the wild and the only known breeding population in south Florida, even though they historically covered the entire southeastern United States.

They have been endangered by human development, leading to habitat loss, and hunting. Loss of habitat pushes these big cats to busy and dangerous roads and highways.



HISTORY



Dating back to the 17th century
The earliest wildlife crossings were **fishladders** built in the 1600s in France. Bundles of branches were used to create steps for fish.

- » Fishladders assist migrating fish over or around obstacles in a river.

Fishladders in 19th century DMV (D.C., Maryland, Virginia)

As the population surrounding the Chesapeake Bay increased, heightened demand for fish depleted shad, striped bass, and white perch populations. Thanks to residents of the DMV pressuring their local governments, the Fish Ladders of the Great Falls were completed in 1892 at a cost of \$75,000.

The first overland wildlife crossing was constructed in France during the 1950s.

HOW MUCH DO THEY REALLY HELP?

Banff National Park, Alberta, Canada



From 1996 to 2016, **44 wildlife crossings**, including 38 underpasses and six overpasses, were built across the part of the Trans-Canada highway passing through Banff.

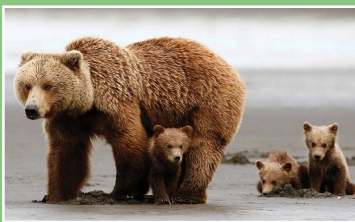
Wildlife collisions fell by 80% and mating increased among grizzlies and black bears.

- » One black bear used the crossings to mate with at least five different females and father at least 11 offspring.
- » Almost 50% black bears and 30% of grizzlies using the crossings to successfully breed during a recent study.
- » A genetic analysis found that the highway prevented grizzlies from the north and south sides from breeding, causing inbred gene pools.

Mama Black Bear
She is forced to lead her cubs across a road and risk death to ensure her babies survive.



Wildlife crossings mitigate the over **one million** wildlife automobile accidents annually, which cost over **\$8 billion** in medical costs and vehicle repairs.



Mama Grizzly Bear
She cannot avoid major roads; she may be outrunning predators, foraging, looking for new territory, etc.

U.S. EXAMPLE: SNOQUALMIE PASS

WASHINGTON STATE

Construction began in 2015 over I-90 in Washington state and was completed in 2019.



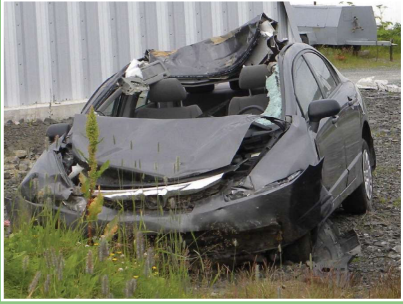
This crossing is the first in a set of 20 to be built along a 15-mile stretch of I-90.

Spanning from Seattle to Boston, I-90 is incredibly economically important to the U.S. However, most animals want to move north to south and vice versa. I-90 traps them from roaming more, and causes a lack of diversity in the gene pool.

I-90's underpasses connect wetlands and streams back to the Yakima River and are also very important for perserving ecosystems.



IMPACT ON HUMANS



Car totaled in moose-vehicle collision.

In the over one million wildlife collisions that occur annually, **200 people die.**

WILDLIFE COLLISION COST

(on average)

Deer \$8,190

Elk \$25,319

Moose \$44,546



Underpasses become cost effective when they prevent **2.6 to 9.2** deer-vehicle collisions per year, depending on the cost of the underpass.



Along a two-mile stretch of the highway that passes through Banff, wildlife collisions decreased from **12 to 2.5** a year, reducing costs by **90% or over \$100,000.**

Collisions (including animal deaths and cost) decrease by **85-95%** with crossings and fencing.

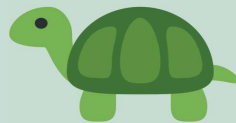
RECENT NEWS

In Wyoming, underpasses on Highway 30 cut deer collisions within a critical migration corridor by over 80%, **breaking even** in costs in just **five** years.



In 2019, Wyoming committed \$2.5 million to wildlife underpasses to ensure the safety of the public.

The California Department of Transportation is designing America's first FRP wildlife bridge, which could be mobile. Fiber-reinforced polymer (FRP) is stronger, lighter, and cheaper than regular concrete. It'd be able to be **disassembled and relocated** in response to changing animal movement patterns.



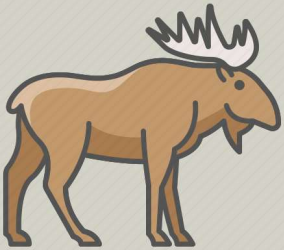
Biden's \$1.2 trillion infrastructure bill allocates **\$350 million** for animal-friendly infrastructure like bridges, underpasses, and roadside fences.



SO...WHAT'S NEXT?

FLEXIBLE SOLUTIONS

Since all wildlife do not react the same to dangerous obstacles like busy roads, there is **no “one size fits all solution.”** The solution adapted for wildlife crossings needs to be **responsive to different species’ needs**, which is why mobile bridges as enabled by FRP would be a good start.



RIGHTING MISTAKES

Wildlife crossings are one way for humans to mitigate the damage that they’ve caused in regards to destruction, fragmentation, and degradation of habitats.

SO WHY CAN’T WE BUILD THESE ALREADY?

Since larger wildlife crossings (the ones that cost the most money) eventually pay for themselves by reducing costs for drivers, insurance companies, and the government, the issue of “not enough funding is not a “money issue,” but a “who pays?” issue.



However, it would cost **\$175 million** to deal with roadkill hot spots in **California alone**. There needs to be a lot more people willing to have the government fund these projects if America wants to successfully solve this issue.

SELECTED SOURCES

- **How wildlife bridges over highways make animals—and people—safer:** <https://www.nationalgeographic.com/animals/article/wildlife-overpasses-underpasses-make-animals-people-safer>
- **Wildlife Crossings:** <https://www.nationalgeographic.org/article/wildlife-crossings/5th-grade/>
- **29 of the Most Heartwarming Wildlife Crossings Around the World:** <https://interestingengineering.com/29-of-the-most-heartwarming-wildlife-crossings-around-the-world>
- **There Are Teeny Tiny Underpasses for Salamanders in Massachusetts:** <https://www.boston.com/cars/news-and-reviews/2015/03/25/there-are-teeny-tiny-underpasses-for-salamanders-in-massachusetts/>
- **Banff bears use Trans-Canada wildlife crossings to find mates:** <https://arc-solutions.org/article/banff-bears-use-trans-canada-wildlife-crossings-to-find-mates-wildlife-crossings-can-cost-up-to-4m-each-but-benefit-bear-populations/>
- **Animals need infrastructure, too:** <https://www.vox.com/down-to-earth/2021/11/12/22774958/animals-wildlife-crossings-bridges-infrastructure>

IMAGES (IN ORDER OF APPEARANCE)

- | | |
|---|--|
| • Cover bridge: jhalliance.org | • Black bear: istockphoto.com |
| • Tree: Pinterest | • Grizzly bear: globalist.news |
| • Crab crossing: The Guardian | • Pass: mtsgreenway.com |
| • Red crab: thedestinyformula.com | • Under construction: komonews.com |
| • Cockatoo: dailymail.co.uk | • Black bear: travel4wildlife.com |
| • Toad: bbc.com | • Car: thestar.com |
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| • Fish ladder: watercanada.net | • Biden: newsweek.com |
| • Bridge: cliparting.com | • Moose: iconfinder |
| • Banff: enjoythesilence.today | • Bear: iconfinder |