

# **HB 1129 Wildlife - Protections and Highway Crossin**

Uploaded by: Cait Kerr

Position: FAV

**Wednesday, February 28, 2024**

**TO:** Marc Korman, Chair of the House Environment and Transportation Committee, and Committee Members

**FROM:** Cait Kerr, The Nature Conservancy, State Policy Manager; Humna Sharif, The Nature Conservancy, Climate Adaptation Manager

**POSITION:** Support HB 1129 Wildlife - Protections and Highway Crossings

The Nature Conservancy (TNC) supports HB 1129 offered by Delegates Ruth, Stein, and Palakovich Carr. HB 1129 will encourage the Maryland Department of Transportation and the Department of Natural Resources (DNR) to collaboratively identify opportunity areas for incorporating wildlife passage features into transportation projects. This will reduce road impacts on imperiled species and reduce wildlife vehicle collision risks for motorists. The bill seeks to create a Highway Crossing Fund to support wildlife crossing projects and the research needed to determine the most strategic locations for crossings. Agencies can use these grant funds to support administrative costs for activities outlined in this bill. It also requires the State Highway Administration to coordinate with DNR and apply for relevant federal funding opportunities for highway crossing projects. By addressing the high number of animal-vehicle collisions, HB 1129 moves Maryland toward a safer future for both people and wildlife

Many species in Maryland can benefit from less expensive wildlife crossing underpasses, often built using existing structures like culverts and bridges. Virginia has already seen the benefits of underpasses – by monitoring wildlife-vehicle collisions before and after erecting directional fencing to funnel deer to culverts along I-64, deer-vehicle collisions in the area fell by an average of 92% after the fencing was installed. In just 1.8 years, the benefits of these culverts with exclusionary fencing exceeded the costs of fencing, with an average savings of \$2.3 million per site.

The section of the Appalachians running through West Virginia, Maryland and Pennsylvania is a critical corridor for species migrating in response to climate change. This section, known as the Allegheny Front, is a priority landscape to preserve the rich biodiversity of the larger Appalachian range as climate change drives species to move and adapt. Serving as a habitat bridge between vast conservation lands in the southern and northern Appalachians, the Allegheny Front plays a critical role in keeping this continental ecosystem connected. By providing safe passage across roadways, we can better protect migratory species traveling through this important corridor.

The precipitous decline in biodiversity is a global challenge, it is jeopardizing food and water supplies and undermining global, social and economic stability – we must all do our part to find solutions that safeguard biodiversity. TNC commends Delegates Ruth, Stein, and Palakovich Carr on introducing this bill, which aims to protect Maryland's rich biodiversity, while also reducing wildlife collisions' safety and economic impacts on our roadways.

**Therefore, we urge a favorable report on HB 1129.**

**HB1129\_MDSierraClub\_fav\_ET 28Feb2024.pdf**

Uploaded by: Carolyn Parsa

Position: FAV



P.O. Box 278  
Riverdale, MD 20738

**Committee: Environment and Transportation**  
**Testimony on: HB 1129 Wildlife – Protections and Highway Crossings**  
**Position: Support**  
**Hearing Date: February 28, 2024**

The Maryland Chapter of the Sierra Club supports HB 1129, which will reduce deer-vehicle collisions and protect rare, threatened, and endangered wildlife from becoming roadkill. Among its provisions, the bill requires the Department of Natural Resources (DNR) and the State Highway Administration (SHA) to improve passageways – such as culverts -- under roads, allowing our wildlife to conduct their natural movements without risk of mortality from vehicle traffic.

In addition to requiring agencies to identify areas where vehicle collisions with deer could be reduced, the bill requires DNR and SHA to prioritize reptiles and amphibians, such as turtles and salamanders, which are especially vulnerable to vehicle collisions because they are slow-moving. Drivers instinctively stop or swerve to avoid hitting these animals. The results range from fender-benders to multi-car collisions. Last May, a turtle crossing in Florida caused an accident damaging seven vehicles.

Road mortality is one of the greatest contributors to declines in North American freshwater turtles. In a Maine study, more than 50 percent of all roadkill animals were turtles, frogs, and salamanders. Overall, turtle populations in the eastern U.S. have suffered a 10 to 20 percent loss from road kills alone. Females are especially vulnerable because they travel further than males and move more slowly while carrying 8-10 eggs. Many turtles don't reach reproductive age until about 15 years old, so losing one mature female is a large loss to the future population.

In Maryland, five of our 18 turtle species suffer significant mortality due to vehicle strikes, including the diamond-backed terrapin, the state reptile and mascot of the University of Maryland College Park (found on both sides of the Bay and along the coast). Vehicle collisions significantly impact four others: the wood turtle (a state-ranked vulnerable species found from the western shore of Bay to Garrett County), the northern map turtle (in Harford and Cecil Counties), and the statewide painted turtle and the eastern box turtle.

Fortunately, SHA has demonstrated a commendable ability to create wildlife passageways under major roads. In 2012, the SHA received a federal DOT Environmental Toolkit Award for an

“Exemplary Ecosystems Initiative,” citing innovative culverts under the Intercounty Connector (ICC). These culverts are utilized by a range of wildlife, including deer, raccoons, opossums, squirrels, and foxes, as well as turtles. The ICC’s fencing directs wildlife to these culverts and limits their access to the roadway. Because they usually follow waterways, turtles and salamanders only require updates of existing pipes that already channel streams under roadways.

In addition to protecting Maryland’s turtles from vehicle traffic, the improved stream culverts will also help our brook trout, even though they aren’t targeted in the legislation. Brook trout are treasured by Marylanders who enjoy fishing but are a vulnerable/watchlist species in the state. In the course of foraging and reproducing, they need to swim both upstream and downstream in creeks channeled under roadways, where current culverts often do not allow upstream passage.

The brook trout’s range overlaps with that of the wood turtle, an imperiled state-rare species, so protecting one can help protect the other. A recent study in New York and Connecticut showed that wood turtles “commonly come in close proximity to the roads intersecting and bordering a stream corridor.” The study recommends that “measures that facilitate safe passage beneath roads should be implemented whenever roads are present near occupied wood turtle habitat.”

For all these reasons, the Maryland Chapter of the Sierra Club supports HB 1129 and encourages a favorable report.

Michael Wilpers  
Natural Places Committee  
wilpersm@gmail.com

Josh Tulkin  
Chapter Director  
Josh.Tulkin@MDSierra.org

# **Support of HB1129.pdf**

Uploaded by: Diana Colangelo

Position: FAV

Dear Environment and Transportation Committee,

I urge you to support HB1129, Wildlife - Protections and Highway Crossings. Our modern road infrastructure has made it very difficult if not impossible for animals to move and migrate in ways that are critical to their survival, and this bill would be a positive step toward repairing the damage.

The focus on connecting habitats of threatened and endangered species and those of greatest conservation need is important. Scientists from around the world, in a UN report called Making Peace with Nature, state that human well-being is critically dependent on Earth's natural systems, including its biodiversity, yet human development degrades its finite capacity to sustain human well-being. We see evidence of it here, with over 500 different animals on the rare, threatened and endangered species list, just in MD.

The intercounty connector, between I-270 and I-95 is a great example of design that facilitates wildlife passage and protects vehicles from animal collisions. Its bottomless arches allow fish and aquatic animals to travel in and along streams and also allow for the passage of deer, raccoons, opossums, squirrels, turtles, foxes and horses. Bridges that span the 100-yr flood plain, not only protect people from the effects of storms, but also protect important habitat.

An additional \$10 fee for car insurance to create the Highway Crossings fund is more than reasonable to protect our declining wildlife.

The inclusion of bicycle and walking paths in the definition of highway is also important, because many wild plants and animals benefit from habitats free from major human disturbance.

Please vote in favor of HB1129.

Sincerely,  
Diana Colangelo  
North Bethesda  
20852

**HB1129\_FAV\_HSUS.pdf**

Uploaded by: Jennifer Bevan-Dangel

Position: FAV





Date: February 28, 2024  
Committee: House Environment and Transportation  
RE: HB 1129, Wildlife – Protections and Highway Crossings  
Position: Support

Chair Korman, Vice Chair Boyce, and Members of the House Environment and Transportation Committee:

On behalf of the Maryland members and supporters of the Humane Society of the United States, we offer our enthusiastic support of HB 1129 requiring the DNR and the State Highway Administration to research wildlife populations and habitat and develop highway crossings for wildlife in the state.

Habitat loss and fragmentation pose an immediate and long-term threat to countless species. The U.S. human population is expected to grow to nearly 400 million by 2050, meaning more development, more deforestation and less wild and open spaces. Even lands remaining undeveloped will become increasingly fragmented by infrastructure developments. Roads, in particular, are a major mortality factor for wildlife populations residing in fragmented habitat.<sup>1</sup> Diminished habitats can also reduce food availability and increase conflicts with humans, pets and livestock.<sup>2</sup>

Developing safe wildlife road crossings as well as restoring and conserving critical habitat and wildlife corridors are critical to ensure wildlife are protected from increased human development and climate change. Road development and vehicle collisions with wildlife can be quite damaging to populations, especially those that are already small and fragile.<sup>3</sup>

While most (87 percent) animal-vehicle collisions in the United States involve deer, many other species are struck on roadways.<sup>4</sup> Vehicle strikes are expensive to society. According to the U.S. Department of Transportation (2008), the estimated average cost of a single animal-vehicle collision is \$6,126 per incident; that includes property damage, human injuries, or, more rarely, fatalities.<sup>5</sup> The cost in today's dollars is likely much higher. For the years 2001-2002, an estimated 26,647 injuries occurred as a result of animal-vehicle collisions.<sup>6</sup> But those are not the only costs. Other losses include:

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<sup>1</sup> Maehr, D. S., M. J. Kelly, C. Bolgiano, T. Lester, and H. McGinnis. 2003. Eastern cougar recovery is linked to the Florida panther: Cardoza and Langlois revisited. *Wildlife Society Bulletin* 31:849-853.

<sup>2</sup> Vickers, T. W., J. N. Sanchez, C. K. Johnson, S. A. Morrison, R. Botta, T. Smith, B. S. Cohen, P. R. Huber, H. B. Ernest, and W. M. Boyce. 2015. Survival and mortality of pumas (puma concolor) in a fragmented, urbanizing landscape. *PLOS One* 10.

<sup>3</sup> Negri, S., and H. B. Quigley. 2010. Cougar Conservation. Pages 221-234 in M. C. Hornocker and S. Negri, editors. *Cougar: Ecology and Conservation*. The University of Chicago Press, Chicago and London.

<sup>4</sup> U.S. Department of Transportation. 2008. *Wildlife-Vehicle Reduction Study: Report to Congress*. <https://www.fhwa.dot.gov/publications/research/safety/08034/08034.pdf>.

<sup>5</sup> U.S. Department of Transportation. 2008.

<sup>6</sup> U.S. Department of Transportation. 2008.

- The suffering and distress of injured animals
- The costs to rehabilitate animals, including X-rays and veterinary care by nonprofit organizations
- The loss of expenditures involved in conservation efforts for threatened or endangered species by governments and organizations
- The costs to municipalities of cleanup and disposal of tens of thousands of animal carcasses
- The loss to businesses from loss of transportation, lodging and meal costs that would have been spent by wildlife recreationists of all types
- The emotional distress of people involved in accidents
- The cultural losses to Native Americans and groups such as wildlife watchers and advocates<sup>7</sup>

The mitigated costs from reduced vehicle collisions and the subsequent reduction in injury to humans and wildlife should also be a factor when cost is considered. Wildlife crossing structures, such as road overpasses and underpasses, including drainage culverts, can reduce the injury and death of wildlife as well as human drivers and vehicle passengers.<sup>8</sup> Additionally, while highway overpasses and underpasses can be expensive, building their creation into the design of new roads can save significant future costs. Using existing structures, such as culverts and tunnels, can reduce costs to the development of safe passages.<sup>9</sup>

For the reasons stated above, we ask that the committee approve HB 1129 to research and develop critical wildlife crossings in our state. We look forward to working with the sponsor on amendments that will address the fiscal note and enable this important work to move forward. Thank you for your consideration of this measure that will save countless lives in the great state of Maryland.

Sincerely,

Jennifer Bevan-Dangel  
Maryland State Director  
[jbevandangel@humanesociety.org](mailto:jbevandangel@humanesociety.org)

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<sup>7</sup> U.S. Department of Transportation. 2008.

<sup>8</sup> Clevenger, A. P., B. Chruszcz, and K. Gunson. 2001. Drainage culverts as habitat linkages and factors affecting passage by mammals. *Journal of Applied Ecology* 38:1340-1349; Ng, S. J., J. W. Dole, R. M. Sauvajot, S. P. D. Riley, and T. J. Valone. 2004. Use of highway undercrossings by wildlife in southern California. *Biological Conservation* 115:499-507.

<sup>9</sup> See e.g., Ng, S. J., J. W. Dole, R. M. Sauvajot, S. P. D. Riley, and T. J. Valone. 2004. Use of highway undercrossings by wildlife in southern California. *Biological Conservation* 115:499-507.

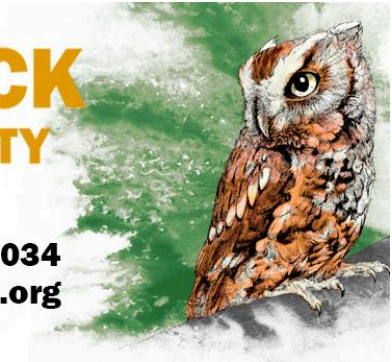
# **HB1129-Testimony-Susquehannock-Wildlife-Society-.p**

Uploaded by: Johnathan Garrison

Position: FAV



# SUSQUEHANNOCK WILDLIFE SOCIETY



**1725 Trappe Church Road Darlington, MD 21034**  
**443-333-WILD (9453) contact@suskywildlife.org**  
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February 26, 2024

Delegate Ruth et al.  
Maryland House of Delegates  
251 Taylor House Office Building  
6 Bladen Street  
Annapolis, MD 21401

Dear Delegate Ruth, Stein, Palakovich Carr, Allen, Ebersole, Fair, Foley, Lehman, Terrasa, Vogel, Watson, Ziegler, and members of the Environment and Transportation Committee,

I am writing on the behalf of Susquehannock Wildlife Society, to express the need for the Wildlife - Protections and Road Crossings Bill (HB 1129), sponsored by Delegate Ruth, to move this bill favorably from committee.

Most people have experienced seeing a wild animal scurry across a road or have seen a hawk fly over the interstate at some point in their lives. These experiences are how most of the population interacts with wild animals, and it may seem that wildlife is living in harmony with human-made structures, such as roads when we have these experiences. Unfortunately, this is far from the truth because roads are affecting populations of wild animals in many detrimental ways.

Roads threaten the persistence of wild animal populations and their habitats in many direct and indirect ways. Roads directly cause increased numbers of deaths among wild animal populations when individuals attempt to cross roads and are crushed by vehicles. Unfortunately, death on roads can cause wild animal populations to decline. In some species, such as turtles, females are disproportionately killed on road because they travel long distances to nesting sites; this can lead to skewed sex ratios, throwing off the balance of a population, leading to local extinction. Some species are killed on roads more often than others due to their sensitivity to disturbance and population structures, which may make them more susceptible to population declines caused by additive death of reproductive adults. For example, reptiles and amphibians are more likely to experience population declines due to roads, compared to other species, because they migrate seasonally on land, are small bodied and therefore may be overlooked by drivers, and their populations are typically sensitive to increased mortality rates. Indirectly, roads affect animal

populations by restricting the exchange of individuals between populations and altering the hydrology of the aquatic systems that they bisect, which can lead to increased amounts of runoff that may contain harmful chemicals, salts, and heavy metals that can affect the survival of wild animals and the environments they inhabit in many ways. Since roads pose an amalgam of threats to wild animal populations, it is crucial that we take action to eliminate and minimize these threats so we can maintain the biodiversity that adds so much beauty and depth to the unique State of Maryland.

Susquehannock Wildlife Society exists to protect wildlife through public education, conservation efforts, rescue, research or legislation, and we will stand as a helping hand and voice for wildlife. We believe that conserving wild animal populations is pertinent to maintaining the magnificence of natural communities in Maryland and fully supports the Wildlife - Protections and Road Crossings (HB 1129) bill because it has such high potential to positively impact the fauna of Maryland by reducing wild animal deaths on roads and mitigating the threats roads have on wild animals.

Fortunately, The Wildlife - Protections and Road Crossings (HB 1129) will enable the State of Maryland to implement wildlife crossings and other adaptive management strategies that have proven to be successful at reducing roadkill in other states and countries. This bill presents a unique and felicitous opportunity for the State of Maryland to invest in the future of our natural history and assure that future generations of Maryland residents will have the privilege of experiencing the grandeur of witnessing a hawk soar over the interstate, a turtle crossing the road, and a fox dashing along the median with its pups.

I appreciate your time and thank you for considering my written testimony on this very important topic.

I implore you to support The Wildlife - Protections and Road Crossings (HB 1129) Bill.

Sincerely,

A handwritten signature in black ink, appearing to read "John Garrison". The signature is fluid and cursive, with the first name "John" and last name "Garrison" clearly distinguishable.

John Garrison  
Conservation Director  
Susquehannock Wildlife Society  
1725 Trappe Church Rd.  
Darlington, Maryland 21034

**Wildlife Corridor PaperFinal copy.pdf**

Uploaded by: Karen Russell

Position: FAV

# WILDLIFE CORRIDORS IN FREDERICK COUNTY: CONSERVING NATURE IN MARYLAND'S APPALACHIAN HEART

Responding to Climate Change and Biodiversity Loss  
by Creating an Enduring Landscape through Green Infrastructure



climate  
CHANGE  
WORKING GROUP  
OF FREDERICK COUNTY

A Climate Change Working Group of Frederick County White Paper  
by Karen Russell

## **Climate Change Working Group**

**Founded in 2016, the Climate Change Working Group's mission is to assist Frederick County administrators and residents in adapting to and mitigating the impacts of climate change through responsible planning, education and advocacy.**

**Contact: Karen Russell, Founder, [ccwgfredco@gmail.com](mailto:ccwgfredco@gmail.com)**

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FRONT COVER PHOTO CREDITS, CLOCKWISE FROM THE TOP:

Karen Russell, Kai Hagen, Scott Norris, Scott Norris

BACK COVER PHOTO CREDITS:

Rt. 355 bridge over the Monocacy River by Scott Norris, others by Karen Russell

EDITORIAL AND PUBLISHING ASSISTANCE:

Catoctin Land Trust



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# Foreword

One consequence of Frederick County's population growth has been the loss and fragmentation of habitat on which many plants and animals depend. Some species are now classified by the State of Maryland as rare, threatened, or endangered. Add to this local challenge the global one of climate change. Many plants and animals that we know and treasure are in trouble. Their habitats are changing and their food sources are, in some cases, disappearing. Fortunately, we already have the tools we need to make a difference on these related challenges. By focusing locally, Frederick County can lay a cornerstone for creating a grand Appalachian Climate Corridor.

Frederick county and neighboring Washington county lie within the broader Appalachian mountain landscape. The Appalachian Mountains represent the most connected landscape and the most heavily travelled wildlife migration corridor in North America. The Appalachian Trail, stretching 2,180 miles from Maine to Georgia, passes through Frederick and Washington counties. Frederick County is uniquely situated to provide access to the Appalachians for plants and animals needing to migrate toward these ranges. Creating contiguous wildlife corridors that connect fragmented habitat facilitates species movement along the Appalachians and ensures continued biodiversity in the changing natural systems on which survival depends.

But we must act now. The implications go much farther than small animals and plants most of us rarely see. They impact our way of life, from trout fishing in Catoctin Mountain streams, to countryside tourism, clean drinking water, and, for locals, the experience of simply enjoying time outdoors.

By prioritizing wildlife corridors in its Livable Frederick green infrastructure plan, Frederick County can mitigate the local impact of both increased temperatures from climate change and reduce the threat of biodiversity loss. However, Green Infrastructure must be addressed before more land use decisions are made.

Using Maryland's green infrastructure assessment, along with Livable Frederick, we should:

- Clearly map existing hubs and corridors and work with private landowners to preserve them using available programs and funding.
- Update maps that show gaps in green infrastructure, including wildlife crossings over highways.
- Create a plan to fill in those gaps, including the major and most expensive obstacles.
- Identify current funding programs that align with creating wildlife corridors, then work to develop new ones.

Frederick County is a leader in preserving land, planting forest buffers, and implementing practices to expand grasslands. Now it's time for everyone to think beyond one restorative project at a time, and instead about a connected, living landscape.



**David Lillard**  
**Executive Director**  
**Catoctin Land Trust**



# Introduction

While the unabated effects of climate change are known to threaten human existence (Ask MIT), it is less understood that human existence is also threatened by the global loss of biological diversity or biodiversity. Biodiversity can be thought of as the rich variety of living things in nature, from microbes in the soil to plant and animal species. Wildlife corridors enable species to migrate as their habitats shift north or to higher elevations, in response to increased temperatures from climate change. By increasing the total amount of contiguous habitat available, they support biodiversity.

In 2021, the Intergovernmental Panel on Climate Change and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services co-sponsored a workshop on Biodiversity and Climate Change. The resulting report states that while both scientific and policy-making circles recognize the interconnection between biodiversity loss and climate change, they have been largely addressed within their own domains, without recognizing the interconnections. “This functional separation creates a risk of incompletely identifying, understanding and dealing with the connections between the two. In the worst case it may lead to taking actions that inadvertently prevent the solution of one or the other, or both issues” (Pörtner et al... 2021, p. 4). It also identifies wildlife corridors (migration corridors) as an effective conservation measure.

Recognized as a globally significant region, the Appalachian Mountains represent the most heavily travelled migration corridor in the United States for mammals, birds and amphibians (TNC). In a July 2022 report, an Appalachian Landscape Climate Advisory Group recognized that rapid loss of biodiversity and increasing range shifts can have cascading effects hindering human health and well-being. The Appalachian Trail, stretching 2180 miles from Maine to Georgia, passes through both Frederick and Washington counties. As the Catoctin and South Mountain ranges represent the eastern edge of the Appalachian mountains, Frederick County is uniquely situated to provide access for plants and animals migrating toward this range from points east, e.g. the Patuxent Research Refuge. Maintaining contiguous wildlife corridors that connect fragmented habitat facilitates species movement and ensures continued biodiversity in the changing natural systems on which survival depends.

By implementing a Livable Frederick green infrastructure plan that prioritizes wildlife corridors, Frederick County can mitigate the impacts of increased temperatures from climate change and the loss of biodiversity, contributing both to local resilience and to that of the entire Appalachian corridor. However, plans for green infrastructure must be in place before more land use decisions are made.

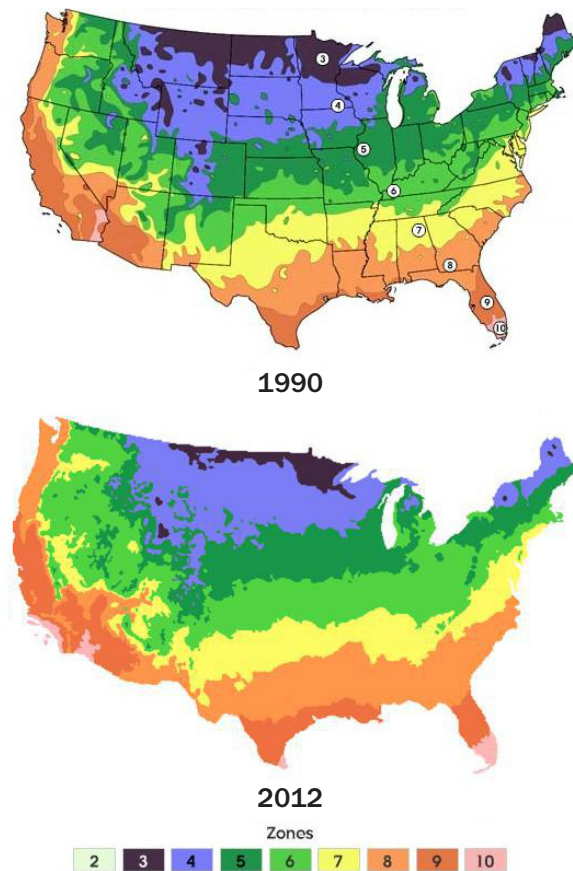
The natural world is our life support system. Protecting it and ensuring its continued function is our best chance of ensuring economic, public and environmental health in an uncertain future.

# Biodiversity Loss and Climate Change

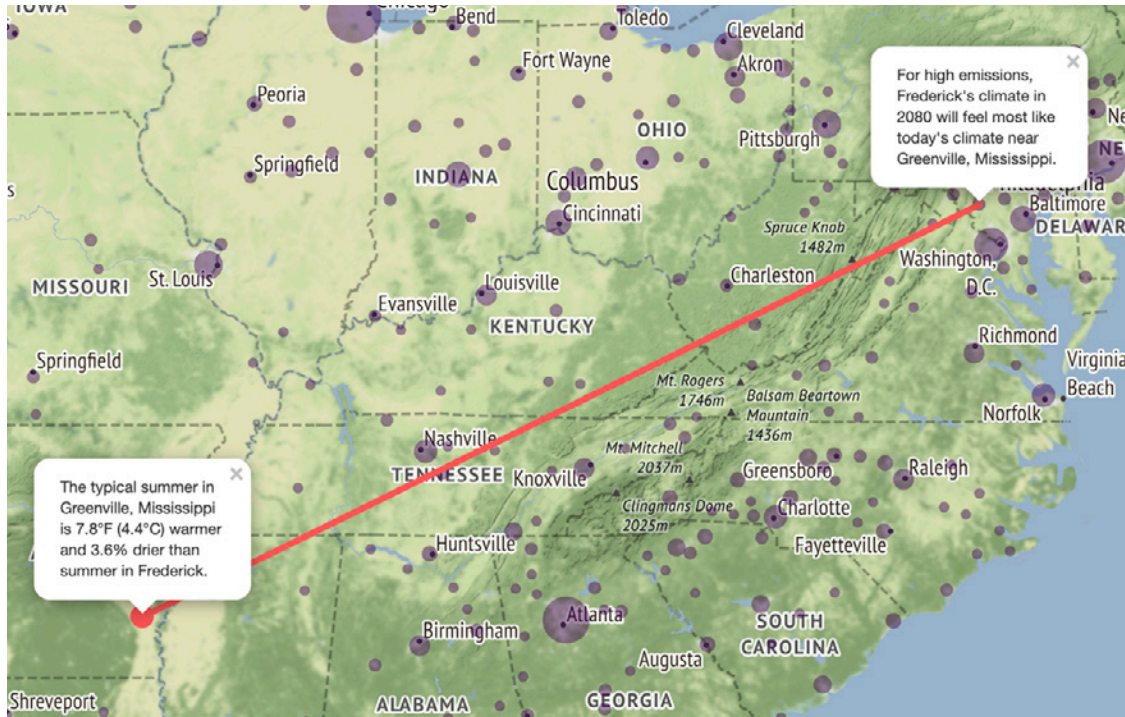
**B**iodiversity enables the functioning of ecosystems — the functions of the natural world that enable life to exist (Kellert & Wilson, 1993). This includes converting atmospheric carbon dioxide into the oxygen we breathe and cleaning the water we drink. Intact ecosystems with healthy forests, meadows, wetlands, and biologically active soils support and are supported by the species that live within them. However, more than 70% of the Earth’s land surface has been altered by human expansion and this encroachment into the natural world has resulted in the loss of species and their habitats (Ehrlich et al. . . 2021). The International Union for Conservation of Nature estimates that some 20% of all species are in danger of extinction over the next few decades (Bradshaw, 2021), which greatly exceeds the background (or normal) rate (Neilson, 2005)— roughly one species per million, or .0001% per year (Wilson, 2016, 54).

Population growth in urbanized areas will impact future accessibility to, and cause overall loss of natural spaces (Seymour, 2016). According to the 2020 census, Frederick County population was 264,780. A conservative projected population increase rate of 1% per year, assuming a business-as-usual scenario, would lead to growth of approximately 100,000 to over 363,000 in 2050. This does not consider human migration away from Maryland’s more than 3,000 miles of shoreline due to sea level rise and/or coastal damage from extreme storms. It is worth noting that between July 2020 and July 2021, Frederick was the fastest growing county in the state of Maryland, with population increasing by 2.6%. Increased demand for housing in Frederick County places pressure on local governments to accommodate development, most often done by expanding into farmland or natural areas. Rural residential development and urban fringe development affect biodiversity patterns by reducing native species richness and survival, and increasing the presence of exotic (non-native) species (Hansen, 2005).

Temperature shifts resulting from global warming between 1990 and 2012 are shown in the two United States Department of Agriculture (USDA) Plant hardiness zone maps in figure 1. Each band represents the average minimum annual temperature for that zone, with the southern tip of Florida being the warmest. Plant hardiness zone boundaries are



**FIGURE 1**  
USDA Plant Hardiness Zones based on average annual minimum temperatures. Source: USDA



**FIGURE 2**

Biological displacement under coming climate conditions.

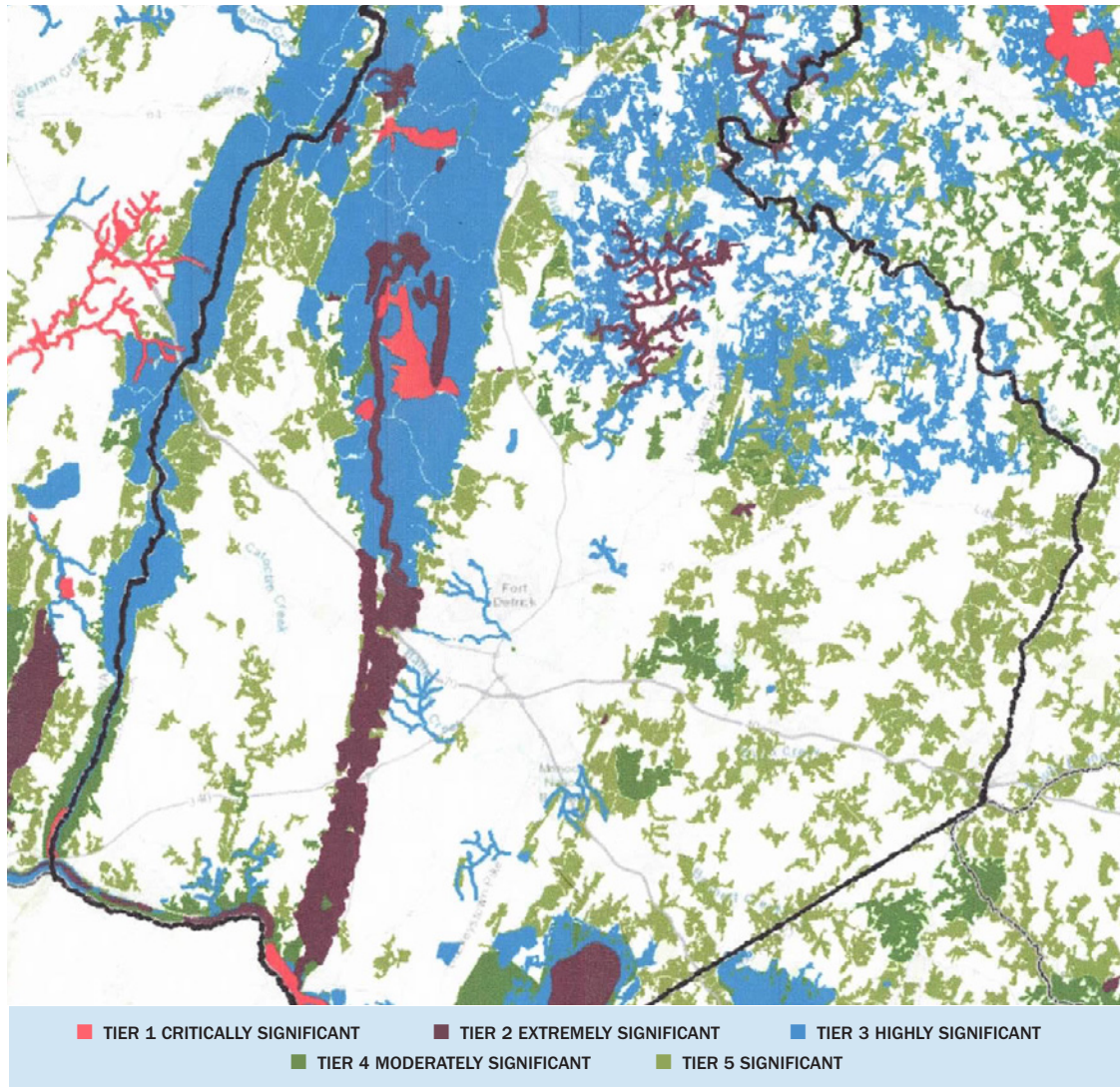
Source: Matt Fitzpatrick, University of Maryland Center for Environmental Science

shifting northward by 13 miles per decade (Jones 2018). Based on research from the University of Maryland Center for Environmental Science, plants and animals now in Greenville, Mississippi will be more adapted to our area by 2080, as shown in figure 2 (Mongilio, 2019).

The Maryland Department of Natural Resources (DNR) Natural Heritage Program collects, manages, analyzes, and distributes spatial data regarding the habitats of the state's rarest plants and animals, high quality and rare natural communities, and other living resources of conservation concern. These data are collected in a five-tiered ranking system called Biodiversity Conservation Network, or Bionet, and include:

- 1,000 rare, threatened or endangered plants and animals; 41 animal and 167 plants in Frederick County, as of November 2021 (DNR);
- 1,500 places where rare, threatened or endangered species live;
- 200 additional animals of greatest conservation need;
- 200 Watch List plants; and
- 27 of 75 ecological communities considered rare in Maryland.

Within Bionet, even those in Tier 5 (the lowest in biological significance) are still important to conserve, both for the species they directly support, as well as for the maintenance of the larger fabric of our natural landscape (DNR, 2016). Figure 3 shows biodiversity in Frederick County ranked by Bionet priority areas for conservation.



**FIGURE 3**

Biodiversity in Frederick County ranked by Bionet priority areas.

Source: Maryland Environmental Resources and Land Information Network

### Habitats and Species: Freshwater, Forest Interior, Grassland

Some species require specialized habitats in order to survive. Brook trout, our only native trout, are currently at the limit of suitable habitat in Frederick County. Brook trout require cold, clean freshwater as well as gravels on the bottom for spawning in the autumn. Current populations are trending downward in the Catoctin Mountains, threatened by rising stream temperatures; however, efforts to preserve their habitat could succeed if measures are taken to protect ground water and stream water quality (Hitt, 2021). Livable Frederick, the county’s master plan, specifically addresses Brook Trout with an initiative to protect and re-stabilize populations (p. 191). Otherwise, assisted migrations may be required and this once plentiful native fish would be lost.

Other species need the insulating effect of a large forest interior free from human disturbance to breed successfully and maintain viable populations. Identified as Forest Interior Dwelling Species,

examples include birds (e.g. owls, wood thrush); turtles (e.g. Eastern box, wood turtle); bats, frogs and salamanders. The Natural Resources Conservation Service (USDA, NRCS, MD) describes forest interior wildlife habitat as:

- Forests of at least 50 acres with 10 or more acres of forest interior habitat;
- Riparian forests of at least 50 acres containing streams; or
- Forests of at least 10 acres containing isolated depressional wetlands of one acre or more that are either too small or too shallow to form lakes or reservoirs.

Still other species thrive in warm season grassland habitat which existed in large portions of the northeastern area of Frederick County, but has steadily declined, not only locally, but across Maryland. According to the Maryland State Wildlife Action Plan 2015–2025 (SWAP 2-16) grasslands developed as early as 10,000 years ago, when Native Americans introduced human-made fires for hunting and farming. Vegetation adjusted to the occurrence of these periodic ground fires and over time, prospered, attracting associated species. Wild turkeys often nest and rear broods in large fields of dense grasses. Songbirds such as field sparrows, indigo buntings, prairie warblers, eastern meadowlarks, loggerhead shrikes and grasshopper sparrows use warm season grasses for cover while raptors like American kestrels and northern harriers use the areas as hunting grounds. Raptors are often attracted to the cottontail rabbits, voles and field mice that make their homes in the grasses (DNR Habitat for Wildlife). Today, farming practices and utility right-of-way management that favor grassland and shrub-scrub nesting species, such as late mowing, hedgerow establishment, and reduced pesticide use, benefit a number of declining grassland species (SWAP 3-38).



DAVE KAZAK

**FIGURE 4**  
Allegheny woodrat,  
commonly called the pack rat.



KAREN RUSSELL

**FIGURE 5**  
Appalachian Hardwood Forest Interior.

Numerous local species are vulnerable to climate change (SWAP, 6-34), including the Allegheny woodrat (figure 4) and beavers. The endangered and important Allegheny woodrat, commonly called the pack rat, brings organic material into nutrient-poor cave ecosystems, which supports a specialized cave invertebrate (animals without backbones) community. Decreases in beaver populations could exacerbate climate effects, as the presence of beavers has been associated with increased groundwater recharge, higher summer stream flows, and refugia (areas naturally buffered from extreme variation in environmental conditions for cold-adapted species such as some amphibians).

According to the SWAP, freshwater mussels, amphibians, and fish were scored as either extremely or highly vulnerable to climate change, and almost 40% of Maryland's globally rare plants are extremely vulnerable (SWAP, 6–17). The Appalachian Northern Hardwood Forest (figure 5) is critically vulnerable to climate change. See the Appendix for a list of vulnerable trees (NIAC, 2021).

# Wildlife Corridors

**W**ildlife corridors are a land use strategy for increasing biodiversity that expands habitat range and accommodates movement northward or to higher elevations, in response to higher temperatures associated with climate change. A wildlife corridor is an interconnected network of natural areas and other open spaces that conserves natural ecosystem values and functions, sustains clean air and water, and provides a wide array of benefits to people and wildlife (Benedict & McMahon, p. 1). The terms Conservation Corridors, Migration Corridors, Biodiversity Corridors, Ecological Corridors, Dispersal corridors and Environmental Corridors are also used to refer to wildlife corridors and include the natural habitats of both plants and animals.

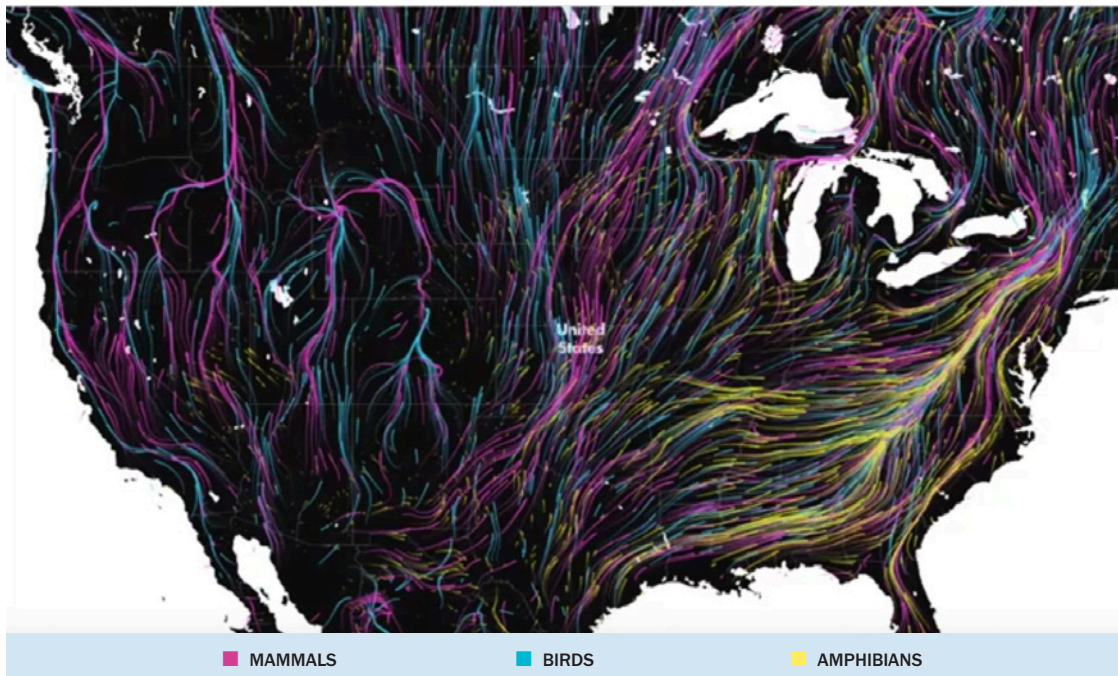
Maintaining connected landscapes is a strategy widely cited in the scientific literature for building climate change resilience (Heller & Zavaleta, 2009). Habitat fragmentation isolates species, limiting the available gene pool for reproduction and resulting in weaker, less viable populations. Connecting habitat fragments allows plants and animals greater range and increases the probability that populations can be sustained (Anderson, 2016). For example, an 18-year plant experiment in South Carolina found that habitat connectivity increased annual colonization rates by 5% and decreased annual extinction rates by 2%, when compared with unconnected fragments. Compounded over time, these percentages generated large increases in species richness in fragments connected by corridors (Damschen et al., 2019).

Connecting fragmented habitat along waterways (riparian buffers), which are natural corridors, not only helps wildlife migrate, it helps ensure future clean sources of water. Leaves on vegetation slow the velocity of rainfall and roots aerate the soil, creating a spongy effect that allows absorption into the ground, where the “sponge” filters out impurities, before recharging the water system. Riparian buffers also slow runoff during rain storms, lessening downstream flooding (Rhea, 2022).

Degraded water quality compromises the biodiversity of natural systems. In Frederick County, the Gas House Pike waste water treatment plant was forced to add Enhanced Nutrient Removal equipment at a cost of about \$50 million (paid with public funds) to filter out excess nitrogen derived from the land (Borda 2011, Panuska 2019). According to a water quality assessment of the Monocacy River, USGS researchers have identified multiple compounds that may be responsible for 70–100% frequencies of intersex (male and female sex tissue in the same fish) in Monocacy River smallmouth bass populations, potentially reducing the ability to reproduce and resist disease (Sellner & Ferrier, 2020).

The Nature Conservancy’s Migrations in Motion map ([figure 6](#)) shows the average direction mammals, birds, and amphibians need to move to track hospitable climates as they shift northward in the continental United States. It also shows the Appalachian Mountains as the most heavily travelled corridor. As Frederick County is a gateway to the Appalachians, connecting fragmented habitat that facilitates species movement toward and along the Appalachians ensures continued biodiversity in the changing natural systems on which survival depends.





**FIGURE 6**

Average direction mammals, birds and amphibians need to move to track hospitable habitats as they shift northward.

Source: The Nature Conservancy, Migrations in Motion,

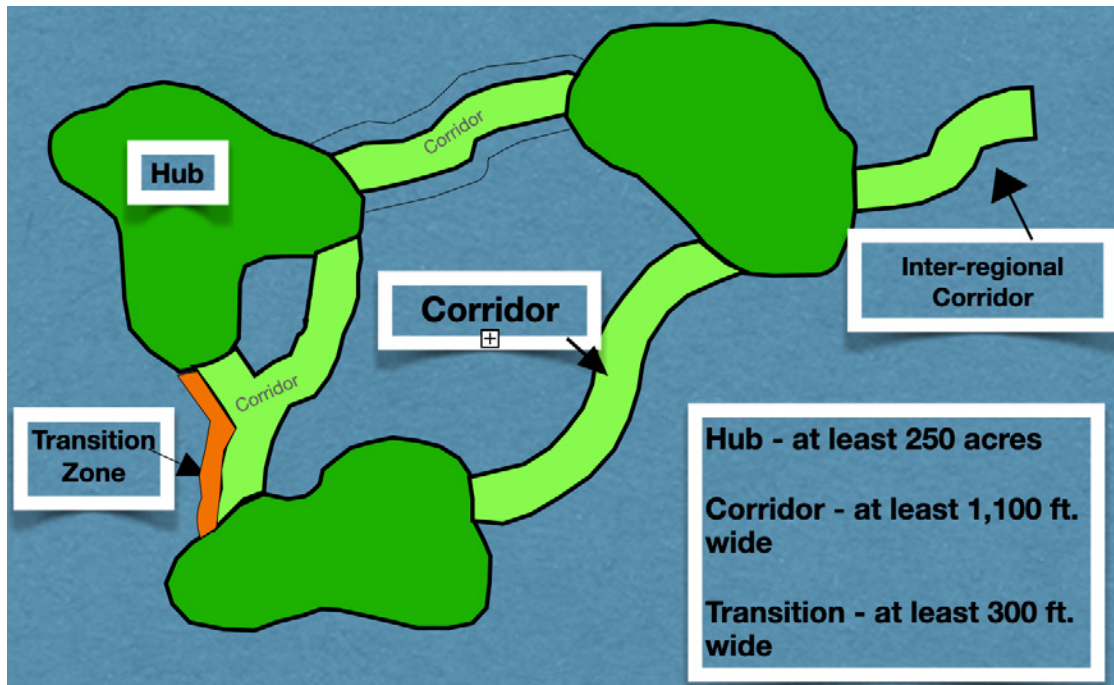
Web. <https://maps.tnc.org/migrations-in-motion/#4/19.00/-78.00>

## Wildlife Corridor Characteristics and Features

Wildlife corridors (figure 7) are networks of hubs connected by habitat corridors, plus transition zones or buffers (Weber 2003, 50–51). Dimensions play an important role in determining what species occur within a corridor and the potential speed with which species pass through the corridor (Hilty et al, 136). In general the size of hubs and distance from each other influence the dimensions of corridors— the longer the corridor, the wider it needs to be. However, wider, shorter corridors are more likely to provide connectivity. One study estimates that habitat patches of 12.4 to 124 acres would need corridors of no longer than .25 to .65 miles and at least 66 to 164 ft. wide to maintain connectivity (Hilty et al, 136–141). Further, plants have different movement requirements than animals. For example, wind direction can affect seed and pollen transfer.

The 2003 Maryland Green Infrastructure Assessment (MGIA) defined hubs as large ecological patches vital to retaining biological diversity and containing one or more of the following:

- sensitive plant or animal species;
- large blocks of contiguous interior forest of least 250 acres, plus a 300 ft. transition zone;
- wetland complexes with at least 250 acres of unmodified wetlands
- streams or rivers and their associated riparian forests and wetlands, with:
  - aquatic species of concern
  - representative populations of the full suite of native fish, amphibians, and reptiles



**FIGURE 7**

Hubs, corridors and transition zones.

Source: Maryland Green Infrastructure Assessment (2003)

- rare cold-water or blackwater (low-gradient, slow flowing streams fed by water seeping through sandy soils that underlie floodplains and swamps) ecosystems, or
- anadromous (migrating upstream to spawn) fish
- conservation areas already protected by public and private organizations.

Corridors of at least 1,100 ft. in width represented “least cost pathways” to link hubs together. Transition zones were characterized as buffers to mitigate the effects of noise, light pollution, domestic animal intrusion, and other sources of disturbance that could intrude along hub/corridor edges and affect the ecological processes in the core area (Weber, 23,85).

In 2010, hubs were re-mapped using newer Landsat data; corridors were not re-mapped. In this update, the size of forest hubs was defined as greater than 50 acres and containing at least 10 acres of Forest Interior Dwelling Species (FIDS) habitat— a reduction from the 250 acre dimension used in the 2003 assessment. This was most likely due to human encroachment into natural areas.

In 2022, the Department of Natural Resources partnered with the Chesapeake Conservancy to remap Maryland’s green infrastructure network using the Conservancy’s new Land Use/Land Cover dataset based on aerial imagery collected in 2018/2019. This dataset enables image resolution down to 1-meter. For this update, the size of forest hubs remains the same as in 2010; however, wetland hubs are defined as areas of contiguous wetland of at least 50 acres, again a reduction from the 2003 assessment. Major new data enhancements, however, facilitate restoration and decision making:

- Hub and corridor information is retained to distinguish between hub type: forest, wetland, and aquatic, as well as corridor type: forest and aquatic.
- Corridors are further broken down to distinguish between existing forest/wetland/aquatic habitat,

restorable gaps (plantable areas) and non-restorable gaps (impervious surfaces).

- Added data layers include the mapping of all forests across the state, an updated FIDS map, and a mapping of the Cell Ecological Value, which scores land area across the state based on a number of datasets, e.g. habitat conditions, biological data, habitat connectivity, patch size.



MARYLAND STATE HIGHWAY ADMINISTRATION

**FIGURE 8**

Intercounty Connector “bottomless arch” wildlife passage.

Elements that address barriers, such as bridges-over and passages-under roads and highways are becoming common worldwide, facilitating connectivity and greatly reducing vehicle collisions with animals. For example, a wildlife passage project for Maryland’s Inter-county Connector (connecting Montgomery and Prince Georges Counties) includes “bottomless arches” (figure 8) that span streams and natural passages. Right-of-way fencing directs wildlife to these crossings and limits their access to the roadway. Post-construction monitoring of the bottomless arches indicates that efforts to support fish populations and passage have been successful. Heavy use by deer, raccoons, opossums, squirrels, turtles, and foxes has been documented (USDOT 2012).

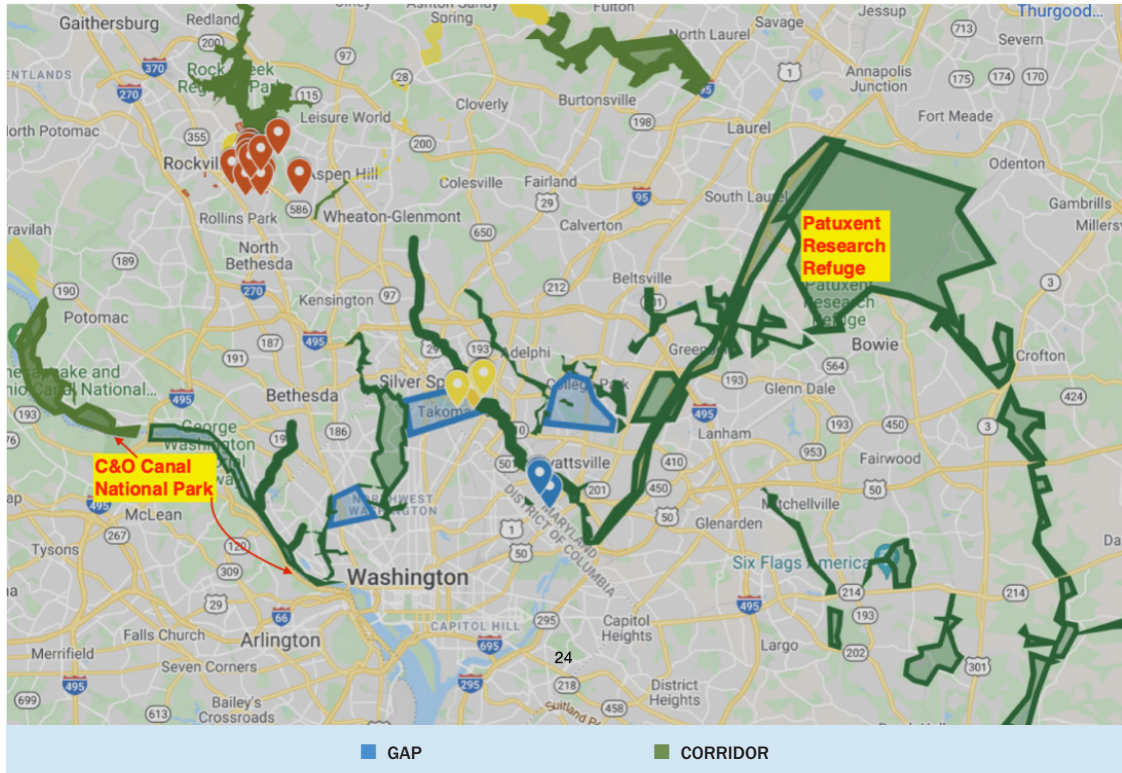
In Banff National Park (Alberta, Canada), there are currently 41 wildlife crossing structures (6 overpasses and 35 underpasses) that help wildlife safely cross the busy Trans–Canada Highway (figure 9). Since monitoring began in 1996, 11 species of large mammals, including bear, elk and cougar, have used crossing structures more than 200,000 times. The Netherlands was one of the first countries to deploy a network of wildlife crossings across the landscape. There are wildlife bridges



ROSS MACDONALD/BANFF NATIONAL PARK

**FIGURE 9**

A wildlife overpass in Banff national park, in the Canadian Rockies.



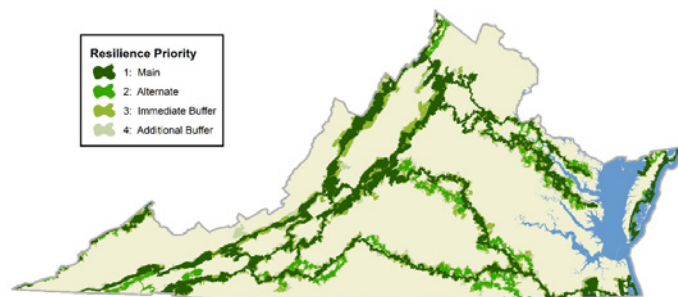
**FIGURE 10**

Maryland Sierra Club Natural Places Committee wildlife corridor map. Source: Sierra Club Maryland Wildlife Network, Maryland Wildlife Corridors (Accessed 9.20.22) <https://marylandcorridors.wordpress.com/>

in Germany, France, and Australia (World Geography). Endangered mountain lions in California benefit from highway overpasses that connect fragmented habitat and significantly reduce vehicle collisions. The recently begun Wallis Annenberg Wildlife Crossing over the Route 101 freeway on the western side of Los Angeles County will allow mountain lions to easily cross eight lanes of traffic, substantially expanding their habitat and reducing genetic diversity problems related to inbreeding.

The Sierra Club Maryland Natural Places Committee is mapping a wildlife corridor across the State. This group’s vision is based on the work of wildlife ecologist and entomologist Doug Tallamy, a University of Delaware professor who advocates for a “Home Grown National Park,” where private land owners connect vegetated areas on their properties to create wildlife corridors (Roth, 2020).

The Committee is designing and developing a native wildlife network driven by volunteers and residents of Maryland. The movement started in the city of Mount Rainier, in Prince Georges County, as an idea from Council member Luke Chesek to create the Mount Rainier Native Plant Network — an effort to educate and incentivize residents on the importance of planting native.



**FIGURE 11**

Virginia Wildlife Biodiversity Corridors. Source: Virginia Wildlife Action Plan

The idea is expanding into other Maryland counties, with the goal of eventually connecting to other corridors in surrounding states.

Figure 10 shows a corridor from the Patuxent Research Refuge to the C&O Canal.

In 2020, Virginia passed legislation (HB 1695, SB 1004) to create a Wildlife Corridor Action Plan (figure 11). Motivated to reduce vehicle-animal collisions, the legislation required Virginia's Departments of Transportation, Conservation and Recreation; and Game and Inland Fisheries to collaborate on a plan to be delivered in September 2022 and every four years thereafter (Moomaw, 2020). March 2023 saw the delivery of that plan.

In 2021, the Florida Wildlife Corridor Act passed the State Senate and House unanimously and was signed into law by Governor Ron DeSantis. The act formally recognizes the existence of the corridor (figure 12) and earmarks \$300 million toward conservation easements from private landowners.

Anne Arundel County finalized a Green Infrastructure Master Plan in April, 2022. It includes the largest natural areas in the County and connections between them, as well as conserved agricultural lands, cultural and historic resources, and trails. The network does not include all natural lands in the County or even all of the parks. Only lands that meet the size and connectivity criteria are included. The criteria prioritize areas that best inform how to apply limited land conservation resources. See figure 13.



FIGURE 12

Source: Florida Wildlife Corridor.org

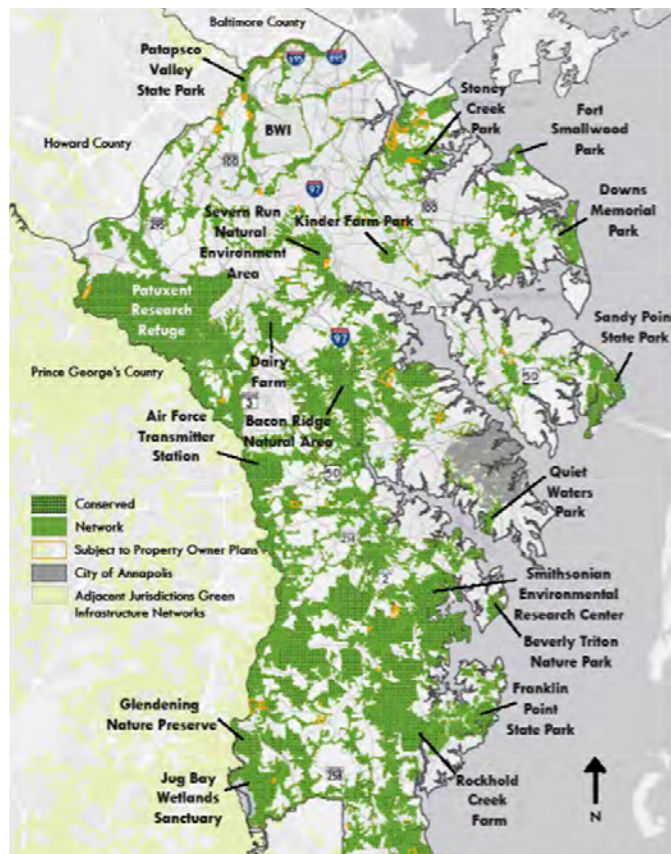


FIGURE 13

Anne Arundel County Green Infrastructure Plan map.

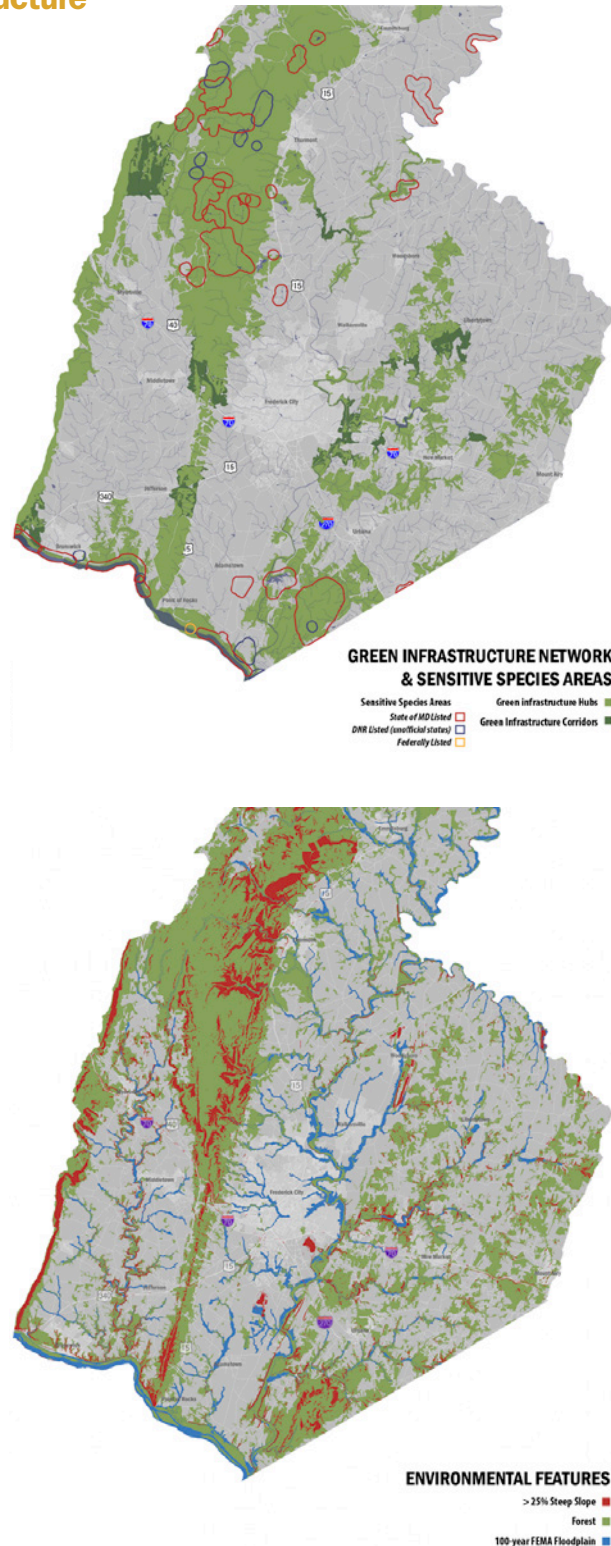
Source: aacounty.org

## Wildlife Corridors in Green Infrastructure

Green infrastructure (GI) is defined as an “interconnected network of natural areas and other open spaces that conserves natural ecosystem values and functions, sustains clean air and water, and provides a wide array of benefits to people and wildlife. It is the ecological framework for environmental, social, and economic health— in short, our natural life support system” (Benedict & McMahon, p. 1).

Figure 14 shows two maps from the Livable Frederick Master Plan (Frederick County, 2019). There are obvious corridors along the Catoctin Mountain and South Mountain ranges, as well as vegetated floodplains along waterways such as the Monocacy River. The Monocacy River flows under bridges on both Route 40 and I-70, avoiding those barriers to movement. The C&O Canal National Historic Park is a dramatic corridor along the Potomac River, with tributaries such as Catoctin Creek leading from the river to the Catoctin and South Mountain ranges.

The Livable Frederick Master Plan highlights the ongoing fragmentation of our natural resource areas, specifically stating that in the future it is important “... to direct urban/suburban growth away from GI and sensitive areas, and to ensure the protection and integration of GI where it exists within areas targeted for growth” (p.48). To accomplish this, the county will pursue the “...development of a Livable Frederick GI Sector Plan” (p. 48), re-stating a similar commitment from the County in 2010 (Frederick County, 2010).



**FIGURE 14**  
Green infrastructure, sensitive species and environmental features maps. Source: Livable Frederick Master Plan (2019)

Livable Frederick includes initiatives consistent with protecting biodiversity and accommodating wildlife movement, such as:

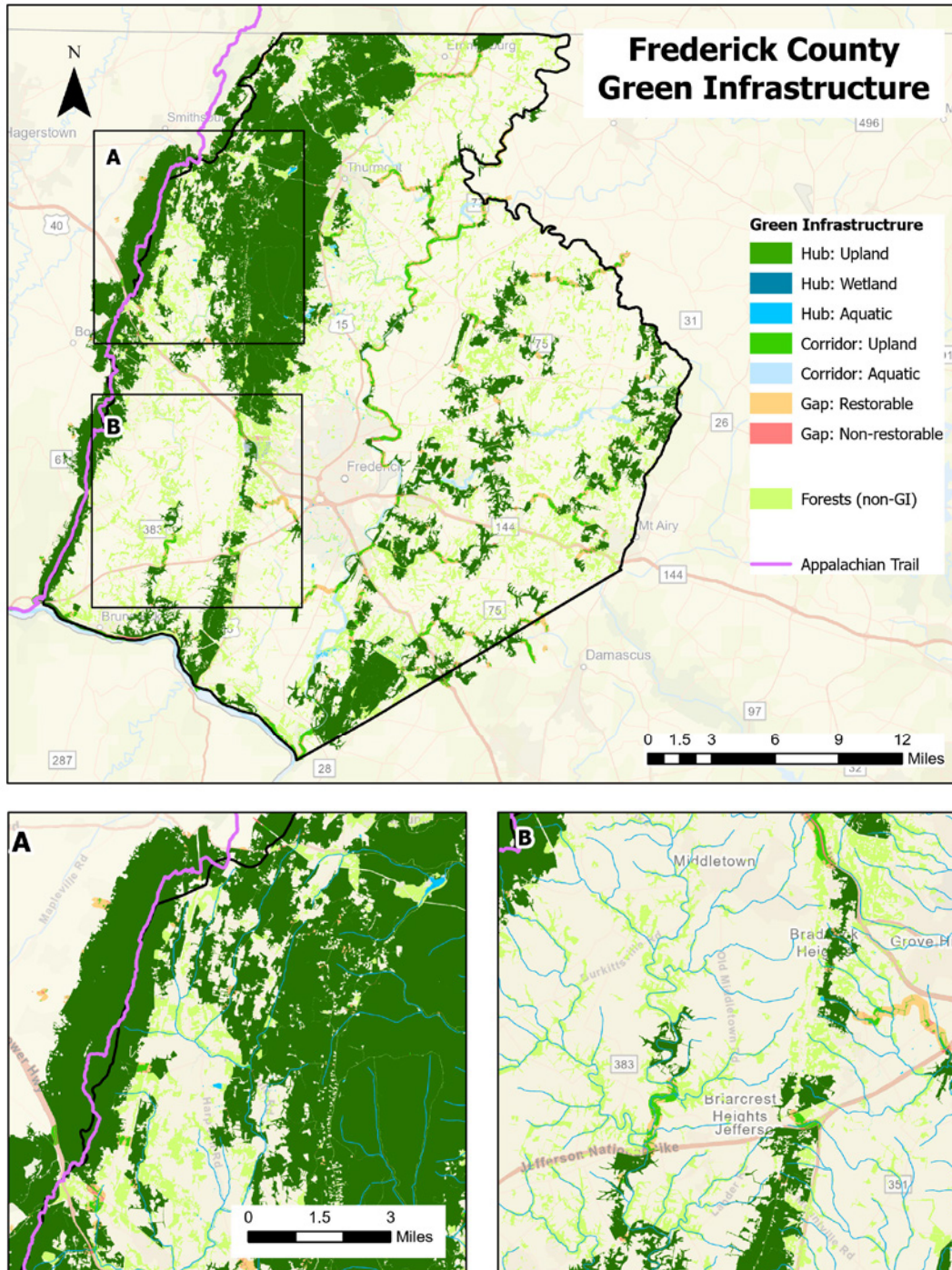
- Including a comprehensive review of natural resources during the creation of community and corridor plans and during the development review process (p. 189);
- Respecting the stewardship of natural resources in the provision of water and sewer infrastructure (p. 101);
- Evaluating infrastructure projects in terms of their capacity to facilitate wildlife survival by preserving contiguous habitats and connecting habitats that are fragmented (p. 104);
- Studying methods to mitigate the conflict between wildlife and motorists by examining the concentration of wildlife crash incidents along county and state roads...(p. 100);
- Advocating for wildlife and pedestrian connections over roads, e.g. I-270 (p. 189); and
- Creating options and incentives that encourage voluntary landowner participation in the establishment of greenways and trails (p. 101).



KAREN RUSSELL

## Green Infrastructure Mapping in Maryland

Maryland's Environmental Resources and Land Information Network (MERLIN Online) is a web map created and actively managed by the Department of Natural Resources (DNR). It is a central, state run repository for Geographic Information Systems (GIS) data collected from all state run agencies and is publicly accessible. In figure 15, a Frederick County green infrastructure map shows



**FIGURE 15**

Green infrastructure map example for Frederick County. Source: Maryland Department of Natural Resources



examples of forest, wetland and aquatic habitat hubs, connecting corridors, and gaps in those corridors that make them unusable, without restoration.

The Appalachian Trail is shown in the map as a purple line running along the western boarder of the county. Two vertical strips of forest can be seen running north to south, both of which are part of the Appalachian Range. The most western strip containing the Appalachian Trail is the South Mountain range, which connects to the C&O Canal National Historical Park along the Potomac River. It includes Greenbriar and South Mountain State Parks. The second strip is the Catoctin Mountain range comprised of a large patchwork of hub and other forest areas that include Gambrill State Park, The Frederick Municipal Forest, Cunningham Falls State Park, and Catoctin Mountain National Park.

Map inset A zooms in on the north western portion of the County, where a patchwork of forest hubs and other forest areas could provide a possible connection between the areas of South Mountain State Park and Cunningham Falls State Park. Map inset B shows a narrow network of hub and other forest areas, including Gambrill State Park and Catoctin Creek, that could provide connection to the C&O Canal National Park/Potomac River area. Together, these maps begin to allow for identification of existing important green infrastructure and other forest features, as well as for the identification of areas where connectivity is currently lacking.

In addition to updated mapping of Maryland's existing GI network, the MD DNR has developed a number of additional conservation and restoration targeting and prioritization geospatial datasets, which allow for identification of conservation and restoration opportunity areas, as well as for analysis of the relative value of ecological and climate resiliency co-benefits that might be realized through project implementation. Together, this suite of data could be used to support the development of a comprehensive GI plan for Frederick County, as well as to strategically guide the development of individual conservation and restoration projects across the county.

According to the DNR Digital Data and Products webpage (DNR, 2022), nearly 10,000 distinct locations of rare species, in Maryland, have been documented over the last 30 years. Protecting as many species as possible, particularly those that are rare, threatened or endangered is important. This data layer can be overlain onto hub/corridor information and factored into hub/corridor identification.

### **The Appalachian Landscape Climate Advisory Group**

The Appalachian Trail runs through both Frederick and Washington counties along the South Mountain range. In 2021, an Appalachian Landscape Climate Advisory Group (CAG) was formed to envision the future of this globally significant landscape through stakeholder conversations, resulting in a report entitled *Conserving an Intact and Enduring Appalachian Landscape: Designing a Corridor in Response to Climate Change*. Efforts are underway to address biodiversity loss and climate change by improving connectivity at continental scale (figure 16, CAG, 20).

The report identifies two goals. The first, "ecological integrity" gauges the "wholeness" of landscapes, or ecosystems, and indicates how an ecosystem will face stressors. According to the report, achieving the goal requires sustaining and improving terrestrial and aquatic connectivity and conserving a climate change refugia network. Climate change refugia are "homes" for species that

remain relatively buffered, even when areas around them get warmer. For example, protecting groundwater in Brook Trout habitat can maintain cold stream temperatures and allow the species to remain in Frederick County (Hitt). The second goal, “human connection to nature” acknowledges that climate change will directly and universally affect quality of life. According to the report, achieving this goal involves engaging communities in understanding how local ecosystems affect well-being, economic prosperity, quality of life, and traditional culture. It also involves understanding the spectrum of involvement and relationships that communities have with the landscape and co-creating solutions that build stronger relationships and engagement.

Locally, the Catoctin Land Trust convenes the Heart of Maryland Conservation Alliance. The Alliance’s Stewardship Work Group collaborates on biodiversity, climate change resilience, and re-forestation. The work group’s vision is a landscape connected via hubs and corridors centered on South Mountain. Participants in the work group include the Maryland Forestry Service, the Frederick Department of Climate and Energy, the Climate Change Working Group of Frederick County, the Sierra Club Catoctin Group, Stream-Link Education, Frederick Green, and others.



**FIGURE 16**

Appalachian Landscape data and image courtesy of The Nature Conservancy.  
Source: Appalachian Landscape Climate Advisory Group (July 2022)

# Human Life, Health and Economic Benefits of Green Infrastructure

**G**reen Infrastructure (GI) that preserves ecosystem values and functions (ecosystem services) supports human life, health, and economies. Ecosystem services include the purification of air and water, the detoxification and decomposition of wastes, and the maintenance of biodiversity (Daily, 1997).

For example, without Earth's diverse plant material, there would be no food from either plant or animal sources and human life would cease. GI supports water quality by filtering out pollutants that fall with the rain and those collected in surface runoff. Trees remove tons of air pollution annually (Coutts & Hahn, 2015), and of course recycle carbon dioxide into oxygen that we breathe.



**FIGURE 17**  
Pokewberry

GI provides protection against floods and hurricanes and a place for outdoor recreation, relaxation, and exercise. Exposure to nature reduces stress, as well as blood pressure, and improves mental clarity and emotional well-being. Hospital patients exposed to natural scenery from a window view after surgery, were shown to experience decreased levels of pain and shorter recovery time. (Seymour, 2016)

Further, “at least half of all prescribed drugs in the US come either directly from natural sources or are derived from natural sources, and 30% of the drugs sold worldwide contain compounds derived from plant material....Without the conservation of GI that supports biodiversity, many bioactive compounds and their potential health benefits could be lost (Coutts & Hahn 2015).” The Frederick County Forest Conservancy Board (2022) notes that chemicals derived from the locally found Pokewberry (figure 17) are used to treat diseases such as AIDS and rheumatoid arthritis.

Frederick County's tourism industry benefits from those who explore the outdoors. Page-views from the Visit Frederick website show a steady increase in people interested in parks and outdoor activities such as biking, from 51,926 in 2018 to 110,374 in 2020. In 2021, a record 21.7 million (Dance, 2022) people visited Maryland State Parks, compared to 21.5 million in 2020 and 14.9 million in 2019 (DNR, 2021). A 2010 Maryland State Parks Economic Impact and Visitor Study (Dougherty, 2011) showed that visitors spent more than \$567 million on food and drinks in restaurants or grocery stores and camping supplies during their trips, producing a total economic impact of more than \$650 million annually. Calculating for inflation (Saving.org), those figures equate to about \$779 million and \$893 million respectively, in 2023. The study did not break out parks by county, however, positive economic impacts of park visits were documented.

Recreational fishing is a popular activity in Frederick County. A 2016 survey of Maryland non-tidal anglers estimates that about \$2.5 million was spent on approximately 60,000 fishing trips taken in 2015 to the following Frederick County waterbodies: Monocacy River, Fishing Creek, Big Hunting Creek, Owens Creek, and Friends Creek. Frederick County also borders and provides access to a portion of the Potomac River, which is the most frequently fished non-tidal river/stream in the State of Maryland. In 2015, there were an estimated 239,000 fishing trips taken to the Potomac River (from North Branch/South Branch junction to Little Falls), with anglers spending an estimated \$23,000,000 on these trips (DNR, 2017).

# Conclusion

**F**rederick County has a responsibility to address climate change and biodiversity loss in the Appalachian corridor. By working on a GI plan that includes wildlife corridors, with the Department of Natural Resources, the Heart of Maryland Conservation Alliance and other interested stakeholders, the County can equitably and sustainably address land use needs for human health, agriculture, population growth and the economy. This model can then be replicated and incorporated on a regional and national level.

## Recommended Actions

In light of the significant foresight and planning required to address habitat reduction and fragmentation, the following actions are recommended:

### Administrative

- The County Planning Office prepares a functional GI plan that identifies strategies to protect natural resources and enhance biodiversity, including wildlife corridors, before undertaking further Livable Frederick small area plans. This includes:
  - Establishing a Geographic Information System database to identify and monitor protection of wildlife corridor tracts, in cooperation with the Maryland Department of Natural Resources
  - Reviewing administrative structures and operational procedures to facilitate implementation
  - Providing funding information and technical assistance to landowners and nonprofit organizations involved in land conservation/preservation
- The County hires a Natural Resource Manager to provide a strong, science-based voice in all land use planning/decision-making and oversees the implementation of the GI plan.
- The Division of Energy and Environment cooperates with community-based nonprofits and government organizations to identify and secure land conservation project funding.

### Community

- Public and non-governmental organizations engage property owners and other community stakeholders in understanding how a GI plan supports social, economic and human health.

### Legislative

- Review existing County policies, codes, and ordinances to better protect the natural GI network; recommend legislative changes as necessary.
- Approve, fund and implement the County GI plan; coordinate with the City as needed to connect habitat corridors
- Engage adjoining jurisdictions to broaden this effort across jurisdictional boundaries; work toward a Maryland Wildlife Corridor Act similar to Florida's

### Advocacy

- Advocate for a City GI plan
- Advocate for the C&O Canal National Park to be a designated wildlife corridor.
- Press for passage of the Federal Wildlife Corridor Act.
- Pursue national wild and scenic status for the Monocacy River.

# Appendix

## Climate Change Projections for Individual Tree Species Piedmont (Subregion 5)



This region's forests will be affected by a changing climate and other stressors during this century. A team of managers and researchers created an assessment that describes the vulnerability of forests in the region ([Butler-Leopold et al. 2018](#)). This report includes information on observed and future climate trends, and also summarizes key vulnerabilities for forested natural communities. The Landscape Change Research Group recently updated the Climate Change Tree Atlas, and this handout summarizes

that information. Full Tree Atlas results are available online at [www.fs.fed.us/nrs/atlas/](http://www.fs.fed.us/nrs/atlas/). Two climate scenarios are presented to “bracket” a range of possible futures. These future climate projections (2070 to 2099) provide information about how individual tree species may respond to a changing climate. Results for “low” and “high” emissions scenarios can be compared on the reverse side of this handout.

The updated Tree Atlas presents additional information helpful to interpret tree species changes:

- Suitable habitat - calculated based on 39 variables that explain where optimum conditions exist for a species, including soils, landforms, and climate variables.
- Adaptability - based on life-history traits that might increase or decrease tolerance of expected changes, such as the ability to withstand different forms of disturbance.
- Capability - a rating of the species' ability to cope or persist with climate change in this region based on suitable habitat change (statistical modeling), adaptability (literature review and expert opinion), and abundance (FIA data). The capability rating is modified by abundance information; ratings are downgraded for rare species and upgraded for abundant species.
- Migration Potential Model - when combined with habitat suitability, an estimate of a species' colonization likelihood for new habitats. This rating can be helpful for assisted migration or focused management (see the table section: “New Habitat with Migration Potential”).

Remember that models are just tools, and they're not perfect. Model projections can't account for all factors that influence future species success. If a species is rare or confined to a small area, model results may be less reliable. These factors, and others, could cause a particular species to perform better or worse than a model projects. Human choices will also continue to influence forest distribution, especially for tree species that are projected to increase. Planting programs may assist the movement of future-adapted species, but this will depend on management decisions. Despite these limits, models provide useful information about future expectations. It's perhaps best to think of these projections as indicators of possibility and potential change.

**SOURCE:** This handout summarizes the full model results for the Mid-Atlantic region, available at [www.fs.fed.us/nrs/atlas/combined/resources/summaries](http://www.fs.fed.us/nrs/atlas/combined/resources/summaries). More information on vulnerability and adaptation in the Mid-Atlantic region can be found at [www.forestadaptation.org/mid-atlantic](http://www.forestadaptation.org/mid-atlantic). A full description of the models and variables are provided in Iverson et al. 2019 ([www.nrs.fs.fed.us/pubs/57857](http://www.nrs.fs.fed.us/pubs/57857)) and [www.nrs.fs.fed.us/pubs/59105](http://www.nrs.fs.fed.us/pubs/59105)) and Peters et al. 2019 ([www.nrs.fs.fed.us/pubs/58353](http://www.nrs.fs.fed.us/pubs/58353)).

### CLIMATE CHANGE CAPABILITY

#### POOR CAPABILITY

Balsam fir	Pitch pine
Bigtooth aspen	Quaking aspen
Black ash	Red pine
Black cherry	Red spruce
Bur oak	Shingle oak
Eastern cottonwood	Striped maple
Eastern hemlock	Swamp white oak
Eastern white pine	Sweet birch
Jack pine	Tamarack (native)
Northern pin oak	White ash
Paper birch	White spruce
Pin oak	Yellow birch

#### FAIR CAPABILITY

American basswood	Shagbark hickory
Flowering dogwood	Silver maple
Hackberry	Sycamore
Osage-orange	Virginia pine

#### GOOD CAPABILITY

American beech	Loblolly pine
American elm	Mockernut hickory
American holly	Northern red oak
Bitternut hickory	Pignut hickory
Black locust	Post oak
Black oak	Red maple
Black walnut	Sassafras
Blackgum	Scarlet oak
Boxelder	Southern red oak
Chestnut oak	Sugar maple
Chinkapin oak	Sweetbay
Eastern hophornbeam	Sweetgum
Eastern redcedar	White oak
Green ash	Yellow-poplar

#### NEW HABITAT WITH MIGRATION POTENTIAL

Atlantic white-cedar	Shortleaf pine
Bald cypress	Sourwood
Blackjack oak	Swamp tupelo
Cherrybark oak	Water oak
Laurel oak	Water tupelo
Pond pine	Winged elm



[www.forestadaptation.org](http://www.forestadaptation.org)

# Climate Change Projections for Individual Tree Species Piedmont (Subregion 5)

**ADAPTABILITY:** Life-history factors, such as the ability to respond favorably to disturbance, that are not included in the Tree Atlas model and may make a species more or less able to adapt to future stressors.

- + **HIGH** Species may perform better than modeled
- **MEDIUM**
- **LOW** Species may perform worse than modeled

**HABITAT CHANGE:** Projected change in suitable habitat between current and potential future conditions.

- ▲ **INCREASE** Projected increase of >20% by 2100
- **NO CHANGE** Projected change of <20% by 2100
- ▼ **DECREASE** Projected decrease of >20% by 2100
- ★ **NEW HABITAT** Tree Atlas projects new habitat for species not currently present

**ABUNDANCE:** Based on Forest Inventory Analysis (FIA) summed Importance Value data, calibrated to a standard geographic area.

- + **ABUNDANT**
- **COMMON**
- **RARE**

**CAPABILITY:** An overall rating that describes a species' ability to cope or persist with climate change based on suitable habitat change class (statistical modeling), adaptability (literature review and expert opinion), and abundance within this region.

- ▲ **GOOD** Increasing suitable habitat, medium or high adaptability, and common or abundant
- **FAIR** Mixed combinations, such as a rare species with increasing suitable habitat and medium adaptability
- ▼ **POOR** Decreasing suitable habitat, medium or low adaptability, and uncommon or rare

SPECIES	LOW CLIMATE CHANGE (RCP 4.5)				HIGH CLIMATE CHANGE (RCP 8.5)			
	ADAPT	ABUN	HABITAT CHANGE	CAPABILITY CHANGE	ADAPT	ABUN	HABITAT CHANGE	CAPABILITY CHANGE
American beech	•	•	▲	△	▲	▲	▲	△
American basswood	•	-	▲	○	▲	○	▲	○
American elm	•	•	●	○	▲	▲	▲	△
American holly	•	-	▲	△	▲	▲	▲	△
Atlantic white-cedar*	-		★		★		★	
Bald cypress	•		★		★		★	
Balsam fir	-	-	▼	▼	▼	▼	▼	▼
Bigtooth aspen	•	-	▼	▼	▼	▼	▼	▼
Bitternut hickory*	+	•	▲	△	▲	▲	▲	△
Black ash	-	-	▼	▼	▼	▼	▼	▼
Black cherry	-	•	●	▼	●	▼	▼	▼
Black locust*	•	•	▲	△	▲	▲	▲	△
Black oak	•	•	▲	△	▲	▲	▲	△
Black walnut*	•	•	▲	△	▲	▲	▲	△
Blackgum	+	•	▲	△	▲	▲	▲	△
Blackjack oak	+		★		★		★	
Boxelder*	+	•	●	△	▲	▲	▲	△
Bur oak	+	-	▼	▼	▼	▼	▼	▼
Cherrybark oak	•		★		★		★	
Chestnut oak	+	•	●	△	●	△	▲	△
Chinkapin oak	•	-	▲	△	▲	▲	▲	△
Eastern cottonwood*	•	-	▼	▼	●	▼	▼	▼
Eastern hemlock	-	•	▼	▼	▼	▼	▼	▼
Eastern hophornbeam*	+	•	▲	△	▲	▲	▲	△
Eastern redcedar	•	•	▲	△	▲	▲	▲	△
Eastern white pine	-	•	▼	▼	▼	▼	▼	▼
Flowering dogwood	•	-	▲	○	▲	○	▲	○
Green ash*	•	•	▲	△	▲	▲	▲	△
Hackberry	+	-	●	○	●	○	●	○
Jack pine	+	-	▼	▼	▼	▼	▼	▼
Laurel oak	•		★		★		★	
Loblolly pine	•	-	▲	△	▲	▲	▲	△
Mockernut hickory	+	•	▲	△	▲	▲	▲	△
Northern pin oak	+	-	▼	▼	▼	▼	▼	▼
Northern red oak	+	•	●	△	●	△	▲	△
Osage-orange	+	-	▼	▼	●	○	●	○
Paper birch	•	-	▼	▼	▼	▼	▼	▼
Pignut hickory	•	•	▲	△	▲	▲	▲	△
Pin oak*	-	•	●	▼	●	▼	▼	▼
Pitch pine	•	•	▼	▼	▼	▼	▼	▼
Pond pine	-		★		★		★	
Post oak	+	-	▲	△	▲	▲	▲	△
Quaking aspen	•	-	●	▼	▼	▼	▼	▼
Red maple	+	+	●	△	▼	▼	▲	△
Red pine	-	-	▼	▼	▼	▼	▼	▼
Red spruce	-	-	▼	▼	▼	▼	▼	▼
Sassafras*	•	•	▲	△	▲	▲	▲	△
Scarlet oak	•	•	▲	△	▲	▲	▲	△
Shagbark hickory	•	•	●	○	●	○	●	○
Shingle oak	•	-	▼	▼	▼	▼	▼	▼
Shortleaf pine	•		★		★		★	
Silver maple*	+	-	●	○	●	○	●	○
Sourwood	+		★		★		★	
Southern red oak	+	-	▲	△	▲	▲	▲	△
Striped maple	•	-	▼	▼	▼	▼	▼	▼
Sugar maple	+	•	●	△	●	△	▲	△
Swamp tupelo	-		★		★		★	
Swamp white oak*	•	•	▼	▼	▼	▼	▼	▼
Sweet birch	-	•	▼	▼	▼	▼	▼	▼
Sweetbay	•	-	▲	△	▲	▲	▲	△
Sweetgum	•	-	▲	△	▲	▲	▲	△
Sycamore*	•	-	▲	○	▲	○	▲	○
Tamarack (native)	-	-	▼	▼	▼	▼	▼	▼
Virginia pine	•	-	●	▼	▲	○	▲	○
Water oak	•		★		★		★	
Water tupelo	-		★		★		★	
White ash	-	•	●	▼	▼	▼	▼	▼
White oak	+	•	▲	△	▲	▲	▲	△
White spruce	•	-	▼	▼	▼	▼	▼	▼
Winged elm	•		★		★		★	
Yellow birch	•	-	●	▼	●	▼	●	▼
Yellow-poplar	+	•	●	△	●	△	▲	△

\*Species with low model reliability based on five statistical metrics of the habitat models that affect change class. See maps and tables for more information ([www.fs.fed.us/nrs/atlas/combined/resources/summaries](http://www.fs.fed.us/nrs/atlas/combined/resources/summaries)).

# References

- Anderson, M.G., Barnett, A., Clark, M., Prince, J., Olivero Sheldon, A. and Vickery B. 2016. *Resilient and Connected Landscapes for Terrestrial Conservation*. The Nature Conservancy, Eastern Conservation Science, Eastern Regional Office. Boston, MA.
- Anne Arundel County Green Infrastructure Master Plan (4.4.2022) <https://www.aacounty.org/departments/planning-and-zoning/long-range-planning/green-infrastructure/green-infrastructure-master-plan-updated-september-2022/pdfViewer.html>
- Appalachian Landscape Climate Advisory Group (CAG). (July 2022) *Conserving an Intact and Enduring Appalachian Landscape: Designing a Corridor in Response to Climate Change*. [https://appalachiantrail.org/wp-content/uploads/2022/07/Appalachian-Landscape-Corridor-Report\\_July-2022.pdf](https://appalachiantrail.org/wp-content/uploads/2022/07/Appalachian-Landscape-Corridor-Report_July-2022.pdf)
- Ask MIT. (2021 July 12) *Why do some people call climate change an “existential threat”?* MIT Climate Portal. Web. 19.3.22 <https://climate.mit.edu/ask-mit/why-do-some-people-call-climate-change-existential-threat>
- Benedict, M. A., & McMahon, E. T. (2006) *Green Infrastructure: Linking Landscapes and Communities*. Island Press.
- Bond, Monica. (Oct, 2003) *Principles of Wildlife Corridor Design*. Center for Biological Diversity. <https://www.biologicaldiversity.org/publications/papers/wild-corridors.pdf>
- Borda, Patti S. *Grant may provide city \$50M reprieve toward wastewater treatment plant upgrade*. Frederick News Post, January 9, 2011
- Bradshaw CJA, Ehrlich PR, Beattie A, Ceballos G, Crist E, Diamond J, Dirzo R, Ehrlich AH, Harte J, Harte ME, Pyke G, Raven PH, Ripple WJ, Saltré F, Turnbull C, Wackernagel M and Blumstein DT (2021) Underestimating the Challenges of Avoiding a Ghastly Future. *Front. Conserv. Sci.* 1:615419. doi: 10.3389/fcosc.2020.615419. p. 2 [www.frontiersin.org/articles/10.3389/fcosc.2020.615419/full](http://www.frontiersin.org/articles/10.3389/fcosc.2020.615419/full)
- Conservation Florida. (June 30, 2021) Conservation Florida Celebrates Signing of Florida Wildlife Corridor Act. <https://conservationfla.org/cflnews/2021/6/30/conservation-florida-celebrates-signing-of-the-florida-wildlife-corridor-act>
- Coutts, C. & Hahn, M. (2015) *Green Infrastructure, Ecosystem Services, and Human Health*. *Int. J. Environ. Res. Public Health*, 12, 9768-9798; doi:10.3390/ijerph120809768
- Daily, G. C. (Ed.) (1997) *Nature's Services: Societal Dependence on Natural Ecosystems*. Island Press
- Damschen, et al. (27 Sept 2019) *Ongoing accumulation of plant diversity through habitat connectivity in an 18-year experiment*. *Science*, vol 365, Issue 6460, pp. 1478-1480. DOI: 10.1126/science.aax8992. <https://www.science.org/doi/10.1126/science.aax8992>
- Dance, S. (2022, Apr 22) *Maryland set to ‘transform’ its state park system amid record usage, making massive investment in rangers, new sites*. The Baltimore Sun. <https://www.baltimoresun.com/maryland/bs-md-state-park-investment-20220422-kh3nay2op5bn5pgn6e3otkn36m-story.html>
- Dougherty, Rebecca. (2011) *2010 Maryland State Parks Economic Impact and Visitor Study*. Maryland Office of Tourism Development, Department of Business and Economic Development.
- Ehrlich, P. R., Beattie, A., Ceballos, G., Crist, E., Diamond, J., Dirzo, R., Ehrlich, A. H., Harte, J., Harte, M. E., Pyke, G., Raven, P. H., Ripple, W. J., Saltré, F., Turnbull, C., Wackernagel, M., & Blumstein, D. T. (2021, January 13). Underestimating the Challenges of Avoiding a Ghastly Future. *Frontiers in Conservation Science*, 1. <https://doi.org/10.3389/fcosc.2020.615419>, p.2
- Fitzpatrick, Matthew (2019, Feb 12) *Climate of North American Cities will Shift Hundreds of Miles in One Generation*. University of Maryland Center for Environmental Science, Appalachian Laboratory, <https://www.umces.edu/news/climate-north-american-cities-will-shift-hundreds-miles-one-generation>
- Florida Wildlife Corridor Foundation. (Accessed 7.13.23) The Full Corridor (map). <https://floridawildlifecorridor.org/maps/>
- Frederick County. (2010) *Frederick County's Future, Many Places, One Community: A Comprehensive Plan for Frederick County, Maryland*. <https://www.frederickcountymd.gov/DocumentCenter/View/16238/Comprehensive-Plan-Goals-Policies-Actions?bidId=>
- Frederick County. (2010) *Conserving our natural resources and green infrastructure*. Comprehensive Plan for Frederick County, MD. <https://www.frederickcountymd.gov/DocumentCenter/View/14783/Natural-Resources-Green-Infrastrure?bidId=>
- Frederick County. (2019) *Livable Frederick master plan*. <https://ww3.frederickcountymd.gov/lfmp/>
- Frederick County Forest Conservancy District Board. *Nature Notes, Pokeberry Plant*. Frederick News Post, August 27, 2022.
- Hansen, Andrew J. et al. (Dec 2005) *Effects of Exurban Development on Biodiversity: Patterns, Mechanisms, and Research Needs*. Ecological Applications. <https://doi.org/10.1890/05-5221>
- Heller, N. E., & Zavaleta, E. S. (2009) *Biodiversity management in the face of climate change: a review of 22 years of recommendations*. *Biological conservation*, 142(1), 14- 32.
- Hilty, Jodi A., et al. (2019) *Corridor Ecology*. Island Press.
- Hitt, N. Presentation to the Frederick County Climate Emergency Mobilization Work Group, May 13, 2021. <https://www.facebook.com/FredCoMdBoards/videos/284915026611284/>
- Jones, Nicola. (2018, October) *Redrawing the Map: How the World's Climate Zones are Shifting*. Yale School of the Environment: Yale Environment 360. <https://e360.yale.edu/features/redrawing-the-map-how-the-worlds-climate-zones-are-shifting>
- Kellert, S. R. & Wilson, E.O. (1993) *The Biophilia Hypothesis*. Island Press.

- Maryland Department of Natural Resources (DNR). (2016, January), *Bionet: Biodiversity conservation network factsheet*. [https://dnr.maryland.gov/wildlife/Documents/BIONET\\_FactSheet.pdf](https://dnr.maryland.gov/wildlife/Documents/BIONET_FactSheet.pdf)
- Maryland Department of Natural Resources (DNR). *Digital Data and Products*. [https://dnr.maryland.gov/wildlife/Pages/plants\\_wildlife/digitaldata.aspx](https://dnr.maryland.gov/wildlife/Pages/plants_wildlife/digitaldata.aspx)
- Maryland Department of Natural Resources (DNR). *Habitat for Wildlife: Warm Season Grasses and Wildlife*. Web 6.13.21 <https://dnr.maryland.gov/wildlife/Pages/habitat/warmseason.aspx>
- Maryland Department of Natural Resources (DNR). *List of Rare, Threatened, and Endangered Species of Frederick County*. (Nov 2021) Wildlife & Heritage Service, Natural Heritage Program.
- Maryland Department of Natural Resources (2021 Feb 4) *Lt. Governor Boyd K. Rutherford, Maryland Department of Natural Resources Announces 45 Percent Increase in Maryland State Parks Attendance in 2020*. <https://news.maryland.gov/dnr/2021/02/04/lt-governor-boyd-k-rutherford-maryland-department-of-natural-resources-announce-45-percent-increase-in-maryland-state-parks-attendance-in-2020/>
- Maryland Department of Natural Resources. *Maryland Environmental Resources and Land Information Network (MERLIN Online)*. <https://gisapps.dnr.state.md.us/coastalatl2019/MERLIN/index.html>
- Maryland Department of Natural Resources. (2016) *Maryland State Wildlife Action Plan 2015-2025 (SWAP)*, Chapters 2, 3, & 6. Annapolis, Maryland. [https://dnr.maryland.gov/wildlife/Pages/plants\\_wildlife/SWAP\\_home.aspx](https://dnr.maryland.gov/wildlife/Pages/plants_wildlife/SWAP_home.aspx)
- Maryland Department of Natural Resources. (2017), *Survey and Management of Maryland's Fishery Resources*. Fishing and Boating Services, Fisheries Monitoring and Assessment Division – Freshwater Fisheries Program. *Fiscal Year 2017 Performance Report, July 1, 2016 – June 30, 2017*.
- Maryland Department of Planning. (2020) *Projections*. Maryland State Data Center.
- Mongilio, H. (2019, March 7) *Study: Frederick climate to feel like Mississippi in 2080*. The Frederick News Post. [https://www.fredericknewspost.com/news/environment/climate/study-frederick-climate-to-feel-like-mississippi-in-2080/article\\_97c5670f-a398-50b8-9872-8b54b4bd49ea.html](https://www.fredericknewspost.com/news/environment/climate/study-frederick-climate-to-feel-like-mississippi-in-2080/article_97c5670f-a398-50b8-9872-8b54b4bd49ea.html)
- Moomaw, Graham. (2020, August 4) *With wildlife corridor plan, Virginia officials hope to reduce highway collisions with animals*. Virginia Mercury. <https://www.virginiamercury.com/2020/08/04/with-wildlife-corridor-plan-virginia-officials-hope-to-reduce-highway-collisions-with-animals/>
- National Institute of Applied Climate Science (NIAC). (Oct 2021) *Climate Change Projections for Individual Tree Species, Piedmont (Subregion 5)*. Web 10.10.22 [https://forestadaptation.org/sites/default/files/MAR5\\_piedmont\\_1x1\\_10212021.pdf](https://forestadaptation.org/sites/default/files/MAR5_piedmont_1x1_10212021.pdf)
- Neilson, Ronald P., et al. *Forecasting Regional to Global Plant Migration in Response to Climate Change*. *Bioscience*. Vol. 55 No. 9.(September 2005): 749-759.
- Panuska, Mallory. *Upgrades to city's wastewater treatment plant near completion*. The Frederick News Post, March 8, 2019
- Pörtner, H.O., Scholes, R.J., et al (2021) “*IPBES-IPCC co-sponsored workshop report on biodiversity and climate change*.” Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services — Intergovernmental Panel on Climate Change, DOI:10.5281/zenodo.4782538. p.4
- Rhea, Danielle. (26 July 2022) “*Roadside Guide to Clean Water: Riparian Buffers*.” Penn State Extension, <https://extension.psu.edu/roadside-guide-to-clean-water-riparian-buffers>.
- Roth, K. (2020, May 20). Author urges gardeners to form one big “national park.” *Frederick News Post*. Retrieved July 5, 2022, from [https://www.fredericknewspost.com/public/ap/author-urges-gardeners-to-form-one-big-national-park/article\\_b82081b0-d0c0-581f-9843-2cde25cb4bc6.html](https://www.fredericknewspost.com/public/ap/author-urges-gardeners-to-form-one-big-national-park/article_b82081b0-d0c0-581f-9843-2cde25cb4bc6.html)
- Sellner, K.G. and D. Ferrier. (2020) *Water Quality Assessment of the Monocacy River*. Contribution #20-1, Center for Coastal and Watershed Studies, Hood College. Frederick, MD. 24 pp. + Appendices. P. 21
- Seymour V (2016) *The Human-Nature Relationship and Its Impact on Health: A Critical Review*. *Front. Public Health* 4:260. doi: 10.3389/fpubh.2016.00260
- Sierra Club Maryland Chapter, Native Plant and Wildlife Corridors-Natural Places Committee (n.d.) <https://marylandcorridors.wordpress.com/>
- The Nature Conservancy (TNC). (n.d.) *Migrations in Motion*. <https://maps.tnc.org/migrations-in-motion/#4/19.00/-78.00>
- The World Geography. (n.d.) *Unusual Bridges for Animals — Wildlife Overpasses*. <http://www.theworldgeography.com/2012/06/unusual-bridges-for-animals-wildlife.html>
- United States Department of Agriculture. (n.d.) *Conservation Programs & Practices for: Forest Interior Wildlife Habitat*. Natural Resources Conservation Service, Maryland. [https://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb1119189.pdf](https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1119189.pdf)
- United States Department of Transportation, Federal Highway Administration. (n.d.) Environmental Review Toolkit, Awards: Exemplary Ecosystem Initiatives 2012. *Maryland: Intercounty Connector Project Wildlife Passage*.
- United Nations Environment Programme. (2021) *Making Peace with Nature: A scientific blueprint to tackle the climate, biodiversity and pollution emergencies*. Nairobi. <https://www.unep.org/resources/making-peace-nature>
- Virginia Wildlife Corridor Action Plan (March 2023) <https://dwr.virginia.gov/wp-content/uploads/media/Virginia-Wildlife-Corridor-Action-Plan.pdf>
- Weber, Ted. *Maryland's Green Infrastructure Assessment*. (May, 2003) Maryland Department of Natural Resources Watershed Services Unit, Landscape and Watershed Analysis Division. 580 Taylor Ave, E-2, Annapolis, MD 21401, [tweber@dnr.state.md.us](mailto:tweber@dnr.state.md.us), 410-260-8802
- Wilson, E. O. (2016) *Half Earth*. Norton.



## **Acknowledgements**

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is a program of the Unitarian Universalist Congregation of Frederick.**

**The CCWG wishes to thank Envision Frederick County for housing our web presence:  
[envisionfrederickcounty.org/climate-environment/climate-change-working-group](https://envisionfrederickcounty.org/climate-environment/climate-change-working-group)**



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CHANGE  
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FIND OUT MORE ABOUT CCWG AND OUR WORK:  
[envisionfrederickcounty.org/climate-environment/climate-change-working-group](https://envisionfrederickcounty.org/climate-environment/climate-change-working-group)

# **Wildlife Crossings Oral Testimony.pdf**

Uploaded by: Karen Russell

Position: FAV

## **Wildlife Protections and Highway Crossings (HB1129) Testimony**

Maryland's [Wildlife-Protections and Highway Crossings](#) bill is a major step forward, in terms of reducing wildlife-vehicle collisions and relieving drivers of the stress and expense of vehicle repair. The inter-county connector, between I-270 and I-95 is a great example of design that facilitates wildlife passage and protects drivers from animal collisions. Love the bottomless arches!

Both Virginia and Pennsylvania have already passed legislation to protect wildlife habitat and reduce collisions. Virginia legislation passed in 2020. Last year, Pennsylvania passed legislation and has received at least [\\$840,000 in federal grant money](#). There is a lot of other federal grant money out there. I will also gladly pay an additional 10 dollars in car insurance toward a Highway Crossings Fund.

One species that will benefit from this bill are turtles and the State Wildlife Action Plan identifies the Wood Turtle, as a species of greatest conservation need. There are over 1200 rare, threatened and endangered species in Maryland-- more than 500 of them animals.

There is a larger picture here. Human well-being is critically dependent on Earth's natural systems, including its biodiversity. However, human encroachment into natural areas has reduced and fragmented habitat, not only causing a decline in both plant and animal species globally, but those left in habitat fragments suffer from inbreeding. I invite you to read a UN report called [Making Peace with Nature](#) to learn more.

Finally, I invite you and/or your staff to read a [white paper on the subject of wildlife corridors](#) that I researched and wrote.

**ih5nb-w5vzk (1).pdf**  
Uploaded by: Lani Hummel  
Position: FAV

Committee: Environment and Transportation

Testimony on: Wildlife Protections and Highway Crossings, HB 1129

Position: SUPPORT

Hearing: February 28, 2024

I am writing in support of the Wildlife Protections and Highway Crossings Act. For 12 years I had a job that required me to travel for 100 days a year. For about half of those days, I traveled by car on highways. As an animal lover, I dreaded the prospect of a collision with an animal. Male deer that were in search of mates in the fall were of particular concern.

Our roads and highways divide habitats and force wildlife to make dangerous crossings, harming rare species and causing dangerous and costly deer-vehicle collisions. The average insurance claim for a deer-vehicle collision is \$6,300, and there are an estimated 30,000 – 35,000 collisions per year in Maryland, with an estimated cost of \$180-200 million for the insurance claims alone. Wildlife crossings or wildlife collision mitigation projects reduce collisions and relieve drivers of the stress and expense of repairing a vehicle.

As a Maryland Master Naturalist, I also appreciate the role wildlife crossings will play in connecting habitats of rare, threatened, and endangered species such as the tiger salamander, wood turtle, spotted turtle, and the iconic diamondback terrapin.

For these reasons, I am asking you to support HB HB 1129.

Thank you for your consideration,

Lani Hummel

Annapolis Roads

**24 MGPA\_HB1129\_Wildlife crossings.pdf**

Uploaded by: Lindsay Thompson

Position: FAV



Maryland Grain Producers Association  
118 Dundee Ave, Chester, MD 21619  
Lindsay.mdag@gmail.com (p) 443-262-8491  
www.marylandgrain.com

Date: February 28, 2024

House Bill 1129 - Wildlife – Protections and Highway Crossings

Committee: Environment & Transportation

MGPA Position: Support

The Maryland Grain Producers Association (MGPA) serves as the voice of grain farmers growing corn, wheat, barley and sorghum across the state. MGPA supports House Bill 1129 which would require the identification and prioritization of threatened and endangered species whose habitat or movement corridors intersect with State highways; (2) the completion of a statewide deer population survey and related habitat maps to assist with identifying areas where wildlife crossings or wildlife-vehicle collision mitigation projects will reduce collisions between vehicles and deer; and (3) the design of new bridges, culverts, and State highways and the replacement or renovation of existing bridges and culverts.

The provision that MGPA is particularly interested in is the requirement that the Department of Natural Resources to conduct a comprehensive deer population survey. The National Agricultural Statistics Service estimated in 2012 that farmers experience over \$10 million in crop damage annually with 75% of that being attributed to deer. MGPA would argue that with the growing deer population in certain areas of the state and increased input costs, that dollar figure is much higher now. Maryland's deer population was estimated to be just over 200,000 white-tailed deer and 10,000 sika deer in 2022. The density of deer to suitable habitat in Maryland is high and therefore causes conflict with not only farmers and their crops but also vehicles and homeowners.

MGPA believes that additional tools and resources may be needed for farmers in certain areas of the state to manage the deer populations but we do not know where those hotspots are except for anecdotal evidence. DNR has not done an observed deer population study since 2013 but instead uses hunter harvest data to extrapolate the populations. We do not feel this is an accurate estimation as hunter harvest is impacted by participation and weather. This method also does not give us the regional specificity that would be needed to provide specific technical assistance to farmers in areas with extreme deer pressure.

We urge a favorable report on HB1129.



# **Wildlife – Protections and Highway Crossings - HB**

Uploaded by: Lisa Radov

Position: FAV



## MARYLAND VOTES FOR ANIMALS

PO Box 10411  
BALTIMORE, MD 21209

February 28, 2024

To: House Environment and Transportation Committee  
From: Lisa Radov, President and Chair, Maryland Votes for Animals, Inc.  
Re: Wildlife – Protections and Highway Crossings– HB 1129 – Support

Chair Korman, Vice - Chair Boyce, members of the Environment and Transportation Committee, thank you for the opportunity to testify before you today. My name is Lisa Radov. I am the President and Chairman of Maryland Votes for Animals, Inc. We champion humane legislation to improve the lives of animals in Maryland. Speaking for Maryland Votes for Animals, our Board of Directors, and our members across the State of Maryland, I respectfully ask that the House Environment & Transportation Committee vote favorably Wildlife – Protections and Highway Crossings – HB 1129.

This bill requires the Department of Natural Resources, in collaboration with the State Highway Administration, to identify and prioritize certain species whose habitat or movement corridors intersect with State highways and develop tools, technology, and techniques to identify certain State highway infrastructure locations. It requires the Department of Natural Resources to take certain actions regarding a statewide deer population survey on or before November 1, 2024 and June 30, 2026, and to collaborate with automobile insurance providers to remit a fee to the Fund.

Vehicle collisions with wildlife on the nation's roads claim the lives of millions of animals and kill or injure tens of thousands of people each year. According to the Pew Charitable Trust, a wildlife crossing along State Highway 9 in Colorado reduced such collisions by 90% from 2015 to 2020. In Oregon, a wildlife crossing on U.S. 97 near Lava Butte decreased collisions by roughly 85% during a 2015-17 monitoring period.

Animals are moving and shifting their migration patterns as they adapt to climate change. Research and technology have made it possible to target the best places for wildlife crossings so that they can most effectively benefit wildlife and motorists. It is time for Maryland to utilize these existing tools to coordinate efforts between the Maryland State Highway Administration and the Department of Natural Resources to protect Maryland's wildlife and drivers.

Maryland's wildlife and motorists are depending on us!

In closing, I would like to thank Delegate Ruth for her sponsorship of HB 1129 and ask the committee for a favorable report.

# **National Aquarium - HB1129 - Favorable.pdf**

Uploaded by: Maggie Ostdahl

Position: FAV



Date: February 28, 2024

Bill: HB 1129 – Wildlife – Protections and Highway Crossings

Position: Support

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Dear Chair Korman and Members of the Committee:

The National Aquarium respectfully requests a favorable report for **House Bill 1179 – Wildlife – Protections and Highway Crossings**, which will encourage agency coordination to reduce road impacts on threatened and endangered species and reduce wildlife-vehicle collision risks for motorists.

Saving wildlife and habitats is one of the National Aquarium's three overarching conservation goals. Increasing habitat connectivity is one key solution to address the ongoing biodiversity crisis, especially when policies include special consideration for threatened and endangered species as this bill does. Roads fragment landscapes, creating barriers to many animals' ability to feed and reproduce, and many species including reptiles and amphibians face the risk of mortality from road crossings during their overland migrations. Examples include wood turtles, semi-aquatic rainbow snakes, and the Eastern tiger salamander which migrates from woodlands in early spring and often travels over roads to reach breeding ponds. This bill will ultimately assist species conservation efforts with improved infrastructure that helps wildlife while reducing dangerous and costly wildlife-vehicle collisions.

This legislation also establishes a Highway Crossing Fund to invest in wildlife crossing infrastructure along with research needed to help determine the best siting of crossing locations. Such a fund will also allow the state to maximize investments in wildlife connectivity; this bill is particularly timely considering significant new federal funding available for wildlife crossings for projects that require non-federal matching amounts. Maryland should join the many other states that have enacted recent legislation encouraging infrastructure that allows safer movement of wildlife.

Properly-sited wildlife crossings significantly reduce wildlife-vehicle collisions and related driver injuries and vehicle damage costs, while improving habitat connectivity which contributes to better conservation of biodiversity. **We urge the Committee to issue a favorable report on HB 1129.**

Contact:

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# **Mark Conway - Support Letter - Wildlife - Protecti**

Uploaded by: Mark Conway

Position: FAV

February 28, 2024

Delegate Marc Korman  
Maryland House of Delegates  
251 Taylor House Office Building  
6 Bladen Street  
Annapolis, MD 21401

Delegate Regina T. Boyce  
Maryland House of Delegates  
251 Taylor House Office Building  
6 Bladen Street  
Annapolis, MD 21401

Dear Delegates Korman, Boyce and members of the Environment and Transportation Committee,

On behalf of Chesapeake Conservancy, I write to urge your support for the Wildlife - Protections and Road Crossings (HB 1129) sponsored by Delegate Ruth and to move this bill favorably from committee.

HB 1129 is a critical step in mitigating one of the biggest threats to our wildlife here in Maryland. While the focus of the Chesapeake Conservancy is most often that of protecting critical habitat, preserving sites of historical and cultural significance, and providing access to our treasured Chesapeake Bay for all; reducing the impact of roads will expand our shared conservation mission to disturbed areas that would otherwise continue to degrade and become less biodiverse over time. We believe this creates a unique opportunity to help enact positive change in many places where our residents live, enjoy, and travel through. Habitat fragmentation and road mortality can be the sole cause of a local wildlife population to blink out. Even if not a protected or rare species that may be disappearing from the wider landscape or even nationwide, many populations represent both an important ecological value as well as that of a unique natural heritage for a community. So many of these places may otherwise lose a particular species locally for future generations to enjoy if habitat is not connected or threats from roads reduced.

We have ambitious goals which include our support for the creation of a National Recreation Area here in the Chesapeake watershed as well as conserving 30% of the land by 2030. However, these bold initiatives do not sufficiently address the fact that so much of our beautiful state is already developed with fragments of habitat and pockets of important wildlife populations still embedded within areas where roadways present a major impediment to their survival. HB1129 allows the state to change course for those still special places that shoulder the impact that comes from more diverse uses, allowing our population to strike a more significant equilibrium.

In many cases just considering wildlife and its need to retain connectivity between habitat areas when designing our infrastructure can provide an immense benefit to those populations. We are fortunate that a wealth of case studies from across the world already exist, with many modern engineering elements having proven to be highly effective in protecting wildlife from harm associated with roadways. By supporting the best, up-to-date research, we can bolster the understanding of behavior for impacted species such as migration patterns, habitat use, population densities, and natural history as it pertains to road impact. This will allow for precise and more cost effective actions. By strengthening and properly funding the working relationships between responsible agencies, many choices made in designs of new infrastructure and the repairs of existing can mitigate the destruction of wildlife populations with improved efficiency and measurable metrics.

Roads also present a hazard for our population as wildlife collisions are numerous and sometimes quite dangerous for vehicle operators. There is also the less discussed weight of seeing constant, unnecessary loss of wildlife on roads presents a significant mental health toll on many members of our communities who feel hopeless to loss of the natural world around us. This bill can show that we not only have compassion and awareness for the problem but that we will act now to prevent further destruction and even restore populations before it is too late.

This bill is a rare opportunity to correct the actions of the past while also setting forth a new vision for how to coexist with some of our most treasured inhabitants of Maryland without sacrificing the necessary progress required to support our growing state.

Thank you for considering my testimony, I urge your support for HB 1129.

Submitted by Mark Conway  
Executive Vice President of External Affairs  
Chesapeake Conservancy

# **Testimony of Dr Mark Southerland Vernal Pool Partn**

Uploaded by: Mark Southerland

Position: FAV





## **HB1129 and SB902 Wildlife Crossing Legislation**

### **TESTIMONY OF DR. MARK SOUTHERLAND -- Favorable**

I received a Ph.D. and Smithsonian Fellowship in freshwater ecology and have consulted for federal, state, and local agencies on water resource issues for 30 years. I am the founder of Vernal Pool Partners and have served with the Maryland Academy of Sciences' Science Council, Maryland Water Monitoring Council, Howard County Environmental Sustainability Board, Howard County Conservancy, Patapsco Heritage Greenway, and Safe Skies Maryland.

#### **Finding Wildlife Passage Opportunities**

Maryland's Wildlife Crossing Bill will encourage the State Department of Transportation and the Department of Natural Resources to work together to identify the most strategic locations for incorporating crossings and wildlife passage features into transportation projects to help reduce road impacts on imperiled species and reduce wildlife-vehicle collision risks for motorists.

#### **Creating Safety and Finding Funding**

The bill will address the high number of animal-vehicle collisions and move Maryland toward a safer future for both people and wildlife. It will help fund wildlife crossing projects and the needed research needed. Agencies can use grant funds to support administrative costs for activities outlined in this bill. It will also require the State Highway Administration to coordinate with the Department of Natural Resources and apply for relevant federal funding opportunities for highway crossing projects.

#### **Wildlife-Vehicle Collisions are Killing Migrating and Imperiled Wildlife**

According to Maryland's State Wildlife and Action Plan, the Wood Turtle is classified as a Species of Greatest Conservation Need. Mortality due to road crossings in Wood Turtle habitat is one of the greatest threats to Wood Turtles due to their slow movement and terrestrial nature. Many other species are highly vulnerable to collisions in areas where roads and their habitats overlap—this is especially true of vernal pool species that migrate from their terrestrial foraging habitat to aquatic breeding habitat, often on the other side of roads. Obligate vernal pool species include wood frog, spotted salamander, marbled salamander, and the state endangered eastern tiger salamander.

The Time is Now. If we wait, we will continue to lose important wildlife from direct mortality and fragmentation of our ecosystems.

A handwritten signature in black ink, appearing to read "Mark Southerland". The signature is fluid and cursive, with a large, sweeping flourish at the end.

Vernal Pool Partners

# **HB1129 -Wildlife - Protections and Highway Crossin**

Uploaded by: Megan D'Arcy

Position: FAV

*Susan O'Neill, Chair*

*Charlotte Davis, Executive Director*

Testimony in Support of  
House Bill 1129 – Wildlife – Protections and Highway Crossings  
House Environment and Transportation Committee  
February 28, 2024

**The Rural Maryland Council supports with amendment House Bill 1129 – Wildlife – Protections and Highway Crossings.** This bill establishes various requirements for the Department of Natural Resources (DNR) and the State Highway Administration (SHA) relating to (1) the identification and prioritization of threatened and endangered species whose habitat or movement corridors intersect with State highways; (2) the completion of a statewide deer population survey and related habitat maps to assist with identifying areas where wildlife crossings or wildlife-vehicle collision mitigation projects will reduce collisions between vehicles and deer; and (3) the design of new bridges, culverts, and State highways and the replacement or renovation of existing bridges and culverts. The bill also establishes the Wildlife Highway Crossings Fund in DNR; among other revenue sources, the bill establishes a \$10 annual wildlife-vehicle collision mitigation fee that must be paid for each insured motor vehicle in the State and remitted to the fund. The bill takes effect July 1, 2024.

According to the State Farm annual deer-vehicle collision 2023-2024 study, across the nation, the growing deer and other animal populations, combined with the displacement of animal habitats, are making it more dangerous on the road, and making driver crashes more likely. The top 5 animal collisions reported by State Farm were: deer (1,288,714), unidentified animals (207,373), rodents (94,805), dogs (55,005), and raccoons (52,054). Maryland is a medium-risk state for animal collisions and 1 in 116 chances of striking a deer or other animal while driving.

Wildlife crossings are structures or pathways designed to facilitate the safe movement of wildlife across roads, highways, or other barriers. Types of crossing include wildlife overpasses, underpasses, ecoducts, culverts, bridges, and amphibian tunnels. Each type of crossing is designed to accommodate the specific needs and behaviors of different species and may vary depending on factors such as terrain, habitat, and the presence of wildlife corridors. These crossings offer numerous benefits for both wildlife and humans. By providing safe passage across roads and other barriers, they reduce the risk of collisions between vehicles and wildlife, which can lead to injuries, fatalities, property damage, and human injuries. Additionally, wildlife crossings help to maintain connectivity between habitat fragments, promote genetic exchange among populations, and support biodiversity conservation.

The Rural Maryland Council respectfully requests your favorable support with amendment of House Bill 1129. The recommended amendment is to include a pilot program in three different areas across the State to produce a case study on the wildlife crossing's effectiveness.

The Rural Maryland Council (RMC) is an independent state agency governed by a nonpartisan, 40-member board that consists of inclusive representation from the federal, state, regional, county and municipal governments, as well as the for-profit and nonprofit sectors. We bring together federal, state, county and municipal government officials as well as representatives of the for-profit and nonprofit sectors to identify challenges unique to rural communities and to craft public policy, programmatic or regulatory solutions.

# **HB1129 MD Written Testimony.pdf**

Uploaded by: Misty boos

Position: FAV



February 27, 2024

Honorable Chair Korman and Members of the House Environment and Transportation Committee  
Room 251 House Office Building  
Annapolis, Maryland 21401

Re: Wildlands Network supports funding wildlife corridor projects through HB1129

Dear Honorable Chair Korman and Members of the House Environment and Transportation Committee

My name is Misty Boos, and I am the U.S. Conservation Policy Manager for Wildlands Network. For thirty years, Wildlands Network has been a conservation leader specializing in restoring and protecting wildlife's ability to move across connected landscapes through science-based research and innovative policy. We are pleased to support [HB1129](#), which will connect habitat and reduce wildlife-vehicle collisions. This bill will also create a Highway Crossing Fund to help pay for wildlife crossing infrastructure projects, as well as the research needed to determine where best to site crossing locations.

Wildlife collisions are expensive and dangerous. The odds of hitting a deer or other animal are 1 in 116 in Maryland, and almost [2,000 people](#) were killed in crashes involving deer, including 14 in Maryland from 2012-2021, according to the Insurance Institute for Highway Safety. There were nearly [33,000](#) deer-vehicle collisions alone in Maryland in 2017, and the cost of these collisions exceeds [\\$100 million](#) annually. That figure does not include the costs associated with collisions with other animals, nor does it consider the costs associated with biodiversity loss.

Now, more than ever, we need to rethink how our infrastructure can better serve people and wildlife. The U.S. Department of Transportation has estimated that motorists collide with over [1 million](#) large animals each year, and [roughly 365 million](#) vertebrates (the equivalent of the entire U.S. human population) die from vehicle strikes. Beyond these deadly collisions, roads fragment the landscape and create barriers to wildlife's ability to find food and mates. Reducing habitat fragmentation is one of the most frequently recommended climate adaptation strategies we can use to support biodiversity. Wildlife crossings give species the ability to move safely as they adapt to a changing climate.

Many states across the U.S. are taking action. Over 20 states passed legislation in recent years encouraging smart infrastructure to facilitate wildlife movement and improve habitat connectivity. Properly-sited wildlife crossings can reduce wildlife-vehicle collisions [by over 90 percent](#), helping reduce driver deaths, injuries, and the costs of damage to vehicles. Wildlife crossing legislation has attracted broad, bipartisan support because wildlife crossings offer a cost-effective method to protect people and support our wildlife.

[HB1129](#) is incredibly timely, given the influx of federal dollars available for wildlife crossing and habitat connectivity projects that require non-federal matching dollars. Other states are taking notice and are taking advantage of the unprecedented amount of federal funding available. Creating a Highway Crossing Fund would provide significant leverage for obtaining capital from the numerous federal and private funding sources available today, including the [Wildlife Crossings Pilot Program](#), a competitive grant with the goal of reducing wildlife-vehicle collisions while improving habitat connectivity. Over 5 years, \$350 million will be awarded to applicants through this program, which provides 80% federal funding for construction, planning, design, and feasibility study needs to reduce wildlife-vehicle conflict. The program will cover 90% of project costs for projects located on interstates. Last year, \$110 million in grants were awarded for [19 wildlife crossing projects in 17 states](#), including eastern states like Pennsylvania, Kentucky, Vermont, Connecticut, and Virginia. Passing [HB1129](#) will provide Maryland with funding to cover the required non-federal share for projects, making the state more competitive for this program. The Wildlife Crossings Pilot Program is just one of at least 15 other funds created or expanded by the [Infrastructure Investment & Jobs Act](#) that can help pay for habitat connectivity and wildlife crossing infrastructure projects.

We urge you to support [HB1129](#) to put Maryland on the path toward a safer future for both people and wildlife.

Thank you for your time and consideration of this important issue.

Sincerely,



Misty Boos  
U.S. Public Policy Manager  
Wildlands Network

**16AF2166-F9B7-4861-9F09-DE9899D16C4F.pdf**

Uploaded by: S Ruth

Position: FAV



**HB1129/173327/1**

AMENDMENTS  
PREPARED  
BY THE  
DEPT. OF LEGISLATIVE  
SERVICES

19 FEB 24  
16:50:16

BY: Delegate Ruth

(To be offered in the Environment and Transportation Committee)

AMENDMENTS TO HOUSE BILL 1129

(First Reading File Bill)

AMENDMENT NO. 1

On page 1, in line 8, after “dates” insert “under certain circumstances”.

AMENDMENT NO. 2

On page 4, in line 13, strike “**THE**” and substitute “**SUBJECT TO THE AVAILABILITY OF FUNDING, THE**”; and in line 22, strike “**SUBJECT TO AVAILABILITY, USE**” and substitute “**USE**”.

On page 5, in lines 1, 6, 13, 19, and 27, in each instance, after “**TERRESTRIAL**” insert “**OR SEMIAQUATIC**”.

On page 6, in line 3, after “**TERRESTRIAL**” insert “**OR SEMIAQUATIC**”.

On page 7, in line 12, after “**TERRESTRIAL**” insert “**OR SEMIAQUATIC**”.



**HB1129 - Ruth - Sponsor Testimony - FAV.docx.pdf**

Uploaded by: S Ruth

Position: FAV



THE MARYLAND HOUSE OF DELEGATES  
ANNAPOLIS, MARYLAND 21401

SPONSOR TESTIMONY IN SUPPORT OF HB1129  
(WILDLIFE – PROTECTIONS AND HIGHWAY CROSSINGS)

Delegate Sheila Ruth  
February 28, 2024

Dear Members of the Environment and Transportation Committee,

Although our road network interconnects our cities, allowing us to reach where we need to, it poses a dangerous and significant barrier to our animal neighbors in Maryland. To animals, roads break apart their habitats and force dangerous crossings in search of food, habitation, and mates. As our roads expand, habitats grow more and more subdivided, fragmented by the road network that ties us together. The Department of Natural Resources lists 526 endangered animals native to Maryland, many of which are put under stress from the fragmentation of their habitats by our road network.

Additionally, vehicle-wildlife collisions, particularly from deer, represent a major economic cost to our state. The [cost of an insurance claim alone from a deer collision averaged \\$6,300 in 2022](#). Given that Maryland sees more than [33,000 deer-vehicle collisions per year](#), this represents a cost to Maryland insurance companies alone of more than \$200 million annually. Our neighbors in the Virginia Department of Transportation estimate that the total costs of a collision rise to over \$40,000 after adding in costs for medical bills, missed work, and removal of animal carcasses. Vehicle-animal collisions don't only threaten animals, they threaten us as well. Just last month, in a tragic incident, [a driver was killed in a deer-vehicle collision in Charles County](#).

However, there are well-tested solutions for both of these problems. Well-placed wildlife overpasses, underpasses, and exclusion fencing can reduce the incidence of vehicle-animal collisions by over 90%, preventing collisions that are dangerous to humans and deadly to animals. [In Virginia](#), culverts with exclusionary fencing paid for themselves on average in less than 2 years. HB 1129 will pursue these commonsense solutions by instructing the DNR and State Highway Administration to develop a list of the species most affected by habitat fragmentation by our road networks, create best practices guidelines for both infrastructure rehabilitation and building new infrastructure that will include wildlife crossings and exclusion fencing, and, given available funding, wildlife maps to direct attention to where it will have the greatest impact. It will also establish a Wildlife Highways Crossing Fund, collected from a fee issued on insured motor vehicles, to fund these developments. This fee – of just \$10 for every vehicle – promises to save many times that amount on preventable collisions for everyday Marylanders and insurance companies alike.

There is significant federal money available. The federal Wildlife Crossings Pilot Program will grant [\\$225 million over the next three years](#) for programs to reconnect fragmented habitats and prevent animal-vehicle collisions, which our neighbors in Virginia and Pennsylvania have both already taken

advantage of for their own programs. Virginia was recently awarded over \$600 thousand to develop a model to identify priority locations for wildlife crossings infrastructure. Pennsylvania was awarded \$840 thousand to develop a comprehensive statewide strategic plan to address safe management and stewardship for wildlife crossings. [See all FY22-FY23 awards at this link.](#)

This money, which was passed as part of the Infrastructure Investment and Jobs Act, is not guaranteed to continue – this is an opportunity that it would be a severe mistake to pass up, promising significant funding for a program which will save our critical environmental heritage from the threat of extinction and everyday Marylanders from countless broken bones, insurance claims, and totaled cars.

For these reasons, I urge a favorable report on HB 1129. Thank you.

**HB 1129\_UNF\_MAMIC.pdf**

Uploaded by: Bryson Popham

Position: UNF



191 Main Street, Suite 310 – Annapolis MD 21401 – 410-268-6871

February 26, 2024

The Honorable Marc Korman  
Chair, Senate Environment and Transportation Committee  
Room 251, House Office Building  
Annapolis, Maryland 21401

RE: House Bill 1129 – Wildlife - Protections and Highway Crossings

Dear Chair Korman and Members of the Committee,

On behalf of the Maryland Association of Mutual Insurance Companies (MAMIC), we respectfully oppose House Bill 1129.

MAMIC is comprised of 12 mutual insurance companies that are headquartered in Maryland and neighboring states. Approximately one-half of our members are domiciled in Maryland, and are key contributors and employers in our local communities. Together, MAMIC members offer a wide variety of insurance products and services and provide coverage for thousands of Maryland citizens.

MAMIC wishes to make it clear to the Committee that it does not oppose the substantive policy established by House Bill 1129. Rather, it is the funding mechanism to which we object. Under the bill, a new Section is created in the Transportation Article to “establish and collect an annual wildlife-vehicle collision mitigation fee for each vehicle” that it insures. That Section also requires a new process by which fees collected by an insurer are remitted to a new Wildlife Highway Crossing Fund” established in the Natural Resources Article.

Generally, such fees are closely related to their subject. Under this legislation, wild animal collisions have only a remote connection to the insurance on the vehicle involved. That is why, for example, when the State acted a number of years ago to provide additional funding for emergency medical services related to traumatic injury, a principal cause of such injuries was motor vehicle accidents, and the State imposed a surcharge on motor vehicle registrations as a result. There is no such nexus between wild animal collisions and insurance on a vehicle.

Equally concerning is the fact, described in the fiscal note, that administrative costs may consume a substantial portion of the mitigation fee created under the bill. The fiscal note states that automobile insurers “may face significant administrative difficulties in collecting . . . the mitigation fee.” The fiscal also cites the phenomenon that “policyholders regularly switch insurance carriers in the middle of the year.” This means that it will be difficult for insurers to determine whether a new customer has already paid the fee.

For these reasons, MAMIC respectfully requests an unfavorable report on House Bill 1129.

Sincerely,

Jeane A. Peters, President

cc: The Honorable Guy Guzzone  
Bryson Popham

# **State Farm Testimony -- Wildlife Crossings HB1129\_**

Uploaded by: Marta Harting

Position: UNF

## STATE FARM INSURANCE COMPANIES

### SB902/HB1129 (Wildlife – Protections and Highway Crossings)

Position: Opposed

State Farm is the second largest writer of private passenger automobile insurance in Maryland, with 886,000 policies in force. There are 433 State Farm agents across Maryland, all of whom are independent small business owners with over 2,000 employees in the State. State Farm pays approximately \$30 million in premium taxes to the State each year, and it gives hundreds of thousands of dollars back to Maryland each year in charitable giving.

State Farm opposes SB902/HB1129 (Wildlife – Protections and Highway Crossings) because it is funded through a \$10 annual wildlife-vehicle collision mitigation fee on insured motor vehicles in the State, which would be required to be collected by insurers and remitted to the State. According to the Fiscal Note, this fee would generate approximately \$51 million for the Fund annually.

State Farm does not have a system in place to assess and bill for the fee, so this bill would impose a significant programming expense. The Fiscal Note shows that the programming expense for the Maryland Automobile Insurance Fund alone would be over \$700,000, and MAIF represents only about 1% of the total market, indicating that overall this bill would impose nearly \$70 million in programming costs industry-wide. The fee also represents a significant added cost to the cost of automobile insurance, exacerbating rising automobile insurance costs currently being experienced due to inflation and other factors.

Policy periods do not align with calendar years, so this creates additional complexity and resulting implementation costs with the collection of an “annual fee.” Further, the bill appears to require insurers to verify whether a new insured had already paid the fee for that year if they switch insurers mid-year. It is unclear how an insurer could verify this information and this burden would represent an additional and ongoing expense of the bill. Further, if the bill is interpreted to require a refund if an insured cancels before the end of the policy period, this would add to the implementation costs of the bill.

Additionally, only law-abiding citizens who carry automobile insurance would pay the fee, allowing the estimated 14% of drivers who are able to drive uninsured to benefit from their violation of Maryland law.

If this program is to be adopted and funded through a fee on the driving public, it should be funded with a broad based fee directly collected by State through an existing mechanism such as vehicle registrations.

**HB 1129 Wildlife Crossing Fund UNF APCIA 0228224.**

Uploaded by: Nancy Egan

Position: UNF





**Testimony of**  
**American Property Casualty Insurance Association (APCIA)**  
**House Environment & Transportation Committee**  
**House Bill 1129 Wildlife-Protections and Highway Crossings**  
**February 28, 2024**

**Unfavorable**

The American Property Casualty Insurance Association (APCIA) is the primary national trade organization representing nearly 67.1 percent of the Maryland property casualty insurance market. APCIA appreciates the opportunity to provide written testimony in opposition to House Bill 1129.

The bill requires the Dept. of Natural Resources (DNR) with the State Highway Administration to identify certain species intersect with the state highways and ascertain key locations where they are crossing. The bill also requires the DNR to estimate the cost to determine the Maryland deer population. Protecting endangered species is an important cause, to be sure, but this bill would create a new \$10 “Wildlife–Vehicle Collision Mitigation Fee” on all auto insurance policies. The purpose of the fee is to fund a program to protect endangered species that live near state highways.

Protecting endangered species is an important cause, to be sure, but it should not be insurers’ and policyholders’ responsibility to fund this. If more funding is needed for wildlife protection, that money should come from the state’s general fund – not insurers and policyholders.

Maryland auto insurance is already subject to a number of taxes, assessments, and fees. Insurers must pay a gross 2% premium tax for all Maryland auto policies. Additionally, Maryland subjects auto insurers to an additional assessment up to 3% under its Automobile Insurance Fund assessment, as well as another assessment up to 2% for the Property and Casualty Insurance Guaranty Corporation. Maryland also has a \$1000 annual Insurance Fraud Prevention fee for all insurers.

Maryland already subjects insurers to a disproportionate tax burden compared to other industries. For example, Maryland collected over \$682 million of insurance taxes in FY 2023 (see page 15, here: [https://marylandtaxes.gov/reports/static-files/revenue/closeout/FY2023\\_Closeout.pdf](https://marylandtaxes.gov/reports/static-files/revenue/closeout/FY2023_Closeout.pdf)). By way of comparison, the corporate income tax raised \$1.8 billion in the same year. This means that the insurance industry alone paid over 37% of the amount of income taxes paid by all other corporations combined. Maryland should spread this tax burden more fairly and not further increase costs to insurers and their consumers.

Further, creating this fee could increase the retaliatory tax consequences for Maryland-domiciled insurers doing business in other states. Maryland-domiciled insurers have to pay retaliatory taxes in states that impose lower taxes on insurers than Maryland. Retaliatory taxes are imposed on out-of-state insurers to equalize the tax burden between the retaliating state and the insurer’s home state. As such, if Maryland creates this new fee on insurers, Maryland-domiciled insurers will have increased retaliatory tax liability in other states. Therefore, this new fee would have the public policy effect of penalizing Maryland insurers doing business outside the state.

In addition, on a practical note, it is also not clear how the fee would be collected by the insurance companies and submitted.

For all these reasons, APCIA respectfully requests an unfavorable report on House Bill 1129.

Nancy J. Egan,

State Government Relations Counsel, DC, DE, MD, VA, WV

[Nancy.egan@APCIA.org](mailto:Nancy.egan@APCIA.org) Cell: 443-841-4174

**hb1129 oppose.pdf**

Uploaded by: Peggy Williams

Position: UNF

HB1129

OPPOSE

Dear Committee Members:

This is the [re-] start of the UNAgenda21 “Wildlands Project,” a socialist takeover of huge swaths of public (and private lands) in order to balance the needs of humans with nature. It ultimately will limit human activity/ownership of corridor areas, ignoring private property rights. This policy is taken directly from the United Nations. It didn’t take hold before, due to unpopularity with the masses, so here we are again. No one elected the UN, so why are we taking orders from them through our legislation? It’s not just this bill; I have lost count! Please pay attention legislators, to what you are ushering in! [Agenda 21 Wildlands Project: What you need to know - RANGEfire!](#)

Peggy Williams

Severna Park, MD 21146

D31

**HB1129 .pdf**

Uploaded by: Suzanne Duffy

Position: UNF

HB1129 is an AGENDA 21 attack on personal property rights. NO to any and all Agenda 21 oppressive bills and infringements on personal freedoms. Agenda 21 is a road paved to hell on earth. How many of you know any of this????

<https://sustainabledevelopment.un.org/outcomedocuments/agenda21>

Vote this evil agenda out of Maryland.

Suzanne Price  
AACo, MD

# **HB 1129 - NCEL Informational Testimony.pdf**

Uploaded by: Logan Christian

Position: INFO

February 26, 2024

Honorable Chair Korman and Members of the House Environment and Transportation Committee  
Room 251 House Office Building  
Annapolis, Maryland 21401

Re: National Caucus of Environmental Legislators informational testimony for HB1129

Dear Honorable Chair Korman and Members of the House Environment and Transportation Committee:

My name is Logan Christian and I am the Wildlife and Habitat Coordinator with the National Caucus of Environmental Legislators (NCEL). Created by and for state legislators, NCEL serves as a resource for a network of over 1200 state lawmakers working to protect, conserve, and improve the natural and human environment.

Maryland is one of 14 states that are working on legislation related to wildlife corridors and crossings this year. Wildlife crossing structures - including wildlife overpasses, underpasses, and funnel fencing - have well-documented benefits. Transportation officials report over [90% reductions](#) in wildlife-vehicle collisions for appropriately sited wildlife crossings, while wildlife managers report improved access to and movement between habitat areas for wildlife populations, improving survival and genetic exchange. The effectiveness of wildlife crossings, coupled with the billions of dollars in federal funding recently made available for wildlife crossing infrastructure via the 2021 Infrastructure Investment and Jobs Act (IIJA), helped spur 15 states to enact over 30 wildlife corridors and crossing bills in the last two years.

States have taken a variety of legislative approaches related to wildlife corridors and crossings. These include measures to:

- 1) Study wildlife corridor locations and priority highway crossing sites
- 2) Improve coordination between state agencies to better address habitat connectivity
- 3) Provide funding for wildlife crossing projects
- 4) Improve state statutes and authorities to build habitat connectivity into project permitting and design processes
- 5) Protect habitat linkages between core wildlife habitat areas



Many of these bills helped states improve their chances of receiving federal funding from the first round of the Wildlife Crossings Pilot Program (WCPP), one of several IJA programs, which awarded \$110 million to 17 states in December 2023.

Maryland HB 1129 combines many of the above-mentioned legislative approaches while also tailoring the proposal to the state's particular needs. First, it calls for analysis of how wildlife crossings can be used to improve habitat connectivity for Maryland's threatened and endangered species, while also requiring a statewide deer population survey to better inform the construction of wildlife crossings that reduce deer-vehicle collisions. The bill would also update Maryland's highway design standards so that future transportation infrastructure additions account for wildlife passage, such as by using sufficient bank width under bridges to accommodate wildlife movement.

The bill also creates a long-term funding source for new wildlife crossing projects by creating a dedicated Wildlife Highway Crossing Fund. Three other states - including Colorado, New Mexico, and Nevada - have established a dedicated, interest-bearing fund for wildlife crossing projects. HB 1129 establishes such a fund, and also creates a dedicated funding source via a car insurance surcharge. The fund will help Maryland implement wildlife crossing projects that result from the statewide studies required by this bill, while also creating a source of matching funds for federal grants like the Wildlife Crossing Pilot Program, which will be available for at least another three years.

Lastly, the bill would improve coordination between the Department of Transportation and Department of Natural Resources to address habitat connectivity. Several states including Oregon, California, and Virginia require coordination between transportation and natural resource agencies, but Maryland's bill would clarify this coordination by creating dedicated liaison positions. HB 1129 aligns with some of the nation's most successful state habitat connectivity laws, while also setting Maryland apart from other states with the addition of a dedicated insurance surcharge and liaison positions.

Thank you for your time and consideration.

Sincerely,

*Logan Christian*

Logan Christian  
Wildlife and Habitat Coordinator  
National Caucus of Environmental Legislators

# **HB1129 - Wildlife - Protections and Highway Crossi**

Uploaded by: Pilar Helm

Position: INFO

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February 28, 2024

The Honorable Marc Korman  
Chair, House Environment and Transportation Committee  
251 House Office Building  
Annapolis MD 21401

***RE: Letter of Information – House Bill 1129 – Wildlife – Protections and Highway Crossings***

Dear Chair Feldman and Committee Members:

The Maryland Department of Transportation (MDOT) offers the following information on House Bill 1129 for the Committee's consideration.

The MDOT and State Highway Administration (SHA) thank the sponsors of this bill and its cross file for meeting to discuss the intent of the bill as well as some possible challenges for SHA with the bill as drafted. House Bill 1129 requires the implementation of certain connectivity infrastructure in the design of new bridges, culverts, and State highways along a waterway in the State that causes habitat fragmentation for a terrestrial threatened species, endangered species, or Species of Greatest Conservation Need.

For bridges and culverts, this provision does not consider design elements dictated by hydrologic and hydraulic analysis, areas that are regulated by the Maryland Department of the Environment. The requirements to incorporate natural or artificial banks and shelves resulting in a larger structure may have upstream or downstream flooding impacts on adjacent properties. While the requirements to implement modifications with the replacement or renovation of a bridge or culvert are limited in those instances where the modifications would significantly increase the project cost or timeline, these provisions in the bill do not account for instances where safety or sound engineering practices would dictate that wildlife connectivity infrastructure not be included in the final design. In other instances where infrastructure enhancements must be considered for roadworks, the implementation is subject to a reasonableness and feasibility assessment performed by the Administration, as the subject matter experts on transportation engineering and highway design.

The SHA notes that the bill generally requires the Administration to consult with DNR on the design of new bridges, culverts, or State highways that could reasonably be expected to cause habitat fragmentation for a terrestrial threatened species, endangered species, or Species of Greatest Conservation Need. While this will result in recommendations only where habitat fragmentation is determined to be an issue, the costs for solutions to rectify the habitat fragmentation vary depending on the required solution or, where options exist, the option selected.

The SHA will continue to prioritize practices that enhance endangered species projects and reduce wildlife related crashes. Presently, SHA, through its Office of Environmental Design, is researching what other states are doing in this area and evaluating potential funding sources for the Administration's efforts. One of SHA's goals for this year is to utilize funds on hand to target grant opportunities and other federal funding for various projects, including the possibility of habitat mapping relative to State highways.

The Honorable Marc Korman  
Page Two

The State Highway Administration will continue to meet with the sponsors to determine whether amendments to the bill could address the concerns included in this letter, as well as how the State could meet the requirements of this bill through the Department's existing business practices.

The Maryland Department of Transportation respectfully requests the Committee consider this information when deliberating House Bill 1129.

Sincerely,

Matthew Mickler  
Deputy Director (Acting)  
Office of Policy and Research  
Maryland State Highway Administration  
410-545-5629

Pilar Helm  
Director  
Office of Government Affairs  
Maryland Department of Transportation  
410-865-1090

**MAIF - Testimony - HB 1129 - 2-28-24.pdf**

Uploaded by: Sandra Dodson

Position: INFO



**MARYLAND**  
AUTO INSURANCE

**POSITION ON PROPOSED LEGISLATION**

**Date:** February 28, 2024

**Position:** Informational

**Bill Number:** House Bill 1129

**Bill Title:** Wildlife – Protections and Highway Crossings

**The Maryland Automobile Insurance Fund**

Maryland Automobile Insurance Fund (MAIF) was created in 1973 as the residual automobile insurer and is required to offer insurance to Maryland residents that have been turned down by two insurance companies or canceled or non-renewed by one. *Insurance Article §20-301.*

**House Bill 1129 Review and Analysis:**

House Bill 1129 requires the Department of Natural Resources, in collaboration the Maryland State Highway Administration, to conduct a statewide deer population survey and take various actions where the habitat or movement corridors of these species intersect with State Highways and bridges. To fund these activities the bill creates the Wildlife Highway Crossing Fund.

Revenue for the Fund relies in part on a \$10 annual wildlife-vehicle collision mitigation fee for each insured vehicle. This fee is collected from policyholders by insurers, including MAIF, and remitted to the Wildlife Highway Crossing Fund.

MAIF is concerned about the impact of House Bill 1129 both from a financial and a logistical standpoint. First, MAIF estimates that significant one-time computer programming will be approximately \$300,000 to \$400,000. Any interface with other State agencies or vendors may generate additional expenses. MAIF is already facing significant reductions in surplus and this cost will exacerbate this problem.

Second, the development and implementation of the vehicle fee collection process will take at least nine months. Therefore, MAIF will have difficulty in meeting the July 1, 2024, effective date.

Third and most importantly, House Bill 1129 creates complications to implement due to policy cancellations and non-renewals. The fee is an annual fee and therefore should be charged only once in any 12-month period. However, MAIF writes many policies for individuals who have been cancelled or non-renewed by other insurers. We would have no way of determining whether the fee had been paid to another insurer within the last 12 months. In addition, MAIF has a cancellation rate of 40% for non-payment. Many of the MAIF cancelled policyholders apply for a new policy within the year and frequently have multiple policies within the year. It would be very difficult to track the \$10 fee through various policy cycles.

In sum, House Bill 1129 poses financial and administrative difficulties for MAIF.

Please let us know if we can answer any questions.

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