ENVIRONMENTAL POLICY INNOVATION CENTER

MOVING WILDLIFE:

A Vision for the Successful Deployment of $1.35 billion to Restore Wildlife Migrations

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ENVIRONMENTAL POLICY INNOVATION CENTER

The mission of EPIC is to build policies that deliver spectacular improvement in the speed and scale of conservation.

EPIC focuses on a narrow set of strategies:

- Improving policies that allow private sector funding or stewardship to expand or supplant public or charitable
- Conservation Work
- Transforming government policies to focus on what matters—outcomes
- Eliminating the organizational barriers that prevent public agencies from adapting to 21st century solutions

We believe that innovation and speed are central to broadening efforts to conserve wildlife, to restore special natural places, and to deliver to people and nature the clean water they need to thrive. To achieve those goals, conservation programs must evolve to accommodate our modern understanding of human behavior and incentives and the challenges posed by humanity's expanding footprint. We embrace experimentation with novel ideas in conservation policy, to learn quickly from mistakes and iteratively design effective approaches to be even more successful.

EPIC is a fiscally sponsored project of Sand County Foundation. Sand County Foundation is a non-profit conservation organization dedicated to working with private landowners across North America to advance ethical and scientifically sound land management practices that benefit the environment.

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EXECUTIVE SUMMARY

A century of transportation infrastructure projects has spurred economic growth and improved our ability to move, but these projects have also led to unintentional yet devastating limitations for wildlife migration and biodiversity. Now there is an opportunity to undo some of the accidental damage. This report has two purposes: first, it summarizes the universe of federal funding opportunities now available to reconnect, restore, and conserve natural spaces to the benefit of wildlife* movement. Second, it explains how to rapidly deploy these funds, coordinate among administering agencies to optimize benefits, and reach communities in greatest need. Tribal nations, states, and local governments have been early actors in restoring wildlife passage and their leadership provides examples of the policy, interagency coordination, budgetary commitment and data collection needed for this work to be successful.

Two new programs with $1.35 billion in funding are being launched by USDOT that dramatically change the scale of federal support for the restoration of wildlife movement: the National Culvert Removal, Replacement, and Restoration Grant Program and the Wildlife Crossing Pilot Program. They will fund wildlife crossings, aquatic species passage, and removal of problematic infrastructure such as culverts.

While the primary focus of this report is on appropriated funds for these two programs explicitly focused on wildlife connectivity projects, the federal government and states can also consider adjustments that would allow many additional Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA) programs to enhance - or at least not degrade - wildlife movement and landscape ecology. Among these are programs that support dam removal, estuary restoration, and reforestation projects, and USDA conservation incentive programs for private landowners. We estimate that $25.257 billion in other agencies' program funds could also support wildlife movement enhancements.

However, USDOT's directly targeted programs and the other agencies' programs will only achieve their full benefits if some key implementation actions are taken:

1. **Create a digital streamlined permitting application and environmental review process** for all wildlife mitigation, habitat restoration, and conservation projects to reduce cost barriers for low-income communities and ensure projects are delivered on time and on budget. Exemptions should be considered as well.

2. **Adjust federal procurement and audit procedures** to accommodate pay for success, outcomes-based procurement, or other innovative procurement strategies so that states and communities can get projects built without waiting on federal approval, and repaid if the project meets federal goals.

3. **Set a voluntary goal for USDOT** to dedicate at least 5% of infrastructure grant funding to comprehensive transportation planning and projects that reduce wildlife morality, improve habitat connectivity, or enhance infrastructure and ecosystem resiliency in the face of climate change and extreme weather events, so that new projects are wildlife-friendly and climate-smart before they are even built.

* Note that we use the term 'wildlife' to connote both terrestrial wildlife species and fish and other creatures that live in water.

4 **Require broader interagency coordination** among all federal agencies administering aligned IIJA and IRA grant programs so that project-level funding is optimized at the systems-level planning and migration corridor scale.

5 **Build a searchable online dashboard** for all federal wildlife mitigation, habitat restoration, and nature-based grants.

6 **Pass comprehensive bipartisan legislation** to support federal agencies, states, tribes, and private landowners in the identification, restoration, and conservation of wildlife corridors.

7 **Provide financial assistance or incentives** for consistent data collection across states as well as early integration of wildlife considerations into all appropriate transportation and government planning processes.

8 **Establish a learning nexus** to share past achievements in the science and practice of habitat connectivity, including lessons learned and best practices so that decision makers aren't reinventing the wheel.

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INTRODUCTION

The loss of free-flowing rivers and landscapes to fragmented parcels and rigidly engineered waterscapes has edged scores of species into perpetually smaller pockets of habitat barely adequate to sustain healthy populations. US based conservation organizations have long advocated for mitigative solutions to this consequential trend. Interventions such as encouraging conservation practices among private landowners, reforestation, and expanding protections to remaining natural areas are among the tools needed to correct the damages. More recently though, there is focus on better understanding where and how major public infrastructure is the culprit driving habitat degradation and biodiversity loss, and what to do about it.

> **“Nature needs to move.**

Habitat fragmentation resulting from transportation infrastructure prohibits and seriously compromises wildlife’s ability to migrate freely along historic routes. Now animals and humans alike are paying the price. A 2008 report by the Federal Highway Administration (FHWA) to Congress brought attention to a deadly and costly trend playing out along highways across the US: wildlife-vehicle collisions. FHWA found that such collisions had increased by 50% over 15 years and carried a hefty price tag in damages shouldered by the American public - the total cost of damages recorded in 2007 was $8.2 billion.[1] According to State Farm Insurance data wildlife-vehicles collisions continue to rise; a 7.2% increase was documented between July 1, 2020, and June 30, 2021.[2]

But the issue doesn’t stop there - 1-2 million animals die annually because of these vehicle strikes. Particularly vulnerable are ungulates such as pronghorn antelope that migrate over 300-miles per year and are now forced to weave through increasing traffic and expanding highway systems.[3]

Highways and roads aren’t the only troubling components of transportation infrastructure choking the flow of species and ecological systems. Culverts - pipes and passages under roads that allow streams and rivers to flow past roads - have long been identified as the root cause of declining fish populations, particularly anadromous fish like salmon that travel thousands of miles and back to complete their life cycle.[4] The decline of fish and water quality due to infrastructure barriers negatively impacts tribal nations as well. From a legal standpoint, culverts’ effects on fish populations undermine treaty rights guaranteeing tribes unencumbered access to wildlife.[5] Dams inflict similar damage by cutting off aquatic habitat, severing estuaries, rivers, and streams and diminishing the quality of the ecosystems more broadly. Many dams also present serious threats to public safety.[6]

Nature needs to move. The strategic introduction of habitat connectivity infrastructure and removal of problematic traditional infrastructure are major pieces to solving the wildlife movement challenge. Fortunately, billions of dollars are now flowing from the Infrastructure Investment and Jobs Act (IIJA), that if wielded strategically could yield large-scale landscape results and truly move the needle on wildlife connectivity. Ensuring these projects unfold within enabling policy environments that incentivize interagency coordination and streamlined data collection, and overhaul problematic bureaucratic processes, is key. Here is one vision for how this might be achieved.

PART 1

The Growing, Yet Patchy Landscape of Corrective Action

Emerging and Existing Policies

There is no federal framework for wildlife movement in the United States, though efforts have been made. In 2019, the Wildlife Corridors and Connectivity Act was introduced and passed by the US House of Representatives but not the Senate.[7] The legislation aimed to establish wildlife corridors on federal lands and provide funding resources to states and tribes for protection of corridors on non-federal lands. Some additional highlights from the bill included a measure to establish a wildlife corridors database and conservation incentives to private landowners using USDA funds.

Without a national strategy or comprehensive bipartisan legislation, wildlife movement work is unlikely to be consistently funded and systematically integrated into long-term government planning processes. States and municipal governments, however, have pushed forward with a patchwork of targeted laws to catalyze the reconnection and rehabilitation of essential habitat and corridors within their borders.

In 2022, seven states passed laws whose provisions range from mandating that state transportation and wildlife agencies coordinate on identification of sites for crossing projects to dedicating funding for wildlife crossing project construction.[8] State leadership and innovation for wildlife movement last year including all of the following:

- **California:** The Safe Roads and Wildlife Protection Act authorizes its Department of Fish and Wildlife (DFW) to approve compensatory mitigation credits for wildlife connectivity projects.[9] The bill also directs the State's Department of Transportation (CalTrans) to assess and develop projects to address barriers to anadromous fish, collaborate with DFW to publish an inventory of potential and funded connectivity projects and assess all transportation projects for wildlife connectivity barriers. Also, the State set aside $50 million in dedicated funding for additional habitat permeability projects to be built.[10]

- **Colorado:** The Safe Crossings for Wildlife and Motorists Act created an annual fund of $5 billion for wildlife crossing projects.[11] These funds can be strategically leveraged to match federal grants for similar work.

- **New Mexico:** Authorized $2 million dedicated to crossing projects, allowing the state to work on 11 critical connectivity projects outlined in its Wildlife Corridors Action Plan.

- **Oregon:** Authorized $7 million for terrestrial crossings and another $8 million for aquatic passage projects across the state.

- **Wyoming:** Authorized millions of additional funding to begin work on several specific terrestrial and aquatic habitat connectivity projects.[12]

- **Massachusetts:** H. 5151 charges the state's Department of Transportation (DOT) with conducting a statewide inventory to identify locations in need of wildlife movement infrastructure. The inventory smartly integrates the eligibility criteria for the upcoming federal Wildlife Crossing Pilot Program as an evaluation benchmark for project feasibility (Blanchard and Hance).

- **Utah:** The Wildlife Accident Protections Act mandates the state's DOT to integrate wildlife connectivity measures in its annual transportation report and $1 million in appropriations to construct projects along a specific wildlife-vehicle collision hotspot.[13]

Several other states adopted wildlife movement legislation far earlier than 2022. Most notably, Florida's efforts to address habitat permeability began in 1994 and culminated in 2021 with the passage of the Florida Wildlife Corridors Act, which included a $300 million budget dedicated to connectivity projects. The Act catalyzed steps to protect historic migratory passages, prevent further habitat fragmentation, and fund construction of wildlife crossings in key locations.[14] These efforts helped the Florida panther population rebound from the brink of extinction in the 1970's to nearly 200 cats as of 2017.[15] Another earlier adopter, Vermont, passed Act 171 in 2016 to further protect its remaining contiguous forest land and increase wildlife crossings in highly fragmented locations through a state-wide linkages analysis approach.[16] That same year New Hampshire passed SB 736 requiring its Department of Fish and Game to inventory existing wildlife infrastructure and identify locations for new crossing projects.

Four additional states have introduced legislation: Mississippi, Indiana, Pennsylvania, and Washington. While two others - Washington and Nevada - have enacted Executive Orders to identify and plan for additional infrastructure projects that increase habitat permeability across various ecosystems. And, lastly, many local municipalities have passed policies to galvanize action. For example, in 2006 Pima County, Arizona passed a half cent tax to establish a Regional Transportation Authority, which included $45 million for "Critical Landscape Linkages" resulting in the completion of connectivity projects within the Sonoran Desert Conservation Multi-Species Conservation plan.[17]

> **"There's been momentum both regionally and locally to improve habitat permeability, but much more is needed.**

The Rise of Wildlife Crossing Projects

Thanks to local action, habitat connectivity projects have gained momentum across the US. From rural Wyoming, Montana, and Florida to urban California, a constellation of underpasses, overpasses, culverts and dam removals[18] have been completed or are in-process. These projects target a range of individual and interlocking goals: improved public safety, enhanced wildlife mobility, reconnection of historic migratory pathways and habitats, exchange of genetic material to preserve endangered or highly sensitive species and bolstered access to a thriving wilderness for recreation, sport, tourism and microeconomic benefit. Projects currently under construction or in design have garnered bipartisan support due to these

range of benefits. Those already completed have benefited from extensive monitoring and evaluation periods further demonstrating the success and cost-savings yielded from these initial investments. A cross-section of completed projects by state, cost, and infrastructure built can be found in Table 1. A more comprehensive list of projects can be viewed on ARC Solution's Wonderful World of Crossings story map. These resources provide insight into where action has been taken to reconnect habitats and the level of resources needed to actualize the work.

Table 1: A Cross Section of Completed Wildlife Mobility Projects

Project	State	Ecosystem	Infrastructure	Cost
US 160 Wildlife Crossings	CO	Terrestrial	One underpass, one overpass, exclusion fence, escape ramps, deer guards	$11M
State Highway 9	CO	Terrestrial	2 overpasses, 5 underpasses, fencing, landscaping, widening of shoulder, rescontruction to 11-mile segment of highway	$40M
US 285 and US 24 Intersection	CO	Terrestrial	1 Underpass, fencing (3 miles)	$5.76M
US 285	CO	Terrestrial	1 Underpass, fencing, roadway improvements	$4.5M
I-25 South Gap Wildlife Underpasses	CO	Terrestrial	4 underpasses, 28 miles of fencing, 59 cameras	$419M
Barstowe's Pond Dam	MA	Aquatic	Dam Removal	$650K
Tack Factory Dam	MA	Aquatic	Dam Removal	$489K
Traphole Brook Dam	MA	Aquatic	Dam Removal	$2M
Flathead Reservation	MT	Terrestrial	42 overpasses	$21M
US 64	NC	Terrestrial	3 underpasses	$6.6M
Bighorn Sheep Crossing	ND	Terrestrial	Underpass, bridge, fencing	$3.1M
(I-40) Tijeras Canyon Safe Passage	NM	Terrestrial	2 underpasses, fencing - integrated into existing project	$750K
Santa Clara Creek (tribal)	NM	Acquatic	1 arch culvert crossing	$800K
I-80 Pequop Summit	NV	Terrestrial	2 overpasses	$14.1M
Parleys Summit	UT	Terrestrial	Overpass	$5M
New Monkton Salamander Crossing	VT	Both	2 Underpasses/Amphibian Friendly Culvert/Box Culvert?	$290K
Snoqualmie Pass/I-90	WA	Terrestrial	Overpass/bridge	$6.2M
Trappers Point	WY	Terrestrial	2 overpasses, 5 underpasses, fencing	$11M

Source: ARC Solutions, 2022[19]

Spotlight on Groundbreaking Projects:

Case Study 1: Tribal Culture and Knowledge Bridges Landscapes

US Highway 93, which cuts through western Montana, once gloomily boasted billboards reading "Pray for me, I drive Highway 93." Hazardous weather conditions coupled with increased traffic and high risk of collision with ungulates had made traveling the highway notoriously perilous. As a result, USDOT and Montana DOT began searching for solutions in the early 90s - one idea they landed on was to widen the 2 lane highway to 4 lanes.[21] A large percentage of the wildlife-vehicle collision hotpots fell along a 56 mile stretch of highway that ran through the Flathead Reservation.[22] Any work to this portion of Highway 93 required consultation with the Bitterroot Salish, Kootenai, and Pend d'Oreilles tribes. The consultation revealed cultural, spiritual, and ecological conflicts with Montana DOT's lane expansion. The proposed project edged onto sacred tribal lands and led to further fragmentation of the landscape for both people and wildlife. The tribal nation offered an alternative vision: build wildlife crossing infrastructure to allow safe passage of animals, reduce collisions, and to avoid structural barriers to communities living along the transportation corridor. From those conversations a $120 million commitment was born that led to construction of 42 wildlife crossing. Eight bridges, 33 culverts and underpasses, and one 200 foot wide bridge for terrestrial species, all built along the segment of Highway 93 falling within the reservation borders.[23] According to early post-construction monitoring, wildlife-vehicle collisions fell 40-60% and 22,000 animals were documented accessing the crossing per year. [24]

Photo credit: ©Wikipedia

Case Study 2: Returning the Mountain Lion to the Mountain

In Santa Monica, California, encroaching urban sprawl coupled with major transportation infrastructure has restricted the mobility of mountain lions and other species across their historic habitat in the Santa Monica Mountain Range.[25] The 10 lane stretch of US Highway 101 snaking its way between the city and mountain landscape has proved dangerous to the already dwindling population of mountain lions in the area. Compounding matters is fragmentation's role in cutting this subpopulation of lions off to escape routes from fast spreading wildfires as well as other lion populations carrying much needed genetic diversity that ensures long-term population health. Scientists tracking the Santa Monica lion population predict their extinction within 50 years unless structural interventions are taken.[26] In response, activists, foundations, and public officials joined forces in 2022 to break ground on the Wallis Annenberg Wildlife Crossing. Once complete it will feature a 165-foot-wide vegetated green overpass with fencing directing mountain lions and many other species away from the highway, over the bridge, and safely to the wide-ranging protected habitat they seek. The cost of the project is $90 million with 60% coming from private donations.[27] The project is one among a relatively small but quickly growing portfolio of connectivity projects where the primary goal is preservation of species and ecosystems.

Photo credit: ©Priscilla du Preez/Unsplash

PART 2

A Vehicle for Change: IIJA Funding is an Unparalleled Opportunity for Action

In 2021, Congress passed the largest infrastructure and environmental spending bills in recent history: the Infrastructure Investment and Jobs Act (IIJA). Provisions within the bill unlock billions in funding, technical support, and data collection that could help undo decades of environmental degradation and biodiversity harm caused by transportation infrastructure.

Within the $567.1 billion in funding to USDOT authorized by the IIJA, there are two groundbreaking programs for wildlife connectivity. The IIJA provided $1 billion for the National Culvert Removal, Replacement, and Restoration Grant Program and $350 million for the Wildlife Crossing Pilot Program.[28] A deeper summary of these two new dedicated connectivity programs can be found in Table 2, below.

Photo credit: ©Niklas Hamann/Unsplash

Table 2: Summary of Habitat Connectivity Funding Opportunities via Infrastructure Investment and Jobs Act

				Eligible Entities						
Program Name	**Amount (FY22-FY26)**	**Grant Type**	**Eligible Habitat Connectivity Related Criteria**	**Tribal Nations**	**State DOT**	**Local Gov**	**FLMA**	**MPO**	**Federal Share**	**Key Provisions**
Wildlife Crossing Pilot Program	$350M	Competitive	Reduces wildlife-vehicle collisions, improves terrestrial and aquatic habitat connectivity	✓	✓	✓	✓	✓	TBD	Eligible partners include academic institutions, NGOs, and foundations regranting to one of these entities is permitted. 60% of funds must be awarded to projects in rural areas
National Culvert Removal, Replacement, and Restoration Program	$1B	Competitive	Restore anadromous fish passage through removal, repair, replacement of culverts and weirs, includes fish passage structures around or over weirs	✓	✓	✓			Up to 80%	Tribes are not required to provide a match, USDOT, US Fish & Wildlife Service and the National Marine Fisheries Service to provide technical assistance to Tribes and underserved communities to aid in project design and grant procedures
INFRA	$8B	Competitive	Reduces wildlife-vehicle collisions, improves terrestrial and aquatic habitat connectivity	✓	✓	✓	✓	✓	Up to 80%	15% of INFRA grants are rederved for small projects (>$25M), 30% of which must be awarded to rural areas
Rebuilding American Infrastructure with Sustainabiity and Equity (RAISE)	$7.5B	Competitive	Improves aquatic connectivity by replacing or rehabilitating cuovetts, wildlife-connectivity projects related to bridges and highways	✓	✓	✓		✓	Up to 80%	Rural, disadvantaged, and high poverty communities exempt from match
Rural Surface Transportation Grant	$2B	Competitive	Wildlife-connection projects in rural areas	✓	✓	✓			Up to 80%	Up to 10% of funding may go to small projects
Bridge Investment Program	$12.5B	Competitive	Removal, repair, replacement of culverts to improve flood control and aquatic connectivity, environmental mitigation is eligible bundled with bridge conctruction or repair projects	✓	✓	✓	✓	✓	Up to 50% for Large Bridge Projects, but capped at 80% - 90% for eligible off-system bridges	Up to 5% of funding may be used to replace or repair culverts
Tribal Transportation Program Safety Fund	$120M	Competitive	Construction or retrofitting of structure to reduce wildlife-vehicle collisions	✓					Up to 100%	
Nationally Significant Federal Lands & Tribal Project Program	$275M	Competitive	Continuous projects that include environmental mitigation in or adjacent to Federal land open to the public, or Tribal land, and reduce wildlife-vehicle collisions and improve aquatic organism passage	✓	✓	✓	✓	✓	Up to 100% for Tribal Nations 90% for FLMA	
PROTECT (Federal)	$1.4B	Competitive	Projects to improve infrastructure resiliency may include work to the size or number of drainage structures	✓	✓	✓	✓	✓	Up to 100% for Tribal Nations 80% for FLMA	Wildlife connectivity not explicitly eligible through drainage structure that can improve aquatic and terrestrial species passage
PROTECT (State)	$7.3B	State Formula Allocation								
Bridge Formula Grant	$27.5B	State Formula Allocation	Mitigation of wildlife impacts eligible during bridge construction and reconstruction	✓	✓	✓			See 23 US Code § 120, 100% for OSB	Newly expanded definition of construction now includes “improvements that reduce the number of wildlive-vehicle collisions, such as wildlife crossing structures”
Highway Safety Improvement Program	$15.6B	State Formula Allocation	Construction or retrofitting of structure to reduce wildlife-vehicle collisions	✓	✓	✓	✓	✓	Up to 90%, otherwise per 23 US Code § 12	
Surface Transportation Block Grant	$64.8B	State Formula Allocation	Construction or retrofitting of structure to reduce wildlife-vehicle collisions	✓	✓	✓			Up to 80% sans projects on Interstate Systems	Newly expanded eligibility to wildlife crossings, also eligible are project planning, design, monitoring and preventative maintenance
Transortation Alternative Program (TAP)	$7.2B	State Formula Grant	Environmental mitigation to reduce wildlife-vehicle caused mortality or to restore/maintain terrestrial or aquatic connectivity	✓	✓	✓		✓	Up to 80% except in certain states	
Federal Lands Access Program	$1.5B	State Formula Grant	Environmental mitigation to reduce wildlife-vehicle caused mortality or to restore/maintain terrestrial or aquatic connectivity	✓	✓	✓			Up to100%	
Federal Lands Transportation Program	$2.2B	Federal Formula Allocation	Environmental mitigation to reduce wildlife-vehicle collisions and animal mortality while improving or maintaining habitat connectivity, or to mitigate historical damage to habitat connectivity	✓					Up to100%	Projects may include construction, replacement, maintenance, or removalof culverts or bridges
Tribal Transportation Program	$3B	Tribal Formula Allocation	Environmental mitigation to reduce wildlife-vehicle collisions and animal mortality while improving or maintaining habitat connectivity, or to mitigate historical damage to habitat connectivity		✓				Up to100%	Projects may include construction, replacement, maintenance, or removalof culverts or bridges

Source: ARC Solutions Funding Guide and Federal Highway Administration[29]

Table 2 also highlights 15 more traditional infrastructure grant programs totaling $160.9 billion that are now poised to fund wildlife mitigation work as components of massive, comprehensive transportation projects such as bridge reconstruction. This newly gained broader eligbility for habitat connectivity work across a number of federal programs really compels the question: how much of these dollars can be leveraged to benefit habitat linkage and combat fragmentation?

> **Even a 5% commitment threshold for funding toward integrating fish passages and terrestrial species crossings into larger projects could yield over $8 billion more toward wildlife movement overall.**

An even bolder question yet: *What if the federal government challenged itself to mobilize a minimum percentage of these program funds to projects integrating connectivity work? What if it could commit to 5%?*

Even a 5% commitment threshold for funding toward integrating fish passages and terrestrial species crossings into larger projects could yield over $8 billion more toward wildlife movement overall (see Chart 1 and 2). That is roughly commensurate with the $8 billion per year price tag related to property damage and injuries related to animal strikes.

Chart 1: How Much Money is There for Wildlife Connectivity?

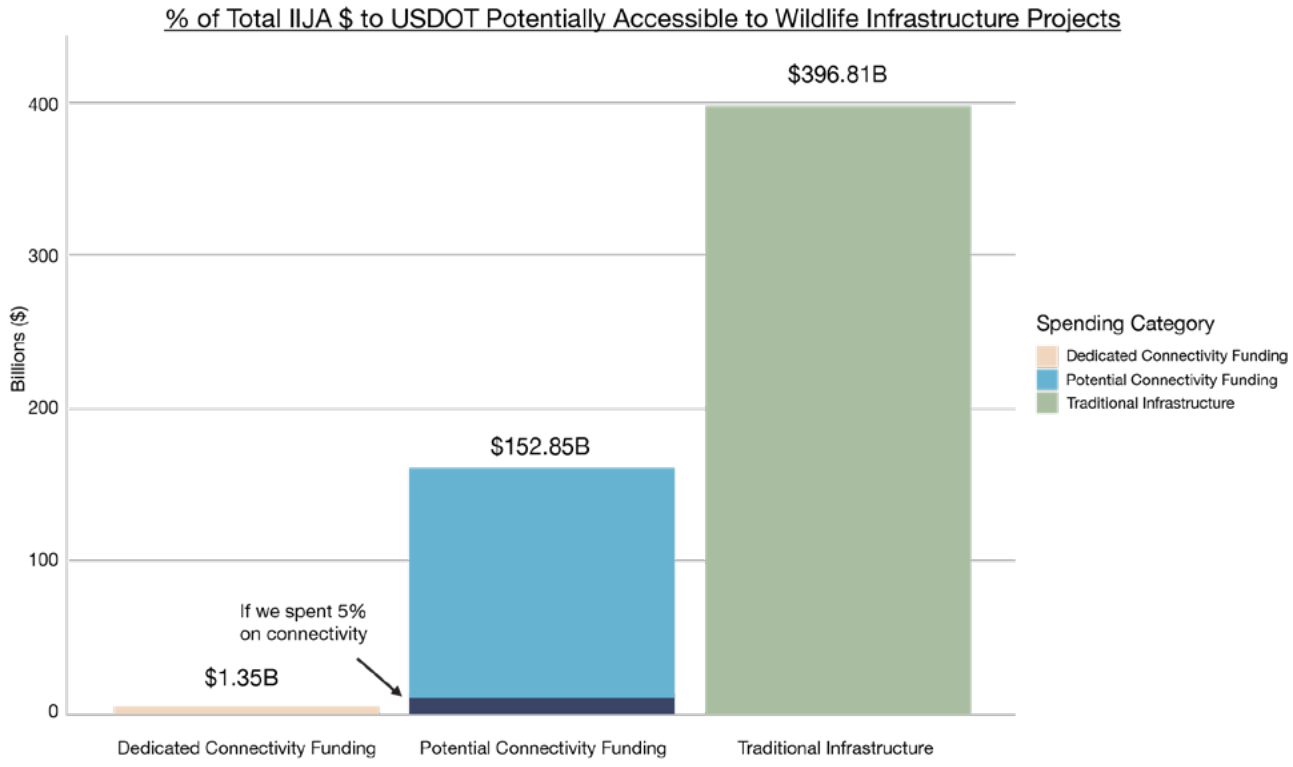
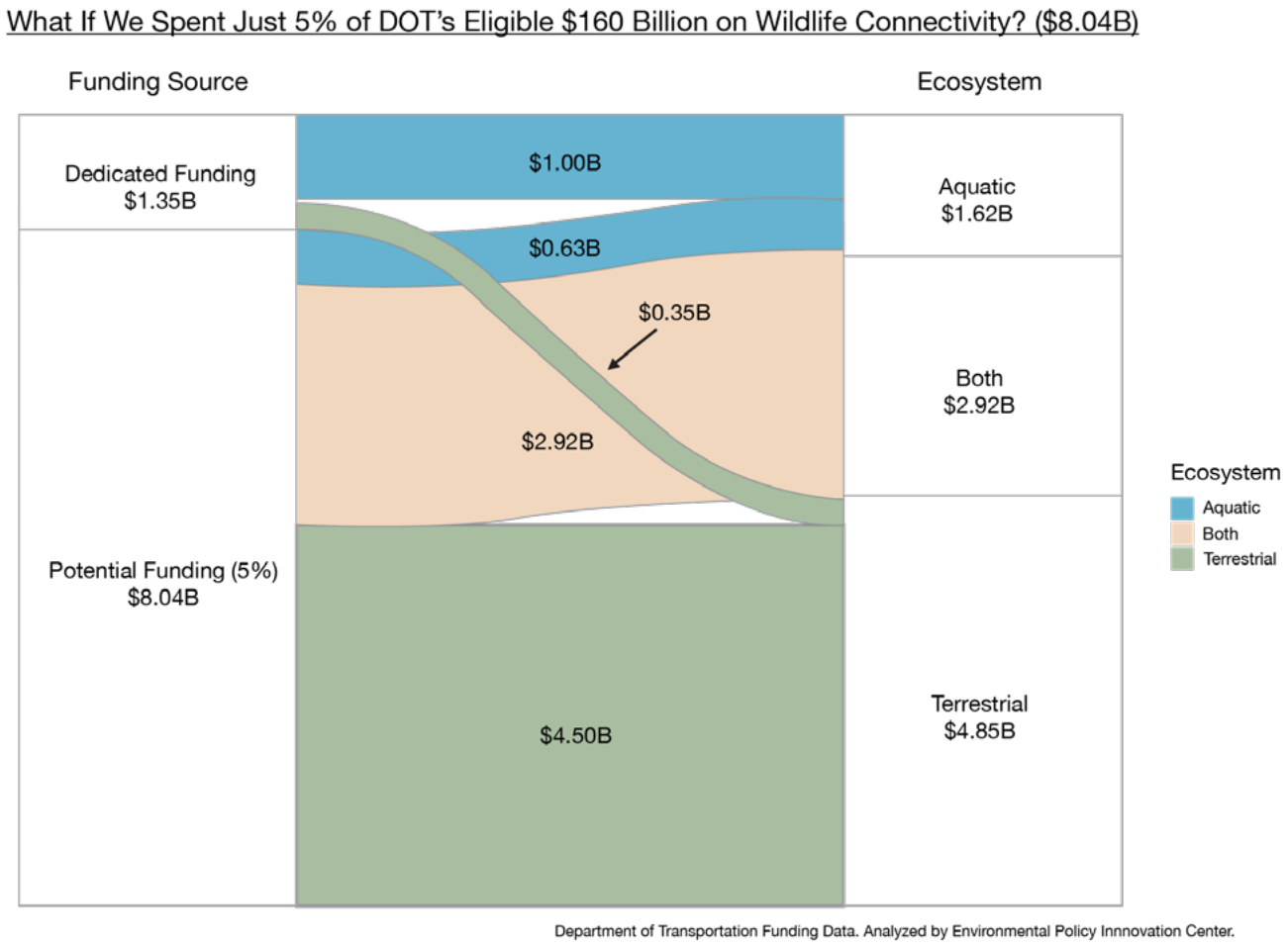
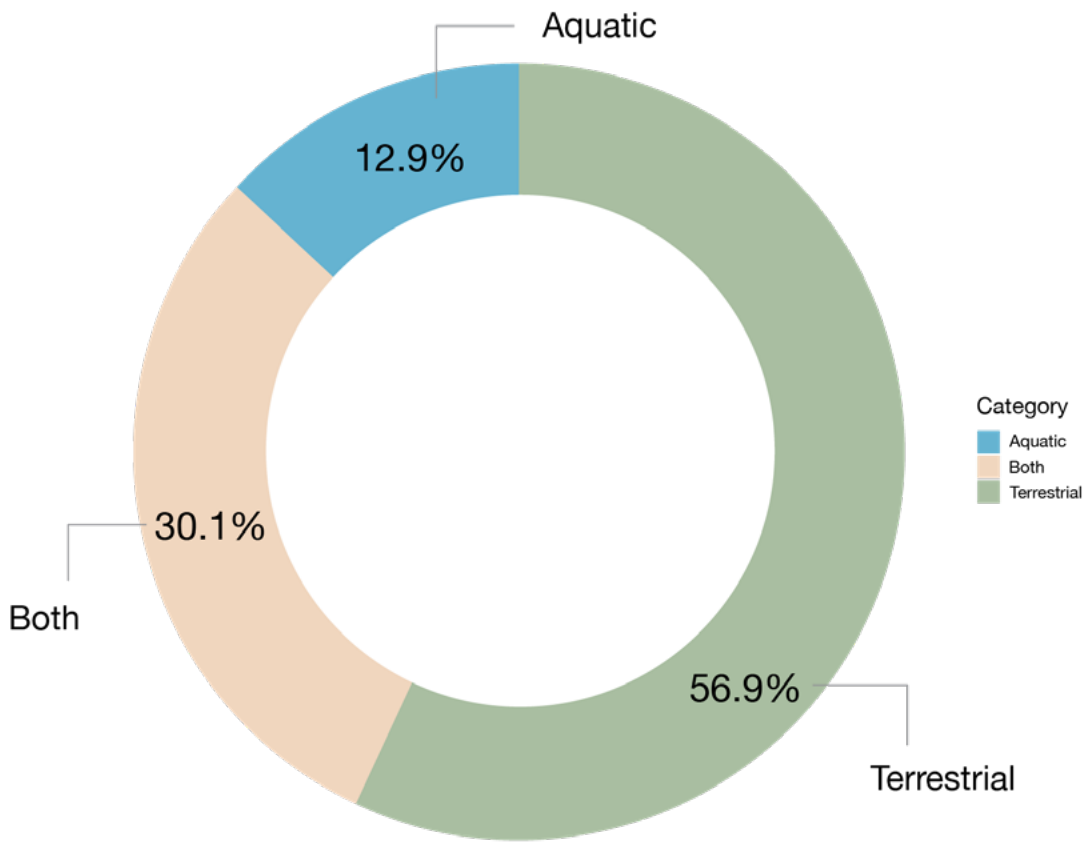


Chart 2: DOT Dedicated Vs. Potential Funding for Wildlife Connectivity



Funding is focused slightly more on the terrestrial ecosystem but there is much greater opportunity to fund fish passage projects beyond the $1 billion culvert program as well. Roughly 13% of the potential funding dollars are eligible to aquatic ecosystem connectivity nested within larger infrastructure projects, and an additional 30% of the grants are eligible to both ecosystem types. Chart 3 displays ecosystem eligibility across USDOT grant programs accessible to crossing projects.

Chart 3: Ecosystem Eligibility by Total Potential Funding Source

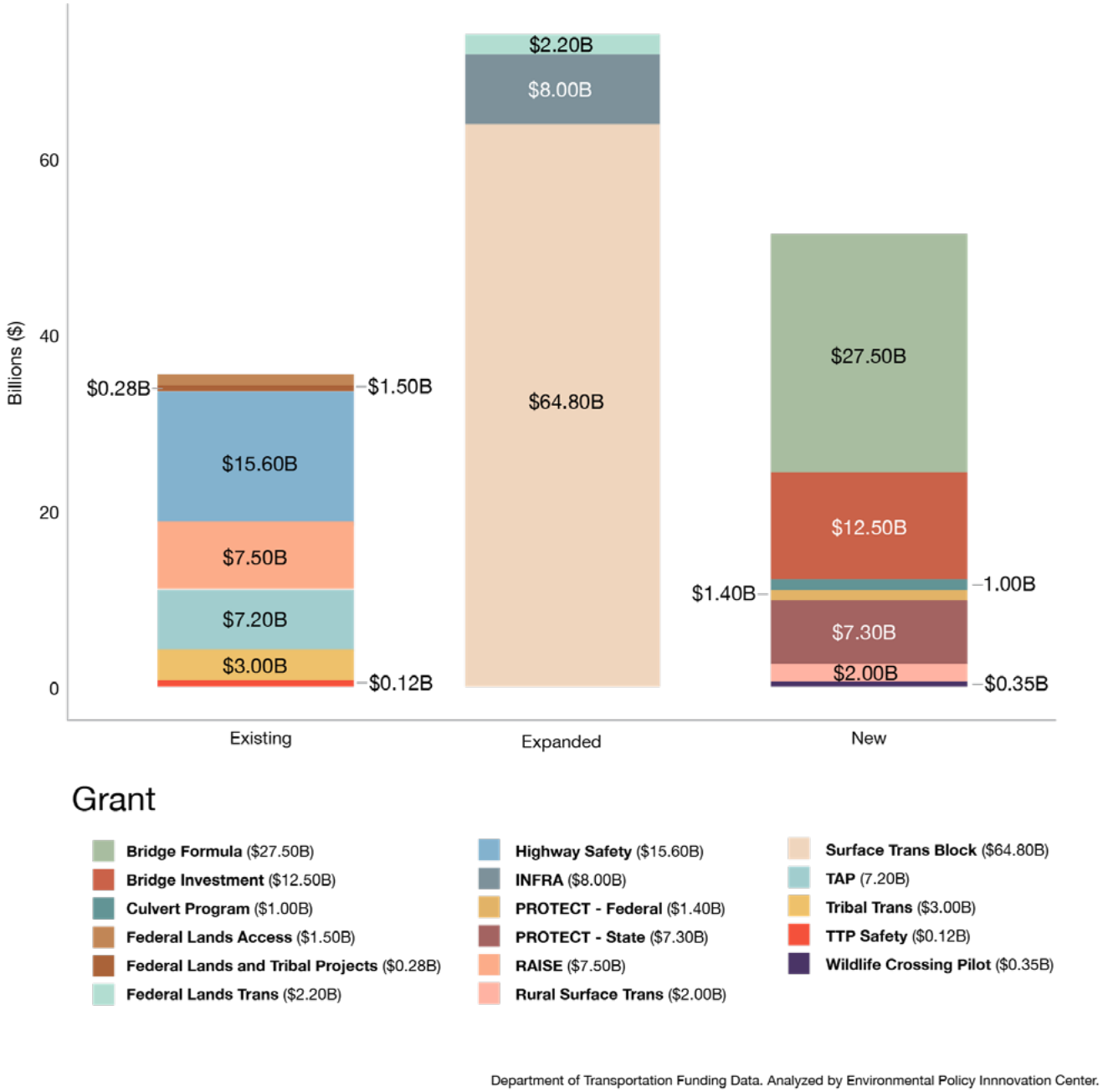


Department of Transportation Funding Data. Analyzed by Environmental Policy Innnovation Center.

The majority of these dollars will be delivered through seven new programs and seven existing programs (See Chart 4). Whether wildlife connectivity is actually integrated into larger transportation infrastructure projects where applicable depends on how USDOT administers each program - this is where a 5% goal can be useful. It is a good sign that so many new federal grant programs are now willing to fund projects including wildlife considerations embedded within larger infrastructure work. Identification and inclusion of crossings and passages must be done early on for successful, mitigative infrastructure projects to advance. Retrofitting after the fact comes with an exorbitant price tag.

It's dually important to note that delivery of this many new and expanded programs - in addition to unprecedented amounts of funding - can exacerbate existing administrative burdens facing a government agency. Robust administrative budget to quickly increase staffing and technical expertise is needed to ensure expedited operations and effective delivery of these grant programs.

Chart 4: Grant Status for Wildlife Funding



Department of Transportation Funding Data. Analyzed by Environmental Policy Innnovation Center.

PART 3

Recommendations for Getting the Money Where it Needs to Go, and On Time

Furthermore, several regulatory and bureaucratic hurdles need to be reconsidered, even if under temporary conditions for the next 5 years to ensure the funding is committed and disbursed within appropriate timeframes. Lastly, steps to gather much needed scientific data to determine where projects are best sited from a public safety and ecological standpoint must be taken.

Streamlined and Transparent Permitting Processes

Permitting is a thorny bureaucratic pinch point for restoration and nature-based projects. The lack of efficiencies within review and approval processes comes with a hefty price tag to communities too: one study estimates that permitting alone can consume up to one-third of a project's budget.[30] For low-income communities, the cost burden associated with permitting may be insurmountable given broader budgetary constraints and competition among constantly shifting priorities. In this often played out context, opportunities to improve ecosystems, natural areas, and overall environmental health in underserved parts of the United States are lost. But the time for change is now. Billions of federal dollars meant to improve the lives of millions of low-income Americans and thousands of degraded ecosystems for generations is on the line. The urgency to improve federal and state permitting and review processes has never been higher, as is the risk of inaction.

> **"Seeking permit exemptions for all habitat connectivity and mitigation restoration projects should be among the highest priorities for decision makers administering wildlife movement programs.**

The good news is that we do not have to look far for promising examples to deliver permitting efficiencies through policy, interagency coordination, and technology - this work is already happening in some states. California's Cutting Green Tape and Virginia's Permitting Enhancement and Evaluation Platform (PEEP) offer a roadmap for federal oversight agencies and other states to follow. Even bolder action has been taken by the state of Washington, which has exempted projects that improve fish passage and aquatic habitats.[31]

Seeking permit exemptions for all habitat connectivity and mitigation restoration projects should be among the highest priorities for decision makers administering wildlife movement programs. If exemptions aren't viable or only partially viable, then streamlining and transparency of existing permitting processes are key.

For example, among the beneficial process efficiency components of California's Cutting Green Tape that federal, state, and local governments might consider are:[32]

- Exemptions for environmental restoration, hazard mitigation, and habitat connectivity projects that may incur short-term disturbance to the target ecosystems and species but yield long term benefits such as restored ecological health and increased wildlife populations. An example project to consider is dam removal.

- Package or bundle permitting for all projects approved under specific restoration and habitat connectivity programs through programmatic permitting (as opposed to individual project permitting)

- Increases in caps placed on landscape/ecosystem size

- A "permit light" process for projects identified as environmentally beneficial

- "Permit Equivalence:" establishes permitting reciprocity for substantially similar projects across multiple agencies - more specifically, if a connectivity project is permitted by one agency, that approval then cuts across agency permitting needs as appropriate.

Beyond the institutional process itself, Virginia's PEEP illustrates the benefits of using technology, project management, and customer service-oriented tools to expedite permits for restoration projects. PEEP is an online dashboard that allows users to track progress of permit approvals. Virginia's Department of Environmental Quality (DEQ) ultimate goal is to save time for everyone: the public and staff alike. PEEP offers much needed clarification on permits needed for specific projects, one application for all DEQ permits, and automated task lists, emails to external stakeholders, and internal performance reports to ensure accountability.[33]

Make Government Procurement Less Painful for Nature-Based Mitigation Projects

Complex and protracted government procurement processes need to be reformed for restoration and connectivity projects to truly access these dollars and break ground within the next 4 years. Among the procurement strategies gaining momentum in the US is pay for success, or outcomes based procurement.

Pay for success offers a low- to no-risk procurement pathway where the private sector delivers agreed upon project outcomes at pre-negotiated price points and the government pays for the outcomes upon successful completion. Such procurements models open doors for cash poor municipalities, particularly ones that also struggle to access financing for public projects. For pay for success to be successfully adopted, however, government procurement and auditing processes must be adjusted to allow for administrative costs or higher administrative cost thresholds than previously eligible.

There is already precedence among government institutions for deploying pay for success to draw lessons from. The National Forest Service has used it to procure forest restoration projects and the Department of Treasury for its Social Impact Partnerships to Pay for Results program.[34]

In 2022, the state of Maryland signed into law the Conservation Finance Act, changing state procurement code to allow for pay for success to be used for rapid delivery of nature-based projects.[35] Similar adjustment to code must be adopted for alternative procurement strategies to be leveraged for timely deployment of IIJA funding.

Reaching Disadvantaged Communities

Additional obstacles lay ahead in ensuring these dollars make it to communities in highest need. These communities are often the same ones facing the most barriers to access funding.

Resolving or significantly reducing the cost-share requirements for low-income communities and tribal nations lessens or eliminates one of the toughest barriers to them in pursuing federal funding opportunities. For example, removing cost-share requirements for tribes resulted in 30% (14 of 55) of new grants awarded to tribal applicants through the America the Beautiful Challenge.[36] That's a total of $26.7M (of $141.7M) awarded to Native-led conservation projects, representing the highest funding commitment to tribal communities by a National Fish and Wildlife Foundation grant program.[37]

Furthermore, USDOT reach can be extended by specifically pursuing opportunities to infuse funding into the Tribal Transportation Assistance Program (T-TAP) to provide technical support to tribal nations looking to pursue funding applications. Many tribal nations struggle with capacity limitations and are unfamiliar with federal application processes. Bolstering tribal communities with technical knowledge and individual support can reduce or eliminate the unequal administrative and budgetary burdens they face when determining whether to apply. USDOT must provide tribal-focused webinars and information sessions for grant programs - tribes are sovereign nations and often prefer to interact with the federal government directly, rather than interacting with states or being grouped in with states as the audience for information sessions. Each tribe is unique and therefore must be treated individually. Establishing regional tribal liaisons, similar to the administrative structure of FEMA, the Bureau of Reclamation, and the U.S. Army Corps of Engineers[38], can also facilitate tribal information sharing and engagement. Also, a single platform by which communities can easily search and apply for federal grant opportunities, track progress of applications, and streamline permits can reduce cost burdens associated with proposal preparation and permit applications. A one-stop shopping experience can also encourage synergistic project proposals leveraging federal dollars across multiple programs to optimize impacts.

Lastly, outcomes-based procurement is another tool that could be of great assistance to disadvantaged communities - under this model, tribal nations, local, and city governments assume low to zero risk and it eliminates the upfront commitment of public funds or use of low-interest loans, which some institutions cannot accommodate or apply for. An earlier section of this paper discusses this procurement framework in greater detail.

PART 4

Restoration and Conservation Dollars Have a Role to Play

A holistic vision for wildlife movement cannot be achieved with connectivity infrastructure alone - the ecosystems and habitats being reconnected are often in need of restoration too. The broader goal of wildlife movement should be to create healthier, more interconnected corridors across broader geographies for greatest improvement to species mobility. Restored corridors in Centennial Valley, Montana, for example, have allowed for more seamless passage through private and public lands for thousands of pronghorn during their migratory season.

A holistic vision for wildlife movement cannot be achieved with connectivity infrastructure alone - the ecosystems and habitats being reconnected are often in need of restoration too.

Table 3, below, shows billions of dollars stretched across 6 additional federal agencies that have a role to play in supporting connected landscapes for wildlife. These funding streams can be paired with USDOT connectivity grants to maximize nature-based outcomes.

Let's imagine for a moment a project that pairs USDOT funding for culvert removal and recovery with a broader estuary restoration project funded by EPA or dam removal by USFWS that lead to improved ecosystem health at a watershed scale. Or a USFS re-vegetation grant paired with USDOT wildlife crossing project resulting in wildlife movement and habitat restoration at the landscape scale needed to improve migratory corridors.

Table 3: IIJA Restoration Dollars by Administering Agency and Program Focus

	General	Endangered Species	Aquatic Ecosystems	Fish Passage/ Dam Removal	Estuary	Re-vegetation
USFS	$500M		$80M			$200M
Reclamation		$50M	$350M			
NOAA						
ACOE			$2B			
USFWS	$162M			$200M		
EPA	$1.7B				$15M	

Source: Environmental Policy Innovation Center, 2022[20]

USDA conservation programs are also instrumental to efforts to increase habitat health and permeability. Specifically programs like EQIP, that assist farmers in deploying equipment — including fencing strategies that consider wildlife migration patterns — and others that encourage conservation practices and easements for privately held agricultural lands.[39] Collectively, USDA's conservation programs received $20 billion authorized under the IRA. Noteworthy too is the agency's new habitat leasing pilot in partnership with the State of Wyoming, which offers a promising model for expanding wildlife habitat and migration paths.[40] Coordination with USDA to bring farmers into the fold with beneficial conservation practices, easements that stabilize long-term land use, and to ensure fencing projects are improving rather than prohibiting species migration can unlock additional opportunities for wildlife movement. Least among them increased stakeholder engagement with agricultural landowners.

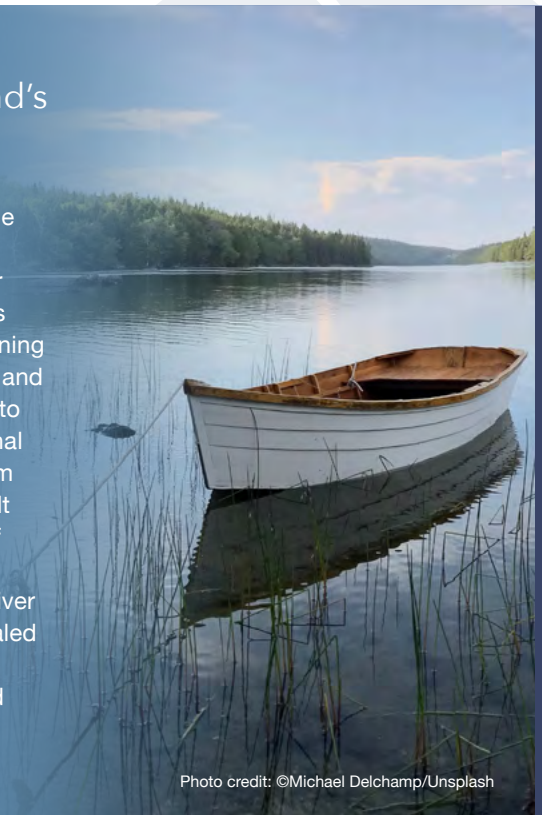
> **"Harmonizing federal agencies' efforts is our best chance at optimizing this once in a lifetime opportunity.**

Agencies holding wildlife crossing, dam removal, and conservation incentives for private landowners such as DOT, USDA, and FEMA should be integrated into coordination efforts along with agencies featured in Table 3. Such interagency coordination mirrors efforts already underway in a number of states. States recognize, as the federal government also should, that a number of agencies are broadly responsible for improving wildlife movement and habitat at scale. Harmonizing federal agencies' efforts is our best chance at optimizing this once in a lifetime opportunity.

Spotlight on Groundbreaking Projects:

Case Study 3: Dam Removal Restores New England's Second Largest River System

The Penobscot River blankets an 8,750 square mile drainage area and discharges 10 billion gallons of water a day.[41] Beyond the sheer scale of the system, there were three ailing dams blocking 12 native anadromous fish species from their historic breeding grounds.[42] Any plan to restore the river habitat would be complex and need to weigh the surrounding community's dependence on hydroelectric power as well. What could be done? An opening to explore solutions came when an electric company purchased the dams and sought to relicense them. The relicensing process catalyzed the company to engage with the Penobscot Indian Nation along with other local and national environmental organizations which resulted in a plan no one expected: dam removal. Overall, the plan called for removal of 2 dams, a fish passage built around the third, and major investment in broader ecological restoration of the river system. The dams were removed by 2013 and the fish passage completed in 2015, reconnecting thousands of miles of habitat along the river and its tributaries. Monitoring following the completion of the project revealed river herring and other native fish returning in the millions to spawn along their original migration routes. Numbers had dwindled to the hundreds and thousands prior to restoration efforts - this was a major sign of progress.[43]



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PART 5

Optimizing the Impact of Dollars Spent

In 5 years, what gains could be made in wildlife movement if troubling bureaucratic processes are overhauled and related federal grant programs coordinated and administered strategically? How much more can be done if the White House sets a goal with USDOT to ensure 5% of IIJA dollars are spent on wildlife crossings under eligible programs? The answer is A LOT.

Table 4. Average Cost of Terrestrial Crossing Structures

Structure	Cost	Details
Large Mammal Wildlife Underpass	$250,000- $600,000	This depends primarily on the size and materials (bridge span, metal arch, concrete box, etc). Crossings suitable for a range of large mammals should be at least 7m wide x 3.5m high.
Double Span Overpass	$2.75-$7 Million	This type of overpass can span four or more lanes of traffic. This price varies depending on terrain, structure width, and the number of lanes spanned. For example, a double span overpass in NV spanning four lanes cost $2.75M, while a double span overpass in WA spanning six lanes and a median with difficult terrain cost $6.2M.
Cattle guards	~$30,000 each	Cattle guards are used to limit some animals from entering the highway at access roads and driveways. *They are not effective for all species (like bears), and may be a safety concern for target ungulate species.*

Source: Center for Large Landscape Conservation, general cost estimates based on projects completed since 2010.[44]

The average cost of terrestrial connectivity projects is depicted in Table 4. These are estimates based on projects in western states and not adjusted for inflation, however using these figures as a baseline dollar amount still helps illustrate the scale at which transformative habitat connectivity work can happen if IIJA dollars are wielded wisely. The Wildlife Crossing Pilot Program could bring to life 1,666 underpasses, 50 double span bridges or 11,667 cattle guards to prevent animals from wandering onto highways.

However, if ecosystem connectivity structures are embedded within larger transportation infrastructure projects where eligible, the impact increases. Using the hypothetical scenario of 5% of funding going to wildlife movement structures within appropriate new and existing projects, then an additional $4.85 billion could be realized. Said another way, an additional 8,083 underpasses, 693 overpasses, or 161,666 cattle guards can be funded. The State of Colorado alone has identified over 100 locations where crossings are needed. With a bit of coordination and encouragement, the full potential of USDOT's IIJA funding can be realized in support of large-scale wildlife conservation and the fight against fragmentation and rapid biodiversity loss.

> **"With a bit of coordination and encouragement, the full potential of USDOT's IIJA funding can be realized in support of large-scale wildlife conservation and the fight against fragmentation and rapid biodiversity loss.**

On the aquatic passage side, state officials in Oregon estimate that the cost of culvert repair can range from $50,000 to $250,000. Replacing problematic culverts with ones meeting fish passage criteria can cost $1.5 million to $12 million.[45] These figures may not be applicable nationally but help illustrate the scale of impact and substantial gains that can be made to connect wildlife to healthy, expansive habitats. Based on Oregon's figures, the $1 billion Culvert Replacement Program can result in 4,000-20,000 beneficial culvert repairs or 83-667 culvert replacements meeting aquatic conservation criteria. Again, if 5% of funding going to larger projects where aquatic passage is an eligible component is applied to connectivity infrastructure, then an additional $1.62 billion is available to bring these nature-based solutions to fruition. That's 135-1,080 more culvert replacements or 6,480-32,400 repairs to the benefit of hundreds to thousands of miles of river, streams, estuaries and wetlands across the nation. The number of projects may be further exceeded as smaller, cost-effective solutions are scaled to mitigate smaller stream crossings along rural and forest roadways.

With broader coordination and integration of dam removal, re-vegetation, estuary restoration, and agricultural land conservation incentives, these positive impacts to natural systems extend even further. Federal, state, tribal nations and local governments would be applying nature-based solutions to environmental degradation at the landscape scale and at a pace that begins to outflank degradation. Ultimately, that's what is needed.

CONCLUSION

Despite the lack of a federal framework and consistent dedicated funding streams, wildlife connectivity work has made progress over the past few decades in the US. Growth in state and municipal policies coupled with substantial investment in tangible projects from Florida to California demonstrate both the need and willingness of local leadership to protect, conserve, and reconnect ecosystems using nature-based solutions.

Much more remains to be done. IIJA and IRA offer obvious and unlocked potential to bring wildlife connectivity infrastructure and conservation to a large-landscape scale as hasn't been seen since the creation of the US National Parks system. And such scale of change is what is needed to ensure public safety and combat rabid biodiversity loss. Interagency coordination among federal agencies to synergize grant programs, identify efficiencies, and collect data for strategic investment is one step to ensuring this mammoth infusion of federal dollars is optimized for greatest impacts. Tweaks to bureaucratic systems and codes stipulating procurement activities and permitting review processes can ensure improved program access by disadvantaged communities and speedier deployment of dollars and execution of projects. Thousands of miles of streams, millions of acres of habitat and countless critical species underpinning ecosystem health stand to thrive from these changes. Communities too will gain enhanced public safety, increased economic prosperity linked to outdoor recreation and tourism, cleaner water and soil and the joy of living within restored, robust natural environments. If this vision doesn't embody America the Beautiful, what does?

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REFERENCES

1 Federal Highway Administration. Wildlife-Vehicle Collision Reduction Study. Fwha.gov. Published August 2008. Accessed December 30, 2022. https://www.fhwa.dot.gov/publications/research/safety/08034/08034.pdf

2 Where are animal (deer) collisions most likely? State Farm. Accessed December 30, 2022. https://www.statefarm.com/simple-insights/auto-and-vehicles/how-likely-are-you-to-have-an-animal-collision

3 Pronghorn. National Wildlife Federation. Accessed December 22, 2022. https://www.nwf.org/educational-resources/wildlife-guide/mammals/pronghorn

4 U.S. Geological Survey. How far do salmon travel? Usgs.gov. Accessed December 22, 2022. https://www.usgs.gov/faqs/how-far-do-salmon-travel

5 Le P. Supreme Court tie favors Indian tribes in Washington state. Seattletimes.com. Published June 11, 2018. Accessed December 30, 2022. https://www.seattletimes.com/nation-world/nation-politics/supreme-court-tie-favors-indian-tribes-in-washington-state

6 Lieb DA, Casey M, Minkoff M. A whole lot of dams in The United States are at risk of failing. HuffPost. Published May 6, 2022. Accessed December 30, 2022. https://www.huffpost.com/entry/high-hazard-dams-united-states_n_627545cbe4b009a811c319fa

7 116th Congress. H.R.2795 - Wildlife Corridors Conservation Act of 2019. Congress.gov. Published May 16, 2019. Accessed December 2, 2022. https://www.congress.gov/bill/116th-congress/house-bill/2795

8 Blanchard E, Wearn A. State summaries: 2022 legislation passed to build wildlife crossings. Conservation Corridor. Published September 9, 2022. Accessed December 4, 2022. https://conservationcorridor.org/digests/2022/09/state-summaries-2022-legislation-passed-to-build-wildlife-crossings/

9 AB-2344 Wildlife connectivity: transportation projects. Legislature.ca.gov. Published October 3, 2022. Accessed December 4, 2022. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220AB2344

10 State of California. Governor Newsom joins groundbreaking for world's largest wildlife crossing as state launches nature-based strategies to fight climate change and protect biodiversity. California Governor. Published April 22, 2022. Accessed December 4, 2022. https://www.gov.ca.gov/2022/04/22/governor-newsom-joins-groundbreaking-for-worlds-largest-wildlife-crossing-as-state-launches-nature-based-strategies-to-fight-climate-change-and-protect-biodiversity/

11 SB22-151: Safe crossings for Colorado wildlife and motorists. Colorado.gov. Accessed December 4, 2022. https://leg.colorado.gov/bills/sb22-151

12 SF0048 - 2022 large project funding. Wyoleg.gov. Published March 15, 2022. Accessed December 4, 2022. https://wyoleg.gov/Legislation/2022/SF0048

13 HB0427. Utah.gov. Accessed December 4, 2022. https://le.utah.gov/~2022/bills/static/HB0427.html

14 Hance B. State-by-state connectivity policy guide: Florida. Conservation Corridor. Published March 25, 2022. Accessed December 4, 2022. https://conservationcorridor.org/digests/2022/03/state-by-state-connectivity-policy-guide-florida/

15 Filkins D. The return of the Florida panther. New Yorker (New York, N.Y.: 1925). https://www.newyorker.com/tech/annals-of-technology/the-return-of-the-florida-panther. Published May 29, 2017. Accessed December 27, 2022.

16 Act 171 and planning for forest blocks and habitat connectors. Vermont.gov. Accessed December 4, 2022. https://anr.vermont.gov/act171_forestplanning

17 Beckmann JP, Clevenger AP, Huijser MP, Hilty JA, eds. Safe Passages: Highways, Wildlife, and Habitat Connectivity. Island Press; 2010.

18 Deck H. Milburnie Dam removal. Sound Rivers. Published December 26, 2017. Accessed December 13, 2022. https://soundrivers.org/milburnie-dam-removal/

19 ARC Solutions. ND: Bighorn sheep underpass. Published October 14, 2021. Accessed November 28, 2022. https://storymaps.arcgis.com/stories/e071a7dfbf164c7382c9ab9352d7995d

20 Environmental Policy Innovation Center. Delivering Faster Restoration with Bipartisan Infrastructure Law (BIL) Funding. Published 2022. Accessed February 6, 2023. https://static1.squarespace.com/static/611cc20b78b5f677dad664ab/t/62a34676ebd6c6530cdcb3b7/1654867581335/FasterRestoration_EPIC.pdf

21 ARC Solutions. MT: U.S. highway 93 north the people's way. ArcGIS StoryMaps. Published October 13, 2021. Accessed December 9, 2022. https://storymaps.arcgis.com/stories/5b970c7a45424846ace84bc31366f2e6

22 Matthews M. Montana tribes drive the road to sovereignty. High Country News. Published August 13, 2001. Accessed December 16, 2022. https://www.hcn.org/issues/208/10656

23 Moler S. A hallmark of context-sensitive design. Federal Highway Administration. Published June 2022. Accessed December 9, 2022. https://highways.dot.gov/public-roads/mayjune-2002/hallmark-context-sensitive-design

24 Jannotta S. Safe passages. Montana State University. Published October 13, 2014. Accessed December 9, 2022. https://www.montana.edu/news/mountainsandminds/15109/safe-passages

25 Sahagún L. A cougar passage rises over a deadly Southern California freeway. The Los Angeles times. https://www.latimes.com/california/story/2022-04-22/a-cougar-crossing-rises-over-a-deadly-l-a-freeway. Published April 22, 2022. Accessed December 8, 2022.

26 CalMatters. California is betting $61 million that new Highway crossings will keep wildlife safe. Patch. Published July 6, 2021. Accessed December 8, 2022. https://patch.com/california/los-angeles/california-betting-61-million-new-highway-crossings-will-keep-wildlife-safe

27 Lloyd J. What to know about construction of the 101 Freeway wildlife crossing. NBC Southern California. Published September 20, 2022. Accessed December 8, 2022. https://www.nbclosangeles.com/news/local/101-freeway-agoura-hills-la-wildlife-crossing-mountain-lions/2988542/

28 AASHTO. Infrastructure Investment and Jobs Act (IIJA). Transportation.org. Published September 15, 2021. Accessed December 9, 2022. https://policy.transportation.org/wp-content/uploads/sites/59/2021/09/2021-09-15-AASHTO-Comprehensive-Analysis-of-IIJA-FINAL.pdf

29 Callahan R. Wildlife infrastructure funding opportunities within the infrastructure investment & jobs act. ARC Solutions. Accessed February 5, 2023. https://arc-solutions.org/wp-content/uploads/2022/09/IIJA-Wildlife-Infrastructure-Funding-Guide_FINAL.pdf

30 California Landscape Stewardship Network. Cutting Green Tape: Regulatory Efficiencies for a Resilient Environment. CLSN. Published November 2020. Accessed December 14, 2022. https://calandscapestewardshipnetwork.org/sites/default/files/2020-12/CGT_FINAL_hires.pdf

31 Washington State Legislature. RCW 90.58.147: Substantial development permit—Exemption for projects to improve fish or wildlife habitat or fish passage. Leg.wa.gov. Accessed January 17, 2023. https://app.leg.wa.gov/rcw/default.aspx?cite=90.58.147

32 California Natural Resources Agency. Transforming Environmental Restoration: Progress on the Cutting Green Tape initiative. Resources.ca.gov. Published March 17, 2022. Accessed December 30, 2022. https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Green-Tape/update-20220317/CNRA-Report--Transforming-Environmental-Restoration--Progress-on-the-Cutting-Green-Tape-Initiative.pdf

33 Madsen B. If you can track a pizza, you can track a permit. Environmental Policy Innovation Center. Published December 12, 2022. Accessed December 14, 2022. https://www.policyinnovation.org/blog/if-you-can-track-a-pizza-you-can-track-a-permit

34 SIPPRA - Pay for Results. U.S. Department of the Treasury. Accessed December 14, 2022. https://home.treasury.gov/services/social-impact-partnerships/sippra-pay-for-results

35 Lopez-Santos P. New Maryland conservation finance law advances green and blue infrastructure. The Environmental Council of the States (ECOS). Published April 29, 2022. Accessed December 14, 2022. https://www.ecos.org/news-and-updates/new-maryland-conservation-finance-law-advances-green-and-blue-infrastructure/

36 The White House. What they are saying: “America the Beautiful” initiative. Published May 10, 2021. Accessed December 2, 2022. https://www.whitehouse.gov/ceq/news-updates/2021/05/10/what-they-are-saying/

37 Native Americans in Philanthropy. Tribal climate & conservation. Nativephilanthropy.org. Accessed January 13, 2023. https://atbc.nativephilanthropy.org

38 U.S. Army Corps of Engineers. Nationwide Permit 27 - Aquatic Habitat Restoration, Enhancement, and Establishment Activities. USACE. Published February 25, 2022. Accessed November 28, 2022. https://www.swt.usace.army.mil/Portals/41/docs/missions/regulatory/2021%20NWP/NWP-27.pdf?ver=2Lce-C9I_3zKSuZfvgv-lw%3D%3D

39 Inflation Reduction Act. Natural Resources Conservation Service. Accessed December 12, 2022. https://www.nrcs.usda.gov/about/priorities/inflation-reduction-act

40 Western Landowners Alliance. Big idea – the habitat lease – western landowners alliance. Westernlandowners.org. Accessed December 27, 2022. https://westernlandowners.org/policy/habitat-lease/

41 Penobscot. Maine Rivers. Published May 21, 2009. Accessed December 30, 2022. https://mainerivers.org/watershed-profiles/penobscot-watershed/

42 Penobscot river restoration project. Natural Resources Council of Maine. Published September 25, 2013. Accessed February 5, 2023. https://www.nrcm.org/programs/waters/penobscot-river-restoration-project/

43 Restoring the Penobscot River. The Nature Conservancy. Accessed December 30, 2022. https://www.nature.org/en-us/about-us/where-we-work/united-states/maine/stories-in-maine/restoring-the-penobscot-river/

44 Ament R, Callahan R, Fairbank E. Wildlife-vehicle conflict, crossing structures, and cost estimates. The Center for Large Landscape Conservation. Accessed December 9, 2022. https://largelandscapes.org/wp-content/uploads/2021/01/Wildlife-vehicle-Conflict-Crossing-Structures-and-Cost-Estimates.pdf

45 Oregon Department of Fish and Wildlife. Culvert repair programmatic agreement 2018 annual report. Oregon.gov. Published January 2021. Accessed December 14, 2022. https://www.oregon.gov/odot/GeoEnvironmental/Docs_Hydraulics/CRPA18_Report_Final.pdf

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