



Guide to Expanding Mitigation

MAKING THE CONNECTION TO WILDLIFE



FEMA



Photo: Wild turkeys in front of City Hall in La Conner, WA
Cover Photo: Deer on a suburban lawn



Photo: Squirrel on a park bench

When thinking of wildlife, especially from an urban perspective, we often picture far-off wilderness and “nature” as a place away from busy communities. But the reality is that whether we live in a small rural village or a bustling metropolis, wildlife is all around us. Squirrels scurrying along a park bench, seagulls hovering above a boardwalk, coyotes trotting across a suburban street—wildlife and people live alongside each other. This means that our actions affect their existence, and when we are affected by disasters, they too are at risk.

This *Guide to Expanding Mitigation* provides recommendations for working with wildlife experts to support hazard mitigation, especially in the planning process and project development. This guide is designed to help community officials begin a conversation about mitigation investments that can protect wildlife while building greater community resilience.



This *Guide to Expanding Mitigation* is part of a [series](#) highlighting innovative and emerging partnerships for mitigation.



Photo: Birds flying over wetlands on Bear Island, SC

IMPACTS OF DISASTERS ON WILDLIFE

When disasters strike, they affect wildlife habitats and natural systems as well as human settlements. Changing climatic conditions have harmed ecosystems and reduced their natural adaptive capacity. For example, a prolonged heat wave in California caused persistent warm water conditions, endangering the coastal ecosystem. The bulk kelp forest off the coast of California began collapsing in 2014, and 95% of it has been lost. This loss not only has an impact on the many species living in the kelp forest, it also means communities have lost the ecosystem services that kelp forests provide—fisheries, tourism, carbon sequestration, and more.

Mitigation projects can be designed to be beneficial for both humans and wildlife. Thinking about the vulnerability of wildlife and human dependence on their ecosystem services will allow communities to:

- Identify intact natural systems that could provide protective functions.
- Determine where ecosystems need to be restored.
- Design adaptation strategies that enhance the capacity of those systems to provide risk reduction benefits.

CLIMATE CHANGE

The Intergovernmental Panel on Climate Change Fifth Assessment Report suggests that 20–30% of species will be at a higher risk of extinction as global mean temperature exceeds 2–3°C above pre-industrial levels. From coral reef bleaching to shifts in species ranges, local extinctions to changes in growing seasons, there is already clear evidence that climate change is an active stressor.



Photo: Volunteers planting sea grass in FL



Photo: Beaver building its dam in Grand Teton National Park

RESTORING ECOSYSTEMS, REDUCING RISK

Communities are increasingly turning to nature-based solutions because many natural systems are already well-adapted to manage change and have the capacity to withstand or recover from the impacts of extreme weather- and climate-related hazards.

Floods are among the most frequent and expensive disasters in the country. A combination of historic stream and river channelization, increased development, and heavier rainfall due to climate change is exacerbating flooding and erosion risk across the country. The use of natural infrastructure for stormwater and flood management can effectively reduce risks from flooding and improve habitat for fish and wildlife. For example, a project in Florida's Upper St. Johns River Basin involves plugging canals and creating a system of water management, marsh conservation, and marsh restoration in over 166,500 acres of floodplain. When completed, this project will have restored much of the original wetlands and conserved the remaining untouched land. The restored wetlands will be able to contain 500,000 acre-feet of water, a substantial benefit for flood control.

DID YOU KNOW?



Beavers are ecosystem engineers. They fell trees and build dams to capture water and expand their aquatic habitats. Although the failure of a beaver dam can cause downstream flooding, the water in beaver ponds replenishes aquifers, filters out impurities, slows the impact of wildfires and floods, and creates thriving riparian areas that sustain other species. Beaver-created wetlands can recharge groundwater, sustain summer water flows, provide natural firebreaks, and most often reduce downstream flood risk by slowing and retaining water.

Extreme heat and drought contribute to many challenges like water shortages, crop losses, damage to aquatic and terrestrial habitats, and severe wildfires. Human development can also compound the effects of extreme heat and drought on habitat when water is drawn from natural areas. A number of natural infrastructure approaches are effective in mitigating extreme heat and drought, including watershed protection, water conservation, and urban green infrastructure such as planting trees and installing green roofs. For example, the Chicago Wilderness Plan is guiding the rebuilding of northern Illinois' green infrastructure, which is a network of forests, streams, wetlands and other natural areas. Forested lands help reduce the urban heat island effect and combat flash flooding. They also provide habitat for many animals.

Wildfire is a natural process in many forest, shrubland, and grassland systems. In recent decades wildfires have caused increased risk to humans, due to historical and current land-use practices and suppression of natural fire regimes, development in fire-prone areas, expansion of invasive species, and climate change. Ecological forest management, such as restoring natural fire regimes, targeted thinning, prescribed fire, and post-fire restoration, can help reduce the threat of wildfire while providing co-benefits like increased water quantity and quality and improved habitat for fish and wildlife. For example, across the western U.S. forest managers are restoring forest lands to conditions that more closely represent their historic state. These projects reduce the threat of tree-killing canopy blazes and improve habitat for declining species in the area, such as the California spotted owl and the Pacific fisher.

Sea level rise, exacerbated by climate change, is a growing threat to coastal communities. Although hard armoring, like seawalls and bulkheads, continues to expand along coastal areas, communities are increasingly embracing natural infrastructure to reduce risks. For example, the Maryland Department of Natural Resources promotes "living shorelines" along the Chesapeake Bay. Instead of armoring their shorelines, communities who choose this approach are stabilizing their waterfronts with "bio logs" made of temporary coconut-fiber and restoring them with vegetation appropriate to the salinity, water depth and level of wave action specific to their property. Living shorelines provide better protection from erosion, naturally filter pollutants and sediments, offer a habitat for a variety of wildlife, and most would argue the natural beauty of the shoreline is improved.



Photo: Harbor seal in a CA kelp forest



Photo: Bald eagle flying above a city



Photo: Children exploring tide pools in La Jolla, CA

PLANNING FOR WILDLIFE

Human-wildlife coexistence has not always been prioritized in the U.S. Wildlife habitat has been reduced or diminished by development. A fundamental part of sustaining habitat and ecosystem protection and resilience is the degree of land connectivity and the spatial pattern of landscape features, even in developed areas. When roads and sprawling development bisect and transform landscapes, habitats become fragmented and the potential for wildlife-vehicle collisions increases. Habitat conservation planning, especially at the regional scale, helps communities prepare to conserve biodiversity and critical habitats in the face of impacts from development, agricultural land conversions, resource extraction, major infrastructure development, and other activities that threaten natural ecosystems. One example of a regional connectivity effort is the Connecting Habitat Across New Jersey (CHANJ) initiative, which offers statewide mapping and a guidance document to prioritize land protection and habitat restoration.

Every state has its own Comprehensive Wildlife Conservation Strategy or Wildlife Action Plan that sets a vision and plan of action for wildlife conservation and funding in each state. These plans should be consulted when crafting mitigation plans and strategies, and governmental and non-profit conservation groups should be invited to participate in the planning process. Climate adaptation plays a central role when establishing conservation planning priorities. Conservation plans take a regional look at ecosystems, which is similar in scale to the resolution of climate change projections. Effectively responding to the challenges of climate change will require regionally coordinated management responses.

KEY TERMS

Adaptive capacity – The ability of systems, institutions, humans, and other organisms to adjust to change, take advantage of opportunities, or respond to consequences of hazards.

Biodiversity – The variety of plant and animal species within an ecosystem or geographic area.

Biophilia – The innate affinity that humans have for the natural world, and the benefits to humans from being good stewards of the environment and working with nature.

Ecosystem – The diversity of plant and animal species in a geographic area and how they interact.

Ecosystem services – Benefits people obtain from wildlife or ecosystems, such as water supply, water recharge and filtration, fish and wildlife habitats, air filtration, and recreation.

Ecosystem restoration – Human services to land and water that increase habitat for multiple species, and assist in the recovery of damaged ecosystems while conserving intact ecosystems.

Nutrient recycling – The way in which elements are continuously being broken down and/or exchanged for reuse between the living and non-living components of an ecosystem.



Photo: Birds on an urban pond



Photo: Community garden in New York City

ECONOMIC AND SOCIAL BENEFITS OF PROTECTING WILDLIFE

Economic Benefits – Nature-based approaches for hazard mitigation can be just as effective as conventional structural approaches and they are often more cost-effective. Coastal wetlands, for example, provide significant risk reduction even when they have been damaged by human activity. A single acre of wetland can store up to 1.5 million gallons of floodwater. These ecosystems also provide additional benefits, like serving as a nursery for fish nutrient cycling and carbon sequestration. All these benefits will increase the economic value of wetland habitats.

Globally, the estimated value of ecosystem services provided by natural systems ranges from \$125–145 trillion per year. In the U.S. alone, coastal habitats provide estimated benefits valued at over \$100 billion annually. Scientists from The Nature Conservancy estimate that in the U.S., preventing development in the more than 100,000 square miles of remaining unprotected natural lands that lie within the 100-year floodplain would avoid nearly \$400 billion in potential flood damage to new development by 2050.

Social Benefits – Mitigation planning can tie into the growing movement for “biophilic cities,” which are cities that provide close and daily contact with nature and foster awareness of and caring for nature. This movement suggests that cities advance their sustainability and resilience through increased biodiversity and urban natural systems. High biodiversity is correlated with ecosystems that generate substantial environmental services, such as climate moderation, nutrient recycling, water purification and recharge, oxygen production, and assimilation of waste and pollutants.

In urban environments, nature provides opportunities for residents and guests to become involved in ecological restoration and contributes to greater social cohesion, better health, and greater resilience. For example, following Hurricane Sandy, community gardens across New York City served as restorative gathering places and provided opportunities for residents to assist in rebuilding their neighborhoods. In rural settings, protecting wildlife is synonymous with protecting the land and its beauty that so many rural residents treasure. Instead of viewing open spaces as opportunities to develop, living in sync with nature is central to what farming and rural communities see as essential to their quality of life.

There is an emotional connection between biodiversity and resilience goals. Biodiverse communities can help strengthen commitments to place. This sense of place represents an important first step in being prepared to respond to a crisis or future shock.

BIOPHILIC CITIES

What makes a city a “biophilic city”? The concept of biophilic cities is rooted in the idea of “biophilia,” which is the notion that humans are innately drawn to nature. Humans want nature and need natural elements like sunlight, fresh air and greenery around us in cities. Biophilic cities not only provide abundant opportunities to be outside and to enjoy nature, but also invest in the social and physical infrastructure that helps bring urbanites in closer connection and understanding of nature. There is a [Biophilic Cities](#) organization that supports a network of cities from around the world dedicated to improving the connection between residents and urban nature. These partner cities are working to conserve and celebrate nature in all its forms and the many ways in which cities and their inhabitants benefit from biodiversity and wild urban spaces.



Photo: Elk dashing across a busy road



Photo: Geese overlooking the lake in New York City's Central Park

CONSIDERING WILDLIFE IN MITIGATION

When incorporating wildlife protection and ecosystem restoration in their mitigation program, communities should:

- Take stock of the risks climate change poses to an area and the opportunities for applying nature-based solutions to address them.
- Evaluate the role of current policies in protecting or endangering ecosystems that could provide climate adaptation benefits.
- Include ecosystem-based approaches when evaluating alternatives to reduce community risks, including protecting critical gray infrastructure like storm sewer systems, pipelines and roads.
- Look for opportunities to accomplish both climate adaptation and mitigation.

When communities consider wildlife in mitigation, it is a best practice to identify where natural systems provide hazard protection and other critical services, and prioritize protection or restoration of these systems in plan updates and revisions. To scale up investments in resilience and maximize the value of their efforts, communities should ensure that the design and application of natural infrastructure solutions, such as forest restoration, mitigation banking, or living shorelines, take future climate factors into account. They should also make sure that enhancing ecosystem resilience and deploying nature-based solutions are part of major investments, such as disaster recovery and mitigation efforts.

OUTREACH

Cross-agency collaboration is central for connecting wildlife and mitigation efforts. It is important to engage relevant groups early in the process, before major design or policy decisions are made. They can offer advice on which actions can occur at the neighborhood or municipal level and which may need to occur at a broader state or federal level. When embarking on the mitigation planning process, consider including the following government agencies, individuals and/or organizations:

- Wildlife volunteers/friends groups
- Parks and recreation department
- Tribal and inter-tribal organizations
- Environmental protection/conservation organizations
- Land trusts
- Sports groups (e.g. Ducks Unlimited, Trout Unlimited, etc.)
- U.S. Fish and Wildlife Service regional office
- County, state, and federal environmental agencies

WILDLIFENYC

WildlifeNYC is a multi-agency public campaign that focuses on raising awareness about wildlife in New York City. The [WildlifeNYC website](#) features educational activities, information about local wildlife species and wildlife-related events that all promote coexistence and are designed to foster awareness and understanding about urban wildlife. The website also hosts a Report a Sighting feature that allows residents across all five boroughs to report sightings of wildlife like deer, coyotes, foxes, and more.

RESOURCES

Guides to Expanding Mitigation

<https://www.fema.gov/about/organization/region-2/guides-expanding-mitigation>
Link to all available Guides to Expanding Mitigation.

FEMA Hazard Mitigation Planning

<https://fema.gov/hazard-mitigation-planning>
Review standards and guidance for the planning process.

Building Community Resilience with Nature-Based Solutions

https://www.fema.gov/sites/default/files/documents/fema_riskmap-nature-based-solutions-guide_2021.pdf
Learn how to identify and engage staff and resources to apply nature-based solutions.

Naturally Resilient Communities

<http://nrcregions.org/resources/>
Explore resources to learn about or apply nature-based solutions.

United Nations Decade on Ecosystem Restoration

<https://www.decadeonrestoration.org/>
Learn about the UN effort to prevent, halt and reverse the degradation of ecosystems globally.

Methow Beaver Project

<https://methowbeaverproject.org/>
Learn more about the role of beavers in watershed management.

State Wildlife Action Plans

<https://www.fishwildlife.org/afwa-informs/state-wildlife-action-plans>
Learn about each state and territory plan for conserving the nation's fish and wildlife.



ENGAGE WITH US

Are you a state, local, tribal or territorial official interested in making the connection between wildlife and hazard mitigation? Are you a wildlife professional interested in connecting with local officials to reduce risk from hazards? Please contact us at FEMA-ExpandingMitigation@fema.dhs.gov.

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