Integrating Wildlife Habitat Connectivity Into Local Government Planning

Examples, Recommendations, and Resources for U.S. Towns and Counties

CENTER for LARGE LANDSCAPE CONSERVATION

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Image: A coyote walks near a neighborhood in Los Angeles, California. Credit: Adobe Stock.
Cover image: Mule deer on the outskirts of Salt Lake City, Utah. Credit: Adobe Stock.

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1. INTRODUCTION

This report aims to clearly define habitat connectivity and highlight actionable strategies for integrating it into local government planning. By incorporating habitat connectivity into policies, plans, and planning tools, local governments can play a vital role in protecting natural systems and building healthier, more resilient communities, now and for generations to come.

Land use planning in local government involves balancing a wide range of complex and often competing priorities. The task of reconciling these needs is exacerbated by limited staffing and funding, evolving scientific information and societal values, and the realities of political and public engagement. We have developed this document to assist planners in integrating natural resource conservation and wildlife habitat connectivity into local land use strategies.

The document outlines the benefits of habitat connectivity for municipalities and counties, offers practical recommendations for incorporating ecological connectivity into local government planning and implementation, and provides examples of plans, policies, reports, case studies, and sample language from around the country that demonstrate how connectivity can be addressed.

Wildlife Habitat Connectivity: Needs and Impacts

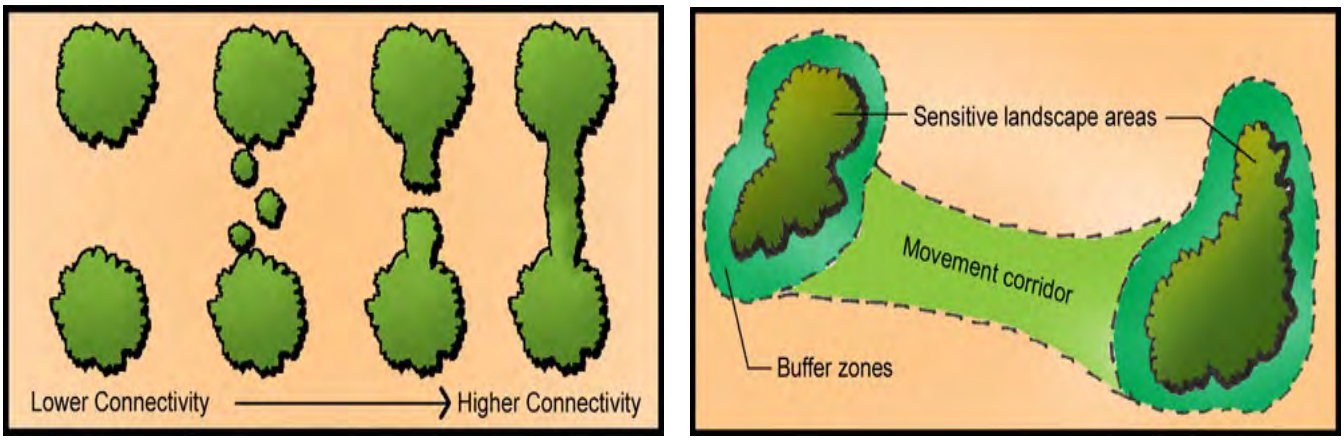
What We Mean By 'Wildlife Habitat Connectivity'

Connectivity is a common term with many uses. Planners often refer to connectivity in transportation systems. However, in this document, connectivity refers only to *ecological* or *wildlife habitat connectivity* and we use these two terms interchangeably. While ecological connectivity may be the most appropriate term, we find that wildlife habitat connectivity may be more easily grasped by non-scientists. Other wildlife connectivity–related terms that may be used in planning contexts in other documents can include wildlife corridor, movement corridor, wildlife linkage, linkage area, migration pathway, greenway, and habitat connector. Communities and their representatives may find various terms more appropriate.

Ecological connectivity is about the need and opportunity for animals, plants, and water to move from one place to another and is defined as *"the degree to which the landscape facilitates or impedes movement,"* which is critical to wildlife for accessing food, water, and mates (Taylor et al. 1993). Intact ecosystems, which both wildlife and people depend on, provide valuable services like pollination, climate regulation, and nutrient cycling. For this reason, global guidelines define ecological connectivity *as "the unimpeded movement of species and the flow of natural processes that sustain life on Earth"* (CMS 2024).

Connectivity occurs at different scales, is species dependent, can require contiguous habitat or water (referred to as "structural connectivity"), or be noncontiguous but functional ("functional connectivity"): migratory birds, for example, may be able to move across suitable habitats even in the absence of contiguity. Intact riparian corridors, forests, grasslands, wetland complexes, and free-flowing streams enable connectivity across a landscape. In contrast, open spaces and parks, regardless of size, are often isolated and surrounded by development.

Large, connected networks of conserved lands are better able to support biodiversity and ecological function than fragmented areas. Connecting remaining blocks of forests or other types of habitats through riparian networks or other landscape linkages enables connectivity. While we often think of a wildlife corridor as a discrete linear path, for many species, habitat or ecological connectivity refers to all the interconnections across the variety of habitat types and land uses across a defined landscape, with redundancy leading to a more permeable and resilient ecological network.



Concepts of fragmentation and connectivity. Credit: Bentrup 2008.

While less developed areas may have greater ability to maintain connected spaces, it is also possible to restore habitat connectivity in regions with greater development. Creating landscape linkages between natural features is a way to restore connectivity in an otherwise fragmented landscape. Installation of wildlife crossing structures along a road that bisects habitat, increasing vegetative cover, improving a degraded stream channel, or installing wildlife-friendly fencing are examples of techniques used to restore connectivity.

Impacts of Fragmentation on Wildlife Habitat Connectivity

Fragmentation is the term used to describe a lack of habitat connectivity and describes a loss or stress of interconnections among natural systems. A fragmented landscape is like a dropped and shattered dinner plate – instead of one whole space for holding everything, it is scattered with pieces too small to use or too hard to reach. Fragmentation breaks habitats into smaller and isolated patches, making it harder for animals to access resources, disperse to new areas, find mates, or even survive. Fragmentation can be seen in measurable landscape changes, such as greater isolation between habitat patches, loss of interior habitat, and increased edges in formerly continuous habitat, which can increase exposure to human disturbance, predators, and invasive species. Such habitat loss can lead to local extinctions, loss of biodiversity, and weakened ecosystems (Haddad et al. 2015; USEPA 2013). Needs of individual species vary, and there is rarely a clear threshold for "disconnectedness." Provision of wildlife habitat does not necessarily preclude other land uses, but most wildlife species require connectedness.

Landscape fragmentation from development is accelerating, with residential expansion projected to grow dramatically (Bierwagen et al. 2010, Xie et al. 2023). As sprawl expands beyond town centers, it consumes increasing amounts of land while housing fewer people. Larger ex-urban lots and the road networks needed to access them occupy significant space and further divide the landscape. Further, private lands are essential for wildlife and biodiversity conservation, as people tend to build within environmentally rich areas, encompassing critical habitat, migration corridors, and ecological diversity that cannot be protected by public lands alone (Hilty et al. 2019). As Kretser et al. (2023) aptly summarized:

> *Private lands play a critical role in conservation, providing a disproportionate amount of high-quality habitat for wildlife species (Scott et al. 2001) and ecosystem services essential for human well-being (Kroeger & Casey 2007). One out of every four acres of private land in the U.S. (Brown et al. 2005) and nearly half of Canada peri-urban areas have been converted to housing development (Czekajlo et al. 2021), with extraordinary consequences for nature and society. Structural changes to ecological communities are occurring (Glennon & Kretser 2021), specialist species are being replaced with human-adapted generalists (Glennon & Kretser 2013), human-wildlife conflicts are increasing (Kretser et al. 2008), and fragmented landscapes inhibit ecosystem processes (Haddad et al. 2015) and impede migrating species (Goad et al.*

2014). Although sometimes referred to as 'matrix' lands or non-habitat, many private lands are now widely recognized as providing critical habitat. In the U.S., private lands are the most biologically productive and support the greatest number of wildlife species (Scott et al. 2001), and yet they are also the most threatened.

Subdivision near Spokane, Washington. Credit: Adobe Stock.

Local Governments and Wildlife Habitat Connectivity

Natural Resources and Local Governments' Authority

Across both urban and rural areas in the United States, pressures to expand beyond existing development footprints have continued to intensify in part due to trends such as remote work, rising housing costs, population growth, and shifts accelerated by the Covid-19 pandemic. As these pressures increase, local governments and planners grapple not only with the need to extend necessary services and infrastructure, but also the consequences of habitat disturbance. Whether the issue of expanding growth is viewed through the lens of planning, community safety, or wildlife management and conservation, a core question remains the same: can we maintain connected natural landscapes that support human, wildlife, and overall ecological health?

Each state has a system of local government written into its constitution and state laws. Most states have at least two tiers of local government: counties and municipalities. In some states there may be different types of jurisdictions, including township, city, town, parish, borough, village, and reservation. In this report, we refer to counties and to municipalities, cities, and towns. We use the latter three terms interchangeably to indicate the smallest available unit of local government. We use the term communities more broadly, to refer to cities or towns as well as counties.

In most cases, statutory language provides land use power and the authority to plan to municipal or county governments, granting local governments significant autonomy and discretion in selecting tools and regulations for implementation. Local governments have land use authority over almost two-thirds of land in the United States (Walsh 2023), as the federal government owns and manages about one-third of land in the country (Congress.gov 2020). Local government can help to limit the impact of development on natural resources, especially when it

comes to the gradual effects of residential and commercial growth that can erode traditional land use patterns and degrade environmental integrity.

Local government plays a pivotal role in shaping how development aligns with community priorities. They hold broad authority to enact protections for clean water, open space, natural amenities, and other vital local resources. As such, local elected leaders and planning staff are essential in directing the trajectory of both development and conservation. However, the ability of local officials to guide development in support of conservation goals depends heavily on what is codified in local plans and ordinances. Nearly every exercise of land use authority has the potential to affect wildlife and natural resources. Without clear policies or provisions that address ecological concerns, officials often lack the tools needed to guide development in ways that protect important environmental values.

Communities across the country have used habitat-focused planning and implementation tools and strategies to guide growth, preserve rural lands, and protect vital resources. Aversion to regulation notwithstanding, such strategies often appeal across a political spectrum—the majority of citizenry generally appreciates wildlife and strategic approaches that yield cost savings and mesh with economic sensibilities. As development pressures increase, communities may respond by strengthening regulations, in recognition that open space, natural resources, and wildlife are key community priorities. Conservation-driven policies frequently emerge in response to imminent development threats and reflect a community's desire to preserve rural character and a strong sense of place (Kretser et al. 2019).

However, many local governments lack explicit policies to preserve natural resources, wildlife habitat, or connectivity. While comprehensive plans may mention habitat protection, few communities translate these goals into tools such as zoning, subdivision regulations, or development standards. This report addresses that gap and shows how local jurisdictions can act, through planning, policy, and partnerships, to safeguard wildlife movement and protect open space and vital natural resources into the future.

Female mountain lion in Verdugo Hills near Los Angeles, California. Credit: National Park Service.

How Local Governments Can Address Wildlife Habitat Connectivity

Counties and municipalities influence the ability to maintain connected habitat on a local and regional scale; land use planning can help ensure a larger pattern of connected lands and water in a region. County and municipal-level plans and their implementation mechanisms are critical tools to integrate natural resources and connectivity considerations to help reduce fragmentation. They can be used to avoid, minimize, or mitigate the impacts of development on natural resources and connectivity, and include a combination of regulatory and incentive-based tools.

Local governments can take a range of actions to address wildlife habitat connectivity, including but not limited to:

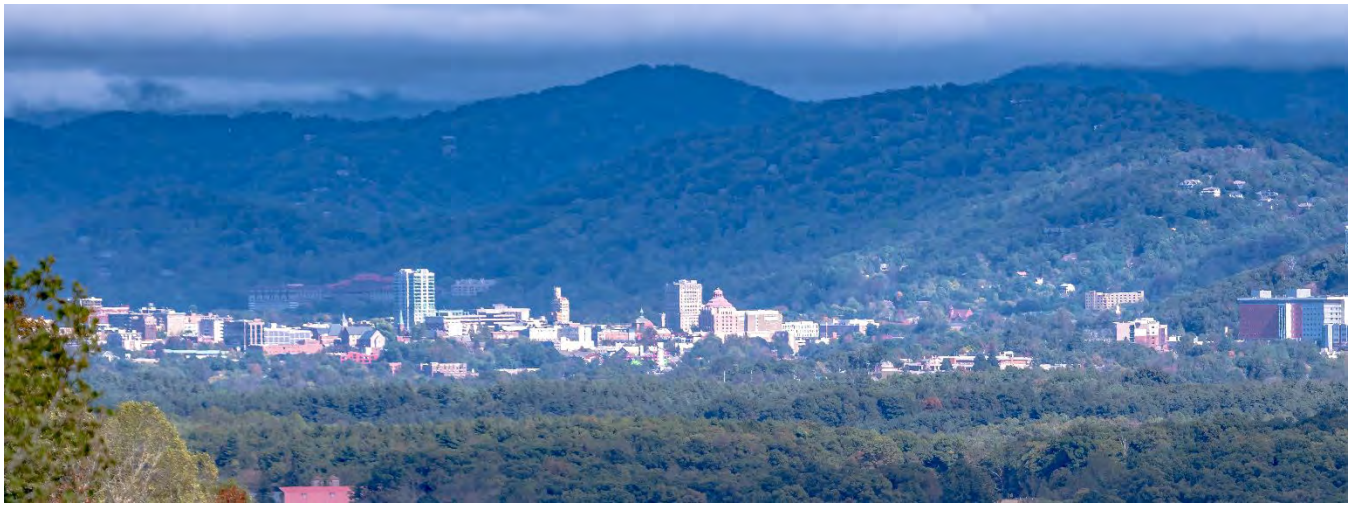
- Identifying wildlife corridors to inform planning
- Integrating wildlife corridor protection into comprehensive plans
- Adopting overlay zones or resource protection ordinances
- Requiring habitat-sensitive subdivision design
- Establishing setbacks and buffers for sensitive resource areas
- Using tools like cluster development and transfer of development rights
- Providing density bonuses for conservation
- Prioritizing undeveloped and connected open spaces for acquisition and protection
- Retrofitting transportation or hydrological infrastructure to improve wildlife and aquatic movement

Many local governments also support these efforts through non-regulatory means, such as:

- Conservation partnerships
- Dedicated natural resource staff
- Public education
- Participation in state or regional connectivity initiatives

Connectivity can also be incorporated into climate resilience planning. For instance, the Washington state Department of Commerce recommends that local governments: "*Identify opportunities to expand habitat protection and improve habitat quality and connectivity to foster climate resilience using conservation area designations, buffers, and open space corridors*" as a high priority to address climate change.

Find more details on what local governments can do for wildlife habitat connectivity in the Recommendations section below.



Communities thrive amid rich natural resources. Pictured: Asheville, North Carolina. Credit: Adobe Stock.

Local Government Benefits from Conserving Wildlife Habitat Connectivity

Planning for wildlife habitat connectivity has many associated co-benefits for towns and counties.

Environmental

Enhancing habitat connectivity helps towns and counties to be more resilient to a changing climate by improving carbon sequestration, mitigating heat islands, and buffering flood events and droughts, in addition to helping species adapt and move (White House 2022). Connected landscapes enhance ecosystem services like pollination and aquifer recharge and improve the air and water quality from which people benefit (USLTA and USFWS 2017). Residential development often gains greater benefits when protected open space is of sufficient quality and size to support native wildlife and habitats.

Quality of Life

Planning for connectivity as part of natural resources conservation not only improves ecological function but also provides opportunities that improve human health and quality of life. Connected, open space networks facilitate communities with parks and greenways linking neighborhoods. Nature, trails, viewsheds, and recreational opportunities are amenities that benefit human health (USLTA and USFWS 2017).

Smart Growth and Economics

Land use planning that incorporates wildlife habitat connectivity also minimizes sprawl, which is expensive for communities to manage. Rural and working landscapes also benefit from planning for wildlife habitat connectivity as large tracts of land remain viable for farming and ranching with development clustered in town centers (ICMA and SGN 2010).

In addition to the rationales above, many cost-benefit analyses highlight increased property values and associated financial benefits to towns and counties from the presence of wildlife corridors and other open space (Chester County 2019; LTA and USFWS 2017).

Natural open lands provide benefits to wildlife, humans, and ecosystems. Credit: Kylie Paul.

2. OVERVIEW OF LOCAL GOVERNMENT PLANNING FRAMEWORK

Plans and Policies

Local land use planning involves varying types of rules that govern land development. While processes may differ by community, local government decision-making generally involves elected city or county councils, which have final authority over land use and development decisions. These councils rely on recommendations from advisory planning commissions—typically appointed citizen boards—and professional planning staff who provide technical analysis and support. Effective decision-making depends on clear, up-to-date policies and codes that guide these bodies. When specific topics, such as wildlife conservation, are not included in the local planning framework or code, they are less likely to be addressed in decisions. Public input and relevant data also play important roles in the process.

A local government's planning framework usually includes articulation of an overarching vision in a comprehensive land use plan and adoption of regulatory and non-regulatory policy strategies to implement the plan. A comprehensive plan (also known as master, town, or general plan) provides a vision and goals for future development and open space, among other broad community goals, across the area of jurisdiction. Such plans describe a community's policies to achieve its vision. They are often required statutorily and serve the legal foundation for land use decisions. An ordinance is a specific law or regulation passed by a city or town council, county commission, or other local legislative body. A code refers to a comprehensive set of laws that may include ordinances, regulations, and other administrative rules, organized by subject matter. The most common approaches for implementing the policies articulated in a comprehensive plan are: a) zoning regulations, which manage the location, type, density, and associated impacts of land use and development, and b) subdivision regulations, which regulate the overall pattern of development, including the division of a parcel of land for sale or development.

Local land use planning involves multiple component plans, standards, and other tools. The general approaches and roles of various components, and examples of how they may include connectivity, are summarized in *Table 1*. Standards in land use planning are regulatory provisions that define the minimum or maximum requirements for various aspects of land development to ensure consistency, safety, environmental protection, and community goals. *Table 2* provides similar information for several types of standards, including examples of how they may include connectivity. *Table 3* highlights additional tools that can support habitat protection efforts within a land use planning context. None of the tables below are exhaustive. It is important to note that for every description, caveats exist based on specific contexts. Many of the approaches and strategies shown are further described below, and examples and recommendations are found in subsequent sections of this report.

A neighborhood abuts a forested area outside of Rochester, New York. Credit: Adobe Stock.

Table 1. Standard/generalized components of local land use planning

Land Use Framework	Role	Examples of Connectivity Strategies
Comprehensive/ General/ Master Plan	Big-picture, policy-level vision document that guides future development and conservation decisions	• Mapping wildlife corridors and core habitats • Wildlife habitat goals, policies, and objectives • Land use designations that steer development away from sensitive areas •Urban growth boundary • Regional coordination on connectivity and green infrastructure plans • Create connected networks of open spaces and habitat • Transportation planning
Functional/ Supporting Plans	Standalone or integrated plans that set priorities for conservation, infrastructure, and growth	• Wildlife corridor or habitat plans • Trails, greenways, open space master plans • Climate action or resilience plans • Regional conservation visioning • Green infrastructure strategy documents • Hazard management plans
Zoning Ordinances*	Regulatory tool that controls land use, building types, and locations. Parcel-specific and legally binding	• Conservation or environmental overlay zones • Wildlife habitat protection criteria • Buffer requirements between development and sensitive zones • Cluster or conservation subdivision incentives • Density bonuses for habitat preservation • Use restrictions in wildlife zones (e.g., no fencing, lighting limits) • Setbacks tailored to wildlife needs • Landscaping requirements
Subdivision Regulations	Govern land division, lot layout, and supporting infrastructure (roads, utilities, etc.) layout	• Connected open space requirements • Cluster development requirements • Wildlife corridor set-asides – dedicate areas to remain undeveloped • Lot and layout standards to avoid fragmenting habitat • Native vegetation retention
Site Plan and Development Review	Apply at the individual project level, focusing on design details and environmental impacts	• Require site plans to show wildlife movement paths • Wildlife-friendly landscaping (native plants, no invasives) • Lighting design for nocturnal species • Wildlife-friendly fencing or no-fencing policies • Connectivity analysis or environmental assessments
Voluntary Tools & Partnerships	Non-regulatory support for habitat goals	• Conservation easements • Public education for wildlife-friendly practices • Landowner incentives / Transfer of Development Right programs • Inter-agency coordination • Current use taxation programs

*Terms used by each county or municipality may differ and include regulation, ordinance, resolution, code, and bylaw. The full body of a local government's ordinances may be referred to as its land use code, development code, unified development code, or unified development ordinance.

Table 2. Numerous types of standards within the land use planning framework

Standard Type	What They Regulate	Key Characteristics	Habitat Protection Role	Possible Connectivity Strategy	Land Use Framework
Subdivision Standards	How land is divided, including infrastructure layout and access, open space	Govern street layout, lot access, utilities, open space dedication	• High role • Determine how fragmentation occurs at development level • Protect sensitive areas through layout	• Require corridor set-asides • Preserve native vegetation • Design road networks to reduce fragmentation	Subdivision regulations
Conservation Subdivision Standards	Form of subdivision with a focus on conserving open space and habitat, clustered development, open space preservation	Requires or encourages compact development in exchange for preserved open space, site-specific conservation planning	• Very high role • Explicitly designed to protect habitat and reduce fragmentation • Maintains larger, contiguous habitat areas, buffers, and internal corridors	• Preserve contiguous open space • Require habitat assessments • Prioritize conservation land	Subdivision code, zoning code, overlay district
Performance Standards	Environmental and operational impacts of development	Outcome-based; flexible standards tied to measurable impacts (e.g., lighting, noise, vegetation removal)	• High role • Can directly reduce impacts to adjacent wildlife habitat • Mitigates habitat disturbance by limiting harmful site-level impacts	• Set max light/noise thresholds • Require contiguous open space • Maintain minimum habitat connectivity • Retain native habitat	Zoning, development review standards, environmental regs
Development Standards	Physical form and intensity of development	Prescriptive rules for development form and placement. Vary by zone; regulate setbacks, lot size, coverage, density	• Moderate role • Can limit footprint and intensity of development in sensitive areas	• Include lot coverage limit • Include open space percentages • Include setbacks from habitat	Zoning, overlay districts
Site Plan Standards	Detailed review of how a project will be laid out on a specific site	Project-specific; ensure compliance with zoning, environmental, and design standards	• Moderate role • Opportunity to tailor design to reduce habitat conflicts • Ensures habitat-sensitive layout, building envelope placement, and vegetative buffers	•Require habitat-friendly site layout, buffer placement, and crossings •Show wildlife corridors on plans •Include native landscaping •Minimize barriers like fencing or lighting	Linked to zoning, site plan review, development review

Design Standards	Physical layout of lots, roads, buildings, open space, and site components	Aesthetic and functional aspects of sites, includes road design, setbacks, fencing, building envelopes, lot configuration	• Indirect role • Encourages compatible design with natural landscapes • Avoid habitat disturbance	• Require native landscaping or wildlife-friendly fencing	Site plan review in subdivision regs, zoning code, overlay zones; Design manuals
General Use Standards	Broad use rules applied across multiple zones	Uniform across jurisdictions; may include height, parking, lighting, signage	• Indirect role • Can help reduce impacts like noise, lighting, or traffic near habitat	• Limit uses or impacts near habitat through general restrictions (e.g., lighting limits)	Zoning

Natural open space can serve as connectivity areas for both wildlife and people. Credit: Kylie Paul.

Table 3. Various land use and conservation tools that can be used by local governments

Tool	What They Do or Regulate	Key Characteristics	Habitat Protection Role	Land Use Framework
Overlay Zones	Additional standards layered on top of base zoning, within mapped boundary	Focused on conservation/resource areas; may modify uses, densities, setbacks	• Adds stricter protection for habitats, corridors, riparian zones	Zoning regulations
Setbacks and Buffers	Required distance from sensitive areas or features	Fixed or variable-width areas around habitat features	• Separates development from wildlife areas • Maintains corridors and edge habitat	Zoning or subdivision code, environmental regulations
Open Space Residential Development	Clusters development on part of a property while conserving the rest as open space	Requires design standards and long-term land management; often part of subdivision regulations	• Reduces fragmentation • Maintains ecological function of conserved areas	Subdivision standards, sometimes zoning overlay
Density Bonuses	Increases allowed density in exchange for conservation	Incentive-based tool; often tied to overlays	• Encourages developers to conserve habitat in exchange for greater development rights elsewhere	Zoning/site development
Open Space Acquisition	Public or nonprofit entities purchase land to keep it undeveloped	Permanent protection; publicly owned; often funded by bonds or tax measures	• Direct protection of critical habitat areas • Prevents fragmentation	Outside regulatory frameworks; often complements them
Conservation Easements	Legally binding agreements that restrict development on private land	Voluntary; typically permanent; retains private ownership; held by land trusts or agencies	• Maintains large, connected habitats while allowing some land uses	Operates alongside zoning and land use laws
Purchase of Development Rights (PDR)	Government or nonprofits buy development rights from landowners, who retain other rights	Voluntary, compensatory; keeps land in private ownership but limits development	• Prevents conversion of habitat to developed use • Supports large working landscapes	Coordinated with local zoning or open space programs
Transfer of Development Rights (TDR)	Transfers development potential to less sensitive areas	Voluntary; requires sending and receiving areas; between developers and property owners	• Protects habitat in sending zones by redirecting development	Zoning regulations
Wildlife Crossing Structures	Facilitate safe movement of wildlife under or over roads and other infrastructure	Engineered structures (e.g., overpasses, underpasses) paired with fencing; require interagency coordination and site prioritization	• Reduce wildlife-vehicle collisions • Maintain or restore wildlife habitat connectivity across fragmented landscapes	Can be incorporated into transportation planning, capital improvement programs, and infrastructure retrofits

Comprehensive/General/Master/Town Plans

A comprehensive plan is a long-term advisory document that guides land development decisions, shaping future policies, regulations, development approvals, and zoning decisions. It sets the overall vision, goals, and policies for a community's future and provides goals, policies, and strategies, focusing on topics in sections (also called plan elements) such as land use, transportation, housing, environment, economic development, parks, and infrastructure. The plan can integrate conservation principles, policy recommendations, natural resource data, and other conservation and ecosystem factors throughout its sections, called plan elements. A comprehensive plan may include an existing conditions map to depict current patterns of development, infrastructure, and land use. Comprehensive plans often include a future land use map (FLUM) that establishes a long-term physical growth strategy, focusing on desired land use patterns and zoning recommendations. Various plan components such as specific plan elements may be required by state legislation.

Functional/Supporting Plans

Separate, focused supporting plans provide depth, analysis, and strategies for a specific topic that may be addressed in a more general fashion in a comprehensive plan. These targeted plans are often incorporated by reference into the comprehensive plan or adopted as an amendment. Types of functional plans include parks and open space, natural resources, transportation, stormwater or hazard management, climate action or resilience, and so on. Some communities have developed connectivity plans.

Maps, Inventories, Studies, or Analyses

Effective conservation planning requires mapping and inventory of natural features, areas with rare, threatened, or endangered species, and connectivity locations. Scientific understanding—such as habitat connectivity maps and ecological inventories—supports decision-making. Biologists, planners, and communities can identify priority areas to develop and guide conservation strategies and regulatory efforts. Comprehensive plans can incorporate wildlife habitat connectivity or other critical area mapping and direct actions to maintain connectivity among these areas.

Base Zoning Districts

Zoning ordinances divide a community into designated districts—such as residential, commercial, natural resource/open-space, or industrial—and permitted land uses. For example, residential uses may be allowed in both residential and commercial zones, with restrictions on certain commercial activities in residential areas. Zoning districts have defined standards, such as minimum lot sizes, density limits, maximum building height, number of stories, lot coverage, and setback requirements. Zones may limit development to protect open space, recreation areas, forests, habitats, or agricultural or rural areas through use restrictions, requirements for lesser densities, large minimum lots, or cluster development, and so on. Names of these types of districts may include Conservation; Open Space; Agricultural; Forest; Rural; Natural Resource, Resource Lands, or similar.

While most counties in the United States have some form of zoning, rural areas may not have zoning or limit zoning to town centers. In these cases, county subdivision regulations or state oversight govern unzoned areas. Absent zoning, jurisdictions generally lack the legal framework to apply land use regulations—such as density limits, transfer of development rights, or conservation or other types of overlays—because there is no mechanism to define and enforce those tools. While some conservation or development strategies can be implemented through other mechanisms, zoning is the primary vehicle for regulating land use in most communities.

Overlay Zone

An overlay zone is a mapped zoning designation that identifies conservation or other priorities and adds supplemental requirements to underlying zoning. Many communities use overlay zones for natural resources protection because they can apply across multiple base zones, be tied to mapped features like floodplains,

wetlands, or habitat corridors, and include performance standards or prohibitions specific to sensitive areas. Overlay zones allow the application of additional standards across multiple base zone districts without rewriting each one. Overlay zones may regulate the placement of development, impose density limits, establish no-build areas, require larger lot sizes or setbacks, or introduce design standards. They can also adjust permitted uses and density allowances to reduce impacts on sensitive lands. Conservation-oriented overlays often incorporate cluster or conservation standards for subdivisions that include density transfers or bonuses and open space requirements. Wildlife habitat and corridor zone overlays can also be used to protect important ecological areas and species.

Standards

Standards are the specific rules and guidelines that govern how land can be developed, used, and maintained. Numerous types of standards exist within both zoning and subdivision regulations. Regulatory components to protect wildlife habitat connectivity can include habitat assessments, wildlife corridor and connectivity requirements, open space requirements, wildlife-friendly fencing, setbacks from habitat, performance-based outcomes, limitations on development, roads, and driveways, and so on. See Table 2 above.

New housing construction in Washington state. Credit: Adobe Stock.

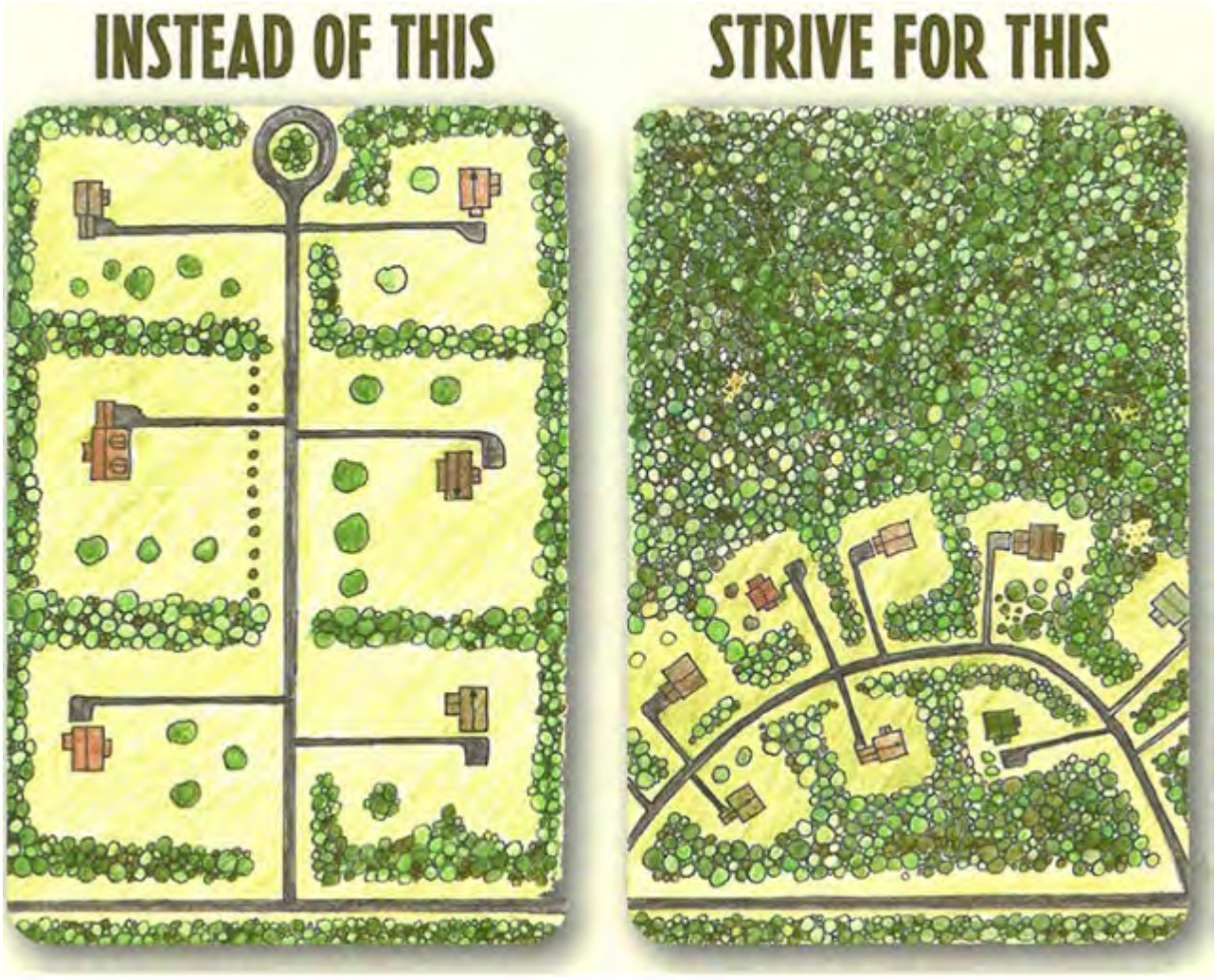
Buffers/Setbacks

Buffers and setbacks can be effective tools to limit the impact of development on sensitive environmental areas and serve as protective zones around wildlife habitat features such as riparian areas, wetlands, forests, and corridors. They are intended to reduce the direct disturbance of infrastructure (buildings, roads, etc.) and human activity. Buffers and setbacks provide clear guidance for developers and landowners and offer local governments enforceable tools. They may be paired with designated building envelopes or no-build zones to prevent additional encroachment into ecologically important areas. Buffers and setbacks can be integrated into zoning codes,

subdivision regulations, or development standards to help protect wildlife habitat while still accommodating growth.

Open Space Residential Development

Open space residential development (OSRD) is a design approach that allows housing to be concentrated on smaller lots or limited portions of a parcel, leaving the remaining land as open space. Various terms may be used such as conservation subdivision, cluster development, cluster subdivision, flexible development, open space subdivision, and so on. Conservation subdivisions have a higher percentage of open space (typically 50-70%) with at least half of the buildable land set aside as permanent conservation areas (Arendt 1996). The core concept of OSRD is the preservation of natural resources, wildlife habitat, and/or agricultural land by focusing development in smaller, more compact areas surrounded by or at the edge of a larger open space parcel. When implemented effectively, clustering can reduce habitat fragmentation and increase the quality and connectivity of habitat for a variety of species. Connecting open spaces on adjacent parcels can also protect viewsheds, facilitate trail systems, and provide other community benefits. OSRD is typically implemented through zoning and subdivision regulations and is nearly always voluntary or incentive-based and often paired with density bonuses to catalyze its use.



Depiction of clustered development. Note, this image is for demonstration purposes and may not apply to all settings. Communities in the wildland urban interface, for instance, may need to emphasize fire-safe planning and design.
Credit: Wildlife Conservation Society Adirondack Program.

Purchase of Development Rights and Transfer of Development Rights

A Purchase of Development Rights (PDR) program is a voluntary land conservation tool in which a government agency or land trust buys development rights from willing landowners. Once purchased, the development rights are withdrawn, typically through a conservation easement, ensuring the land remains largely undeveloped. A landowner retains ownership and can continue to use the land for defined activities like farming, forestry, or habitat management that maintain open space. PDR programs are often funded by local, state, or federal government programs (including grants, bonds, or taxes) and are used to preserve open space, farmland, and wildlife habitat.

Transfer of Development Rights (TDR) programs are also voluntary tools that allow landowners to separate and sell development rights, while preserving land as open space, typically through a conservation easement. Development rights are transferred from zoned sending areas (most often ecologically, agriculturally, or culturally valuable land) to outside receiving areas where higher-density development is encouraged. TDR programs aim to limit or remove development in priority areas for conservation while guiding growth to locations served by infrastructure and public services attractive to residents. The programs rely on willing buyers and sellers, and successful programs tend to have the following components: strong community support, high demand for density bonuses, sufficient infrastructure in receiving areas, and local capacity to manage growth.

Density Bonuses

Density bonuses allow developers to build at higher densities than typically permitted in exchange for community benefits like open space and natural resources conservation, affordable housing, or historic preservation. Density bonus programs may be a standalone tool but are also commonly used with cluster development, TDR programs, and conservation easements to incentivize their use. They are found in both zoning and subdivision regulations. Density bonus programs differ widely in their scale and effectiveness; they tend to be successful in areas with strong development demand and underused when incentives are insufficient or when ample land is available. Many examples and case studies in this report use density bonuses.

Enabling Conditions

Local governments can help to maintain and protect wildlife habitat connectivity by establishing enabling conditions, funding mechanisms, and other supportive actions. These conditions complement land use policies and regulations. Non-regulatory options such as conservation of open space through citizen-supported bonds and taxes, information developed via habitat assessments, and guidelines for wildlife-friendly practices (*see Guidance Resources section*), enable citizens to engage with conservation actions more broadly at a local level and often enjoy considerable support.

Land Acquisition/Private Lands/Conservation Easements

Local governments can purchase land outright through a fee simple acquisition for inclusion into a parks, conservation lands, water resources protection, or related management strategy. They can also secure conservation easements with willing landowners, which restrict development while keeping the land in private ownership. These actions are often carried out in partnership with land trusts or state or federal programs. These approaches are essential to permanently protect critical wildlife habitat and corridors from development.

Funding

Establishing local funding mechanisms, such as conservation mill levies, open space bonds, or transfer taxes, can provide financial resources for habitat protection. Incentive programs like tax reductions or grants can encourage private landowners to conserve or restore wildlife corridors. Having funding significantly motivates action and can help support conservation steps like leases, acquisitions, and conservation easements and other various approaches. State programs like Current Use or Present Use Value Taxation Programs can be valuable for providing property tax relief for agricultural, forest, or open space lands. These are state-enabled and implemented locally.

Regional Planning

Wildlife corridors often span multiple jurisdictions. Local governments can coordinate with neighboring counties, regional planning organizations, state agencies, and tribes to ensure connectivity is maintained across landscapes. *Refer to the Guidance Resources section for a list of regional connectivity planning documents.*

Partnerships, Coordination, and Agreements

Collaborating with non-governmental organizations (NGOs), universities, and wildlife experts can help local governments access technical assistance, data, and public outreach capacity to better inform conservation decisions. Connectivity is most effectively achieved through coordinated efforts across multiple scales and levels of government; no single policy can fully address all connectivity challenges. Success can depend on collaborative partnerships (Keeley et al. 2019) and a variety of strategies implemented at local, regional, and ecoregional levels to conserve and enhance habitat connectivity.

Staff

While a significant number of communities have very few planning staff, some local governments have employees with natural resources conservation portfolios. Where available, dedicated natural resources staff are able to improve natural resources conservation outcomes by providing expertise, implementing programs, enforcing regulations, collecting data, and engaging the public. They collaborate with other organizations, secure funding, and ensure that efforts, such as wildlife habitat protection and wildlife corridors, are managed effectively and integrated into planning.

Resolutions

Resolutions are formal, non-binding statements or decisions made by a governing body, such as a city council or county commission, to express a position, intent, or policy on a particular issue. They do not have the force of law like ordinances or statutes, but they can be influential in guiding future decisions, shaping public policy, or supporting collaborative efforts. Local government resolutions are commonly used to address issues like community priorities, public health, environmental protection, and strategic goals.

Human-Wildlife Coexistence Strategies

In addition to planning measures to reduce human-wildlife conflict, local governments can implement management actions to help residents and communities live more safely and responsibly with wildlife. These include securing trash and food attractants, enforcing pet and livestock regulations, supporting efforts to build wildlife crossing structures, and managing landscaping practices such as using native plants. Local governments can also engage in public education efforts, monitoring programs, and coordination with state wildlife agencies and conservation districts that help tailor management to local species and conditions.

Wildlife Crossing Structures

Wildlife crossing structures include overpasses, underpasses, bridges, culverts, and tunnels that allow wildlife to safely move under or over a highway. With proper fencing to guide animals, wildlife crossing structures can cut wildlife-vehicle collisions by 80-100% (Huijser et al. 2008). Existing culverts and bridges can also be modified to encourage increased wildlife use and keep animals off roads in a cost-effective manner. Local governments can support the development of wildlife crossing structures to connect habitat on either side of a road in part by integrating relevant policies into transportation and land use planning frameworks.

3. EMPOWERING LOCAL ACTION: HOW STATES CAN DRIVE CONNECTIVITY PLANNING

Legislation

Most states have statutory language that governs or provides municipal or county authority to plan, including which planning elements may be available for managing natural resources. According to a recent study, 35 out of 50 states require local governments to develop and implement comprehensive/master plans (Pettit and Shah 2021). Still, these planning requirements vary by jurisdiction. State codes mandate county planning in 26 states, municipal planning in 20 states, city planning in 12 states, and town planning in seven states. Eleven states specify elements that must be included in a local comprehensive plan, and 14 states suggest elements for comprehensive plans, but do not mandate them (Pettit and Shah 2021).

State enabling laws that require alignment between comprehensive plans and local ordinances can strongly incentivize local governments to take action, prompting some communities that might not otherwise engage in planning to adopt land use policies (Berke et al. 1996). This type of integration is helpful to the success of connectivity policies, according to agency staff responsible for implementation and other experts (Brammer et al. 2024). One unique challenge with local governments and connectivity planning is the sheer number of entities; the number of local governments can pose a challenge to the creation of connected landscapes. The 2022 U.S. Census of Governments counted 38,736 general-purpose local governments: 3,031 counties, 19,491 municipalities, and 16,214 townships (U.S. Census Bureau 2023). State legislation requiring local governments to consider connectivity can help create a larger framework for effective connectivity conservation.

States can have a significant impact in conservation efforts (McConville et al. 2024). State approaches that require aspects of natural resource conservation can serve to protect wildlife habitat connectivity. Statewide riparian buffer requirements or wetlands protections such as Minnesota's Buffer Law (Mnn St 103F.48) that includes requirements for counties to enforce vegetated riparian buffers can significantly benefit wildlife habitat conservation. Several states have adopted or proposed legislation requiring municipal or county plans to consider habitat connectivity, such as Vermont (Act 171), California (Assembly Bill 1889), Delaware (Senate Bill 237), and Maryland (House Bill 731). For instance, Vermont's Act 171 requires that towns and regions identify and protect forest blocks and wildlife corridors in their planning processes to ensure sustainable development while reducing harmful effects on wildlife habitats and ecosystems.

Some states have adopted legislation requiring local governments to manage growth in ways that protect environmental resources. In the 1970s, Oregon became the first state to establish a statewide land use planning program, in response to unchecked sprawl despite county-level efforts. As Liberty (2024) notes, *"the Oregon legislature recognized that 'local control' had been tested and had utterly failed to stop sprawl."* Under this system, every city was required to establish an urban growth boundary, developed in coordination with the state, to protect surrounding natural and agricultural areas by steering development inward. This approach helped encourage more compact growth, including multifamily housing and smaller residential lots, within urban areas (Tibbetts 1998).

Similarly, Washington's Growth Management Act requires cities and counties to adopt regulations protecting "critical areas" as well as "fish and wildlife habitat conservation areas," which the law's guidelines suggest include habitat connectivity. Further, in Washington every city and county that develops a comprehensive plan must identify open space corridors within and between urban growth boundaries. These corridors are required to include lands valuable for recreation, wildlife habitat, trails, and linking critical areas, and the law notes that the county or city *"should plan an integrated system that uses identified corridors to link established large areas of*

parks and recreational lands, resource lands, greenbelts, streams, and wildlife corridors to help protect fish and wildlife habitat conservation areas."

Florida has taken a more incentive-based approach to protect a contiguous swath of open space natural areas and working lands for habitat connectivity. The state's Wildlife Corridor Act designates an 18-million-acre corridor and encourages state, regional, and local agencies to prioritize projects within the corridor in land acquisition and conservation easement programs and activities. In 2021, the state legislature set aside $300 million for the conservation of the Florida Wildlife Corridor and $100 million for the state's land acquisition program (Florida Forever) and has continued to invest hundreds of millions of dollars in the corridor since then. Several counties have now acquired conservation easements within the corridor.

Whether a state legislature adopts a regulatory or voluntary approach to spur county and municipal governments to consider connectivity, implementation of such measures is more likely if the state identifies a funding mechanism to support local planning efforts. State enabling legislation can also allow smaller governments to access funding and other resources from higher levels of government (Brammer et al. 2024). Laws that enable local governments to fund conservation action can be essential. Massachusetts' Community Preservation Act (CPA) (2000) enabled municipalities to adopt a property tax levy, by referendum, to support open space protection, outdoor recreation, and other issues. Nearly half the state's municipalities have adopted the CPA model and over 37,000 open space acres have been purchased to date.

Programs and Planning

Many states have programs that support local government planning efforts, especially as they relate to wildlife conservation and natural resource protection. These programs often provide technical assistance, funding, data, and guidance to help local governments integrate conservation goals into land use planning and decision-making. The extent and nature of state support for local government conservation-related planning are shaped by a combination of governance philosophies, environmental priorities, funding availability, and ecological contexts. These state programs tend to include staff dedicated to connecting with local governments on natural resources and planning. *Refer to the State Programs section for examples.*

State Wildlife Action Plans (SWAPs) are ten-year strategic documents developed by each state to conserve wildlife and their habitats, particularly species of greatest conservation need (SGCN). These plans are a requirement for receiving federal funding through the State and Tribal Wildlife Grants Program. While SWAPs are non-regulatory, they serve as essential guidance documents for conservation actions across sectors, including land use and development. SWAPs can explicitly support local government planning and wildlife habitat connectivity by including connectivity as a conservation priority, identifying local government planning as a key strategy, providing or referencing data and tools, and so on. New Hampshire's 2025 (draft) State Wildlife Action Plan includes goals and strategies related to local land use planning and wildlife habitat connectivity.

There are several ways states can support and strengthen local government efforts to incorporate natural resources and wildlife considerations into planning and decision-making. These include, but are not limited to:

- *Authorize local action:* Enact state legislation that empowers or requires local governments to include wildlife habitat connectivity in plans and policies.
- *Provide model policies:* Share example ordinances, plan language, and toolkits to guide local efforts.
- *Provide data and tools:* Supply habitat maps, wildlife movement models, and GIS data; provide help in their use; and track local adoption.
- *Build local and regional capacity:* Fund trainings, technical staff, and regional planners; support cross-jurisdiction coordination and data sharing.
- *Provide financial support:* Offer grants, incentives, and cost-share for conservation planning, land protection, and habitat restoration activities.
- *Align with state plans:* Coordinate local goals with State Wildlife Action Plans and connectivity strategies.

4. RESEARCH APPROACH

To identify relevant local government policies and plans that address connectivity, the authors leveraged professional networks, search engines, and related published literature. We sought examples that incorporated connectivity language in plans or policies, and particularly those with objective(s) related to conservation of species, habitats, and/or connectivity. We searched for examples using the terms connectivity, linkages, corridors, migration, permeability, wildlife travel corridors, habitat fragmentation, large blocks/core habitat, and so on.

The goal of the search was to identify examples and case studies that a) represent the breadth of local government policy tools that can be used to advance connectivity conservation (e.g., procedural/planning, regulatory, financial/incentive-based); b) serve as helpful examples for planners; c) come from different regions of the United States; d) are clearly designed to address wildlife habitat connectivity; and e) are primarily from the past 20 years.

We provided examples for several types of plans, policies, and implementation tools. We also included sample text to further highlight some of these examples and to share specific concepts or types of language used. The intention is to help local jurisdictions develop habitat connectivity goals, policies, and recommended actions. The case studies we selected tended to involve communities that included connectivity throughout several components of local governance. We also spoke with local government staff or community and nonprofit representatives to gain more information for case studies and examples. We asked about factors that have supported the design and implementation of connectivity policies, and for perspectives on connectivity conservation outcomes, lessons learned, improvements desired, challenges, or other thoughts related to the policy/plan. These responses were incorporated into the report's recommendations.

Caveats

The examples, case studies, and recommendations in this report are representative, rather than an exhaustive list of the options available to communities for inclusion of habitat connectivity in local government planning. While we did examine published scientific and planning journal articles, we did not undertake a systematic literature review. Rather, we focused on providing current, site-based examples.

The examples and guidelines included are intentionally broad to allow for application in a variety of geographies and governance contexts, and to support connectivity conservation across diverse species and ecosystems. Adoption and implementation of the models and recommendations described in this report may require adaptation to fit social and ecological contexts. No one approach will be relevant for all communities. For the most part, our analysis did not include an assessment of the impacts and efficacy of the policies highlighted. For such review, in part see Kretser and Reed (2017), Reed et al. (2014), Smith et al. (2012), and others. Additional resources and published literature may provide analyses of how and why conservation-oriented local government planning may be most successful (e.g., Miller et al. 2008, Kretser et al. 2019).

Overall Findings

From our review, we found that across the U.S., local governments are increasingly recognizing the importance of wildlife habitat connectivity and are addressing it using a range of planning, regulatory, and voluntary strategies. While approaches vary widely by region, capacity, and political will, a growing interest in safeguarding ecological connectivity at the local level is apparent.

Connectivity considerations were most often found within comprehensive plans. Many of the plans did not include strong or specific implementation measures to enforce or fund actions to protect connectivity. As such, much of the connectivity policy language remained aspirational, which is an important foundational step that also provides the need and opportunity to take further action in zoning and subdivision regulations, for instance. A recent

analysis in Vermont found that many municipalities included policies to minimize forest fragmentation, however implementation of these policies via subdivision regulations and bylaws was limited (VNRC and VFWD 2022).

Communities with implementation actions often developed overlay districts of mapped priority areas and regulatory standards with emphasis on maintaining open space and use of incentives like density bonuses. These tools are effective, but not yet in common use. For instance, in Vermont, wildlife overlay or natural resource overlay districts exist in only 3% and 4% of municipal zoning regulations, respectively (VNRC and VFWD 2022). Nevertheless, with proper implementation measures and widespread adoption across jurisdictions, including connectivity considerations into local government comprehensive and functional plans, and using effective tools like overlay zones with development standards can be an effective means of improving landscape permeability and facilitating wildlife migration.

According to our analysis and other researchers, significant challenges remain for local governments to address habitat connectivity in planning (Bakelaar 2025). These include but are not limited to:

- Limited authority or mandates (in some states)
- Competing development and land use priorities
- Lack of ecological data or staff expertise
- Coordination across jurisdictions, especially when wildlife corridors span multiple boundaries and conservation of natural resources requires oversight by multiple entities.
- Political resistance or concerns about property rights
- Limited staffing and/or financial resources
- Lack of regulatory tools or flexibility needed to integrate habitat conservation into planning
- Enforcement is often lacking, even when policies exist

In the following section, we offer recommendations on mechanisms that planners, partners, and agencies may use to incorporate connectivity into local government plans and policies. These suggestions and best practices are based on conversations with planners and partners, examples and case studies, published literature, and other guidance documents used to develop this report. Not every recommendation may apply to every location or effort.

Open space provides important habitat for wildlife. Credit: David Waschbüsch via Pexels.

5. RECOMMENDATIONS

Summary of Recommendations

To address wildlife habitat connectivity in local land use planning, local government planners can use the following tools, which will be described in greater detail below:

Map and identify connectivity areas. Mapping is a major step toward understanding and communicating where and why connectivity needs exist and why they matter. Identify, map, and designate important wildlife habitat, natural resources, and key linkage areas.

Establish a regional vision and approach for maintaining open space and natural resource functions for connectivity. A connectivity vision and strategy are important and should be included in a comprehensive plan.

***Establish a funding source to support core open space and corridors*.** Consider local taxes, bonds, grants, and other tools to support open space easements, acquisitions, and connections among natural resources.

Integrate connectivity into comprehensive plans. Include wildlife habitat connectivity and natural resources conservation goals, objectives, strategies, policies, and mapping in comprehensive plans.

Integrate connectivity into functional plans. Include wildlife habitat connectivity and natural resources conservation goals, objectives, strategies, policies, and mapping in a special functional plan, and cross-reference in other functional plans. Consider developing a local/regional connectivity plan.

Align land use regulations with comprehensive plan goals to support connectivity. Update zoning and subdivision regulations as soon as possible after a comprehensive plan revision to ensure regulations reflect natural resource and habitat connectivity goals and strategies outlined in the comprehensive plan.

Use clear regulations and incentives in zoning, subdivision regulations, and development standards to keep habitats connected. Planning approaches should aim to avoid habitat fragmentation, preserve key wildlife corridors, and maintain connected open space that supports natural resource functions. Tools such as conservation overlays, cluster development, and buffer requirements can help ensure that new development supports wildlife movement and maintains ecological connectivity across the landscape.

Build internal and regional capacity. Connectivity is a complex and cross-jurisdictional effort. Leverage agency and public-private partnerships to collaborate across jurisdictions, train staff and decision-makers, and team up on data, mapping, planning, implementation, outreach, and education efforts.

Educate and engage the community and decision-makers. Community engagement is essential to taking most of these steps. Provide clear explanations and relevant examples to elected officials, planning commissioners, and the public about why habitat connectivity matters and how local tools can address it.

Use multiple tools in tandem. In addition to planning, policies, and regulations, related approaches include using capital improvement and acquisition tools, incentivizing conservation on private land, managing local government lands for wildlife, building wildlife crossing structures, retrofitting infrastructure for wildlife movement, and incorporating climate resilience goals.

Overarching Recommendations

Include wildlife considerations within land use planning as a fundamental first step. While this document focuses on wildlife habitat connectivity, including wildlife values more broadly is an essential first step, within plans, policies, regulations, maps, and other tools. While many communities include general natural resources considerations in their land use planning efforts, far fewer reference wildlife or habitat specifically (VNRC and VFWD 2022).

Take initial steps to incorporate wildlife habitat connectivity considerations into multiple stages of local government land use planning. Every community is at a different stage of opportunity and challenge related to conservation of habitat connectivity in land use planning. Local governments can start at any point by adding information about habitats, wildlife, and connectivity to existing plans and inventories. Incorporating conservation goals in public utility and transportation planning can be especially effective, as where there are roads, water, and/or sewer provisions, there will tend to be future development. Planners can draft goals to protect linkage zones, large forests, and diverse habitat types to aid in future comprehensive plan or land use regulations updates. Strive to understand the options available, as laid out in this report.

Proactively address connectivity planning to avoid doing "too little too late." Planning and regulations often emerge after significant impacts to a community's natural environment have occurred or in response to growing development pressures. It often takes a catalyzing issue to motivate a community, which can lead to *"a vicious cycle where we must degrade wildlife habitat before becoming aware of it, let alone committed to protecting it. As such, it remains to be seen if exurban suburban communities can play catch-up quickly enough"* (Hill 2024). Local governments can help their communities anticipate and address problems before they become intractable by engaging in planning at the earliest possible period.

Develop clear wildlife habitat connectivity goals and strategies. To ensure a strategic approach, it's important to consider questions such as connectivity for what reason or species, connectivity to where, what is in the way, what outputs are effective, and what input information is needed (Greenaway et al. 2019). Considering these questions will clarify a discrete set of connectivity objectives that focus on the steps to take and help articulate the way in which those steps will be undertaken.

Promote horizontal and vertical integration across departments, plans, and policies to support coordinated implementation. Ensure habitat connectivity criteria and objectives are incorporated across departments, plans, and policies to address interrelated issues that span topic areas, jurisdictions, and agencies. It can be helpful to examine existing plans and overlapping ordinances such as hillsides/scenic lands and landscaping codes that may have related goals, to identify opportunities to reinforce shared objectives.

Include wildlife habitat connectivity in both planning and implementation tools. It is an important first step to include goals and recommendations for habitat connectivity-related regulatory and incentive-based actions in a comprehensive plan. The next essential step is to ensure the policies that support a regulatory framework are developed and actively implemented. While many plans may demonstrate support for siting standards, subdivision regulations, and clustering of development, implementation in zoning bylaws and subdivision regulations tends to lag. Update zoning and subdivision code as soon as possible after revising a comprehensive plan to ensure the regulations reflect the underlying plan's visions, goals, and strategies.

Within plans and policies, direct and incentivize development in preferred areas and avoid key habitat and linkage areas. Aim to guide development where it is best suited and discourage development outside of these areas in order to keep natural areas intact. Wildlife, natural resources, and/or connectivity considerations should be represented in each type of standard (development, subdivision, performance, site plan, etc.).

Use a combination of regulatory and non-regulatory strategies. The strategies that a community selects will vary depending on its goals, but the most success tends to come from a mix of regulatory, voluntary, and incentive-based measures. Relying solely on *"vague goals and standards or simply the trust that content-neutral 'planning'*

would somehow change the pattern of development" may not lead to outcomes (Liberty 2024). However, leaning only on regulations or strict no-build concepts can create community aversion or backlash to the issue. The right balance of regulatory and market-based tools reflects local landscape conditions and political context.

Prioritize the long-term protection of private and public lands. Communities should actively protect the habitat and linkage areas that are deemed most important. Acquisitions, conservation easements, land swaps, and transfer of development rights are important tools to protect open space in perpetuity. It is ideal to establish a network linking conserved open space, land under long-term stewardship, and other key habitats that may be protected in the future**.**

Aim to serve multiple purposes in one location or effort. Outcomes may be most successful when multiple land use benefits and purposes are served. Connecting with other departments and partners to review mapped geographical or physical characteristics can show where overlap of needs and goals may occur. In many areas, space is insufficient to designate distinct areas for different uses, and accommodating overlapping land use values within the same area is necessary. Solutions call for innovative strategies that encourage concentrated development for housing needs in areas with sufficient services while preserving ecologically sensitive lands.

Adopt a multi-pronged approach to wildlife habitat connectivity that operates across multiple scales. An effective approach requires multiple strategies, including local land use planning and open space protection. Additionally, coordination across agencies and stakeholders from the federal to the local level creates synergy by aligning efforts. State policies positively influence the number of sustainable or conservation policies adopted at the local level. Advancing connectivity requires coordinated efforts across levels of government and integration across sectors and agencies such as conservation, transportation, climate, and energy.

Take a regional approach to scale up conservation impact. Multiple towns and counties addressing connectivity and wildlife needs is an important approach, given that wildlife move beyond boundary lines. Collaborate with neighboring counties and municipalities, regional commissions, Metropolitan Planning Organizations (MPOs), and others to incorporate connectivity into the development and implementation of regional plans, supporting a broader, cross-jurisdictional approach to conservation of habitat connectivity. Effective working relationships between towns and counties are therefore essential.

Sandhill cranes in a rural community. Credit: Kylie Paul.

Include clearly written terms, policies, and plans. Because conservation occurs within a complex and ever-changing county or municipal decision-making landscape, it is essential to have clear, well-justified, and publicly supported conservation actions (Lee et al. 2022). Defining wildlife habitat connectivity, wildlife corridors, and other related terms will provide clarity about which wildlife and natural resources are included and provide a clear standard of review for addressing impacts. Policy-oriented definitions should be included in a comprehensive plan. Additionally, land use regulations should contain precise, enforceable definitions to ensure effective implementation. Regulatory standards should be specific and enforceable to ensure natural resources are adequately protected within land use planning processes. Various documents provide excellent recommendations on how to write such standards (e.g., VNRC 2013).

Recommendations: Maps, Inventories, Studies, or Analyses

Begin local conservation planning with data collection, mapping, and the identification and prioritization of natural resources, wildlife habitat, and connectivity areas. This clarifies what and where key conservation areas exist. Visual mapping offers a compelling way to engage the community. It helps communicate the importance of habitat conservation, which in turn helps build commitment among planners. Overall, spatial data layers and analyses serve as a practical tool to integrate habitat connectivity into planning decisions.

Explore the many tools and documents that are available to help local governments with natural resources, wildlife, and connectivity mapping. For some key examples, *refer to the Guidance Resources section of this report.* These include Greenaway (2016), Greenaway et al. (2019), Firehock (2019), and VFWD and ANR (2018).

Seek data, mapping, and analyses from state, federal, regional, local, nonprofit, and academic partner sources. Many local governments do not have the capacity to collect or develop their own natural resource data and mapping. A clear role for coalitions, NGOs, or agency staff may be to provide information and mapping for local governments. Data layers and mapping from peer-reviewed literature or from agency data or outputs may sometimes be required, as they may be considered more trusted, vetted, and thus legally defensible.

Incorporate a map(s) of information into plans and prioritize areas for conservation. In the comprehensive plan, include wildlife habitat considerations into an existing conditions land use map, and into the Future Land Use Map.

Ensure the desired scale is used. Others have recommended to: "*Provide planners with adequate and appropriately scaled science and mapping to identify and prioritize lands and waters important for connectivity and related action...Landscape or regionally scaled science generally is of limited value at the local level where decisions on land use planning are at the forest-block, habitat patch, and parcel scale...Ideally, connectivity mapping needs to get down to the [local] scale...[with] technical assistance…to interpret this mapping down to the individual municipal scale*." (Huffman et al. 2025).

Consider combining a wildlife habitat connectivity layer with other natural resource layers. In some communities, explicitly mapping wildlife corridors or adopting habitat connectivity–specific regulations may not be suitable. However, incorporating linkage areas into broader categories such as natural resources, sensitive habitat, or riparian and habitat areas, can make them more acceptable. Another strategy is to spatially identify and categorize habitat areas across the landscape into varying levels of wildlife value. For example, Montana's Gallatin County's Growth Policy (2021) maps several tiers of wildlife resource values, including core wildlife habitat, higher value for wildlife, lower value for wildlife, and urban/urbanizing area.

Involve biologists in planning and land use decisions to improve conservation outcomes. A study that examined 11 western states and more than 700 towns in four northeast states found that requiring consultation with a biological expert in planning and development decisions is rare in land use regulations (Reed et al. 2014; Kretser and Reed 2012, in Kretser et al. 2023). Some local governments require an inventory of wildlife and natural resources during the development review process to consider wildlife resources in the project area. Inventories

should occur in comprehensive planning and land use code updates, as well as at a project level. They should be prioritized for large subdivisions or projects located in important natural resource areas. Kretser et al. (2023) provides a list of examples of agencies, resources, and organizations that could be consulted to assist in improving biological information within planning, code updates, and development reviews. State agencies can offer technical guidance on wildlife conservation issues, and state regulations may authorize resource management agencies to provide that role.

Include potential and existing locations for wildlife crossing structures in mapping. Effective wildlife crossing structures require open space on either side of a structure so that animals can access it. Therefore, identifying potential locations for structures can enable towns and partners, such as land trusts, to prioritize conservation easements or acquisitions surrounding existing wildlife crossings or in areas where a wildlife crossing may be built in the future. Areas where wildlife movement pathways cross with roads can be identified in spatial tools for planning processes. Further, the development of a formal wildlife and transportation assessment can be included as a goal in a comprehensive plan or transportation element to determine suitable areas.

Black bear crosses a roadway. Credit: Adobe Stock.

Recommendations: Comprehensive and Functional Plans

Include wildlife habitat connectivity in comprehensive plans, to lead to connectivity policies and action. When a comprehensive plan is updated, ensure the concept of wildlife habitat connectivity is incorporated by including wildlife habitat and connectivity goals, policies, and objectives, to support the protection of wildlife corridors and connected open space. Implementation measures that identify specific actions, include timelines, propose changes to land use codes, describe funding priorities, and recommend new ordinances or regulations are particularly effective. These directives can outline how a local government will achieve wildlife habitat connectivity such as planning and zoning, incentives like clustering, open space acquisition, and conservation easements.

Include habitat connectivity components in various comprehensive plan elements. Most comprehensive plans have sections or plan elements on issues such as watershed management, park and open space, and transportation. Wildlife habitat connectivity and habitat conservation components should be included in these elements. For instance, one can incorporate aquatic and terrestrial connectivity into public works and hazard mitigation projects, like culverts and bridges, and locate future parks and trails where they can serve as buffers or help to protect landscape linkages (Windham Regional Commission 2024). By suggesting these opportunities in plan elements, connectivity considerations can be integrated into project proposals and funding.

Undertake a wildlife habitat connectivity and/or wildlife crossings plan or plan element. A comprehensive plan could include a connectivity element or a goal of developing a functional plan or assessment. A stand-alone functional plan can offer greater detail by identifying and mapping connectivity or potential wildlife crossings areas, prioritizing objectives, informing future acquisition proposals, and setting a path forward for identifying public funding sources.

Include mapped wildlife corridors (or similar) as a data layer in a comprehensive plan's Future Land Use Map (FLUM). Common labels include "Wildlife Movement Corridor," "Environmental Priority Area," or "Connectivity Zone." Because a FLUM guides zoning, development, and infrastructure decisions, integrating these connectivity areas establishes official recognition, influences growth patterns, and supports the use of regulatory tools such as overlay zones and conservation incentives. Goals and policies in the comprehensive plan should reference habitat connectivity and FLUM integration.

Emphasize co-benefits of conservation of wildlife habitat connectivity. Many communities, counties, and states consistently vote in favor of maintaining open space through local taxes and bonds, indicating strong public interest. At the level of local government, discussion of recreational trails, flood mitigation, wetland conservation, riparian area buffers, and protection of pollination services are among topics that enable public education about habitat connectivity. Greenways, for example, can be developed for multiple benefits, including flood protection and recreation, while also providing buffers from development or corridors that wildlife can use to access larger protected habitat and open spaces.

Recommendations: Land Use and Development Regulation

There are many ways to implement connectivity-related land use strategies. We provide overarching recommendations here. *For more detailed recommendations, we suggest diving deeper into the examples provided in the report and in the documents shared in the Guidance Resources section.*

In land use codes, aim to use approaches that:

- Secure or expand open spaces that are sufficiently large and connected to protect sensitive areas and species;
- Require development buffers from mapped corridors, natural areas, and riparian areas;
- Limit development and/or restrict other activities in mapped corridors;
- Provide wildlife corridors and buffers of sufficient size (Kahal and Lee 2025);
- Incentivize building in town centers away from priority habitat, open space, and linkage areas;
- Cluster development to leave large, connected, and protected open spaces intact;
- Retain native vegetation, include seasonal restrictions, and include lighting and fencing restrictions;
- Require review and assessment of impact to wildlife and habitat at the project level; and
- Complement other natural resource and public planning needs, such as protecting water quality, managing floods, and preserving greenways and open space.

Zoning and Subdivision

Include special zoning districts within base zoning to formalize conservation as a primary land use category. Create zoning districts like Resource Protection or Open Space Districts, to establish base zoning districts

specifically aimed at preserving natural resources and habitat. Conservation-oriented districts should mention and specifically address wildlife impacts and should include specific standards to address habitat fragmentation.

Use overlay districts, as they can be effective at maintaining habitat and reducing fragmentation impacts. Overlay districts for wildlife, natural resources, or conservation should be used in zoning regulations more frequently. Create an overlay district to add standards or limitations to protect sensitive habitats like connectivity areas that exist in base zoning districts that lack sufficient protective standards. These tools add focused protection for sensitive areas like wetlands, corridors, or habitat patches without changing underlying land use rights. As noted in the Chaffee County Comprehensive Plan (2019), *"Overlay zones are most effective when they integrate: maps; site development standards for vegetation, management, setbacks, resource avoidance, etc.; resource assessments as part of the development application materials; flexible site design; density limitations; [and] development review procedures and criteria for fair evaluation of proposals."*

Use density controls to help prevent fragmentation and preserve larger habitat blocks. Maintain low-density zoning (e.g., one unit per 20+ acres or one unit per 40+ acres) in rural or natural resource conservation areas. Site plans (*see Standards subsection below*) can help to ensure even low-density development minimizes impact on habitat connectivity.

Include use restrictions in sensitive zones to help reduce disturbance and habitat degradation in key wildlife areas. Limit high-impact land uses (e.g., mining, industrial, high-density housing) in areas zoned for conservation, agriculture, or low-intensity use.

Plan the design, location, size, and management of open space to ensure it is effective for wildlife and habitat connectivity. The retention or creation of open space is often required through a variety of processes, including subdivision regulations, open space zoning or overlay districts, cluster or conservation subdivisions, density bonus programs, transfer of development rights programs, and planned unit developments. Developers and planners should prioritize maintaining effective connectivity areas across the natural landscape, over incidental pocket parks or marginal green areas with limited ecological or recreational value. Designated open spaces for wildlife habitat connectivity should be planned and integrated intentionally into development design, rather than created via residual areas (such as sites that are unsuitable for construction or irregular remnants between lots). Open space requirements are more effective when they specify clear, measurable standards for the minimum portion of a development site that must be preserved. Ideally, these standards should be informed by ecological criteria, such as the minimum habitat size needed to support local target species or the necessary buffer width to minimize edge effects for sensitive wildlife (Kretser et al. 2023). Open space ownership and management plans are useful to ensure long-term habitat quality of the open space.

Include natural resource inventory or habitat assessment requirements to ensure that development responds to and addresses site-specific ecological conditions. Require development project applicants to map natural features (e.g., wildlife habitat, species, corridors, wetlands, topography) before designing a subdivision layout. Ideal plans examine a parcel to be developed in relation to its surroundings.

Standards

Ensure broad application of wildlife-related standards in the land use planning framework. Land use planning standards are the mechanisms for implementing a community's comprehensive plan's goals and policies. Specific types of standards address various aspects of development, reflecting the particular focus and purpose of each set of regulations. Make sure wildlife-related standards are included in specific areas as well as broadly throughout the land use and development regulation framework. For instance, strive to ensure standards that protect wildlife habitat exist not only in overlay zones or in open space or natural resource zoning districts, but are also incorporated throughout all base zone district standards. Another example is that if wildlife habitat–related standards are found only in subdivision regulations, then they will apply only to residential subdivision developments; push toward including wildlife provisions within all development standards. Below are examples of provisions to protect wildlife and connectivity, within a few types of standards.

Subdivision Standards

- Wildlife corridor buffers - Require subdivisions near wildlife corridors to maintain meaningful buffers of native vegetation. Limit the construction of fencing or other barriers.
- Open space connectivity requirements - Open space in new subdivisions should be linked with adjacent habitat areas, not isolated patches.
- Layout standards – Road placement and lot orientation should avoid fragmenting habitat.

Performance Standards

- Connectivity-based performance metrics - Maintain a minimum amount of contiguous open space, set standards for habitat preservation based on minimum contiguous acreage, cap noise or light pollution levels, and limit impervious surfaces.
- Mitigation requirements - If development affects connectivity, require mitigation, such as off-site wildlife corridor restoration, funding for local conservation initiatives, and installation of wildlife underpasses/overpasses. However, it is preferable for development to avoid, minimize, and mitigate impacts on-site.

Site Plan and Development Review

- Corridor integration into site plans - Require site plans to identify natural resources, priority habitats, wildlife corridors, and how the development will avoid fragmenting them.
- Wildlife-friendly design features - Use native landscaping, wildlife-friendly fencing, permeable surfaces, and dark-sky compliant lighting to reduce habitat disruption. Consider wildlife crossings under roads.
- Analyses and assessments - Require connectivity analysis or environmental assessments for sensitive areas, species, or habitat types identified as priorities by local governments.

Tools and Incentives

Examination of existing regulations and restrictions may show how incentives might benefit habitat connectivity. Regulations can be paired with incentive-based efforts that encourage developers and landowners to seek innovative approaches.

Depending on the context, some or all of these tools may be useful:

Density bonuses – These are useful when there is strong development pressure in specific areas (e.g., near town centers or transit corridors), the market is robust enough that a bonus in density or height is a true incentive, and where local governments wish to align development with conservation goals without incurring direct land acquisition cost. Use this incentive when the goal is to encourage clustering of development away from sensitive habitats, directing growth to appropriate locations while protecting open space, wetlands, riparian zones, or habitat corridors on-site.

Site design flexibility – Flexibility in dimensional requirements, street widths, required buffers, and so on enables engineers to design around natural resources while integrating open space into site design. These can include allowances for multi-family residences in a zone established for single-family residences, reduced road width, and reduced set-back distances, among other options.

Transfer of Development Rights (TDR) – These are useful when there is a clear distinction between “sending areas” (important habitat to conserve) and “receiving areas” (places targeted for higher-density development), the community has capacity to administer a program and strong policy support, and there is an active real estate market where developers value greater density and are willing to purchase development rights. Use to maintain wildlife corridors across parcels and for permanent protection of large, connected habitat blocks while enabling smart growth elsewhere.

Purchase of Development Rights (PDR) – These are useful when there is a strong public or nonprofit funding source (e.g., land trusts, bond measures, state grants), targeted lands have high conservation value, and landowners wish to retain use for activities like ranching or forestry. Use when the goal is to protect habitat from fragmentation in areas with high ecological value, preserving critical wildlife habitat in perpetuity.

Open Space Residential Development

Use clustering requirements as an essential tool for land and wildlife conservation. Conservation developments or conservation subdivisions require or encourage compact development in exchange for preserved open space, explicitly designed to protect habitat and reduce fragmentation. According to Kretser et al. (2019), a strong conservation development (CD) ordinance includes wildlife, habitat, species, or habitat connectivity as a stated purpose, a requirement to protect at least 50% of the site area, a required ecological site analysis that includes mapped and inventoried conservation targets, and habitat requirements within a management plan to encourage long-term stewardship. Ensuring the open space is preserved and intended for wildlife, habitat, species, or habitat connectivity is essential, as many communities may define open space generally to include active uses such as community swimming pools, ball courts, and community gardens rather than passive open space such as undeveloped areas with intact forests, fields, and so on. Further, roadway buffers may often be used as passive open space but these may have little ecological value.

The following guidelines are recommended for clustering with wildlife habitat connectivity in mind (Kretser et al. 2023):

- *Locate clusters of housing and associated infrastructure on the least ecologically valuable areas of the property, including areas that were previously disturbed or altered;*
- *Locate clusters of housing at the edge of the property and near existing development on adjacent properties;*
- *Minimize the development footprint of housing clusters and associated infrastructure to keep the edge to area ratio of housing clusters as low as possible;*
- *Within clusters, locate home sites close enough together such that their disturbance zones overlap;*
- *Limit the density of housing clusters if building structures near ecologically sensitive areas of the property is unavoidable; and*
- *Buffers should be established between housing clusters and adjacent open space.*

Create a management plan and mechanism for the protected portion of a property. A detailed management plan and long-term funding mechanism should be in place. The responsibility for managing the protected portion can depend on local policies, capacity, and the nature of the development. Land trusts tend to be suited for the ecological management and long-term stewardship required. The responsible entity must have clear legal authority, the ability to enforce restrictions, and the resources to manage land in line with conservation objectives.

Include a broader, mapped vision to improve the outcomes of a CD. Regional connectivity CDs have been criticized for protecting land at too small a scale. To avoid this, conservation subdivisions should be incorporated into a larger conservation vision and network, planned at the municipal or county level to protect wildlife habitat or other resources like agricultural lands and water resources.

Consider whether improved incentivizing is needed. Clustering can be an essential tool for land conservation. In many communities it may need further incentives such as density bonuses or changes to the subdivision approval process to favor conservation subdivisions over conventional subdivisions.

For more detailed recommendations regarding effective conservation-based cluster subdivision or developments, investigate the extensive published literature and best practices that are available on the topic (e.g., Farr et al. 2018; Firehock 2019; Kretser et al. 2019; Mockrin et al. 2017; Reed et al. 2014; Smith et al. 2012).

Capacity Recommendations: Funding, Staff, and Relationships

Strive to find funding to support connectivity policies. Most communities do not allocate new or dedicated funding for implementation of connectivity plans and policies. However, funding significantly motivates action and can support conservation acquisitions, easements, leases, and other protections. Some states have programs that encourage and support local government planning for conservation, including offering grants for planning expenses (*see State Programs examples section)*. In other cases, cities and counties have funded habitat and natural resources assessments that serve as the basis for community-wide conservation efforts long-term. Seek or create funding mechanisms through local, state, and federal opportunities. Some communities have undertaken local funding options to support conservation measures, using options such as general obligation bonds, property taxes, budget allocation, and sales tax. A different type of funding support can be found in the form of Current Use Taxation Programs (CUTPs), also called Present Use Value programs. In many states, CUTPs are important to help reduce the financial pressure on landowners to convert agricultural or forest lands into developed properties by offering property tax relief at the local level.

Hire natural resource–educated planners and biologist positions. Investing in dedicated natural resource–educated planners and biologist positions within local government planning departments is valuable to address capacity deficits. These individuals can facilitate communication, coordinate conservation efforts, and bridge the gap between policy and implementation. Having a long-term agency champion who understands the big picture and who can inform and influence planning, funding, acquisition, and habitat improvement actions is invaluable. Many land use regulations rely on staff to make site-specific decisions related to natural resource impacts, such as subdivision/development review meetings where the implementation of policies occurs. Having consistent, knowledgeable dedicated staff that have sufficient time, expertise, and resources is invaluable.

Encourage companies like developers to have biologists on staff. When conservation strategies are in place, developers can work with biological consultants to integrate biodiversity principles in all phases of development—from site assessment to monitoring. These consultants can provide regulatory compliance and, also, offer site-specific recommendations that consider both ecological needs and broader equity issues, such as affordable housing and access to nature (Kretser et al. 2023).

Seek, develop, and engage informed and committed decision-makers. The engagement of decision-makers is critical. For instance, the city of Buckeye, Arizona, focuses on wildlife habitat connectivity in large part due to the vision and focus of a previous long-term mayor. As the White Tank Mountains Regional Connectivity Initiative shares from the current mayor of Buckeye: *"We have an incredible opportunity to build this city responsibly with a keen eye toward what we want to be when we grow up. Wildlife corridors and habitats, open space, and recreation areas are very important and we can't just bulldoze everything to create tract homes. If we have done that, then we have failed at the city level. I will proudly continue the conservation foresight and leadership that Mayor Meck has passed on to me."*

Strive to significantly engage the public. Early and meaningful community engagement can be essential for successfully integrating wildlife habitat connectivity recommendations into land use planning and development decisions. Achieving this requires time as well as leadership that is open and flexible. This involvement is especially important for communities that possess significant natural assets but face constraints such as limited resources or a history of exclusion from planning processes.

Leverage agency biologists and other partnerships. Some state agencies provide liaisons who are responsible for translating science and offering real-world examples of what land use planning for connectivity looks like (e.g., Maine, Vermont, and North Carolina; *see State Programs examples section*). Planners can establish relationships with biological experts to advise on plans and land use codes. It can be highly valuable to engage biological experts at each stage of planning, including setting goals and objectives, mapping and analysis of ecological resources, identification and evaluation of alternatives, creation of conservation policies and strategies, review of draft documents, and implementation of plans or codes.

Conservation partnerships can offer support and collaboration for local government connectivity planning efforts (Keeley et al. 2019; Parrott et al. 2019). Planning and natural resources staff should connect with regional connectivity groups, watershed groups, land trusts and other private land conservation partners. Land trusts may be more flexible and timelier than local governments in protecting specific parcels. Local government advisory committees (e.g., open space committees, natural resource advisory boards) can be effective to push conservation within a local government, especially if they have knowledgeable and committed champions and chairpersons.

River otters use a wildlife underpass in Florida. Credit: fStop Foundation.

Recommendations: Wildlife Crossing Structures

Local governments can play a critical role in supporting, initiating, or facilitating wildlife crossing structures, such as overpasses, underpasses, and culverts, which reduce wildlife-vehicle collisions and maintain wildlife movement. While these projects are often led by state transportation agencies, local land use planning authorities can contribute.

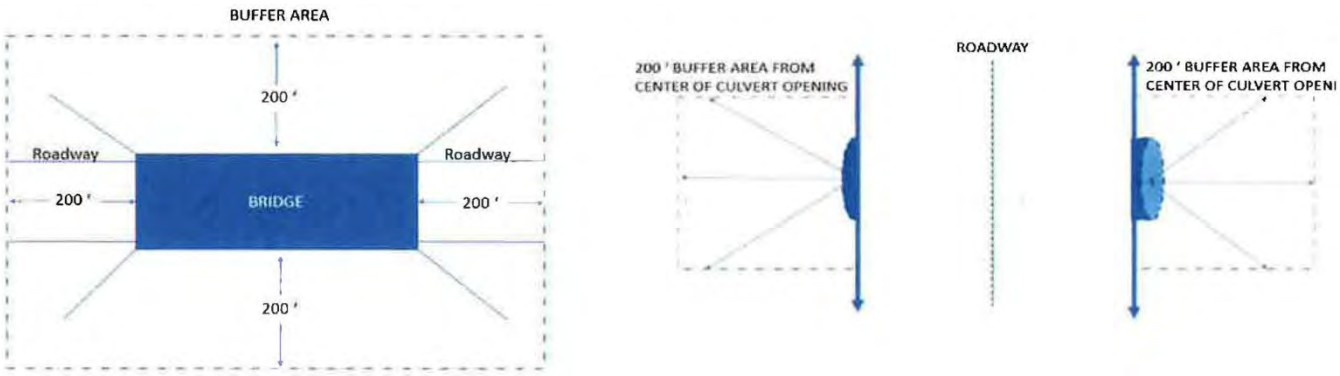
Identify priority locations for future wildlife crossing structures. In an increasing number of states, departments of transportation (DOTs), departments of wildlife, and/or partners have conducted analyses to identify and prioritize data-driven locations for future wildlife crossing structure projects. Examine these plans to understand the key local areas for potential crossings. If such a plan does not exist, initiate or examine existing habitat connectivity mapping to identify pinch point locations where key wildlife habitat crosses busy roadways. Particularly consider locations where there is adjacent current or future protected land on both sides of the roadway and areas near parks, open space, riparian corridors, or major undeveloped tracts.

Retrofit existing infrastructure to support wildlife habitat connectivity. Look at existing infrastructure like bridges and culverts that may already, or have the potential to, help wildlife move under roadways. These existing structures can be retrofitted to enhance wildlife movement with modifications like the creation of dry wildlife paths, adding fencing to funnel wildlife to the structure, and vegetation management.

Incorporate wildlife crossing structures into plans and policies. Include goals and actions that identify, prioritize, and support the need and consideration of wildlife crossing structures within a comprehensive plan's natural

resources or transportation elements, as well as natural resource plans, recreational park and trail plans, and transportation plans. Zoning and subdivision regulations may establish overlays or conditional use requirements that allow for mitigation measures like wildlife crossings. Identify priority wildlife corridors and crossings, flag locations of known wildlife conflicts, and align local road planning with connectivity needs.

Limit or prevent development at current or potential future wildlife crossing structure locations to align land use and zoning with crossing needs. Strive to protect lands adjacent to current or potential future wildlife crossing structures and connectivity areas via acquisition or conservation easements. Include development and design standards that mandate or incentivize preserving open space where critical habitat is adjacent to roads to allow for future construction of wildlife crossing structures. Implement land use planning tools to limit or prevent land use changes like subdivisions or commercial development that block or impair identified corridors or wildlife crossing areas. For instance, use overlay zones or site plan review to require mitigation or easements in priority areas; limit fencing, lighting, or noise that can disrupt animal movement; require a buffer limiting disturbance near a wildlife crossing structure (see image from Ventura County, CA below); and/or ensure new roads in subdivisions consider wildlife crossing needs.



Example illustration of required buffer or setback area from existing wildlife crossing structure of a culvert or bridge. Credit: Ventura County, California, Code of Ordinances Article 9, Section 8109-4.8.3.4.

Include wildlife considerations in stormwater and infrastructure planning. Coordinate stormwater drainage structures (culverts, bridges) with wildlife passage functionality, especially for amphibians, small mammals, or aquatic species. Use multi-benefit infrastructure designs such as elevated causeways or large box culverts that serve both hydraulic and ecological functions.

Advocate and partner for funding. Partnerships with state transportation departments, wildlife agencies, and conservation organizations are essential for wildlife crossing structure implementation. Local governments may have access to funding streams unavailable to other entities. Collaborate with state DOTs, wildlife agencies, tribes, or partners on grant proposals such as those available through the Federal Highways Administration. Use local matching funds to strengthen regional applications.

Engage in early coordination with transportation planners on new or improved roads and encourage the inclusion of wildlife passage features in local or state road improvement projects. Look at state DOT long-range transportation plans and state transportation improvement plans to identify upcoming road construction projects. Compare these with land use plans and connectivity plans to find overlaps or opportunities for wildlife crossings. If a potential project overlaps with key areas, contact the DOT district engineer or environmental lead early to discuss possible wildlife crossing options.

Recommendations: State-level Policies and Processes

Enact state regulations or legislation requiring or encouraging the consideration of connectivity in local government planning. State-level action can significantly advance habitat connectivity by requiring its inclusion in local planning. States or partners should review existing land use statutes across municipal, county, and state jurisdictions to clarify opportunities and challenges for local land use planning and assess which provisions support or hinder conservation goals. This analysis could become the foundation for a robust advocacy platform. To revise statutes, legislative work may be needed to change planning mandates in order to incorporate connectivity explicitly. Legislative and administrative policies can complement each other to ensure robust implementation of connectivity conservation goals. Numerous successful states have forwarded legislative connectivity actions in the U.S. (Ament et al. 2019; Brammer et al. 2024; Breuer et al. 2022; Sito and Christian 2024). *Refer to the Empowering Local Action section for more information.*

Develop state agency programs that support local governments in connectivity conservation. Some state wildlife agencies have programs that share wildlife information with local governments. They provide data and mapping tools about wildlife habitat and connectivity, elevate planning resources that integrate connectivity considerations, and provide resources including funding and training for community and planners. Some states have wildlife agency staff focused on local land use planning and development review, which provides significant benefits to the state and local communities. State agencies that offer some aspects of wildlife and wildlife habitat guidance for local governments but do not emphasize wildlife habitat connectivity should strive to do so. *Refer to the State Programs section for examples.*

Issue state agency or administrative guidance to prioritize the inclusion of connectivity in local government planning. State administrative policies can establish the conservation of wildlife habitat connectivity as an agency priority and guide staff to integrate connectivity considerations into decision-making. Enforceable state agency regulations can be especially effective, promoting a more consistent and coordinated approach across jurisdictions, rather than a fragmented, community-by-community effort. Further, local governments look to state agencies for guidance. It is particularly helpful for planners if state agency information provides specific recommendations or requirements (e.g., sizes of buffers or corridor widths) rather than generalities. Standardized methods, criteria, definitions, and performance metrics from higher-level guidance could enable consistency across various local governments (Bakelaar 2025). As one local government staff member noted, *"if the state doesn't move from recommendation to requirement, they/we are barely moving the dial."* State Wildlife Action Plans are opportunities to include a focus on coordination with local governments, particularly around connectivity mapping and planning.

Recommendations: Partners

While most of the recommendations in this report offer guidance for government staff or officials, this section provides related suggestions directly to non-governmental partners and individuals who want to engage in local planning efforts. *Refer also to the Enabling Conditions: Partnerships section and see the Resources section* for examples of how partners have developed information to help local governments carry out habitat connectivity and conservation activities.

Help drive connectivity policies as a partner organization and/or coalitions. Many successes for corridor planning and implementation have been driven by a conservation group's identification of needs and opportunities, along with building constituencies to enable action. Groups may be skilled at articulating a compelling vision for natural resources in a given area, connecting and informing landowners, and inspiring action to realize the vision. Often, success occurs when a regional coalition can support and collaborate with local governments, helping to catalyze leadership and maintain momentum (Propst 2024). Advocates for habitat connectivity, together with independent or agency experts, can ensure planners are familiar with mapping resources, identify opportunities to incorporate

connectivity into policies and regulations, and make informed decisions about open space and natural resources conservation.

Provide funding and technical support. Establishing a multi-year grant program to support local organizations in integrating wildlife-friendly policies into local land use regulations could significantly increase the number of participating local governments. This funding and resources could scale implementation with adequate capacity and coordination across a region, state, or the nation, and could include requirements for participation in a statewide training network, use of model ordinances, and oversight by an advisory group. Such an idea has been proposed by experts and needs uptake by funders.

Key approaches that organizations can take to integrate wildlife habitat connectivity into land use planning include but are not limited to:

- Participate early and often in planning processes;
- Provide data and technical expertise;
- Build relationships with local planners and officials;
- Advocate for policy and code changes;
- Engage and educate the public;
- Secure and leverage funding; and
- Protect key lands that support connectivity.

Engage scientists in local planning. Habitat fragmentation due to residential development is one of the most pressing threats to wildlife and biodiversity. Informed citizens, and especially those with a conservation biology background or interest, should strive to learn more about local land use planning processes, serve on local planning boards, submit comments on plans and development reviews, get to know local government planners and elected officials, and support local growth-management advocacy organizations. Educators should push students to do so at an early stage of career development. Planning mechanisms are extremely detailed. Individuals and groups that can roll up their sleeves to engage are needed.

Learn and share examples and best practices to streamline efforts. Reading this report and investigating the information found in the resources and guidance documents shared below will prepare individuals, consultants, organizations, and planners to help move a community through key processes. Ultimately, this citizen engagement leads to the adoption of stronger ordinances and greater accountability for implementation.

Mule deer near a community. Credit: Adobe Stock.

6. EXAMPLES OF PLANS AND POLICIES

Plans, policies, and implementation tools can integrate wildlife habitat connectivity considerations. Examples of local government plans and policies grouped by type of component, e.g., planning (comprehensive and other plans) or implementation (land use and development regulations), follow.

Examples: Comprehensive/General/Master/Town Plans

Chaffee County, Colorado: Comprehensive Plan (2020)

The comprehensive plan includes a guiding principle to manage and *"direct growth to compatible areas where growth makes sense using analysis to consider economic, physical, social, and ecological constraints. Plan and develop sustainably, with the goal of protecting our natural resources, wildlife and viewsheds."* A goal is to *"protect critical wildlife habitat, connectivity and migration corridors cross-jurisdictionally."* Strategies to do so include mapping wildlife habitat and corridors, using the map to develop and implement wildlife protection standards for new development, adopting a conservation subdivision overlay with development standards in the highest priority habitat areas, and working with partners to protect and restore habitats. The future land use map includes wildlife habitat and conservation areas. Land use policies include developing a natural resources overlay, in part to protect wildlife habitat patches and corridors, and adopting a conservation subdivision policy. The plan includes future growth scenarios where land use planning scenarios different from current trends were considered. The selected alternative is a combination of two scenarios: "Conservation, Corridors, and Connectivity" and "Growth Focused to Existing Communities."

Sample Text

Develop mapping and geospatial modeling of the most impactful wildlife habitat and migration corridors in Chaffee through the Chaffee Recreation Plan and the Chaffee Recreation Suitability Map. Use the wildlife map and model data to develop and then implement wildlife protection standards for all new development. For highest priority habitat areas, adopt a conservation subdivision overlay with appropriate development standards.

Larimer County, Colorado: Comprehensive Plan (2019)

The plan includes several direct vision and policy references to wildlife habitat connectivity. It notes the need for consistency with other planning documents, as *"In the past, much of the problem regarding certainty and consistency of land use decisions has come from basic inconsistencies between the adopted Plan and the land use regulations—particularly the zoning map. This Comprehensive Plan largely continues traditional patterns of land use without changing the gross densities of development established by current zoning. The County will use performance standards, design criteria, required levels of service and similar tools, as well as several incentive-driven alternative development patterns, to encourage new development to achieve Plan goals. This makes it imperative that the Principles and Policies be clearly translated into standards and criteria in a new Land Use Code."*

Sample Text

Larimer County supports and encourages the conservation, stewardship, and resiliency of our natural resources, wildlife habitat and ecosystems.

- *1.4 Encourage well-designed conservation developments that take into account broader landscape connectivity of residual lands and conservation of significant natural, cultural, and visual resources.*
- *1.7 Establish standards for buffers and setbacks between developments and wetlands, river corridors, wildlife habitat and movement corridors and native plant communities or require a finding that the*

proposed development is compatible with these natural values and/or effects have been adequately mitigated.

- *1. 8 Minimize fragmentation and ensure connectivity of native habitats and movement corridors to protect ecosystems and native species when designing and constructing development and infrastructure projects.*

Town of Estes Park, Colorado: Estes Forward Comprehensive Plan (2022)

Estes Park within Larimer County worked closely with the County to update its plan such that each recommended town action is compared directly with the County's recommended action. Several goals, policies, and actions reference wildlife habitat connectivity and tools to reduce fragmentation.

Sample Text

Goal: Ensure the provision and preservation of diverse and accessible open spaces throughout the Valley while allowing for contextual development in the right locations.

- *NE 2.4 Policy: The Town and County encourage cluster residential development to protect wildlife habitat and movement.*

Goal NE3: Protect wildlife and enhance biodiversity and ecosystems.

- *NE 3.1 Policy: The Town protects existing native wildlife habitat and vegetation communities by minimizing disturbance outside of the building envelope and limiting fragmentation, except as required for wildfire protection.*
- *NE 3.2 Policy: The Town and County encourage the conservation and protection of connected wildlife habitats and movement corridors.*
- *NE 3.4 Policy: The Town and County limit development in wildlife conservation priority areas as identified in the Estes Valley Open Space Plan.*
- *NE 3.A, NE 3.B, NE 3.C Recommended Actions: Consider an Environmentally Sensitive Lands Zoning Overlay that would be subject to additional design review. Improve wildlife movement by requiring wildlife-friendly fencing on all new development, reviewing setback requirements from key habitat areas/wildlife movement corridors, encouraging removal of legacy barbed wire fencing, seeking grant funding, and developing an incentive program. Update the 2008 Wildlife Habitat Assessment and Development Code, including map of wildlife corridors and sensitive habitat.*

Rio Grande County, Colorado: Joint Master Plan (2016)

Rio Grande County updated its Master Plan in 2016. Under objectives, the plan includes multiple actions related to protecting land and habitat connectivity, including: *"Work with the Rio Grande Headwaters Trust, land owners, and others to establish conservation easements using the Colorado Conservation Tax Exchange Program," "Maintain subdivision guidelines that protect significant wildlife habitats and migration corridors,"* and *"Require that any new subdivision within 1,000 feet of the Rio Grande River have a minimum lot size of 5 acres."*

Lake County, Florida: Comprehensive Plan (2010/2025)

Lake County's plan is continuously updated or amended, as is its Code of Ordinances. Both are highly detailed with numerous goals, policies, and provisions related directly to wildlife and habitat corridors. The plan includes a requirement, which has been achieved, to establish criteria and thresholds for Rural Conservation Subdivision design (*see Open Space Residential Development examples section*) through use of clustering and open space to protect wildlife corridors, noting that *"Lake County shall regulate uses and activities consistent with the Conservation Element and other policies of this plan in order to protect wildlife, habitat and wildlife corridors."* The plan has conservation-oriented policies for specific geographic areas, special communities, protection areas, rural protection areas, and overlay districts, along with steps to protect specific habitat types such as natural upland plant communities. It includes policies related to wildlife crossing structures *(see Wildlife Crossing Structures*

example section) and has a substantial Conservation Element that serves as a natural resources data, inventory, and analysis document.

Sample Text

Identification and Protection of Wildlife and Habitat Corridors policy: Lake County shall cooperate with federal, state and local agencies and conservation organizations to identify wildlife and habitat corridors that serve as biological connections between natural areas, and shall implement programs that protect the viability of these corridors. These programs shall include focused land acquisition initiatives, conservation easements, and appropriate regulatory measures.

Wildlife Consideration within Development Projects policy: The County shall regulate the use of land within or adjacent to wildlife and habitat corridors that have been identified by an agency having jurisdiction in a manner consistent with the continued function of those corridors. The County shall require that land use or development proposals demonstrate that wildlife and habitat corridors will not be adversely impacted by a proposed use or activity. In addition to requiring the protection of corridors, the County shall regulate the density and intensity of adjacent uses, permitted activities, landscaping, lighting, and other factors that may contribute to the function or viability of identified corridors.

Park County, Montana: Growth Policy (2017)

The Park County Growth Policy (Montana's term for a comprehensive plan) includes goals, objectives, and actions to promote coexistence with wildlife. It directs the planning department to *"[i]dentify critical wildlife corridors for development, infrastructure and conservation planning,"* and to include this information in the Park County Atlas.

Sample Text

Use expertise, information and data from state and federal wildlife managers to identify and map corridors…Incorporate wildlife corridor mapping into the Park County Atlas…Encourage Montana Department of Transportation to include mitigation of wildlife corridors in planning and implementing highway projects.

Town of Bolton, Vermont: Town Plan (2025)

Bolton's town plan includes text that describes the importance of wildlife travel corridors, the need for reduction of forest block fragmentation, and the town's dedication to minimizing impacts. It includes goals and objectives for avoidance of forest and wildlife habitat fragmentation by minimizing subdivision, road incursions, and clearing for development. Buffers around surface and ground water are included, with development prohibited within specified distances depending on the water body.

Sample Text

Forest blocks are often prioritized for conservation to prevent fragmentation and ensure the long-term integrity of the state's ecological resources. Forest blocks are connected by wildlife travel corridors. These corridors are essential to wildlife survival because they connect habitat and allow wildlife to move to new locations and range freely between blocks that are otherwise unconnected and noncontiguous, depending on their seasonal needs and life cycles. Wildlife travel corridors often cross roads in Bolton, leading to potential danger to both animals and humans. Planning can minimize the impacts of development on forest blocks and wildlife travel corridors. Bolton supports further inventories of wildlife travel corridors in Bolton. Bolton will take additional steps if further conservation measures are needed.

Loudoun County, Virginia: Comprehensive Plan 2019

This comprehensive plan includes discussion of wildlife habitats, fragmentation, and the need for connectivity. It includes a natural heritage resources policy focused on preserving contiguous protected open space. A wildlife habitat policy aims to protect wildlife travel corridors, require development proposals to 'create links' to adjacent natural and open spaces, preserve native vegetation, and identify and encourage protection of wildlife corridors

via conservation easements, development design, and the County open space program. It notes the value of an integrated approach by conserving multiple resources together. Development applications require an impact avoidance plan when natural resources are present, in coordination with state agencies.

A Zoning Ordinance includes a low-density Mountainside Overlay District, a River and Stream Corridors Resources 100- to 300-foot buffer area, and other resource-related components.

Deer in farmland in western Montana. Credit: Kylie Paul.

Examples: Functional/Supporting Plans

Summit County, Colorado: County-wide connectivity plan resolution (2019)

In 2017, the Summit County Safe Passages coalition, comprising local governments, state and federal agencies, community groups, landowners, and nonprofit organizations, developed the Summit County Safe Passages for Wildlife: A County-Wide Connectivity Plan. The County formally endorsed the Plan in 2019. In the resolution it notes that *"[i]mplementing mitigation recommendations from the Summit County Safe Passages Plan will set the example for communities, state and nationwide, to work together and provide for the needs of both people and wildlife"* and that it is *"a guiding document to inform future actions, including future updates to county master plans and development code amendments."* The resolution is not durable or enforceable itself but led the Colorado State Department of Transportation to invest $750,000 in a roadway crossing project in the county (Brammer et al. 2024).

Gallatin County, Montana: Sensitive Lands Protection Plan (2023)

The Sensitive Lands Protection Plan maps the value of habitat areas throughout the County. It sets goals to avoid creating barriers to wildlife movement and migration, minimize habitat loss and fragmentation, and minimize human-wildlife conflicts. The Plan also allows the County to consider the potential for fragmentation, loss of wildlife habitat, and potential for barriers to wildlife movement and migration in carrying out subdivision review. The plan was adopted by the county in a resolution of adoption as a revision to the Growth Policy (the terms used for Montana's comprehensive plans), which recognizes the value of *"healthy native plant and wildlife habitat and protection of areas important for wildlife movement and migration."* Further, the Growth Policy includes numerous references to wildlife movement and migration. It maps several tiers of wildlife resource values, including core wildlife habitat, higher value for wildlife, lower value for wildlife, and urban/urbanizing areas, with corresponding land use planning goals and recommendations for the tiers.

Middlesex County, New Jersey: Destination 2040 Open Space and Recreation Plan (2022)

This plan is an element of the county's Master Plan. It includes a goal to preserve and steward natural resources and wildlife habitats and uses greenways as "*multi-use landscape elements that can connect wildlife, provide passive recreation, and provide essential transportation corridors."* Several greenways and natural areas' stated purpose includes the provision of a natural wildlife corridor. To determine the most important ecological habitat areas to preserve open space, the county developed an Open Space Needs Analysis. Factors considered include critical wildlife habitat, habitat cores, habitat corridors, habitat fragments, vernal pool habitat, and national heritage preservation sites. *"Habitat corridors represent areas throughout Middlesex County that have the potential to connect habitat. These areas are important for the movement of species throughout Middlesex County."* Habitat corridors are those identified by the state program CHANJ.

Town of Wawarsing, New York: Open Space Plan (2018)

The towns of Wawarsing and Rochester worked together on an open space planning process, *"to better protect important features, resources and places that they share in common."* Goals include to: *"promote ecological and recreational connectivity and reduce habitat fragmentation across the region"* and *"enhance ecological connectivity and contiguity."* Wawarsing adopted the plan as an appendix to its comprehensive plan in 2018. After adoption, two plan recommendations were completed, with both the 8,000-acre Cedar Swamp and the 3,000-acre Catskill-Shawangunk Greenway Corridor designated as Critical Environmental Areas (CEAs). Potential impacts to these important areas via development projects are to be evaluated during environmental reviews.

Sample Text

Such a regional approach promises to more broadly and effectively protect the important natural and open spaces resources of each town, at a scale and dimension not available to either [town], singularly. Additionally, when considering important resources such as landscape linkages, corridors, habitats and aquatic resources, and watersheds, inter-municipal approaches are needed when resources cross borders.

Sustain connectivity of large biodiversity areas (Catskills & Shawangunks) in the face of increasing migration obstacles along Rt. 209 corridor.

Albermarle County, Virginia: Biodiversity Action Plan (2018)

This plan specifies actions to achieve county biodiversity protection goals through a landscape-level analysis and focuses on connectivity and habitat fragmentation. It offers recommendations for policies and incentive programs to encourage conservation, including goals and recommendations to minimize habitat fragmentation and maintain connectivity and to limit biological effects of parcel subdivisions. It was prepared by the Albemarle County Natural Heritage Committee and County staff as directed in the 2015 Albemarle County Comprehensive Plan. The revised Comprehensive Plan was amended in 2019 (and currently being updated again) to adopt several of the Biodiversity Action Plan's recommendations and to ensure its implementation as a county goal.

Sample Text

Minimize or reduce habitat fragmentation county-wide and maintain habitat connectivity… Promote protection of forested and other habitat corridors with road and waterway crossings favorable to animal movements and prioritize these corridors for conservation... Improve policies for subdivision of properties to help prevent habitat fragmentation and maintain parcels of sufficient size for agriculture and forestry… Encourage Rural Preservation Developments with small building lots of two acres or less and the remainder of the land preserved as open space… Reduce the impact of rural roads and other fragmenting features on habitat… Use the ACE program and other applicable state or regional programs to acquire open space properties that can function as movement corridors connecting land in the county to Shenandoah National Park or as climate change refugia.

Identify locations where the fragmenting effects of roads can be reduced or eliminated. Develop means for wildlife to pass safely under roads at strategic locations. Identify areas where reduced vehicle speed, traffic signs, or other steps will reduce wildlife mortality. Intersections of roads and riparian corridors are of particular importance. Where possible, prevent new public roads and other infrastructure from bisecting forest blocks and habitat corridors. Conduct a survey of all public roads in the county to identify opportunities for improving stream habitat and aquatic connectivity where roads cross streams. Promote the use of open arch and other open bottom structures for road crossings of streams.

Further Examples: Functional/Supporting Plans

- Frederick County, Maryland: Green Infrastructure Plan

Examples: Maps, Inventories, Studies, or Analyses

For further examples of partner guidance or resource documents related to this topic, refer to the Resources section.

City of Buckeye, Arizona: Buckeye Wildlife Corridors Best Practices Guide (2021)

This guide won an award by the Arizona Chapter of the American Planning Association, where it was recognized for its quality, comprehensiveness, and extent of collaboration. The guide includes case studies, a literature review, best management practices, and tools for development that integrate wildlife corridors within Buckeye's growth area. The guide notes that "*to maintain the connectivity that preserves our biodiversity, an empirical and thoughtful approach was required."* The guide further includes that "*past planning efforts, including the General Plan and the Parks and Recreation Master Plan, have identified the importance of wildlife connectivity to maintain and enhance biodiversity in the City. The goals and policies articulate a vision for natural and planned wildlife corridors...found within these documents are essential wildlife-friendly related policies and additional information to preserve our wildlife corridors."*

Boulder County, Colorado: Habitat Fragmentation Analysis (2018) and Permeable Landscapes for Climate Change Adaptation study (2020)

Grants from the Boulder County Parks and Open Space Department funded these studies to inform and provide tools to the County to help with land use planning and management decisions.

Town of Montgomery, New York: Natural Resource Inventory (2020)

New York municipalities may create a Conservation Advisory Council (CAC) which, as per state law, is then required to create a Natural Resources Inventory (NRI). The inventory serves as a reference document to inform comprehensive planning and land use decisions and laws. Prepared by the Montgomery Conservation Advisory Council and the Hudson River Estuary Program, this NRI references forest fragmentation, linkage zones, and connectivity and includes maps of forest patches and regional forest linkage zones.

Several counties, North Carolina: A Landscape Plan for Wildlife Habitat Connectivity (2019)

In North Carolina's Triangle area, local governments partnered with conservation organizations to produce a regional landscape-scale assessment of priority wildlife corridors called A Landscape Plan for Wildlife Habitat Connectivity in the Eno River and New Hope Creek Watersheds, North Carolina Covering Portions of Orange, Durham, Chatham, and Wake Counties. This analysis was partially funded through North Carolina's Partners for Green Growth program cost-share assistance (*See State Program examples section below*).

City of Denton, Texas: Wildlife Corridor Map (2024)

The City of Denton Comprehensive Plan includes a key action to "*identify and map wildlife corridors throughout the city*." Staff and others led an effort described in the City of Denton Informal Staff Report to Mayor and City Council 2023 to undertake wildlife corridor mapping. They used Linkage Mapper to develop a Wildlife Corridor Map, which is to be integrated into the City's online interactive mapping tool and used in reviewing and recommending future land uses. They defined corridors as *"greenspace and manmade structures/improvements that allow wildlife to move between larger areas of existing habitat."* Formal incorporation of this definition into the City code or documents is anticipated.

Town of Northfield, Vermont: Town Plan – Forest Block map (2020)

An analysis and map using data related to Forest Blocks are included in the Northfield Town Plan. It notes that *"forest blocks of 500 acres or more are needed to fully provide…. benefits [including] withstand and recover from catastrophic events like storms or wildfires…provide habitat for species sensitive to human disturbance [and so on]. Forest covers 83% of Northfield and 87% of that forest land remains part of a large block (more than 500 acres in area) that is unfragmented or minimally impacted by roads, development and agriculture. 73% of forest remains part of a large parcel (more than 50 acres in area)."* The map depicts priority forest habitat blocks, priority wildlife habitat, priority wildlife crossings, and rare, threatened, or endangered species and significant natural communities.

Gray fox in a greenway. Credit: Kylie Paul.

City of Bellingham, Washington: Wildlife Corridor Analysis (2021)

This analysis identifies important habitat hubs, wildlife corridors, and forest breaks within the city limits and urban growth area. It models wildlife habitat connectivity, quantifying the relative importance of habitat areas and habitat patch links for selected focal wildlife species. It is part of an assessment phase of the city's Urban Forestry Management Plan, a strategic plan within City limits and the Urban Growth Area to maintain Bellingham's forest. The plan includes *"protect and restore priority habitat areas, movement corridors, and forests"* as one of six goals. Numerous actions are detailed relating to land acquisition, trail and recreation guidelines, tree cover studies, and restoration opportunities. Urban forest criteria and indicators to show performance of actions are defined.

Whatcom County, Washington: Wildlife Habitat Connectivity in Whatcom County, Washington (2023)

This partner-managed project assisted the county in identifying key wildlife habitat connectivity areas and designating critical connectivity areas for inclusion in the County's Critical Area Ordinance. It provided valuable GIS data layers for the county's mapping systems.

Rocky View County, Alberta, Canada: Municipal Land Use Suitability Tool Report (2023)

The Canadian nonprofit research organization Miistakis Institute and the Oldman River Regional Services Commission applied a decision-support tool called Municipal Land Use Suitability Tool (MLUST) to assist Rocky View County in identifying the most suitable areas for industrial scale solar or wind energy development. To do so, they identified features they valued on the landscape, which included agriculture, ecology, and cultural land use values. The analysis includes wildlife movement areas as areas to avoid. The areas most suitable for renewable energy development aligned with locations showing a low rating of probable conflict with other land uses.

Examples: Base Zoning Districts

Chaffee County, Colorado: Land Use Code (2024)

Chaffee County has numerous components within its Land Use Code that aim to protect wildlife habitat and migration corridors. It includes Public/Conservation/Recreation (PCR) and Agriculture/Ranching (AR) zoning districts that have a maximum density of one unit per 35 acres. In the AR district, a land use cluster and open space incentive program provides for increased density options when implementing a conservation subdivision design (*See the Open Space Residential Development section*). Minimum landscape surface ratios for the AR, PCR, and Rural Residential zones are high, and the maximum building coverage ratio is low. Significant wildlife-related standards are recognized in many districts. The code's Resource Protection Policy notes *"It is the policy…not to rezone property in a manner that would create or facilitate the creation of development rights or entitlements that would…Reduce the level of protection for significant natural resources (e.g., wildlife, wildlife habitat or migration corridors, exceptional natural features, wetlands and waterbodies, and prime farmland) that exist on the subject property."*

Examples: Overlay Zoning

City of Scottsdale, Arizona: Environmentally Sensitive Lands Overlay (1991/2004)

To guide development in 134 square miles of desert and mountain areas of Scottsdale, Arizona, the city created a set of zoning regulations within an Environmentally Sensitive Lands Overlay (ESL). Benefits of the ESL include open space between properties and along roadways, maintaining wildlife corridors, and protecting native vegetation. The ordinance requires that a percentage of each property (20% to 80% based upon landform area and slope) is set aside as a permanent, natural area open space (NAOS) easement to protect features like washes, mountain ridges, peaks, and prime wildlife habitat and corridors. The NAOS applies to subdivisions, and density transfers, bonuses, and cluster development are used to help maintain connected open spaces. Early application on a per-

lot basis resulted in disconnected slivers of open space. Minimizing the cost of public services is one rationale for the ESL, since the cost of infrastructure development in environmentally sensitive areas is often higher than in other areas. The ESL is supported by the city's 2022 General Plan's Open Space Element.

Sample Text

[Location of open space will prioritize] "preservation of natural watercourses. The need for unimpeded wildlife access and movement within and between NAOS areas is an important criteria. Therefore, minor and major watercourses, vista corridors, scenic corridors and particularly where located adjacent to the McDowell Sonoran Preserve, shall be given key consideration as riparian habitats associated with major and minor water courses…[and will prioritize] Continuity of open space within the development project and with adjacent developments or with the McDowell Sonoran Preserve.

Ventura County, California: Code of Ordinances - Habitat Connectivity and Wildlife Corridors Overlay Zone (2019) and Critical Wildlife Passage Areas Overlay

These two ordinances (Ordinances 4537 and 4539) designate standards for development and require environmental reviews for projects that may hinder wildlife habitat connectivity, helping protect mapped wildlife corridors. Regulatory mechanisms in the zoning code for the overlay zones (8109-4.8 and 8109-4.9) focus on outdoor night lighting, setback buffers around surface water features and known wildlife crossings, limits on impermeable fencing, encouraging compact siting, and prohibiting intentional planting of invasive plants. The Ventura County code also includes development standards for local habitat connectivity corridors as well. An interactive map of the overlay zone is available.

Sample Text

Habitat Connectivity and Wildlife Corridors overlay zone *The general purposes of the Habitat Connectivity and Wildlife Corridors overlay zone are to preserve functional connectivity for wildlife and vegetation throughout the overlay zone by minimizing direct and indirect barriers, minimizing loss of vegetation and habitat fragmentation and minimizing impacts to those areas that are narrow, impacted or otherwise tenuous with respect to wildlife movement.*

Critical Wildlife Passage Areas overlay zone. *There are three (3) critical wildlife passage areas that are located entirely within the boundaries of the larger Habitat Connectivity and Wildlife Corridors overlay zone. These areas are particularly critical for facilitating wildlife movement due to any of the following: 1) the existence of intact native habitat or other habitat with important beneficial values for wildlife; 2) proximity to water bodies or ridgelines; 3) proximity to critical roadway crossings; 4) likelihood of encroachment by future development which could easily disturb wildlife movement and plant dispersal; or 5) presence of non-urbanized or undeveloped lands within a geographic location that connects core habitats at a regional scale.*

Teton County, Idaho: Land Development Code - Natural Resource Overlay (2024)

The Natural Resource Overlay (NRO) within the Teton County Land Development Code is based on habitat and wildlife data from the Idaho Department of Fish and Game and others. The NRO map was recently updated and it identifies areas with significant ecological value, including habitats for big game migration corridors and seasonal range, and habitats for waterbirds, songbirds, raptors, and sharp-tailed grouse. Natural Resource Protection development standards require that if any portion of a proposed development or special use falls in or near the NRO, the proposal is subject to site plan review to ensure impacts to the natural resources are avoided or mitigated. Development in areas identified by the NRO is required to be clustered to limit impacts and provide open space.

Sample Text

5-4-1 E. All development proposed within wildlife habitat, range, breeding grounds, and migration corridors as identified on the Teton County Natural Resource Overlay Map and updated identification of areas where indicator habitats and/or habitats for indicator species are found as documented by input that is accepted by the County from Idaho Department of Fish and Game or other qualified wildlife professionals is subject to site plan review to ensure that the location of proposed development or use avoids or mitigates impacts to indicator species and indicator habitats to the extent practical, given the size and location of the development property. 1. The location of proposed development shall: a. Reduce fragmentation of functional, intact areas of native vegetation and indicator habitat… b. Avoid locations that affect landscape elements such as unique rock formations, sheltered draws, drainage ways, or riparian corridors; and c. Maintain connectivity among fish and wildlife habitats and protect sensitive fish and wildlife habitats use for travel, foraging, reproduction, shelter, and security.

Town of Brunswick, Maine: Wildlife Protection Overlay District (1997/2017)

The Wildlife Protection Overlay District aims to reduce habitat loss for native species in rural zoning districts while allowing development. Its intent is to minimize fragmentation of large, unbroken forest blocks and limit activities that hinder species movement between forest areas. The overlay zone maps large, forested Wildlife Habitat Blocks and Wildlife Corridors connecting the blocks. Development activities within these mapped overlay zones must avoid or minimize disturbance with greater mitigation required as lot coverages increase. Alternately, density bonuses exist for landowners who limit or forgo disturbance.

Sample Text

Land for Wildlife Corridor mitigation required in accordance with Subsection a above shall be permanently protected through a conservation easement, deed restriction, or similar mechanism that limits future disturbance, in accordance with Subsection 4.2.5.C. Mitigation land must be located within the same corridor as the disturbed area.

Spokane County, Washington: Critical Areas Ordinance (1996/2018)

Spokane County's Critical Areas Ordinance includes designation and protection of fish and wildlife habitat conservation areas and species-specific conservation areas, in accordance with the requirements of the state's Growth Management Act. The ordinance applies to all unincorporated areas of the county. Recorded priority habitats include wildlife corridors (e.g., areas used for *"frequent foraging movements, seasonal migrations, or the once-in-a lifetime dispersion of juvenile animals"*), landscape linkages that enable "*community and ecosystem processes to operate,"* riparian areas, and urban and rural open space that serve as corridors between other priority habitats. Performance standards are specified for regulated uses in these areas. Incentives such as property tax relief, on-site density transfers, and off-site transfers of development rights facilitate conservation goals while protecting property rights.

Case Studies: Overlay Zoning

These communities use overlay zones and are described in the Case Studies section.

- City of Eagle Mountain City, Utah: Wildlife Corridor Overlay Zone
- Town of Jericho, Vermont: Natural Resources Overlay
- Teton County, Wyoming: Natural Resources Overlay

Further Examples: Overlay Zoning

- Blaine County, Idaho: Wildlife Overlay District
- King County, Washington: Critical Areas Ordinance
- Summit County, Colorado: Wildlife Habitat Overlay District

Examples: Standards

Numerous types of standards exist within both zoning and subdivision regulations and are represented in this section. Standards related to clustering are described separately (*see Open Space Residential Development examples section)*.

Chaffee County, Colorado: Land Use Code (2024)

Via a Natural Resource Stewardship section of the Code, several tools are used "*to ensure that these natural resources are protected and conserved in the face of new development by minimizing impacts and disturbances, enhancing existing conditions, and restoring or replacing the community resource value lost to development."* These are applicable to all development within the County, including subdivisions, and full compliance with the standards is required prior to the issuance of any development permit.

- Use of the Chaffee County Planning for Wildlife Map is required *"to identify locations of sensitive (e.g., high or highest quality) wildlife habitats for land and aquatic species, including potential habitats and known locations of rare, threatened, or endangered species, big game winter ranges, and migration corridors,"* with note that "*as wildlife distribution is fluid and populations are dynamic, the map shall be used as an initial guide to identify where various levels of wildlife impacts may occur."*
- The preparation of a Habitat, Range, and Migration Corridor Report by a qualified biologist, with consultation with Colorado Parks and Wildlife (CPW), may be required to identify how to preserve and manage wildlife habitat within the design of a proposed development.
- The Code requires that "*all development shall be required to avoid and minimize impacts to high-quality and highest-quality habitat as identified on the Planning for Wildlife Map and confirmed by a wildlife report for the subject property. After avoidance and minimization strategies are implemented, remaining impacts shall be mitigated based on identified habitat quality, as set out in Table 3.6.3.2., "Required Mitigation Actions"* (including conservation subdivision standards, inclusion of wildlife crossings for new roads, sound buffers, seasonal limitations on human activities, and avoidance of all water bodies). Additional mitigation measures may be required if outlined in the wildlife report.
- Wildlife stewardship techniques/objectives include visual and sound buffers, location controls of land disturbance, preservation of native vegetation, and habitat compensation.
- Conservation subdivision design is required if within a high value or highest value habitat or critical wildlife corridor, thereby preserving in perpetuity the critical habitat areas in exchange for density bonuses.
- Resource setbacks are required, including setbacks 100 feet from rivers and lakes, 300 feet from rivers and streams within mapped high or highest quality wildlife habitat, and 100 feet from high or highest quality wildlife habitat.
- Safe passage for wildlife via wildlife crossings is required for development that occurs in high or highest quality habitat, so that wildlife identified in the wildlife report, including aquatic species, are afforded safe passage through the development and across its roads.
- The Code notes that "*it is the County's policy to ensure no net loss of high-quality and highest-quality habitat. If it is demonstrated that additional habitat must be conserved or in-kind habitat protected off-site to compensate for habitat loss or material habitat degradation, such measures shall be coordinated with CPW."*

Routt County, Colorado: Development Standards – Development within a Sensitive Wildlife Area (2024)

Within the Unified Development Code's Development Standards, the section on Environmental Standards includes standards for Development within a Sensitive Wildlife Area. The purpose is to "*protect areas of high priority wildlife habitat, including migration corridors, and areas for breeding, feeding and living."* Based on Colorado Parks and Wildlife maps, development projects must determine if they are located in a high priority

habitat area. If so, development must be limited, following avoidance, minimization, and mitigation actions. A mitigation plan that details mitigation measures is required such that "*proposed development shall maintain connectivity of habitats and provide wildlife corridors around and within the project area.*"

Sample Text

When examining impacts of a proposed development, *The County shall consider cumulative impacts related to wildlife habitat and/or migration routes, production areas, and winter range.*

All applications for new large-scale developments shall provide additional public benefit to address a community need...Examples of public benefit include…Permanent preservation of a significant amount of open space (beyond the minimum open space requirement) that protect areas of critical wildlife habitat to ensure natural areas are not fragmented by development or commercial recreation through a conservation easement or other method acceptable to the County.

All efforts shall be made to ensure that trails and transportation systems do not infringe on wildlife habitats and movement corridors.

Routt County, Colorado: Zoning and Land Uses - Solar Energy System – Community and Utility Scale (2024)

This is within the zoning and land uses section of the Unified Development Code, relating to community and utility scale solar energy systems, and it applies to all systems that produce renewable solar energy in unincorporated parts of Routt County. Performance standard requirements that address wildlife habitat and connectivity include mitigation steps and habitat avoidance, as solar collectors must be arranged in a way that *"provides wildlife movement corridors through the project area, as determined necessary, for the purpose of facilitating wildlife passage and landscape connectivity."*

Sample Text

Sensitive wildlife species and their habitats shall be avoided to the greatest extent possible, especially during critical periods. All efforts shall be made to avoid facility activities and uses from bisecting any existing habitats and wildlife corridors on, and adjacent to, the site. This includes the clearing of land and placement of infrastructure, such as collectors, transmission lines, roads and other appurtenances that may bisect important habitats or wildlife corridors.

Applicants shall mitigate the impact that the project has on local wildlife and overall wildlife patterns in the region, through the following actions: i.) Applicant shall work with CPW to identify High Priority Habitat and design their project to avoid, minimize and mitigate potential impacts to wildlife and their habitats. ii.) The facility shall maintain landscape connectivity of habitats and provide wildlife movement corridors through and around the improved area and shall be identified on the submitted Site Plan.

Town of Snowmass Village, Colorado: Development Evaluation Standards – Protection of Environmentally Sensitive Areas (2024)

Within the Land Use and Development Code of the Municipal Code, these procedures and evaluation standards for reviewing development ensure that "*development is located, designed and used in such a way that these sensitive wildlife habitat areas are protected*" and applies to any development application for Planned Use Development, subdivision, or special review within the Wildlife, Mule Deer Seasonal Activity and Elk Seasonal Activity maps (including elk migration corridors) found in the Comprehensive Plan. A site-specific wildlife habitat analysis and a wildlife habitat mitigation and enhancement plan are required. Development standards for mitigation include avoidance of intrusion, maintaining native vegetation, road location, habitat enhancement, prohibition of dogs, and other related standards. This section also specifies standards for a mapped Brush Creek Impact Area.

Sample Text

Development shall be prohibited in elk production areas, elk concentration areas, elk severe winter range, elk migration corridors, mule deer severe winter range, bighorn sheep winter range and the buffer areas surrounding the nest sites of golden eagles, goshawks and red-tailed hawks. However, development may be considered within these areas if at least four (4) out of five (5) of the members of the Town Council adopt a resolution authorizing consideration of some development in such areas.

Town of Bolton, Vermont: Land Use and Development Regulations (2023)

In Development Review, development site plan review includes that "*site layout and design, to the extent feasible, shall incorporate and/or protect…critical wildlife habitat areas and wildlife travel corridors*." Similarly in Subdivision Review Standards, subdivisions within certain districts "*shall be designed and configured to preserve…critical wildlife habitat areas and wildlife travel corridors*" and "*fragmentation of productive forest lands and critical wildlife habitat areas shall be avoided*." Approaches to do so include specification of dimensional standards such as 25-acre minimum lot size, surface water setbacks, reduced building envelope size, and so on. Further, all subdivisions must identify and provide for the protection of natural and cultural resources including natural areas and wildlife habitat using numerous specific methods. Within this document, definitions of forest fragmentation and of wildlife habitat connector are provided.

Sample Text

Subdivision Review Standards: *Natural Areas and Wildlife Habitat: Subdivision boundaries, lot lines and layout, roads, driveways and building envelopes shall be located and configured to avoid the fragmentation of and adverse impacts to natural areas, critical wildlife habitat areas and wildlife travel corridors, identified in the town plan, by the Vermont Department of Fish & Wildlife, or through site investigation. Methods for avoiding such adverse impacts include but may not be limited to the following:*

- *Building envelopes shall be located to exclude identified natural areas, critical wildlife habitat areas and wildlife travel corridors.*
- *A buffer area of adequate size, as determined in consultation with the Conservation Commission, state officials or other qualified consultants, shall be established as needed to protect critical wildlife habitat areas and natural communities.*
- *Roads, driveways and utilities shall be sited and designed to avoid the fragmentation of identified natural areas, critical wildlife habitat areas and wildlife travel corridors, for example by sharing existing rights-of-way and/or following existing linear features such as roads, tree lines, stone walls, fence lines or field edges to minimize fragmentation.*
- *The Board may require the submission of a management plan, prepared by a wildlife biologist or comparable professional, to identify the function and relative value of impacted critical wildlife habitat areas, wildlife corridors, and associated management strategies.*
- *Identified natural areas, critical wildlife habitat areas, associated buffer areas and wildlife travel corridors should be included and designated as open space, in accordance with Section 7.4.*

Case Studies: Standards

These communities are described in the Case Studies section and have specific standards relating to connectivity.

- City of Eagle Mountain City, Utah: Wildlife Corridor Overlay Zone development standards
- Town of Jericho, Vermont: Natural Resources Overlay District general standards
- Teton County, Wyoming: Environmental Standards

Further Examples: Standards

- Ventura County, California: Standards for Habitat Connectivity and Wildlife Corridors Overlay Zone and Critical Wildlife Passage Areas Overlay Zone, including lighting, fencing, setbacks, and vegetation modifications

Examples: Buffers/Setbacks

Buffers and setbacks can be integrated into zoning codes, subdivision regulations, or development standards to help protect wildlife habitat while still accommodating growth. Since they can fit into several different regulatory categories, they are included here together in their own section.

Fort Collins, Colorado: Natural Habitats and Features - Buffer Zone Performance Standards (2024)

Within the General Development and Site Design portion of the Land Use Code, if any portion of a development site is within five hundred (500) feet of an area or feature identified as a mapped natural habitat or feature or contains natural habitats or features that have significant ecological value, then the development plan needs to be designed to be compatible with and to protect natural habitats, features, and associated plants and animals. An ecological characterizations study is required, including examination of wildlife movement corridors. A buffer zone for the natural habitats and features is determined, and the general buffer zone distance is established according to a provided buffer zone table. Project design and development activities follow Buffer Zone Performance Standards and other standards.

Sample Text

Connections. If the development site contains existing natural habitats or features that connect to other off-site natural habitats or features, to the maximum extent feasible the development plan shall preserve such natural connections. If natural habitats or features lie adjacent to (meaning in the region immediately round about) the development site, but such natural habitats or features are not presently connected across the development site, then the development plan shall, to the extent reasonably feasible, provide such connection. Such connections shall be designed and constructed to allow for the continuance of existing wildlife movement between natural habitats or features and to enhance the opportunity for the establishment of new connections between areas for the movement of wildlife.

City of South Fulton, Georgia: Code of Ordinances - Stream Buffer Protection (2020)

Buffers adjacent to streams provide benefits such as providing riparian wildlife habitat. This code applies to all land development activities on property containing a stream protection area. It creates buffer zones for the protection of water resources and minimizes land development by establishing buffer zone requirements. It requires that *"an undisturbed natural vegetative buffer must be maintained for 75 feet, measured horizontally, on both banks (as applicable) of the stream as measured from the top of the stream bank…An additional setback must be maintained for 25 feet, measured horizontally, beyond the undisturbed natural vegetative buffer, in which all impervious cover [is] prohibited. Grading, filling and earthmoving [must be] minimized within the setback."*

Missoula County, Montana: Environmental Design Standards - Riparian Resource Protection (2023)

Within the Zoning Regulations, standards are applied to structures, uses, and associated activity that trigger a Zoning Compliance Permit along rivers, streams and creeks, and wetland areas. A minimum 50-foot Riparian Resource Protection Area setback is required to protect all riparian resources, and a further Riparian Resource Buffer of 50 feet is applied in addition to keep development sufficiently distanced from riparian resources. Further, specific creeks and rivers in the County have specific buffer distances (up to 450 feet from some major rivers).

Includes incorporation of Channel Migration Zones. Qualifying wetlands also have a 50-foot buffer. Regulates activities in the Resource Protection Area and in the Buffer. Fencing in the Resource Protection Area is prohibited except for wildlife-friendly fencing. A website is used to communicate further information to the public about the buffer regulations.

Sample Text

Fencing in the Riparian Resource Protection Area is prohibited, except for wildlife-friendly fencing meeting the following standards to allow for safe and convenient wildlife movement.

City of Anacortes, Washington: Unified Development Code - Riparian Management Zone (2019)

In Anacortes, a riparian management zone (RMZ) is considered a fish and wildlife habitat conservation area, one of five state-required types of critical areas. The width of the RMZ is the height of the tallest 200-year-old "site-potential tree" or 100 feet, whichever is greater, measured horizontally. Development is prohibited within or over a riparian watercourse, and actions detrimental to habitat in the RMZ are prohibited. A restoration plan following mitigation standards is required commensurate with the impact of a development. The code encourages the voluntary opening and restoration of a previously channelized, culverted, or piped watercourse, and includes specific enhancement measures to RMZs.

Sample Text

It is the long-term goal of the city to restore the city's RMZs and to protect fish passage where scientifically justified. The city has determined that best available science supports protecting these RMZs as described in this section.

White-tailed deer in wildlife habitat outside of a residential area in Montana. Credit: Kylie Paul.

Examples: Tools and Incentives

A number of flexible, voluntary approaches exist that encourage landowners and developers to protect natural resources. These tools are often used in combination with other approaches, such as a transfer of development rights program, density bonuses, cluster development standards, and natural resource setbacks.

Examples: Open Space Residential Development

Chaffee County, Colorado: Land Use Code (2024)

Chaffee County includes numerous wildlife components in its Land Use Code. It notes that "*sites and subdivisions shall be designed with natural resource stewardship as a central objective. If a subject property to be subdivided into three or more lots is located within a high value or highest value habitat or critical wildlife corridor, then conservation subdivision design*" is required. There are two types of conservation subdivisions: rural land use cluster and the rural open space incentive (ROSI), intended to encourage land and water conservation and preservation of open areas through clustering of residential subdivision parcels at higher densities than the rural land use cluster allows. The ROSI provides for a 4x density bonus in exchange for preserving two-thirds of a subject property and includes an additional density bonus of one residential unit granted for each additional 35 acres included in a remainder parcel. The resource stewardship area/remainder parcel should be contiguous and undivided, and connected to comparable protected areas on adjacent lands, where possible. This ensures that habitat can be connected across property boundaries in an attempt to further reduce fragmentation.

Sample Text

Resource Protection Priorities. Conservation subdivisions shall be designed to further an articulated set of resource protection priorities. However, as to all natural resources and natural and man-made hazards, designs shall seek first to avoid impacts and risks, then minimize impacts and risks, then mitigate impacts and risks. As to particular resources:

1. Agricultural and ranch lands. Irrigated agricultural and ranching landscapes and areas with the most productive soils shall be prioritized for preservation.

2. Wildlife. High value and highest value habitat, big game migration corridors, and big game winter range to be designated for protection shall be selected and configured for continuing value to wildlife, as follows: a. Elements of habitat or range that are interdependent shall not be separated in ways that materially compromise the overall habitat. b. Protected areas of big game migration corridors and big game winter ranges shall provide a continuous connection to off-site big game migration corridors and big game winter ranges, such that large-scale regional wildlife movements are not impeded by the proposed development. c. Roads, fencing, improvements, and grading shall not materially interfere with wildlife movement across habitats, big game migration corridors, and big game winter ranges.

Lake County, Florida: Code of Ordinances - Rural Conservation Subdivision Design Standards (2025)

These regulations aim to provide housing that preserves *"agricultural and forestry lands, natural and cultural features, scenic viewsheds, and rural community character that would be at great risk of becoming lost through conventional development approaches, and which it is the policy to incorporate, to the greatest extent practicable, into an interconnected network of permanent greenway conservation lands adding both economic and environmental value to the proposed development and to the broader community."* They are applicable wherever a conservation subdivision is required under the county's Comprehensive Plan, including within designated Rural Protection Areas, and can be used elsewhere.

These regulations specifically aim to: *"Cluster development to create large contiguous tracts of common open space or protected space; to protect environmentally sensitive areas, including, but not limited to, habitat, wildlife, and wildlife corridors; to maximize buffering to adjacent conservation land; to protect aquifer recharge and karst*

features; and to create opportunities for passive recreation," "maintain, enhance, and protect corridors for wildlife movement in coordination with adjacent properties," and minimize disturbance, encourage conservation easements, and include dark sky lighting ordinance. It includes open space and protected space requirements from 35-90% minimum requirement depending on location and these should be in undivided preserves or 'an interconnected network of protected space.' Evaluation criteria related to forest land and natural areas conservation are included.

Further Examples

- Town of Kittery, Maine: Conservation Subdivision
- Montgomery County, Maryland: Rural Neighborhood Cluster Zone
- City of Amherst, Massachusetts: Open Space Community Development

Examples: Purchase of Development Rights, and Transfer of Development Rights

Albermarle County, Virginia: Acquisition of Conservation Easements Program

This program is a PDR program that focuses on preserving open spaces, including wildlife habitat corridors. The program provides financial incentives to landowners to protect ecologically sensitive areas, contributing to biodiversity conservation and climate resilience. It focuses on stream buffers, forests, and farmland, and notes that it benefits the community by "*enhancing biodiversity conservation, by protecting natural habitat and ecological connectivity across the landscape*."

Pinelands, New Jersey: Regional Pinelands Development Credit Program

The New Jersey Pinelands Commission, a state agency working alongside county and local governments, implements land management and environmental protection goals through a comprehensive management plan. One key tool supporting land preservation is the Pinelands Development Credit (PDC) program, a regional TDR system. Since it started in 1982, over 58,000 acres of sensitive and rare ecosystems have been protected.

Further Examples

- Blaine County, Idaho: TDR
- Boulder County Colorado: TDR
- King County, Washington: TDR
- Stafford County, Virginia: PDR

Examples: Density Bonuses

Scott County, Minnesota: Comprehensive Plan - Natural Area Corridors (2019)

The Natural Area Corridors program uses a voluntary approach, including eligibility for a density bonus for a private land development, provided the natural area is permanently protected through a conservation easement.

Brevard County, Florida: Code of Ordinances - Open Space Subdivisions

An open space ordinance designed to promote cluster development and land use efficiency by conserving the ecological functions of natural areas and minimizing development and maintenance costs. It establishes a defined ratio of open space to density bonuses, available to developers building within specified zoning districts. While primarily established for wetlands and riverine floodplains, significant wildlife habitat areas are also a priority.

Examples: Enabling Conditions

Enabling Conditions: Land Acquisition/Private Lands/Conservation Easements

City of Peoria, Arizona: Peoria Sonoran Preservation Program - Planning Open Space Acquisitions (2015)

This program aims to identify areas that "*merit conservation and feasible strategies to fulfill our community's vision*." The plan includes wildlife movement and incorporates the existing Maricopa County Wildlife Connectivity Assessment into their Open Space Decision Support Model, where it prioritizes "*areas of general wildlife importance in conjunction with other sensitive resources and wildlife corridors*" when looking at land acquisitions for open space.

Lake County, Florida: Code of Ordinances - Public Lands and Trails Acquisition Advisory Committee (2024)

The Public Lands and Trails Acquisition Advisory Committee was created *"to prepare and recommend to the Board of County Commissioners for approval, policies to guide the acquisition and management of public lands. Public lands purchased with 2024 referendum funds may be acquired and improved for the following purposes only: To protect drinking water sources; improve the water quality of rivers, lakes, and streams; protect open space from overdevelopment; provide for connectivity between habitat and corridors through which wildlife can travel and proliferate"* and other purposes. The recommended spending policies should have a 50/50 funding balance between natural, passive use lands and lands used for trail connectivity, and trail projects are to be constructed as part of the Greenway System defined "*by the Florida Department of Environmental Protection (FDEP), Office of Greenways and Trails, as natural corridors of protected open space that are vital for functional and healthy native ecosystems. These ecological greenways support the environment and allow wildlife to thrive and migrate from place to place.*" They also are to be used for recreation.

Enabling Conditions: Funding

City of Scottsdale, Arizona: Sales tax for land acquisition and improvements

In 1995, Scottsdale voters approved a 0.2%, 30-year sales tax increase and an additional 0.15% sales tax in 2004 to acquire open space land in the McDowell Mountains to expand the McDowell Sonoran Preserve. Additional votes for several bond initiatives to provide funding for land and improvements also have been passed over time.

Colorado Springs, Colorado: Trails, Open Space and Parks sales tax

Trails, Open Space, and Parks (TOPS) is a 0.1% sales tax by the City of Colorado Springs, to help preserve trails, open spaces, and parks. The funding goes directly to the acquisition, development, and preservation of the natural land. Initially approved in 1997, it was extended in 2003 and 2023.

Teton County, Wyoming: Funding for wildlife crossings

In 2019, voters dedicated $10 million from the county's Special Purpose Excise Tax to design and build wildlife crossing structures. This effort is guided by the Wildlife Crossings Master Plan, which pinpoints wildlife-vehicle collision hotspots and outlines mitigation measures to enhance public safety while preserving wildlife corridors.

Chaffee County, Colorado: Chaffee Common Ground

Chaffee Common Ground is a community-driven initiative born out of a county planning process that aims to preserve quality of life and natural resources in the region. Enabled through a voter-approved 0.25% sales tax, the Common Ground program supports projects that protect scenic views, forest health, watersheds, water quality, and wildlife habitat. It is overseen by a Citizen Advisory Committee that advises the County Commissioners.

Enabling Conditions: Regional Planning

Highlands Region, New Jersey: Highlands Regional Master Plan (2008)

Through the passage of the Highlands Water Protection and Planning Act of 2004, the New Jersey Legislature required the New Jersey Highlands Water Protection and Planning Council (the Highlands Council) to prepare and adopt a Regional Master Plan to protect natural resources in the Highlands Region, which was completed in 2008. One approach in the plan includes: *"To protect the Highlands Region critical habitat, the Highlands Council will develop or adapt a conservation and management overlay district ordinance for use by municipalities for inclusion in municipal master plans. The purpose of the overlay district ordinance is to identify critical habitat within each municipality, highlighting: habitat in need of protection from fragmentation and other anthropogenic impacts; habitat critical to maintaining wildlife and plant populations; and habitat that serves other essential ecosystem functions such as carbon sequestration and ground water recharge."* One goal within the Highlands Regional Master Plan is for the "*inclusion of Critical Habitat Area Management Plans (CHCMPs) in the master plans and development regulations of conforming municipalities and counties."* The Borough of Kinnelon CHCMP was finished in 2020 and focuses on protecting critical habitat and reducing habitat fragmentation. It includes policies, requirements, best management practices, performance, design, and mitigation standards, and procedures to do so, such as a policy *"to prohibit through plan conformance, local development review, and Highlands Project Review the direct impact of new human development or expansion or increased intensity of existing development within critical habitat."*

Puget Sound Regional Council, Washington: Regional Open Space Conservation Plan (2018) and maps

The Puget Sound Regional Council (PSRC) is an interlocal agency governed by a General Assembly and Executive Board made up of locally elected officials and agency representatives. It is a designated Metropolitan Planning Organization and Regional Transportation Planning Organization under federal and state law, respectively. Among other efforts, PSRC works with local governments and partners to protect open space in the region. The Regional Open Space Conservation Plan maps the open space network across King, Pierce, Snohomish, and Kitsap counties and highlights key actions needed to expand and preserve these areas for the long term. It provides a Conservation Toolkit (2022) offering planning resources to protect open space, farms, forests, and rural lands.

Enabling Conditions: Partnerships, Coordination, and Agreements

Maricopa County, Arizona: White Tank Mountains Regional Connectivity Initiative

The initiative is a collaborative effort in Maricopa County, Arizona, led by the White Tank Mountains Conservancy (WTMC), and it includes community leaders, municipal partners, landowners, and stakeholders to engage, inform, and activate the public and coalition to identify and establish connectivity solutions. They undertake strategies like funding acquisition or conservation easements, redirecting development, or using conservation-oriented development solutions. They have developed a highly informative and engaging StoryMap. WTMC has spent considerable effort building the science to demonstrate the need, educating and advocating with landowners, and keeping the message alive and relevant.

Litchfield County, Connecticut: Northwest Connecticut Affordable Housing and Conservation Collaboration

The group formed in 2024 to bring together conservation and affordable housing advocates, including Litchfield County, to equip participating communities with strategies, tools, and connections to support affordable housing and conservation efforts. It created an Affordable Housing and Conservation Collaboration Strategy (2024). An online mapping tool helps to visualize areas for conservation, opportunities for affordable housing, and intersections between them. Considering wildlife core and linkage corridors is a specific component of this work.

La Plata County, Colorado: Memorandum of Understanding between the Colorado Department of Transportation (CDOT), Colorado Parks and Wildlife (CPW), and County of La Plata (2023)

An agreement between CPW, CDOT, and La Plata County outlining responsibilities for collaborating on transportation and land use development projects. It includes making recommendations to ensure the effectiveness of crossing structures and facilitating resource sharing and communication. Planning department staff is supposed to identify potential development projects adjacent to a crossing for consultation and negotiation during the development review process. Currently, there have been few opportunities to implement the MOU. *This MOU is not readily available online.*

Enabling Conditions: Staff

Having dedicated natural resource–educated planners and biologist positions within local government planning departments is invaluable. Some examples include: Fort Collins, Colorado: Natural Areas Department staff, King County, Washington's Water and Land Resources Division, and Boulder County, Colorado's Parks and Open Space staff.

Enabling Conditions: Resolutions

Borough of Kinnelon, New Jersey: Pledge of Municipal Support for New Jersey Wildlife Action Plan (2013)

The Borough of Kinnelon mayor and council passed a resolution in 2013 supporting the New Jersey Wildlife Action Plan, including text noting that the Borough "*will protect wildlife habitats and maintain connectivity of habitat when formulating an open space acquisition strategy, open space stewardship plans and through the municipal master plan including planning and zoning ordinances*."

Several counties in New Mexico - Resolutions in Support of Protecting Wildlife Corridors in the Upper Rio Grande Basin (2019)

Several New Mexico counties (including Rio Arriba, Santa Fe, San Miguel, and Taos County, as well as several municipalities) adopted similar resolutions supporting passage of the Wildlife Corridors Conservation Act, introduced in Congress in May 2019. These resolutions also urged the Carson, Santa Fe, and Rio Grande National Forests to establish special management areas for wildlife habitat connectivity. The policies emphasize that wildlife resources are "fundamental" to each county's "*history, culture and identity*" and highlight "*the need and opportunity to foster increased collaboration among state, federal and tribal natural resource managers to promote and protect landscape connectivity*."

Enabling Conditions: Human-Wildlife Coexistence Strategies

Fort Collins, Colorado: City of Fort Collins Natural Areas Department - Wildlife Conservation Guidelines (2017)

This document puts forth general management strategies for City-managed natural areas in the urban and rural setting. Includes language such as:

- *Identify movement corridors connecting habitats and conserve through easement, acquisition, or by structural modification (e.g., culvert placement, fence modification, fence removal)*
- *Movement corridors or areas with high levels of use will be considered when developing recreation plans, and specific actions include conservation and management of wetlands and ponds that serve as breeding pools, identification and conservation of dispersal corridors, and ensuring good water quality by maintaining protective vegetative buffers around water bodies when possible.*
- *Continue to construct and alter fencing to allow a variety of wildlife species safe passage.*

Town of Snowmass Village, Colorado: Municipal Code - Seasonal Wildlife Closure Areas Ordinance (2024)

To protect seasonally sensitive habitat for wildlife, Snowmass passed an ordinance within its municipal code closing specific recreation trails at different times of the year. Snowmass's Animal Services Division enforces this ordinance by penalties.

City and County of Missoula, Montana: Bear Buffer/Mitigation Zone (2010/2023)

Missoula's Bear Buffer Zone was initially established in 2010 as part of the city's original wildlife feeding ordinance. A Missoula Human-Bear Conflict Management Plan (2022) details approaches to secure attractants. In 2023, the Missoula City Council and County Commissioners adopted a joint resolution supporting bear-smart policies for Missoula, committing the city and county to address the root causes of human-bear conflicts. The resolution uses a combination of public education and promotion, ordinance, and enforcement. It includes an extensive buffer zone where garbage and attractants must be contained in a bear-resistant manner. The Missoula Public Health department is responsible for enforcement.

Wildlife crossing structure (overpass) on State Hwy 9 in Colorado. Grand County, CO helped pay for the crossing structure. Credit: CLLC/Kylie Paul.

Examples: Wildlife Crossing Structures

Chaffee County, Colorado: Land Use Code (2024)

Several standards require wildlife considerations related to roads. One design standard falls within the chapter related to roads and another applies to all development within the county such that "*development that occurs on a subject property that contains high or highest quality habitat shall be designed and operated so that wildlife identified in the wildlife report, including aquatic species, are afforded safe passage through the development and across its roads*."

Sample Text

Section 3.2.2.1 Road Layout and Design - *Design for Safe Passage Wildlife. Where road impacts to habitats, big game migration corridors, and big game winter ranges cannot be avoided, the impacts of roads shall be minimized and mitigated using contextually appropriate design techniques to provide for safe passage of wildlife (e.g.,*

depending upon the nature of the resource, signage, reduced design speeds, narrow widths, traffic calming, wildlife passage structures, wildlife fencing, at-grade crossings, and periodic or seasonal closures).

Pima County, Arizona: Several Components of Planning and Implementation

Pima County Wildlife Connectivity Assessment: Detailed Linkages (Coyote-Ironwood-Tucson Linkage Design) (2012)*:* Several counties in Arizona developed Wildlife Connectivity Assessments through county-level stakeholder workshops, building upon a statewide Arizona Wildlife Linkages Assessment put together by state and federal agencies and nonprofit partners from 2004 through 2006. In Pima County, the county-level assessment suggested five priority areas for detailed linkage designs and implementation.

Wildlife Crossing Structures*:* Pima County voters approved excise taxes to support a Regional Transportation Authority (RTA) with $45 million allocated for the construction of wildlife crossings as early as 2006. These funds, in conjunction with further study by the Arizona Department of Transportation and Fish and Game Department, led to the construction of the Oracle Road wildlife overpass and underpass across/under a six-lane highway in 2016 and other projects have been undertaken or are underway. As part of this process, the Regional Transportation Authority has sponsored "detailed linkages" analyses to protect connectivity between wildland blocks.

Conservation Lands System (CLS)*:* Included mapped and prioritized Critical Landscape Connections, using overlay zoning and development regulations to protect biologically sensitive areas. Policies guide land use decisions within CLS-designated zones and require consideration of impacts on wildlife corridors, ensuring that development does not compromise connectivity. The County notes that *"the County comprehensive plan is guided by the CLS 'roadmap' that was developed with the assistance of over 150 contributing scientists and based on local studies of the land*."

Sonoran Desert Conservation Plan (SDCP)*:* Regional planning approach, implementing landscape-level conservation tools such as inclusion of biological information into the County's Comprehensive Land Use Plan and purchase and lease of conservation lands.

La Plata County, Colorado: Several Components of Planning and Implementation

Land Use Code *(2020)* and Comprehensive Plan *(2017)*: Both documents include policies aimed at safeguarding wildlife habitat, and the LUC references wildlife migration routes.

Best Management Practices for Wildlife and Roads in La Plata County *(2010)*: A document prepared for the county, *"to be used as a guide to assist with planning, design, and implementation of appropriate transportation-related wildlife BMPs for projects occurring within the county."* This document was not formally adopted.

Living with Wildlife Advisory Board*:* According to the 2017 *Comprehensive Plan,* the board "*advises the La Plata County Commissioners on methods of preventing and resolving wildlife conflicts which includes providing public education for drivers."*

County Mapping Tool*:* Includes wildlife crossing structures on the map.

Memorandum of Understanding between the Colorado Department of Transportation (CDOT), Colorado Parks and Wildlife (CPW), and County of La Plata (2023): An agreement between CPW, CDOT, and La Plata County outlining responsibilities for collaborating on transportation and land use development projects. It includes making recommendations to ensure the effectiveness of crossing structures and facilitating resource sharing and communication. Planning department staff is supposed to identify potential development projects adjacent to a crossing for consultation and negotiation during the development review process. At this time, there have been few opportunities to implement the MOU. This MOU is not available online.

Summit County, Colorado: Summit County Safe Passages for Wildlife: A County-Wide Connectivity Plan for Wildlife (2017)

The Summit County Safe Passages coalition of local governments, state and federal agencies, community groups, and nonprofit organizations developed the plan in 2017. The County formally endorsed the plan in 2019 in a resolution that noted: "*The Summit County Safe Passages Plan is a guidance document to support the integration of wildlife movement needs into transportation projects, land use planning and land management in Summit County.*"

Lake County, Florida: Comprehensive Plan (2010/2025)

This plan includes several references to wildlife crossing structures, in addition to wildlife corridors. The policies are associated with specific areas or districts and are also found within the Transportation Element. For instance, the plan includes a Florida Black Bear Scenic Byway Corridor Overlay District with language to establish standards for the "*creation and maintenance of a safe corridor for people and wildlife, including the provision of wildlife crossing structures.*"

Sample Text

The County shall support structural modifications to roads within the Wekiva River Protection Area and generally within the Wekiva-Ocala ecological corridor for wildlife movement. Lake County shall coordinate with transportation and conservation agencies regarding the provision of crossing structures for bear and other wildlife, including underpasses and spans, to be integrated into the design of the Wekiva Parkway and appurtenant roadway facilities. Further, the County shall cooperate with and encourage the Fish and Wildlife Conservation Commission and transportation agencies to study wildlife crossing structures for SR 40, SR 44, and CR 42.

Movement of Wildlife Crossings policy: Collaboration with the Florida Fish and Wildlife Conservation Commission (FFWCC), the U.S. Fish and Wildlife Service, and the Florida Department of Transportation shall be required to establish standards and locations for the movement of wildlife on public roads and other corridors, as well as ensuring the crossings or corridors are of the appropriate size.

Durham-Chapel Hill-Carrboro Metropolitan Planning Organization, North Carolina: Wildlife Crossings Plan (2024)

This regional agency developed a wildlife crossing plan for its planning area to improve roadway safety for both humans and wildlife and approved it in 2024. It notes that "*the following steps were identified and implemented to help meet this goal*," including *"Adopt recommendations in local, state, and MPO transportation plans and processes, so that all new road and bridge projects that cross wildlife corridors and core areas are informed by the recommendations from the start. This entails the DCHC MPO Board and NCDOT Board of Transportation adopting relevant projects…and local councils and county board of commissioners adopting relevant changes to local ordinances.***"**

Loudoun County, Virginia: Prioritizing Wildlife Crossings in Loudoun County, Virginia report (2023)

Local-level officials in Loudoun were inspired to take similar action after the release of Virginia's Wildlife Corridor Action Plan in 2023, which identified state-level priority areas for wildlife crossing projects that would improve driver safety and wildlife habitat connectivity. Connectivity components had previously been included in county planning documents but without local mapping and prioritizing, it was challenging to undertake. Further information can be found in Virginia's Habitat Connectivity Hub.

Case Studies: Wildlife Crossing Structures

These communities directly incorporate wildlife crossing structures plans or policies and are described in the Case Studies section.

- Maricopa County, Arizona
- Douglas County, Colorado
- Pasco County, Florida
- City of Eagle Mountain City, Utah
- Town of Jericho, Vermont
- Teton County, Wyoming

A wildlife underpass tunnel installed under a road in Monkton, Vermont to help pass small- and medium-sized animal species, and specifically to help amphibians. Credit: Vermont Agency of Transportation.

Examples: Connectivity-related Definitions and/or Descriptions

Clearly defining or describing wildlife corridors, wildlife habitat connectivity, and related concepts is essential to ensure consistent understanding among stakeholders and to support the development of effective conservation policies. A formal definition provides a basis for integrating corridor protection into zoning, development review, and other comprehensive planning efforts. It also strengthens the legal and strategic foundation for regulatory and non-regulatory measures aimed at preserving habitat connectivity and biodiversity. Sample definitions follow.

Sample Text: Connectivity-related Definitions and/or Descriptions

Forest Fragmentation: The division or physical conversion of a contiguous tract or block of resource land identified for protection under these regulations, including forest land, farmland and critical wildlife habitat, by any land development other than by a recreational trail or use exempt from municipal land use regulation. [This includes

the subdivision of resource lands into smaller parcels held under separate or independent management, and the extension of roads and driveways that result in noncontiguous, isolated and remnant resource land that can no longer physically sustain its ecological or productive functions.] **Town of Bolton, Vermont: Land Use and Development Regulations**

Wildlife Habitat Connector: A "habitat connector" as defined under 24 V.S.A. § 4302, including land or water that links wildlife habitat within a landscape, allowing the movement and migration of animals and plants and the functioning of ecological processes. May include recreational trails and agricultural and silvicultural uses currently exempt from municipal land use regulation. For purposes of these regulations, potential wildlife travel corridors include those initially mapped in the 2013 Science to Action Report, as referenced in the Bolton Town Plan, or more recently by the Vermont Agency of Natural Resources, and are subject to field identification and verification by the applicant. **Town of Bolton, Vermont: Land Use and Development Regulations**

Large, contiguous expanses of habitat that provide connectivity between critical areas enable migration and reduce human conflict are most valuable to wildlife. However, small areas can also provide critical habitat and may be just as important to ensuring countywide habitat connectivity. **Teton County, Wyoming: Comprehensive Plan**

Examples: State Programs Providing Support for Local Governments

Vermont - Community Wildlife Program

Vermont's Agency of Natural Resources' Vermont Fish and Wildlife Department has a Community Wildlife Program that provides valuable resources regarding land use planning and land management. It offers technical services to towns, regional planning commissions, and nongovernmental organizations to help find natural resource information, review town planning documents, connect with other partners, and focus on a larger regional scale for planning. The program hosts webinars relating to land use planning and wildlife, such as 'Better Zoning to Prevent Forest Fragmentation' and 'Demystifying Subdivision Regulations: Reducing Sprawl Development and Forest Fragmentation.' It provides valuable documents such as Conserving Vermont's Natural Heritage, which shares recommendations on land use planning conservation goals and strategies to protect habitat corridors, among other natural resources. In addition, Mapping Vermont's Natural Heritage serves as a guide for municipal and regional planners, providing background on the state's natural landscape, town-specific natural resources maps, and a step-by-step approach for balancing ecological priorities with other community goals.

North Carolina - Green Growth Toolbox program

The Green Growth Toolbox is a technical assistance program developed by the North Carolina Wildlife Resources Commission (NCWRC) to help local governments, planners, and developers integrate wildlife habitat conservation into land use planning and development decisions. Two full-time NCWRC employees provide technical assistance to local governments, and the Partners for Green Growth is a cost-share funding resource offered to reimburse cost-share funds and 80 hours of technical assistance to local governments or partnerships to gather information for an ordinance, write plans, create a model ordinance, or to craft conservation development or land use guidelines to be considered by the governing board for adoption. The handbook Green Growth Toolbox: Nature-based Planning Solutions - A Guide for Planners, Communities, and Developers includes data tools, planning guidance, model ordinances, case studies, and technical support, and provides recommendations to reduce habitat fragmentation and maintain wildlife travel corridors. It includes a 'NC Model Natural Resources Conservation Ordinance.' The program offers training or informational programs called Lunch and Learns to connect and inform planners, architects, and consulting firms.

Maine - Beginning with Habitat Program

Maine's Department of Inland Fisheries and Wildlife has a robust Beginning with Habitat program, which "*helps Maine municipalities, landowners, and land trusts build habitat conservation into their long-term plans*." The program provides in-person technical services for communities, with several staff including a Municipal Planning Biologist, a Private Lands Wildlife Biologist, and a GIS and Climate Coordinator. Staff provide conservation strategies, maps, and information on location and quality of natural resources like wildlife habitat, wetlands, and large unfragmented landscapes, to help "*Maine municipalities make scientifically informed choices about where to encourage development and where to focus their conservation efforts*." The interactive map includes layers focusing on conservation and connectivity planning resources such as undeveloped habitat blocks, undeveloped block connectors, riparian connectors, and highway bridge connectors.

New York – Conservation and Land Use Program

The Department of Environmental Conservation's Hudson River Estuary Program has a Conservation and Land Use Program, which helps communities and partners identify conservation priorities and apply planning principles. It provides municipalities, land trusts, watershed groups, and others with data, mapping tools, training, technical assistance, and potential grant funding to plan and conserve key lands and waters. Land use planning guidance documents include Creating Conservation Overlay Zoning: A Guide for Communities in the Hudson River Estuary Watershed. Further, this program manages the Amphibian Migrations and Road Crossings Project.

Florida – Florida Wildlife Conservation Guide

The Florida Fish and Wildlife Conservation Commission has a collaborative, online Florida Wildlife Conservation Guide that includes resources regarding habitat and species needs, requirements, and management considerations. The Development Planning section provides resources and examples of local government plans and regulations related to environmentally sensitive and wildlife-friendly development practices.

Washington – Land Use Conservation and Policy Section

Washington Department of Fish and Wildlife's (WDFW) Habitat Program and Land Use Conservation and Policy section works, in part, to develop habitat connectivity land use management recommendations for local jurisdictions, as all cities and counties in Washington must designate and protect five different critical area types, including Fish and Wildlife Habitat Conservation Areas. Each WDFW district has a planner on staff to act as technical advisor to local government planners and others. WDFW has produced numerous management recommendations for local governments for wildlife species and habitats under their Priority Habitats and Species program. They provide spatial data and technical assistance to help planners designate and protect critical habitat.

7. CASE STUDIES

Case Study: Cities of Buckeye and Surprise, Arizona, within Maricopa County

Rapidly growing cities within Maricopa County, Arizona—an area experiencing exponential population growth and already the most populous county in the state — have put forth guidance documents to help maintain ecological connectivity within their boundaries and among regional parks and surrounding mountains.

Nestled among the White Tank Mountains and Hassayampa and Gila Rivers, the City of Buckeye manages a 640-square-mile planning area. Several policies in the city's 2022 General Plan highlight its goal of maintaining connectivity among regional parks and large habitat blocks, such as mountain ranges in its vicinity, and along rivers and washes within its planning area. The Plan states: "*Habitat fragmentation leads to changes in species diversity and can lead to local, regional, or species level extinction of native flora and fauna. It is important to retain wildlife habitat connectivity as Buckeye grows in the form of protected wildlife corridors. Wildlife corridors of natural desert landscape also provide other ecosystem services such as urban cooling, water capture and recharge, and scenic nature viewing for residents and visitors*."

Buckeye's recently updated Parks and Recreation Master Plan includes a detailed corridor map and considerations for connectivity planning, in its chapter on Open Spaces, derived from a 2024 Conceptual Wildlife Linkage Report, authored by the nonprofit White Tank Mountains Conservancy with the participation of Arizona Game and Fish. The Report details the planning process and research and data used to develop a wildlife linkage footprint in conjunction with the White Tank Mountains Conservancy's Regional Connectivity Initiative.

Adjacent to Buckeye, the City of Surprise is protecting its natural drainages and wildlife corridors, buffered by recreational greenways as a connected Open Space System. In both cases, the cities seek to maintain buffered natural washes along with constructed features as part of critical flood control infrastructure and underscore the co-benefits of maintaining open space as development continues.

Both cities contain entitlements to master planned communities (MPCs) that have yet to be developed, including 240,000 homes across 27 MPCs in Buckeye, according to the city's General Plan. Realizing each city's vision of connected open space networks depends on a mix of tools to achieve the connectivity goals and policies of their General Plans. For example, Surprise intends to maintain areas defined as Scenic Lands with slopes of 20% or more as largely open by allowing density transfers. Further, the city's Planning and Engineering Design Standards include requirements for setbacks from washes and floodways, along with identification and preservation of environmentally sensitive lands, and their integration into a development's open space system. Buckeye's city ordinances state that "*open spaces should be connected together to provide continuity*" and also require the protection of natural features, including "*native trees, watercourses, riparian areas, historic monuments, and similar irreplaceable assets*." Development must "*preserve and utilize natural topography and geologic features, scenic vistas, native trees, and vegetation, and prevent the disruption of natural drainage patterns*."

Buckeye's Wildlife Corridors Best Practices Guide—which will be amended to reflect much of the location and design recommendations of the findings of the more recent Conceptual Wildlife Linkage Report—illustrates a range of 'wildlife friendly' design elements and practices at the scale of an individual lot, neighborhood, or large development as examples for use by MPCs. The Guide also describes the use of tools such as density bonuses for open space conservation. Additional concepts include riparian area and wildlife corridor treatments by terrain and native landscaping. The guide states that "*From the evaluation of community master plans and amendments to commercial and residential design review to County Projects, City planners use this Guide to facilitate the discussion about planning within wildlife corridors to establish continuity*."

The work of both cities is further buttressed by the County's Vision 2030 Comprehensive Plan, which includes policy to protect important plant and animal habitat and migration corridors, wildlife habitat connectivity and

linkages, open space and connections, floodways and floodplains, water conservation, and hillsides of greater than fifteen percent slope. Its Natural Resources Master Plan describes the need to maintain ecological connectivity such that development does not preclude "*Maricopa County Parks' ecological function, biological diversity, sustainability, conservation, future preservation, and recreation potential*."

Moreover, the region benefits from a 2012 Wildlife Connectivity Assessment developed through stakeholder consultation under the auspices of the Arizona Wildlife Linkages Workgroup, a collaborative of federal and state agencies and nonprofit organizations with the involvement of local agencies. Earlier statewide assessments, such as the 2006 Arizona Wildlife Linkages Assessment and related modeling of linkages among protected areas within and near Maricopa County have also been carried out.

Documents

City of Buckeye Wildlife Corridors Best Practices Guide (2024)
City of Buckeye - Imagine Buckeye General Plan 2040 (2022)
City of Buckeye Parks and Recreation Master Plan (2025)
City of Buckeye Parks and Recreation Master Plan (2016)
City of Surprise 2040 General Plan (2024)
City of Suprise Planning and Engineering Design Standards (2020)
White Tank Mountains Regional Connectivity Initiative Conceptual Wildlife Linkages Report (2024)
White Tank Mountains Regional Connectivity Initiative story map
Maricopa County Natural Resources Master Plan (2024)
Maricopa County Vision 2030 Comprehensive Plan (2016)
Maricopa County Wildlife Connectivity Assessment (2012)
Arizona Wildlife Linkages Assessment (2006)

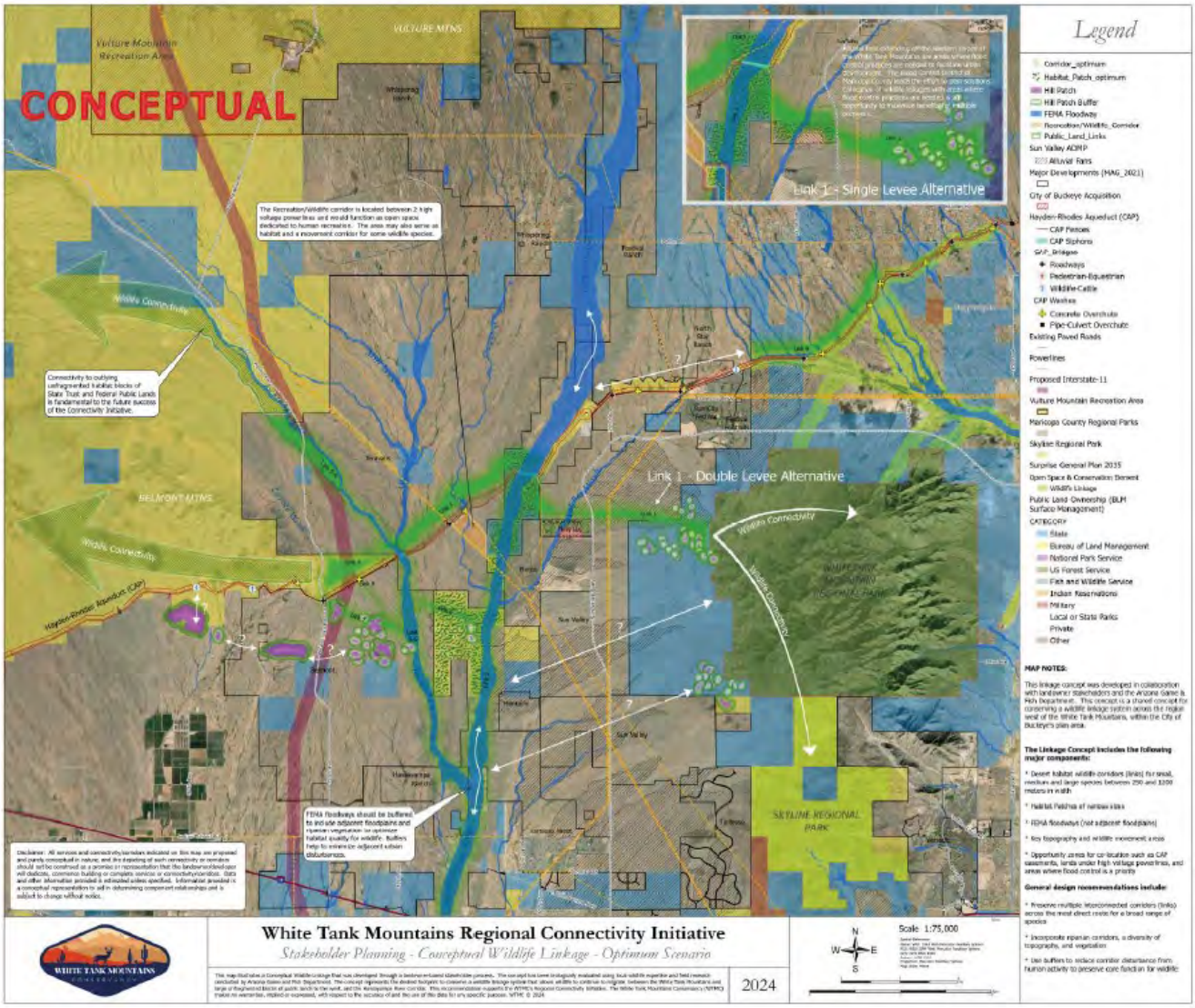
Key Takeaways

- A significant, nonprofit-led regional connectivity initiative (see White Tank Mountains Conservancy story map, above) has engaged with state and local agencies, the public, and developers over time, while putting together key science and data needs, and building public support.
- The City of Buckeye has served a long-time leadership role.
- City and county connectivity planning is integrated across agencies and departments.
- State-led connectivity assessments and involvement by Arizona Game and Fish and the Arizona Department of Transportation have taken place over decades.

Sample Text

City of Buckeye, AZ – Imagine Buckeye General Plan 2040 *The City of Buckeye will continue its collaborative efforts with the Arizona Game and Fish Department, developers, property owners, and advocacy groups, such as the White Tank Mountains Conservancy, to plan, design, and implement solutions for barriers to wildlife passage through washes, drainage ways, and other open space corridors where appropriate.*

City of Buckeye, Arizona – Imagine Buckeye General Plan 2040 – Wildlife Crossings *The City of Buckeye should provide for wildlife crossings where needed in the transportation plan.*



Conceptual Wildlife Linkage map, Chapter 6 of City of Buckeye Parks and Recreation Master Plan (2025)

Case Study: Douglas County, Colorado

"Much of the success of Douglas County's program comes from our master plan and regulations, our proactive open space and land conservation program, and collaboration with our partners. But an often-overlooked component of our program is long-term staff that have an eye for the nuances of the plan, that can identify and maximize opportunities early as well as recognize and minimize potential impacts before they occur." ***Andy Hough, Environmental Resources Coordinator, Douglas County, pers. comm 2025***

Just south of the Denver metropolitan region, Douglas County, Colorado has employed a range of tools to address regional open space and ecological connectivity for its many residents and elk, mule deer, bighorn sheep, and other wildlife along the Front Range.

Even in the face of high population growth, Douglas County's policies have directed development intensity, and 90% of the area's population live in designated urban areas, which make up 20% of the land. In 2019, Douglas County updated its Comprehensive Master Plan to guide growth through 2040 and more fully highlight ecological connectivity for wildlife. The Plan's Wildlife Resources Map identifies and assigns priority to connections among three tiers of habitat: large habitat blocks including national forest and regional open-space areas, moderately-sized areas that are "*contained within, or shaped by, development*", and parcel-level habitat on individual residential or commercial lots. Critically, specific wildlife habitat conservation areas, movement areas, and overland connections are identified.

Multiple policies within the Plan support these designations, which are geared to: "*maintain healthy ecosystems within the county by establishing, maintaining, buffering, and improving a set of core habitat areas, such as habitat conservation areas (HCAs), connected by movement corridors and overland connections….*" Examples of supporting policies are: "*link wildlife habitat and movement corridors, wherever possible,"* and "*locate development outside of important wildlife habitat and movement corridors."* Subdivision and zoning regulations—which include areas zoned for agriculture and for open space conservation—reinforce the policies, together with the county's land use review process. Density bonuses for cluster design are one tool the county draws upon, along with a requirement for wildlife management and habitat conservation plans for development proposed in high-value wildlife habitat areas, and stricter review and mitigation requirements for development in moderate-value wildlife habitat, as included in the Wildlife section of the Comprehensive Master Plan.

Douglas County began protecting open space over 30 years ago using tools such as conservation easements for working lands and fee title purchase, funded by a sales tax (0.17%) to support Parks, Trails and Open Space and Use, approved by voters in 1994 and renewed in 2022. Among other features, the tax can help protect wildlife habitat and movement corridors, including "*critical wildlife habitat resources and movement corridors including wetlands; riparian areas; and fragile ecosystems and areas of undisturbed, native vegetation*." To date, these funds have been matched 3:1 by outside sources and used to conserve more than 65,000 aces. The county identified essential habitat connections between areas protected using these funds and nearby open space, with the help of Colorado Department of Parks and Wildlife in its 2012 Parks, Open Space and Recreation Master Plan.

The county also helped to initiate a network of planned and existing wildlife crossings along Interstate 25, US Route 85, and State Highway 83, some of which stem from earlier investment in conservation easements that, today, make up the largest conserved habitat block along Colorado's Front Range. Several crossings include habitat features that also provide cover for small fauna, including the federally threatened Preble's meadow jumping mouse. This achievement and future crossings are bolstered by the Comprehensive Plan, which states the County will "*balance the location and design of transportation infrastructure with accommodation of wildlife habitat and movement values."* The crossings and overland movement areas depicted on the Wildlife Resources Map serve as further reinforcement.

Documents

Douglas County Zoning Resolution (2024)
Douglas County Subdivision Resolution (2021)
Douglas County 2040 Comprehensive Master Plan (2019)
Douglas County Wildlife Resources Map
Douglas County Wildlife Planning & Corridor System
Douglas County 2030 Parks, Open Space and Recreation Master Plan (2012)

Key Takeaways

- A 30-year open space program supported by a voter-approved sales tax has brought about the largest open space block in Colorado's Front Range.
- Douglas County's Wildlife Resources Map—which arose from identification of ridgelines, protected lands, and riparian areas, followed by filling in connections based on expert knowledge—has served as a critical tool on which policy and regulations have been based.
- A combination of incentives and regulations, including density bonuses and zoning, has directed 90% of the population and associated development to 20% of the land.
- While planning documents support connectivity, the ability of long-term staff able to recognize opportunities, and the support of Colorado Parks and Wildlife and Colorado Department of Transportation, have been integral to success.

Sample Text

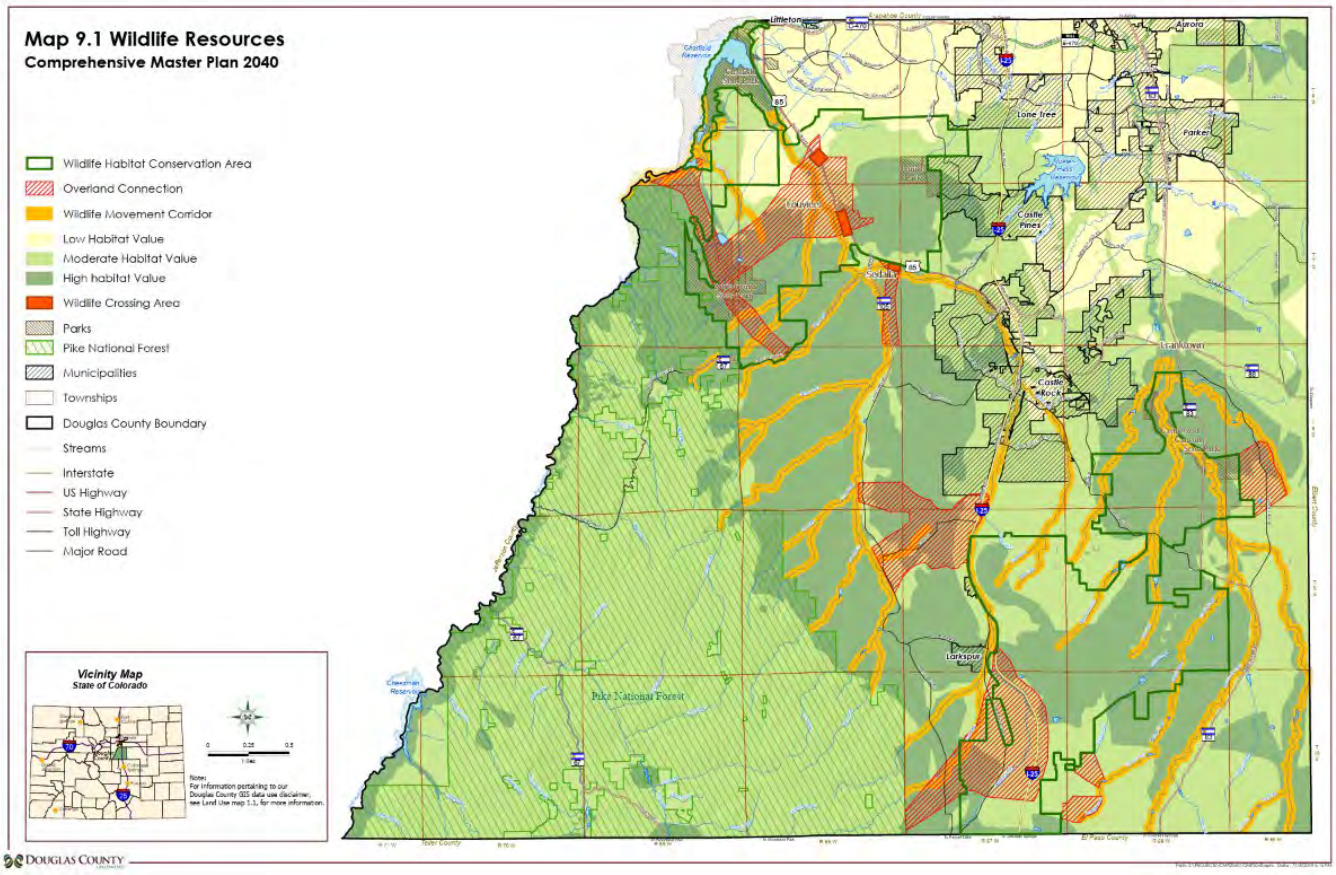
Douglas County, Colorado: Comprehensive Master Plan *– Wildlife Section 9*

Douglas County accommodates the long-term needs of wildlife by creating a habitat plan based on an ecosystem model. The County model relies on a system of large, core-habitat areas connected by movement corridors to various habitat types dispersed throughout the county. The CMP also acknowledges the importance of smaller habitat areas and corridors, including the open areas within residential lots.

Minimize impacts to wildlife by ensuring that development and land use are compatible with wildlife, wildlife habitat, and movement corridors.

Identify important wildlife habitat, habitat conservation areas (HCAs), movement corridors, and overland connections, as designated on the Wildlife Resources Map in applicable land use applications. Evaluate the potential impact of the proposed change in land use on wildlife and habitat. The identified design solutions should be appropriate to the scale and intensity of the proposed land use.

Balance the location and design of transportation infrastructure with accommodation of wildlife habitat and movement values.



Douglas County, Colorado Wildlife Resources Map (from Comprehensive Master Plan 2040)

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Case Study: Pasco County, Florida

"Acquisition of lands within the County's Ecological Corridors has been successful primarily due to the willingness of landowners to negotiate the purchase of their property for conservation. Through the Ordinance, we are also able to negotiate the purchase of properties in the Ecological Corridors not acquired through the Willing Seller Program. We also coordinate with surrounding counties to pursue corridor connections, including the Florida Wildlife Corridor." ***Jackie Jordan, Senior Biologist, Pasco County, pers. comm 2025***

Located north of Tampa in west-central Florida, Pasco County seeks to "*[p]rotect, conserve, enhance, and manage the natural land and water resources of Pasco County through a regional conservation strategy that protects the most significant natural resources of the County through a combination of standards for specified critical linkages, land acquisition, land use strategies, managing and preserving public lands, land use policies, wetlands, and water resources,"* as one of two main goals in the Conservation Element of its 2025 Comprehensive Plan. The strategy includes seven Ecological Corridors, initially designated as *critical linkages* in 2006, to preserve pathways between state, county, and other public lands to maintain connectivity for a range of species: spotted turtles, gopher frogs, ospreys, fox squirrels, bears, and river otters, among others. The corridors help to connect land within ecological planning units (e.g., sandhills, forest, inland wetland/river systems) identified in a 2002 Assessment of Measures to Protect Wildlife Habitat in Pasco County. The Assessment and subsequent linkage designation are the result of a legal settlement arising from a citizen-led lawsuit which alleged the county was not adequately protecting wildlife in accordance with its Comprehensive Plan. The settlement, as explained in the Comprehensive Plan, required that the county initiate a study to evaluate potential wildlife corridors linking major wellfields with existing public lands in Pasco and neighboring counties. The study was to identify the most appropriate methods for establishing and protecting these corridors.

Approximately 22% of Pasco County is conserved in a manner that protects natural resources. Larger protected areas were purchased in the distant past by the Florida Division of Forestry's Department of Environmental Protection and the Southwest Florida Water Management District, often for wellfield protection. More recently, Pasco County has protected sensitive lands, some of which overlap with the formal Ecological Corridors through a Penny for Pasco sales tax. Since 2004, a portion of this voter-approved tax—which has been reauthorized twice and extends to 2039—has provided significant funds for the county's Environmental Lands Acquisition and Management Program, known by its acronym, ELAMP. The Program has protected 6,255 acres, including portions of designated ecological corridors. According to ELAMP: "*By connecting a mosaic of both terrestrial and aquatic habitats, we increase the viability of populations of a multitude of species of both flora and fauna – including multiple listed* [i.e., threatened, endangered, or of special concern] *species, such as the gopher tortoise. This connectivity also helps to preserve countless ecosystem functions that greatly benefit the environment, the economy, and our daily lives*."

A decade after initially recognizing *critical linkages* in its Comprehensive Plan, the county adopted a regulatory framework for their protection on private land and renamed them Ecological Corridors. The designated corridors are largely comprised—as much as 80%—of jurisdictional (state and federal) wetlands. Much of the adjacent areas are agricultural, especially in terms of cattle, hay, and citrus crops, however some have undergone residential and commercial conversion. In order to incentivize maintaining the designated corridors as open space, the county's Ecological Corridors Ordinance allows for increased density (additional residential square footage) or intensity (additional non-residential square footage or land uses) for transfer of development outside of a corridor, financial compensation in lieu of an increased density transfer, or a combination. Other incentives, such as increased lot coverages and building heights or relaxation of landscaping standards for development elsewhere can also be awarded. If incentives are accepted, corridor land becomes county property or is put into a conservation easement. Development in accordance with prior regulations within a corridor can proceed, provided there is no increase in density or intensity; ELAMP also funds purchases of land from willing sellers. Development of new roads is prohibited in corridors, unless they are the sole option to access a site, or part of the County's larger

highway vision, in which case wildlife underpasses—bridges or culverts depending on the species present—are required.

On parcels within an ecological corridor that transfer development to other areas or accept compensation in lieu of doing so, only a handful of uses, such as passive recreation, weed control, selective logging, and grazing, are allowed, and then only with prior county approval and an environmental management plan that demonstrates best practices. The county has developed a robust document, Guidelines for Implementation of Land Development Code Section 804: Ecological Corridors, to help landowners understand options and prohibitions. For example, "*[a]gricultural activities in existence prior to development approval may continue at the same intensity, so long as the activity has been included in the rezoning conditions, development order, or development agreement and does not fragment the corridor, reduce the ability of the corridor to function as a genetic exchange pathway and transit for wildlife, impede the flow of water, or alter the biological and ecological integrity of the corridor.*" Landowners not seeking to increase density or intensity on their properties may voluntarily opt into the ecological corridor requirements.

Documents

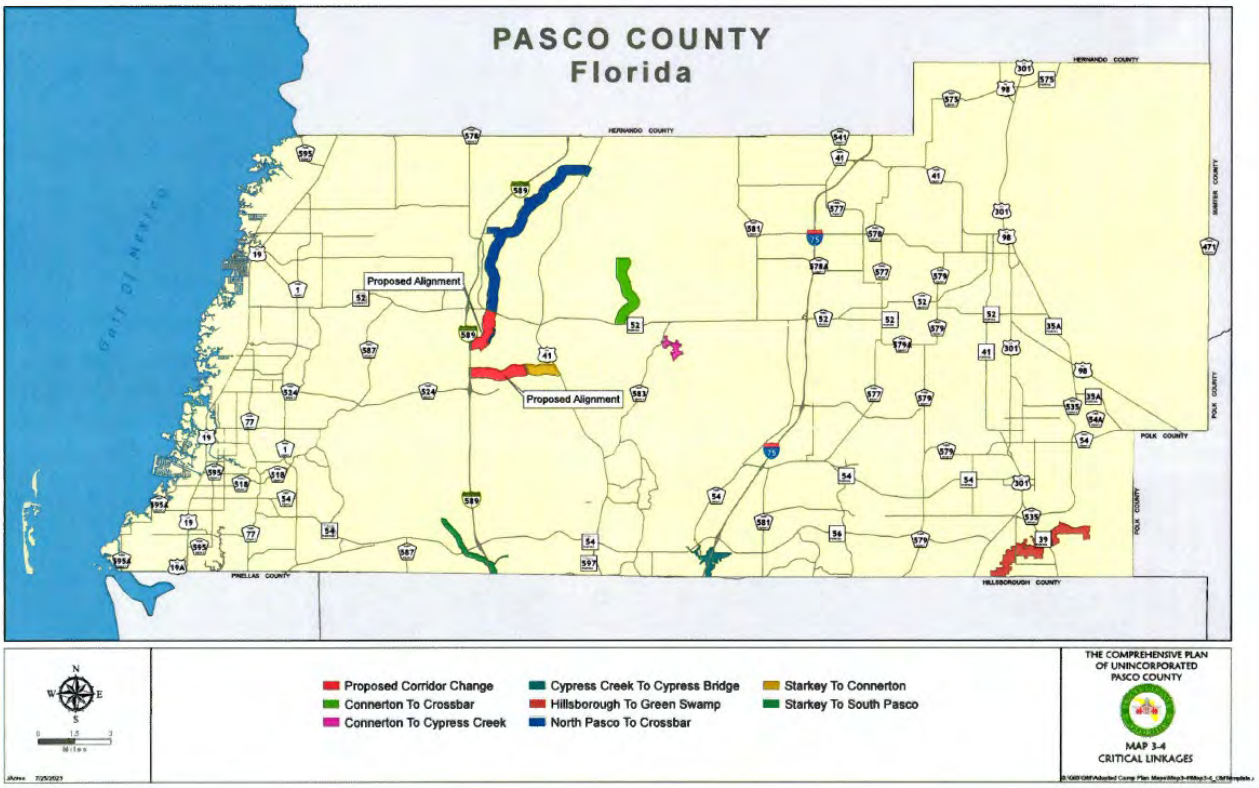
Pasco County Comprehensive Plan: Conservation Element (2020)
Ecological Corridors Ordinance (2016)
Guidelines for Implementation of Land Development Code Section 804: Ecological Corridors (2015)
What Are My Development Options if I Am Subject to the Ecological Corridors Ordinance (PDF)
Ecological Corridors Appraisal Process (PDF)
Environmental Acquisition and Land Management Program
Penny for Pasco
Assessment of Measures to Protect Wildlife Habitat in Pasco County (2002)

Key Takeaways

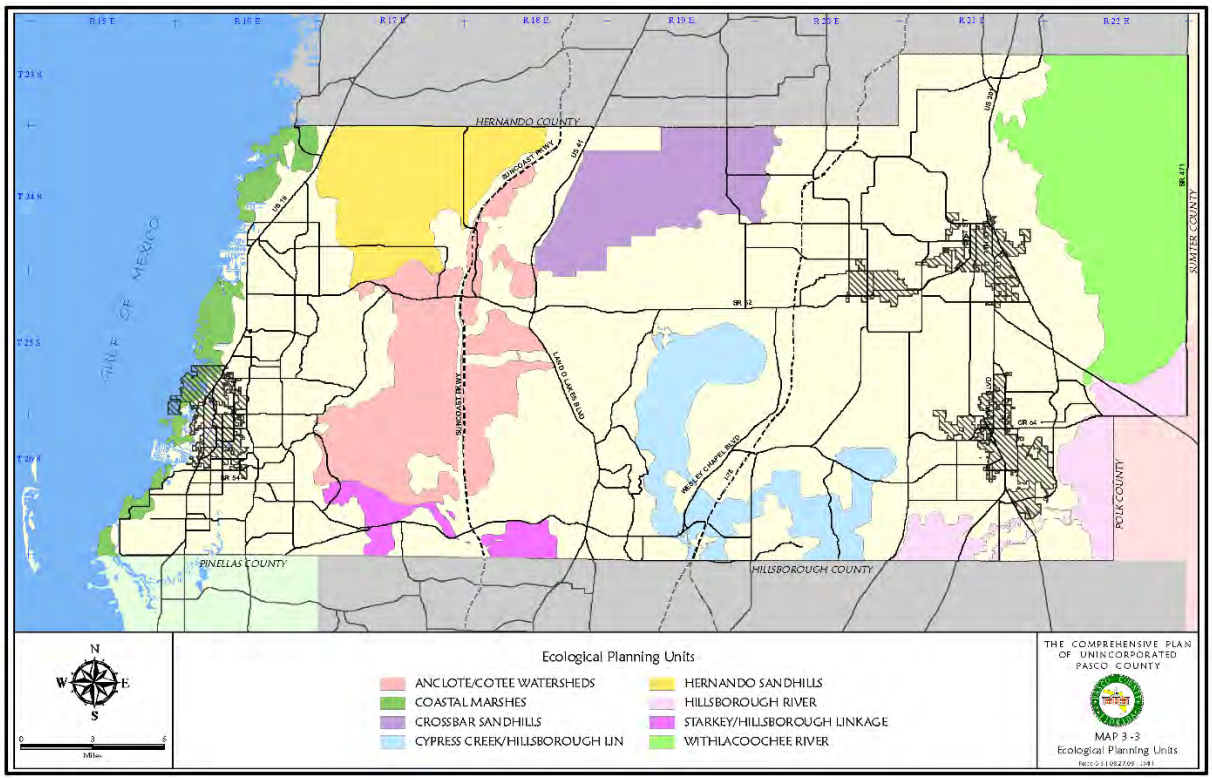
- Ecological Corridors connecting larger tracts of public land were formally designated to connect larger blocks of public land, more than a decade after a county-led habitat assessment was conducted as part of a settlement of a citizen-led lawsuit.
- Corridor integrity is maintained through incentives to transfer development outside of the designated areas and/or compensate landowners who seek to increase development density or intensity.
- A 20-year open space program supported by a voter-approved sales tax has enabled purchase of lands for conservation.
- Corridor implementation supports interconnected goals of state and county agencies, with emphasis on wetland and riverine conservation, and larger conserved areas are often the result of historic wellfield protection activities.

Sample Text

Pasco County, Florida: Comprehensive Plan – Wildlife Crossings *Prohibit local roadway crossings of all designated critical linkages unless this crossing is necessary and required as the only reasonable means of access to the uplands on a site. Any such crossing that is permitted for local roadways shall be required to provide a wildlife under crossing that is designed to accommodate the expected species of wildlife and the ecological conditions in the vicinity of the road and address the following issues: (1) Size and location (2) Type of crossing, including landscaping techniques (such as funneling). (3) Appropriate structural design. (4) Lighting. (5) Signage. (6) Fencing…Any crossings of any designated critical linkages for collector or arterial roadways or for utilities must be unavoidable and be minimized and shall be required to provide a wildlife under crossing.*



Critical Linkages map from Pasco County, Florida's Comprehensive Plan.



Ecological Planning Unit map from Pasco County, Florida's Comprehensive Plan.

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Case Study: Scott County, Minnesota

One of seven counties in the Twin Cities Metropolitan Area, Scott County describes identification and provision of *conservation corridors* and *open natural spaces* as part of a broader goal within its 2040 Comprehensive Plan to: "*respec[t] and manag[e] our natural, aggregate, agricultural and environmental resources – Our rivers and streams, lakes and wetlands, bluffs and river bottoms, wildlife habitats and significant natural and agricultural areas are preserved for current and future generations to enjoy."* The Plan describes doing so "*based on natural resource inventories"* and *"through the use of cluster development, density options, innovative site design, and through public-private partnerships."* Bounded to the north and west by the Minnesota River, the county's corridor protection emphasizes protection of surface water features, including wetlands. Resident surveys as early as 2005 identified protection of woodlands, wetlands, habitat areas, and ground water as priority issues to address in long-range planning.

The Natural Area Corridors program in the Comprehensive Plan includes a series of *corridor purpose statements* that describe the breadth of the county's goals for implementation of the corridors. These include: "*allow for movement of wildlife in order to meet their basic habitat requirements for feeding, breeding, and resting* and *provide connectivity between larger preservation areas."* The Plan highlights that*: "[d]esignating Natural Area Corridors is not intended to prohibit development. Rather, the intent is to guide development-related decisions as outlined within the…corridor purpose statements, and involves a combination of efforts to protect high priority natural areas under private ownership as well as public ownership in combination with parks planning*."

The Comprehensive Plan includes a map of county-defined Natural Area Corridors, defined as "*linear connection[s] of natural features* [connecting] *areas with known sensitive species or communities, unique natural communities, and high and medium quality natural communities*." The map is used to guide land use development decisions, and the County evaluates proposed development of property within a mapped Natural Area Corridor for protection of natural resources. Parcels located within a corridor may be eligible for cost-share programs for shore and wetland restoration or development of filter strips, among other options. Further, density bonuses for cluster development may be offered for permanent protection of natural areas through conservation easements. An outreach brochure, Creating a Natural Areas Legacy, describes transfer of development rights and participation in state or federal set-aside programs as additional possibilities. Additional thematic elements, policies, and attributes of the Comprehensive Plan, including a Planned Land Use Map and defined implementation options to achieve Natural Areas Corridors, reinforce Scott County's emphasis upon and use of incentive-based measures to maintain sensitive natural features and preserve open space and agricultural land.

In order to create the Natural Area Corridors map, multiple agencies—the Scott Watershed Management Organization, Watershed Planning Commission, Parks Advisory Commission, Planning Advisory Commission, Townships, and Soil & Water Conservation District Board—determined features and land types to be included. GIS data and land quality rankings from an early-2000s state Land Cover Classification System inventory, along with information from the Minnesota Department of Natural Heritage, serve as the basis of the map. As Scott County includes multiple local government units with natural resources responsibilities, one important goal of the Plan is integration of activities to "*[d]evelop a cohesive countywide land use pattern that insures compatibility and functional relationships among activities and between jurisdictions."*

Documents

Scott County 2040 Planned Land Use Map (Amended 2024)
Scott County 2040 Comprehensive Plan (2019)
Scott County Natural Area Corridors Map (2017)
Scott County Brochure: Creating a Natural Areas Legacy

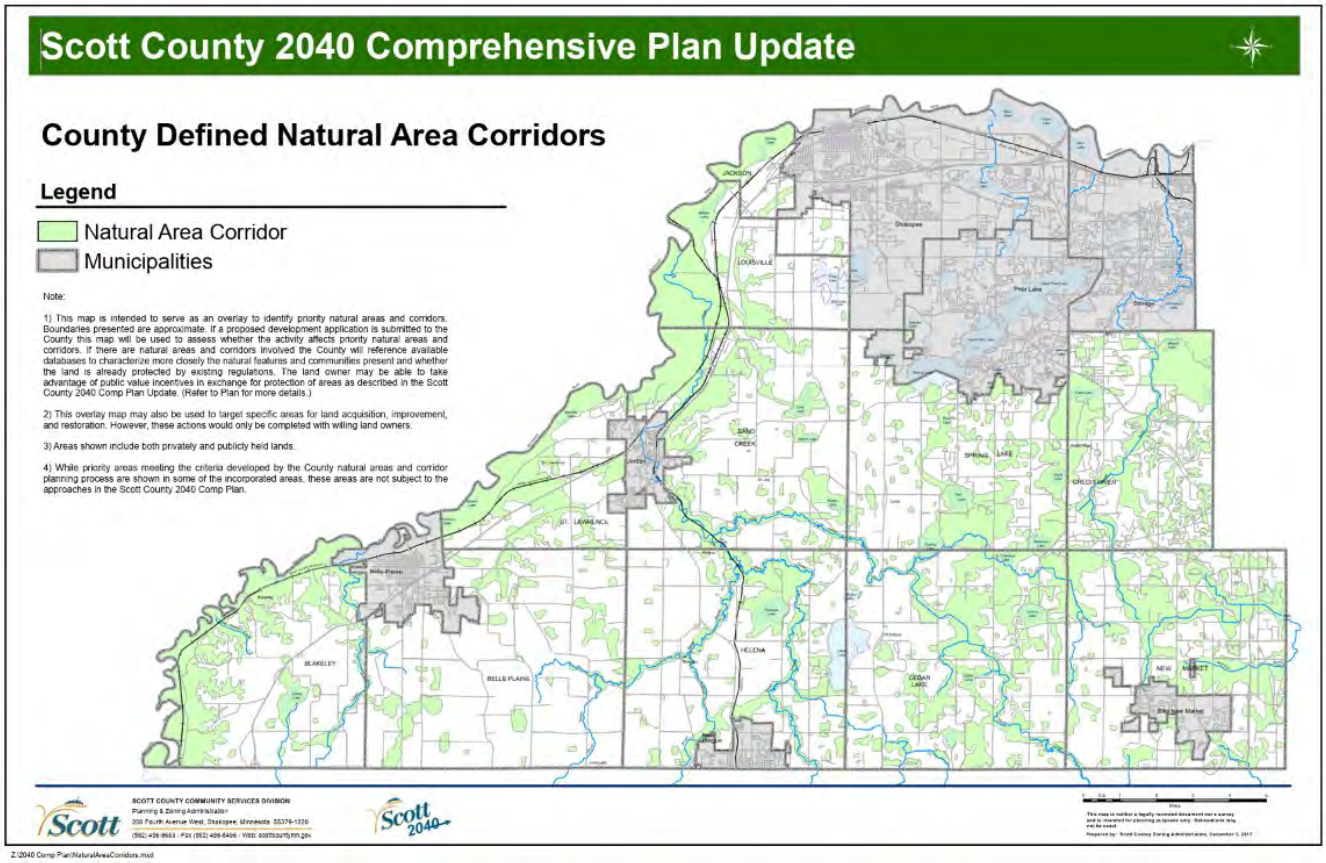
Key Takeaways

- A County-level Natural Areas Corridors map, based on state data, guides incentive-driven, voluntary, private land conservation efforts and parks development.
- Natural Areas Corridors planning and implementation guidance supports interconnected goals of multiple agencies with an emphasis on preservation of water quality and wetland conservation.
- The designation of Natural Areas Corridors is the outcome of 40 years of long-range planning and the concerns of residents expressed in county-wide surveys.

Sample Text

Scott County, Minnesota: Comprehensive Plan *Establish natural resource corridors that link and protect natural open spaces and environmentally sensitive areas, to retain the rural character of Scott County and provide for wildlife corridors.*

Scott County, Minnesota: Comprehensive Plan – Wildlife Crossings *Work to establish a regionally-focused land use and transportation planning process that will ensure the preservation and management of both "green infrastructure" (i.e., Natural Area Corridors) and "gray infrastructure" (i.e., highways, bridges). Consider Natural Area Corridors in the placement, design, and construction of transportation infrastructure.*



Scott County, Minnesota Natural Area Corridors map

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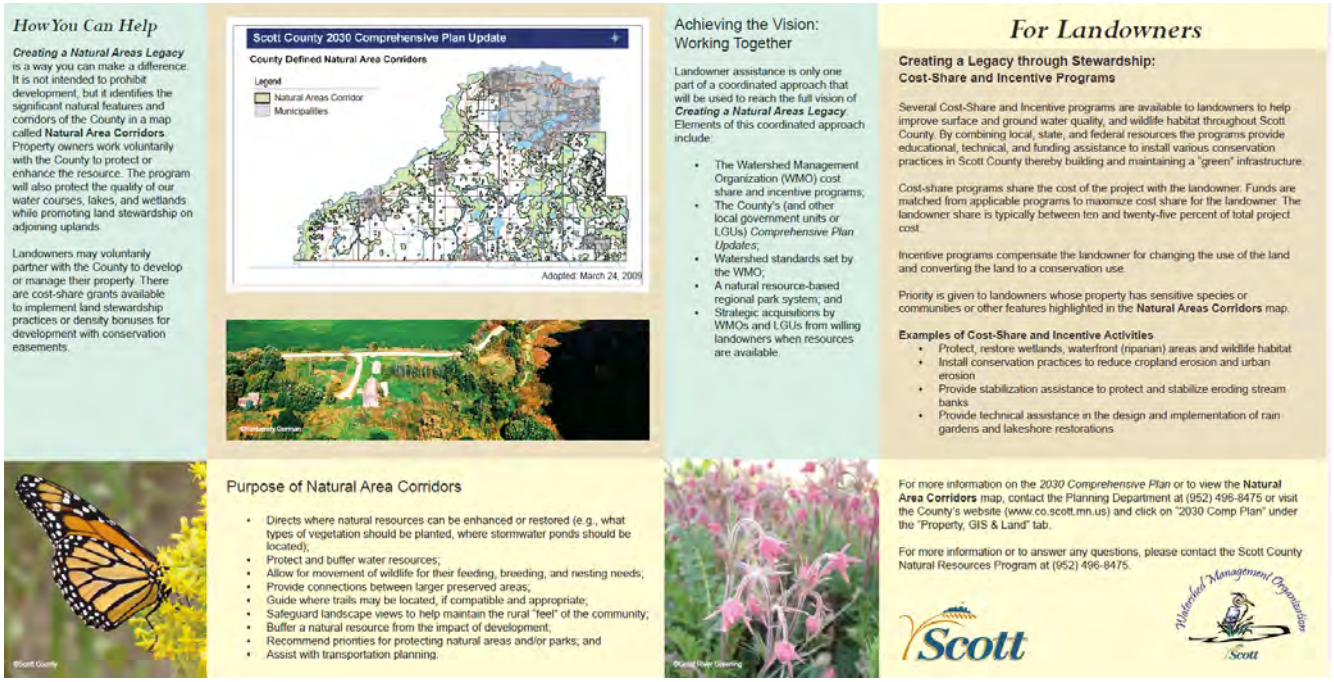

Brochure for Scott County, Minnesota's Natural Areas Legacy program

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Case Study: City of Eagle Mountain City, Utah

"This is a great example of using real data and science to make on the ground management decisions and to assist in implementing conservation strategies that not only protect wildlife and mule deer habitat but will allow for appropriate recreational uses and responsible growth within the City of Eagle Mountain." ***Todd Black, Wildlife Biologist and Open Space Manager, Eagle Mountain City, pers. comm 2025***

Eagle Mountain City, Utah, a rapidly developing area in one of the nation's fastest growing states, adopted policies and regulations to help maintain habitat and migration corridors, including formal designation of a city-wide Mule Deer Migration Corridor in 2021. The corridor—the first recognized in the state—extends from the northwest corner of Eagle Mountain City through its interior to meet up with Bureau of Land Management land on its western boundary; at present, only about 30% of Eagle Mountain City's 50-mile extent is built out. In the corridor, the city is *"restricting development in key areas, enhancing vegetation that supports a mule deer's diet, and installing signage to inform the public about the importance of the migration route to prevent deer-vehicle collisions."* Further, the city is working with federal and state agencies and nonprofits to fence the corridor, which will require 25 miles of fencing to cover its extent, along with as many as nine wildlife crossings. One underpass and one 'at grade' crossing exist at present, with five more 'at grade' crossings, another underpass, and an overpass anticipated (Todd Black, pers. comm 2025). The city's corridor is part of a critical movement pathway identified by the Utah Migration Initiative. The city's involvement stems from work by the Utah Department of Wildlife Resources and Utah Department of Transportation, along with citizen interest, to reduce wildlife-vehicle collisions by fencing a stretch of highway that runs through Eagle Mountain City.

In Eagle Mountain City's Wildlife Corridor Overlay Zone, *"no development shall occur in the critical mule deer migration corridor, except for safety mitigating measures and outdoor recreational amenities, [and then only] if the approval authority believes the amenity is in the public's best interest and will not significantly impact wildlife and the surrounding habitat."* Designation as unimproved parkland, conservation easements, and density transfers are tools listed as options to protect the corridor. Formulated to allow for additional designations for other essential wildlife corridors, wildlife habitat, and/or landscape linkages, the code *"does not change the underlying zoning, but establishes standards, requirements, and procedures for areas where an existing zone and the wildlife corridor overlay zone overlap*." A 330-ft minimum corridor width that *"the city shall make every effort to safeguard"* and a 75-ft buffer from natural washes are codified. Additional code language regulates safety lighting, fencing, or natural surface trails that may occur within a corridor to avoid fragmentation. Recently, the city adopted a Natural Open Space & Wildlife Habitat Management Plan in order to prioritize tasks to maintain the ecological integrity of city-owned natural open space in the Overlay Zone and elsewhere.

The city's 2020 Parks, Trails and Open Space Master Plan indicates other crucial and substantial mule deer and pronghorn antelope habitat within city limits, along with nearby elk habitat. One of the Plan's five objectives is to *"conserve, connect and enhance natural open space,"* along with supporting goals that the city "*use conservation easements, grant funding, and other preservation strategies to protect ridgelines, hillsides, and natural areas"* and "*create solutions to protect wild animal movement such as creating a designated wildlife corridor and protected roadway crossing."* Multiple strategies and policies in the Master Plan support these goals. One strategy is that the city will "*aim to ensure a network of connected open spaces to ensure they aren't disjointed and lose environmental and recreational value."* Subordinate policy examples are the city will: "*assemble open corridors and greenbelts, which may be linkages to existing open space or connecting nodes of development, trails, wildlife corridors or riparian buffers*; *incorporate and adopt wildlife crossings in all existing and future transportation plans,"* and *"work with [the state's Division of Wildlife Resources] to assist landowners in identifying potential funding assistance for fence design modifications to facilitate safe wildlife passage."*

The Master Plan also has two "*immediate*" open space goals: "*Eagle Mountain should embrace and enhance its identity as a City with unparalleled access to preserved open space, intact wildlife corridors, and spectacular vistas to create a unique legacy, positive economic impact, and elevated quality of life"* and *"As Eagle Mountain continues*

to develop, identify and preserve important wildlife habitat and migration corridors valued by citizens." While much of Eagle Mountain's existing open space is expected to be developed in a series of Master Development Plans, key initiatives of the city's 2018 General Plan are Meaningful Open Space & Amenities and Sustainable & Resilient Systems. The General Plan emphasizes interwoven benefits of "centered growth" in targeted areas to reduce travel time, provide walkable communities, improve air quality, conserve scarce water, and "*reduce growth pressure on the Wasatch Back*."

The city's key initiatives and the benefits enumerated are grounded within Wasatch Choice Vison, a "*four-county land use and transportation vision*" initiated in 2005. Utah County, where Eagle Mountain City is located, is presently updating its own General Plan with the support of the statewide Envision Utah planning entity. The latter states: "*Utah County finds itself in the spotlight at the epicenter of growth and transformation in the Beehive State. In many ways, Utah County's growth will determine the future of Utah.*"

Documents

Eagle Mountain City: Wildlife Corridor Overlay Zone (2024)
Eagle Mountain City: Natural Open Space & Wildlife Habitat Management Plan (2025)
Eagle Mountain City: Parks, Trails, & Open Space Master Plan (2020)
Eagle Mountain Mule Deer Migration Corridor map
Utah Migration Initiative: Eagle Mountain Deer Migration Corridor
Eagle Mountain City General Plan (2018)

Key Takeaways

- Extensive city connectivity planning has been initiated early in the city's growth trajectory while the area encompasses undeveloped land.
- The hire of a staff wildlife biologist for coordination and outreach has improved regulations and implementation activities.
- State-led connectivity assessments and cooperative work by the Utah Migration Initiative, Utah Division of Wildlife Resources, and Utah Department of Transportation have supported the process.
- The ability to maintain connectivity long-term depends on effective buffering of future development.

Sample Text

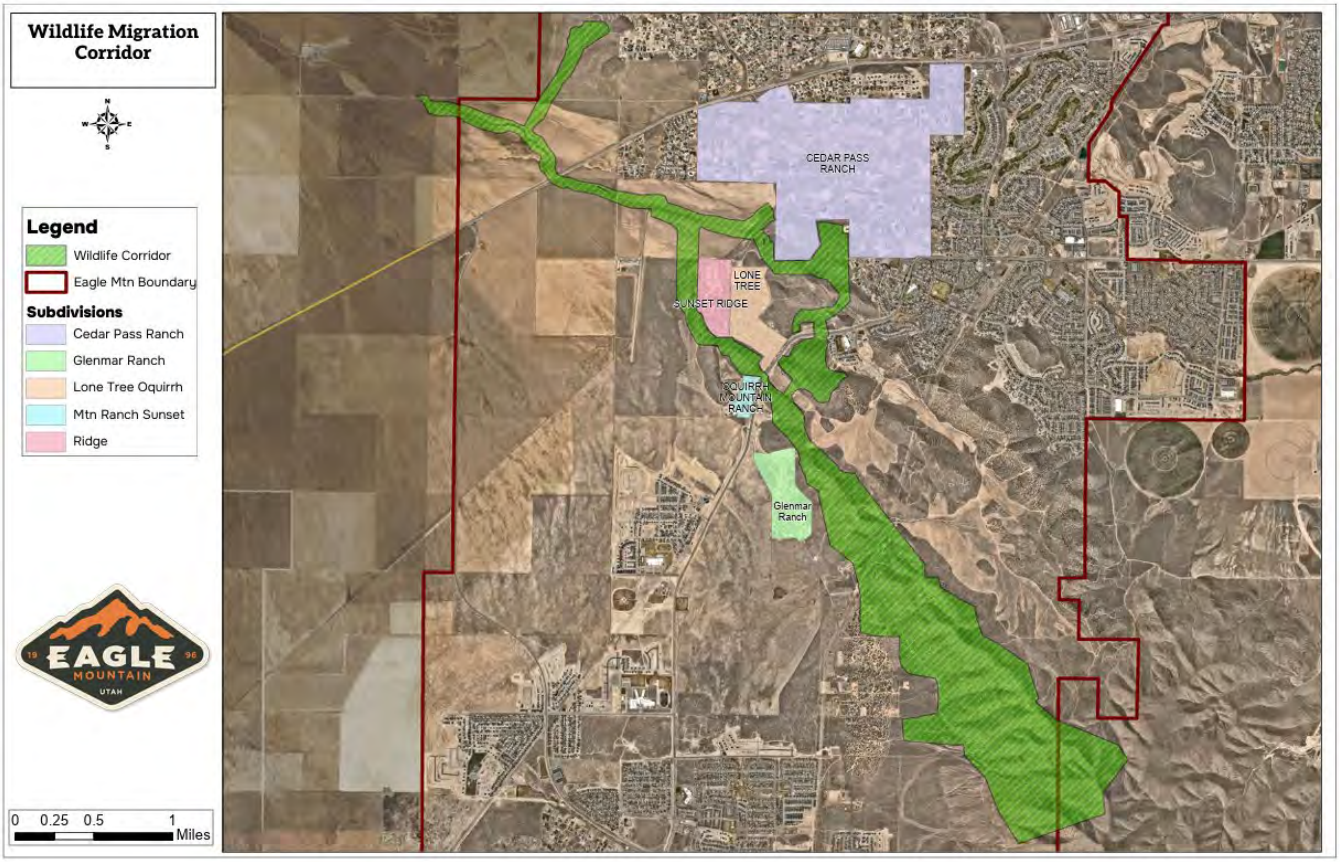
Eagle Mountain City, Utah: General Plan *Preserve wildlife migration routes and habitat, where possible…Utilize green subdivision design approaches - locate residential lots and infrastructure to protect valued resources such as view sheds, agricultural/grazing lands, watershed/hydrologic functions, and wildlife habitat and corridors in addition to unbuildable areas.*

Eagle Mountain City: Parks, Trails, and Open Space Master Plan *Strategy: Aim to ensure a network of connected open spaces to ensure they aren't disjointed and lose environmental and recreational value. Policy: Create and implement zoning overlays that provide protection to identified habitat corridors.*

Eagle Mountain City, Utah: Wildlife Corridor Overlay Zone *A new or amended wildlife corridor overlay zone shall include one or more of the following:*

- *Essential wildlife corridors, wildlife habitat, and/or landscape linkages.*
- *Areas identified using scientific data by city officials, county officials, state officials, non-governmental organizations, and/or federal agencies that can show seasonal habitat use within the home range of an individual species.*
- *Wildlife habitat areas used by species that are unique, rare, threatened, endangered, or otherwise deemed to be of significance to Eagle Mountain City; a listed species and/or critical habitat designation by the U.S. Fish and Wildlife Service; or a species and/or habitat of special concern to the Utah DWR, the Bureau of Land Management, and/or other government agencies.*

- *Natural geographic or topological areas such as gulches, washes, riparian areas, drainages, ridge tops, or other significant habitats are used to connect, link, and/or safeguard habitats. These may include watering areas and/or microhabitats such as natural riparian areas or traditional/historic nesting locations.*



Eagle Mountain City, Utah's Wildlife Migration Corridor map

Case Study: Town of Jericho, Vermont

"Jericho's Natural Resource Overlay district helps implement the conservation vision articulated in the Town Plan. On its own, rural residential zoning is not sufficient to protect habitat and connectivity. In fact, it is where we see the majority of sprawl in our state." ***Jens Hawkins-Hilke, Conservation Planner for Vermont Fish & Wildlife Department, pers. comm 2025***

Located in north central Vermont between Burlington and the Green Mountains, the Town of Jericho has carried out significant planning to protect its rural character and maintain large, connected habitat blocks. While seeking to add housing and grow its population, Jericho will: "*[p]rotect and conserve Jericho's irreplaceable natural resources such as wildlife habitat, significant natural communities, large blocks of forestland, habitat connectors, and unique cultural and landscape features, through programs and clear policies."* The overarching goal of the 2024 Town Plan is two-fold: "*directing policies and public investments to help grow our community, while continuing to protect natural resources and the rural landscape."* Jericho's vision includes that it will be a community where "*all its residents, including the wildlife, can thrive*."

The Plan includes a series of maps to guide future land use, with the bulk of land envisioned as Natural Resources and Agricultural Protection areas, and development concentrated near existing village centers. "*Protecting large contiguous blocks of forest and forested highlands are the highest priority"* for the former, while "*large open fields and forested highlands"* are expected to dominate the latter. Under the goal of *Stewarding a Resilient Community*, the town commits to "*[p]rotect natural resources, working lands, and natural water systems from fragmentation and encroachment."* Moreover, it wishes to do so to help *"prepare for and adapt to weather extremes and changes in our natural world which result from climate change."*

In addition to a Zoning Map that includes open space and agricultural/rural development categories, regulatory documents include a 2018 Natural Resources Overlay (NRO) whose purpose is to "*preserve and to protect specific Natural Resources of Jericho by preserving their ecological characteristics and scenic qualities and preventing degradation of their ecological functions*." The NRO indicates primary and secondary conservation areas. Threatened and endangered species, vernal pools, forested riparian areas and rarer upland natural communities are ranked as primary "*because they are rare, irreplaceable, unique, or otherwise essential."* High elevation forest habitat blocks and wildlife crossing locations are considered secondary because "*their continued function requires standards to minimize and mitigate Land Development impacts on the Resource*."

Jericho's 2022 Land Use Development Regulations specify requirements to avoid and/or reduce future impacts to each of the resources shown on the NRO. In all cases, "[*l]and [d]evelopment shall not permanently harm or jeopardize the continued viability of the Resource, or its ecological functions, and shall not have an undue adverse impact on the Resource."* Further, *"[l]and [d]evelopment shall minimize Habitat Fragmentation of the Protected Natural Resource."* Development requirements depend upon the resource. For example, in a high elevation forest block, "[*l]and [d]evelopment, including land preparation and clearing, shall be limited to retain forest cover and vegetation so that its functions as forest habitat and connectivity among adjacent Protected Natural Resources is maintained."*

Jericho's regulations also protect aquatic connectivity. Rivers, wetlands, and wellheads are mapped on overlays in the Town Plan, and the Land Use Development Regulations require setbacks, among other conservation measures. The Regulations specify: "*stream crossings such as culverts must be large enough to pass fish, wildlife, debris, and floods, and to prevent downstream scour. Crossings should have a natural streambed with substrate and water depths that are similar to the surrounding stream. The crossing should span the stream and banks, must not change the water velocity, must continue the natural streambed, and must create no noticeable change in the watercourse. Effective crossings include bridges, open bottom arches, culverts that span and remain buried in the stream*."

In accordance with Vermont Act 171—a 2016 statute "*to encourage and allow municipalities to address protection of forest blocks and habitat connectors, while also supporting the local forest products industry*"—the Town Plan states that "*Jericho intends to prioritize delineated forest blocks and add important habitat connectors to protect contiguous pathways between the larger blocks as part of anticipated updates to the Natural Resource Overlay*." Act 171 defines a habitat connector as "*land or water, or both, that links patches of wildlife habitat within a landscape, allowing the movement, migration, and dispersal of animals and plants and the functioning of ecological processes."* While Act 171 requires identification and planning to minimize fragmentation of forest blocks and habitat connectors, it does not require a regulatory approach for their protection.

The existing NRO stems from a 2013 natural resource inventory conducted in four Chittenden County towns under a Science to Action project launched two years prior. Community volunteers, Audubon Vermont, and other state, regional and local partners were integral to the process, which included considerable publish outreach. The Vermont Department of Fish and Wildlife gathered data and, also, local understanding of forest resources, rare species, significant natural communities, and large connected habitat blocks through "community values mapping." The Vermont Natural Resources Council then developed recommendations based on the bylaws and plans of each participating town. Jericho's Conservation Commission, an advisory group to Planning Commission, adapted the information developed into the NRO.

Documents

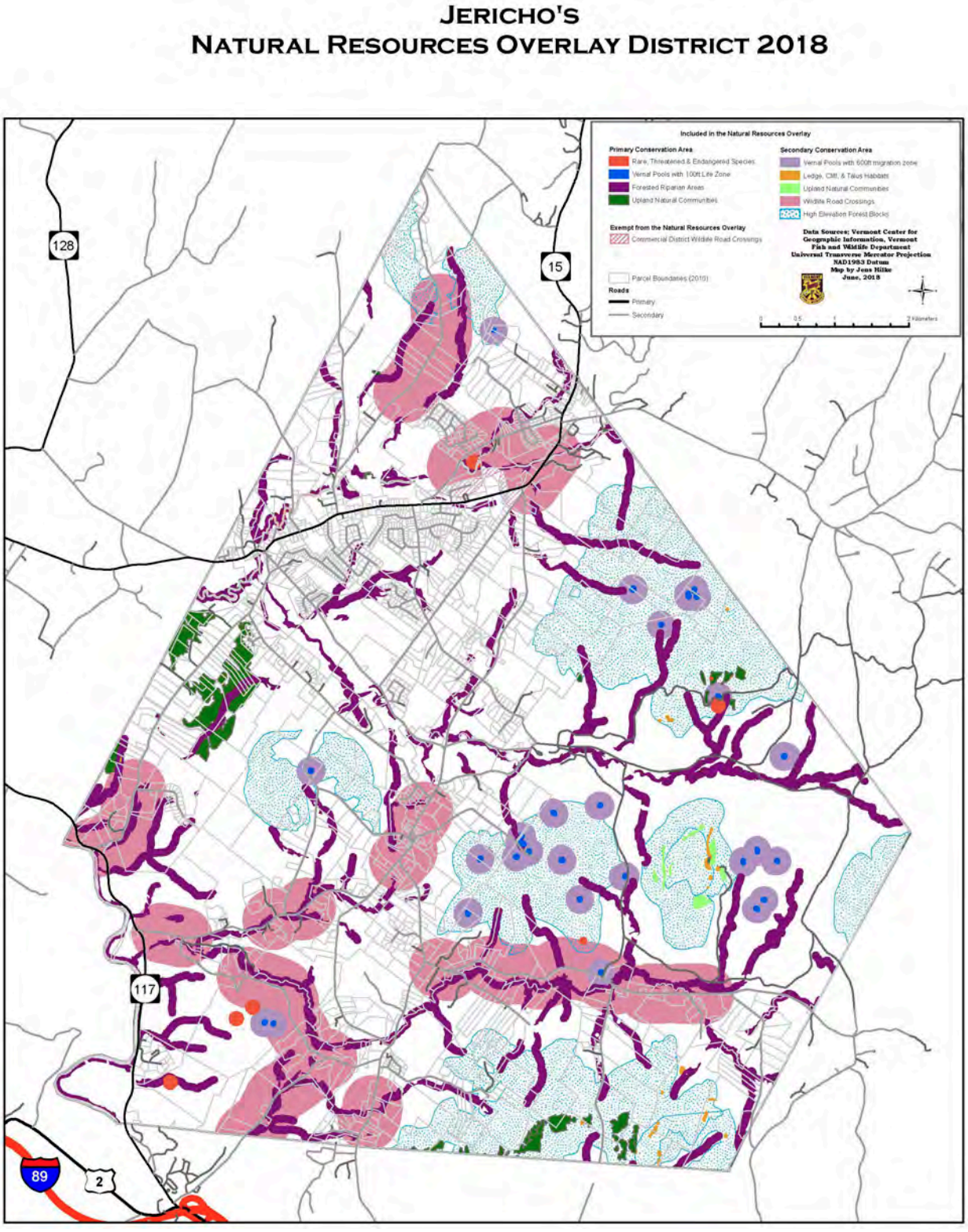
Town of Jericho Plan (2024)
Town of Jericho Land Use Development Regulations (2022)
Town of Jericho Natural Resources Overlay map (2018)
Town of Jericho Zoning Map (2016)
Science to Action: Four Town Natural Resources Inventory (2013)
Science to Action Story Map: Celebrating People, Place and Process
Vermont Act 171 and Planning for Forest Blocks and Habitat Connectors (2016)

Key Takeaways

- An-depth natural resources inventory and public outreach initiated over a decade ago with the support of the Vermont's Department of Fish and Wildlife, Vermont Natural Resources Council, and other state and regional agencies and organizations laid the groundwork for subsequent regulatory implementation.
- Collaboration between the town's Conservation and Planning Commissions, along with public outreach activities, shaped development of the Natural Resources Overlay.
- In addition to long-standing, state-level enabling legislation for planning, Vermont's Act 171 (2016) *encourage[s] and allow[s] municipalities to address protection of forest blocks and habitat connectors, while also supporting the local forest products industry.*

Sample Text

Town of Jericho, Vermont – Land Use and Development Regulations – Wildlife Crossings- *For Wildlife Road Crossings – Land Development may disrupt but shall not prevent the continued or potential future use by wildlife species. Land Development should be located as far as possible from wildlife travel ways and vegetation adjacent to travel ways should be retained. Land Development should avoid fences, guardrails, walls, or substantial changes in grade that would disrupt the movement of wildlife within the crossing. Where fences or guardrails are necessary, they should be no higher than 4.5 feet and should have at least 16 inches of clearance between the lowest horizontal part of the fence and the ground, unless otherwise required to serve the barrier's purpose.*



Town of Jericho, Vermont's Natural Resources Overlay District map

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Case Study: Teton County, Wyoming, including the Town of Jackson

With less than 3% of Teton County (some 75,000 acres) as private land, of which about 44% (as of 2007) is already developed, the County and the Town of Jackson have extensive planning and zoning regulations to maintain wildlife, habitat, and ecological connectivity across private and public lands. Although they make up only a small portion of the county, private lands often serve as critical winter range and host riparian corridors in valley bottoms. In keeping with a three-pronged Community Vision of Ecosystem Stewardship, Growth Management and Quality of Life, the first principle of the 2020 Teton County/Jackson Comprehensive Master Plan is "*[m]aintain healthy populations of all native species. For future generations to enjoy the ecosystem that exists today, the community must manage our impacts to wildlife, wildlife habitat, and wildlife movement corridors on private and public land."*

Ecosystem stewardship and growth goals are explicitly tied to *"preserve open spaces of ecological and scenic value while also allowing for enhanced housing, economic development, social, and civic opportunities"* by directing growth to areas of existing infrastructure and services. These exist on just about 7% of private land. The Plan separates the county into a series of Character Districts with subareas for housing, agricultural preservation, or other wildlife habitat/connectivity conservation. In the latter two, the Plan suggests maintaining "non-development conservation" through incentives and density transfers, with buildings clustered "*away from sensitive areas in exchange for permanently protected and actively stewarded open space."* The Plan further envisions 60% or greater new growth occurring in "Complete Neighborhoods" with no more than 40% in rural areas, along with a concurrent goal that 65% of the local workforce is able to live locally. Indicators for these goals are reviewed annually.

In recognition of the county's role within the Greater Yellowstone Ecosystem, policies include requirements for design and best practices for wildlife permeability at scales from rural to urban, including in midtown areas where creeks or other movement corridors are known to exist. The Comprehensive Plan requires establishment of a monitoring system for *"assessing the singular and cumulative impacts of growth and development on wildlife and natural resources"* with adaptive management *"to provide better habitat and movement corridor protection."* A rigorous, tiered Natural Resources Overlay (NRO) based on the needs of critical habitat for focal species and "indicative of ecosystem health" was adopted in February 2025. The updated NRO, with greater attention to maintaining connectivity, supersedes a version put in place in 1994. Even at that time, the NRO was based on winter habitat for elk, moose, and mule deer; migration corridors for elk and mule deer; bald eagle and trumpeter swan nesting areas; and cutthroat trout spawning areas. The updated NRO incorporates this information, along with wildlife corridors for mule deer and pronghorn antelope identified by Wyoming Game and Fish, and a finer-scale county-level evaluation of suitable habitat for 17 focal species. The species—elk, moose, and mule deer, two amphibians, one fish and 11 birds—were largely selected as habitat obligates to ensure adequate representation of the landscape.

The Natural Resources Overlay is a key resource for the application of the county's detailed Land Development Regulations. Even at the base tier of the NRO, natural resources must be evaluated via a desktop checklist. Properties in the high- and mid-tiers usually require the help of a professional to carry out an environmental review or more in-depth environmental assessment to evaluate development alternatives that help to maintain intact habitat. The process includes substantial consideration of landscape-level, population-level and property-level data sets included in the NRO, with further evaluation on-site to determine prospective building envelopes that can limit impacts on wildlife. Fragmentation metrics are used to score the amount of new 'edge' and habitat interruption [scored by ratio of habitat edge (feet) to habitat patch area (square feet)] that may be created via development alternatives through the county's Zoning Compliance Verification process. Properties in the high- and mid-tiers of the NRO must detail natural resources within ½ mile or ¼ mile, respectively, for which setbacks and resource protections apply.

The natural resources assessment for a given property allows for a comprehensive review of the natural resource protection standards expressed in the Land Development Regulations to minimize impact. The Regulations state: "*The Natural Resources Assessment will accurately determine the resources present on a subject property including but not limited to Waterbody and Wetland Protections, Terrestrial Habitats, Protected Species, Crucial Habitats, wildlife movement corridors and existing and planned wildlife crossings. The Natural Resources Assessment does not result in application approval, it results in recommended natural resources protections associated with an application for use or physical development."* The Regulations require wildlife-friendly fencing and setbacks from wetlands and water bodies, prohibit building on slopes greater than 30 degrees, and ensure any retaining walls built for access roads are staggered to permit wildlife movement, among other criteria. They also prescribe mitigation requirements at a ratio of 2:1 to offset any unavoidable impacts.

In addition to its careful consideration of connectivity in land use, Teton County also has clear guidance on locations where wildlife road crossings are needed based upon a comprehensive 2018 Wildlife Crossings Master Plan. The latter examined opportunities to reduce wildlife-vehicle collisions and maintain habitat connectivity. The crossings are included in the Comprehensive Master Plan.

Documents

Teton County Natural Resources Overlay (2025)
Teton County Land Development Regulations (2025)
Teton County/Jackson Comprehensive Master Plan (2020)
Teton County Wildlife Crossings Master Plan (2018)

Key Takeaways

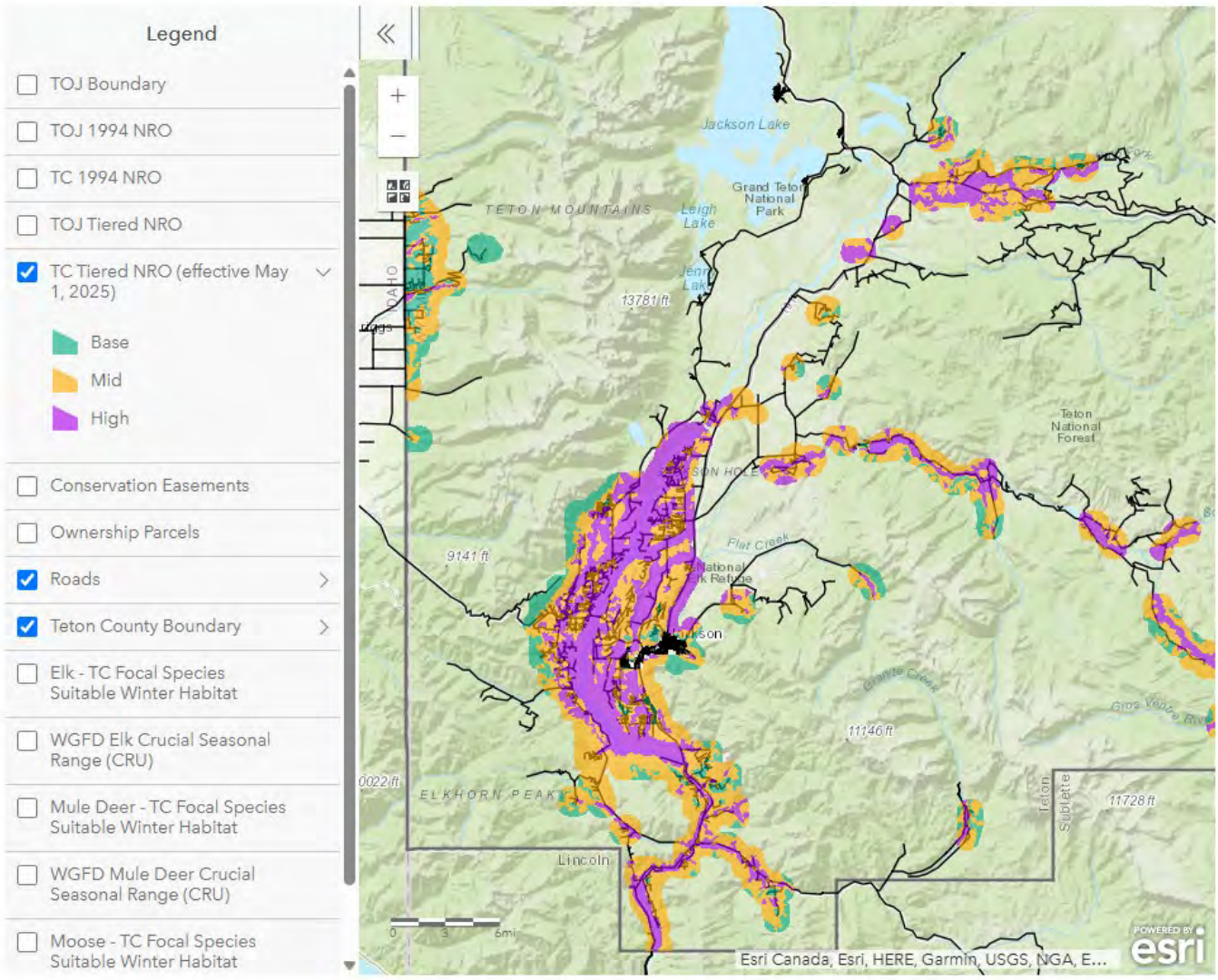
- Wyoming Game and Fish has helped to identify wildlife corridors in the region.
- A rigorous, county-level Natural Resources Overlay has served a key role in natural resources protection for decades and was recently updated to maintain habitat connectivity by reducing fragmentation.
- Wildlife, wildlife habitat, and wildlife movement corridors across public and private land are a primary emphasis of the area's interlocking county-city Comprehensive Plan and Wildlife Crossings Master Plan, supported by detailed Land Development Regulations.
- Upzoning and downzoning are used as tools to encourage cluster development and preserve open space, with regularly tracked indicators and review of progress toward established goals.

Sample Text

Teton County, Wyoming: Natural Resources Overlay *Minimizes Wildlife Impact. The location of the proposed development shall minimize impacts on the areas protected (e.g., crucial migration routes, crucial winter range, nesting areas). For the purposes of this standard, "minimize" is defined as locating development to avoid higher quality habitats or vegetative cover types for lesser quality habitats or vegetative cover types. Only when avoidance is not practicable due to significant topographical constraints related to the property, may higher quality habitats or vegetative cover types be impacted.*

Teton County, Wyoming: Natural Resources Overlay *Protected Natural Resources. Applies in all Tiers. Intact Terrestrial Habitat Patches. Intact terrestrial habitat patches are connected areas of similar overstory vegetation species (e.g., ordinal rank) inclusive of riparian, forest, shrub, grassland and previously disturbed areas. Intact habitat/ vegetation patches are central to preserving and protecting the area's wildlife species. The intent of habitat patch regulations is to limit/ minimize fragmentation of habitat patches from development, maximize existing and remaining patch size, minimize patch edge (created by development) and resulting edge effects, and promote clustering of development both on-site as well as within the vicinity. Intact patches are central to preserving and protecting the area's wildlife species.*

Teton County, Wyoming: Natural Resources Overlay *Fragmentation. Fragmentation is the breaking up of continuous habitats by development. Avoiding and minimizing fragmentation of a habitat patch is central to the goal of maximizing existing and remaining patch size, minimizing patch edge, and resulting edge effects caused by development, while also clustering development both on-site as well as within the context of the neighboring vicinity. The avoidance and minimization of fragmentation caused by development shall be quantified for patch overstories with an ordinal rank of 4 and above by comparing existing conditions and proposed conditions based on the four criteria below. For the purpose of this section of the LDRs similar species means those of similar ordinal rank.*



Teton County's Natural Resource Overlay. Screenshot from https://www.ecoconnectjh.com/nro-stakeholders

8. RESOURCES

Guidance Resources

Listed below are connectivity or conservation-focused guidance documents for local governments, created by state agencies or partner groups. While some of these documents are written for a specific geographic region, each contains information valuable across regions. Numerous other high-quality documents of this kind exist but are not included here.

Overall Land Use and Connectivity Guidance

Connecting the Dots: A Guide to Using Ecological Connectivity Modelling in Municipal Planning. Miistakis Institute. 2016. Canada. (Greenaway 2016)

Connectivity Risk Assessment/Wildlife Movement Tool. Miistakis Institute. 2024. Canada. An online tool designed to help municipal decision-makers assess the impacts of a proposed development to ecological connectivity by identifying high, medium, and low risk. Suggests mitigation strategies to reduce those risks and supports more informed permitting decisions.

Conservation Design and Stewardship Guidelines for Local Land-Use Regulations. Wildlife Conservation Society and the Conservation Development Working Group at Colorado State University. 2023. (Kretser et al. 2023) Provides science-based guidelines for how residential design, construction, and stewardship could be improved to protect wildlife habitats on private lands. Includes tables with examples of published scientific studies that quantified the distance at which housing negatively impacts wildlife, and minimum patch size requirements for species.

Development Mitigation Guidelines for Ecological Corridors. Miistakis Institute. 2025. Canada. (Kahal and Lee 2025). Written to allow flexibility to achieve a design unique to the development location, to benefit both human and ecological connectivity, and written for use by developers and decision-makers, including municipal planning staff, to guide development permit applications and decisions.

Growing Greener: Putting Conservation into Local Plans and Ordinances. 1999. Arendt, R.G.

Incorporating Wildlife Science into Land Use Planning to Improve Private Lands Conservation. Wildlife Conservation Society, Adirondack Program Technical Paper #5. 2017.

Innovative Land Use Planning Techniques: A Handbook for Sustainable Development. New Hampshire Department of Environmental Services. 2008.

Land Trusts and Wildlife Crossing Structures: A Toolkit Detailing How Land Trusts Can Contribute to Highway Infrastructure Projects for Wildlife. Center for Large Landscape Conservation. 2023.

Mapping Vermont's Natural Heritage: A Mapping and Conservation Guide for Municipal and Regional Planners in Vermont. 2018. Vermont Fish and Wildlife Department and Agency of Natural Resources (VFWD and ANR 2018).

Planning to Connect: A Guide to Incorporating Ecological Connectivity into Municipal Planning. Miistakis Institute. 2019. (Greenaway et al. 2019)

Resilient and Connected Landscapes reports and data. The Nature Conservancy. 2016.

Regional Guidance

Best Practices for Adopting Conservation Inventories and Plans: A Guide for Communities in the Hudson River Estuary Watershed. New York State Department of Environmental Conservation's Hudson River Estuary Program, Cornell University, and Pace Land Use Law Center. 2023.

Colorado's Guide to Planning Trails with Wildlife in Mind. Colorado Parks and Wildlife Department of Natural Resources. 2021.

Community Strategies for Vermont's Forests and Wildlife: A Guide for Local Action. Vermont Natural Resources Council. 2013. Provides good explanations of regulatory and non-regulatory actions for local governments and is useful outside of Vermont. (VNRC 2013)

Connecting Habitat Across New Jersey (CHANJ) Guidance Document Version 1.0. New Jersey Division of Fish and Wildlife, Department of Environmental Protection. 2019. Provides guidance and mapping tools for prioritizing habitat conservation in the state, identifying key areas and actions needed to preserve and restore habitat connectivity.

Fish and Wildlife Conservation Recommendations for Subdivision Development in Montana. Montana Fish, Wildlife & Parks. 2012. Created to help guide fish and wildlife professionals and inform municipal and county leaders and land developers.

Fragmentation and Connectivity Considerations for Larimer County Open Space Lands. 2018. Colorado Natural Heritage Program. A review of existing methods for identifying and managing fragmentation and maintaining functional habitat patches for the County open space program.

A Green Infrastructure Plan to Restore, Connect, and Protect South Carolina's Habitats. Green Infrastructure Center. 2023.

Make Room for Wildlife: A Resource for Local Planners and Communities in the Adirondacks. Saranac Lake, NY: Wildlife Conservation Society, Adirondack Program. 2009.

Pathways to an Ecologically Connected Transborder Landscape – A Distillation of Key Learnings, Strategies, and Actions from the 2024 Northeastern North America/Turtle Island Landscape Connectivity Summit. The Staying Connected Initiative. 2025. (Huffman et al. 2025)

Planning: A Key Step Towards Protecting Forest and Wildlife Resources: ACT 171 Guidance. Vermont Agency of Natural Resources. 2018.

Planning for Connectivity: A Utah Guide to Integrating Wildlife Language into Local Planning and Implementation. Wildlands Network. 2025. *Not yet available.*

Prioritizing Wildlife Crossings in Loudoun County, Virginia - Improving Road Safety for Wildlife and Drivers - Mitigating Roadkill, Maintaining Habitat Connectivity, and Reducing Wildlife-Vehicle Collisions. W&M Institute for Integrative Conservation. 2023.

Taghkanic Headwaters Conservation Plan. 2022. Creates a vision for the Taghkanic headwaters in Columbia County, NY. The plan maps areas of exceptional importance and identifies tools, strategies, and conservation actions for local governments and others.

West-Wide Study to Identify Important Highway Locations for Wildlife Crossings. Center for Large Landscape Conservation, Western Transportation Institute – Montana State University. 2023.

Wildlife Considerations in Local Planning: Evaluating Twenty Years of Progress in Vermont. Vermont Natural Resources Council (VNRC) and the Vermont Fish and Wildlife Department (VFWD). 2022. (VNRC and VFWD 2022)

Conservation Subdivision/Overlay Zoning Guidance

Conservation Design for Subdivisions: A Practical Guide for Creating Open Space Networks. Arendt, R.G. 1996.

Conservation Subdivision Handbook: A guide for North Carolina Communities in the Use of Conservation Design for Land Use Planning. North Carolina State University. 2011. Includes a model conservation subdivision ordinance (Allen et al. 2011).

Creating Conservation Overlay Zoning: A Guide for Communities in the Hudson River Estuary Watershed. Fink, J.T. and E. Svenson. 2022.

Ecological Corridor Overlay: Recommendations for Implementation in Rural Municipalities. Miistakis Institute and Oldman River Regional Services Commission. 2025.

Forest Connectivity in the Developing Landscape A Design Guide for Conservation Developments. Green Infrastructure Center Inc. 2019. (Firehock 2019). Provides the reasons, steps, processes, and marketing tools for conservation subdivision design, and uses habitat modeling and best design practices for maximizing forest conservation and connectivity. Includes case studies in North Carolina and South Carolina.

State Level Connectivity Policy

An Analysis of State and Local Policies to Maintain Ecological Connectivity. University of Wyoming Ruckelshaus Institute. 2024.

Ecological Connectivity Policy Compendium: U.S. Policies to Conserve Ecological Connectivity 2007-2021. Center for Large Landscape Conservation. 2022.

National Caucus of Environmental Legislators keeps close track of state legislation relating to wildlife corridors and crossings around the nation.

State of the States: A look at how far U.S. state habitat connectivity legislation has advanced and what is working. Wildlands Network and National Caucus of Environmental Legislators. 2024.

Wildlife Connectivity: Opportunities for State Legislation. 2019. Center for Large Landscape Conservation.

Key Research Literature Related to Wildlife Habitat Connectivity and Local Government

This list of key research literature is not exhaustive, but it highlights some valuable and representative works in the field.

Bakelaar, M.G. 2025. Local Government Planning and Maintenance of Ecological Connectivity in a Fragmented Landscape. PhD Dissertation. University of Waterloo. https://hdl.handle.net/10012/21416

Cameron, D.R., C.A. Schloss, D.M. Theobald, and S.A. Morrison. 2022. A framework to select strategies for conserving and restoring habitat connectivity in complex landscapes. Conservation Science and Practice, 4(6), e12698. https://doi.org/10.1111/csp2.12698

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Hostetler, M. and S. Reed. 2014. Conservation development: Designing and managing residential landscapes for wildlife. Urban wildlife conservation: Theory and practice 279-302. https://link.springer.com/chapter/10.1007/978-1-4899-7500-3_13

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