ENVIRONMENTAL
Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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Habitat-Sensitive Site Design and Development Practices to Minimize the Impact of Development on Wildlife

The rapid increase in human population and rate of development in New Hampshire is placing significant stress on our native wildlife populations. Land that was once habitat for wildlife species is being converted into residential and commercial subdivisions, roads, and other uses. The development of land and related activities impact both the quantity and quality of wildlife habitat. This fact sheet provides an overview of those impacts and offers some strategies for developers and towns to reduce the impact of development on native wildlife. This fact sheet is part of a two-part series; a second fact sheet focuses on actions a local municipality should pursue to better conserve wildlife habitat.

How Development Impacts Wildlife

Habitat Loss

The loss of habitat through the conversion of land from its natural state to a developed landscape represents the single greatest impact of increased human activity on native wildlife. All animal species require certain habitat features to survive. Development typically eliminates or significantly changes many important habitat features found in a natural area, thus reducing or eliminating the habitat value of that area. For example, a diverse wildlife population depends upon the natural diversity of native plants found in most undeveloped areas. Development often changes the vegetative community, making it more difficult for many native species to survive. Those species able to survive in urban settings may thrive, but the rest are forced to find new territory or perish.

Habitat Fragmentation

Habitat fragmentation is a less obvious consequence of development, reducing both the quantity and quality of habitat. Fragmentation is a process whereby large tracts of the natural landscape are gradually developed and subdivided until only patches of original habitat remain. The patches are often too small and too far apart to support the basic survival and reproductive needs of many wildlife species during various stages of their life-cycle or in different times of the year. When a species' habitat is separated by distances that make movement from one patch to another impossible, the impacts on the genetic health of the population are significant and reduce a species ability to reproduce and withstand stress. In addition, smaller habitat patches and the wildlife that depend on them are more vulnerable to the catastrophic effects of natural disturbances such as fire and ice storms. Fragmentation also results in higher populations of generalist predators, resulting in increased predation on those species that attempt to use the remaining habitat blocks.

Changing Landscape

The impact of human activity on wildlife extends beyond the actual area of development. When evaluating the impact of human activity on wildlife, we should consider a "disturbance zone"- the entire area where habitat value has been meaningfully reduced. The encroachment of human activity into a natural area creates more "edge effects." Edge effects are changes in environmental conditions and animal behavior and well-being that result from being in close proximity to the border between habitat areas. Unlike natural borders, human disturbances often create "harder" edges with greater detrimental impacts on wildlife. Even seemingly small manmade disturbances, such as power line easements, can have major consequences for wildlife.

In addition, the encroachment of human activity reduces the amount of interior habitat area relative to edge or border area. While borders between two different habitats are often an essential part of the ecology of an area, when habitat becomes so small that it is all edge and no interior, it loses its ability to support those species that require an isolated interior for some portion of their life, e.g. some nesting birds.

Landscape disturbance caused by development can also serve to introduce invasive species into natural habitats, further degrading the quality of remaining habitat areas.

The Impact of Roads

Roads may be the "single most destructive element of the habitat fragmentation process." They can:

- Disrupt or prevent passage across the disturbed area.
- Provide an entrance for exotic species or predators.
- Increase mortality.
- Increase unnatural disturbances from sources such as pollution and fire.

Source: Noss, 1993, Schonewald-Cox and Buechner 1990 and Bennett 1991, as cited in Duerksen, et al.

Changing Aquatic Habitat

Development also affects the quality and quantity of aquatic habitat. The more hard surface present after development, the less rainwater infiltrates the soil. Rainwater instead runs off the land at an increased volume and rate. This reduces the recharge of groundwater and increases flooding, streambed erosion, and sedimentation. Runoff from developed areas also is often warmer and polluted with pathogens (e.g. bacteria and viruses), household chemicals, metals, fertilizers, pesticides, oil, and grease. As vegetative buffers along water bodies are lost, sunlight can further warm water beyond a threshold at which native species can survive and reproduce.

The structural habitat of aquatic systems also can be significantly degraded by modifications associated with roads and development. The quality and flow of rivers, streams and wetlands can be reduced by inadequate or inappropriately designed culverts, creation of new dams, and channel straightening or modification.

Daily Human Activity

Human activity introduces changes to the surrounding environment that can negatively impact natural habitat. Changes in lighting in an area, for example, can significantly affect some species' behavioral and biological rhythms, which are guided by natural cycles of light and dark. Nocturnal species, particularly birds, can become disoriented by night-time lighting. Domestic pets, particularly

cats, may prey excessively on wildlife, such as ground-nesting birds. The availability of household trash can alter the composition of wildlife communities by providing food for animal populations that thrive on trash (such as rats, raccoons, and skunks) to the detriment of those that do not, e.g. small mammals and song birds.

Human recreational activity in an area may directly impact wildlife and reduce the quality of the habitat provided. Human activities can disturb sensitive habitats, like wetlands, and disturb or "flush" wildlife. Flushing wildlife raises an animals' stress level and increases energy consumption. If repeated frequently, such disturbance can impact reproduction and survivorship.

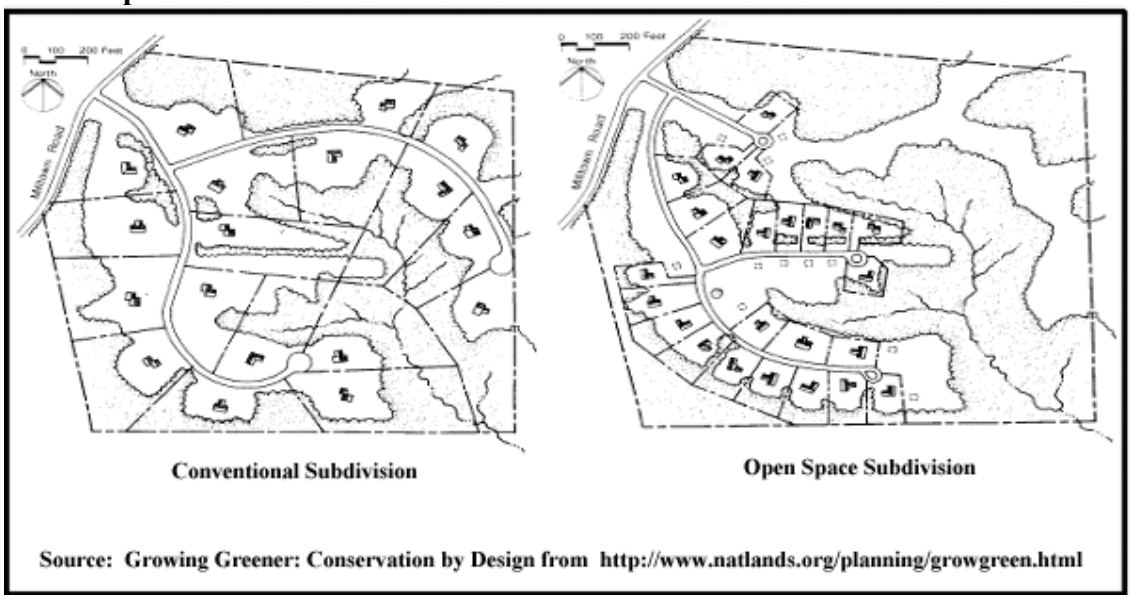
Habitat-Sensitive Site Design and Development Practices

This section offers developers and towns a few basic site design and development practices to minimize the impact of development on habitat and reduce the impact of human activity on wildlife.

Practice #1 **Applicants should review the habitat conservation goals cited in local and regional plans and manuals on habitat identification and protection.**

A development plan should reflect the town's and/or region's habitat conservation objectives. Local master plans, habitat conservation plans, local open space plans, regional land trust or conservation organization's plans, and natural resource inventories can provide baseline information on local and regional goals for habitat conservation and help identify important habitat features that should be conserved. Additional resources, such as Identifying and Protecting New Hampshire's Significant Wildlife Habitat: A Guide for Towns and Conservation Groups and New Hampshire's Comprehensive Wildlife Conservation Plan (due out by October 1, 2005) by the NH Fish and Game Department, can provide more specific information on what natural features to look for and conserve. Consideration of local and regional habitat objectives in preparing a development proposal helps to establish a positive working relationship with the community, protects natural features that make the land attractive, and supports timely project review and approval.

Practice #2 **Apply principles of conservation design to minimize impacts and preserve natural undeveloped lands.**



Practice #3 **Preserve large and contiguous blocks of natural, undisturbed vegetation, looking for opportunities to connect to undeveloped lands on adjacent parcels.**

Leaving only small isolated patches of undeveloped land greatly reduces the habitat value of that land for wildlife. Development should be designed so that remaining open space is located adjacent to other open space, thereby creating large contiguous tracts of habitat. The larger the tract, the more likely it is to sustain large, healthy, and diverse populations of wildlife. Municipalities and developers should explore mechanisms, such as density averaging or density transfer, to allow the transfer of development from areas of high habitat value to other areas that are better suited for development.

Practice #4 **Conserve rare and outstanding landscape elements, such as unique features or habitats, by directing development to other areas.**

Habitats that are unusual state-wide or in a particular geographic region are often vital to rare wildlife species. Salt marshes, riparian areas, vernal pools, enriched forests, and large wetland complexes deserve particular attention. Uplands adjacent to these areas are also important because several habitat types are often necessary for meeting the needs of wildlife species during different seasons and life-cycle stages. Development should be guided away from lands featuring intact diverse habitat types and toward more homogenous areas of lesser habitat value. Communities should consider obtaining conservation easements on areas of high habitat value to conserve this valuable natural resource.

Practice #5 **Identify and conserve wildlife corridors through the property to facilitate wildlife movement across developed areas.**

Undeveloped corridors of land that connect habitat areas should be preserved wherever possible. Carefully designed strips of protected land can allow for wildlife movement between larger habitat areas, helping to preserve the habitat value of adjacent lands. To be effective, corridors must be designed with actual wildlife movements in mind, be of sufficient width to provide adequate cover, and remain in a natural, vegetated state. Often wildlife corridors will align with wetlands and ridges. A site-specific wildlife assessment can be prepared to identify appropriate corridors through a property.

Examples of Important Habitat

Habitat of Rare Wildlife Species - Lands inhabited by species listed as endangered, threatened, or of special concern should be considered a priority for conservation.

Unfragmented Lands - Large tracts of contiguous open space that feature a mix of habitat types are more valuable to wildlife than small, fragmented patches.

Riparian Areas & Shorelines - The interaction of land and water fosters biodiversity and is invaluable for many reptiles, amphibians, and migratory birds.

Priority Wetlands - Swamps, marshes, tidal flats, wet meadows, and bogs. For a legal definition, see New Hampshire Code of Administrative Rules Wt 101.82.

Agricultural and Other Open Land - Some species are dependent on open fields, an increasingly rare habitat type.

Other Unique or Critical Habitats - Habitat types that are rare state-wide or to a particular geographic region are vital for maintaining regional biodiversity.

Connecting Lands - Areas with very-low development density between large unfragmented lands that provide wildlife with habitat, food, and cover, as well as corridors for movement.

Practice #6 **Maintain significant buffers of undeveloped land between important habitat areas and developed areas.**

Pedestrian and vehicular activity affects wildlife even if it occurs at a great distance. Buffers of undeveloped land between important habitat areas and developed areas can reduce the negative impacts of human activity on wildlife. Two guidance documents, "Buffers for Wetlands and Surface Waters: A Guidebook for New Hampshire Municipalities" and "Buffer Zones and Beyond: Wildlife Use of Wetland Buffer Zones and their Protection under the Massachusetts Wetland Protection Act," provide information on appropriate buffers for wildlife.

Practice #7 **Maintain or replace natural features and functions within developed areas.**

Measures should be taken to mitigate negative impacts to wildlife habitat that occur during and after construction:

- Capture and infiltrate rainwater on-site to maintain the natural water cycle. Techniques for managing stormwater on-site, such as rain gardens on individual lots, are often less expensive than conventional stormwater treatment and retention systems. See www.lowimpactdevelopment.org for more information on this topic.
- Maintain the structure and function of aquatic systems. For example, culverts should have sufficiently large openings to maintain natural water flow, have natural stream bottoms, and be sized for bank-full stream width (i.e., the width of the stream during the 1½ year flow event) to reduce potential future erosion near culvert openings. To ensure that fish can access the upper reaches of their habitat, culverts should have a trough or narrow channel in the bottom running the full length of the culvert to maintain sufficient water depth during low-flow periods to support fish passage
- Use native vegetation for landscaping. Using native vegetation supports wildlife needs for food and cover, avoids introducing invasive species that can threaten natural ecosystems, and minimizes watering needs.
- Minimize clearing, grading, and compaction of soil.
- De-compact remaining open soil after construction is complete and replace an adequate amount of top soil to facilitate faster regrowth of vegetation and better absorption of rainwater. This has benefits for both terrestrial and aquatic habitats.

References and Resources

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Site Specific Wildlife Assessment Form. DRAFT. Currently under development by NH Fish and Game Dept., Audubon Society of NH, UNH Cooperative Extension, Jordan Institute, and NH Association of Natural Resource Scientists, for use by wetland and soil consultants and others working on land use planning and development projects.