



SECTION 5. GREENING INCENTIVES & ORDINANCES

U.S. FISH & WILDLIFE SERVICE

ACHIEVE GREEN GROWTH THROUGH INCENTIVES AND ORDINANCES

Communities around the country have developed ordinances with the goal of protecting important wildlife habitats. However, research by the University of Colorado has shown that most ordinances lacked measures to minimize habitat fragmentation, a leading cause of wildlife declines.^{1,2} In addition, many ordinances also do not sufficiently define wildlife habitat, so habitat cannot be consistently identified or actually conserved.

Habitat fragmentation from development patterns is *the* leading cause in current declines of most of the over 450 wildlife Species of Greatest Conservation Need in our state. Green Growth emphasizes growth management incentives and ordinances that remove barriers to wildlife habitat conservation. We encourage local governments to focus on reducing wildlife habitat fragmentation.

How to Use This Section

Please use the NC Model Natural Resources Conservation Ordinance as your primary guide to NC Wildlife Commission recommendations for conserving wildlife habitat through ordinance language. The other example ordinances are intended to provide options for approaches and language to help you tailor your community's ordinance and not as a comprehensive way to achieve effective wildlife habitat conservation.

This Section can be used as a checklist of recommendations for local ordinance updates. However, Green Growth Toolbox program staff are available to review ordinances and recommend specific changes.

What about
**climate
resilience ?**



Any of our Greening Ordinances recommendations will improve community climate resilience and are "nature-based solutions." Ordinance updates using the GGT may qualify for climate resilience grant funds.

Please see [page 92](#) for a visual representation of a landscape that accommodates development, wildlife habitat, and natural resource conservation.

Reduce Wildlife Habitat Fragmentation



Source: 1000 Friends of Florida, Benjamin Pennington

Many local governments nationwide have ordinances that require or encourage habitat conservation. However, these policies are failing to prevent habitat loss because they do not clearly state that wildlife habitat should remain unfragmented. To prevent fragmentation, the habitat interior to edge ratio should be minimized by being as close to circular, without perforation, and as large as possible. Natural open space on adjacent developments should be connected so that a connected network of natural areas can be formed. Private or public greenways or trails can be placed in connected natural open space.

How to Use This Section (cont.)

To justify ordinance updates it is important to know the economic and other benefits. Use Section 1 and the [Benefits of Green Growth factsheet^g](#) available on our website to inform decision makers about the economic and health benefits of Green Growth.

Use Section 2, Conservation Data, to understand where priority habitats are located in your community. Require applicants to display specific map layers from the Conservation Data in maps used for rezoning and development approval. Craft habitat conservation measures in ordinances that refers to and defines the Conservation Data layers.

To understand design and development standards ordinance language for sufficient habitat conservation, see Section 3, Wildlife Habitat Conservation Recommendations.

Principles for Greening Ordinances

Maintain land use patterns that do not fragment wildlife habitat, that do maintain rural character, and conserve, buffer, and connect priority wildlife habitats.

In existing urban & suburban areas, encourage high density development, mixed uses, transit oriented development, and low impact development stormwater measures. Implement a Conservation Incentive District that buffers and connects streams, floodplains, and wetlands. Generally, encourage development of upland (non-wetland) areas not depicted on the NC Biodiversity & Wildlife Habitat Assessment. Infill development and major development that does not expand the suburbs out into rural areas, is best for wildlife.

In rural areas, encourage rural land uses that ensure the vitality of keep forestry and farming. Any development should be clustered with mostly smaller lot sizes (a variety of lot sizes can be accommodated), consider implementing a Conservation Incentive District that conserves all habitat types ([page 94](#)).

^g www.ncwildlife.org/Portals/0/Conserving/documents/GGT/Benefits%20of%20Green%20Growth.pdf?ver=LjAbTs-15KLkbQR41Nm9cg%3d%3d

Conventional Subdivision - Uses minimum lot size and offers no density bonus
Farmland, grassland habitat and historical site are lost.



Conservation Subdivision - Uses development units per acre, allows density bonus, & a variety of lot sizes



Image courtesy of Randall Arendt, from Arendt, R., M. Collins, and A. Valentine (1996). Open Space Design Guidebook: Albemarle Pamlico Estuarine Region. Prepared for the North Carolina Association of County Commissioners. Media, PA, Natural Lands Trust.

GREENING INCENTIVES

Incentives are important for creating development patterns and practices that maintain wildlife habitat and natural resources. Here, we summarize the incentives available in North Carolina and also some popular incentives used by other states, but which may require approval from our State Legislature to implement.

Development density bonuses: Develop more units on less land and offer a variety of lot sizes

To encourage habitat conservation and habitat connectivity in subdivisions, many community ordinances featured in this section offer a density bonus in exchange for conservation of over 40% of the site.

Permanent Conservation and Ownership of Conservation Areas

A variety of entities can own conservation areas associated with developments, including developers, or homeowner's associations. The land can sometimes be donated to a land trust or other entity. It is essential that the land is permanently conserved by the strongest legal tools available.

Conservation Easements

A conservation easement should be placed on natural open space in conservation developments. If that is not possible, there are other less secure ways to conserve natural open space on site.



Under a conservation easement the landowner retains full ownership of their property. Conservation easements are voluntary legal agreements that permanently protect land from intensive development. Landowners can donate conservation easements to an easement holder, usually a land trust. An easement donation can offer significant tax reduction cost savings to landowners. Conservation measures in the easement are negotiable and

match the landowner's property-use objectives and needs with long-term benefits to their community. Local governments can greatly support the ability of landowners to utilize conservation easements by creating funding mechanisms to finance legal and real estate transactions fees for conservation easement projects led by land trusts. Local governments and Soil and Water Conservation Districts can also hold conservation easements. Target easement projects to the highest priority wildlife habitat and natural resources.

Find your local land trust at www.findalandtrust.org.

For examples of local government support of conservation easements, see Section 4, [page 69](#).

If a conservation easement is not possible:

Placing high priority habitats in commonly-owned open space is technically possible without a conservation easement. The homeowner's association can own the land and fund habitat management. Developers can also donate conservation land to local governments or other entities. Deed restrictions offer a minimum of habitat conservation assurance, but are better than no legal documentation.

Other incentives

- Priority development review and personal assistance to expedite permitting.
- Awards and certification for developers that avoid sensitive natural areas and minimize urban sprawl including:
 - [The Wildlife Friendly Development Certification](#) program (developer application fee required) certifies qualifying developments.^h
 - [LEED certification](#) (developer application fee required), particularly the LEED Neighborhood Development Certification.ⁱ
 - [The Greater Triangle Stewardship Development Awards program](#) is a local awards program for developments that show outstanding environmental stewardship.^j



A Note on Property Tax Incentives Programs in NC

Land used for wildlife habitat, farming, and/or forestry may be eligible for tax incentives that reduce a landowner's property tax burden. Land eventually converts into the use for which it is taxed. Working lands do not require residential public services and will likely convert to that tax rate without tax-relief, so the following programs are very important to maintain strong rural communities, wildlife, and natural resources we depend on. We recommend that local governments provide information to landowners about the following incentives. Consider featuring the following programs on your local government's website.

The Wildlife Conservation Lands Program (WCLP)

This program enables landowners to receive a reduced property tax rate for conserving and managing wildlife habitat. Landowners must have owned their property for at least four years, have at least 20 acres of habitat, and use the land for wildlife habitat.^k

Agricultural and Forestry Present-Use Value

Landowners with an approved forest management plan or a working farm can qualify for a reduced property tax rate. Refer to:

^h www.ncwildcertify.org

ⁱ www.usgbc.org/leed

^j www.gtsda.org/

^k www.ncwildlife.org/Conserving/Programs/Land-Conservation-Program

- [NC forest Service Present-Use Value Program for Forestland](http://ncforestservice.gov/Managing_your_forest/managing_presentuse.htm)^l
- [Voluntary Agricultural Districts](http://www.ncagr.gov/Farmlandpreservation/VAD/) encourage agricultural land uses.^m

Comprehensive Incentive-based Growth Management Programs

For the most threatened unique ecosystems, especially those with threatened and endangered wildlife (such as areas of intact longleaf pine forest), encouraging extensive land development will not conserve high priority wildlife or habitats. In this scenario, a combination of public and private land acquisition investments and policy that supports managed regional growth has been shown to work. The following types of programs have demonstrated success in this regard but may need approval by the NC Legislature.

Voluntary Transfer of Development Rights (TDR)

Twenty states have passed legislation that enables TDRs,³ including Georgia and Tennessee. Two hundred such programs exist in the country.⁴ Willing landowners can choose to enroll their land as a development rights sending area that contains environmentally sensitive resources and agricultural areas the community wants to maintain. Voluntary development receiving areas are where higher density development is desired, such as in areas needing urban renewal.

The TDR program then facilitates transactions where willing landowners in the sending area sell development rights to developers in the receiving area who desire increased development density. A successful TDR Program takes careful steps not to disenfranchise landowners and to set baseline densities that create a development density purchase incentive.

^l http://ncforestservice.gov/Managing_your_forest/managing_presentuse.htm
^m www.ncagr.gov/Farmlandpreservation/VAD/

Voluntary Transfer of Development Rights



MCSWEEN PHOTOGRAPHY

Example TDR Programs

- [King County, Washington's TDR Program](#) has preserved the most wildlife habitat of any TDR program (92,000 acres, 2000 - 2022), while accommodating growth.ⁿ
- [Montgomery County, Maryland's TDR Program](#) was established to preserve farmland and to curb sprawl originating from Washington D.C.^o

The Rural Lands Stewardship Program (RLSP)

A non-regulatory, market-driven, incentive program led by landowners

Although the results of the RLSP program have been mixed, this framework is a promising approach. The [RLSP was spearheaded by Collier County, Florida](#)^p and offers landowners of large acreage property an incentive-based solution for growth management in Florida. The program can serve communities nationwide. In 2004, the Florida legislature enabled this innovative approach. It is not a TDR program, but a credit-trading program whereby willing landowners and developers trade credits to conserve valued natural resources, including wildlife habitat. The effectiveness of Florida's program to truly conserve natural resources and wildlife habitat is still in question, however. Some outcomes may lead to scattered urbanization in rural areas, which fragments habitat.⁴ The program was deemed a success by Collier County, who still employs it and plans to improve it to address problems. The lack of parity between Florida State Land Use Planning rules and the RLSP has prevented adoption by other counties to date. See <https://rlsafacts.com> for full details.

Regional Commissions

The Pinelands of New Jersey is an interesting case study for how to achieve conservation of large landscapes of unique habitat under significant development pressure. [The New Jersey Pinelands Commission](#)^q provides growth management incentives to participating communities. The Pinelands Commission also monitors the economic health of the region. Pinelands communities consistently issue more building permits than other areas of the state and have a 4 percent higher median sales price. Building transactions during the economic recession beginning in 2007 were 50 percent higher in the Pinelands and the unemployment rate was the same as other areas.⁵

n <https://kingcounty.gov/services/environment/stewardship/sustainable-building/transfer-development-rights.aspx>

o <https://montgomeryplanning.org/planning/agricultural-reserve/transferable-development-rights/>

p www.colliercountyfl.gov/government/growth-management/divisions/planning-and-zoning-division/comprehensive-planning-section/rural-lands-stewardship-area/rural-lands-stewardship-area-history-and-archive

q <http://www.state.nj.us/pinelands>

GREENING ORDINANCES

Reduce Unnecessary Fragmentation and Impacts to Priority Wildlife Habitats

Create and rework existing ordinances to make better use of open space by reducing habitat fragmentation and unnecessary habitat impacts.

Green ordinances:

- Direct development to existing towns and cities.
- Direct extensive development away from the boundaries of Managed Areas (See page 33). Maintain a rural landscape and priority habitat between Managed Areas.
- Conserve a network of large, connected priority habitats represented in the Conservation Data. Larger core habitat areas can be conserved among different connecting parcels and are linked by wildlife travel corridors. Encourage or require connection of large blocks of natural open space on adjacent developments.
- Can be crafted over time. Take any steps toward Green Growth that your community supports.
- Clearly state in the ordinance *Intent and Purpose* the objective(s) from the comprehensive land use plan that are being implemented.
- As much as possible, this section is organized in the order of a typical unified development ordinance so it can be used more easily to update land use ordinances.

It is important to coordinate with other community departments, such as environmental health or fire and rescue, to ensure that their requirements do not unnecessarily compromise habitat conservation and connectivity.

A Model Natural Resources Conservation Ordinance for North Carolina



The N.C. Wildlife Commission and the Duke Nicholas Institute for Energy, Environment, and Sustainability teamed up with the Town of Navassa, N.C., to provide a model ordinance for comprehensive natural resource and habitat conservation in North Carolina communities. The model ordinance acts as an overlay district and is meant to conserve only the most sensitive natural resource areas and the most rare types of upland wildlife habitats. The model language in this ordinance can be used to reduce habitat impacts in any local ordinance.

Please see www.ncwildlife.org/greengrowth for details.

* This model ordinance can be used in any ordinance to define habitat types and standards to conserve and connect habitats.

Importance of a Conservation Incentive District and Conservation Subdivisions

One of the most effective things a community can do to conserve a contiguous connected network of habitat is to have a Conservation District or Conservation Incentive District. If creating a new district is not practical in the near future, make sure your community has a conservation subdivision option that avoids habitat fragmentation.

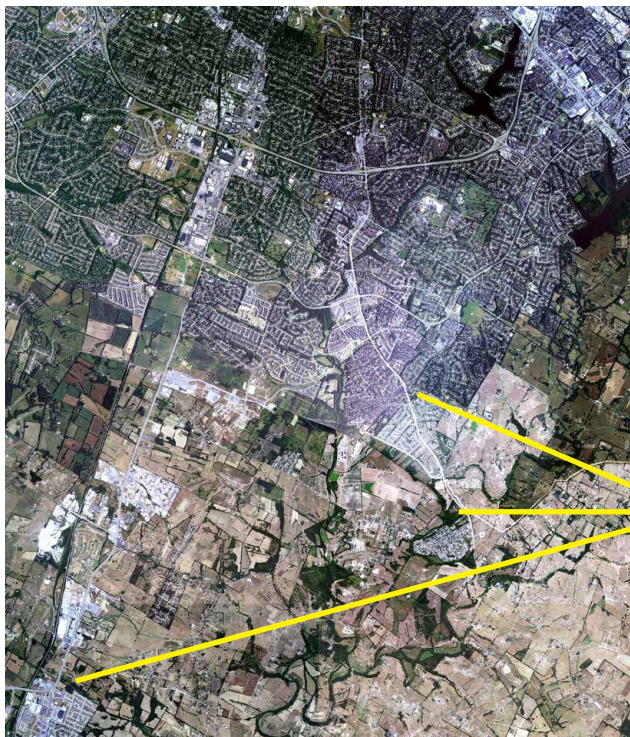
Employ Urban Service Areas to Reduce ‘Sprawl’

The primary threat to priority wildlife habitat, farming, and forestry is extensive development spreading haphazardly into rural areas. An Urban Service Area (USA) is a mapped line within which urban services are provided and expanded regularly to meet development demand. Over 100 U.S. cities, counties, and states, including Tennessee have USAs.⁶

- Proper USA management coupled with other planning methods can help direct growth to city centers, curbing sprawl outside the urban fringe.⁷
- USAs maintain rural areas only if the county also uses them.⁸
- Other growth management mechanisms, such as minimum density requirements and transfer of development rights, are used in concert with the USA.⁹
- If drawn to exclude areas with important natural resources of high ecological value, a USA can help your community implement Green Growth.

Example Urban Service Areas

- Fayette County and towns and Lexington, Kentucky, were the first jurisdictions in the U.S. to implement a USA in 1958. They still use this growth management tool, which has resulted in less sprawl than is found in comparable cities.



An Aerial View of Lexington, Kentucky

An aerial view of southeastern Lexington, Kentucky (National Agriculture Imagery Program, 2012) demonstrates the centralized growth pattern and agricultural conservation. This has resulted from the use of an Urban Service Area put in place and expanded since 1958. Notice the centralized pattern of development of other towns due to municipal and county USA policies.

Urban areas are centralized.

Farmland is not threatened by inefficient development patterns.

Examples:

- The [Orange County, NC, Rural Buffer](https://cwp.org/wp-content/uploads/2018/02/Orange-Countys-Rural-Buffer-REV.-3.13.19.pdf) defines the extent of urban services provided. Joint planning among Chapel Hill, Orange County, and Carrboro helps manage growth using this approach.^g

Implications of Urban Service Areas

Research has shown that USAs do not affect housing affordability and land values, or deter growth if the Urban Service Area is expanded in time to meet rising development demand.¹⁰ Effective growth management policies do appear to significantly lower public service and infrastructure costs to taxpayers.¹¹ If insufficient housing or an overstock of commercial or industrial land is allowed within the USA, this can be a disadvantage to neighboring towns left with too much housing, fewer local jobs, and less tax revenue.¹²

Considerations for Zoning

Done correctly, zoning a jurisdiction based on the suitability of the land to accommodate different land uses can protect natural resources, public health, and the economy. However, various conventional development practices, such as mid-density residential development with a 1 to 3 acre minimum lot size, fragments habitats, degrading the network of natural areas on which our communities depend.

Natural resource-based zoning:

- Manages growth patterns by using development units per acre instead of minimum lot size to encourage development clustering.
- Bases the location of zoning districts on an analyses of the Conservation Data and maps presented in Section 2, in addition to the common considerations.
- Maintains healthy streams and wetlands and encourages development patterns and standards that conserve upland priority wildlife habitats.
- Encourages quality, high density, development in towns and cities, near existing urban services and public transportation and away from sensitive areas.
- Encourages rural and urban cluster development.
- Maintains a rural landscape around and between permanently conserved lands.

Make high density development as easy as possible in towns and cities.

- However, avoid placing high density developments in or near priority wildlife habitats mapped in the Conservation Data.
- Focus on crafting a conservation district ([See page 94](#)) that conserves and connects forests along streams, rivers, and wetlands.
- In towns and cities, only allow conservation subdivisions in conservation districts and not other districts, so that they do not occur in areas without sensitive resources. It is better to build high density development in areas without priority habitats in towns and cities to prevent ‘sprawl.’
- In towns and cities, upland areas without endangered species, even if they look natural, should usually be developed to prevent development spreading out into rural areas. Consult with a wildlife biologist to review your plans and ordinances.

Make any conservation-based development use ‘by-right’, to reduce permitting barriers.
Make conventional development methods a special use in sensitive areas.

- Employ ‘town-center’ mixed uses to provide housing near retail and services to residents. Utilize minimum density requirements for these developments. Aesthetically pleasing high density shopping areas, where people can sit outside, make more income in sales and rent than box store strip mall retail areas.¹³
- Use Transit Oriented Development where high density neighborhoods are close to high-quality public transportation, to ensure ridership.

Ensure that rural areas maintain character and natural resources.

In rural districts:

- Zone by development units per acre instead of minimum lot size (See page 83). This allows development units to be clustered.¹⁴
- Employ a Conservation District or Conservation Incentive District (See page 94).
- Remove permitting barriers by making clustered and conservation development a ‘by-right’ development permit. This removes additional development review and saves the developer and planning department time. Consider making larger lot developments a conditional use.
- If development is desired near sensitive habitats, encourage low density clustered rural subdivisions of one dwelling per four or more acres.¹⁵
- Even large lot zoning of 10 acre minimum lot sizes can fragment habitat for “area-sensitive” wildlife, including most forest dwelling birds, amphibians, and reptiles and some mammals like bobcats and black bear.¹⁶ Development densities of one development unit per 25 acres can lead to the loss of certain bird species from the area.¹⁷
- Zone districts with the most important habitats and wildlife corridors for agricultural uses and very low overall density. To lower impacts to the most threatened priority wildlife species in North Carolina, more than 25 acres per dwelling unit will be needed.^{18, 19, 20} This density could be justified in highly sensitive areas and could meet demand for working lands and wildlife-related recreation.
- Consider using feature-based density described in Section 1.3 of [New Hampshire’s Innovative Planning Techniques guide](#). This approach excludes important habitats in the net site acreage in order to better conserve habitats.^h

Recommendations for Rezoning:

- Require a sketch / concept plan and a pre-application meeting with the planning department, ahead of expensive design. NC local governments such as Randolph, Moore, and Chatham Counties and many others have done this. Developments can be approved more quickly because developers understand the development and design standards ahead of time.
- Require that developers show the Conservation Data on maps and in their concept plan, address how they will minimize impacts to priority habitats. This reduces unnecessary impacts to habitats and the benefits that natural areas provide to residents and the community.

Examples and other resources:

- A similar program to the GGT, the [Hudson River Estuary Program \(NY\)](#), has a guide dedicated to conservation zoning.ⁱ
- [Natural Resource Protection Zoning](#).^j These districts have no underlying zoning and are designed to be very low density and specifically to conserve sensitive resources applying the principles outlined above. This method was developed in Massachusetts by working with private landowners. This approach was used for many years by local governments. In 2021, it was enacted statewide as part of an economic growth legislative package.
- During the zoning process, [Pasco County, FL](#)^k require coordination with state and federal wildlife agencies to conserve habitat on all development sites where listed species are documented (Section 802).

Climate resilience

- [The City of St. Augustine, Florida](#) has a simple Conservation Overlay Zone ordinance (Chapter 11, Article II) that includes areas that flood every 10 years.^l
- Georgetown University Law School Climate Center maintains a web page focused on [resilient zoning and overlays](#)^m that includes example local government ordinances and model ordinances.
- [Smart Growth Fixes for Climate Adaptation and Resilience](#), U.S. EPAⁿ
- [Wetlands Watch Resilient Zoning](#)^o

Table of Uses

List major subdivisions and other major development types such as Planned Use Developments, as a land use in the Table of Uses and consider permitting them only in districts where major development is appropriate. See the Moore County, NC Unified Development Ordinance Table of Uses as an example of this.

i https://www.dec.ny.gov/docs/remediation_hudson_pdf/overlayzones.pdf

j www.mass.gov/doc/smart-growthsmart-energy-slideshowsopen-space-design-osdnatural-resource-protection-zoning-nrpz/download

k https://library.municode.com/fl/pasco_county/codes/land_development_code

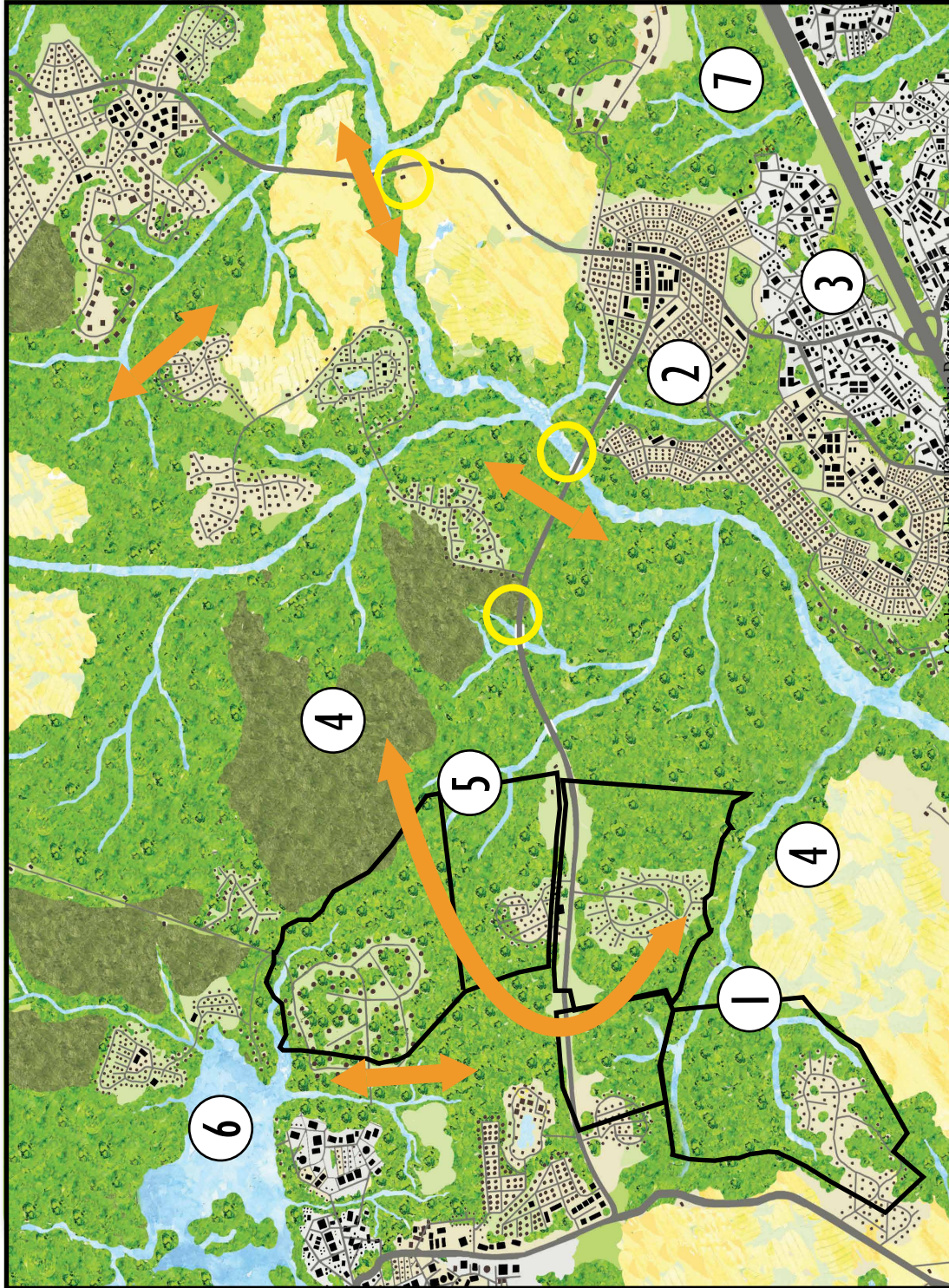
l https://library.municode.com/fl/st._augustine/codes/code_of_ordinances

m www.georgetownclimate.org/adaptation/toolkits/managed-retreat-toolkit/zoning-and-overlay-zones.html

n www.epa.gov/smartgrowth/smart-growth-fixes-climate-adaptation-and-resilience

o <https://wetlandswatch.org/resilient-zoning>

Efficient, Natural Resource-Based Land Use Pattern



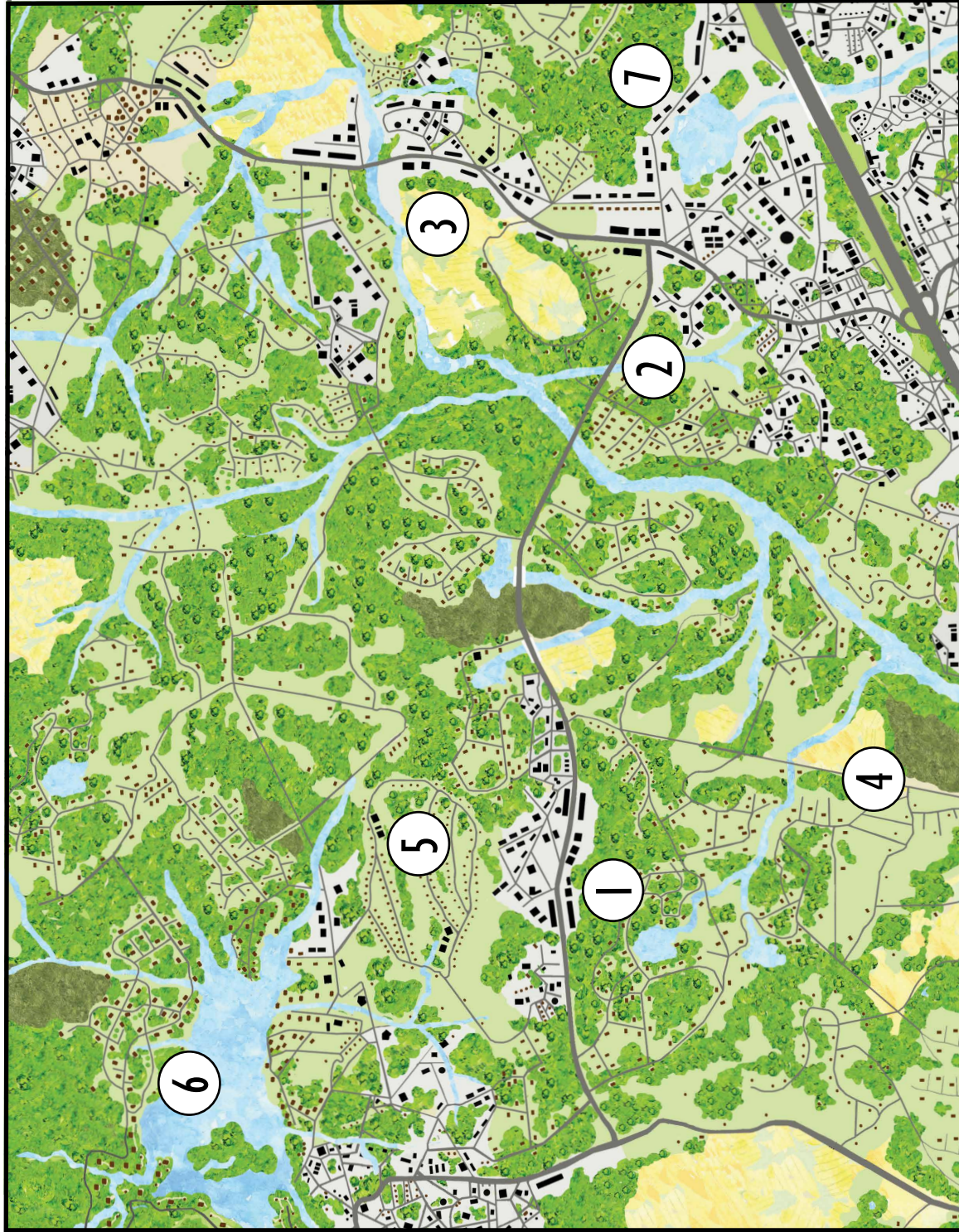
Large, connected priority habitat areas, working lands and other natural resources are secure with an efficient land use pattern.

1. Rural cluster developments conserve large areas of habitat that are connected to habitat on adjacent parcels.
2. Walkable communities are more compact and near commercial uses.
3. Industry and box retail commercial are located near highway junctions for prime vehicle access and less impact.
4. Farms and working forests are not threatened by development encroachment.
5. Small wetland upland habitat buffers are conserved among parcels.
6. Bald eagle nest and waterbird nesting colony buffers are conserved.
7. Stream and river forested buffers of 100 to 300 feet are in place. The floodplain is undeveloped. Greenways are extensive.

Bridges are designed as wildlife underpasses and retain non-flooded land for passage.

- Residential
- Commercial / Industrial
- Native Forest
- Farms
- Lawn
- Streams, Rivers & Reservoirs
- Working Forests
- Wildlife Travel Corridors

Inefficient Land Use Pattern that Weakens Natural Resources



The same amount of development is pictured here. Habitat loss has occurred due to fragmentation. More roads and spread-out sewer lines cost taxpayers more for maintenance.

1. Rural areas have become suburban sprawl. Intermittent streams are stormwater ponds that reduce groundwater recharge.
2. Communities are not walkable and are far from commercial uses.
3. Industry and box retail commercial are not strategically located, leading to urban decay.
4. Farms and working forests are lost and threatened by development encroachment.
5. Wetlands are surrounded by roads and do not have sufficient upland forest buffers.
6. Bald eagles and wading birds are uncommon.
7. Streams and rivers have minimal to no forested buffers. The floodplain is developed. Drought and flooding increase.

Graphic created by ECHO 3 Graphic Design, Star, N.C.

Bridges do not allow for terrestrial wildlife passage. Priority wildlife and natural resources are threatened.

Craft a Conservation Incentive Overlay or District

In areas not appropriate for extensive development, such as those with an existing network of the highest priority wildlife habitats and wetlands, consider a natural resources overlay district with goals and standards focused on conserving, buffering and connecting habitat. Other intensive land uses can be conditional or not permitted in a conservation district.

Model Ordinance:

- We recommend using the NC Model Natural Resources Conservation Ordinance ([page 87](#)). This model ordinance provides the mapping process and model language needed in NC to legally conserve habitats in a conservation district or conservation subdivision. The model also defines NC priority habitat types, which many ordinances do not include, but need to, in order to effectively conserve declining habitat. There are two versions of the model ordinance. One has mandatory language and one is an incentive-based ordinance.

Other Examples:

- [Hillsborough County, FL^p](#), maintains a map of “Significant Wildlife Habitat” (SWH) and requires development conserve up to 50 percent of SWH. They also zone by units per acre instead of minimum lot size and require a state and federal wetlands permit before a building permit is issued. Search the term ‘Significant Wildlife Habitat’ in their ordinance to find the language.
- [Habitat corridors - Pasco County, FL require conservation of mapped Ecological Corridors \(Section 803\)^c](#). They offer a range of development options including density bonuses and density transfer on and off-site to avoid impacts to mapped Ecological Corridors. Please note the wetland buffers are not sufficient for habitats in NC.
- [The Town of Brunswick, ME, Wildlife Habitat Overlay District^a](#) discourages habitat fragmentation and creates incentives to maintain contiguous blocks of natural open space during development.
- The King County, WA Code is very comprehensive. Their [Critical Areas Ordinance \(Title 21 Zoning, Section 21A.24.500\)^r](#) requires protection of Wildlife Habitat Conservation Areas, for wildlife species listed as priorities in the Comprehensive Plan.
- Summit County, CO is another comprehensive example. Their [Wildlife Habitat Overlay District \(Section 4200\)^s](#) can be seen on their GIS map and seems effective at reducing wildlife habitat fragmentation.

Reduce Habitat Impacts in Development Ordinances and Standards

Recommendations for Development Review

- Consider appointing a natural resources board of people with a natural resources background to review ordinances and provide guidance to the subdivision review board. Many local governments across the country now do this.
- More and more local governments in NC are requiring that applicants demonstrate that they have received state or federal environmental permits ahead of construction. This ensures that building permits are not issued to developments that will

p www.hillsboroughcounty.org/en/businesses/zoning/land-development-code

q www.brunswickme.org/229/Planning-Development

r https://kingcounty.gov/council/legislation/kc_code.aspx

s www.summitcountycolorado.gov/937/Development-Regulations

On-Site Development Patterns that Conserve Habitat

In the figure below, A and B have the same development density, but in image B the lots are clustered and roads are designed to avoid habitat fragmentation.



A. Less habitat conserved



B. More habitat conserved

- A. Habitat fragmentation created by large lot zoning and no clustering. This also increases impervious surfaces and stormwater run off due to longer driveways.
- B. Clustered development outside sensitive areas and near the main road conserves wider connected habitat.

Source: 1000 Friends of Florida, created by Benjamin Pennington

flood or destroy federal endangered species habitats.

- Many local governments require a sketch or concept plan for all major development. Sketch or concept plans can be reviewed at the planning staff level.
 - In the sketch or concept plan the developer should:
 - ▶ Consult and show the Conservation Data for Green Growth and aerial photos on development sketch plans and plats.
 - ▶ For large -scale developments, such as major subdivisions, Planned Use and Mixed Use development, obtain on-site survey information about the location of priority habitats during the stream or wetlands survey or from a qualified biologist. See [Appendix B](#) for a list of natural resource agencies that may be able to conduct surveys free of charge.
 - ▶ Describe the methods they plan to use from Section 3 of the GGT handbook to minimize impacts and connect contiguous unfragmented habitats on or adjacent to the site.
- Large-scale development proposals can be reviewed by a biologist or an outside entity with biological expertise. This is not a regulatory process, voluntary recommendations would be offered.

Dimensional Standards and Setbacks

- To reduce the amount of infrastructure and land taken up by developed uses it is important to minimize development set-backs as much as possible. Reduced front setbacks have also been shown to provide a better sense of community, since neighbors can see each other and are more likely to interact.
- Reducing setback distances helps to ensure lots do not fall within priority habitats which should be in a common area.

- Employ 'building envelopes'. All developed areas should be clustered and not dispersed across the site. Wildlife habitat should be unfragmented by development.

Parking

- Minimize parking and encourage over-flow parking on permeable surfaces such as grass. There is a wealth of information and model ordinance language via an Internet search on how to employ maximum instead of minimum parking standards to ensure developers do not build too much parking.

Open Space Design Standards

- The following recommendations also apply to any open space or conservation design standards in a conservation / cluster development ordinance.
- Separate active and passive open space criteria.
- Primary areas (highest priority) for all open space, if present on site, would be priority wildlife habitats represented in the Conservation Data.
- Incorporate the habitat conservation recommendations in Section 3 as standards in these ordinances. A convenient way to do this is to use the NC Model Natural Resources Conservation Ordinance definition of Significant Natural Resource Areas to define habitats and the order in which habitat on site should be conserved.
- Include language that requires the connectivity of habitat on site and connectivity to habitat adjacent to the site. All habitats and habitat corridors should be as wide as possible on all sides. (This language is in the NC Model Natural Resources Conservation Ordinance).

Wildlife habitat conditions change over time. As such, if conservation of specific habitat areas is required on developed sites, the delineation of the habitat must be based on a site survey and not only on a map depicting wildlife habitat. If the specific location of required open space on a development is voluntary, a site survey does not need to be required.

Protect Natural Heritage Sites

Natural Heritage sites are Natural Heritage Natural Areas (NHNAs) and the locations of Natural Heritage Element Occurrences (NHEOs). These areas are identified and mapped by the NC Natural Heritage Program. They support rare wildlife, plants, and natural communities. GIS map layers of SNHAs and NHEOs are provided through the Conservation Data for Green Growth and are detailed in Section 2.

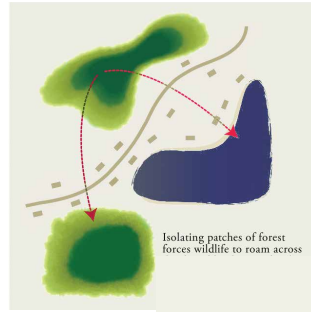
- Because they contain the rarest and most outstanding elements of biological diversity in our state, these areas are not appropriate for development.
- Permanently protecting these areas through land acquisition or conservation easements is the best way to conserve these areas.

If building must occur within Natural Heritage sites, these land development standards should be considered:

- The applicant should contact the NC Wildlife Resources Commission (NCWRC), so we can provide guidance or consult with the US Fish & Wildlife Service (USFWS) to ensure they are not in violation of the US Endangered Species Act. The NCWRC can often let the applicant know if they need to consult with the USFWS.

Development Patterns that Connect Habitat

Encouraging clustered development and connected natural open space on adjacent lands allows wildlife and plants to disperse through the landscape. This reduces the chance that priority wildlife species will become threatened.



A. Habitat is fragmented



B. Habitat is connected

A. Habitat is separated by large lawns and dispersed buildings.

B. More clustered development allows habitat to be connected.

Source: 1000 Friends of Florida, created by Benjamin Pennington

- Completion of an environmental assessment to identify negative impacts that any proposed development project will have on the Natural Heritage site.
- Review of the environmental assessment by the NC Natural Heritage Program.

Example Ordinances

- The N.C. Model Natural Resources Conservation Ordinance ([page 87](#)).
- [Carrboro, North Carolina, Land Use Ordinance Section 15-198](#) for open space standards ties design requirements to maps of habitat. The Development Application Checklist, includes an initial staff meeting, site visit, and the requirement to maintain contiguous habitat.^t
- [Hillsborough County and the City of Tampa, Florida, Upland Habitat Protection Ordinance](#) is designed to protect important plant communities and wildlife habitat. Approved upland habitat plans are required before major development within significant upland habitats.^u
- Section 7.6 General Design Standards of the [Orange County, North Carolina, Unified Development Ordinance](#) requires creation of one or more strategies to protect Natural Heritage sites.^v
- [Section 8.10 in Article 8, “Durham Inventory Site Protection Standards,”](#) of the Durham County, North Carolina, Unified Development Ordinance sets forth measures for protecting sites identified in Durham County’s Natural Heritage Inventory.^w

^t <https://townofcarrboro.org/298/Land-Use-Ordinance>

^u https://library.municode.com/fl/hillsborough_county/codes/land_development_code?nodeId=ARTIVNAREADPUFA_PT4.01.00NARE_S4.01.09ENSEARPLSIWIHA

^v www.orangecountync.gov/1497/Documents

^w <https://durham.municipal.codes/UDO/8.10>

Conservation and Cluster Subdivisions and Standards

Conservation subdivisions are popular because profit margins can be greater and the same number of homes, if not slightly more, can be accommodated while conserving natural open space. Many local governments have incentive-based ordinances for developers to cluster homes and set-aside open space. However, habitat fragmentation and destruction can happen when the open space standards above are not been incorporated into ordinances.

When development cannot be avoided in sensitive areas, nature-based development standards include:

- Minimizing habitat fragmentation
- Minimizing frontage and setback requirements to increase contiguous open space.
- Clustering development
- Utilizing building envelopes to minimize disturbance of natural vegetation on lots.
- Follow the guidance in Open Space Standards above.
- For details on how to design wildlife friendly developments, see Section 6.
- It is often possible to accommodate a mix of housing densities, from large lots to more affordable and attractive condo-type development, on site due to open space amenities and attractive housing appearance.
- In general, it is best to conserve 50 percent or more of the site.
- See Section 6 for more information.

Example Ordinances

These North Carolina ordinances contain some, but not all, components of an ecologically sound conservation development ordinance.

- We recommend using the NC Model Natural Resources Conservation Ordinance ([page 87](#)) in combination with a review of the following to understand how priority wildlife habitats can best be conserved in conservation / cluster subdivisions.
- Articles 614 and 815 of the [Randolph County, North Carolina, Unified Development Ordinance](#) outlines a Cluster Subdivision Overlay District. Incentives, such as density bonuses and planning assistance to developers, have led 50 percent of developers to choose cluster developments. They also address conservation of Natural Heritage Areas. The Birkhead Wilderness Small Area Plan in the UDO requires “Natural Heritage Subdivision Overlay Districts” be used for any residential development at a density of one unit per six acres. Forest Management Plans (usually provided by the NC Forest Service) are required and the three types of open space ownership and protection are included in the ordinance language. We recommend no significant area of natural open space be placed between roads and developed areas and that ordinances have a purpose of minimizing habitat fragmentation.
- [The Chatham County, NC Conservation Subdivision Guidelines](#) s provides a density bonus for conserving natural heritage areas and N.C. Wildlife Action Plan priority habitats on a minimum of 32 percent of the site.^x
- [Article 7, “Cluster \(Conservation\) Subdivisions” of the Franklin County, North Carolina, Unified Development Ordinance](#) establishes open space standards that include some GGT recommendations for preserving wildlife habitat and significant natural areas.^y

x www.chathamcountync.gov/government/departments-programs-i-z/planning/ordinances-regulations

y www.franklincountync.gov/county_services/planning_and_inspections_department/index.php

- [Pima County AZ conservation subdivision ordinance \(18.09.100\)](#) requires 50 percent conservation of the site not including infrastructure areas, defines Arizona priority habitats well, and discourages habitat fragmentation.^z
- The NC State University Forestry and Environmental Outreach Program produced a [guide to conservation subdivisions](#). It has numerous NC case studies.^{aa}
- [The Model Rural Cluster Development Ordinance from the SW Wisconsin Regional Planning Commission](#).^{ab}



LB ROLLER

red-headed woodpecker

More examples of habitat conservation through development standards

- [Fort Collins, Colorado](#), has included conservation measures for priority wildlife habitats in its development standards (Section 3.4.1)^{ac} that are tied to a [Natural Features and Habitat Inventory map](#).^{ad}
- [Boulder County, Colorado, Land Use Code, Section 7-1700](#), requires development proposals include a Wildlife Impact Report whenever the project is located within important wildlife habitats or wildlife corridors shown on conservation maps in the comprehensive plan. The report is developed by a biologist and is reviewed, approved, and monitored by the parks department.^{ae}
- [The Town of Davidson, NC Planning Ordinance](#) requires environmental inventories and 40 percent or more open space conservation in districts outside of urban and suburban areas. Emphasis is placed on conserving wetlands and slopes > 20% in 'primary areas.' Included in 'secondary conservation areas,' are 600 foot wide riparian habitat zones along streams. (This is a recommendation from Section 3).^{af}

Large Lot Subdivisions: Not ideal but sometimes in demand

Wildlife habitat will be better conserved in developments that have minimal lot sizes combined with larger blocks of unfragmented open space outside of development lots. However, where large lots (> 0.25 acres) are desired, ordinances could:

- Include building envelopes, maximum lot coverage proportions and minimal set-back distances to encourage habitat conservation on large lots.
- Require built structures should be near each other and near to roads, situated far from sensitive areas.
- Encourage most of the lot to be maintained in natural habitat except for a house, modest yard that accommodates the septic drain field (if applicable) and driveway.
- Encourage the connection of large areas of contiguous habitat between adjacent subdivisions.

z http://pimacounty-az.elaws.us/code/coor_title18_ch18.09_sec18.09.100

aa www.ncufc.org/uploads/Conservation_subdivision.pdf

ab www.sewrpc.org/SEWRPCFiles/CommunityAssistance/ModelOrdinances/cluster_ordinance.pdf

ac www.fcgov.com/cityclerk/codes.php

ad www.fcgov.com/gis/downloadable-data

ae <https://bouldercounty.gov/property-and-land/land-use/planning/land-use-code/>

af www.townofdavidson.org/1006/Planning-Ordinance

Roads

- Encourage bridges, designed as wildlife crossings, on roads that run through high priority habitat. These can be installed during repair times and can reduce storm-debris damage when installed over streams.
- Pasco Co, FL include design standards for wildlife-road underpasses in their [land development code \(Chapter 800\)](#)^{ag} and provide design guidelines in their [Ecological Corridor Guidance document](#).^{ah}
- Minimize the use and width of impervious surface and curb and gutter.
- See [page 72](#) in Section 4 for wildlife crossing planning and design information.
- Use the [NC Wildlife Commission cumulative impacts guidance document](#)^{ai} for design recommendations for other road or driveway-stream crossing structures.

Stormwater

Stormwater can present a challenge to high density development. Low Impact Development techniques can be used for density calculations and affordable stormwater treatment. Large lots are sometimes in demand and are needed for individual septic systems. Please see [pages 58 to 60](#) in Section 3 for LID stormwater recommendations that can be written into ordinances.

- [N.C. Department of Environmental Quality Stormwater-EZ](#) is a voluntary LID approach encouraged by the our state.^{aj}
- The [N.C. State University Low Impact Development Guidebook](#)^{ak} includes a model ordinance.
- Consider allowing and encouraging “blue roofs” to slow stormwater run-off.

Community and Wastewater Treatment that Encourages Clustering

Where capacity exists and development is desired in rural areas, it is possible to encourage clustered development where sewer is not available by using community septic and other decentralized wastewater treatment systems. These systems are defined by the collection, treatment, and reuse of wastewater close to the point of origin and are thus, better for the environment when care is taken to monitor and manage the system. Community septic systems should consist of septic tanks on individual lots to maintain homeowner accountability but should have the drain field on common open space. Open space can be maintained as a native grassland or native plant meadow and can be placed at the entrance to the community. See the following for Low Impact Development guidance:

- [N.C. State University Low Impact Development Guidebook](#) chapter and curriculum module, “Wastewater Systems,”
- [U.S. EPA guidance](#)^{al}

ag https://library.municode.com/fl/pasco_county/codes/land_development_code

ah <https://content.civicplus.com/api/assets/790fe2ff-95a4-45f5-89b5-51a6a7fa8528>

ai www.ncwildlife.org/portals/0/Conserving/documents/2002_GuidanceMemorandumforSecondaryandCumulativeImpacts.pdf

aj <https://deq.nc.gov/about/divisions/energy-mineral-land-resources/energy-mineral-land-permit-guidance/stormwater-lid-storm-ez>

ak www.planning.org/knowledgebase/resource/9141187/

al [.www.epa.gov/septic](http://www.epa.gov/septic)

What are invasive, exotic plants?

Invasive, exotic plants are species that do not naturally occur in North Carolina but have been introduced by people. Many introduced plants pose no threat, but some grow out of control. Common invasive plants in North Carolina include:

- Kudzu (*Pueraria montana*)
- Japanese Stilt Grass (*Microstegium vimineum*)
- English Ivy (*Hedera helix*)
- Chinese Privet (*Ligustrum sinense*)
- Multiflora Rose (*Rosa multiflora*)



Kudzu has taken over this field.

Invasive species can cause significant damage to ecosystems, habitats, native species, and agriculture productivity. There are large economic costs from invasive species, so controlling them early on is important.

Tree Protection and Forest Conservation Ordinances

Ordinances that protect trees and forests will improve community resilience, as well as, community appearance and other benefits. To improve ecosystem health, it is important to encourage removal of nonnative and invasive tree and plant species, retain the native tree canopy and plant native, non-invasive vegetation. Tree protection will reduce energy use and costs through shading of homes and businesses, among other benefits, such as flood and drought reduction, ground water recharge, and greenhouse gas and heat island reduction. Retention of 50 percent of the tree canopy within a jurisdiction will greatly aid air quality and the drinking water supply, according to American Forests. This is also recommended for wildlife conservation. Consider the amount of development that zoning districts encourage over the study area to help determine the percent of canopy retention for certain types of development uses. Setting standards to conserve unfragmented, undeveloped forested areas on development tracts can simplify tree protection standards.

To effectively preserve the tree canopy within developed areas:

- Define requirements for minimizing the amount of *native* tree and shrub cover removed in connection with development.
- Require submission of a vegetation delineation as part of a development proposal that demonstrates the location of mature native trees and shrubs.
- Ensure that the native tree and shrub species of the region will be retained by species and diameter requirements. For example, mature longleaf pine trees native to the Sandhills have a smaller diameter compared to mature hardwood trees. Small to mid-size hardwoods should be removed in upland longleaf pine areas.

N.C. State University Forestry Extension Urban and Community Forestry Publications provide best practices for [successful tree protection ordinances](#).

The North Carolina Division of Forest Resources Urban and Community Forestry Program offers grants and technical assistance to communities interested in tree protection.^{am}

^{am} http://ncforestservice.gov/Urban/Urban_Forestry.htm

Example Ordinances

- The [Town of Chapel Hill, N.C., Tree Protection Ordinance](#) (Appendix A, Article 5.7) requires applicants to submit a Landscape Protection Plan that encourages preservation of specimen and rare trees and significant tree stands. As part of its carbon reduction strategy, the town is working to address no net loss of the canopy cover and an increase in trees proportional to population growth.^{an}
- [Carroll County, Maryland's Forest Conservation Ordinance](#) requires Forest Stand Delineations and Forest Protection Plans in development. The ordinance requires one acre of forest be planted for every acre removed. Reforestation is directed to priority areas (i.e., stream buffers, wildlife corridors, steep slopes, etc.).^{ao}

Landscaping and Vegetation Control Ordinances

Control invasives and maintain natives!

In addition to tree protection, local ordinances can include measures to promote and maintain native species of vegetation and discourage the introduction and proliferation of invasive, exotic species. These types of ordinances can vastly reduce water shortages because a significant amount of water is used to maintain nonnative landscaping. Native species are tolerant of local climate and do not need to be watered as often. Maintaining and planting native plants is critical to maintaining bird populations. In spring, young chicks are fed a 100 percent insect diet of hundreds of insects per day. Insect resistant and nonnative plants vastly reduce the abundance of beneficial insects, such as butterflies and native bees. Components of an effective landscaping or vegetation control ordinances will include:

- Landscaping plant lists that feature native plants at the top of the list, as few non-native plants as possible and no invasive plants.
- Language that prohibits the introduction of invasive, exotic plants and insect resistant plants during the development process.
- Language that limits planting of insect resistant plants to below ten percent.
- Requirements for the removal of invasive plants.
- Landscaping standards for public works projects so that native (and drought resistant) species are required in local landscaping projects.

For information and lists of invasive, nonnative plants in North Carolina, see Section 3, [page 60](#).

Example Ordinances

- [Moore County NC UDO Chapter 7, Sec. 7.11 H. - J.](#) outlines recommended native plants and prohibited non-native invasive plants.
- [Brevard County, Florida's Land Clearing Performance Standards, Sec. 62-4335](#), is a particularly exemplary model that requires removal of nonnative, invasive plants and requires vegetation control to curb proliferation.^{ap}

an www.townofchapelhill.org/government/departments-services/parks-and-recreation/parks/park-maintenance/trees-in-chapel-hill/tree-protection

ao www.carrollcountymd.gov/government/directory/land-resource-management/resource-management/programs/forest-conservation-program/

ap https://library.municode.com/fl/brevard_county/codes/code_of_ordinances

GREENING HAZARD MITIGATION AND RELATED ORDINANCES

Conserving upland habitats using any of the recommendations in the GGT will reduce the impact of hazards such as flooding, drought, and wildfires. However, many priority wildlife habitats are hazard prone areas such as floodplains and fire-prone forests. Conserving wildlife and habitat in hazard prone areas is essential to reduce the severity of hazards to residents. It is important to understand potential future hazards from climate change that could affect your community.

Stream, Wetland and Floodplain Ordinances

To adequately protect public safety and welfare, these ordinances can protect important species, habitats, and ecosystems if allowed in the NC general statutes. If local governments are not prohibited from enacting local ordinances that are more protective than state and federal law, we recommend the following:

- Require that applicants demonstrate approved state and federal wetlands permits prior to construction.
- State the economic and environmental importance of maintaining biologically functional streams, wetlands, and floodplains.
- Define specific buffer widths, based on science, within which no permanent structures are allowed.
- Discourage or disallow major development in the 100 or 500-year floodplain.
- Encourage the management of stormwater on site through Low Impact Development techniques such as rain gardens, native vegetation, constructed wetlands, and swales

Section 3, “Habitat Conservation Recommendations,” outlines more specific stream, wetland and floodplain protection standards that can be codified into ordinances.

Example Ordinances

- Section 304 of [Chatham County, North Carolina, Watershed Protection Ordinance](#) establishes strong buffer requirements for perennial, intermittent, and ephemeral streams, springs, seeps, and wetlands. It requires that field delineations of streams accompany development proposals. In addition, Chatham County’s Flood Damage Prevention Ordinance prohibits development in the 100- year floodplain.^{aq}
- [The Town of Wolfeboro, New Hampshire, Wetland Conservation Overlay District, Zoning Ch.175 Article II](#), functions to buffer and connect wetlands and streams by establishing a 100 foot, no touch buffer around prime wetland complexes.^{ar}
- Orange County, NC does not allow new structures in the floodplain. See the bottom of www.orangecountync.gov/1309/Floodplain-Information.

aq www.chathamcountync.gov/government/departments-programs-i-z/planning/ordinances-regulations
ar <http://ecode360.com/10186926#10186926>

Steep Slope Protection Ordinances

Steep slopes are often biologically diverse and support unique plant communities, rock outcrops, cliffs, and other important habitat features. When development occurs on or adjacent to steep slopes, sedimentation and erosion can damage important downhill resources and scenic views. Not to mention landslides put people and property at risk. Steep slope protection ordinances can assist in preserving important natural assets by limiting development on certain slopes, landslide prone areas and:

- Areas with important wildlife habitats on, near, or downhill.
- Areas above a certain elevation.
- Areas with particularly important views.

Example Ordinances

- The Land of Sky Regional Council has developed a [report to be used in the development of steep slope protection ordinances](http://www.landofsky.org/pdf/LGS/LandofSky-MRSSPS-final-report.pdf).^{as}
- [Park City, Utah](https://www.parkcity.org/departments/planning)'s Sensitive Area Overlay Zone, Ch.15 - 2.21-3, regulations require protection of steep slopes and ridgelines as part of a broader set of overlay zones that also encourage preservation of wildlife habitat and wetlands.^{at}
- [The Lyme, New Hampshire](https://www.lymenh.gov/planning-and-zoning-administrator/pages/regulations-ordinances), Steep Slopes Conservation District, Article 3.27.2, limits development activities where the average slope is 20 percent or greater. It limits development in areas that are visible from public waters and roads.^{au}
- [Pickens County, Georgia](https://library.municode.com/ga/pickens_county/codes/code_of_ordinances?nodeId=PTIICOOR_CH26EN_ARTIVMOPRPL), Mountain Protection Plan ordinance, Section 26.91 to 26.120, limits development in areas that are 2,200 feet in elevation and on slopes of 25% or more.^{av}

Wildfire Hazard and Smoke Management

Wildfire hazard ordinances can help your community minimize wildfire and manage smoke conflicts while keeping forests healthy.

Many habitats and wildlife in North Carolina are fire-dependent. Occasional fires clear out thick, dense vegetation, improving habitat for many species. Prescribed burning is used as a resource management tool on many public lands.

Prescribed fire is also an effective strategy to reduce woody fuels and wildfire risk to communities. This is especially important in preparation for periods of drought.



Prescribed fire at the edge of a Managed Area threatened by housing encroachment.

as <http://www.landofsky.org/pdf/LGS/LandofSky-MRSSPS-final-report.pdf>

at <https://www.parkcity.org/departments/planning>

au <https://www.lymenh.gov/planning-and-zoning-administrator/pages/regulations-ordinances>

av https://library.municode.com/ga/pickens_county/codes/code_of_ordinances?nodeId=PTIICOOR_CH26EN_ARTIVMOPRPL

Why is this important to planning?

The smoke associated with prescribed burning can pose a risk to smoke sensitive individuals, such as people with asthma, and can cause hazards, such as reduced visibility on roadways.

- The greatest risk occurs within a half-mile radius of a burn, which is referred to as a Smoke Awareness Area.
- When housing, schools, prisons, businesses, or extensive roads occur within a smoke awareness area, it is difficult for land managers to obtain a permit to conduct prescribed burns and the chance for catastrophic fires increases.

Many communities in North Carolina are located in the wildland-urban interface where development is encroaching on habitats where wildfire risks can be high, if habitats are not managed with prescribed fire.

How can an ordinance help?

Local ordinances can help to manage risks associated with built infrastructure next to areas where prescribed burning occurs. Effective ordinances can:

- Limit incompatible land uses (schools, roads, nursing homes, hospitals, high density development) within a half-mile buffer of lands where prescribed burning occurs regularly.
- Land use within Smoke Awareness Areas would ideally be limited to very low density residential uses and agricultural uses.
- Cluster structures instead of spreading them throughout the recommended half-mile Smoke Awareness Area. Land managers may be able to avoid “putting smoke” on houses this way.
- In addition, we recommend all new developments within this buffer provide disclosure forms to new residents explaining that they will occasionally be exposed to smoke from prescribed burns.
- If the development will take place near natural open space, ensure that the applicant complies with Firewise Communities guidelines to protect homes from wildfire. www.firewise.org

Where does prescribed burning occur in my community?

- The Smoke Awareness Area map is provided as part of the Conservation Data for Green Growth ([see Section 2, page 33](#)).
- For more information about prescribed fire in North Carolina, [see page 4](#) and the North Carolina Prescribed Fire Council website <http://ncprescribedfirecouncil.org/>.

Example Ordinance

- The [Jefferson County, Colorado Wildfire Hazard Overlay District](#) limits land uses and requires hazard mitigation strategies around any dwellings and/or the submission of a wildfire mitigation site plan for developments located within the district.

ENERGY SYSTEMS ORDINANCES: MINIMIZING WILDLIFE IMPACTS

Wind Energy Systems Ordinances

As communities seek to promote renewable energy to reach North Carolina's renewable energy standard, wind energy is often considered. Certain wind energy systems, however, can have significant negative and avoidable impacts on wildlife.

The North Carolina Wind Energy Working Group defined the issues related to wind development for communities. Some of the issues considered include public safety concerns like setbacks from buildings and property lines, noise and wildlife impacts, among other issues. For more information on common types of wind power projects visit the American Wind Energy Association website <http://awea.org>.

There are unique sets of concerns and regulatory issues for projects of different scales. NCDEQ now has a permitting process for onshore wind facilities.

Wildlife Impacts from Wind Farms Considered in Permitting

Direct mortality - is the greatest impact to wildlife. The time of year and turbine speed directly affect mortality. On average, two birds are killed per turbine per year.²¹ Estimates for bat mortality have reported that as many as 33,000 to 111,000 bats are killed per year by wind facilities in Pennsylvania, West Virginia, western Maryland, and Virginia.²²

Habitat loss or alteration - occurs when natural habitats are cleared for the installation of wind turbines, infrastructure, and transmission lines. For example, ridgetop projects in the Appalachians have been converting forests to roadways and open fields.

Habitat and area avoidance by wildlife - Many declining species of wildlife will abandon areas or fields that contain wind turbines due to constant disturbance by the flickering shadows, lights, and movements of turbines. This has been observed particularly in certain waterfowl^{23, 24, 25} and raptors and many grassland birds^{26, 27}.

Connectivity issues - Connecting wind farms to energy transmission lines requires building new, above ground infrastructure that can limit the mobility of wildlife in the area. Birds and bats can collide with above ground transmission lines.³⁴

Resources for Wind Energy Systems Ordinances

- The North Carolina Wind Working Group has prepared a model wind ordinance for local communities. Examples of how counties like Watauga, Ashe, Carteret, Camden and others have used and adapted this model and additional models from across the nation can be found at <https://energy.appstate.edu/additional-tags-categories/north-carolina>.^{aw} Search the database for "wind" and "policy or regulation."
- The Department of Energy and others also have produced a [guide for county commissioners](#).^{ax}
- For commercial wind projects and their environmental review, two good summary documents include the, "U.S. Fish and Wildlife Services Guidance on Siting Land-based Wind Energy Projects."^{ay}

A special thanks to Curtis Smalling of Audubon North Carolina for providing this information.

aw <https://energy.appstate.edu/additional-tags-categories/north-carolina>

ax www.osti.gov/biblio/896718

ay www.fws.gov/media/land-based-wind-energy-guidelines

Solar Energy Systems Ordinances

NC is one of the top solar energy producers in the country in solar farms. It has become a popular form of economic development, energy independence and low pollution source of power. However, large swaths of land are developing into solar farms, so incorporating wildlife habitat conservation measures is very important.

- Encourage co-location of solar installations on top of existing built structures. Doing so, where possible, uses less land.
- Include requirements for optimum solar building orientation and require that solar ‘stub-ins’ be constructed during building renovation or construction. ‘Stub-ins’ support rooftop solar panels and are affordable.
- Land-based solar installations should be built away from sensitive wildlife habitats and forests ideally should not be cut in order to build a solar farm.
- Encourage compact solar panel design to allow for more energy generation in less space.



MICHA JOST

Rooftop Solar

Resources for Solar Energy Systems Ordinances

- Use the [detailed NC Wildlife Commission recommendations on our website](#).^{az}
- [The N.C. Sustainable Energy Association](#) and the N.C. Solar Center provide a template solar energy systems ordinance for North Carolina communities.^{ba}

More Information on Greening Incentives and Ordinances

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az www.ncwildlife.org/Conserving/Programs/Green-Growth-Toolbox/Conservation-Recommendations

ba <https://energync.org/>

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- 18 Ibid. 15
- 19 Ibid. 17
- 20 Justification for the development density of 1 du per 30 acres is also based on the space needs of priority wildlife in N.C. For example, in order to conserve longleaf pine forest an area of 2,000 acres is required. To conserve interior forest songbirds an area of 500 to 1,700 acres is needed. Under this dwelling density and with a 2 acre minimum lot size, a 500 acre tract would have 16.5 houses. A total of 33 acres would be taken up in 2 acre lots.
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