U.S. FISH & WILDLIFE SERVICE

ACHIEVE GREEN GROWTH THROUGH INCENTIVES AND ORDINANCES

Green Growth includes providing growth management incentives and revising ordinances to remove barriers to wildlife, habitat and natural resource conservation. This section outlines the components of greening incentives and ordinances and provides links to methods used by other communities.

Check our website www.ncwildlife.org\greengrowth for additional examples.

For the most threatened unique ecosystems, especially those with the most 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 Pinelands of New Jersey is a good case study for how to achieve conservation of large landscapes of unique habitat under significant development pressure. The New Jersey Pinelands Commission regional planning compacts provide 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.[1]
www.state.nj.us/pinelands/

Land Use Patterns that Maintain Natural Resources

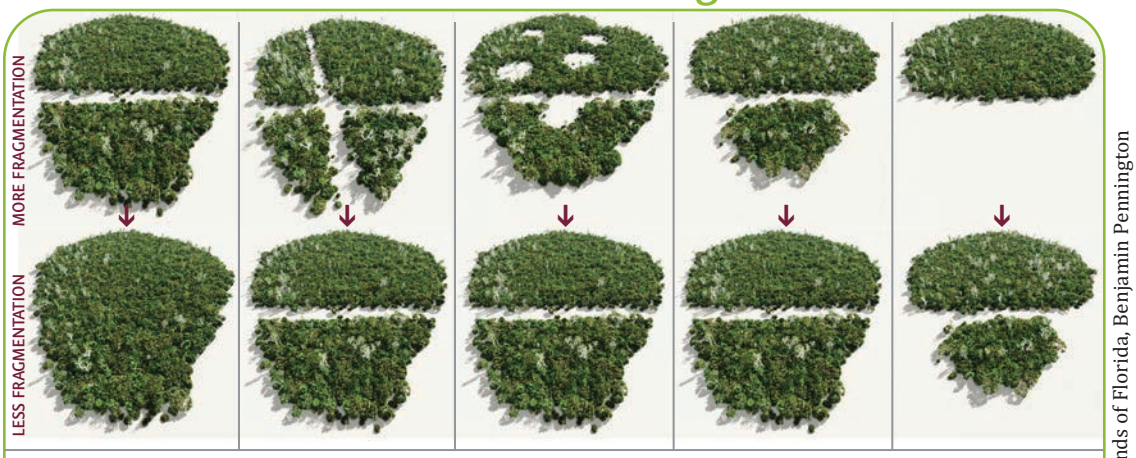
Making better use of opportunities to conserve biodiversity

Land use patterns that conserve, buffer and connect priority wildlife habitats and other natural resources can allow communities to maintain the benefits of Green Growth. These patterns are most assured when incentives and ordinances encourage centered, more dense growth patterns, mixed uses, rural cluster development, transit oriented development, appropriate habitat conservation and low impact development measures. Greener development decisions can allow for the same number of development projects that are needed while encouraging more efficient land use without harming private property rights.
See page 84 for a visual representation of land use patterns that maintain natural resources.

Benefits of Natural Resource-Based Land Use Patterns

- Less tax payer dollars spent on infrastructure maintenance and more funds to provide business incentives and labor force training.
- More free services provided by nature, such as water quality and quantity.
- Lower transportation costs which improves housing affordability.
- More walking and biking opportunities for healthier, more desirable communities.

Reduce Wildlife Habitat Fragmentation



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.

Source: 1000 Friends of Florida, Benjamin Pennington

GREENING INCENTIVES

Use of incentives is important to 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 would require approval from our State Legislature to implement.

We recommend that local governments employ and provide information to landowners about the following incentives that encourage natural resource-based land use patterns.

Conservation Easements

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 that meet the qualifying criteria of their local land trust, local or state government or other government entity, such as a Soil and Water Conservation District. An easement donation can offer significant tax reduction to landowners. Conservation measures in the easement are negotiable and match 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 local 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.ctnc.org/land-trusts/find-your-local-land-trust/.

For examples of local government support of conservation easements, see Section 4, page 63.

N.C. Conservation Tax Credit Program

This program could provide tax credits for land that conserves habitat, if it is re-established by the N.C. Legislature. www.ctc-nc.org

The Wildlife Conservation Lands Program (WCLP)

This is a new program that enables landowners to receive a reduced property tax rate for conserving priority wildlife habitat. Landowners must have owned their property for at least five years. The N.C. Wildlife Resources Commission must verify 20 acres or more of contiguous priority wildlife habitat on the land for landowners to qualify.

bog turtle

For more information:
www.ncwildlife.org/Conserving/Programs/LandConservationProgram.aspx

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.

For more information:

- Present-Use Value Program for Forestland:
  http://ncforestservice.gov/Managing_your_forest/managing_presentuse.htm
- Example of Present-Use Value on a county website:
  www.hendersoncountync.org/ca/taxpvalue.html
- Voluntary Agricultural Districts:
  Voluntary Agricultural Districts encourage agricultural land uses. For more information visit the Land Preservation Notebook at www.cals.ncsu.edu/wq/lpn/index.htm.

Conservation-Based Development Incentives

Make any conservation-based development use by right, to reduce regulatory barriers. Make conventional development methods a special use in conservation districts that contain the most sensitive areas.

Provide a density bonus incentive outside sensitive areas in exchange for natural, unfragmented, open space set-asides.

In urban and urbanizing areas, conservation development should usually only be encouraged to conserve unfragmented forests along waterways, including intermittent streams, floodplains and wetlands as opposed to tracts of upland habitat. This will help to prevent habitat fragmentation and sprawl.

In rural areas consider creating a conservation district in the most environmentally sensitive areas that encourages large, unfragmented natural open space set-asides in exchange for a density bonus.

- Reduce the fees charged to developers for services in exchange for conservation.
- Flexible development standards such as reduced set-backs and screening buffers.
- Reduced development application fees.
- Priority development review and personal assistance to expedite permitting.
- Awards and certification for developers that avoid sensitive natural areas and minimize urban sprawl.

Examples

- See handbook page 89 for conservation development incentives ordinances used by Franklin, Chatham and Randolph Counties. Their ordinances provide a density bonus in exchange for up to 50 percent or more unfragmented, priority wildlife habitat conservation. These options are consistently chosen by developers in those counties.
- The Wildlife Friendly Development Certification program (developer application fee required) certifies qualifying developments. www.ncwildcertify.org
- LEED certification (developer application fee required), particularly the LEED Neighborhood Development Certification. www.usgbc.org/leed
- The Greater Triangle Stewardship Development Awards program. www.trianglestewardship.org

Incentives that Require Approval by the N.C. Legislature

Voluntary Transfer of Development Rights (TDR)

This is an important tool that can protect ecosystems while promoting economic growth.

- In N.C., communities must obtain approval from the state legislature to use TDRs. Davidson and the counties of Orange, Chatham and Currituck have worked to do this.
- Willing landowners enroll their land voluntarily in a development rights sending area that contains environmentally sensitive and agricultural areas. Development receiving areas are where higher density development is desired.

Voluntary Transfer of Development Rights

MCSWEEN PHOTOGRAPHY

- The TDR program facilitates transactions where willing landowners in sending areas sell development rights to developers in receiving areas.
- Twenty states have passed legislation that enables TDRs,[2] including Georgia and Tennessee. Two hundred such programs exist in the country.[3]

Example TDR Programs

- King County, Washington's TFDR program has preserved 92,000 acres, while accommodating needed growth. www.kingcounty.gov/environment/stewardship/sustainable-building/transfer-development-rights.aspx
- Montgomery County, Maryland's TDR program was established to preserve farmland and to curb sprawl originating from Washington D.C. www.montgomeryplanning.org/community/plan_areas/rural_area/planning_process/about_the_process/tdr.shtm

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, it is a promising approach. The RLSP was spearheaded by Collier County, Florida and major landowners to find an incentive-based solution for growth management. The program can serve communities nationwide. It is a credit-trading program whereby willing landowners and developers trade credits to conserve valued natural resources and wildlife habitat. 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 (Chapin and Coutts, 2011, reference on page 97). http://privatelands.org/rural/RLSP.htm

GREENING ORDINANCES

Rework existing ordinances to make better use of open space by reducing habitat fragmentation and removing barriers for developments that conserve habitat and natural resources.

Communities around the country have developed ordinances with the goal of protecting important wildlife habitats. However, recent research by the University of Colorado has shown that most ordinances lack measures to encourage habitat continuity and are leading to habitat fragmentation.[5] The information in this section and the handbook aims to provide effective planning methods that conserve habitats and reduce habitat fragmentation.

Protection of Important Wildlife Habitats

Protection of important wildlife habitats is necessary to achieve Green Growth. To preserve viable habitat, it is important to do the following:

- Direct extensive development away from the boundaries of Managed Areas. Maintain a rural landscape in conservation priority areas between protected areas.
- Have an understanding of your region's priority wildlife habitats detailed in the N.C. Wildlife Action Plan.
- Develop an understanding of the Conservation Data provided in Section 2 and in the regional appendix and where these habitats are in your region.
- Learn about federal and state-listed endangered and threatened species detailed in Appendix A.
- Work toward conserving a network of important habitats - larger core habitat areas linked by wildlife travel corridors. Encourage or require connection of large blocks natural open space on adjacent developments.
- Conserve Natural Heritage Natural Areas and Natural Heritage Elements.
- Take any steps toward Green Growth that your community supports.

Example Ordinances

- The N.C. Model Natural Resources Conservation Ordinance (see next page). www.ncwildlife.org/greengrowth
- 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 the overlay district. http://landuse.law.pace.edu/landuse/documents/laws/reg4/FL-ORD-Tampa-UplandHabitatProtection.doc
- The Town of Falmouth, Massachusetts, has a Wildlife Overlay District within which any proposed development must take concrete steps to protect habitat. www.falmouthmass.us/planning/corridor_map.pdf
- The Town of Brunswick, Maine, Wildlife Habitat Overlay District creates incentives to maintain contiguous blocks of natural open space during development and is intended to supplement underlying subdivision ordinances. www.beginningwithhabitat.org/pdf/Brunswick%20Wildlife%20Habitat%20Overlay%20District.pdf
- The King County, Washington, Critical Areas Ordinance requires protection of Wildlife Habitat Conservation Areas, for wildlife species listed as priorities in the Comprehensive Plan. www.kingcounty.gov/property/permits/codes/CAO.aspx

A Model Natural Resources Conservation Ordinance for North Carolina

The N.C. Wildlife Resources Commission and the Duke Nicholas Institute for Environmental Policy Solutions 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. It can be modified to work as an option in exchange for a density bonus incentive.
Please see www.ncwildlife.org\greengrowth for details.

Open Space Standards and Habitat Conservation

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.

Protection of 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 N.C. Natural Heritage Program. They support rare wildlife, plants and natural communities. GIS map layers of NHNAs 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:

- 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 N.C. Natural Heritage Program.

Example Ordinances

- The N.C. Model Natural Resources Conservation Ordinance. www.ncwildlife.org/greengrowth
- Article IV of the Orange County, North Carolina, Unified Development Ordinance requires creation of one or more strategies to protect Natural Heritage sites. www.co.orange.nc.us/planning/Ordinances.asp
- Section 8.10 in Article 8, "Environmental Protection," of the Durham County, North Carolina, Unified Development Ordinance sets forth measures for protecting sites identified in Durham County's Natural Heritage Inventory. http://durhamnc.gov/ich/cb/ccpd/Pages/Durham-Unified-Development-Ordinance.aspx

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

How can Green Growth Improve Conventional Zoning?

Without zoning, essentially any land use could take place anywhere and there is less capacity to manage community character or public service costs. 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, mid-density residential development (or 1 to 3 acre minimum lot sizes) and large minimum lot sizes from 3 to 10 acres result in extensive manicured landscaping and inefficient land use. Such patterns fragment habitat and waste water, degrading the network of natural areas on which our communities depend.

Natural resource-based zoning:

- Bases the design of disricts and policies 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 more concentrated and high density growth near existing urban services and public transportation.
- Encourages rural and urban cluster development.
- Maintains a rural landscape around and between permanently protected areas.

Please see page 84 for a visual representation of a landscape that accommodates development, wildlife habitat and natural resource conservation.

On-Site 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 and maintains better function of habitats to provide ecosystem services benefits.

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

Considerations for Effective Natural Resource-Based Zoning

Enable the highest development density possible in cities and towns.

- Identify barriers to redevelopment and encourage it in urban areas.
- Identify and address economic and environmental barriers to maximizing city and town development densities. Low impact development techniques can remove environmental barriers and reduce the cost of construction.[6]
- Try to avoid placing high density developments, including Planned Use or Mixed Use Developments, in or near priority wildlife habitats.
- Use Transit Oriented Development to concentrate neighborhoods close to high-quality public transportation to ensure ridership.

Ensure that desired rural areas maintain character and natural resources.

- To absorb rural housing demand, encourage rural cluster developments or conservation subdivisions that set aside priority habitat areas and maximize clustering of development. Research demonstrates that this minimizes impacts to wildlife habitat.[7,8,9,10] These developments can conserve habitat and accommodate people who want to own large acreages if methods are used to minimize land conversion to lawns, cluster homes and protect and connect habitat on large lots.
- Zone by development units per acre instead of minimum lot size. This allows habitat open space to be clustered.[11] Many jurisdictions take this approach now. If your community and prospective residents value natural area conservation, development density can be lower than development designed for septic utilities.
- Remove permitting barriers by making clustered and conservation development a 'by right' development permit. When conservation-based development practices are by right this removes additional local government development review. Consider making larger lot size, spread-out developments a conditional use that requires extra review in your community's zoning ordinance.

Encourage very low overall development density coupled with cluster development in the highest priority areas.

- 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 30 acres per dwelling unit will be needed.[12,13] This density could be justified in highly sensitive areas and could meet demand for working lands and wildlife-related recreation. Building envelopes should be less than two acres and all developed areas should be clustered and not dispersed across the site. Wildlife habitat should be unfragmented by development.[14]
- For areas where more development is desired near sensitive habitat areas, encourage low density clustered rural subdivisions of one dwelling per four or more acres.[15] Built areas should be placed outside of and at least 350 feet from habitats. Lot sizes should be no more than one acre if possible.
- Even large lot zoning of 10 acre minimum lot sizes can fragment habitat for area-sensitive wildlife, including forest interior birds, some 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]

Reduce the need to build costly new roads and utilities.

- Encourage mixed uses to provide nearby retail and services to residents. Utilize minimum density requirements where possible to encourage multifamily residences and higher densities of buildings.
- Establish commercial, appropriate industrial and high-density residential districts near city or town centers, public transportation hubs and in centers near interstate exchanges.
- Clustered development and conservation subdivisions require less road and infrastructure construction due to short driveways and more efficient design.

Conserve and connect habitat and natural resources.

- Consider a natural resources overlay district in the most sensitive areas with goals and standards focused on conserving, buffering and connecting habitat. See www.ncwildlife.org\greengrowth for the North Carolina Model Natural Resources Conservation Ordinance.
- Consider using feature-based density in which the area of important habitats is also considered with other site considerations when analyzing density options. It is necessary to exclude important habitats in the net site acreage in order to better conserve habitats. For more information see http://des.nh.gov/organization/divisions/water/wmb/repp/documents/ilupt_chpt_1.3.pdf.
- Consider Natural Resource Protection Zoning. 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 is being developed in Massachusetts. For more information see www.nefainfo.org/Natural%20Resource%20Protection%20Zoning.pdf.

Challenges and Solutions for Natural Resource-Based Zoning

- Stormwater can present a challenge to high density development. Use Low Impact Development techniques and consider the space needed for these in calculating density.
- Large lots are sometimes in demand and are needed for individual septic systems. Please see page 90 for workarounds that will minimize impacts to wildlife and habitat.
- 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.
- Who owns the contiguous open space outside of lots? The homeowner association can own the open space and pay property taxes on it. A land trust, your local Soil and Water District or other nonprofit may be able to place a conservation easement on the open space.

CHESAPEAKE BAY PROGRAM

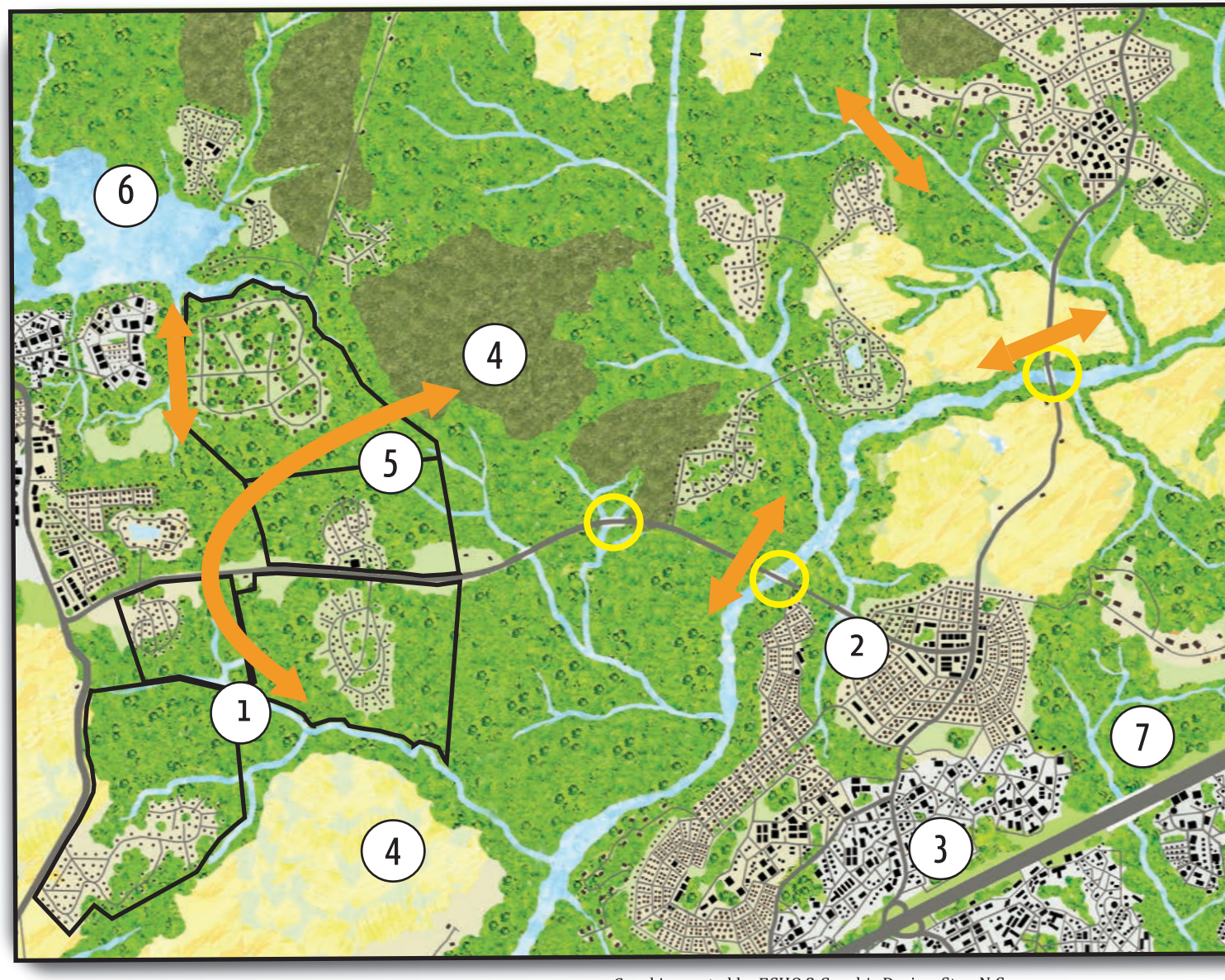
LID bioretention to collect street stormwater runoff in a densely developed area.

Example Zoning Ordinances

Examples of communities that have begun to establish nature-friendly zoning patterns include the following:

- Section 911 of the Burke County, North Carolina, Zoning Ordinance sets forth requirements for development within designated "conservation districts." Within these areas, developments must set aside a minimum amount of open space, built structures must be located within designated building envelopes and clustering of dwellings is encouraged. www.co.burke.nc.us
- Hillsborough County, Florida, uses maps of significant wildlife habitat, www.hillsboroughcounty.org/index.aspx?NID=1629, to determine some zoning district residential densities. Hillsborough County also offers an example of zoning by units per acre instead of minimum lot sizes. http://library.municode.com/HTML/12399/level2/ARTIVNAREADPUFA_PT4.01.00NARE.html#TOPTITLE
- The Town of Chapel Hill, North Carolina, Rural Buffer defines the extent of urban services provided. Joint planning among Chapel Hill, Orange County and Carrboro helps to manage growth using this approach. www.ci.carrboro.nc.us/PZI/BulletinBoard/PDFs/temp-071107/JointPlanning-RuralBufferOverviewforMgrSearch.pdf
- The Shutesbury, Massachusetts, Zoning Bylaw is based on Natural Resource Protection Zoning. www.shutesbury.org/bylaws/.
- The Model Rural Cluster Development Ordinance from the Southeastern Wisconsin Regional Planning Commission. www.sewrpc.org/SEWRPCFiles/CommunityAssistance/ModelOrdinances/cluster_ordinance.pdf
- See additional examples throughout this section and on our website.

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.

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

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

Residential

Commercial / Industrial

Wildlife Travel Corridors

Native Forest

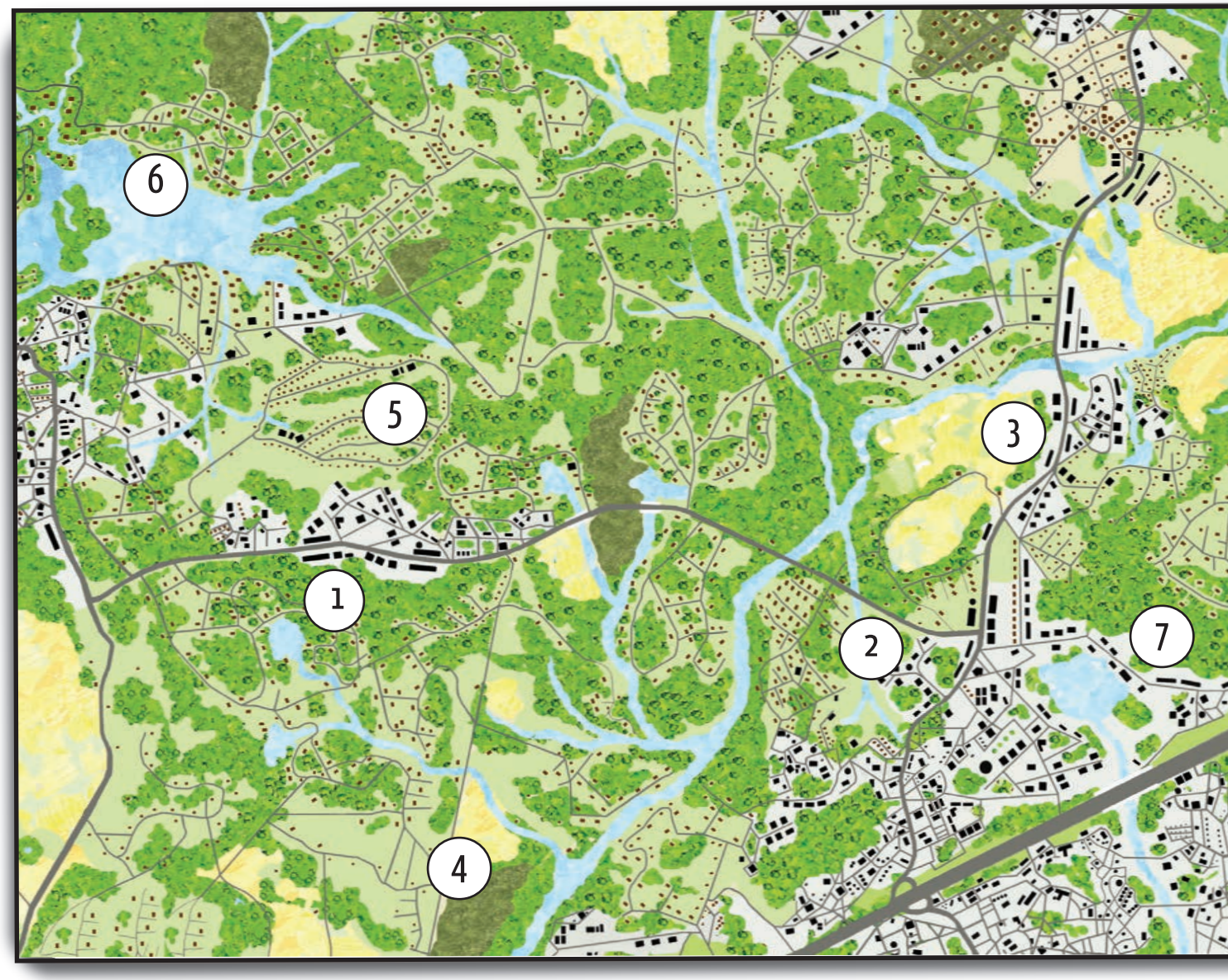
Farms

Lawn

Streams, Rivers & Reservoirs

Working Forests

Inefficient Land Use Pattern that Weakens Natural Resources



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

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 sre not strategically located, leading to urban decay.
4. Farms and working forests are lost and threatened by development encroachment.
5. Wetlands are surounded 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.

Urban Service 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, use Urban Service Areas.[18]

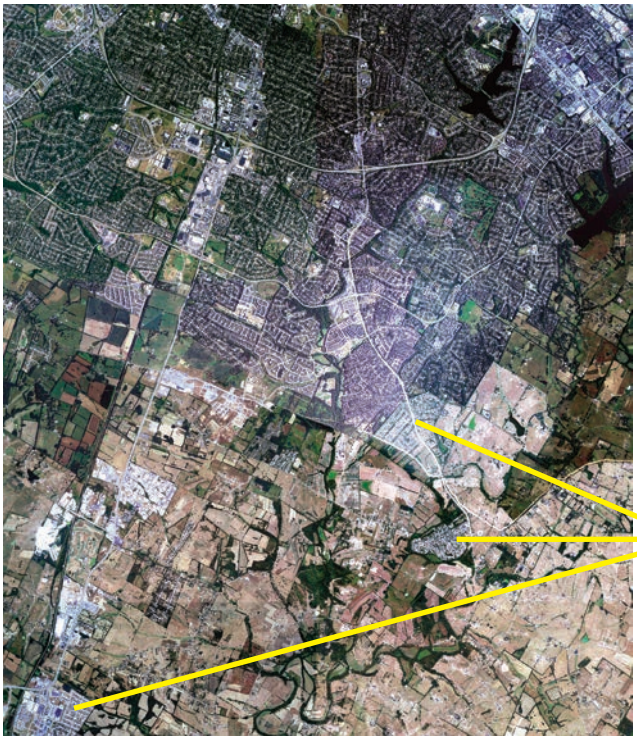
- Proper USA management coupled with other planning methods can help concentrate growth in city centers, curbing sprawl outside the urban fringe.[19]
- USAs maintain rural areas only if the county also uses them.[20]
- Other growth management mechanisms such as minimum density requirements and transfer of development rights are used in concert with the USA.[21]
- 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.
- The Lancaster County, Pennsylvania, Urban Growth Area combines the boundary with agricultural zoning to support farming. www.co.lancaster.pa.us/planning/lib/planning/envision/planssummaries/balance_full_report.pdf

Implications of Urban Service Areas

Recent 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.[22] Effective growth management policies do appear to significantly lower public service and infrastructure costs to taxpayers.[23] 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.[24]



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.

Wildlife Conservation in Development Ordinances

Other kinds of development ordinances, such as the Subdivision Ordinance, can help implement your community's conservation goals. This section presents guidance on how various types of ordinances can be enhanced.

Development Standards

When development needs to take place in sensitive areas, Natural Resource-Based Development Standards include:

- Placing high priority habitats in commonly-owned open space or conservation easement. The homeowner association can own and fund habitat management.
- 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.

It can save time in development review and produce more consistent results, to include habitat conservation measures in the development standards.

Fort Collins, Colorado, has included conservation of priority wildlife habitats in its development standards, Section 3.4.1, www.colocode.com/ftcollins/landuse/article3.htm#sec3d2d1. The Natural Habitat Inventory map on the GIS website helps to guide planning, www.fcgov.com/gis/maps.php.

Development Application and Review Requirements

Development ordinances can include development application and review requirements that will help projects minimize the negative impacts to your community's natural assets.

- Require a sketch plan and an initial project meeting between the developer, planning department staff, adjacent landowners and other stakeholders. Randolph County, North Carolina, experienced an increase in efficiency using this approach.
- Require all development applications to present information about the important species and habitats on and near the site. Encourage or require applicants to take the following steps:
  - Consult the Conservation Data for Green Growth and display map layers on development sketch plans and plats.
  - Obtain on-site survey information about the location of priority habitats during the stream or wetlands survey or from another biologist. See Appendix B for a list of natural resource agencies that may be able to conduct surveys free of charge.
  - Review the Conservation Data map layers that are near the site. Identify potentially important wildlife travel corridors, even when conservation GIS data are limited for the site.
  - By referencing site survey findings noted above, describe the significance of any important species and habitats on site.
  - Require a description of the methods the developer plans to use to conserve contiguous unfragmented habitats on or adjacent to the site.

- Major development proposals can be reviewed by a biologist or an outside entity with biological expertise.
- Applicants can demonstrate that they have received state or federal environmental permits ahead of construction.

For additional development standards that can be included in application and review requirements, see Section 6, "Greening Development Review and Site Design," beginning on page 99.

Example Ordinances

- Boulder County, Colorado, Land Use Code, Section 7-1700, requires development proposals to include a Wildlife Impact Report whenever the project is located within important wildlife habitats, wildlife corridors or other areas shown on conservation maps in the county's comprehensive plan. The wildlife impact report is developed by a biologist and is reviewed, approved and monitored by the County Parks and Open Space Department. www.bouldercounty.org/property/build/pages/lucode.aspx
- Section 8.2 of the Town of Davidson, N.C., Planning Ordinance requires environmental inventories, including identification of wildlife and distinctive natural features, for all development proposals. www.ci.davidson.nc.us/DocumentView.aspx?DID=1301
- Carrboro, North Carolina, Development Guide Application Checklist includes an initial staff meeting, site walk and the requirement to maintain contiguous habitat. www.ci.carrboro.nc.us/pzi/PDFs/ToCDevGuide/a6.pdf

Conservation and Cluster Subdivision Ordinances

Conservation subdivisions are popular because profit margins can be greater and the same number of homes can be accommodated while conserving open space. Many local governments have ordinances that provide incentives for developers to cluster homes and set-aside open space. This type of development has the potential to benefit wildlife habitat and biodiversity if policies address priority wildlife habitat conservation.

- Incorporate wildlife friendly design principles in these ordinances.
- For a detailed description of how to design wildlife friendly developments, see Section 6.
- A number of communities allow conservation subdivisions as by-right development in rural areas with sensitive resources, meaning that a variance or a conditional use permit is required for traditional subdivisions.
- 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 if possible.
- Contiguous open space can be owned by the homeowner association.

Example Ordinances

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

- The N.C. State University Forestry and Environmental Outreach Program has produced a guide to conservation subdivisions. This free publication highlights numerous case studies and provides a model ordinance. www.ces.ncsu.edu/forestry/pdf/ag/ag742.pdf.
- Article 30, "Flexible Development," of the Franklin County, North Carolina, Unified Development Ordinance establishes open space standards for flexible developments that include requirements for preserving wildlife habitat and significant natural areas. www.franklincountync.us/services/planning-and-inspections/current-planning-2/unified-development-ordinance
- Section 3 of the Randolph County, North Carolina, Unified Development Ordinance outlines a Cluster Subdivision Overlay. 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. www.co.randolph.nc.us/pz/UnifiedDevelopmentOrdinance.htm
- Section 7.7 in the Chatham County, North Carolina, Subdivision Regulations 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. www.chathamnc.org/Index.aspx?page=440

Conventional Subdivision

Farmland, grassland habitat and historical site are lost.

Conservation Subdivision

Natural and historic features are properly identified prior to design and maintained. Grassland and forest wildlife habitat is managed with funds from the homeowner association. A biologist is contracted for habitat management.

Image and information 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.

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:

- Encourage built structures to be clustered and 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.[25]
- Encourage the connection of large areas of contiguous habitat between adjacent subdivisions.
- Building envelopes, maximum lot coverage proportions and minimal set-back distances can be used to encourage habitat conservation on large lots.

Proper Community Wastewater Treatment can Encourage Clustering

No wastewater system will substitute if wastewater quantity exceeds the capacity of the land and it is best to direct growth towards existing towns and cities. However, 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 or can be placed at the entrance to the community. Wastewater can be filtered and reused for non-potable uses. Once sewer becomes available, homes can be required to hook up to sewer and this common open space can be developed into a more compact neighborhood. Decentralized systems are even being considered for use in urban development. See the following for Low Impact Development guidance:

- N.C. State University *Low Impact Development Guidebook* chapter and curriculum module, "Wastewater Systems," available at www.ces.ncsu.edu/depts/agecon/WECO/lid-curriculum/index.php
- U.S. EPA guidance http://water.epa.gov/infrastructure/septic/.

GREENING HAZARD MITIGATION AND RELATED ORDINANCES

Many priority wildlife habitats occur in hazard prone areas such as floodplains and fire-prone forests. Conserving wildlife and habitat in hazard prone areas can reduce the severity of hazards to your community such as flooding, drought and wildfire. 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 also protect important species, habitats and ecosystems. To accomplish this these ordinances:

- 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.
- Require that applicants demonstrate approved state and federal wetlands permits prior to construction.

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. Section 304 also 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. www.chathamnc.org/Index.aspx?page=440
- 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. http://ecode360.com/10186926#10186926
- Orange County, North Carolina, does not allow new structures in the floodplain. www.co.orange.nc.us/planning/floodplain_information.asp#FloodplainDevel

Tree Protection and Forest Conservation Ordinances

Ordinances that protect trees and forests will improve hazard mitigation, 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 and ground water recharge. 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.


L.B. ROLLER

red-headed woodpecker

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.[26]
- 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 midsize hardwoods should be removed in upland longleaf pine areas.

N.C. State University Forestry Extension Urban and Community Forestry Publications provide best practices for tree protection ordinances at www.ces.ncsu.edu/forestry/resources/publications/urban_forestry.php and a searchable database of local ordinances relating to forestry at www.ces.ncsu.edu/nreos/forest/ordinance/.

The North Carolina Division of Forest Resources Urban and Community Forestry Program offers grants and technical assistance to communities interested in tree protection. http://ncforestservice.gov/Urban/Urban_Forestry.htm

Example Ordinances

- The Town of Chapel Hill, N.C., Tree Protection Ordinance 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. www.ci.chapel-hill.nc.us/index.aspx?page=879
- 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.).

  http://ccgovernment.carr.org/ccg/resmgmt/forconsmanual.pdf
- Pinehurst, North Carolina's Voluntary Tree Preservation and Xeriscaping Program outlines goals and measures to maintain Sandhill's native trees and shrubs on development sites. www.vopnc.org/Government/Boards-Commissions Committees/Conservation-Commission/Tree-Preservation-Committee

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 to 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 nonnative 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 pages 54 to 55.

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.

Example Ordinance

- Brevard County, Florida's Land Clearing Performance Standards, Section 62-4341 (15), is a particularly exemplary model that requires removal of nonnative, invasive plants and requires vegetation control to curb proliferation. http://library.municode.com/index.aspx?clientId=10473

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. www.landofsky.org/mrss.html.
- Park City, Utah's Sensitive Area Overlay Zone, Ch.15 - 2.21, 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. www.parkcity.org/index.aspx?page=89
- The Lyme, New Hampshire, Steep Slopes Conservation District, Article III 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. www.lymenh.gov/Public_Documents/LymeNH_PlanZone/bzinfo
- Pickens County, Georgia's Mountain Protection Plan ordinance, Ch. 26, Article IV, limits development in areas that are 2,200 feet in elevation and on slopes of 25% or more. http://library.municode.com/index.aspx?clientId=13227

Wildfire Hazard and Smoke Management

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

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 (see page 4).

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.

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.
- 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 30).

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, Section 32, 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. http://jeffco.us/planning-and-zoning/regulations/zoning-resolution/

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 one of the ways to produce greener sources of energy. 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 that must be 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. Fortunately, many examples are available. Given the current lack of a consolidated permitting process for the state, however, local governments can expect to be on the front lines of wind energy development in North Carolina.

Possible Wildlife Impacts from Wind Farms

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.[27] 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. [28]

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 [29,30,31] and raptors and many grassland birds[33].

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. www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NC18R
- 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 www.wind.appstate.edu/resources/reports.
- The Department of Energy and others also have produced a guide for county commissioners. www.osti.gov/bridge/product.biblio.jsp?query_id=0&page=0&osti_id=896718&Row=0&formname=basicsearch.jsp
- 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," www.fws.gov/windenergy/docs/WEG_September_1-3_2011.pdf and the, "Comprehensive Guide to Studying Wind/Wildlife Interactions," www.nationalwind.org//publications/comprehensiveguide.aspx, produced by the National Wind Coordinating Committee.

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

Solar Energy Systems Ordinances

Solar power has become a popular form of economic development, energy independence and low pollution source of power. Our state has more solar farms than most. Some wildlife friendly recommendations for solar installations include:

MICHA JOST *Rooftop Solar Farm*

- Encourage co-location of the solar installation on top of existing built structures. Doing so, where possible, uses less land.
- To reduce barriers to commercial and industrial or residential rooftop solar, include requirements for optimum solar building orientation and require that solar stub-ins be constructed during building renovation or construction. Stub-ins are the structures needed to support rooftop solar and are very affordable.
- Encourage land-based solar installations to be built away from sensitive wildlife habitats and that forests are not cut down in order to build a solar farm.
- Encourage compact solar panel design to allow for more energy generation in less space.

Resources for Solar Energy Systems Ordinances

- The N.C. Sustainable Energy Association and the N.C. Solar Center provide a template solar energy systems ordinance for North Carolina. www.planning.org/solar/data/content/?ContentID=1002562

Measures of Incentive and Ordinance Success

It is important not to simply measure the total acres of land conserved as a measure of conservation success because this does not account for habitat fragmentation.[35] Measures of habitat fragmentation measure the habitat core interior to habitat edge ratio (core area index) within the area of study. The Core Area Index can be measured in GIS using a free program called 'Fragstats' available from the University of Massachusetts at www.umass.edu/landeco/research/fragstats/fragstats.html.

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