SECTION 2. CONSERVATION DATA

ornate chorus frog

The Green Growth Toolbox explains how to conserve priority wildlife and habitats in your community through three levels of land use planning:

- Visioning and plan making,
- Incentives and ordinance and rule setting,
- Development review and site design.

To plan for Green Growth, communities need information and maps about important species, habitats and ecosystems in their jurisdiction. This section of the handbook describes the following for Geographic Information Systems (GIS) specialists and non-specialists:

- the three components of the Conservation Data for Green Growth,
- how to use the Conservation Data in site selection and the three levels of planning,
- and how to do natural resource inventories to supplement existing data.

THE CONSERVATION DATA FOR GREEN GROWTH

Available for download at
www.ncwildlife.org/GGT

The Conservation Data for Green Growth is available for download from our website. It can also be viewed on N.C. Natural Heritage Program's Data Explorer.[a] Our training workshops provide detailed guidance on how to interpret this data.

The highest priority wildlife habitats in greatest decline listed below are described in the N.C. Wildlife Action Plan and are represented in the GIS data explained in this section.

- Beaches and estuarine islands
- Coastal wetlands
- Maritime forests
- Longleaf pine forests
- Small wetland communities
- Mountain bogs
- Early successional habitat (grasslands and shrublands)
- Floodplain forests
- Habitats at high elevation
- Caves/mines
- Rock outcrops
- Streams and key aquatic habitats
- Large unfragmented, undeveloped parcels
- Undeveloped tracts in close proximity to existing Managed Areas
- Important wildlife travel corridors (natural areas between priority habitat areas)

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a   https://ncnhde.natureserve.org/

Detailed information about priority habitats is available in the N.C. Wildlife Action Plan.[b] Habitat descriptions are also available on the NCWRC's website[c] at and in the Green Growth Toolbox regional appendices.[d]

There are 3 components to the Conservation Data for Green Growth.

- **Component 1** (11 map layers)–centers on using the Biodiversity and Wildlife Habitat Assessment (BWHA) map. This assessment is part of the N.C. Conservation Planning Tool. The BWHA and other map layers that were used to create the BWHA values are provided as part of this component.

- **Component 2** (8 map layers)–is comprised of map layers that the N.C. Wildlife Commission recommends be used in addition to the BWHA to give a complete picture of wildlife habitat conservation needs and opportunities in your community.

- **Component 3**– Additional regional information and map layers have been developed with more refined local data and appear as an appendix to the handbook if they are available in your planning area. .

Collectively, these map layers constitute the Conservation Data for Green Growth. Check the quick reference chart beginning on for summaries about how to use the data and to find out which map layers are appropriate to use in each level of planning.

> When possible, we recommend downloading or receiving data from the original source in order that you have the most up-to-date data. The boxes next to each map layer provide the original data title and source information.

What is the
N.C. Conservation Planning Tool?

The N.C. Conservation Planning Tool is based on green infrastructure principles, which emphasize the importance of maintaining an interconnected network of green space that conserves natural ecosystems and provides associated benefits to our communities.

- The Conservation Planning Tool (CPT) identifies and prioritizes, on a statewide scale, essential high-quality natural resources required to maintain healthy ecosystems.

- This analysis pinpoints areas that are already protected as well as those areas that represent gaps, which are areas that would be a priority for conservation but are not protected.

- The goal of this tool is to highlight areas of opportunity to collaborate on conservation of significant natural resources.

pine barrens treefrog   _marbled salamander_   _bobolink_

COMPONENT I ▶ **Biodiversity and Wildlife Habitat Assesment (BWHA)**
Part of the N.C. Conservation Planning Tool

- The Biodiversity and Wildlife Habitat Assessment[e] is a map that represents the highest priority areas for conservation of wildlife habitat and biodiversity in North Carolina.

  - GIS Raster File Title: bwha
  - Original Source: NCNHP

- The BWHA is one map layer that is a composite 30 x 30 meter pixel grid comprised of most of the individual map layers used in the Green Growth Toolbox.

- The assessment is based on the best science and expertise from multiple sources. Areas with more rare, abundant and diverse species and habitats are rated as a higher conservation value on a scale of 10 to 1 in this map layer.

- The areas with a relative conservation value of maximum (10) to very high (7) are the most sensitive with the rarest species and habitats. These are the most important areas to conserve, buffer and connect for wildlife purposes.

- Areas with a rank of 6 to 1 are of high (6) to moderate (1) conservation priority. They play an important role in maintaining habitat connectivity and biodiversity but may not be as sensitive or rare as the higher ranked areas.

- The areas that appear as **grey** have at least 20 percent impervious surface and likely have the least habitat value. They have been assigned the value of –1.

- White areas are of unknown value and most have not been inventoried.

- Detailed information about the data used, the conservation value ranks, and methods used for the BWHA are provided through this link[f]
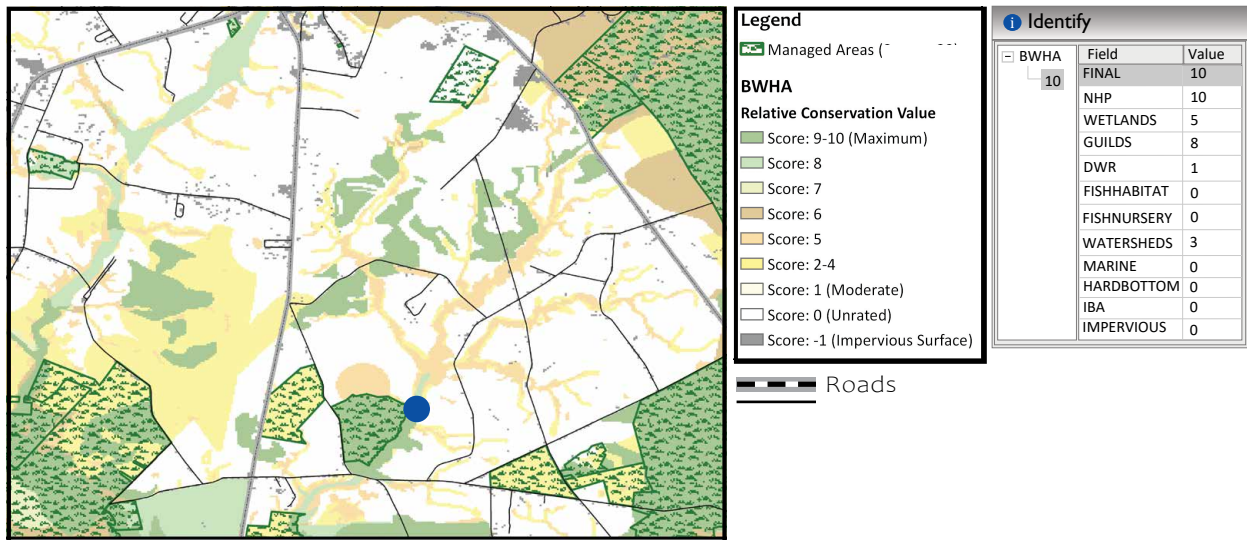
Recommended use of these data:
- To identify important habitats and potential wildlife travel corridors that can be used in transportation plans, land use plans and other plans, incentives and ordinances.

- At a fine scale, the boundaries of this layer may be inaccurate. We recommend using the individual component map layers in addition to the BWHA for development review and site design.

- If your conservation options are limited to only the highest priority areas, we recommend that the greatest conservation measures are placed in areas that rank from 10 to 7 in the BWHA. High priority areas can be connected by maintaining low density but clustered development in or outside low ranking areas.

- All areas with a value equal to or greater than 1 are very important to maintaining a healthy natural environment. Major development or major roads in these areas should be kept to a minimum as much as possible.

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e   https://ncnhde.natureserve.org/content/data-download
f   https://www.ncnhp.org/biodiversity-and-wildlife-habitat-assessment

Legend

🗺 Managed Areas (

BWHA

Relative Conservation Value

🟩 Score: 9-10 (Maximum)
🟩 Score: 8
🟨 Score: 7
🟧 Score: 6
🟧 Score: 5
🟨 Score: 2-4
⬜ Score: 1 (Moderate)
⬜ Score: 0 (Unrated)
⬛ Score: -1 (Impervious Surface)

▬ ▬ Roads

ℹ Identify

BWHA	Field	Value
10	FINAL	10
	NHP	10
	WETLANDS	5
	GUILDS	8
	DWR	1
	FISHHABITAT	0
	FISHNURSERY	0
	WATERSHEDS	3
	MARINE	0
	HARDBOTTOM	0
	IBA	0
	IMPERVIOUS	0

- **When using the 'Identify' feature and clicking on the BWHA map layer in ArcMap or ArcMap Reader (free software available through our website) you will see the BWHA data table.**

- **A key to the BWHA legend and data table key is on page 37.**

- **The FINAL field shows the maximum Relative Conservation Value of 10. This value comes from the NHP (Natural Heritage Program) field value (10) which means that it is a Natural Heritage Area (see below). The value of the highest ranked feature is the FINAL value.**

- **Also at that location are other natural features including a wetland with a value of 5, which means the data come from the National Wetlands Inventory (NWI). Please note that on the Coastal Plain the Coastal Region Evaluation of Wetland Significance (CREWS) data is available and is more accurate.**

What GIS Data Make up the Biodiversity and Wildlife Habitat Assessment?

N.C. Natural Heritage Program Map Layers

The data below are provided by the N.C. Natural Heritage Program[g] (NCNHP), which is within the N.C. Department of Natural and Cultural Resources. NCNHP updates these data quarterly. To inquire about receiving regular updates, please contact the N.C. Natural Heritage Program Conservation Data Manager.

Natural Heritage Areas
(Formerly named *Significant* Natural Heritage Areas)

- Download GIS Shapefile: nha
- Original Source: NCNHP

Natural Heritage Areas[h] (NHAs) are identified by N.C. Natural Heritage Program ecologists. These sites support rare and high-quality populations of native plants, wildlife and natural communities (habitats) on both land and water and are extremely important to the conservation of our state's biodiversity. A site's value rating may be due to the presence of rare species, rare or high-quality natural communities or other important ecological features.[1]

Accuracy
All NHAs are based on field surveys. Field surveys are updated infrequently and some NHAs may have been destroyed. It is important to verify their status on-the-ground ahead of site

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g   http://www.ncnhp.org

h   https://www.ncnhp.org/conservation/natural-areas
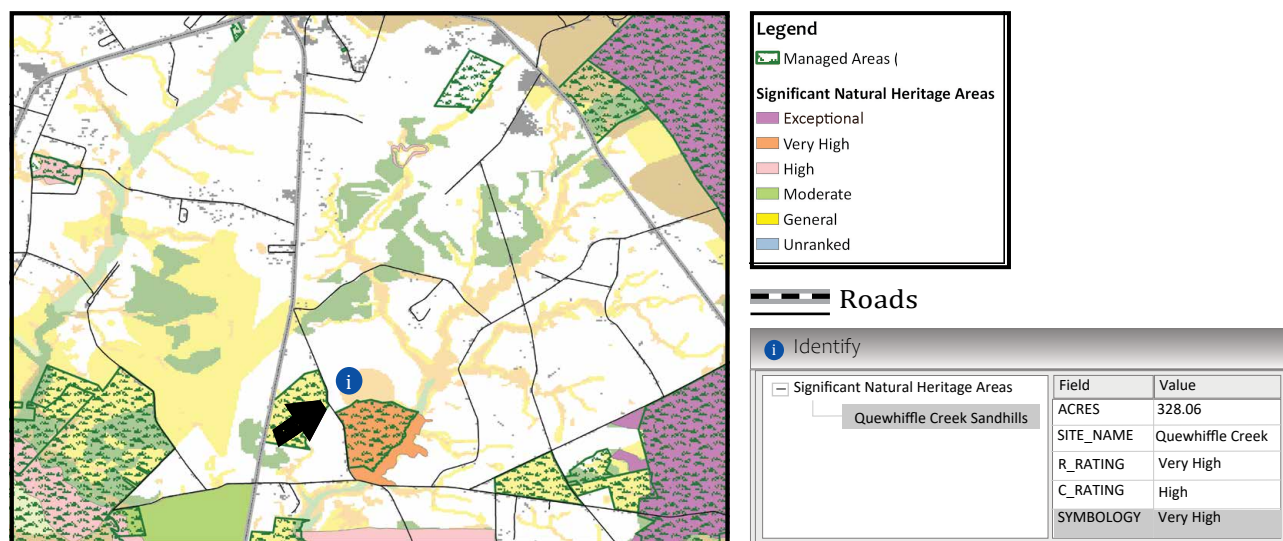
design or purchase.

Where can I find more information?
- The rating system for NHAs changed in 2013 to make the evaluation of sites more consistent. Click here for information on the rating system[i]
- Descriptions on Natural Heritage Areas are detailed in County Inventory reports, which can be requested here[j]

Recommended use of these data:
- To identify districts where conservation and connection of natural open space in development standards could be a priority.
- These areas should be set-aside from development as much as possible.
- To identify high priorities for new parks and conservation lands.
- To identify high priority areas where a proportion of the site could be required to be conserved, if habitat is verified by a site survey, or where the placement of required open space should be encouraged.
- To identify high priority routes for wildlife travel corridors.
- When using this data please contact us at greengrowth@ncwildlife.org.

Please note: The BWHA depicts a 300 foot wide area of high conservation value on each side of the waterways classified as *Aquatic* Natural Heritage Areas (see Figure 4).

FIGURE 2. NATURAL HERITAGE AREAS

Legend

Managed Areas (

Significant Natural Heritage Areas
- Exceptional
- Very High
- High
- Moderate
- General
- Unranked

Roads

Identify

Significant Natural Heritage Areas	Field	Value
Quewhiffle Creek Sandhills	ACRES	328.06
	SITE_NAME	Quewhiffle Creek
	R_RATING	Very High
	C_RATING	High
	SYMBOLOGY	Very High

* Compare this to Figure 1 to view how NHAs are depicted in the BWHA.

Under the NHA rating system each NHA has a C and R rating based on the biodiversity and rarity of species on the site (C rating) and the condition of the globally imperilled species populations on the site (R rating). The SYMBOLOGY field offers a single rating for each NHA that is equal to the highest C or R rating.

i   https://www.ncnhp.org/conservation/natural-areas
j   https://www.ncnhp.org/publications/nhp-publications/searchable-list-nhp-publications

Natural Heritage Element Occurrences

Natural Heritage Element Occurrence (NHEO)[k] data identify approximate locations of rare plants and animals, high quality, or unique natural communities), and important animal assemblages (places where rare animals live in groups).

> • GIS Shapefile: nheo
> • Original Source: NCNHP

- These plants, animals, natural communities, and animal assemblages are elements of natural diversity and features of conservation interest. The locations where elements have been seen are referred to as element occurrences or "EOs" because they represent where an element occurs on the landscape, either currently or historically.[2]
- The NHEO data includes observations of plants and animal that have legal protection at the federal and/or state level as well as elements that do not have any legal protection but are being monitored by the N.C. Natural Heritage Program (NCNHP). However, not all priority wildlife and habitats species datasets are included.
- Most biologists and ecologists contribute to this dataset so it is fairly comprehensive. Despite this, if the dataset does not show an element occurrence at a location, it does not mean one is not there; the area may never have been surveyed. For this reason, NHEO data alone cannot be used to decide if an element is found at a location or not.
- The NHEO data are very useful for planning purposes because if an element occurrence has been seen in or near an area of interest, then it is more likely to be found in that area if the habitat a plant or animal uses is also present there.

Tier 1 vs. Tier 2 Data File
- The NHEO data is available as either Tier 1 or Tier 2 datasets. The Tier 2 data is only available to federal or state government employees.
- The Tier 1 data contains the same mapped features as shown in the Tier 2 data; however, the identity of data sensitive element occurrences in this data set has been removed to protect them. to get the identity of specific data sensitive records.
- IMPORTANT – The NHEO data has been abused for illegal and damaging collection of rare wildlife and plants. This data set should not be integrated into public online data systems or element occurrence locations labeled with species names on maps.
- Please see the NCNHP's Terms and Conditions of Use[l] for additional details about using NCNHP data.

Accuracy
- These data come from field surveys and some element occurrences may have been destroyed since their most recent survey. Therefore, it is important to verify their existence by an on-the-ground survey of the site.
- NHEO data that are large perfect circles or squares mean that habitat for a species is likely to occur on undeveloped, natural areas within those polygons, but that the exact location has not been determined.
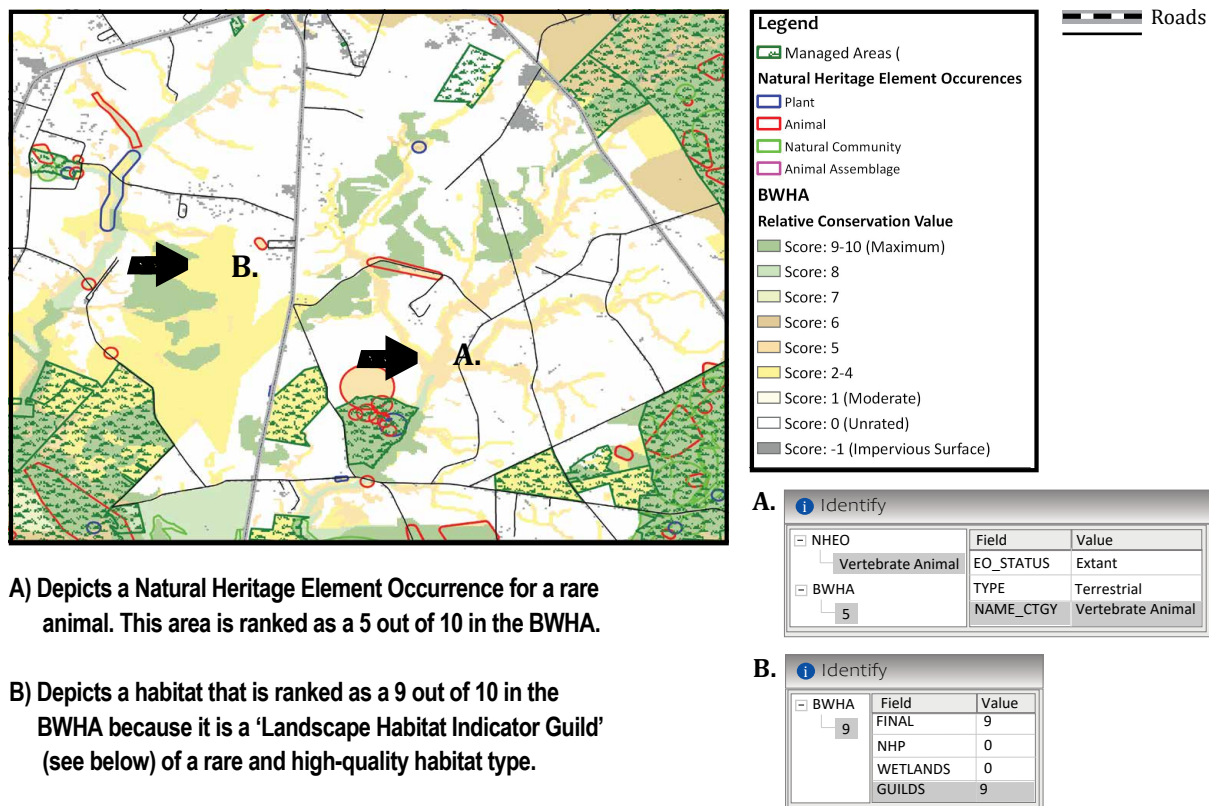- NHEO data used in the BWHA includes only the most accurate records.

Recommended use of these data:
- See recommendations for Natural Heritage Areas.
- NHEO data identifies Colonial Waterbird Nesting Colonies, areas where groups of waterbirds, such as herons and egrets, nest in colonies. We recommend a 330-foot buffer around the colony to prevent birds from abandoning their nests when development occurs in close proximity to the nests.

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k   https://www.ncnhp.org/conservation/natural-heritage-element-occurrences

l   https://ncnhde.natureserve.org/legal

FIGURE 3. NATURAL HERITAGE ELEMENT OCCURRENCES AND GUILDS

Legend

Managed Areas (

Natural Heritage Element Occurences

- Plant
- Animal
- Natural Community
- Animal Assemblage

BWHA

Relative Conservation Value

- Score: 9-10 (Maximum)
- Score: 8
- Score: 7
- Score: 6
- Score: 5
- Score: 2-4
- Score: 1 (Moderate)
- Score: 0 (Unrated)
- Score: -1 (Impervious Surface)

Roads

A) Depicts a Natural Heritage Element Occurrence for a rare animal. This area is ranked as a 5 out of 10 in the BWHA.

B) Depicts a habitat that is ranked as a 9 out of 10 in the BWHA because it is a 'Landscape Habitat Indicator Guild' (see below) of a rare and high-quality habitat type.

A. ⓘ Identify

NHEO		Field	Value
	Vertebrate Animal	EO_STATUS	Extant
BWHA		TYPE	Terrestrial
	5	NAME_CTGY	Vertebrate Animal

B. ⓘ Identify

BWHA	Field	Value
9	FINAL	9
	NHP	0
	WETLANDS	0
	GUILDS	9

Landscape Habitat Indicator Guilds

Landscape Habitat Indicator Guild[m] (hereafter "guilds") represent high-quality, core wildlife habitats and connections between those habitats where wildlife can travel. These habitats are mapped based on the presence of guilds (groups) of species that use a particular type of habitat. These species are highly sensitive to habitat fragmentation and need large areas of habitat that are not separated by incompatible vegetation types, development or roads that they cannot travel across. Guild areas are ranked as a higher priority for conservation if they are more rare and if there are records of a larger number of guild species.

- Interpret from the BWHA
- Original Source: NCNHP

Accuracy

Each guild core habitat area is established only when field surveys confirm the presence of guild species within the habitat. The core areas and habitat connectors are then mapped using aerial photos. The extent of the habitat and wildlife travel corridors is based on the documented dispersal behavior of the guild species from the scientific literature.[3]

Recommended use of these data:

- See recommendations for use of the BWHA.
- Interpret the presence of guilds from the BWHA where the data table "GUILDS" field is a value greater than 0.
- If using this data in site design, on-the-ground surveys may be needed.

Riparian Habitats and Priority Watersheds

The BWHA depicts buffers on all streams. These recommendations are based on extensive scientific research that demonstrates conditions necessary to conserve aquatic life. We recommend trying to keep impervious surfaces to 10 percent in all watersheds due to the detrimental effects of runoff on aquatic life. We recognize our recommendations may not always be possible and encourage local governments and developers to do as much as possible through development standards, especially in priority watersheds.

Streams within Subwatersheds with Federally Listed Fish and Mussels

- Biologists with the NC Wildlife Commission and the U.S. Fish and Wildlife Service conduct field surveys that help identify subsections of watersheds (subwatersheds) that contain federally listed fish and mussels.

> • GIS Shapefile: Fed_hucs
> • Original Source: NCNHP
> • GIS map layer only available on the GGT website.

- If a federally listed fish or mussel is found within streams in a subwatershed or if the subwatershed leads directly into waters that contain federally threatened or endangered species, the subwatershed will appear in this map layer.[n]

Accuracy
These data are collected during field surveys and the map is updated every six months.

Recommended use of these data:
- All streams in these subwatersheds are recommended to have 200 foot buffers on each side of the stream to ensure the endangered animal's habitat is maintained. This buffer is represented on the BWHA map.
- Aim to keep impervious surfaces to a maximum of 10 percent in watersheds.
- These recommendations come from a scientific literature review and recommendations published by the NC Wildlife Commission. See page 27, "Where can I find more information?" for details.

Map Layers from Other Organizations

Outstanding Resource Waters and High Quality Waters

- In addition to using data on the location of streams, we recommend local governments use a layer that depicts watersheds that contain streams that are Outstanding Resource Waters and High Quality Waters.[o]

> • GIS Shapefile: hqworw
> • Original Source: N.C. Division of Water Resources

- This map layer was developed by the North Carolina Division of Energy, Mineral, and Land Resources "to protect waters which are rated excellent based on biological and physical/chemical characteristics."[4]
- Streams within these watersheds are important for wildlife habitat and biological diversity because they are high-quality, which means they are likely to support healthy ecosystems.
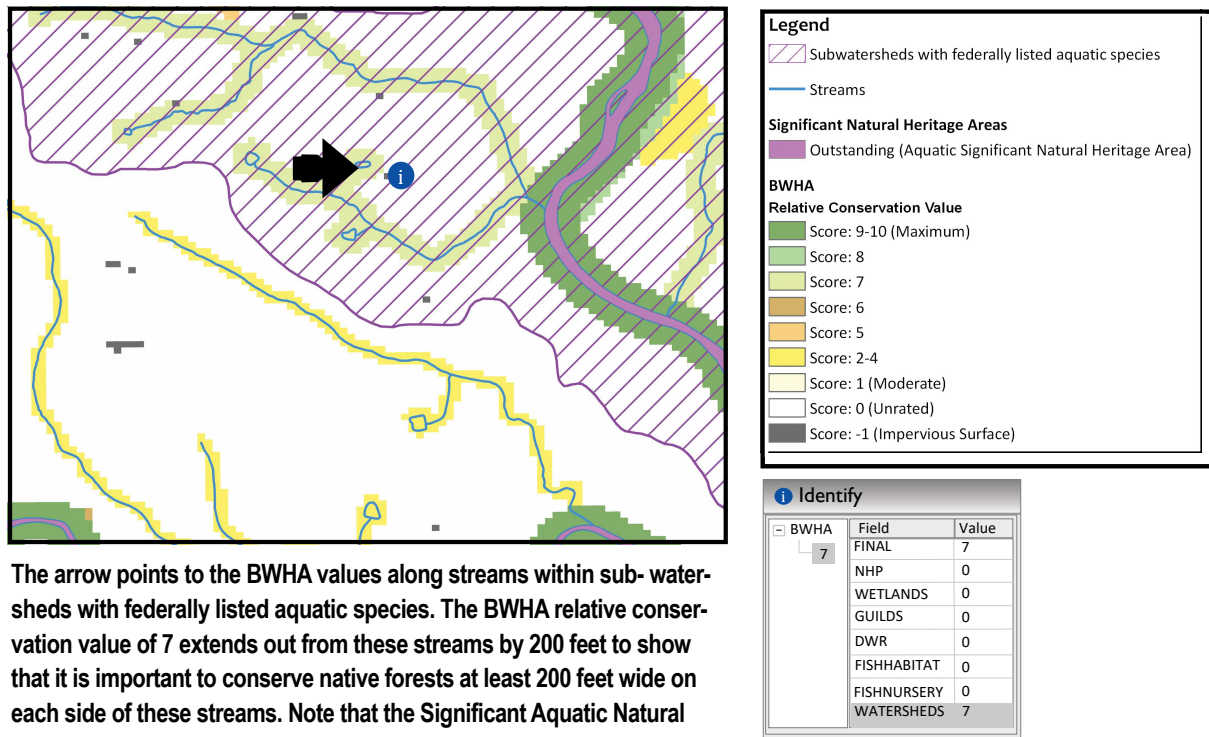
Accuracy
These waters go through a rigorous process to become designated but are not always taken off of this list once they become impaired and no longer meet the criteria.

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n https://www.ncwildlife.org/Conserving/Programs/Green-Growth-Toolbox/Conservation-Data#96141739-important-watersheds

o https://deq.nc.gov/about/divisions/energy-mineral-land-resources/hqw-orw

FIGURE 4. RIPARIAN HABITATS: SUBWATERSHEDS WITH FEDERALLY LISTED SPECIES

Legend

/// Subwatersheds with federally listed aquatic species

—— Streams

Significant Natural Heritage Areas

▨ Outstanding (Aquatic Significant Natural Heritage Area)

BWHA
Relative Conservation Value

■ Score: 9-10 (Maximum)
■ Score: 8
■ Score: 7
■ Score: 6
■ Score: 5
■ Score: 2-4
□ Score: 1 (Moderate)
□ Score: 0 (Unrated)
■ Score: -1 (Impervious Surface)

ⓘ **Identify**

BWHA	Field	Value
7	FINAL	7
	NHP	0
	WETLANDS	0
	GUILDS	0
	DWR	0
	FISHHABITAT	0
	FISHNURSERY	0
	WATERSHEDS	7

The arrow points to the BWHA values along streams within sub- water-sheds with federally listed aquatic species. The BWHA relative conservation value of 7 extends out from these streams by 200 feet to show that it is important to conserve native forests at least 200 feet wide on each side of these streams. Note that the Significant Aquatic Natural Heritage Area has a 300 foot wide area of high conservation value on each side. We recommend conservation of these buffer areas.

Recommended use of these data:
- To identify priority watersheds within which streams or rivers could be buffered by at least 100 feet (or 200 feet if they also contain federally listed species) on each side.
- Aim to keep impervious surfaces to a maximum of 10 percent in watersheds.

Wild Brook Trout Streams (Mountains only)

North Carolina is home to more brook trout than anywhere else in the Southeast, yet this prized fish has been greatly impacted and now exists only in 20 percent of its historic range.

We do not provide these streams as an individual map layer because it is possible to identify the location of these streams from the BWHA map and by using the 'hydro24k' streams map layer (on page 28). These streams are identified in the BWHA data table as FISHHABITAT with a BWHA rank of 9 and have a 100 foot buffer mapped on each side of them.
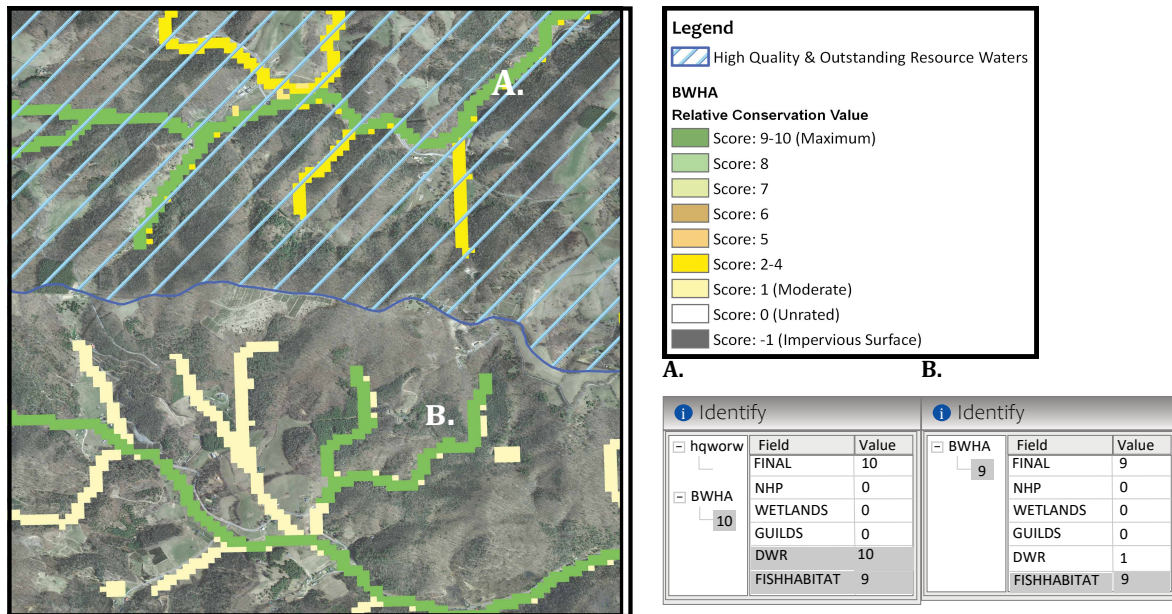
Recommended use of these data:
- To identify priority watersheds with streams or rivers that could be buffered by at least 100 feet (or 200 feet if they also contain federally listed species) on each side.

Where can I find more information on aquatic wildlife conservation?
N.C. Wildlife Commission conservation recommendations for aquatic wildlife can be found in Guidance Memorandum to Address and Mitigate Secondary and Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality.ᵖ

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p   https://www.ncwildlife.org/portals/0/Conserving/documents/2002_
     GuidanceMemorandumforSecondaryandCumulativeImpacts.pdf

Legend

- High Quality & Outstanding Resource Waters

BWHA
Relative Conservation Value

- Score: 9-10 (Maximum)
- Score: 8
- Score: 7
- Score: 6
- Score: 5
- Score: 2-4
- Score: 1 (Moderate)
- Score: 0 (Unrated)
- Score: -1 (Impervious Surface)

A.

ⓘ Identify

	Field	Value
⊟ hqworw	FINAL	10
	NHP	0
⊟ BWHA	WETLANDS	0
10	GUILDS	0
	DWR	10
	FISHHABITAT	9

B.

ⓘ Identify

	Field	Value
⊟ BWHA	FINAL	9
9	NHP	0
	WETLANDS	0
	GUILDS	0
	DWR	1
	FISHHABITAT	9

A) The BWHA relative conservation value for this stream is a 10 because the stream is rated as Outstanding Resource Waters by the N.C. Division of Water Resources (DWR). The GIS map layer for High Quality and Outstanding Resource Waters, which is a statewide map is also depicted. The data table shows a value of 9 for FISHHABITAT. This means that the stream also contains wild trout. Wild trout only occur in some streams in the mountains.

B) This stream contains wild trout and is not rated as High Quality and Outstanding Resource Waters therefore the BWHA value at this location is 9 for the FISHHABITAT field and the FINAL field.

Streams

- State regulations administered by the N.C. Division of Water Resources (NCDWR)require the use of their data by communities in several river basins. You should consult these regulations,[q] as this handbook is not meant to describe or replace these regulations.

- The best available source of data to identify and classify streams is from the North Carolina Stream Mapping Program[r]. Unfortunately, this dataset is currently only available for certain mountain counties.

- The dataset that is available statewide for streams is the 1:24,000-scale Hydrography with Water Classifications based on the USGS 1:24,000 scale Topographic Quad Data (also known as "blue-line" streams).

- GIS Shapefile: hydro24k
- Original Source: N.C. Division of Water Resources
- Best GIS data are available for some streams via the N.C. Stream Mapping Project.

Accuracy

Research indicates that USGS topographic maps (and USDA Soil Survey maps) are somewhat inaccurate. Due to such inaccuracies, we recommend field surveys be conducted to identify and classify stream location and quality ahead of development.

q   https://deq.nc.gov/about/divisions/energy-mineral-and-land-resources/stormwater/stormwater-program/stormwater-rules-and-regulations

r   https://www.nconemap.gov/pages/streams

Recommended use of these data:

Identify stream location on the ground.
- The 'hydro24k' map layer is most appropriate to use for viewing the general locations of streams. If N.C. Stream Mapping data is not available it is best to survey stream location on site.
- The NCDWR has developed a stream identification manual[s] that presents guidance on identifying intermittent and perennial streams in North Carolina.

Buffer verified streams in order to adequately conserve aquatic life and water quality.

Use the DWR Classifications in the data table to understand the BWHA rank for stream buffers.
- The BWHA ranks stream buffer areas based on the DWR surface waters classification – denoted as the field DWR in the BWHA data table. Refer to Chapter 4 of the N.C. Conservation Planning Tool Report for DWR Classifications and BWHA conservation value ranks.
- In the hydro24k streams map layer data table, refer to the 'CLASS' field for descriptions of the DWR Surface Water Classification.
- Use the BWHA rank to identify priority stream buffers when stream buffers on all streams are not possible.

Where can I find more information?
The NCDWR website provides more information on Surface Water Classifications[t]

Wetlands

Coastal Region Evaluation of Wetland Significance (CREWS)

This dataset contains information on wetland quality and is sometimes more accurate than the National Wetlands Inventory below. The CREWS analysis differenti-

- GIS Shapefile: [County name]_wets
- Original Source: NCDCM

ates between exceptional, substantial, and beneficial wetlands. Exceptional wetlands are the highest quality and the best functioning. The CREWS data provided through the GGT website includes a legend for these wetland significance ratings. Please see the Green Growth Toolbox Coastal Region Appendix and N.C. Division of Coastal Management website for more information.

National Wetland Inventory (NWI) Wetlands

NWI Layer—and its Limitations
- The only available GIS layer that displays wetland locations across the state is the National Wetland

- GIS Shapefile: CONUS_wet_poly
- Original Source: USFWS

  Inventory[u] layer, which was mostly produced using high altitude aerial photographs from the 1980s and elevation, soils maps, and other information.
- Due to the inaccuracies in photo interpretation and draining and ditching of wetlands over the past decades, this layer is generally considered to have moderate to low accuracy because it does not completely reflect conditions on the ground. In addition, this layer does not have easily accessible wetland quality information.
- We recommend using this layer in planning because the NWI layer is the only available source of wetland data for the entire state.

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s   https://deq.nc.gov/media/4810/download
t   https://deq.nc.gov/about/divisions/water-resources/water-quality-permitting/401-buffer-permitting-branch
u   https://www.fws.gov/program/national-wetlands-inventory

Recommended use of these data:

- To identify areas where many wetlands exist and where extensive development may not be appropriate in order to conserve water and wildlife.
- In order to conserve small wetland communities (isolated wetlands fed by surface water and not by streams or rivers) for wildlife and water quality, it is essential that wetlands be surrounded with undisturbed upland habitat. For more information and recommended buffer widths, see Section 3, pages 54 to 56.
- To identify areas to survey for confirmation of wetland presence and habitat quality.

Why are wetlands important for wildlife?

- In addition to playing an important role in cleaning and storing our water, many wetlands provide outstanding wildlife habitat and have high biodiversity.
- The N.C. Wildlife Action Plan identifies wetland communities as priority habitats for conservation efforts across the state.[5]
- Small wetland habitats such as vernal pools, seeps, bogs and small depression ponds are especially important as breeding sites for amphibians and reptiles because they do not typically contain fish that prey on their eggs and young.
- Due to the lack of regulations for protecting small wetlands (typically < 0.1 acre), these are declining dramatically along with the unique animal and plant species that depend on these types of wetlands.

Important Bird Areas (IBAs)

Important Bird Areas[v] are documented and mapped by the N.C. Audubon Society using field survey data. All IBAs rank as a 6 in the BWHA.
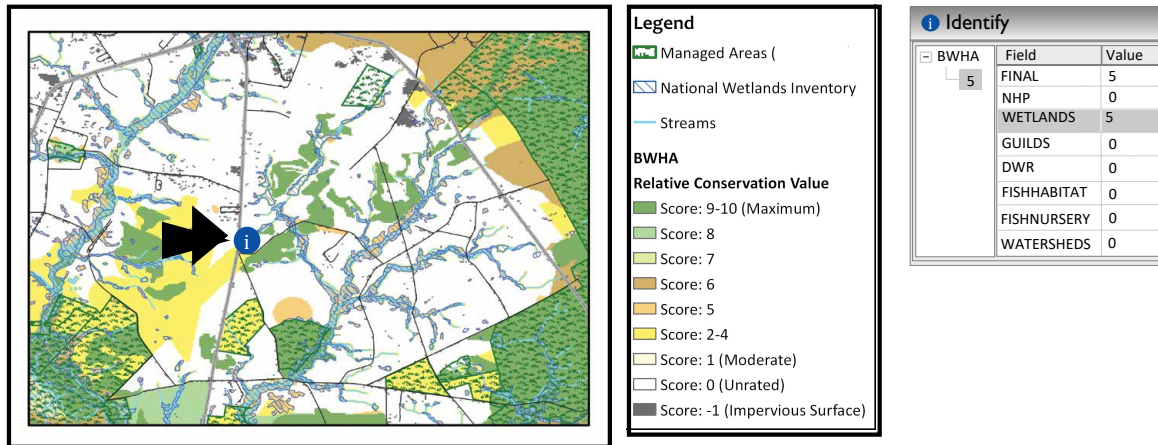
> - GIS Shapefile: NC_IBAs
> - Original Source: N.C. Audubon Society

"IBAs, are places that provide essential habitat for one or more species of birds at some time during their annual cycle, including breeding, migration and wintering periods. Well-known North Carolina IBAs include iconic landmarks such as Grandfather Mountain and Cape Lookout National Seashore. Nearly all of the state's IBAs include a state, federal, or nongovernmental conservation lands component, but many also contain a high percentage of privately owned and managed land."[6]

Recommended use of these data:

- This data is most appropriate for visioning and plan making because IBAs are typically very large. All areas within the IBAs are important to birds, however, specific habitat that should be conserved within the IBAs is best identified by a biologist or by using the other map layers in the Conservation Data for Green Growth.
- Identification, during visioning and plan making, of areas where large blocks of fields and forests should be maintained.

FIGURE 6. WETLANDS

SECTION

2

COMPONENT 2

Legend

Managed Areas (

National Wetlands Inventory

Streams

BWHA
Relative Conservation Value

Score: 9-10 (Maximum)
Score: 8
Score: 7
Score: 6
Score: 5
Score: 2-4
Score: 1 (Moderate)
Score: 0 (Unrated)
Score: -1 (Impervious Surface)

Identify

BWHA	Field	Value
5	FINAL	5
	NHP	0
	WETLANDS	5
	GUILDS	0
	DWR	0
	FISHHABITAT	0
	FISHNURSERY	0
	WATERSHEDS	0

For non-coastal counties the available wetlands data are from the National Wetlands Inventory (NWI), pictured above. The BWHA 'WETLANDS' value for NWI wetlands is always 5.

Legend

National Wetlands Inventory

Brunswick_CREWS

Exceptional
Substantial
Beneficial
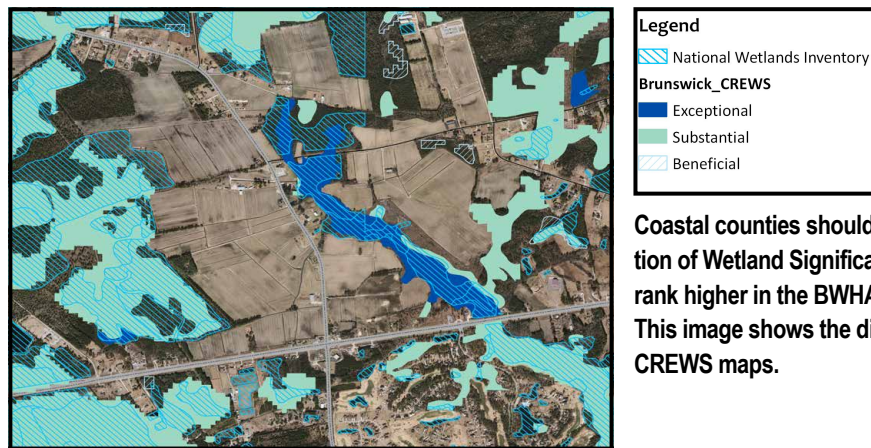
Coastal counties should refer to the Coastal Region Evaluation of Wetland Significance—CREWS. CREWS wetlands can rank higher in the BWHA because the data are more accurate. This image shows the differences between the NWI and the CREWS maps.

COMPONENT 2 ▶ Statewide Data to Use in Addition to the Biodiversity and Wildlife Habitat Assessment

Managed Areas

Managed Areas[w] displays private and public lands that are managed under an agreement, easement, or public ownership where habitat management is one of the goals. Management on these areas can include prescribed burning and tree thinning to enhances wildlife habitat.

- GIS Shapefile: marea
- Original Source: NCNHP

- The N.C. Conservation Planning Tool provides a more extensive set of Open Space and Conservation Lands maps that include lands that are not managed for habitat.

Recommended use of these data:
- Buffer and connect these areas with other natural areas by encouraging agricultural districts around and between them. Managed Areas include NC Wildlife Commission Game Lands discussed below.

---

w   See https://www.ncnhp.org/activities/conservation/managed-areas

Why is it important to connect Managed Areas with corridors of undeveloped land?
When permanently conserved lands are surrounded by development, many wildlife species and habitats within them will cease to exist. Wildlife and plant populations need to be connected with one another to maintain genetic diversity.

Smoke Awareness Areas

Smoke awareness areas demonstrate locations that are most likely to experience smoke from prescribed burning. See page 4 for information on prescribed burning. These areas are indicated by a one half mile boundary drawn around

- GIS Shapefile: Smoke_Awareness
- Original Source: NCWRC

the perimeter of lands managed with fire. The Sandhills GGT Regional Appendix has more refined Smoke Awareness Area maps based on local conditions. Most prescribed burns occur on smaller units within larger tracts of managed lands. Agencies and organizations that conduct prescribed burns do so only under conditions that are designed to maximize vertical smoke dispersal and minimize any impacts to public safety. See Section 5, page 104, for information on Wildfire and Smoke Management ordinances.

Recommended use of these data:
- To identify areas where working lands or natural areas should be encouraged to avoid the exposure of residents to smoke for a few days every two to three years.

Game Land Hunting Safety Buffers

- Conflicts can arise between Game Land users and residents who live close to Game Lands, such as disturbance to homeowners and

- GIS Shapefile: gml_buffer
- Original Source: NCWRC

limits to hunting on Game Lands. To minimize such conflicts, we recommend establishing a 150 yard hunting safety buffer[x] around Game Lands in your jurisdiction, especially in areas where Game Lands are narrow.
- The hunting safety buffer map layer displays this recommended 150 yard buffer.

Recommended use of these data:
- To identify areas where working lands or natural areas should be encouraged to maintain habitat quality and connectivity and the use of Game Lands for hunting.
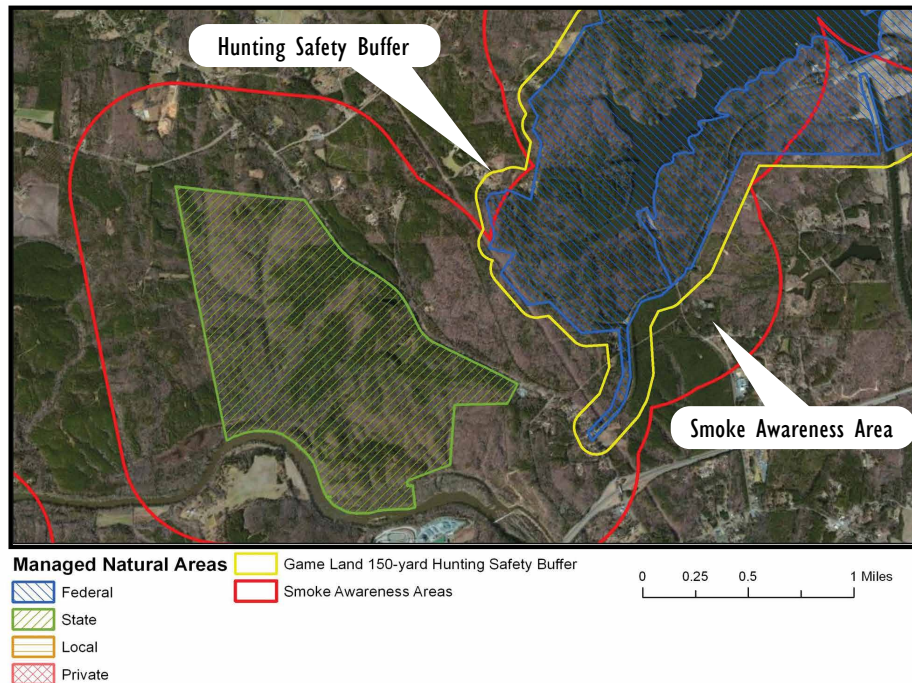
Bald Eagle Nest Buffers

Bald eagles are protected under the Bald and Golden Eagle Protection Act. This map layer displays a 330 and a 660-foot buffer on each nest.

- GIS Shapefile: Contact NCWRC for data
- Original Source: NCWRC

Recommended use of these data:
- To identify areas for a 330 or 660-foot no-touch buffer that will protect bald eagles. A 660-foot buffer is needed if development is visible from the nest.
- We recommend consulting with the U.S. Fish and Wildlife Service. See Appendix B for contact information.

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x   https://www.ncwildlife.org/Conserving/Programs/Green-Growth-Toolbox/Conservation-Data#96141741-hunting-safety--smoke-awareness-areas

FIGURE 7. MANAGED AREAS, SMOKE AWARENESS AND HUNTING SAFETY AREAS

Managed Areas are privately or publically owned and are managed for wildlife and biodiversity conservation to some extent under a conservation agreement. These areas appear in hatched colors above. The managed areas where pre-scribed fire takes place have a smoke awareness area mapped around them. NCWRC Game Lands have a hunting safety buffer of 150 yards mapped around them. It is important to encourage working lands around and between Managed Areas to maintain habitat quality and wildlife travel corridors.

Floodplain Boundaries from the N.C. Floodplain Mapping Program

- N.C. Floodplain Mapping Program data maps the 100 and 500-year floodplains.
- In addition to using floodplain data to reduce flood hazards, data on flood plains can help local governments plan to conserve this valuable wildlife habitat.
- To download the best available data floodplain data for your county, visit N.C. Flood-plain Mapping Program[y]

  - Original Source: NC Floodplain Mapping Program
  - Download from their website at www.ncfloodmaps.com

Recommended use of these data:
- Displaying floodplain boundaries can provide a starting place for identifying important floodplain forest habitats within floodplain boundaries either with aerial photos or on the ground surveys.
- Consider discouraging major development in the 100 or 500-year floodplains. One hundred-year floods (one percent chance of annual flooding) are more common due to climate change. Property damage can be reduced by conserving habitats for wildlife and plant communities by not building in floodplains.

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y   https://flood.nc.gov/ncflood/mappingprogram.html

Other Assessments in the N.C. Conservation Planning Tool

Besides the Biodiversity and Wildlife Habitat Assessment, the CPT includes other natural resource assessments.[z] Detailed information on the map layers is provided in the CPT report.[aa]

- Open Space and Conservation Lands[ab] by the N.C. Natural Heritage Program
- Agricultural Lands Assessment[ac] by the N.C. Department of Agriculture & Consumer Services
- Forest Lands Assessment[ad] by the N.C. Forest Service based on the N.C. Forest Action Plan.[ae]

Recommended use of these data:
- To identify areas where multiple natural resources and wildlife conservation objectives can be achieved through maintaining agricultural districts, connected wildlife habitat, and working lands

Additional Mapping Resources for Resiliency Planning

Wildlife habitats provide important services for helping our communities become more resilient to a changing climate. The protection of floodplains and wetlands will help reduce hazards associated with extreme storm events, the protection of tree canopy in our developed landscapes will reduce hazards associated with higher temperatures, and natural areas sequester and store carbon, reducing our greenhouse gas footprint. See Section 1 for more information. The N.C. Office of Climate Resiliency and Recovery provides a centralized place[af] for acessing data related to climate resiliency planning needs. The datasets most applicable to wildlife conservation planning are highlighted below.

Resilient and Connected Landscapes

With climate change, the impacts of a fragmented landscape on wildlife are compounded, as wildlife need to move across the landscape in response to ecosystems that are shifting geographically as the climate shifts. For example, as temperatures increase, some species that thrive in cooler temperatures will shift their range northerly to follow those cooler temperatures. The Nature Conservancy's Resilient and Connected Landscapes dataset[ag] is a useful dataset for understanding which habitats are most important to conserve to support ecological shifts in our landscape. There are two assessments available that are useful for land use planning work:

1. Resilient Sites: these are areas on the landscape that are the most resilient to climate change because they are well connected across the landscape and contain a variety of habitats within them, which allows terrestrial wildlife to respond to shifting habitats easily and allows them to move in response to extreme weather events.
2. Connectivity and Climate Flow: This assessment identifies areas that have more and less ability for terrestrial wildlife to gradually move in response to changes in the climate. Areas that have many barriers are not easy for wildlife to move through show up in brown colors; blue areas are more connected natural areas that faciliate wildlife movement.[7]

z   ttps://ncnhde.natureserve.org/content/datadownload

aa   http://ncnhp.org/conservation/conservation-planning-tool/resources/report

ab   https://www.ncnhp.org/documents/open-space-and-conservation-lands

ac   www.ncmhtd.com/EnvironmentalPrograms/AgAssessment/

ad   www.ncmhtd.com/NCFS/ForestActionPlanPriorityLayers/

ae   www.ncforestactionplan.com

af   https://www.rebuild.nc.gov/resiliency/climate-data

ag   http://www.conservationgateway.org/ConservationPractices/ClimateChange/Pages/Climate-Resilience.aspx

Recommended use of these Data:

- When used in addition to the BWHA, Marea, and other Component 1 Conservation Data, this data can be used to idenitfy where communities might prioritize protection. Consider conserving the 'more' and 'most' resilient sites where possible and ensure that that a network of wildlife corridors and habitat patches are conserved to the extent possible within lesser resilient areas.
- The Connectivity and Climate Flow dataset could be used in transportation planning to identify where roads are intersecting areas of high flow; these can then be considered for providing improved wildlife passage infrastructure.
- At a fine scale, the boundaries of these layers may be inaccurate. They are useful for planning but they are not appropriate for development review and site design.

Estimate of Flood Extent following Recent Hurricanes

TNC used satellite imagery to map the estimated inland flood extent of recent hurricanes (Hurricanes Matthew, 2016 and Florence, 2018). Their analysis shows that flooding often went beyond the 100-year floodplain boundaries (figure 8).[8]

Recommended use of the Data:

- Use this data to understand where flooding may occur in future storm events.
- Consider discouraging development in areas that may experience flooding.
- Target these areas for conservation easements and acquisitions, buy-outs, and habitat restoration.

FIGURE 8. ESTIMATE OF FLOOD EXTENT FOLLOWING RECENT HURRICANES

—— 100-year Flood Hazard Area   ▮ Hurricane Matthew   ▮ Hurricane Florence

Recent hurricanes led to historic levels of flooding. The Estimate of Flood Extent dataset helps communities prepare for emergencies, understand flood risks to developed land uses, and plan to reduce impacts by reducing development in areas that may flood.

NC Conservation Benefits Calculator

The NC Conservation Benefits Calculator[ah] is a web-based tool developed by Duke University's Nicholas Institute for Energy, Environment & Sustainability in collaboration with the Conservation Trust for North Carolina to help decision-makers understand the multiple benefits natural and working lands provide to communities and/or landowners. Many of these benefits match resiliency-related goals a community might identify. The tool can calculate a range of metrics related to different benefits a community or landowner gains when protecting an area of interest. This tool can help decision-makers understand the value of protecting certain properties from development. It can also help communities track progress towards meeting goals identified in a plan.

- Carbon storage and sequestration metrics show how much carbon is currently stored in forested areas in your community and show the potential of areas to store carbon into the future (sequestration). This helps communities understand how forested areas meet resiliency goals of reduced greenhouse gas emissions.
- The downstream flood attenuation metric helps communities understand what areas will reduce flooding, if protected from development, and can be used to support hazard mitigation planning.
- The wild pollination metric can be used to identify habitats that can be conserved to protect wild pollinator species that pollinate crops in agricultural areas.
- Another tool, the Conservation Prioritization tool[ai], looks at the range of benefits at a watershed scale (HUC-12) and helps users understand which watersheds land conservation work will provide the most benefits. This information may help communities make decisions related to zoning and future land use.

The User's Guide[aj] provides information on how to use the tools, the methods behind the development of the metrics, and the sources for the different data sets, which include data from the NHP and TNC. See the Nicholas Institute website[ak] for more information.

Many other natural resources datasets are availlable to support climate resiliency on the coast and are described in the Coastal Regional Appendix.

Further References for Conservation Planning

There are a variety of resources that can be used to identify priority areas to employ conservation-based development planning methods. The number of map layers and the scale of the tools below make them most appropriate for reference to identify priority conservation areas during planning as opposed to being part of the core set of Conservation Data for Green Growth map layers. See Appendix F for details.

- The Southeast Conservation Blueprint[al] - crafted by the Southeast Conservation Adaptation Strategy, identifies priority areas and habitat types and estimates habitat quality.[9]
- Conservation Opportunity Areas[am] - identifies watersheds that have the most need for conservation due to the likely occurrence of species of greatest need on unprotected lands.[10]

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ah   https://prioritizationcobenefitstool.users.earthengine.app/view/cobenefitscalculator

ai   https://prioritizationcobenefitstool.users.earthengine.app/view/nc-huc-12-conservation-prioritizer

aj   https://storymaps.arcgis.com/stories/6ac20916c67b4164901b50ac3e640d6a

ak   https://nicholasinstitute.duke.edu/project/conservation-planning-tools-north-carolinas-people-and-nature

al   https://secassoutheast.org/blueprint

am   http://tecumseh.zo.ncsu.edu/coa/

COMPONENT 3 ▶ Regional Datasets and Habitat Information

In addition to data that are relevant statewide, more detailed conservtion data exist for different regions of the state, see figure 9 below. These are are explained along with regional habitat information in the Regional Appendices.[an] We recommend that mountain counties use the Southern Appalachain Man and the Biosphere[ao] Conservation Data.

FIGURE 9. REGIONAL APPENDICES

Coastal Region
Sandhills Region
Uwharries Region
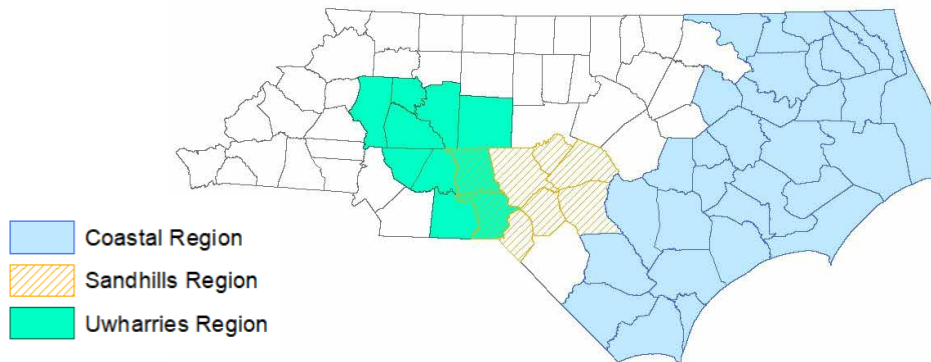
USING CONSERVATION DATA IN LOCAL PLANNING

Local governments can take four basic steps to start using the Conservation Data for Green Growth in planning activities:

1) **Integrate the data with your community's online or networked GIS database.**
2) **Use the data in visioning and plan making.**
3) **Use the data in incentives and ordinance and rule setting.**
4) **Use the data in development site location, review and design.**

1. Integrate the dataset with your community's GIS database.

The most effective way to use this dataset is to integrate it with your community's existing GIS database and online interactive map server.

- These layers can then be easily accessed by developers for site selection, all local government departments, and the public during planning projects.
- Prevent illegal collection of rare species by displaying only the public Natural Heritage Element Occurrence data without species names on public maps.

Example

- Chatham County, NC's Conservation Viewer[ap]

Update Data Regularly

It is important to schedule regular updates of your community's Conservation Data. If you link to the ARCGIS Map Services directory, the data on your website will be updated as the original source is updated. Datasets available for download on the Green Growth website will be updated once per year. It is best if you schedule updates for different layers from their original source using information provided in the quick reference guide on page 42.

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an   https://www.ncwildlife.org/Conserving/Programs/Green-Growth-Toolbox/Conservation-Data/Regional-Data
ao   https://www.samab.org/
ap   https://chathamncgis.maps.arcgis.com/apps/webappviewer/index.html?id=50e45ef5a0394cb48dfe81aabccd902a

2. Use the dataset in visioning and plan making

Green planning refers to creating and revising planning documents and stand-alone conservation plans to consider, encourage and enable conservation of priority habitats. For more detailed information, see Section 4 , "Green Planning."

To integrate the Conservation Data for Green Growth in visioning and plan making follow these steps:

1) Display the map layers in planning documents and provide descriptions of what each layer means.
2) Develop strategies to conserve and connect the important species, habitats and ecosystems displayed on maps. A menu of conservation strategies is presented in Section 4.
3) Identify natural areas that may contain important wildlife habitats that have not been mapped such as springs, seeps and vernal pools. Establish goals and strategies to gather this information.

3. Use the dataset in incentives and ordinance and rule-setting.
For more detailed information, see Section 5, "Greening Ordinances."

Greening incentives, ordinances and rule setting involves creating and revising land use incentives and regulations to implement the goals and strategies for habitat conservation set forth in planning documents.

To use the Conservation Data for Green Growth in ordinance and rule setting:

1) Display the map layers on parcel maps and use these maps to help guide development of incentives, placement of zoning districts or subdivision ordinances that encourage open space conservation.
2) Integrate requirements for using the data in relevant parts of your subdivision ordinance. For instance, require development proposals to display conservation data map layers on development plans to help guide voluntary conservation.

4. Use the dataset in development site location, review and design.
For more detailed information, see Section 6, "Greening Development Site Location, Review, and Design."

To "green" developments planners and local government staff can follow three basic steps:

1) Consult the Conservation Data for Green Growth to see if any map layers overlap with the parcels to be developed.
2) Highlight any overlapping habitat areas on preliminary development sketch plans and bring these areas to the applicant's attention.
3) Help the applicant incorporate wildlife friendly development practices into their preliminary plans using the recommendations in Section 3.

Caveats:
* Please note it is not appropriate to require conservation of natural areas solely based on map boundaries. Site surveys are needed to verify habitat presence ahead of development design when specific habitats are required to be conserved.
* It is appropriate to use maps to guide which *districts* require open space set asides. If site surveys before development are not a desired requirement, it is appropriate to encourage (but not to require) that the specific location of natural open space be within mapped habitats.

*   It is appropriate to require some form of open space conservation within the bound aries of the game land hunting safety buffers and other map layers based on property boundaries if desired.

NATURAL RESOURCE INVENTORIES AND SITE SURVEYS

A natural resource inventory or a site survey involves biologists and ecologists doing fieldwork to collect information about the location and status (condition or rarity) of important species and habitats. The Conservation Data for Green Growth may not always provide all of the information your community may need to understand the condition of local natural assets. Although using Conservation Data is a good starting point, you may wish to do a more extensive field inventory to supplement existing information.

Natural Resource Inventories—Where to start
The following five steps will help you get started.

Step 1. Determine if your county or city needs additional natural resource information.

- First, identify what field inventory work has already been done in your jurisdiction.
- The N.C. Natural Heritage Program has conducted "Natural Heritage Inventories" for many counties across the state. Check here[aq] to determine whether an inventory has been completed for your county. Even if a Natural Heritage Inventory has been conducted recently, you may want additional information—whether for a specific watershed or your entire jurisdiction.

Step 2. Identify how the inventory will be used. You could use the inventory to:

- Better guide transportation and hazard planning,
- Develop conservation strategies for your comprehensive plan,
- Update outdated inventories,
- Improve information to be more competitive for land acquisition grants for natural parks and historic sites,
- Identify important districts or sites for conservation subdivisions,
- Improve management of parks, open space, trails and greenways.

Step 3. Develop a list of the types of natural resources to be inventoried. A qualified biologist can assist in developing this list, which may include:

- Streams, wetlands, springs, seeps,
- High-quality and rare natural communities,
- Important wildlife habitats identified in the N.C. Wildlife Action Plan,
- Significant or sensitive native plant communities,
- Forest resources, including canopy cover, native forest communities, and plantations,
- Location of invasive, exotic species outbreaks.

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aq   https://www.ncnhp.org/activities/inventories/county-natural-areas-inventory-program

Step 4. Identify how the inventory will be completed.

- An ecological consultant could be hired to complete the inventory.
- Refer to Appendix B for contact information of partner agencies and organizations who may be able to assist your community to complete the inventory at lower expense.
- Work with a biologist to organize a "Bioblitz" as part of your inventory. These are fun events where families, school groups and ecological experts team up to inventory every area possible within 24 hours.
- Whatever your approach, be certain to involve organizations with biological expertise to ensure the inventory methodology is sound.

Step 5. Conduct the inventory, analyze the data and develop your product.

- Qualified natural resource professionals should lead the inventory and data analysis efforts.
- One of the most useful products can be a database containing the inventory results.
- Maps displaying the inventory and other Conservation Data can then be used in all of your community's planning activities.

Examples of Local Natural Resource Inventories

- Mecklenburg County, North Carolina, Natural Resources Section[ar] conducts biological inventories to guide park management and purchase.
- Orange County, North Carolina actively updates and uses their Natural Heritage Inventory in their comprehensive plan and in their Natural and Cultural Resources Conservation programs.
- Wake County, North Carolina, Parks, Recreation and Open Space Department con duct natural resources inventories for their parks and work to dedicate nature preserves in partnership with the Wake Nature Preserves Partnership.[as]
- The City of Portland, Oregon, Natural Resource Inventory[at] uses aerial photography and GIS to map important buffers, habitats, and wildlife travel corridors.
- The City of Lakeland, Tennessee, conducts a Natural Resources Assessment used in their Comprehensive Plan.
- Dutchess County, NY, has an award winning Natural Resources Inventory[au] used in land use decision making.

ar   https://www.mecknc.gov/ParkandRec/StewardshipServices/NaturalResources/Pages/default.aspx

as   https://wakenature.wordpress.com/wakenature-preserves/

at   https://www.portland.gov/bps/planning/comp-plan/2035-comprehensive-plan-and-supporting-documents#!/action=viewmore&type=topPages

au   https://www.dutchessny.gov/Departments/Planning/Natural-Resource-Inventory.htm

LEGENDS FOR CPT ASSESSMENT LAYERS

Biodiversity/Wildlife Habitat Assessment
Relative Conservation Value

- 9-10 (Maximum)
- 8
- 7
- 6
- 5
- 2-4
- 1 (Moderate)
- 0 (Unrated)
- Impervious surface >20%
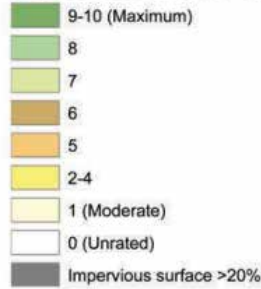
Legend for the Biodiversity/Wildlife Habitat Assessment

Key to Identify Tool Results for the Biodiversity/Wildlife Habitat Assessment			
Category Name	Value	Individual Input Layers	Source for Input Layers
NHP	10	Natural Areas – Exceptional and Very High Site Rating	*N.C. Natural Heritage Program*
	8	Natural Areas – High and Moderate Site Rating	
	6	Natural Areas - General Site Rating	
	5	Element Occurrences – High ranking	
	4	Element Occurrences – Other	
Wetlands	7	Coastal Region Evaluation of Wetland Significance (CREWS) – Exceptional	*N.C. Division of Coastal Management*
	6	Coastal Region Evaluation of Wetland Significance (CREWS) – Substantial	
	5	National Wetland Inventory (NWI)	*U.S. Fish and Wildlife Service*
	2	Coastal Region Evaluation of Wetland Significance (CREWS) – Beneficial	*N.C. Division of Coastal Management*
Guilds	1-10	Landscape Habitat Indicator Guilds	*N.C. Natural Heritage Program*
DWR	10	Outstanding Resource Waters	*N.C. Division of Water Resources*
	9	Stream BioClassification – Excellent	
	8	High Quality Waters	
	7	Stream BioClassification – Good	
	1	All other streams	
Fish Habitat	9	Wild Brook Trout	*N.C. Wildlife Resources Commission*
	8	Anadromous Fish Spawning Areas	*N.C. Division of Marine Fisheries*
Fish Nursery	8	Fish Nursery Areas	*N.C. Division of Marine Fisheries*
Watersheds	7	Stream buffer tributaries to federally-listed species (Threatened & Endangered)	*N.C. Natural Heritage Program*
	3	Priority Watersheds	*N.C. Natural Heritage Program, N.C. Wildlife Resources Commission*
Marine	8	Oyster Sanctuaries	*N.C. Division of Marine Fisheries*
	6	Submerged Aquatic Vegetation (SAV)	
Hardbottom	8	Open Shellfish/Shellbottom	*N.C. Division of Marine Fisheries*
	7	Hard Bottom	
	5	Closed Shellfish/Shellbottom	
IBA	6	Important Bird Areas	*Audubon Society*
Impervious	-1	Impervious Surface above 20%	*U.S. Environmental Protection Agency*

Source: https://www.ncnhp.org/cpt-report-2018

STATEWIDE GIS CONSERVATION DATA REFERENCE CHART

These Conservation Data map layers are the most applicable data available statewide for land use planning. The 'Levels of Planning' column denotes whether the map layer is appropriate for use in the planning activity. Additional regional datasets are referenced in the regional appendices.

GIS Data Layer	Layer Label	Where to Download Directly	Update Frequency	Summary of Interpretation & Recommendations for use[13]	Visioning & Plan-Making	Ordinance & Rule-Setting	Development Review & Design
	REFERENCE INFORMATION[11]				LEVELS OF PLANNING[12]		
Biodiversity and Wildlife Habitat Assessment	bwha	N.C. Conservation Planning Tool[14] or via N.C. One Map[15]	Biannual	• To identify priority areas for conservation • To identify wildlife and habitat corridors that connect important natural areas • Areas that rank 10 to 7 or 6 should receive the strongest protections. • Low intensity land uses should be encouraged.	X	X	
Map Layers that were used to create the Biodiversity and Wildlife Habitat Assessment - *The map layers below were used to create the BWHA. They can be used for a higher degree of accuracy, more detailed information and to highlight specific types of habitat and priority areas in land use planning activities.*							
Landscape Habitat Indicator Guilds[16]	N/A	Interpret these areas directly from the BWHA data table.	Biannual	(Same as those for BWHA above). These represent large habitats where area sensitive species have been found.	X	X	
Tier 1 Resources: Sensitive Wildlife Habitats - *The map layers below are used in the BWHA and represent the following: a) data of high accuracy that should be ground-truthed at the site level, b) areas that are highly sensitive to development and should be set aside from development to the maximum extent possible.*							
Natural Heritage Areas	nha	N.C. One Map	Quarterly	Field-delineated high-quality habitats that should receive the highest protections.	X	X	X
Natural Heritage Element Occurrences[16]	nheo	N.C. Natural Heritage Program	Quarterly	(Same as NHA above)	X	X	X
Streams	hydro24k	N.C. One Map	Irregular	Maintain buffer of natural forest at least 100 feet wide, especially in priority watersheds.	X	X	X
Subwatersheds with federally listed fish and mussels	Fed_HUCs	Green Growth Toolbox website[17]	Biannual	Buffer streams within these watersheds by 200 ft to protect imperilled species.	X	X	X
Wild Brook Trout Streams	N/A	Interpret these areas directly from the BWHA data table.	Biannual	The 100 foot stream buffers mapped in the BWHA are a high priority (9 out of 10).	X	X	X
CREWS Wetlands (Coastal counties only)	[County name]_wets	Division of Coastal Management. Obtain from the Green Growth Toolbox website for easier to use legend.	Irregular	• Sites where a federal or state wetlands permit is likely required. • Verify wetlands by survey ahead of development. • Set aside development especially for higher quality wetlands. • Buffer and connect verified wetlands to each other and streams	X	X	
National Wetland Inventory wetlands	CONUS_wet_poly	U.S. Fish & Wildlife Service website[18]	Irregular		X		

STATEWIDE GIS CONSERVATION DATA REFERENCE CHART

GIS Data Layer	REFERENCE INFORMATION				LEVELS OF PLANNING		
	Layer Label	Where to Download Directly	Update Frequency	Summary of Interpretation & Recommendations for use	Visioning & Plan-Making	Ordinance & Rule-Setting	Development Review & Design
Tier 2 Resources: Wildlife Habitat Landscapes - *The map layers below represent the following: a) data that are meant to be used at large scales and b) areas where agricultural districts should be encouraged and c) areas where low overall development density is recommended but rural cluster development is encouraged outside of sensitive areas and away from Managed Areas.*							
High Quality and Outstanding Resource Waters	hqworw	N.C. One Map	Irregular	Streams documented to be high-quality and support important resources. These are a priority for wide buffers.			
Important Bird Areas (IBAs)	NC_IBAs	N.C. Audubon Society http://ncaudubonblog.org/downloads/	Irregular	To identify areas where widespread or intense development will negatively impact priority bird species and should be avoided if possible.	X	X	
Map layers not used in the BWHA that we recommend should be used in addition to the BWHA *These layers will give a more complete picture of wildlife habitat conservation needs and opportunities in your community.*							
Managed Areas	marea	N.C. Natural Heritage Program	Quarterly	Buffer and connect these areas with other managed and high priority areas by encouraging agricultural land uses around and between them	X	X	X
Tier 1 Resources: Sensitive Wildlife Habitats							
Colonial waterbird nest site buffers	nheo	N.C. Natural Heritage Program	Quarterly	Maintain a 330 foot undeveloped buffer to avoid disturbing large groups of nests.	X	X	X
Bald Eagle nests	N/A	Obtain from the N.C. Wildlife Resources Commission and filter the detailed NHEO dataset.	Irregular	A formal or informal permit may be needed from the U.S. Fish & Wildlife Service. Buffers range from approximately 330 to 660 feet.[19]	X	X	X
Floodplain boundaries	fldmaphazar	N.C. Floodplain Mapping Program www.ncfloodmaps.com[20]	Irregular	Locations with flooding risk and high potential for important wildlife habitats. Should be set aside from development to the maximum extent possible.	X	X	X
Tier 2 Resources: Wildlife Habitat Landscapes							
Smoke Awareness Areas (approx. ½ mile)	smoke awareness	Green Growth Toolbox website	Yearly	An area that may experience smoke from controlled burning periodically, where it is best to encourage non-developed land uses	X	X	X
Game Land Hunting Safety Buffer (150 yards)	gml_buffer	Green Growth Toolbox website	Yearly	An area where it is best to encourage non-developed land uses to prevent conflicts between hunting and private property	X	X	X
Forestry Lands Assessment		N.C. Conservation Planning Tool	Irregular	Encourage agricultural districts especially in high priority areas	X	X	
Agriculture Lands Assessment					X	X	

1   N.C. Natural Heritage Program. (n.d.). Natural Areas. Retrieved July 2022, from N.C. Natural Heritage Program: https://www.ncnhp.org/conservation/natural-areas
    N.C. Natural Heritage Program. (n.d.). Request Copy of an NHP Publication. Retrieved from N.C. Natural Heritage Program: https://www.ncnhp.org/publications/request-copy-nhp-publication

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8   Schaffer-Smith, D. (2020). Hurricanes Matthew and Florence: impacts and opportunities to improve floodplain management - GIS Data. Retrieved May 2022, from:https://knb.ecoinformatics.org/view/doi%3A10.5063%2FF1JM280P

9   Southeast Conservation Adaptation Strategy (SECAS). 2021. South Atlantic Blueprint 2021. Retrieved July 2022, from https://blueprint.geoplatform.gov/southatlantic/

10 N.C. Wildlife Resources Commission & Biodiversity and Spatial Information Center. (n.d.). North Carolina Wildlife Habitat Threat Data Viewer and Analysis Tool. Retrieved from http://tecumseh.zo.ncsu.edu/coa/

11 The columns under the header "Reference Information" mean the following: the "GIS Data Layer" column presents the name of each data layer that is described in Section 2 of this handbook, the column titled "Layer Label" displays the name of the shapefile, the "Where to Download Directly" column contains instructions on where to download the most up-to-date data from the original source, and the "Update Frequency" column indicates how often updates are made by the data originator and should be made to each data layer.

12 The columns under the header "Levels of Planning" contain "X" marks that show which levels of planning are appropriate for each data layer. For example, all three boxes in Natural Heritage Areas row are marked with an "X." This means that this data layer should be used in visioning and plan making, ordinance and rule setting, and development review. On the other hand, only one box in the "National Wetland Inventory wetlands" row is marked with an "X". This means that layer is only appropriate for use in visioning and plan making.

13 The 'Summary of Interpretation & Recommendations for Use' column summarizes the recommendations of the N.C. Wildlife Resources Commission for use of this GIS data to conserve wildlife and habitats of conservation concern.

14 http://www.conservationtool.nc.gov

15 http://data.nconemap.com/geoportal/

16 The Natural Heritage Element Occurrence layer downloaded through the Green Growth Toolbox website or NC OneMap only has a minimal set of attributes. Because the full dataset contains sensitive information, it must be obtained by contacting the N.C. Natural Heritage Program Conservation Information Manager (www.ncnhp.org/web/nhp/contact).

17 http://www.ncwildlife.org/Conserving/Programs/GreenGrowthToolbox/ConservationData.aspx

18 http://www.fws.gov/wetlands/Data/State-Downloads.html

19 U.S. FWS Bald Eagle Management Guidelines and Permits. [Internet]. [2013]. U.S. Fish and Wildlife Service. Available from: http://www.fws.gov/midwest/MidwestBird/EaglePermits/baeatakepermit.html

20 Floodplain data is not available for download on the GGT website. The best available data for your county should be downloaded from http://www.ncfloodmaps.com.