

NC Wildlife Action Plan 2017 Regional Workshops

*Synergy is the creation of a whole that is
greater than the simple sum of its parts.*

Cindy Simpson (Carr)

NC Wildlife Action Plan Coordinator

 NORTH CAROLINA
Wildlife Resources Commission

The following slide presentation was used during the 2017 Wildlife Action Plan and Spatial Analysis Tools Regional Workshops.

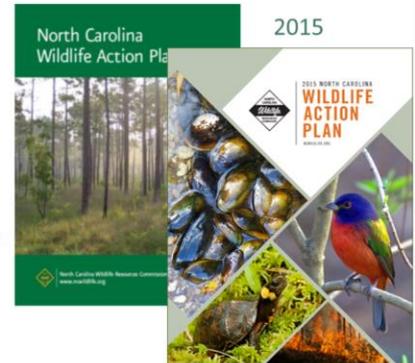
What is the Wildlife Action Plan (WAP)?

Teaming With Wildlife effort highlights need for permanent, non-game wildlife funding for States



In 2002, Congress creates Tribal and State Wildlife Grants Program and requires Wildlife Action Plan, 10-year review/revision cycle

2005



A brief history about the origins of the State Wildlife Grant Program and the need to create a Wildlife Action Plan:

- Wildlife conservation for game animals, which includes both wildlife and fisheries, receives dedicated funding through excise taxes. The Pittman-Robertson (PR), Dingell-Johnson (DJ) and Wallap-Breaux taxes are paid by the manufacturers of hunting and fishing equipment and are apportioned to the States.
- Every state wildlife agency receives these funds for use in managing game species.
- Wildlife conservation efforts for non-game animals, which is the largest proportion of wildlife, was generally opportunistically funded through allocations from the annual budget. These annual allocations were not consistent and made planning for conservation over time difficult.
- A group of conservationists recognized the need for a long-term, dedicated funding source for non-game wildlife and they worked with interested members of Congress to create the State and Tribal Wildlife Grant Program.
- President Bush signed the legislation in 2002, thus creating the funding mechanism for our State Wildlife Grants Program (what we call SWG).

- The SWG program provides federal matching grant dollars to all 50 states, 6 territories, and native American nations.
- States, territories, and tribes qualify to receive SWG matching funds by developing and publishing a wildlife action plan document.
- The US Fish & Wildlife Service manages the SWG program and has review and approval authority for the Plans.
- The basic content of every Plan must address 8 required elements. USFWS and the Association of Fish & Wildlife Agencies (AFWA) have worked together to develop guidance and best management practices for states to use in developing the Plans.

The first NC Wildlife Action Plan (NCWAP) was published in 2005. The 2015 NCWAP is the second version and was developed to satisfy federal requirements that all states conduct a comprehensive review and revision at 10-year minimum intervals.

The 2015 NCWAP was approved by USFWS in March 2016. This makes NC eligible to receive annual allocations of State Wildlife Grant Program matching funds. North Carolina Wildlife Resources Commission uses the federal matching funds for conservation of aquatic and terrestrial non-game animals identified as Species of Greatest Conservation Need (SGCN).

Extensive Coordination and Collaboration

Federal Partners / # Programs	State Partners / # Programs	Initiatives / Other Programs	
USFWS – 12	NCWRC – 10	Atlantic Coast JV	NC Longleaf Coalition
USFS – 7	NCMNS – 3	Appalachian Mtn. JV	NC PARC
NPS – 6	NCNHP – 7	AP3C	NC PIF
NRCS – 6	NCDMF – 9	APNEP	NC Prescribed Fire Council
NOAA Fisheries – 4	NCDCM – 10	Audubon NC	NC Sandhills Conservation Partnership
USEPA – 9	NCDWR – 5	Blue Ridge Forever	NC Universities
USGS – 9	NCEEP – 4	Cape Fear Arch CC	NC Wildlife Federation
DoD – 15	NCFS – 14	Cape Fear River Partnership	Onslow Bight Conservation Forum
USACE – 4	NCDOT – 5	Charlotte-Mecklenburg County, Div. of Nature Preserves & Natural Resources	Open Space NC
LCC - 2	NC Aquariums – 6	Chatham Conserv. Partnership	Orange County Lands Legacy Program
	NC Zoo – 4	Conservation Trust for NC	Robust Redhorse Conservation Committee
	NC Env. Educ. – 3	Durham County Community Conservation Assist. Program	SARP
	PCP – 2	Durham County Farmland Protection Program	TNC
	S&WC - 4	Eastern Band Cherokee Indians	Upper Neuse River Basin Association
		Eastern Brook Trout JV	Upper Tar Collaboration
		Greater Uwharrie Conservation Partnership	USDA Apiculture Program
			WakeNature Preserves Partnership

This list is a representation of the many partners involved in developing the 2015 NCWAP. The 2015 NCWAP was developed over a 2.5 year period through extensive collaboration and coordination with federal, state, and local governments as well as numerous other partners and organizations.

The numbers listed next to the federal and state partners represents the number of different conservation oriented programs that implement NCWAP priorities or are programs linked to education about conservation opportunities affecting fish and wildlife and their habitats.

This document does not reflect just NC Wildlife Resources Commission perspectives – it represents the conservation needs and goals of the entire state.

WAP Content: 8 Required Elements

1. Species of greatest conservation need (SGCN)
2. Location and condition of key habitats, natural communities
3. Problems, priority survey & research efforts needed
4. Conservation action priorities
5. Plans for monitoring species, habitats
6. Review and revise
7. Coordinate with other agencies and organizations
8. Broad public participation in developing and implementing these plans



NORTH CAROLINA
Wildlife Resources Commission

USFWS and the Association of Fish & Wildlife Agencies (AFWA) have worked together to develop guidance and best management practices for states to use in developing the Plans. The basic content of every Plan must address 8 required elements, noted in the list below.

Congress identified eight required elements to be addressed in each state's wildlife action plan (technically called a "comprehensive wildlife conservation strategy"). Congress also directed that the plans must identify and be focused on the species in greatest need of conservation yet address the full array of wildlife and wildlife-related issues.

(1) **Information on the distribution and abundance of species of wildlife**, including low and declining populations as the state fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the state's wildlife; and,

(2) **Descriptions of locations and relative condition of key habitats and community types** essential to conservation of species identified in (1); and,

(3) **Descriptions of problems** which may adversely affect species identified in (1) or their habitats, **and priority research and survey efforts** needed to identify factors which may assist in restoration and improved conservation of these species

and habitats; and,

(4) **Descriptions of conservation actions** proposed to conserve the identified species and habitats and priorities for implementing such actions; and,

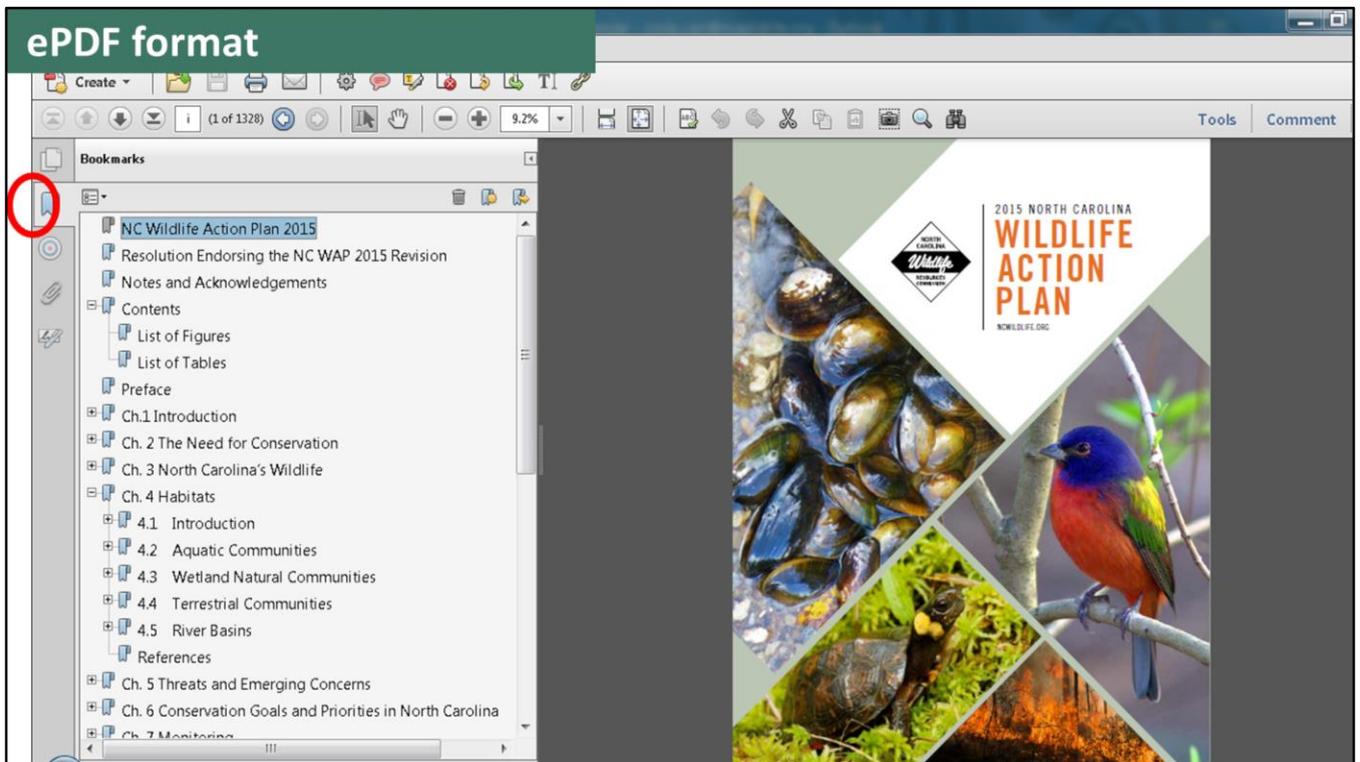
(5) **Proposed plans for monitoring** species identified in (1) and their habitats, for monitoring the effectiveness of the conservation actions proposed in (4), and for adapting these conservation actions to respond appropriately to new information or changing conditions; and,

(6) **Descriptions of procedures to review the plan** at intervals not to exceed ten years; and,

(7) Plans for **coordinating the development, implementation, review, and revision of the plan with federal, state, and local agencies and Indian tribes** that manage significant land and water areas within the state or administer programs that significantly affect the conservation of identified species and habitats.

(8) **Broad public participation** is an essential element of developing and implementing these plans, the projects that are carried out while these plans are developed, and the species in greatest need of conservation.

The NCWAP content addresses these eight required elements outlined in federal guidance from the USFWS. Chapter 1 Section 1.3.3 (see page 4) outlines the organization and format for the 2015 Plan. Table 1.1, found on page 6, provides a roadmap to where these elements are addressed in both the 2005 original and the 2015 revised Plans.



The 2015 NCWAP was developed as an ePDF publication, meaning the document contains active navigation links to both internal and external content.

Clicking on the Bookmark feature in Adobe PDF opens an expandable Table of Contents that can be used to navigate through the document.

URL hyperlinks to referenced information available outside the document allows the reader to access that information provided they have internet connection.

WAP Content

Chapter 3 Species

- This chapter identifies Species of Greatest Conservation Need (SGCN) and other priority species (Required Element 1)

- Amphibians & Reptiles
- Birds
- Crayfish
- Freshwater Fish & Mussels
- Mammals
- Aquatic & Terrestrial Snails

Taxa Teams of Species Experts  Results Provide Extensive Data Sets

- Marine Species
 - Pelagic Birds
 - Insects
-  Federal Listings, Species Experts, & Conservation Plans



Chapter 3 addresses the first required element: Information about the distribution and abundance of **species** of wildlife. The NC Wildlife Resources Commission has legislative authority over several taxonomic groups of aquatic and terrestrial species.

A list of Species of Greatest Conservation Need (SGCN) was created for the taxonomic groups in the left side column. The SGCN list was developed through collaboration of Taxa Teams comprised of species specialists and experts. There were eight Taxa Teams formed for evaluation and the results of their evaluations and recommendations were reviewed using a peer-review process. Appendix C in the 2015 Plan provides more information about the members of the Teams and others involved in the revision process.

Information about the three groups in the right side box was provided by taxa specialists or gathered from relevant conservation documents (i.e., fisheries management plans, species recovery plans, joint venture conservation plans), or through recommendations provided by conservation organizations (i.e., Xerces Society, Partners In Flight).

Species of Greatest Conservation Need (SGCN)

409 Species on 2015 SGCN Lists

371 species on 2005 SGCN Lists

Taxonomic Group	Taxa Team Evaluation Results (by category*)			% SGCN of total evaluated
	Conservation Concern (SGCN)	Knowledge Gaps	Management Need	
Amphibians	49	57	42	51 %
Reptiles	43	35	21	52 %
Birds	99	78	76	35 %
Crayfishes	19	14	5	38 %
Freshwater Fishes	69	69	68	30 %
Freshwater Mussels	31	27	30	60 %
Mammals	26	28	29	25 %
Snails – Freshwater	8	3	5	12 %
Snails – Terrestrial	65	177	188	29 %
Insects – Freshwater	16	-	-	-
Insects – Terrestrial	28	-	-	-
TOTALS	409	488	464	

(*species may be included in more than one evaluation category)



The knowledge gained from implementation of the research, surveys, and monitoring recommendations outlined in the 2005 NCWAP was used during the Taxa Team evaluations.

In comparing the list of species considered to have the greatest conservation need (SGCN) from the 2005 Plan with the 2015 Plan, it appears the revised list has a higher count of species than before. In actuality the 2015 Plan added more taxonomic groups than were addressed in the original 2005 Plan. For instance, freshwater and terrestrial insect species and terrestrial snail species were not included in the 2005 Plan, but they have been added to the SGCN list in the revised Plan.

A list of all SGCN can be found in Appendix P of the 2015 NCWAP. Lists of SGCN by taxonomic groups and additional information about priority conservation actions to benefit those species, can be found in Chapter 3 of the Plan.

Taxa Team Evaluations: Ranking and Prioritization

Species Ranking Metrics - 3 Evaluation Categories

Conservation Concern:

9 metrics

- measure conservation status, both range-wide and in NC, and the expected scope and severity of 11 threats

Knowledge Gaps:

5 metrics

- measure extent of knowledge about species in NC and rank the importance of research on threat topic

Management Concerns:

6 metrics

- Evaluate the need and basis for management

Metrics are based on evaluation criteria used by others

- NatureServe Evaluation Tool
- IUCN Red List
- Millsap et al. criteria (Florida Game and Fresh Water Fish Commission)

Extensive data sets were created from the results of Taxa Team evaluations and are available for download as Excel files from the NCWAP website

<http://www.ncwildlife.org/plan>

Eight taxa teams of species experts were convened to evaluate the State's fish and wildlife species. They used ranking criteria where were divided into three topic categories during their evaluations.

1. The Conservation Concern category is designed to evaluate biological vulnerability by considering the global and regional status and trends of a species (wherever it occurs) as well as its local status (wherever it occurs in North Carolina).
 - Scores in the Conservation Concern category were used to determine Species of Greatest Conservation Need (SGCN), a central component of the NC Wildlife Action Plan.
2. The Knowledge Gaps category is similar in scope to the Research Needed classification scheme outlined in the International Union for Conservation of Nature (IUCN) Red List Categories and Criteria.
 - This category was developed to identify and prioritize survey, monitoring, and research needs of species in North Carolina.
3. The Management Concerns category was used to identify and highlight population sustainability issues and areas where management action may be needed to mitigate impacts on both game and nongame species.
 - Priority ranking can be used to inform conservation priorities for game species, such as harvest limits, land management activities, and species management activities.

Each of the 20 ranking metrics applied during the Taxa Team evaluations used an empirical scale with assigned scoring. An internet based application collected Taxa Team evaluation responses and scores were calculated and averaged in the database. Taxa Teams used quartile thresholds as the ranking limit for prioritization and designation of SGCN. An extensive dataset of the evaluation results are provided in Appendix G and can be downloaded from the NCWAP web page www.ncwildlife.org/plan as Excel workbooks.

CONSERVATION CONCERN			
Metric	Explanation		Scale
1. Conservation Protection Status	What is the current conservation protection status? <ul style="list-style-type: none"> This information will be provided and reviewers will not need to make a selection. 	10 8 6 4 1 0	(a) Federal and State Listed as Endangered (E) or Threatened (T) (b) State Listed Endangered (E) (c) State Listed Threatened (T) (d) Federal Candidate Species (C) (e) State Special Concern (SC) (f) None
2. Range-Wide Population Size	What is the estimated number of adults within the species' range?	10 10 9 8 8 6 2 0	(a) 1 – 50 individuals (b) 50 - 250 individuals (c) 250 - 1,000 individuals (d) 1,000 - 2,500 individuals (e) 2,500 - 10,000 individuals (f) 10,000 - 100,000 individuals (g) 100,000 - 1,000,000 individuals (h) >1,000,000 individuals
3. Range Size (Global, Regional)	What is the estimated area of distribution (range size)? <ul style="list-style-type: none"> North Carolina has 125,919.81 km² 	10 9 8 7 6 4 2 0 1	(a) < 100 km ² (< about 40 mi ²) (b) 100 - 250 km ² (c) 250-1,000 km ² (d) 1,000-5,000 km ² (e) 5,000-20,000 km ² (f) 20,000-200,000 km ² (g) 200,000-2,500,000 km ² (h) >2,500,000 km ² (i) Unknown
4. Range-wide Distribution Trend (long-term)	What is the estimated % change in area occupied by the species. <ul style="list-style-type: none"> Long-term considers the time from European settlement up to recent historical periods more than 20 years ago? 	10 9 8 7 6 4 2 0	(a) Decline of >90% (b) Decline of 80 - 90% (c) Decline of 70 - 80% (d) Decline of 50 - 70% (e) Decline of 30 - 50% (f) Decline of 10 - 30% (g) Relatively Stable (≤ 10% increase or decrease) (h) Increasing (≥ 10% increase)

This example of the Conservation Concern evaluation category evaluation metrics shows the first four metrics used by the Taxa Teams. These metrics evaluate a species status wherever they occur, not just in North Carolina.

The 20 metrics that make up the evaluation protocol and associated response scales are provided in a “cheat sheet” included in the Excel workbooks that can be downloaded from the NCWAP web page (by taxonomic group in Appendix G).

Assigned scores that correspond to each metric’s scale is provided with the cheat sheet in the column to the left of the scale. To reduce evaluation bias by Taxa Team members, the scores were automatically calculated and averaged in a separate process and results were reviewed after all evaluations were completed.

CONSERVATION CONCERN			
Metric	Explanation		Scale
5. NC Population Size	What is the estimated number of adults within North Carolina?	10 10 9 8 8 6 2 0	(a) 1 – 50 individuals (b) 50 - 250 individuals (c) 250 - 1,000 individuals (d) 1,000 - 2,500 individuals (e) 2,500 - 10,000 individuals (f) 10,000 - 100,000 individuals (g) 100,000 - 1,000,000 individuals (h) >1,000,000 individuals
6. NC Range Size	What is the estimated range size for the species in North Carolina? <ul style="list-style-type: none"> If a species has distinct breeding and non-breeding ranges in NC, use the smaller range to determine a score. Assign scores based on the most restricted area (range) within NC over which the species is distributed (number of counties or river basins) or where it is expected to occur based on habitat availability. 	10 9 7 4 2 0	(a) 1 – 2 counties - or - 1 river basin (b) 3 – 5 counties - or - 2 river basins (c) 6 – 10 counties - or - 3 river basins (d) 11 – 25 counties - or - 4 - 6 river basins (e) 26 – 50 counties - or - 7 - 10 river basins (f) More than 50 counties (or Statewide) – or – 11 or more river basins
7. NC Population Trend (short-term)	What is the estimated short-term distribution trend for the species in North Carolina? <ul style="list-style-type: none"> Scores are assigned based on recent trends within the last 20 years that relate to the number of individuals throughout the species' range in NC Assign scores based on the most restricted area (range) within NC over which the species is distributed (number of counties or river basins) or where it is expected to occur based on habitat availability. 	10 9 8 7 6 4 2 0	(a) Decline of >90% (b) Decline of 80 - 90% (c) Decline of 70 - 80% (d) Decline of 50 - 70% (e) Decline of 30 - 50% (f) Decline of 10 - 30% (g) Relatively Stable (\leq 10% increase or decrease) (h) Increasing (\geq 10% increase)
8. NC Population Concentration	Is the species known or suspected to concentrate (or aggregate) in North Carolina?	10 8 6 4 0	(a) majority concentrates at single location or stream reach in NC (b) majority concentrates at 2 – 10 terrestrial locations or stream reaches in NC (c) majority concentrates at 11 – 25 terrestrial locations or stream reaches in NC (d) majority concentrates at > 25 terrestrial locations or stream reaches in NC (e) the species does not congregate or aggregate in NC

This example of the Conservation Concern evaluation category represents the four metrics related to species as they occur in NC.

All of the metrics and the associated ranking categories are provided in a “cheat sheet” in the Excel workbooks that can be downloaded from the NCWAP web page (by taxonomic group in Appendix G). The cheat sheet provides all 20 metrics for all three evaluation categories and the associated response scales.

MAMMALS		Conservation Concern - SGCN List	Knowledge Gap Priority List	Management Priority List	Order	Family	Population	Exotic or Nonnative?	Current North Carolina conservation protection status in North Carolina: Federal, T (a) or C (4) - purple State E (3) or T (C) or SO (a) - light blue	Federal Listing Status	State Listing Status	RANGE-WIDE		RANGE-WIDE		North Carolina	North Carolina	North Carolina	North Carolina	Known or suspected to concentrate or aggregate (or by its rarity is concentrated) in North Carolina?
Common Name (some may be provisional)	Scientific Name											Metric 1	Metric 2	Metric 3	Metric 4					
Bobcat	<i>Lynx rufus</i>			X	Carnivora	Felidae		N	f			h	h	f-g	g	f	g	e		
Eastern Cougar	<i>Puma concolor</i>				Carnivora	Felidae	Extirpat	N	f			e	g							
Striped Skunk	<i>Mephitis mephitis</i>				Carnivora	Mephitidae		N	f			h	h	g-h	g	f	g-h	e		
Eastern Spotted Skunk	<i>Spilogale putorius</i>		X		Carnivora	Mephitidae		N	f			g-h	g-h	d-e	d-e	d	c-d	e		
No. American River Otter	<i>Lontra canadensis</i>			X	Carnivora	Mustelidae		N	f			g-h	h	e-f	f-g	f	f-g	e		
Long-tailed Weasel	<i>Mustela frenata</i>				Carnivora	Mustelidae		N	f			g-h	h	g	f	e-f	g	e		
Least Weasel	<i>Mustela nivalis</i>		X		Carnivora	Mustelidae		N	f			g-h	h	g	d	c-d	g	e		
American Mink	<i>Neovison vison</i>				Carnivora	Mustelidae		N	f			g-h	h	f-g	f-g	f	f-g	e		
Common Raccoon	<i>Procyon lotor</i>			X	Carnivora	Procyonidae		N	f			h	h	g-h	g-h	f	g-h	e		
American Black Bear	<i>Ursus americanus</i>				Carnivora	Ursidae		N	f			g	h	f	f	e-f	f-g	e		
Brazilian Free-tailed Bat	<i>Tadarida brasiliensis</i>			X	Chiroptera	Molossidae		N	f			h	h	g-h	f-g	d-e	h	d-e		
Rafinesque's Big-eared Bat	<i>Corynorhinus rafinesquii</i>	X	X		Chiroptera	Vespertilionidae		N	f			f-g	f-g	f	e-f	d-e	f-g	d		
Rafinesque's Big-eared Bat	<i>Corynorhinus rafinesquii macrotis</i>	X	X		Chiroptera	Vespertilionidae	CP pop	N	e	SC		e-f	f-g	e-f	d-e	d-e	e-f	d		
Rafinesque's Big-eared Bat	<i>Corynorhinus rafinesquii rafinesquii</i>	X	X		Chiroptera	Vespertilionidae	Mtn pop	N	c	T		e-f	f-g	e-f	c-d	c-d	f-g	c-d		
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	X	X		Chiroptera	Vespertilionidae		N	f			g-h	g-h	d-e	c-d	b	f-g	b		
Virginia Big-eared Bat	<i>Corynorhinus townsendii virginianus</i>	X	X		Chiroptera	Vespertilionidae		N	a	E	E	e-f	d-e	d-e	c-d	b	f-g	b		
Big Brown Bat	<i>Eptesicus fuscus</i>				Chiroptera	Vespertilionidae		N	f			g-h	h	f-g	g-h	f	f-g	d-e		
Silver-haired Bat	<i>Lasioryctes noctivagans</i>			X	Chiroptera	Vespertilionidae		N	f			g-h	h	g	e-f	f	g	e		
Eastern Red Bat	<i>Lasiurus borealis</i>			X	Chiroptera	Vespertilionidae		N	f			g-h	h	g	g-h	f	g	e		

This is an example of the Excel worksheet with Conservation Concern category evaluation results (without scoring). The Metric responses represent both single answer results and a range of results.

For example, Metric 3 considers the estimated area of distribution (range size) for wherever each species occurs, including areas outside North Carolina.

- For migratory bird species, range size can be very large.
- For endemic salamander species, range size can be small.
- For many species we have a general idea of their range size, but uncertainty is represented by the range of metric responses such as “g-h” (as compared to a response that is only “h”).
- The alphabetical order of each response gives an indication about level of concern. For example, the cheat sheet shows that a response in the higher range (e.g., “a”) has an assigned score of 10 points. This indicates a high level of conservation concern. In comparison, responses in the lower range (e.g., “h”) may have a low score or in some cases no score at all.
- Published literature and research findings will refine our knowledge about a species and can influence future Taxa Team evaluation results.

WAP Content

Chapter 4 Habitats

- This chapter provides descriptions for important aquatic, wetland, and terrestrial natural communities found in North Carolina (Required Element 2).
 - 4 physiographic provinces/regional ecosystems
 - 17 river basins and priority 12-digit HUCs
 - 12 aquatic community types
 - 11 wetland community types
 - 17 terrestrial communities



Schafale MP. 2012. Guide to the Natural Communities of North Carolina, Fourth Approximation. North Carolina Department of Environmental and Natural Resources, NC Natural Heritage Program. 217 pp.

The second required element addresses important habitats for wildlife. North Carolina is generally considered to consist of three major physiographic provinces (or ecoregions) — Mountains, Piedmont, and Coastal Plain. These were the basis for discussion in the 2005 NCWAP.

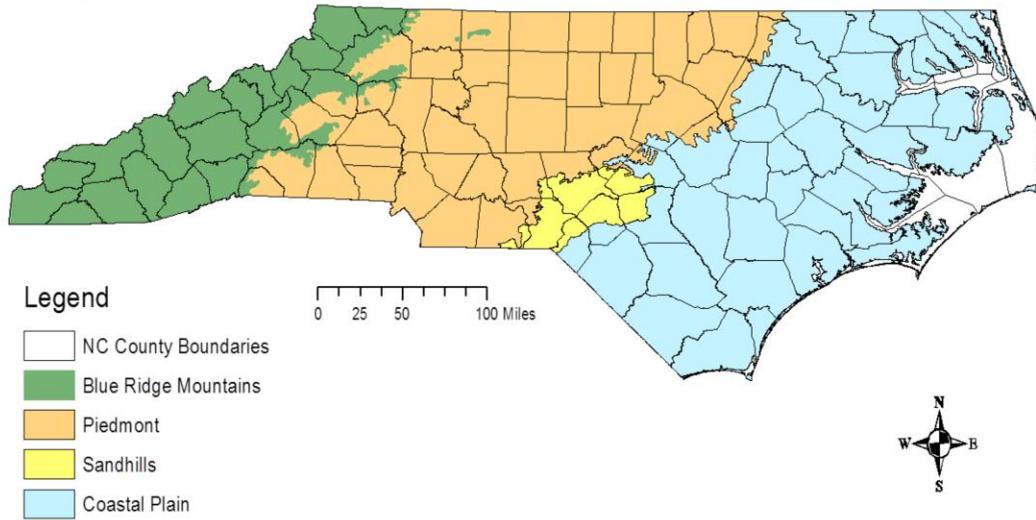
However, given the unique nature of the Sandhills ecoregion, the 2015 NCWAP includes the Sandhills as a separate ecoregion from the Coastal Plain. The boundaries are described in publications by Bailey (1995, 1998, 2009) and Omernik and Griffith (2008). The next slide provides a map showing the boundaries of the four regional ecosystems used in the NCWAP.

Chapter 4 in the 2015 Plan provides information about the State's important habitats.

- Wetland and upland terrestrial community descriptions are based on descriptions published by the NC Natural Heritage Program (Schafale and Weakley 1990; NCNHP 2010; Schafale 2012).
- Aquatic communities were described as riverine systems in the 2005 NCWAP. The 2015 Plan uses a stream classification system based on drainage area (DA) as a break for size classes, similar to those described by the Southeast Aquatic Resources Partnership (SARP) and in the Northeast Aquatic Habitat Classification System and the National Fish Habitat Framework. The 2015 NCWAP uses 12-digit Hydrologic Unit Code (HUC) boundaries to identify aquatic system priorities.

Appendix H contains a cross-walk linking species with the habitats they are associated with. The results are provided in an Excel workbook with species-habitat associations for SGCN in each of the eight taxonomic groups that were evaluated by Taxa Teams. Appendix H can be downloaded from the NCWAP web page at www.ncwildlife.org/plan.

Physiographic Provinces/Ecoregions



This ecoregion map is based on a GIS shapefile created to represent the four ecoregions described in the 2015 NCWAP.

The natural communities described in Chapter 4 of the 2015 NCWAP have been associated with these ecoregions.

Priority natural community types

Ecoregion	Community Type
Statewide	All wetlands Riparian and floodplain communities Early successional communities Rock outcrops Streams and rivers Caves and mines
Mountains	Bogs and fens Spruce–fir forests High-elevation habitats
Piedmont	Large unfragmented tracts near existing conservation holdings
Sandhills	Managed early successional landscapes
Coastal Plain	Sand, shell, and wrack shoreline (beaches) Maritime grasslands and dunes Maritime forests Coastal peatlands (pocosins) *Estuarine islands *Inlet spits

*Community descriptions for estuarine islands and inlet spits are not provided in this document; however, the estuarine islands and inlet spits are found along the state's coast and are created by natural sand deposition and by placement of dredged (spoil) materials. These habitats are important for numerous colonial waterbird, wading bird, and beach-nesting shorebird species, including many that are listed as SGCN and priority species.

Many of the state's natural community types cover large areas and are well represented, while others cover less area or may be more at risk from loss of biodiversity when considering local and regional threats (i.e., land use change, development).

Given the richness of their biodiversity, the ecosystem services they support, and the benefits they provide to wildlife (including SGCN and other priority species), certain natural community types are of higher priority for land conservation action because they are more imperiled. These are outlined in Table 4.4 in Chapter 4 of the 2015 NCWAP and are listed here.

Natural community types and ecoregion associations				
AQUATIC COMMUNITIES	Mountains	Piedmont	Sandhills	Coastal Plain
Coldwater Systems (< 20° C)	X	X		
Coolwater Systems (> 20° C, < 25° C)	X	X		
Warmwater Systems (> 25° C)	X	X	X	X
Headwaters/Small Creeks (< 40 sq.mi. DA)	X	X	X	X
Large Creeks/Small Rivers (40 – 200 sq.mi. DA)	X	X	X	X
Medium Rivers (200 – 3,800 sq.mi. DA)	X	X	X	X
Large Rivers (> 3,800 sq.mi. DA)				X
Stream Swamp Systems				X
Natural Lakes				X
Reservoirs & Impoundments	X	X	X	X
Groundwater, Springs, Subterranean Waters	X	X	X	X
Estuarine Aquatic Communities				X

Based on Southeast Aquatic Resources Partnership (SARP) and TNC stream classification framework (2013)

The 2005 WAP described riverine communities as one type and lumped all lakes and reservoirs into one description.

As previously noted, aquatic communities are based on a stream classification system that uses drainage area (DA) as a determination for size classes. The 2015 WAP provides separate descriptions for riverine systems based on these DAs and separates the natural lakes found in the CP from man-made lakes and reservoirs that are found statewide.

Aquatic communities are further defined based on summer water temperatures. Whether the seasonal and daily variation of water temperature is natural or induced by discharges into the system, the temperature will influence the composition and distribution of aquatic species in the system.

- The coldwater designation is based upon two general principles: temperature regime and fish community structure. Water temperatures typically do not exceed 20 degrees Celsius (°C) [68 degrees Fahrenheit (°F)]. For example, coldwater streams generally have a fish species composition that includes Brook, Brown, and Rainbow trout, Mottled Sculpin, Longnose and Blacknose Dace, Central Stoneroller, as well as others.
- Coolwater systems have summer temperatures that are predominantly warmer than 20°C (68°F) but typically do not exceed 25°C (76°F). Examples of coolwater fish species includes Smallmouth Bass, Rock Bass, Walleye, Muskellunge, Creek Chub, River Chub, Bluehead Chub, Fantail Darter, and Greenside Darter.

- Warmwater streams have summer temperatures that are predominantly warmer than 25°C (77°F). Examples of warmwater fish species in North Carolina include Blacknose Dace, Creek Chub, Green Sunfish, Largemouth Bass, and White Sucker.

Aquatic community descriptions and recommended priority conservation actions are provided in Chapter 4, Section 4.2.

Watersheds of large rivers are commonly referred to as basins and North Carolina uses the basin concept as a spatial framework for assessment and management of drainage systems across the state. The NC Department of Environment and Natural Resources (NCDENR) designated the boundaries for 17 major river basins in the State.

- Five river basins in the western part of the state are part of the Interior Basin and drain to the Mississippi River.
- Twelve river basins are part of the Atlantic Slope and drain to the Atlantic Ocean.

River basins descriptions and recommended priority conservation actions are provided in Chapter 4, Section 4.5.

Natural community types and ecoregion associations

WETLAND COMMUNITIES	Mountains	Piedmont	Sandhills	Coastal Plain
Bogs & Fens	X			
Estuarine Wetland Communities				X
Floodplains – Blackwater Systems			X	X
Floodplains – Brownwater Systems				X
Floodplains – Inland Systems	X	X	X	
Freshwater Tidal Wetlands				X
Nonalluvial Mineral Wetlands			X	X
Pocosins			X	X
Upland Pools & Depressions	X	X	X	X
Upland Seepages & Spray Cliffs	X	X	X	X
Wet Pine Savannas			X	X



There are several methods for characterizing wetlands that are based on dominant vegetation communities, dominant soil characteristics, or dominant hydrologic factors. One method defines them based on the relationship between hydrology, geomorphology, and function.

The wetland communities included in the 2015 NCWAP are based on descriptions by Schafale and Weakley’s 3rd Approximation (1990) and Mike Schafale’s more recent 4th approximation (2012).

Wetland community descriptions are provided in alphabetical order in Chapter 4, Sections 4.3 (see 2015 NCWAP).

Natural community types and ecoregion associations				
TERRESTRIAL COMMUNITIES	Mountains	Piedmont	Sandhills	Coastal Plain
Caves & Mines	X	X		X
Cove Forests	X			
Dry Coniferous Woodlands	X	X		
Dry Longleaf Pine Communities		X	X	X
Grass & Heath Balds	X	X		
High-elevation Cliffs & Rock Outcrops	X			
Low Elevation Flatrocks, Cliffs, & Rock Outcrops	X	X		X
Mafic Glades & Barrens	X			
Maritime Forests				X
Maritime Grasslands				X
Mesic Forests		X	X	X
Oak & Mixed Hardwood/Pine Forests and Managed Pine Timber		X	X	X
Montane Oak Forests	X			
Northern Hardwood Forests	X			
Sand, Shell, & Wrack Shorelines				X
Spruce–fir Forests	X			
Successional Communities (Herbaceous, Shrub, and Woody)	X	X	X	X

The upland terrestrial communities described in Chapter 4, Section 4.4 are based on descriptions published by the NC Natural Heritage Program in their 2010 climate vulnerability assessments, which uses descriptions found in Schafale and Weakley’s 3rd approximation (1990) and Schafale’s 4th approximation (2012).

Upland terrestrial community descriptions are generally arranged in elevational order as they occur on the landscape, beginning in the high elevations of the western Mountains and proceeding eastward toward the coast.

Upland terrestrial communities are described in Chapter 4 Section 4.4.

APPENDIX H – SGCN HABITAT ASSOCIATIONS (Terrestrial)

Habitat Associations by Ecoregion		AMPHIBIANS				Conservation Concern Priority	Knowledge Gap Priority	Management Concern Priority	Population Designation ?	FEDERAL STATUS	STATE STATUS	4.4 Terrestrial Communities							4.3 Wetland Communities				4.2.6 Gw. Springs/ Caves			4.2.7 Headwater Streams/ Small Creeks	
		Species - Habitat Associations February 2015										4.4.17 Successional Communities							4.3.5 Inland Floodplains				4.2.3 Coldwater		4.2.4 Coolwater		4.2.5 Warmwater
Mountain	Piedmont	Blue Ridge	Coastal Plain	Scientific Name	Common Name	Order	Family					4.4.9 Mesic Forests	4.4.11 Mixed Hardwood Pine Forests	Herb	Shrub	Woody	4.4.13 Sparsely Settled/ Mixed Habitats	4.4.19 Upland Pools & Depressions	4.3.3 Upland Seepages & Spray/Cliffs	4.3.5 Inland Floodplains	4.2.3 Coldwater	4.2.4 Coolwater	4.2.5 Warmwater	4.2.6 Gw. Springs/ Caves	4.2.7 Headwater Streams/ Small Creeks		
0	0	1	4	<i>Anaxyrus quercicus</i>	Oak Toad	Anura	Bufoiidae	X	X																		
0	0	1	3	<i>Hyla andersonii</i>	Pine Barrens Treefrog	Anura	Hylidae	X	X	X																	
0	12	0	0	<i>Hyla versicolor</i>	Gray Treefrog	Anura	Hylidae	X	X			X	X		X	X	X	X	X	X	X	X	X	X	X	X	
0	0	7	7	<i>Pseudacris nigrita</i>	Southern Chorus Frog	Anura	Hylidae	X	X	X																	
0	0	1	3	<i>Pseudacris ornata</i>	Ornate Chorus Frog	Anura	Hylidae	X	X																		
0	0	1	3	<i>Lithobates capito</i>	Gopher Frog	Anura	Ranidae	X	X																		
7	5	0	0	<i>Ambystoma talpoideum</i>	Mole Salamander	Caudata	Ambystomidae	X	X	X		SC	X	X			X	X			X						
0	1	1	2	<i>Ambystoma tigrinum tigrinum</i>	Eastern Tiger Salamander	Caudata	Ambystomidae	X	X			T						X									
0	14	0	0	<i>Eurycea bislineata</i>	Northern Two-Lined Salamander	Caudata	Plethodontidae	X	X				X	X		X	X	X	X	X	X	X	X	X	X	X	
0	1	0	4	<i>Eurycea quadridigitata</i>	Dwarf Salamander	Caudata	Plethodontidae	X	X	X		SC						X									
8	5	0	0	<i>Hemidactylium scutatum</i>	Four-Toed Salamander	Caudata	Plethodontidae	X	X	X		SC	X	X				X	X	X							
7	3	1	5	<i>Plethodon glutinosus</i>	Northern Slimy Salamander	Caudata	Plethodontidae	X	X				X	X							X						
7	0	0	0	<i>Plethodon wehrlei</i>	Wehrle's Salamander	Caudata	Plethodontidae	X	X	X																	
5	0	0	0	<i>Plethodon welleri</i>	Weller's Salamander	Caudata	Plethodontidae	X	X	X		FSC	SC														
0	0	0	1	<i>Necturus lewisi</i>	Neuse River Waterdog	Caudata	Proteidae	X	X			FSC	SC														
17	12	0	0	<i>Hyla chrysoscelis</i>	Cope's Gray Treefrog	Anura	Hylidae	X	X				X	X		X	X	X	X	X	X	X	X	X	X	X	
0	0	4	7	<i>Lithobates virgatipes</i>	Carpenter Frog	Anura	Ranidae	X																			

One of the primary data sets provided with the 2015 WAP is found in Appendix H. This dataset is a cross-walk that associates both terrestrial and aquatic SGCN described in Chapter 3 and natural communities (habitats) described in Chapter 4.

An Excel worksheet is provided for in Appendix H for each of the eight taxonomic groups evaluated by Taxa Teams.

This example is for terrestrial species in the Amphibian taxa group and provides association with their habitats in each of the four ecoregions. The red underline is for the Northern Slimy Salamander and shown in the example is it's association with Mesic Forests, Mixed Hardwood Pine Forests, and Inland Floodplains in the Piedmont ecoregion.

APPENDIX H – SGCN HABITAT ASSOCIATIONS (Aquatics/River Basins)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AI					
w = Mountains P = Piedmont SH = Sandhills				ALL AQUATIC SPECIES Taxa Team Review Draft Results Habitat and River Basin Associations Last Revised April 22, 2015																	Headwater Streams/ Small Creeks	Small River Systems/ Large Creeks		Medium River Systems		Large River Systems		Stream Swaps		Reservoirs & Impoundments		Natural Lakes		GW, Springs, Sebrer.		Estuarine Aquatic Communities	1	2	3	4	5		
1	M	P	S	C	Scientific Name	Common Name	SGCN Conservation Knowledge Management Priority List	Family	Pop?	Introduced or Invasive? *see notes Column BA	Federal Status	State Status	Cold	Cool	Warm	Cold	Cool	Warm	Cold	Cool	Warm	Cold	Cool	Warm	Cold	Cool	Warm	Cold	Cool	Warm	Natural Lakes	Cold	Warm	Estuarine Aquatic Communities	1	2	3	4	5				
	X				<i>Cambarus bartonii</i>	Valley River Crayfish	X	X		N			H	H		H	H																										
	X				<i>Cambarus carolinus</i>	Red Burrowing Crayfish	X			N			H	H																													
	X				<i>Cambarus caryocatus</i>	Greensboro Burrowing Crayfish	X	X	X	N		SC																															
	X				<i>Cambarus chousensisi</i>	Chauga Crayfish	X			N	FSC	SC	H	H		H	H																										
	X				<i>Cambarus dissi</i>	Carolina Ladle Crayfish		X		N							P	P																									
	X				<i>Cambarus eseechensis</i>	Grandfather Mountain Crayfish	X			N	FSC		H	H		H	H																										
	X				<i>Cambarus greggii</i>	Little Tennessee Crayfish	X			N	FSC	SC	H	H		H	H																										
	X	X			<i>Cambarus howardi</i>	Chattahoochee Crayfish		X		N			H, P			H, P	H, P																										
	X	X			<i>Cambarus hystericus</i>	Sandhills spiny crayfish		X		N						SH, CP																											
	X	X			<i>Cambarus jolisi</i>	Carolina Footfalls Crayfish		X	X	N			H	H, P		H, P	P																										
	X	X			<i>Cambarus lemai</i>	Broad River Stream Crayfish	X			N		SC	H, P	P		H, P	P																										
	X				<i>Cambarus nodosus</i>	Knotty Burrowing Crayfish	X			N						H																											
	X				<i>Cambarus parisi</i>	Hivassee Headwater Crayfish		X		N	FSC	SC	H	H																													
	X				<i>Cambarus reburus</i>	French Broad River Crayfish	X	X		N	FSC		H	H		H																											
	X	X			<i>Cambarus spicatus</i>	Broad River Spiny Crayfish	X	X		N	FSC	SC	H, P	P		H, P	P																										
	X				<i>Cambarus tuckasegee</i>	Tuckasegee stream crayfish	X			N			H	H		H	H																										
	X	X			<i>Diogenes virginensis</i>	Chowanoke Crayfish	X			N	FSC	SC				P, CP																											
	X				<i>Procambarus angulos</i>	Coastal Plain Crayfish		X	X	N						CP																											
	X				<i>Procambarus blandifolii</i>	Santee Crayfish	X	X	X	N						CP																											
	X				<i>Procambarus brazzevilli</i>	Wacoamaw Crayfish	X	X		N		SC				CP																											
	X	X			<i>Procambarus medialis</i>	Pamlico Crayfish	X	X	X	N						CP																											
	X	X			<i>Procambarus peasei</i>	Carolina Sandhills Crayfish	X	X		N						SH, CP																											
	X				<i>Procambarus plummarus</i>	Croatan Crayfish	X	X		N						CP																											

Appendix H provides species-habitat associations for both terrestrial and aquatic communities.

This example is for the associations between SGCN described in Chapter 3 and aquatic habitats and river basins described in Chapter 4.

Since aquatic communities and river basins cover a landscape continuum, the workbook also notes the ecoregion where they are found.

The cross-walk associations are provided in an Excel workbook for the eight taxonomic groups evaluated by Taxa Teams.

WAP Content

Chapter 5 Threats

- This chapter focuses on problems likely to affect fish and wildlife species or their habitats over the next 10 year planning cycle.
- The 11 threat categories in this chapter are based on the definitions and hierarchical classification scheme published by Salafsky et al. (2008) (Required Element 3).

- | | |
|---|---|
| 1. Residential & Commercial Development | 6. Human Intrusions & Disturbance |
| 2. Agriculture & Aquaculture | 7. Natural System Modifications |
| 3. Energy Production & Mining | 8. Invasive & Other Problematic Species & Genes |
| 4. Transportation & Service Corridors | 9. Pollution |
| 5. Biological Resource Use | 10. Climate Change & Severe Weather |
| | 11. Disease & Pathogens |



Salafsky N, Salzer D, Stattersfield AJ, Hilton-Taylor C, Neugarten R, Butchart SHM, Collen B, Cox N, Master LL, O'Connor S, et al. 2008. A standard lexicon for biodiversity conservation: unified classifications of threats and actions. *Conserv Biol.* [accessed 2015 July];22:897–911..

Based on best practice guide recommendation from the Association of Fish and Wildlife Agencies (AFWA) and USFWS, a list of 11 threat categories representing those most likely to impact fish and wildlife are described in Chapter 5 of the 2015 NCWAP. All states and territories that have published a Wildlife Action Plan were encouraged to use these threat categories; where used, the NCWAP can be compared with their results.

The threat categories are based on the definitions and hierarchical classification scheme published by Salafsky et al. (2008) and adopted by the IUCN Conservation Measures Partnership (IUCN 2012), with two modifications made by the Taxa Teams.

- First, the threat category covering geologic events (volcanic, earthquake, and avalanches) was eliminated based on an expectation these events will have little to no impact on wildlife in North Carolina over the 10-year planning horizon represented by this Plan. This category was replaced with disease and pathogens as the focus (next bullet).
- Second, disease and pathogens are addressed as a separate threat category because of the serious threat they pose to fish and wildlife and ecosystems. This category was added instead of considering this topic as a subset of Section 5.10 Invasive and Other Problematic Genes.

Metric 9		Explanation						
SCOPE	(a) Pervasive – Affects all or most (71-100%) of the total population or occurrences							
	(b) Large – Affects much (31-70%) of the total population or occurrences							
	(c) Restricted – Affects some (11-30%) of the total population or occurrences							
	(d) Small – Affects a small (1-10%) proportion of the total population or occurrences							
	(e) Unknown – There is insufficient information to determine the scope of threats							
	(f) None							
SEVERITY	(a) Extreme – Likely to destroy or eliminate occurrences, or reduce the population 71-100%							
	(b) Serious – Likely to seriously degrade/reduce affected occurrences or habitat or reduce the population 31-70%							
	(c) Moderate – Likely to moderately degrade/reduce affected occurrences or habitat or reduce the population 11-30%							
	(d) Slight – Likely to only slightly degrade/reduce affected occurrences or habitat, or reduce the population 1-10%							
	(e) Unknown – There is insufficient information to determine the severity of threats							
	(f) None							
		Scope					Very High = 10 points High = 8 – 9 points Medium = 5 – 7 points Low = 1 – 4 points	 
		Pervasive	Large	Restricted	Small	Unknown		
	Extreme	Very High	High	Medium	Low	Medium		
	Serious	High	High	Medium	Low	Medium		
	Moderate	Medium	Medium	Low	Low	Low		
	Slight	Low	Low	Low	Low	Low		
Unknown	Medium	Medium	Low	Low				
							 	

Using recommendations to the states and territories from AFWA for best practices in revising wildlife action plans, the NCWAP Taxa Teams evaluated threats applying the 11 categories described previously. To evaluate threats as a conservation concern, Taxa Teams applied Metric 9 to gauge the scope and severity of the threat impacts to fish and wildlife as part of the evaluation process.

The scope and severity descriptions are based on the scales outlined in NatureServe’s evaluation assessment report.

Results were calculated using a Bayesian network analysis of the relationship between a threat’s expected scope and its expected severity. A score was assigned to each of these risk categories and the final threats score reflected a calculated average for each threat category.

The relationship between scope and severity of the impact was used to assign an overall risk category of very high, high, medium, low, or not a threat.

Metric 9 results were incorporated in the discussion about threats without additional analysis beyond Taxa Team consideration. A next step is future analysis of these results, with consideration to include applicable results from published research in peer-reviewed publications.

APPENDIX G – THREAT ASSESSMENT RESULTS, SCOPE & SEVERITY

AMPHIBIANS Taxa Team Evaluation Results		Conservation Priority - SGCN	Knowledge Gap Research Priority	Management Concern or Management Need	Order	Family	Population	Exotic? Non-native?	VERY HIGH		HIGH		MEDIUM		LOW		SCOPE														
																					(a) Extensive Affects all or most (71-100%) of the total population or occurrences (b) Large Affects much (31-70%) of the total population or occurrences (c) Restricted Affects some (11-30%) of the total population or occurrences (d) Small Affects a small (1-10%) proportion of the total population or occurrences (e) Unknown There is insufficient information to determine the scope of threats (f) None										
										9.01 Residential and commercial development		9.02 Agriculture and Aquaculture		9.03 Energy production and mining		9.04 Transportation and service corridors		9.05 Biological resource use													
Common Name	Scientific Name								(a) Scope	(b) Severity	3.01	(a) Scope	(b) Severity	3.02	(a) Scope	(b) Severity	3.03	(a) Scope	(b) Severity	3.04	(a) Scope	(b) Severity	3.05								
Northern Cricket Frog	<i>Acris crepitans</i>				Anura	Hylidae	N		b - c	c - d	3	b - d	d	3	c - f	d - f	3	b - f	d - f	3	d - f	d - f	2								
Southern Cricket Frog	<i>Acris gryllus</i>				Anura	Hylidae	N		c	c	3	d	d	3	f	f	0	f	f	0	f	f	0								
Mabee's Salamander	<i>Ambystoma mabeei</i>	X	X	X	Caudata	Ambystomatidae	N	a - b	b - c	7	c - e	c - e	3	c - e	c - e	3	a - c	a - c	8	d - e	d - e	2									
Spotted Salamander	<i>Ambystoma maculatum</i>		X	X	Caudata	Ambystomatidae	N	a - d	b - d	6	c - e	c - e	3	c - e	c - e	3	b - d	b - d	5	d - e	d - e	2									
Marbled Salamander	<i>Ambystoma opacum</i>		X	X	Caudata	Ambystomatidae	N	a - d	b - d	6	c - e	c - e	3	c - e	c - e	3	b - d	b - d	5	d - e	d - e	2									
Mole Salamander	<i>Ambystoma talpoideum</i>	X	X	X	Caudata	Ambystomatidae	N	a - b	b - c	7	c - e	c - e	3	c - e	c - e	3	a - c	b - c	7	d - e	d - e	2									
Eastern Tiger Salamander	<i>Ambystoma tigrinum tigrinum</i>	X		X	Caudata	Ambystomatidae	N	a - b	b	8	b - e	b - e	3	a - e	b - e	4	a - b	a - b	9	d - e	d - e	2									
Two-toed Amphiuma	<i>Amphiuma means</i>		X		Caudata	Amphiumidae	N	d	d - f	3	d	d	3	d - e	d - e	2	d - e	d - e	2	d - f	d - f	2									
Eastern American Toad	<i>Bufo [Anaxyrus] a. americanus</i>			X	Anura	Bufo	N	b - d	c - d	3	b - d	c - d	3	c - d	d	3	b - d	c - d	3	d - e	d - e	2									
Fowler's Toad	<i>Bufo [Anaxyrus] fowleri</i>			X	Anura	Bufo	N	b - d	c - d	3	b - d	c - d	3	c - d	d	3	b - d	c - d	3	d - e	d - e	2									
Southern Toad	<i>Bufo [Anaxyrus] terrestris</i>			X	Anura	Bufo	N	d	d	3	d	d	3	d	d	3	d	d	3	d	d	3									
Green Salamander	<i>Aneides aeneus</i>	X		X	Caudata	Plethodontidae	N	b	b	8	b	b	8	d	d	3	b	b	8	e	e	1									
Oak Toad	<i>Bufo [Anaxyrus] quercicus</i>	X		X	Anura	Bufo	N	d	d	3	d	c	3	d	d	3	d	d	3	d	d	3									
Eastern Hellbender	<i>Cryptobranchus a. allaganiensis</i>	X		X	Caudata	Cryptobranchidae	N	b - c	c	4	b - c	c	4	d	c - d	3	c - e	c - e	3	b - d	b - d	5									
Seepage Salamander	<i>Desmognathus aeneus</i>	X	X		Caudata	Plethodontidae	N	c	c	3	b	b	8	d	d	3	c	c	3	d	d	3									

This example from Appendix G for Freshwater Fishes shows the Excel workbook with Metric 9 results considering the expected impact (scope and severity) of the 11 threat categories for each species.

Similar to the other metrics used in the evaluation, there is an answer scale for measuring scope and severity. The alphabetical order of each response gives an indication about level of concern.

For example, the cheat sheet shows that a response in the higher range (e.g., “a”) indicates higher concerns and is therefore scored higher. In comparison, responses in the lower range (e.g., “e” or “f”) are of low concern and may have a low score or no score at all.

Results that have a range of scores (e.g., “b – d”) indicates there is uncertainty and the Taxa Team evaluation results indicate an expected range of impacts. Research results can be used to answer questions about how a species will be impacted and can influence future evaluation results.

APPENDIX G – THREAT ASSESSMENT RESULTS, SCOPE & SEVERITY

AMPHIBIANS Taxa Team Evaluation Results		Conservation Priority - SGCN	Knowledge Gap - Research Priority	Management Concern or Need	Order	Family	Population	Exotic? Non-native?	VERY HIGH	HIGH	SCOPE			SEVERITY					
MEDIUM	LOW								(a) Extralim.	(b) Large	(c) Restricted	(a) Extreme	(b) Serious	(c) Moderate					
Common Name	Scientific Name							Residential and commercial development	Agriculture and Aquaculture	Energy production and mining	Transportation and service corridors	Biological resource use	Human intrusions and disturbance	Natural system modifications	Invasive, other problematic species and genes	Pollution	Climate change and severe weather	Disease and pathogens	
								9.01	9.02	9.03	9.04	9.05	9.06	9.07	9.08	9.09	9.10	9.11	
Southern Cricket Frog	<i>Acris gryllus</i>				Anura	Hylidae		N	3	3	0	0	0	3	1	3	1	1	
Mabee's Salamander	<i>Ambystoma mabeei</i>	X	X	X	Caudata	Ambystomatidae		N	7	3	3	8	2	3	7	3	3	6	3
Spotted Salamander	<i>Ambystoma maculatum</i>		X	X	Caudata	Ambystomatidae		N	6	3	3	5	2	3	5	2	3	3	3
Marbled Salamander	<i>Ambystoma opacum</i>		X	X	Caudata	Ambystomatidae		N	6	3	3	5	2	3	5	3	3	3	3
Mole Salamander	<i>Ambystoma talpoideum</i>	X	X	X	Caudata	Ambystomatidae		N	7	3	3	7	2	3	7	2	3	3	1
Eastern Tiger Salamander	<i>Ambystoma tigrinum tigrinum</i>	X		X	Caudata	Ambystomatidae		N	8	3	4	9	2	3	7	3	3	6	3
Green Salamander	<i>Aneides aeneus</i>	X		X	Caudata	Plethodontidae		N	8	8	3	8	1	5	3	1	3	8	1
Oak Toad	<i>Bufo [Anaxyrus] quercicus</i>	X		X	Anura	Bufo		N	3	3	3	3	3	0	3	0	1	1	1
Eastern Hellbender	<i>Cryptobranchus a. allaganiensis</i>	X		X	Caudata	Cryptobranchidae		N	4	4	3	3	5	3	3	1	6	7	3
Red Salamander	<i>Pseudotriton ruber</i>		X		Caudata	Plethodontidae		N	8	8	3	3	3	8	8	1	8	3	1
Carolina Gopher Frog	<i>Rana [Lithobates] capito</i>	X		X	Anura	Ranidae		N	8	3	8	8	3	3	10	1	3	10	8
Wood Frog	<i>Rana sylvatica pop.3 [Lithobates sylvaticus]</i>	X	X	X	Anura	Ranidae	CP pop.	N	3	3	3	8	3	3	3	3	3	10	1
Eastern Spadefoot	<i>Scaphiopus holbrookii</i>		X		Anura	Scaphiopodidae		N	3	3	3	3	3	3	1	3	3	3	1
Eastern Lesser Siren	<i>Siren intermedia intermedia</i>	X	X		Caudata	Sirenidae		N	4	5	3	3	5	3	5	5	8	5	5

This example from Appendix G for Amphibians shows the results for Metric 9 with the columns hidden and only the Bayesian network results are shown.

Colors were used to correspond with the level of anticipated impact and make it easier to do a quick visual review to identify which threats and which species have the highest level of concern.

14. Threats Assessment – Knowledge Gaps (research priorities)	<p>Rank each of the 11 threat categories on a scale of 1 – 11 depending on the expected likelihood it will impact the species over the next 10 years and there is a knowledge gap indicating a need for research.</p> <ul style="list-style-type: none"> Consider how likely each threat category is to contribute to the extinction risk for a species over the next 10-year planning horizon 1 – 4 = LOW ->.....5 - 8 MEDIUM->.....-> 9 - 11 = HIGH
14.1	Residential & commercial development
14.2	Agriculture & aquaculture
14.3	Energy production & mining
14.4	Transportation & service corridors
14.5	Biological resource use
14.6	Human intrusions & disturbance
14.7	Natural system modifications
14.8	Invasive & other problematic species & genes
14.9	Pollution
14.10	Climate change & severe weather
14.11	Disease & pathogens



It is unrealistic to assign maximum levels of concern to all threats because there are not adequate resources to address them and it would not be feasible to conduct research on all of the topics.

To evaluate threats using the Knowledge Gap evaluation category, Taxa Team members applied Metric 14 to independently prioritize each of the 11 threat categories for importance as a research topic for each species.

The evaluation results were then reported using a scale of ‘high, medium, or low.’

APPENDIX G – THREAT ASSESSMENT RESULTS, RESEARCH PRIORITIES

AMPHIBIANS Taxa Team Evaluation Results		Conservation Priority - SGCN	Knowledge Gap - Research Priority	Management Concern or Need	Order	Family	Population	Exotic? Non-native?	Level of knowledge about statewide distribution	Status of monitoring statewide population trends	Level of knowledge about factors that affect a species' population size or distribution in NC	Level of knowledge about the species' population size in NC	Importance of the threat category as a research topic for a species:										
Common Name	Scientific Name												Metric 10	Metric 11	Metric 12	Metric 13	14.1	14.2	14.3	14.4	14.5	14.6	14.7
Southern Cricket Frog	<i>Acris gryllus</i>				Anura	Hyllidae		N	b - c	c	c	a - b	2	1	1	6	2	2	9	5	4	4	2
Mabee's Salamander	<i>Ambystoma mabeei</i>	X	X	X	Caudata	Ambystomatidae		N	b	c	b - c	a - b	8	7	5	9	2	2	6	3	6	9	7
Spotted Salamander	<i>Ambystoma maculatum</i>		X	X	Caudata	Ambystomatidae		N	b - c	b - c	b - c	a - b	8	7	5	9	2	2	6	3	6	8	7
Marbled Salamander	<i>Ambystoma opacum</i>		X	X	Caudata	Ambystomatidae		N	b	b - c	b - c	a - b	8	7	5	9	2	2	6	3	6	8	7
Mole Salamander	<i>Ambystoma talpoideum</i>	X	X	X	Caudata	Ambystomatidae		N	a - b	b - c	b	a - b	8	7	5	9	2	2	6	3	6	8	7
Eastern Tiger Salamander	<i>Ambystoma tigrinum tigrinum</i>	X		X	Caudata	Ambystomatidae		N	b	b - c	b - c	b - c	8	7	5	9	2	2	6	3	6	9	7
Green Salamander	<i>Aneides aeneus</i>	X		X	Caudata	Plethodontidae		N	b	c - d	c	b	11	8	3	10	9	7	11	1	5	10	5
Oak Toad	<i>Bufo [Anaxyrus] quercicus</i>	X		X	Anura	Bufonidae		N	b - c	c	b - c	a - b					2	1	4	1	2	3	2
Eastern Hellbender	<i>Cryptobranchus a. allaganiensis</i>	X		X	Caudata	Cryptobranchidae		N	b	c - d	c	b	4	6	6	2	8	8	9	4	4	6	4
Red Salamander	<i>Pseudotriton ruber</i>		X	X	Caudata	Plethodontidae		N	b - c	b	c	a - b	11	10	9	10						9	5
Carolina Gopher Frog	<i>Rana [Lithobates] capito</i>	X		X	Anura	Ranidae		N	b	c - d	c	b - c	9	5	7	8	1	3	11	4	2	10	6
Wood Frog	<i>Rana sylvatica pop.3 [Lithobates sylvaticus]</i>	X	X	X	Anura	Ranidae	CP pop.	N	b	a - b	b	a - b	5	5	5	9	1	1	1	1	5	10	11
Eastern Spadefoot	<i>Scaphiopus holbrookii</i>		X	X	Anura	Scaphiopodidae		N	b	c	b - c	a - b	11	8	5	5	10	4	11	1	7	6	9
Eastern Lesser Siren	<i>Siren intermedia intermedia</i>	X	X	X	Caudata	Sirenidae		N	b	a - b	b	a - b	5	5	5	9	1	1	1	1	5	10	11

This example from Appendix G for Amphibians shows the results for Metric 14.

Colors were used to correspond to the priority ranking for importance as a research topic.

As with the results from Metric 9, the color association makes it easier to do a quick visual review to identify which threats have the greatest need for research for the species.

WAP Content

References – Additional Information and Datasets

Appendixes

- G: Taxa Team Evaluation Results
(Conservation Concern, Knowledge Gaps, and Management Needs)
- H: SGCN Habitat Associations
- I: Map of North American Bird Conservation Initiative Areas
- J: Priority 12-Digit HUCs by River Basin (+ GIS layers)
- N: List of Federal Endangered Species Recovery Plans
- P: List of SGCN by Taxonomic Group
(Amphibians, Birds, Crayfishes, FW Fishes, FW Mussels, Insects, Mammals, Reptiles, Snails)



Several important datasets were developed from the results of the Taxa Team evaluations and are provided as appendixes in the 2015 NCWAP. The appendixes also include other types of information that can be useful when considering where conservation need is high.

This list includes the datasets that can be downloaded from the 2015 NCWAP web page www.ncwildlife.org/plan.

North Carolina Wildlife Resources Commission

www.ncwildlife.org/plan

Licensing **Conserving** Hunting Trapping Fishing Boating Learning Outdoor Activities About Contacts News Blog Careers Store

North Carolina's Wildlife Action Plan (NCWAP) is a comprehensive planning tool developed by the N.C. Wildlife Resources Commission to help conserve and enhance the state's full array of fish and wildlife species and their habitats. It was developed in cooperation with numerous partners, including federal and state agencies, conservation organizations, and stakeholders. The N.C. Wildlife Resources Commission received approval from the U.S. Fish & Wildlife Service for the comprehensive revision of the N.C. Wildlife Action Plan on March 30, 2016.

The 2015 Wildlife Action Plan is available to view online as an ePDF document and can be downloaded using the links provided below. The original 2005 Plan can also be downloaded as a PDF from a link provided below.

Click on the links below to learn more about Species of Greatest Conservation Need (SGCN) or to download North Carolina's WAP.

- New (April/May 2017):** click on the [Decision Support Tools for Conservation Opportunity Areas \(COA\) and Threat Assessment](#) tab below to find out more about these two new web-based tools that support priority conservation recommendations in the 2015 NCWAP.
- New (10/2016):** click on the [2015 Downloads](#) tab below to download ArcGIS shapefile data representing statewide 12-digit hydrologic unit code (HUC) priorities.

This is the NCWAP web site at www.ncwildlife.org/plan. Shown is the top portion of the web page. The next slide shows the bottom of the web page.

The NCWAP can be reached from the Agency's home page by navigating from the "Conserving" menu found at the top of the web page (circled in red).

The screenshot shows the website for the North Carolina Wildlife Resources Commission. The header includes the logo, the URL www.ncwildlife.org/plan, a search bar, and social media icons. A navigation menu at the top lists various categories, with "Conserving" highlighted by a red circle. Below the navigation is the "Wildlife Action Plan" section, which contains several expandable tabs: "Introduction", "Decision Support Tools for Conservation Opportunity Areas (COA) and Threats Assessment", "2015 Document Downloads", "2005 Document Downloads", "Implementation", and "River Basins and Aquatic Habitats". Below the tabs is an "FAQs" section with text explaining the State Wildlife Grants (SWG) program and the requirements for the Wildlife Action Plan.

This is the NCWAP web site at www.ncwildlife.org/plan. Shown is the bottom portion of the web page material.

Clicking on the tabs will expand the section where more information is provided.

The “2015 Document Downloads” tab provides several links to download the ePDF version of the 2015 NCWAP as well as the Excel files representing datasets provided in the appendixes.

This tab also provides a link to download ArcGIS shapefiles and an ArcMap package containing the priority HUC12s for the 17 river basins of the state. These are described in Chapter 4 Section 4.5 of the NCWAP.

Cindy Simpson

Wildlife Action Plan Coordinator
cindy.carr@ncwildlife.org

NC Wildlife Resources Commission

1721 Mail Service Center
Raleigh, NC 27699-1721

office: 919-707-0227

fax: 919-707-0028

www.ncwildlife.org/plan



Contact information and web page address for the 2015 NCWAP.