

# 5. Accomack-Northampton Planning Region Local Action Plan Summary

## WILDLIFE ACTION PLAN AND LOCAL SUMMARIES OVERVIEW

### *Wildlife Action Plan*

Virginia is fortunate to contain a wide variety of natural resources and landscapes that provide Virginians with a range of benefits, services, and economic opportunities. Natural resource conservation in Virginia, as in most states, is implemented by government agencies, non-governmental organizations, private institutions, academic institutions, and private citizens. These groups work to enhance the quality of life within the Commonwealth by conserving Virginia's air, land, water, and wildlife. Adequate funding and human capital needed to manage and conserve these valuable resources are not always available. In 2005, Virginia's conservation community first came together to maximize the benefits of their actions and created the state's first Wildlife Action Plan (Action Plan). It was written to prioritize and focus conservation efforts to prevent species from declining to the point where they become threatened or endangered (DGIF 2005). The 2015 Action Plan is an update of the original Plan. The Action Plan must address eight specific elements mandated by Congress. They are:

- 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 determined to be necessary 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-Strategy at intervals not to exceed ten years; and*
- 7. Plans for coordinating, to the extent feasible, the development, implementation, review, and revision of the Plan-Strategy 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. Congress has affirmed through Wildlife and Conservation Restoration Program (WCRP) and State Wildlife Grants (SWG), that broad public participation is an essential element of developing and implementing these Plans-Strategies, the projects that are carried out while these Plans-Strategies are developed, and the Species in Greatest Need of Conservation (SGCN) that Congress has indicated such programs and projects are intended to emphasize.*

Each species included in the 2015 Action Plan (Species of Greatest Conservation Need or SGCN) has been evaluated and prioritized based upon two criteria: degree of imperilment and management opportunity.

To describe imperilment, SGCN are grouped into one of four Tiers: Critical (Tier I), Very High (Tier II), High (Tier III), and Moderate (Tier IV).

***Tier I - Critical Conservation Need.*** *Species face an extremely high risk of extinction or extirpation. Populations of these species are at critically low levels, face immediate threat(s), and/or occur within an extremely limited range. Intense and immediate management action is needed.*

***Tier II - Very High Conservation Need.*** *Species have a high risk of extinction or extirpation. Populations of these species are at very low levels, face real threat(s), and/or occur within a very limited distribution. Immediate management is needed for stabilization and recovery.*

***Tier III - High Conservation Need.*** *Extinction or extirpation is possible. Populations of these species are in decline, have declined to low levels, and/or are restricted in range. Management action is needed to stabilize or increase populations.*

***Tier IV - Moderate Conservation Need.*** *The species may be rare in parts of its range, particularly on the periphery. Populations of these species have demonstrated a declining trend or a declining trend is suspected which, if continued, is likely to qualify this species for a higher tier in the foreseeable future. Long-term planning is necessary to stabilize or increase populations.*

While degree of imperilment is an important consideration, it is often insufficient to prioritize the use of limited human and financial resources. In order to identify and triage conservation opportunities, development of the updated Action Plan (2015) included assigning a Conservation Opportunity Ranking to each species identified within the Plan. The rankings were assigned with input from taxa or species experts (biologists) and other members of Virginia's conservation community. Rankings also are based on conservation or management actions and research needs identified for the species within the 2005 Action Plan. In addition, a literature review was conducted to garner any new information available since the first version of the Action Plan. The three Conservation Opportunity Rankings are described as follows:

*A – Managers have identified “on the ground” species or habitat management strategies expected to benefit the species; at least some of which can be implemented with existing resources and are expected to have a reasonable chance of improving the species’ conservation status.*

*B – Managers have only identified research needs for the species or managers have only identified “on the ground” conservation actions that cannot be implemented due to lack of personnel, funding, or other circumstance.*

*C – Managers have failed to identify “on the ground” actions or research needs that could benefit this species or its habitat, or all identified conservation opportunities for a species have been exhausted.*

Over 880 SGCN are listed in the 2015 Action Plan and found in varying densities across the state (Figure 1). Of the Plan’s SGCN, 23.4 percent are classified as Conservation Opportunity Ranking A, 7.1 percent are classified Conservation Opportunity Ranking B; and 69.5 percent are classified as Conservation Opportunity Ranking C. Additionally, of the 883 SGCN:

- Approximately 25% of the SGCN are already listed as threatened or endangered under the Federal or Virginia Endangered Species Act,
- Approximately 60% are aquatic,
- Approximately 70% are invertebrates, and
- All are impacted by the loss or degradation of their habitats.

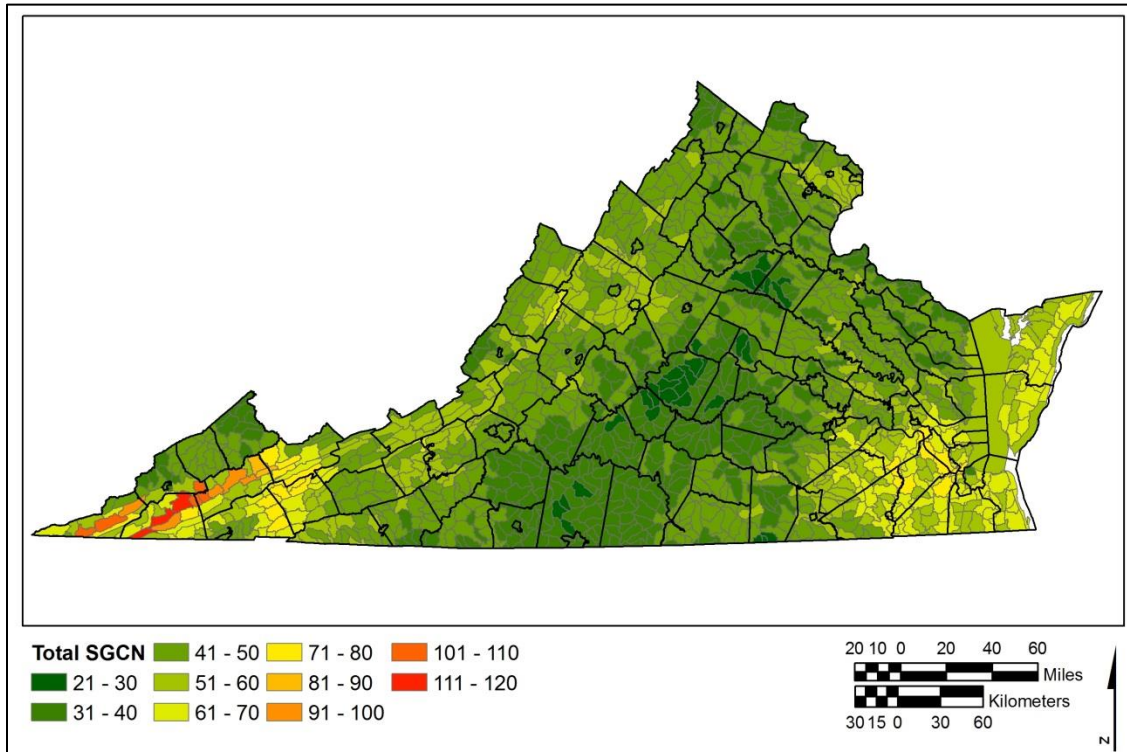


Figure 1. State Distribution of Species of Greatest Conservation Need by HUC12 Watersheds.

## *Wildlife Action Plan Implementation*

Since its creation, the Action Plan has helped Virginia acquire over \$17 million in new conservation funding through the State Wildlife Grants Program. These resources have been used to implement significant research, advance species recovery efforts via captive propagation, and restore and conserve important wildlife habitats. Despite these successes, many conservation practitioners feel the original Action Plan never reached its full potential. One common concern is that it failed to focus at the habitat level where the needs of many species could be addressed at once. Further, many partners indicated the original Action Plan did not provide sufficient details to help prioritize conservation needs and opportunities at a local scale, where many land use decisions are made, and conservation efforts are implemented. Lacking these local insights, it was often difficult for agencies, municipalities, organizations, academic institutions, and landowners to identify and focus on the highest priority wildlife conservation opportunities for their geographic area. To address this concern and make the Action Plan more user-friendly and relevant at a finer scale, this version (2015) of the Action Plan was developed to include locally-based summaries. These summaries identify species that are local priorities, habitats required to conserve those species, regional threats impacting species and habitats, and priority conservation actions that can be taken to address those threats. The goal of these summaries is to facilitate and benefit the work of local governments, conservation groups, landowners, and other members of the conservation community who wish to support wildlife conservation within their regions.

### *Local Action Plan Summaries*

In creating the updated Action Plan, the Virginia Department of Game and Inland Fisheries (DGIF) adopted a model developed by the Virginia Department of Conservation and Recreation (DCR) for the Virginia Outdoors Plan. The Virginia Outdoors Plan describes recreational resource issues for 21 multi-county Recreational Planning Regions. Each Recreational Planning Region is roughly analogous to one of Virginia's 21 local Planning District Commissions (PDC). The PDCs are voluntary associations of local governments intended to foster intergovernmental cooperation by bringing together local officials, agency staff, the public, and partners to discuss common needs and develop solutions to regional issues. With its focus on local-scale actions, the Virginia Outdoors Plan has become an important tool for identifying and addressing local recreational issues. This DCR model was adapted and used in this Action Plan to address wildlife and habitat issues for the benefit of planning region residents. More broadly, the new Action Plan's Local Action Plan Summaries (Local Summaries) create a framework that Virginia's diverse conservation community can use to identify issues and locations of mutual conservation interest, enhance collaborative opportunities, develop new conservation resources, and craft "win-win" situations that can be beneficial for both the people and wildlife of Virginia.

## ACCOMACK-NORTHAMPTON LOCAL PLANNING REGION SUMMARY OVERVIEW

The Accomack-Northampton Planning Region consists of 1,356,989 acres (2,120 square miles) and includes Accomack and Northampton counties and the town of Chincoteague. There are no large population centers within this planning region, and human populations are relatively low compared to other portions of the state (e.g., Accomack County has approximately 33,000 residents, and Northampton County has approximately 12,000 residents per the 2010 census) (U.S. Census Bureau 2015). However, the region's human population is expected to grow by 30 percent over the next 20 years (VIMS 2013).

Less developed and more rural areas often provide a diversity of valuable wildlife habitats, which can be degraded or lost as human populations grow. This planning region is especially important to the conservation of countless bird species that migrate to or through this area as part of their annual cycles. Examples include the American black duck, the American oystercatcher, the willet, and scores of other shorebirds, waterbirds, waterfowl, song birds, and raptors. Virginia's Eastern Shore is also home to several species that are not found in any other part of Virginia, such as the New Jersey chorus frog and the Delmarva fox squirrel. Additionally, this planning region contains some of the best remaining examples of rare maritime forest habitats in Virginia. It also includes a variety of other habitats: mature mixed hardwood forests, young forests, retired agricultural land, tidal wetlands, tidally influenced streams and riparian habitats, beaches and dunes and mudflats, and marine habitats (Figure 2).

In developing conservation actions for habitats and priority species within this planning region, a number of factors must be considered to determine how limited resources can be allocated to best effect. A project's likely impact and probability of success, the effectiveness of historic and ongoing conservation actions, as well as logistical, economic, and political factors all influence the selection and prioritization of conservation actions. Virginia's Wildlife Action Plan advocates a proactive approach that focuses conservation resources to manage species before they become critically imperiled and to implement projects that can simultaneously benefit multiple species and human communities. These factors were considered during the development of the conservation actions included in the following sections as well as in analyzing the existing threats facing SGCN and their habitats. Threats and conservation actions are organized based on the habitat types found within this planning region upon which priority SGCN depend.

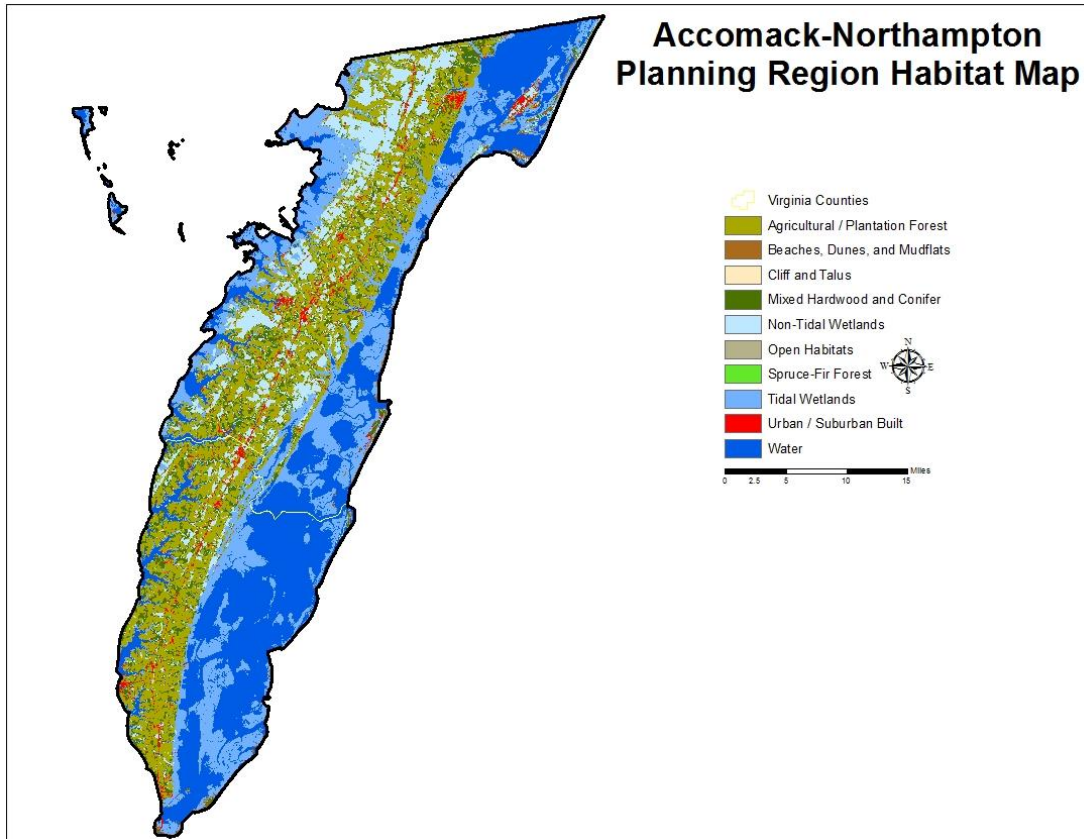


Figure 2. Accomack Northampton Planning Region Habitats (Anderson et al. 2013).

### *Priority Species of Greatest Conservation Need*

Of Virginia’s 883 SGCN, 79 are believed to either occur, or have recently occurred, within the Accomack Northampton Planning Region (Appendix A). Of these 79 species, **67 SGCN are dependent upon habitats provided within the Accomack Northampton Planning Region. These species constitute the priority SGCN for the planning region (Table 2).** A summary of SGCN Tier and Conservation Opportunity Rankings is provided in Table 1, while Figure 3 demonstrates the density of the 67 priority species within this planning region.

Priority SGCNs within this Local Summary include species for which this planning region comprises a significant portion of its range in Virginia. To determine species priority, the authors implemented a 10 percent rule to identify locally important species. Under the 10 percent rule, an SGCN is included in a Local Summary if the planning region provides at least 10 percent of that species’ range in Virginia. However, there are several other instances that warrant inclusion on a planning region’s priority SGCN list. First, several SGCN occur statewide but in low numbers in each planning region and will never reach the 10 percent threshold in any single planning region. Species that fall in this category were manually added to priority SGCN lists where appropriate. Some species only occur in three or fewer planning regions. These SGCN are also included on priority lists for the planning regions in which they are found due to their rarity in

the state and the importance of those few planning regions to their survival. For migrant species that may only be in Virginia for a matter of days, these migratory habitats are considered critical for their long-term conservation. When these circumstances were identified, specific migratory species were manually added to local SGCN lists as well. Finally, where a species may have a particularly strong population in a relatively small portion of a planning region, the population may be determined to be significant enough to warrant inclusion on the local SGCN list. Again, when these circumstances were identified, species were manually added to the local priority SGCN list.

Table 1. Tier and Conservation Opportunity Ranking Distribution among Priority SGCN.

Tier and Conservation Opportunity Rank	Number of Priority SGCN
Ia	10
Ib	3
Ic	0
IIa	7
IIb	0
IIc	1
IIIa	7
IIIb	2
IIIc	1
IVa	21
IVb	12
IVc	3

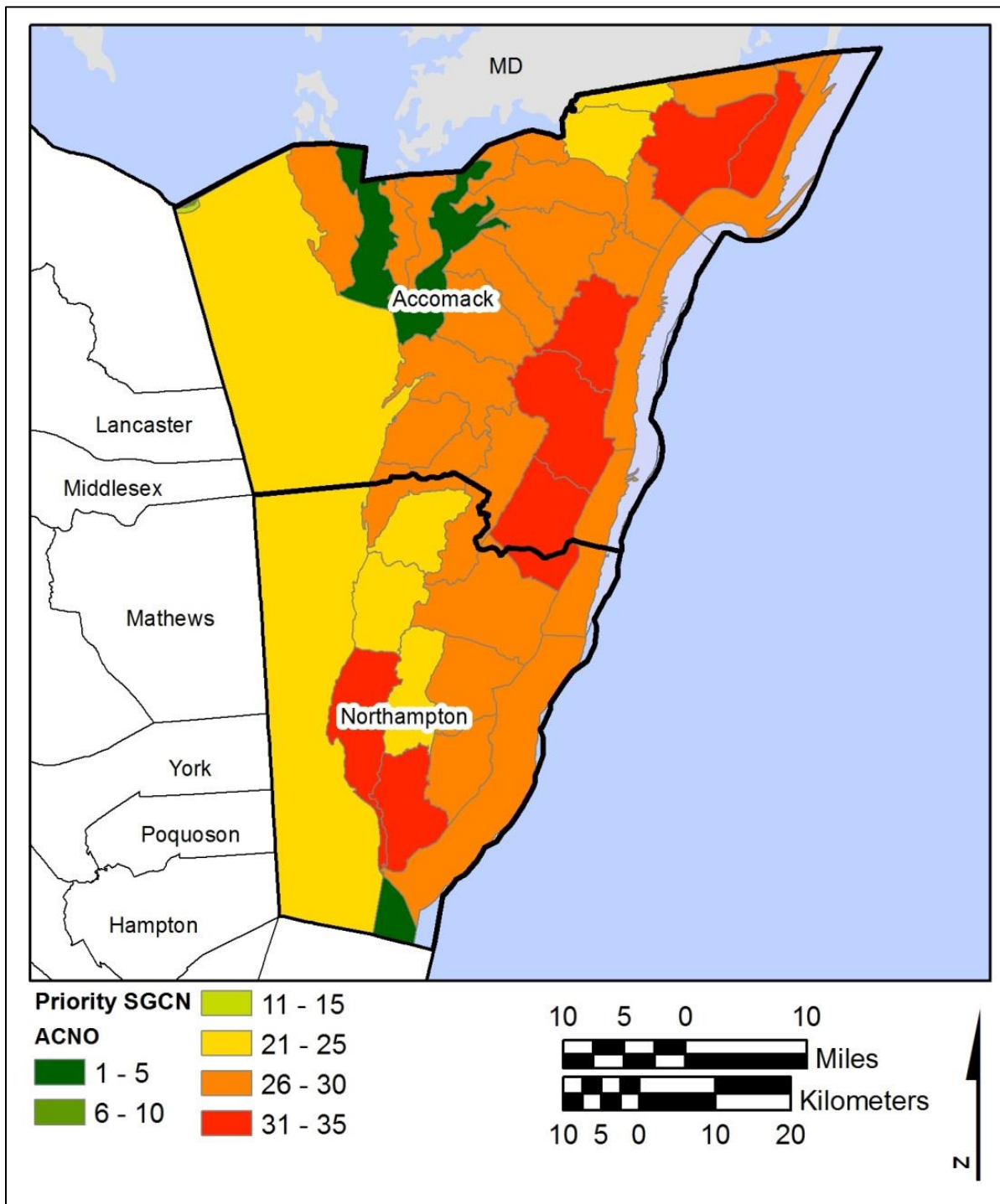


Figure 3. Priority SGCN Density in the Accomack Northampton Planning Region (HUC12 Watersheds).



Table 2. Priority Species of Greatest Conservation Need Distribution within the Accomack Northampton Planning Region.

Taxa	Conservation Status	Tier	Opportunity Ranking	Common Name	Scientific Name	Habitat
<b>Amphibian</b>		IV	c	New Jersey chorus frog	<i>Pseudacris kalmi</i>	Various forests with suitable breeding sites
<b>Bird</b>		II	a	American oystercatcher	<i>Haematopus palliatus</i>	Barrier beaches, salt marshes, and Chesapeake Bay islands and shorelines
<b>Bird</b>		III	c	Bank swallow	<i>Riparia riparia</i>	Habitat includes open and partly open situations, frequently near flowing water. Nests are in steep sand, dirt, or gravel banks, in burrows dug near the top of the bank, along the edge of inland water, or along the coast, or in gravel pits, road embankments, etc.
<b>Bird</b>		III	b	Belted kingfisher	<i>Megaceryle alcyon</i>	Primarily along water, both freshwater and marine, including lakes, streams, wooded creeks and rivers, seacoasts, bays, estuaries, and mangroves. Perches in trees, on over hanging branches, posts and utility wires.
<b>Bird</b>		IV	a	Bicknell's thrush	<i>Catharus bicknelli</i>	Migratory with weak habitat associations in Virginia
<b>Bird</b>	<b>SE</b>	I	a	Black rail	<i>Laterallus jamaicensis</i>	High saltmarsh
<b>Bird</b>		II	a	Black skimmer	<i>Rynchops niger</i>	Beach species that nests on bare sand
<b>Bird</b>		IV	a	Black-and-white warbler	<i>Mniotilta varia</i>	Habitat generalist with broad habitat tolerances.
<b>Bird</b>		IV	a	Black-bellied plover	<i>Pluvialis squatarola</i>	Winter resident along beaches and estuaries
<b>Bird</b>		III	a	Black-crowned night-heron	<i>Nycticorax nycticorax</i>	Variety of marshes, swamps, and wooded streams
<b>Bird</b>		III	a	Brant	<i>Branta bernicla</i>	Saltmarshes and estuaries
<b>Bird</b>		IV	a	Brown thrasher	<i>Toxostoma rufum</i>	Thickets and bushy areas in deciduous forest clearings and forest edge, shrubby areas and gardens; in migration and winter also in scrub.
<b>Bird</b>		IV	b	Chimney swift	<i>Chaetura pelagica</i>	Inhabits rural and urban environments having both an abundance of flying arthropods and suitable roosting/nesting sites.
<b>Bird</b>		IV	b	Clapper rail	<i>Rallus longirostris</i>	Saltmarshes
<b>Bird</b>		II	a	Common tern	<i>Sterna hirundo</i>	Nests primarily on open dynamic beaches
<b>Bird</b>		IV	a	Dunlin	<i>Calidris alpina hudsonia</i>	Winter resident shorelines and estuaries

<b>Bird</b>	IV	a	Eastern kingbird	<i>Tyrannus tyrannus</i>	Forest edge, open situations with scattered trees and shrubs, cultivated lands with bushes and fencerows, and parks; in winter more closely associated with forest clearings and borders
<b>Bird</b>	IV	a	Eastern meadowlark	<i>Sturnella magna</i>	Grasslands, savanna, open fields, pastures, cultivated lands, sometimes marshes.
<b>Bird</b>	IV	a	Eastern towhee	<i>Pipilo erythrophthalmus</i>	Inhabits forest and swamp edges, regenerating clearcuts, open-canopied forests, particularly those with a well-developed understory, reclaimed strip mines, mid-late successional fields, riparian thickets, overgrown fencerows, shrub/small-tree thickets, and other brushy habitats.
<b>Bird</b>	IV	b	Eastern wood-pewee	<i>Contopus virens</i>	Inhabits a wide variety of wooded upland and lowland habitats including deciduous, coniferous, or mixed forests.
<b>Bird</b>	IV	a	Field sparrow	<i>Spizella pusilla</i>	Old fields, brushy hillsides, overgrown pastures, thorn scrub, deciduous forest edge, sparse second growth, fencerows.
<b>Bird</b>	III	a	Forster's tern	<i>Sterna forsteri</i>	Nests in marine and estuarine marshes
<b>Bird</b>	I	a	Glossy ibis	<i>Plegadis falcinellus</i>	Wooded wetlands, estuarine marshes and waters and saltmarshes
<b>Bird</b>	IV	a	Grasshopper sparrow	<i>Ammodramus savannarum</i>	Grassland obligate
<b>Bird</b>	IV	a	Gray catbird	<i>Dumetella carolinensis</i>	Thickets, dense brushy and shrubby areas, undergrowth of forest edge, hedgerows, and gardens, dense second growth.
<b>Bird</b>	IV	a	Greater scaup	<i>Aythya marila</i>	Winter resident on tidal rivers
<b>Bird</b>	IV	b	Green heron	<i>Butorides virescens</i>	Swamps, mangroves, marshes, and margins of ponds, rivers, lakes, and lagoons.
<b>Bird</b>	ST	I	Gull-billed tern	<i>Gelochelidon nilotica</i>	Nests on open sandy beaches and marsh shell rakes
<b>Bird</b>	IV	a	Laughing gull	<i>Leucophaeus atricilla</i>	Seacoasts, bays, estuaries, rarely on large inland bodies of water.
<b>Bird</b>	III	a	Least tern	<i>Sternula antillarum</i>	Nest on open beaches
<b>Bird</b>	II	a	Little blue heron	<i>Egretta caerulea</i>	Freshwater and brackish marshes
<b>Bird</b>	IV	a	Marbled godwit	<i>Limosa fedoa</i>	Occur regularly in the seaside lagoon system throughout the winter
<b>Bird</b>	IV	b	Marsh wren	<i>Cistothorus palustris</i>	Freshwater marshes with cattails and reeds

<b>Bird</b>		IV	b	Northern Flicker	<i>Colaptes auratus</i>	Open forest, both deciduous and coniferous, open woodland, open situations with scattered trees and snags, riparian woodland, pine-oak association, parks.
<b>Bird</b>		IV	a	Northern Gannet	<i>Morus bassanus</i>	Coastal waters primarily but sometimes several hundred miles out to sea.
<b>Bird</b>		IV	a	Northern Pintail	<i>Anas acuta acuta</i>	Lakes, rivers, marshes and ponds in grasslands or cultivated fields.
<b>Bird</b>	<b>FTST</b>	III	a	Piping plover	<i>Charadrius melodus</i>	Barrier beaches and sand pits
<b>Bird</b>		IV	c	Purple sandpiper	<i>Calidris maritima</i>	Winter resident along beaches and jetties
<b>Bird</b>	<b>FTST</b>	I	a	Red knot	<i>Calidris canutus rufus</i>	Migrant along barrier islands and to a lesser extent in the Chesapeake Bay
<b>Bird</b>		IV	a	Royal tern	<i>Thalasseus maxima</i>	Sandy beaches
<b>Bird</b>		IV	b	Rusty blackbird	<i>Euphagus carolinus</i>	Wooded swamp and wooded wetland winter habitat
<b>Bird</b>		III	a	Saltmarsh sparrow	<i>Ammodramus caudacutus</i>	Maritime wetlands around estuaries and barrier islands
<b>Bird</b>		IV	a	Sanderling	<i>Calidris alba</i>	Primarily sandy beaches, less frequently on mud flats and shores of lakes or rivers also on exposed reefs.
<b>Bird</b>		IV	b	Seaside sparrow	<i>Ammodramus maritimus</i>	Grassy salt marshes
<b>Bird</b>		IV	a	Short-billed dowitcher	<i>Limnodromus griseus</i>	Migrant, migration habitat includes saltwater tidal flats, beaches, and salt marshes
<b>Bird</b>		II	a	Snowy Egret	<i>Egretta thula</i>	Marshes, lakes, ponds, lagoons, mangroves, and shallow coastal habitats.
<b>Bird</b>		IV	b	Virginia rail	<i>Rallus limicola</i>	Fresh and brackish marshes, may visit salt marsh in winter
<b>Bird</b>		IV	a	Whimbrel	<i>Numenius phaeopus</i>	Coastal migrant that typically occurs in a variety of saltmarsh habitats
<b>Bird</b>	<b>SE</b>	I	a	Wilson's plover	<i>Charadrius wilsonia</i>	Barrier beaches
<b>Bird</b>		IV	b	Wood thrush	<i>Hylocichla mustelina</i>	Deciduous or mixed forests with a dense tree canopy and a fairly well-developed deciduous understory, especially where moist.
<b>Bird</b>		III	a	Yellow-billed cuckoo	<i>Coccyzus americanus</i>	Open woodland (especially where undergrowth is thick), parks, deciduous riparian woodland.

<b>Bird</b>		IV	a	Yellow-breasted chat	<i>Icteria virens</i>	Second growth, shrubby old pastures, thickets, bushy areas, scrub, woodland undergrowth, and fence rows, including low wet places near streams, pond edges, or swamps; thickets with few tall trees; early successional stages of forest regeneration; commonly in sites close to human habitation.
<b>Bird</b>	<b>ST</b>	I	a	Peregrine falcon	<i>Falco peregrinus</i>	Human structures in the east and cliff sites in the west
<b>Fish</b>		I	b	Atlantic sturgeon	<i>Acipenser oxyrinchus</i>	Migratory.-utilize variety of aquatic and marine habitats
<b>Fish</b>	<b>FESE</b>	I	a	Shortnose sturgeon	<i>Acipenser brevirostrum</i>	Migratory - utilize variety of aquatic and marine habitats
<b>Insect</b>	<b>FTST</b>	II	a	Northeastern beach tiger beetle	<i>Cicindela dorsalis dorsalis</i>	Beach obligate - does not tolerate heavy foot or vehicle traffic
<b>Mammal</b>		III	b	Atlantic bottlenose dolphin	<i>Tursiops truncatus</i>	Marine
<b>Mammal</b>	<b>SE</b>	II	c	Delmarva fox squirrel	<i>Sciurus niger cinereus</i>	Mature pine and hardwood forests with open understories
<b>Mammal</b>	<b>FE</b>	IV	b	Fin whale	<i>Balaenoptera physalus</i>	Marine
<b>Mammal</b>		IV	c	Harbor porpoise	<i>Phocoena phocoena</i>	Marine
<b>Mammal</b>	<b>FE</b>	I	b	Northern right whale	<i>Eubalaena glacialis</i>	Marine
<b>Mammal</b>	<b>FE</b>	IV	b	West Indian manatee	<i>Trichechus manatus latirostris</i>	Marine
<b>Reptile</b>		I	b	Green sea turtle	<i>Chelonia mydas</i>	Marine
<b>Reptile</b>		I	a	Kemp's Ridley sea turtle	<i>Lepidochelys kempii</i>	Marine
<b>Reptile</b>		I	a	Leatherback sea turtle	<i>Dermochelys coriacea</i>	Marine
<b>Reptile</b>	<b>FTST</b>	I	a	Loggerhead sea turtle	<i>Caretta caretta</i>	Nests on ocean-facing beaches and occurs in the lower Chesapeake Bay and inshore, nearshore and offshore coastal waters
<b>Reptile</b>	<b>CC</b>	II	a	Northern diamondback terrapin	<i>Malaclemys terrapin terrapin</i>	Barrier beaches, estuarine marshes and waters

\*\* Federal Endangered (FE), State Endangered (SE), Federal Threatened (FT), State Threatened (ST), Federal Species of Concern (FS), Federal Candidate (FC), Federal Proposed (FP), and Species of Collection Concern (CC).

### *Conserved Lands in Accomack Northampton Planning Region*

Recognizing the importance of the local habitats to resident and migratory wildlife, state, federal, and private entities have made significant investments to conserve lands within this planning region. Conservation mechanisms range from conservation easements to state parks to state wildlife management areas, and National Wildlife Refuges (NWR). Significant conservation assets, in terms of size, include:

- The Virginia Coast Reserve (The Nature Conservancy),
- Assateague Island National Seashore,
- Chincoteague National Wildlife Refuge,
- Wallops Island National Wildlife Refuge,
- Eastern Shore of Virginia National Wildlife Refuge,
- Fisherman Island National Wildlife Refuge,
- Kiptopeke State Park,
- Saxis Wildlife Management Area,
- Doe Creek Wildlife Management Area, and
- Mockhorn Island Wildlife Management Area and GATR Tract.

These properties contain a diversity of open water; beach, dune, and mudflat; forest; open; and wetland habitats (Figure 4). They have been conserved to provide a range of conservation, recreational, and economic benefits such as habitat protection and restoration, ecotourism, and fishing and hunting opportunities.

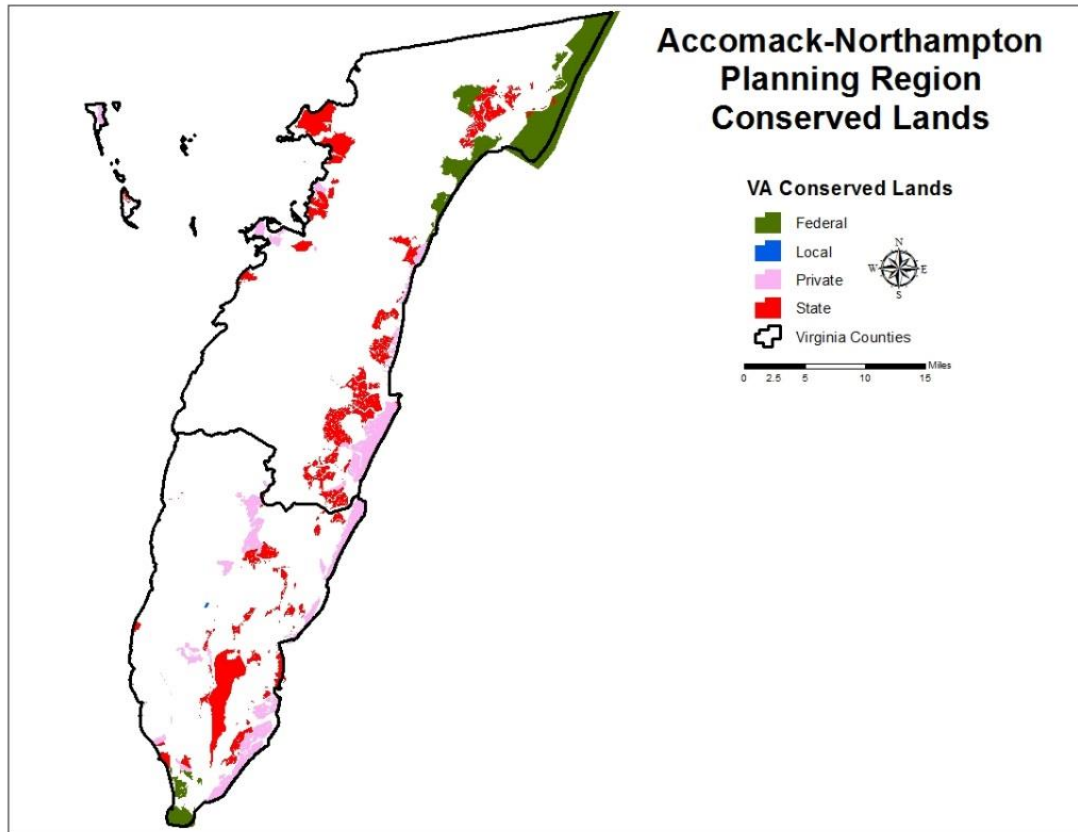


Figure 4. Conservation Lands in Accomack Northampton Planning Region (DCR, Natural Heritage 2014).

These properties serve as the backbone of wildlife conservation efforts on the Eastern Shore. Many of the healthiest and most important habitats have already been conserved within their boundaries. These properties are important for conservation, research, and monitoring. Many of these lands help protect water and habitat quality. As social, economic, and climatic conditions change, however, the conservation value of these properties could be affected. To address these types of changes, one option is to expand or buffer existing conserved lands to allow for the migration of habitats or minimize the impacts of adjacent development. It should be noted that some stakeholders on the Eastern Shore have expressed concerns that putting additional lands in conservation may hinder the economic well-being of the region and negatively impact county residents. Conversely, recent research has indicated conserved lands on the Eastern Shore attract visitors from outside the planning region and can be a significant benefit to local economies (DCR 2013; Carver and Caudill 2013). Specifically, National Wildlife Refuges bring economic and social benefits to communities (Carver and Caudill 2013). For example, in 2011 the Eastern Shore of Virginia National Wildlife Refuge provided over \$2 million in local economic benefit through visitation, jobs, and tax revenue (Carver and Caudill 2013). To balance interests, especially as conditions change, it will be critical for the conservation community to actively engage with local governments and stakeholders to ensure that conservation spending is beneficial for both wildlife and localities.

## *Climate Change Impacts in Accomack Northampton Planning Region*

Few places in Virginia are expected to be as affected by climate change as much as the Eastern Shore. A report published by the Virginia Institute of Marine Science (VIMS) (2013) uses climate scenarios from the Intergovernmental Panel on Climate Change to determine a range of sea-level rise projections for Virginia. Based on this analysis, a range of approximately 1.5 feet to over 7 feet of sea-level rise is projected in the state by 2100. The report recommends considering a foot and a half of sea-level rise over the next 20 to 50 years for planning purposes (VIMS 2013). Tropical storm events also are projected to become more intense (VIMS 2013; Staudinger et al. 2015). Sea-level rise and more intense storm events are likely to increase shoreline erosion, facilitate salt water intrusion, destroy habitats and ecological systems, and increase stormwater overflows and sewage contamination (VIMS 2013). The report also estimates, given these projections, approximately 208 square miles of land and 326 miles of roads could be lost to sea-level rise in Accomack County, and 186 square miles of land and 44 miles of road could be lost to sea-level rise in Northampton County.

Changes in temperature and precipitation will also negatively affect habitats and SCGN in the Accomack Northampton Planning Region. Based on scientific reports and research, it is clear that temperatures in the state will get warmer. The National Climate Assessment (NCA) is a national climate assessment that provides state level information. The NCA indicates Virginia's average temperature could increase by as much as 7°F by 2100 (Melilo et al. 2014). Earlier models used for Virginia's 2008 Climate Action Plan project that average temperatures may increase by 3.1°C (5.6°F) by the end of the century in Virginia (Governor's Commission on Climate Change 2008).

Increased temperatures may lead to heat stress for species, decreased water quality, and dissolved oxygen content as well as changes to food availability (Boicourt and Johnson 2011; Kane 2013). Temperature increases may also be problematic for species at the edge of their ranges. For example, if species are at the more southern end of their range, they may not survive significant increases in temperature that are greater than they can withstand (Pyke et al. 2008). Warmer air temperatures may also result in warmer waters, which could favor parasites and other pests in aquatic environments (Pyke et al. 2008; Najjar et al. 2010; Kane 2013). Additionally, if temperatures and precipitation change such that season length is altered, fish and other species reproductive cycles and other phenological processes may be affected. Ecological conditions may also be altered, including food supplies and sympatric animal behaviors (e.g., fish migrations and nest building).

## CONSERVATION THREATS AND ACTIONS FOR WILDLIFE AND HABITATS IN ACCOMACK NORTHAMPTON PLANNING REGION

The following sections on threats, conservation actions, and conservation priorities are subdivided based on habitat type. Key habitat conservation strategies, actions, threats, and other impacts are summarized in Table 3. In many cases, actions taken to protect or enhance habitat will positively affect many Accomack Northampton Planning Region priority SGCN and other species. Many of these activities are also expected to benefit landowners and communities.

Table 3. Summary of Conservation Strategies and Actions for Accomack Northampton Planning Region.

Conservation Strategies	Conservation Actions	Threats	Economic/ Human Benefits	Priority Areas
<b>Maintain and conserve beach, dune, and mudflat habitats</b>	1) Balance conservation, human, and economic uses for beach, dune, and mudflat habitats; 2) Maintain and support current land use and management policies on all existing conserved lands in Accomack and Northampton counties; 3) Research climate change impact on beaches and how this may affect acquisition and protection strategies of beach habitat; 4) Focus acquisition on areas inland of existing beaches to help protect them and potentially provide migration corridors; 5) Implement predator control methods such as trapping to further enhance these habitats for SGCN; and 6) Create and implement a Keep Cats Indoors outreach campaign.	Climate change, non-native and exotic invasive species, predators	Enhanced ecotourism opportunities	Chesapeake Bay shorelines and islands; areas inland of already protected beaches
<b>Maintain and restore wetland habitats</b>	1) Work with appropriate entities on wetlands permitting process to ensure adequate mitigation and restoration procedures are in place; 2) Implement living shorelines where feasible; 3) Establish or enhance vegetative buffer areas inland of existing wetlands; 4) Utilize relevant data (e.g., Virginia Department of Conservation and Recreation’s wetlands catalog) to identify priority areas for conservation, acquisition, and restoration; and 5) Control invasive species and conduct predator control.	Water quality degradation, habitat/ land use conversion, climate change, exotic and non-native and exotic invasive species, predators	Flood control; filtration services; erosion and sediment control; supports recreational and commercial fisheries; ecotourism/ wildlife watching and fishing/ hunting opportunities	Watershed with priority wetlands and areas adjacent to priority watershed that allow inland migration of wetlands
<b>Enhance, restore, and conserve aquatic and riparian habitats</b>	1) Work with landowners to implement small acreage grazing systems; 2) Repair/ replace failing septic systems; 3) Establish riparian vegetative buffers along waterways; 4) Establish waste storage facilities to better manage animal waste and prevent flow into rivers; 5) Establish retention ponds or features to manage and slow storm water runoff; 6) Continue to identify impaired waters within the planning region; and 7) Work to prevent pet waste from entering waterways.	Sedimentation, contaminants loading, water chemistry alteration, stream nutrient dynamics alteration, effluence of animal waste	Address TMDL concerns by reducing amounts of sediment, nutrients, pesticides, and other pollutants that enter water ways; sustain sport fisheries and recreation opportunities; contribute to clean water supply	Kings Creek, Mill Creek, Occohannock Creek
<b>Maintain and restore forest habitats</b>	1) Protect forested land through acquisition, easement, incentives, or other mechanisms; 2) Implement vegetative buffers around extractive practices and development; 3) Work with state and federal agencies to ensure implementation of appropriate best management practices; 4) Maintain forest health to help ensure forest viability; and 5) Manage forests with consideration of migratory bird species as well as other important SGCN.	Land use change and conversion, invasive species, climate change, threats to maritime forests	Flood control; water quality; ecotourism/ wildlife viewing	Forest patches adjacent to already protected parcels. Areas identified as patches important for migratory roosting



## *Maintain and Conserve Beach, Dune, and Mudflat Habitats*

The Accomack Northampton Planning Region has extensive beach and barrier island habitats that benefit many Action Plan species. Mudflats provide important foraging areas for marbled godwits, piping plovers, American oystercatchers, and other species. Beaches and dunes are important nesting habitats for diamondback terrapins, northeastern beach tiger beetles, piping plovers, gull-billed terns, black skimmers, and numerous other migratory birds. Dunes also protect inland habitats, such as the relatively rare maritime forest communities, from the more intense storm surges and salt spray. Approximately 6,581 acres (1.1 percent of the planning region) are considered beach, dune, or mud flat habitat within the planning region (Anderson et al. 2013).

### **Threats**

Much of the planning region's beach, dune, and mudflat habitat is either protected by state or federal agencies or owned by private organizations such as The Nature Conservancy. Many properties are also managed under conservation easements. With so much of this habitat held in a conserved status, fragmentation and commercial development are not considered a significant threat, although some partners have expressed concern about the impact of residential development on the Bayside of the Eastern Shore.

1. Climate Change: Climate change, with resulting sea-level rise and more intense storm events, will likely lead to increased coastal flooding, presenting a significant challenge for the barrier islands and low lying areas on the peninsula. The effects of flooding are further exacerbated by naturally occurring land subsidence. Severe storms as well as sea-level rise will also likely increase erosion and salt water intrusion along the coast into sensitive ecosystems.
2. Invasive Species: Invasive species such as *Phragmites* and beach vitex (*Vitex rotundifolia*) often out-compete native vegetation and reduce the value of local habitats.
3. Predators: Predators, including raccoons, gulls, coyotes, feral cats, and foxes can have a significant impact on species that utilize these coastal habitats to nest and forage.

### **Conservation Management Actions**

Beaches, dunes, and mudflats are dynamic and have important habitat and economic value. Conservation actions will require the conservation community to work closely with agencies, landowners, municipalities, and elected officials to find a sustainable balance between conservation, human recreation, and economic development. Each of these entities has valid regional concerns that should be considered within the broader management context to accommodate the various interests.

Some partners have suggested that efforts should be made to bring privately owned beaches into some form of conservation. Such actions should be closely examined and only be considered if landowners are willingly involved. Regardless, climate projections indicate many

current beaches could be inundated by a combination of sea-level rise and land subsidence. Under such circumstances, acquiring these areas might not be a wise investment of limited conservation resources.

On Virginia’s barrier islands, even a small number of predators, such as raccoons, foxes, or gulls can have a significant impact on beach nesting birds and reptiles. DGIF and others have demonstrated that trapping is an effective and efficient means of limiting the impacts of predation. As necessary, DGIF and partners will limit the size of these common predator populations to benefit the more rare bird and turtle species.

### Climate-Smart Management Actions

As the climate changes and sea levels rise and land continues to naturally subside, the dynamic beaches, dunes, and mudflats are likely to move and migrate. Over time, this could bring these habitats, and the species that rely upon them, into conflict with existing land uses. Research is needed to understand how these systems are likely to change and to identify opportunities to work with willing landowners to acquire buffer properties that would facilitate movement. Until this issue is better understood, working with willing landowners to acquire properties inland and adjacent to existing conserved beaches may be a useful strategy to provide the opportunity for these habitats to migrate under changing climatic conditions. Protecting these areas can occur through acquisition or partnerships with landowners. Expanding monitoring along these areas to enable early detection and action as areas become increasingly affected by sea-level rise and storm events will be important (Glick et al. 2008).

### *Maintain and Restore Wetland Habitats*

Tidal and non-tidal wetlands are found throughout the Eastern Shore of Virginia. In addition to providing habitat for a diversity of aquatic and terrestrial species, wetlands help maintain water quality and quantity within a watershed, limit erosion caused by floods, and provide recreational opportunities for hunters, anglers, and wildlife watchers. Tidal marshes are the most common wetland type in this area (Table 4). Priority species that depend on these wetlands include the saltmarsh sparrow, black rail, Henslow’s sparrow, king rail, and glossy ibis, among others.

Table 4. Wetland Acreage in Accomack Northampton Planning Region (Anderson et al. 2013).

Wetland Type	Acres	Percent of Planning Region
Tidal Wetlands	134,037.65	22.24%
Non-Tidal Wetlands	65,844.55	10.92%

### Threats

The health and quality of wetlands are affected by a variety of issues, both natural and anthropogenic. As the quality of wetlands degrades, so does the value of that wetland to Virginia’s wildlife.

1. Water Quality: Wetlands help filter nutrients and other pollutants from watersheds, but they are also sensitive to activities that impair water quality and overload the system

(Hemond and Benoit 1986). When best management practices (BMP) are not implemented upstream, runoff laden with nutrients, sediment, and other pollutants enter the system in concentrations that hinder the wetland's filtering capacity. Storm water runoff from urban and developed areas also contributes to water quality issues that degrade wetlands (Hemond and Benoit 1986). Nutrient pollution and sedimentation are important issues for tidal and non-tidal wetlands throughout the Eastern Shore.

2. Land Use Changes: Accomack Northampton Planning Region has extensive tidal wetland areas; many are under protection on state or federal lands, or private lands (those owned by The Nature Conservancy as a part of TNC's Virginia Coast Reserve). One of the most significant threats to tidal marshes outside these protected areas and to non-tidal wetlands is conversion to other uses and hardening of shorelines that can harm wetland integrity and prevent inland migration as sea levels rise. As more areas are developed for additional human uses, wetland areas will likely be lost.
3. Invasive Species: Invasive species often degrade the quality of wetland habitat through damage or loss to wetland vegetation. Nutria eat large amounts of aquatic vegetation and destroy wetlands by burrowing into the substrate. Mute swans out-compete native species by consuming significant amounts of emergent and submerged aquatic vegetation (DGIF 2012). Mute swans can also destroy vegetation by uprooting it, thereby limiting the effectiveness of wetland restoration (DGIF 2012). Invasive plant species such as *Phragmites* can overtake wetlands, changing vegetative composition to a monoculture and diminishing wetland function and value. Examples of invasive species affecting non-tidal wetlands include: *Phragmites*, purple loosestrife, Japanese stilt grass, nutria, mute swans, and exotic invertebrates.
4. Predators: While predators, such as foxes, gulls, feral cats, coyotes, and Norway rats, do not necessarily degrade the quality of wetland vegetation, they can cause small wetlands to become less suitable for marsh-dependent species such as diamondback terrapins, black rails, or black ducks.
5. Climate Change: As sea levels rise and land continues to naturally subside, marshes will likely be inundated and become submerged (CCSP 2009; TNC 2011a). Shallow open water habitats do not support the same vegetative composition as wetlands, affecting the wildlife species that depended on tidal wetland habitats. Additionally, as storms become more intense, increased wave action and scouring may lead to significant erosion and loss of these coastal wetlands (CCSP 2009; TNC 2011a). Increased salinity levels from sea-level rise and more frequent inundation may also pose problems for vegetation and fish and wildlife species with low salinity tolerances.

## Conservation Management Actions

A number of actions can be taken to address threats affecting wetlands on the Eastern Shore. To address development and fill impacts, the federal government and the Commonwealth of Virginia have established an extensive wetlands permitting process to help landowners and developers avoid impacts to wetlands while pursuing their management objectives. The Virginia Tidal Wetlands Act gives authority to the Virginia Marine Resource Commission (VMRC) to issue tidal wetland permits with the option for local governments to assume this responsibility (DEQ 2011). The U.S. Army Corps of Engineers has authority to issue permits for impacts to non-tidal wetlands through the federal Clean Water Act, while DEQ has authority under Virginia's State Water Control Law. Permits are issued through a Joint Permit Application Process that can be initiated with DEQ (DEQ 2011). Mitigation to compensate for wetland loss is often required under these permits. However, wetlands restoration to reestablish or rebuild former wetland areas or restore functions to a degraded wetland are voluntary conservation actions agencies and conservation partners can implement outside of required wetlands mitigation and are an important component to protecting wetlands (DEQ 2011). These types of conservation actions also help provide migration corridors for migratory birds that depend on wetlands for nesting, roosting, and foraging. Various programs implemented by the Natural Resources Conservation Service (NRCS) and other partners provide guidance related to conserving wetlands, establishing oyster reefs, and implementing other actions.

In certain situations, living shorelines can be a viable alternative to hardened or armored shorelines. By using native vegetation, oyster reefs, dune restoration, rock sills, bank grading, or other more natural methods, living shorelines can help protect private property from erosion while also providing opportunities for wetlands to migrate inland as conditions change (Kane 2011; VIMS 2010). Establishing or protecting vegetative buffers upland of wetlands is also important to protect the health of existing wetlands as well as to provide a potential inland migration route as conditions change (Kane 2011). Although a significant amount of wetlands in the planning region are under federal, state, and private protection, the protection of additional wetland areas through acquisition, easement, or agreement would allow for further conservation of this important habitat and associated SGCN. Finally, working to limit invasive plants and animals that might degrade the quality of these habitats will be important conservation actions.

Areas identified by conservation partners, such as the Virginia Department of Conservation and Recreation and The Nature Conservancy, as outstanding opportunities for conservation should also be considered priorities for protection and conservation. An initial review of the Virginia Wetlands Catalog identifies priority wetlands for conservation and restoration (Weber and Bulluck 2014). Designation of these areas is based on several factors, including existing plant and animal diversity, presence of significant natural communities, presence of natural lands providing ecosystem services, presence of corridors and stream buffers, proximity to conserved lands, inclusion within or downstream of healthy watersheds, and location of drinking water sources (Figure 5) (Weber and Bulluck 2014). DCR also designates potential restoration sites, identified based on similar factors as conservation areas, but also including consideration of inclusion within degraded watersheds, proximity to impaired waters, location of existing wetland mitigation banks, presence of prior converted and farmed wetlands, and inclusion of stream reaches with lower aquatic biodiversity (Figure 6) (Weber and Bulluck 2014). High priorities for conservation are on the southern tip adjacent to already protected lands. Moderate wetland conservation priorities exist along the Bayside of the Eastern Shore as well.

Potential areas for wetland restoration exist along the entire Bayside of the Eastern Shore, with efforts focusing on conserving and acquiring areas identified as marsh retreat zones (See Figure 7).

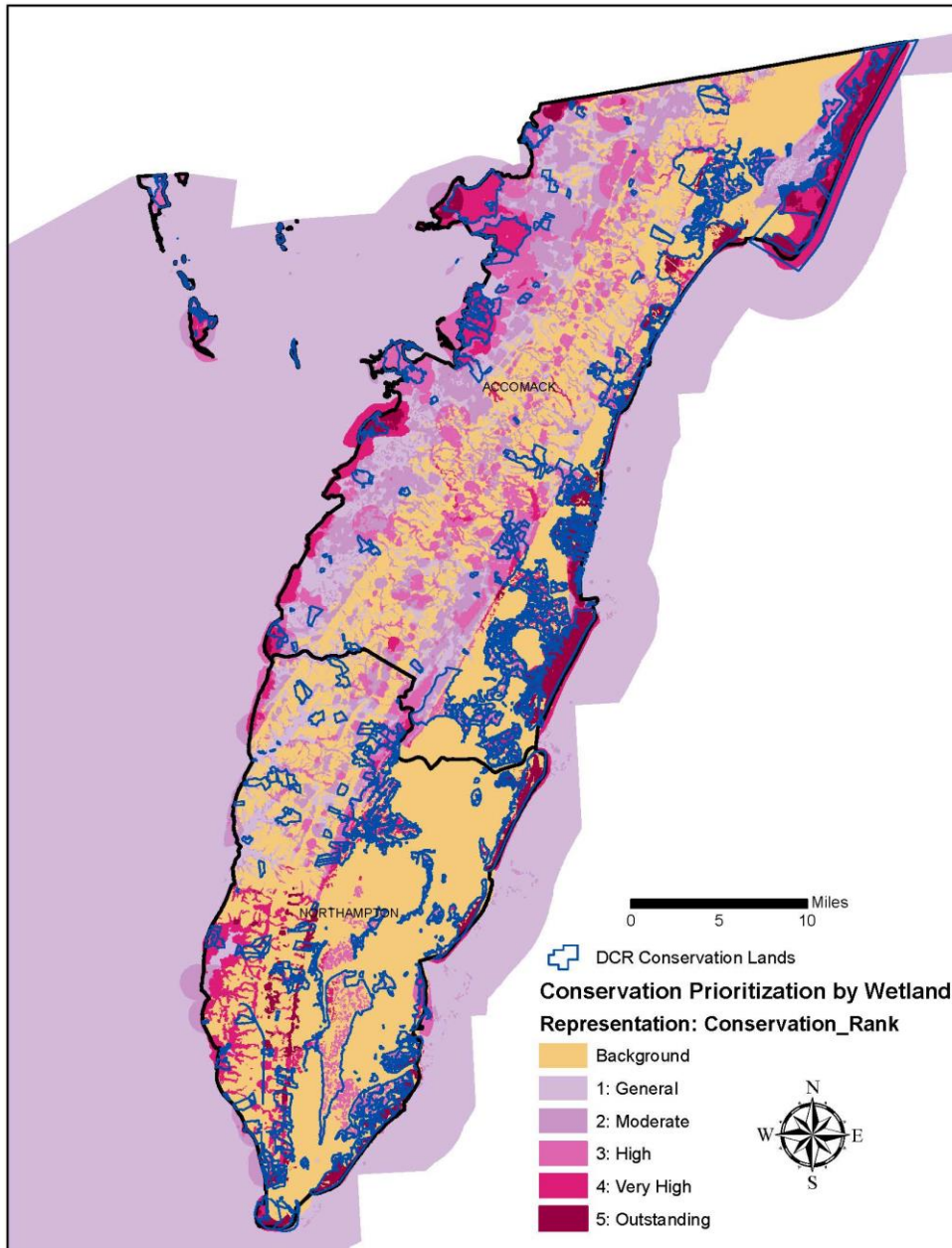


Figure 5. Priority Wetlands for Conservation in Accomack Northampton Planning Region (Weber and Bulluck 2014).

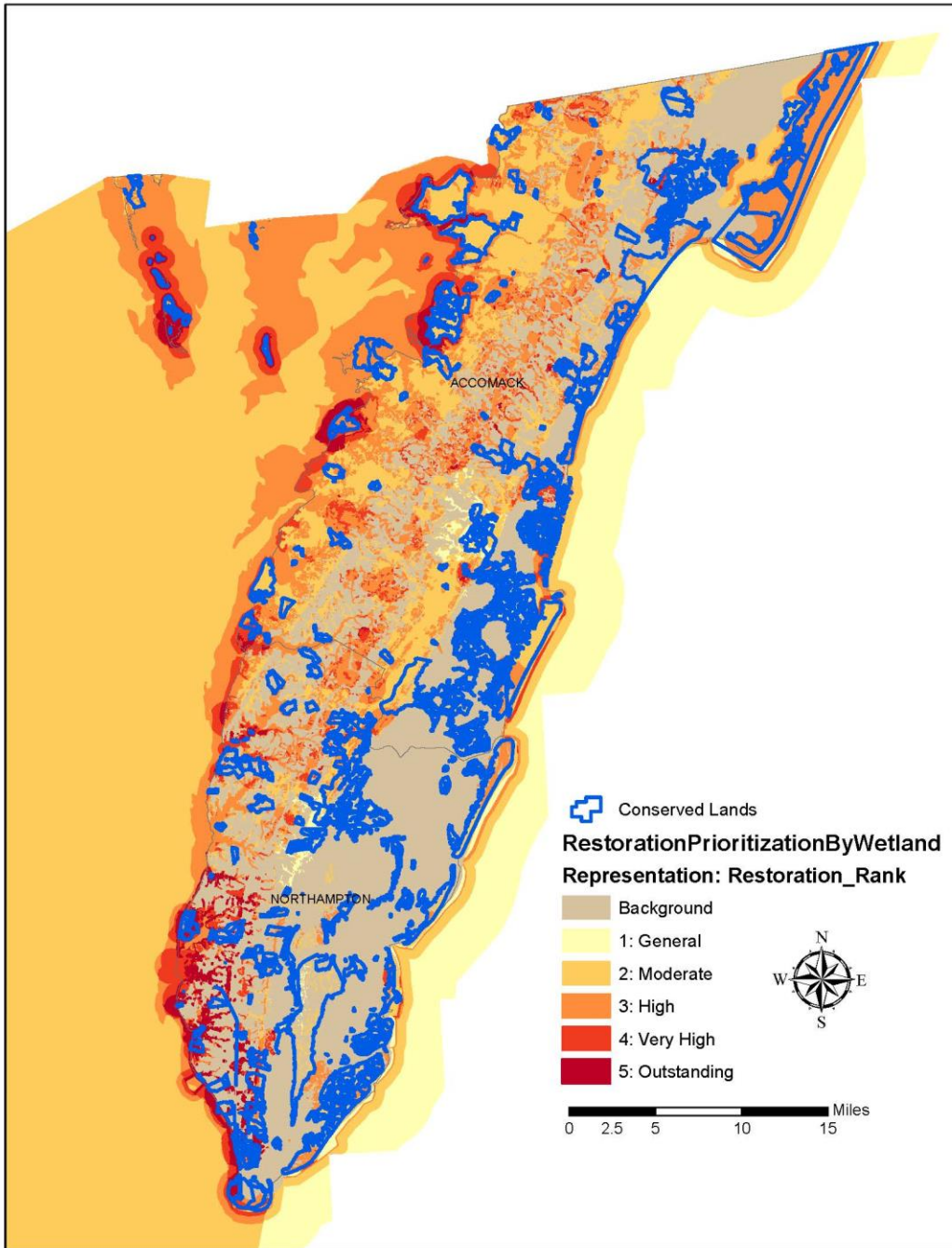


Figure 6. Wetland Restoration Priorities in Accomack Northampton Planning Region (Weber and Bulluck 2014).

## Climate-Smart Management Actions

Priority areas for wetlands protection and restoration within the Accomack Northampton Planning Region include those wetlands that may provide some opportunity for adaptation and resiliency as sea levels rise (TNC 2011b). To identify critical areas for future marsh migration (i.e., advancement or retreat) in response to accelerated sea-level rise that will enhance wetland value for wildlife by protecting and restoring these areas, a new Land Protection Tool for the Southern Tip Ecological Partnership has been developed by The Nature Conservancy and USFWS (Bruce et al. 2015). This tool can be used to evaluate individual parcels based on their potential for marsh retreat due to sea-level rise, habitat value for migratory land birds and raptors, and overall ecological integrity. Identifying these areas may also allow for large wetland complexes to be protected, ensuring larger habitat patches remain available for wildlife. Priority areas for protection are described as “marsh retreat zones” (Figure 7).

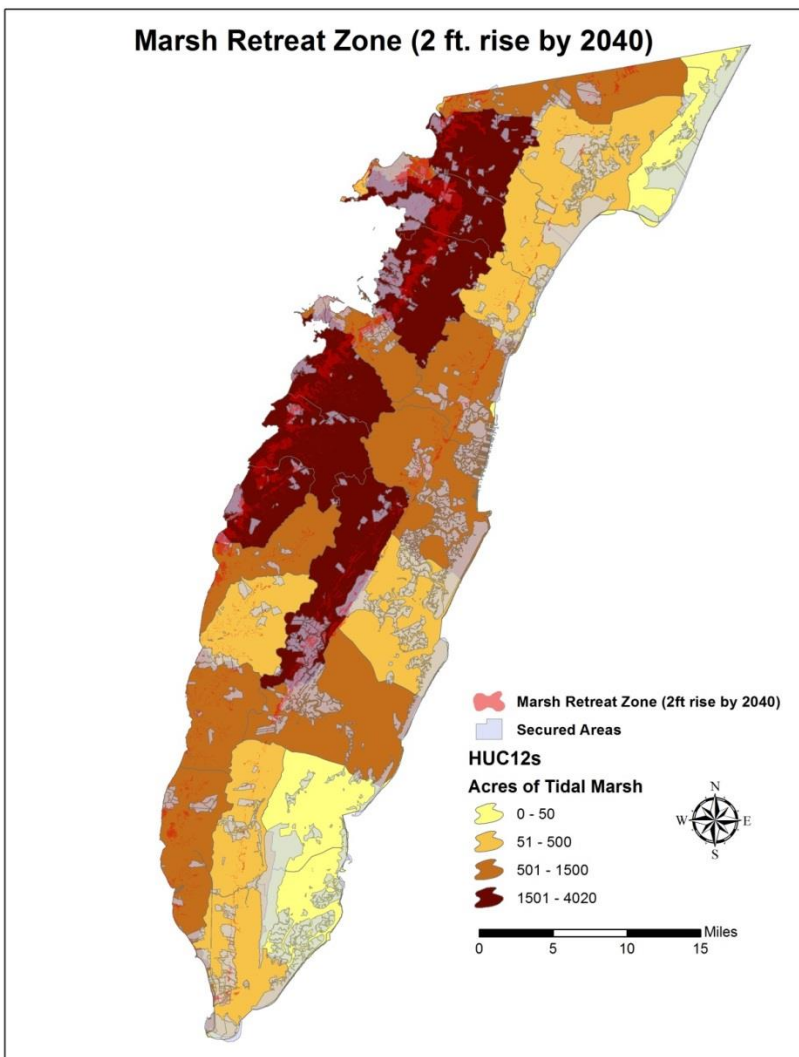


Figure 7. Projected Marsh Retreat Zone on the Eastern Shore (Bruce et al. 2015).

Additional wetlands climate-related conservation actions include: restoring and enhancing vegetation within wetlands to support changing conditions (e.g., using vegetation species that can withstand a broader array of conditions like more frequent inundation and higher salinity levels) and restoring wetlands to increase their elevation along the coast where feasible or needed.

### *Enhance, Maintain, and Restore Aquatic and Riparian Habitats*

Aquatic systems on the Eastern Shore include tidal creeks and streams. Any freshwater stream in the planning regions is still tidally influenced, even if minimally. These systems provide important habitat for numerous species of wildlife, fish, and invertebrates. Approximately 180,000 acres (30 percent) of the planning region is considered aquatic (Anderson et al. 2013). Priority SGCN that depend on these aquatic systems within this planning region include the Atlantic and shortnose sturgeons and little blue heron.

### **Threats**

Aquatic and riparian habitats within the Accomack Northampton Planning Region face multiple threats, primarily from water quality related issues.

1. Water Quality Degradation: Pollution is the most significant threat to aquatic species and riparian habitats within the Accomack Northampton planning region. Polluting materials include fertilizers, eroded sediment, and human and animal waste flowing into the region's tidal creeks from storm water runoff, failing septic systems, and agricultural practices that do not conform to standard best management practices (DEQ 2014). In many cases, watersheds have insufficient riparian buffers and vegetative areas to prevent these materials from flowing into the creek or stream (ACJV 2005). Once present in aquatic systems, these materials may concentrate in sediment and bottom-dwelling organisms where they can result in reduced levels of dissolved oxygen and altered pH levels (Chesapeake Bay Foundation 2014). In addition to the impacts on aquatic life, many of these substances pose a risk to human health and local economies (Chesapeake Bay Foundation 2014).
2. Habitat Conversion and Alteration: Rivers are fragmented by dams, culverts, and other impediments that limit the connectivity of these aquatic habitats. This fragmentation can prevent aquatic species from accessing important aquatic habitats crucial to various life stages. Channelization, shoreline alteration, and extractive land use practices can alter aquatic habitats in terms of changes to hydrology, chemistry, and water temperature. These practices may also directly alter habitats through loss of vegetative riparian cover, filling of streams, or hardening of stream banks.

### **Conservation Management Actions**

Water Quality Improvement Plans have been developed by the Virginia Department of Environmental Quality (DEQ) and various partners. Watersheds within the planning region that have Water Quality Improvement Plans include: Kings Creek (DCR 2011), Mill Creek (Louis Berger 2012), and Occohannock Creek (DCR 2008) (Figure 8).



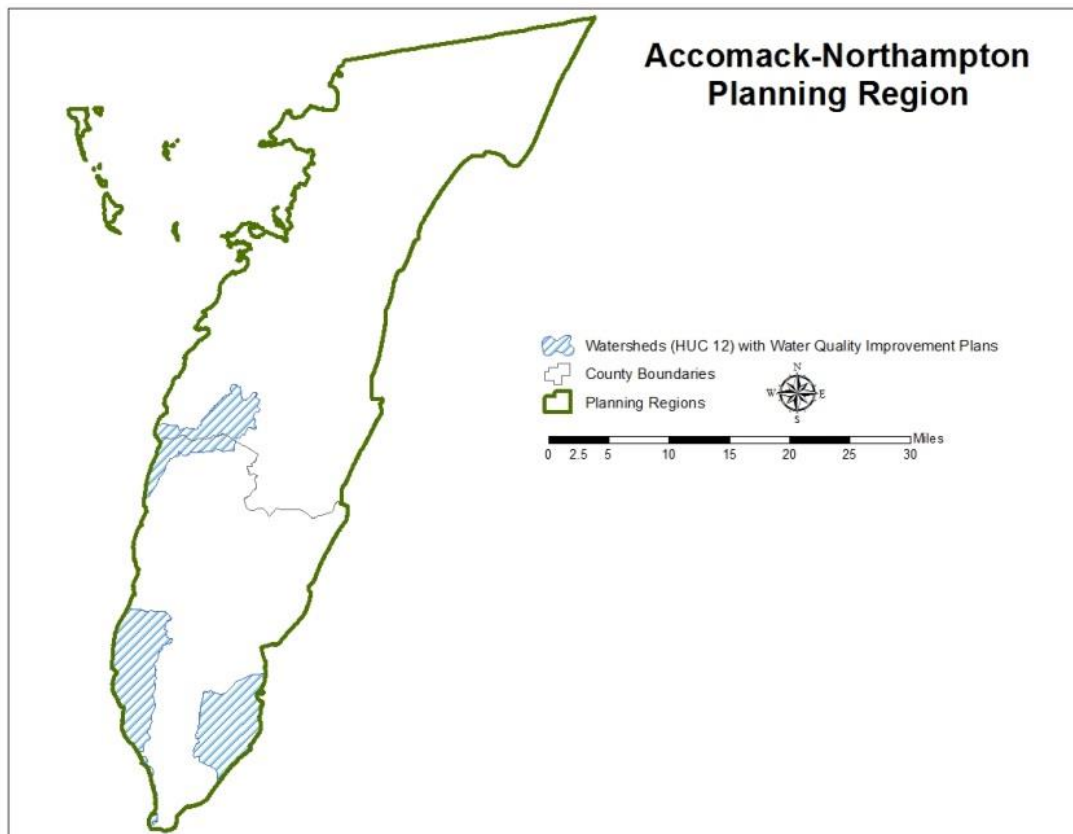


Figure 8. Watersheds with Water Quality Improvement Plans.

Each of these watersheds is designated as being impaired, and the primary actions needed to improve water quality within these watersheds include:

- Establishing riparian vegetative buffers along waterways;
- Establishing waste storage facilities (such as dairy lagoons, or waste sheds) to better manage livestock waste and prevent flow into the river;
- Establishing retention ponds or features to manage and slow storm water runoff from cropland, pastures, forests, and barren lands;
- Working with landowners to implement small acreage grazing systems;
- Repairing or replacing failing septic systems and pit privies; and
- Working to prevent pet waste from entering waterways and establishing a pet litter program to encourage owners to clean up pet waste.

Members of Virginia’s conservation community may consider working in other watersheds of local significance that may not have a Water Quality Improvement Plan. The Virginia Watershed Integrity Model identifies high value watersheds within the planning region for conservation based on their proximity to headwater streams, drinking water source protection, and biological integrity indices (Ciminelli and Scrivani 2007). These areas provide a starting point for identifying additional areas to focus conservation efforts (Figure 9).

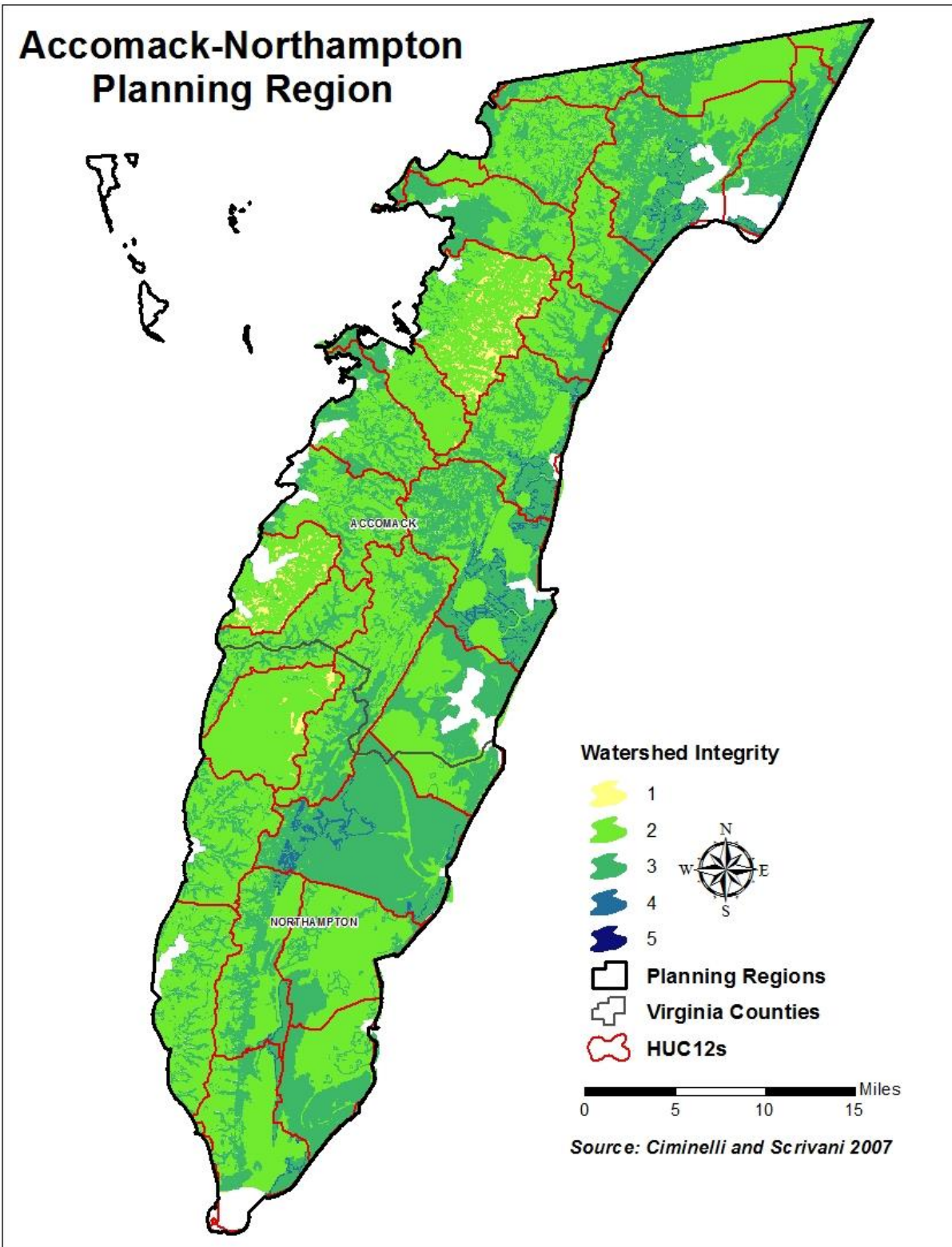


Figure 9. Watershed Integrity Model for Accomack Northampton Planning Region (Ciminelli and Scivani 2007).

Several conservation actions common to most water quality and instream habitat enhancement plans can be implemented with little chance of ill consequence to wildlife or human communities downstream in these areas. Some of the most beneficial actions would include:

- Working with landowners to prevent livestock waste from entering streams;
- Restoring or enhancing vegetated riparian buffers; and
- Working to enhance the health of upland forests and grassland habitats.

Additionally, many agencies help landowners in the Accomack-Northampton Planning Region establish vegetative buffers along waterways flowing through their properties. The Virginia Department of Forestry (DOF), Virginia Department of Agriculture and Consumer Services (VDACS), and DCR have established BMPs for various land uses which, if implemented serve to minimize land use impacts upon adjacent and downstream waters. In addition, landowners are encouraged to work with DOF through the Forest Stewardship Program to utilize timber production BMPs, such as implementation of buffers and careful planning of roads and stream crossings, and agricultural producers are encouraged to work with VDACS and the local Soil and Water Conservation Districts to control erosion and limit runoff through the various available programs (DOF 2014; DCR 2014). NRCS provides landowners with other opportunities, including the Environmental Quality Incentives Program.

Stream restoration and connectivity projects (e.g., removing dams and culverts or modifying them to allow for passage) help improve and provide additional aquatic habitats for fish species within the state; however, there are many dams, and not all can or should be removed. Priority watersheds that would benefit from enhanced connectivity have been identified by the Chesapeake Bay Fish Prioritization Tool and the Southeast Aquatic Connectivity Assessment Tool (Figure 10) (Martin and Apse 2013).

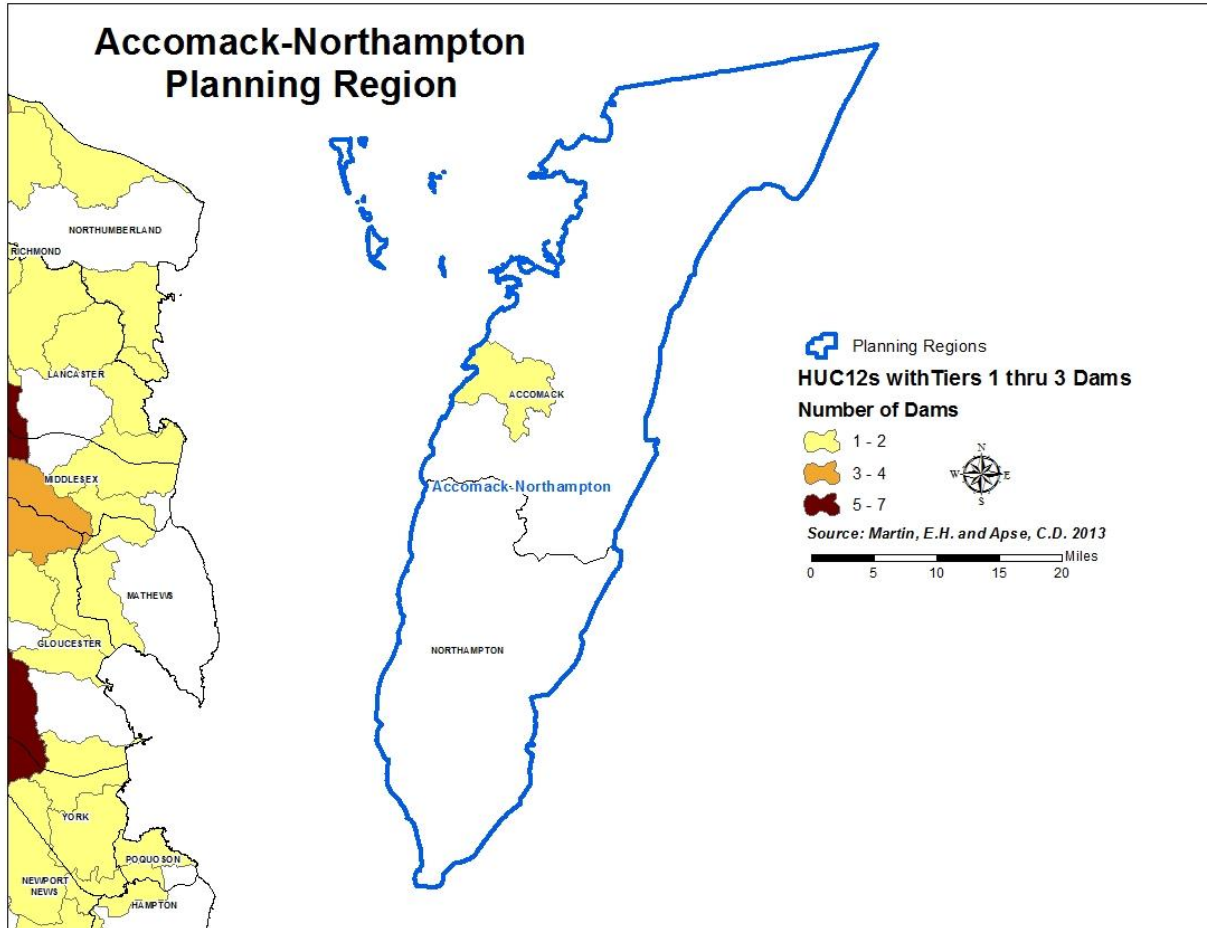


Figure 10. HUC12 Watersheds with Priority Dams for Removal/ Modification for Enhanced Connectivity (Martin and Apse 2013).

### Climate-Smart Management Actions

When planting, restoring, or maintaining riparian buffers, managers should consider how conditions may change in the area and work with appropriate vegetation. For example, if stream flow is expected to become erratic due to increased precipitation or more frequent flooding as is projected to occur, native tree and shrub species that can tolerate flood conditions and inundation should be included in the selected plant species. Utilizing native species that may provide better erosion control (broader, deeper roots) than other species should be encouraged. Techniques and tools may be needed (e.g., fencing, biomats, etc.) to ensure success. Because sea-level rise will likely be an issue, native tree and shrub species that have a broader salinity tolerance should be considered. Additionally, as stream temperatures will likely increase and hydrologic regimes may shift, it will be important to focus on maintaining and/ or improving stream connectivity to ensure aquatic organism can move to preferred habitats as these conditions change. Improving stormwater control methods, to ensure they account for predicted changes in precipitation and flow, could help minimize the future impacts of storm water under climate change (Kane 2013).

## Conserve and Manage Forest Habitats

Mixed hardwood and conifer forests do not make up a large percentage of Accomack Northampton Planning Region; however, these habitats are important for a broad range of coastal forest species. Approximately 7.8 percent of the planning region is covered with mixed hardwood and conifer forests (Table 5). Within this forest type the majority of the trees are mature. Young forest habitat can be loosely defined areas dominated by woody seedlings and saplings (Oehler et al. 2006). Previously, young forest was likely referred to as an early successional habitat for eastern portions of North America. Lack of young forest habitat has detrimental effects on the wildlife species that depend on this forest stage for survival. Mixed hardwood and conifer forests help protect water resources on the Peninsula and provide habitat for species such as the Delmarva fox squirrel, New Jersey chorus frog, Bicknell's thrush, Eastern wood-pewee, Eastern towhee, wood thrush, and migratory birds. The Eastern Shore also retains some of the best examples of the rare coastal plain maritime forests, which occur in small stands of stunted trees with contorted branches and dense vine layers that are often subject to salt spray, high winds, dune deposition, sand shifting, sand blasting, and occasional overwash (Anderson et al. 2013).

Table 5. Forest acreage totals in Accomack Northampton Planning Region (Anderson et al. 2013).

Forest Type	Acres	Percent of Planning Region
<b>Mixed Hardwood and Conifer</b>	47,111.67	7.82%

### Threats

1. Land Use Changes and Conversion: The largest threat to mixed hardwood and conifer forests on the Eastern Shore is fragmentation, mainly due to residential development and resulting roads. In many cases, as with urban or commercial development, the losses can be complete and have profound impacts on local wildlife species composition, water quality, and outdoor recreational opportunities. In other situations, such as conversion to pine plantations, the mixed forest habitat is lost, but the newly planted forest can be managed for several years to provide open young forest habitats that support a diversity of landowner goals, wildlife species, and recreational opportunities. If established BMPs are followed, impacts to waterways and adjoining properties can be prevented or mitigated such as through implementation of vegetative buffer areas (see below).
2. Invasive Species: Invasive plant species and pests are also a significant problem on the Eastern Shore. Of particular note is the southern pine beetle. Southern pine beetle infestations can cause extensive loss to pine trees. Loblolly, short leaf, and Virginia pine are the most affected species within Virginia (DOF 2014).
3. Climate Change: Climate change poses a significant threat to these forests. Sea-level rise and more intense storm events likely will not only inundate forested areas close to the coast, but may also result in significant salt spray and salt water intrusion into lower salinity areas. Climate change is also expected to affect precipitation regimes and result in warmer temperatures, potentially leading to more drought conditions that would be harmful to coastal forests.

4. Threats to Rare Maritime Forest Stands: Stands of both North Atlantic and Central Atlantic maritime forests exist on the Eastern Shore; however, they are rare. In 2007, VIMS completed a survey to delineate and determine the current distribution of maritime forests in Virginia (Berman and Berquist 2007). The review of satellite imagery and field surveys indicates that only 1,389 acres of North Atlantic maritime forest and 2,704 acres of Central Atlantic maritime forest can be found on the Eastern Shore. This report also notes that over 88 percent of the remaining North Atlantic coastal plain maritime forests and 100 percent of Central Atlantic maritime forests occur on conserved lands. As the majority of this forest type exists on protected lands, there are no immediate threats to their persistence; however, during the coming decades, these rare forest stands will likely be threatened by climate change, including sea-level rise and the threat of increasing storm intensity and frequency (Berman and Berquist 2007). As beaches and dunes migrate, it is unclear what actions, if any, can be taken to facilitate the health and persistence of these rare forest patches.

### **Conservation Management Actions**

Actions for conserving mixed hardwood conifer forests in Virginia's Eastern Shore may include working to conserve, either through acquisition, easement, cooperative management, or incentives, remaining intact forest patches capable of supporting a variety of Action Plan species. Land protection will help reduce conversion of forests to development. Additionally, working with landowners to ensure BMPs such as vegetative buffers are in place around agricultural or timber harvest areas will help prevent erosion and run off of sediments and nutrients into adjacent streams. Research demonstrates that vegetative riparian buffers can filter significant amounts of nutrient run off from timber operations and agricultural fields (DOF 2014). Some BMPs recommend a 50 foot buffer and allow some timber harvest within the buffers, while other BMPs encourage a 100 foot buffer with no harvest (DOF 2014; A. Ewing, Virginia Department of Game and Inland Fisheries, personal communication, 2015). BMPs also recommend building roads on areas with minimum slope and minimizing or avoiding stream crossings (DOF 2014).

Working to maintain forest health (balance age classes and diversity of tree species) is also integral to ensuring forest habitat is available to be conserved and protected. DOF makes several key recommendations that relate to habitat health, including but not limited to, using species within their native ranges, if feasible using a mix of tree species to help minimize susceptibility to pests, preventing unnecessary site disturbance, and protecting unusual (rare) forest habitats (DOF 2014). In terms of invasive species and pests, monitoring and control will be important to prevent their spread. Some of these forest habitats should be managed with thinning and prescribed burns to minimize outbreaks while also improving quality of wildlife habitats (USFWS 2014).

For forests in the southern tip of the Accomack Northampton planning region, specifically in the Eastern Shore of Virginia NWR, managers focus forestry conservation actions on providing dense understories with adequate fruit and insect resources for neotropical and temperate migratory bird species as this area is a critical stopover site (USFWS 2004). Small shrubland areas are managed for the same purpose. The NWR is also working to acquire additional surrounding lands, including forested areas (USFWS 2004).

The Delmarva fox squirrel occurs in more northern portions of the planning region, in Chincoteague NWR and on Assateague Island. Forests are being managed for diversity of mature pine and hardwood

forests with understories that are somewhat open, trees that bear seeds and nuts, and mature trees with hollow cavities (USFWS 2014). Management involves prescribed burns and thinning (USFWS 2014).

It will be extremely important to maintain the quality of habitats on lands that have already been conserved. Second, the conservation community may pursue opportunities to conserve other forest patches either through acquisition, easement, or agreement. Priority areas could include forest patches that buffer or expand conserved lands. Virginia has also been working with NASA Wallops Flight Facility, The Nature Conservancy, researchers, and other partners to track night-migrating birds using high frequency radar. If specific areas are determined to be important roosting and foraging areas, working to conserve and enhance their habitat value would also be a priority.

### **Climate-Smart Management Actions**

To best manage forests on the Eastern Shore as the climate changes, it will be imperative to understand how climate may affect potential future composition of forests in Virginia and how that may affect SCGN. Sea-level rise, salt water intrusion, and salt spray are expected to become more significant as sea levels rise and storms become more intense. Conservation and management efforts may need to focus on trees that can better withstand higher salinities, increased temperatures, and drought, among other impacts. Managers may wish to consult the U.S. Forest Service's tree atlas when planning management and conservation of these forests. Harvest guidelines may need to be revised, depending on projections for future tree composition. Invasive species monitoring and prevention will also become even more important to include in forest management as climate change may favor some tree pests, diseases, and invasive species.

In terms of considering how to best manage for birds, mammals, and other species that depend on these forests, managers may want to try to provide refugia for SGCN as habitat is lost as well as establishing corridors both north/ south and east/west between protected areas to assist with species movements as conditions change (King and Finch 2013). Setting aside areas to allow for migration of remaining maritime forest habitat should also be considered. It will be important to work to maintain species diversity and continue to reduce existing stressors that will likely exacerbate impacts from climate change (McKelvey et al. 2013).

### **EFFECTIVENESS MEASURES EXAMPLES**

As discussed within the Action Plan's Introduction (see Measuring the Effectiveness of Conservation Actions), it is increasingly important for the conservation community to demonstrate the effectiveness of conservation actions. Elected officials, budget authorities, private donors, and members of the public want to know that their investments in wildlife conservation are having the desired effects. During 2011, the Association of Fish and Wildlife Agencies developed and tested a series of effectiveness measures meant to support the Wildlife Action Plan implementation and the State Wildlife Grants program (AFWA 2011).

Virginia's 2015 Wildlife Action Plan describes a diversity of conservation actions that should help keep species from becoming endangered. The majority of these involve habitat protection, habitat restoration, controlling invasive species, or implementing efforts to keep pollutants from flowing into

Virginia’s waterways. Important data that can demonstrate the effectiveness of these conservation actions can include the following:

Conservation Action	Indicators of Effectiveness
<b>Creation of Vegetative/ Forest Buffers along Streams or Wetlands</b>	<ul style="list-style-type: none"> <li>• Before/ after photos of project site;</li> <li>• Photos documenting changes as vegetation matures over multiple years;</li> <li>• Before/ after measurements of sedimentation immediately downstream of site; and</li> <li>• Changes in the number and diversity of species utilizing the site.</li> </ul>
<b>Installation of Living Shorelines</b>	<ul style="list-style-type: none"> <li>• Before/ after photos of project site;</li> <li>• Photos documenting changes as vegetation matures over multiple years;</li> <li>• Before/ after measurements of shoreline loss; and</li> <li>• Before/after comparison of the number and diversity of species utilizing the site.</li> </ul>
<b>Control of Invasive Plants</b>	<ul style="list-style-type: none"> <li>• Before/ after photos of project site;</li> <li>• Photos documenting changes as restored vegetation matures over multiple years; and</li> <li>• Before/ after comparison of the number and diversity of species utilizing the site.</li> </ul>
<b>Remove Cattle from Streams</b>	<ul style="list-style-type: none"> <li>• Before/ after photos of project site;</li> <li>• Photos of alternative watering systems (if appropriate)</li> <li>• Photos documenting changes in shoreline as restored vegetation matures over multiple years;</li> <li>• Before/ after comparison of sediment and water chemistry immediately downstream of site; and</li> <li>• Before/ after comparison of the number and diversity of species utilizing the site.</li> </ul>
<b>Creating or Improving Open Habitats</b>	<ul style="list-style-type: none"> <li>• Before/after photos of project site;</li> <li>• Photos documenting changes to the site as the vegetation matures; and</li> <li>• Before/ after comparison of the number and diversity of species utilizing the site.</li> </ul>

## CONCLUSION

The development of the Virginia Wildlife Action Plan presented a unique opportunity for the Commonwealth—an opportunity not only to assess the condition and status of the state’s wildlife and habitat resources, but to provide a shared vision and purpose in the management and conservation of this “common wealth.” The true value of this initiative is this recognition of common interests and the enhancement of existing and fostering of new partnerships to address issues of mutual concern. The Action Plan’s long-term success will depend on the implementation of the recommended actions by



partners across the state and the effectiveness with which conservation partners collectively manage these natural resources.

This Local Action Plan Summary aims to prioritize species, habitats, and conservation actions within this planning region, so that partners working within this region can use limited resources to greatest effect. However, Virginia faces serious issues. Not addressing these problems would risk more species becoming threatened or endangered, the quality of our land and water would decline, and Virginians could lose important pieces of our natural heritage that contribute to our quality of life. However, there are significant conservation opportunities to benefit wildlife and people in the planning region. Our problems are not insurmountable, and most can be addressed with proven conservation management techniques.

Working to maintain and protect existing high quality habitat will be a priority before restoration; however, restoration is still an important action and necessary in many cases. On the Eastern Shore, priority conservation opportunities include:

- Protecting beaches, near and inshore waters, and barrier islands;
- Improving the quantity and quality of water in creeks and rivers through best management practices and water quality improvement mechanisms;
- Protecting and restoring coastal wetlands; and
- Conserving tracts of mature hardwood forests.

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## APPENDIX A. COMPLETE LIST OF SPECIES OF GREATEST CONSERVATION NEED IN ACCOMACK-NORTHAMPTON PLANNING REGION

Complete SGCN list for the Accomack-Northampton Planning Region (SGCN=79). Table includes federal and state statuses, Wildlife Action Plan Tier, and Conservation Opportunity Rankings. Species are listed in alphabetical by taxa.

Taxa	Conservation Status	Tier	Opportunity Ranking	Common Name	Scientific Name
<b>Amphibian</b>		IV	a	Eastern mud salamander	<i>Pseudotriton montanus montanus</i>
<b>Amphibian</b>		IV	c	Eastern spadefoot	<i>Scaphiopus holbrookii</i>
<b>Amphibian</b>		IV	c	New Jersey chorus frog	<i>Pseudacris kalmi</i>
<b>Bird</b>		II	a	American black duck	<i>Anas rubripes</i>
<b>Bird</b>		II	a	American oystercatcher	<i>Haematopus palliatus</i>
<b>Bird</b>		II	a	American woodcock	<i>Scolopax minor</i>
<b>Bird</b>		III	c	Bank swallow	<i>Riparia riparia</i>
<b>Bird</b>		III	a	Barn owl	<i>Tyto alba</i>
<b>Bird</b>		III	b	Belted kingfisher	<i>Megaceryle lcyon</i>
<b>Bird</b>		IV	a	Bicknell's thrush	<i>Catharus bicknelli</i>
<b>Bird</b>		II	a	Black skimmer	<i>Rynchops niger</i>
<b>Bird</b>		IV	a	Black-and-white warbler	<i>Mniotilta varia</i>
<b>Bird</b>		IV	a	Black-bellied plover	<i>Pluvialis squatarola</i>
<b>Bird</b>		III	a	Black-crowned night-heron	<i>Nycticorax nycticorax</i>
<b>Bird</b>		III	a	Brant	<i>Branta bernicla</i>
<b>Bird</b>		IV	a	Brown thrasher	<i>Toxostoma rufum</i>
<b>Bird</b>		IV	b	Chimney swift	<i>Chaetura pelagica</i>
<b>Bird</b>		IV	b	Clapper rail	<i>Rallus longirostris</i>
<b>Bird</b>		II	a	Common tern	<i>Sterna hirundo</i>
<b>Bird</b>		IV	a	Dunlin	<i>Calidris alpina hudsonia</i>
<b>Bird</b>		IV	a	Eastern kingbird	<i>Tyrannus tyrannus</i>
<b>Bird</b>		IV	a	Eastern meadowlark	<i>Sturnella magna</i>
<b>Bird</b>		IV	a	Eastern towhee	<i>Pipilo erythrophthalmus</i>
<b>Bird</b>		III	a	Eastern Whip-poor-will	<i>Caprimulgus vociferus</i>
<b>Bird</b>		IV	b	Eastern wood-pewee	<i>Contopus virens</i>
<b>Bird</b>		IV	a	Field sparrow	<i>Spizella pusilla</i>
<b>Bird</b>		III	a	Forster's tern	<i>Sterna forsteri</i>

Bird		I	a	Glossy ibis	<i>Plegadis falcinellus</i>
Bird		IV	a	Grasshopper sparrow	<i>Ammodramus savannarum</i>
Bird		IV	a	Gray catbird	<i>Dumetella carolinensis</i>
Bird		IV	a	Greater scaup	<i>Aythya marila</i>
Bird		IV	b	Green heron	<i>Butorides virescens</i>
Bird	ST	I	a	Gull-billed tern	<i>Sterna nilotica</i>
Bird		III	a	Kentucky warbler	<i>Oporornis formosus</i>
Bird		III	b	Least bittern	<i>Ixobrychus exilis</i>
Bird		III	a	Least tern	<i>Sterna antillarum</i>
Bird		II	a	Little blue heron	<i>Egretta caerulea</i>
Bird		IV	a	Marbled godwit	<i>Limosa fedoa</i>
Bird		IV	b	Marsh wren	<i>Cistothorus palustris</i>
Bird		III	b	Nelson's sparrow	<i>Ammodramus nelsoni</i>
Bird		III	a	Northern bobwhite	<i>Colinus virginianus</i>
Bird		III	a	Northern harrier	<i>Circus cyaneus</i>
Bird		IV	c	Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>
Bird	ST	I	a	Peregrine falcon	<i>Falco peregrinus</i>
Bird	FTST	III	a	Piping plover	<i>Charadrius melodus</i>
Bird		IV	c	Purple sandpiper	<i>Calidris maritima</i>
Bird	FTST	I	a	Red knot	<i>Calidris canutus rufus</i>
Bird		IV	a	Royal tern	<i>Sterna maxima</i>
Bird		IV	b	Rusty blackbird	<i>Euphagus carolinus</i>
Bird		III	a	Saltmarsh sparrow	<i>Ammodramus caudacutus</i>
Bird		IV	b	Seaside sparrow	<i>Ammodramus maritimus</i>
Bird		IV	a	Short-billed dowitcher	<i>Limnodromus griseus</i>
Bird		IV	b	Virginia rail	<i>Rallus limicola</i>
Bird		IV	a	Whimbrel	<i>Numenius phaeopus</i>
Bird	SE	I	a	Wilson's plover	<i>Charadrius wilsonia</i>
Bird		IV	b	Wood thrush	<i>Hylocichla mustelina</i>
Bird		III	a	Yellow-billed cuckoo	<i>Coccyzus americanus</i>
Bird		IV	a	Yellow-breasted chat	<i>Icteria virens</i>
Fish		III	a	American eel	<i>Anguilla rostrata</i>
Fish		I	b	Atlantic sturgeon	<i>Acipenser oxyrinchus</i>
Fish		IV	c	Least brook lamprey	<i>Lampetra aepyptera</i>
Fish	FESE	I	a	Shortnose sturgeon	<i>Acipenser brevirostrum</i>
Insect	FTST	II	a	Northeastern beach tiger beetle	<i>Cicindela dorsalis dorsalis</i>

<b>Mammal</b>		II	c	Delmarva fox squirrel	<i>Sciurus niger cinereus</i>
<b>Mammal</b>	FE	IV	b	Fin whale	<i>Balaenoptera physalus</i>
<b>Mammal</b>	FESE	II	a	Gray bat	<i>Myotis grisescens</i>
<b>Mammal</b>		IV	c	Harbor porpoise	<i>Phocoena phocoena</i>
<b>Mammal</b>	FE	I	b	Northern right whale	<i>Eubalaena glacialis</i>
<b>Mammal</b>	FE	IV	b	West Indian manatee	<i>Trichechus manatus latirostris</i>
<b>Reptile</b>	SE	II	a	Canebrake rattlesnake	<i>Crotalus horridus (canebrake)</i>
<b>Reptile</b>		IV	a	Common ribbonsnake	<i>Thamnophis sauritus sauritus</i>
<b>Reptile</b>		III	a	Eastern box turtle	<i>Terrapene carolina carolina</i>
<b>Reptile</b>		IV	c	Eastern hog-nosed snake	<i>Heterodon platirhinos</i>
<b>Reptile</b>	FTSE	I	b	Green Sea Turtle	<i>Chelonia mydas</i>
<b>Reptile</b>	FESE	I	a	Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>
<b>Reptile</b>	FESE	I	c	Leatherback Sea Turtle	<i>Dermochelys coriacea</i>
<b>Reptile</b>	FTST	I	a	Loggerhead sea turtle	<i>Caretta caretta</i>
<b>Reptile</b>	CC	II	a	Northern diamondback terrapin	<i>Malaclemys terrapin terrapin</i>
<b>Reptile</b>	CC	III	a	Spotted turtle	<i>Clemmys guttata</i>



## APPENDIX B. SGCN SPATIAL ANALYSIS METHODS

### *Analysis Units*

The species data was analyzed within three spatial units for Virginia: county, planning region, and hydrologic unit (HUC12). The source spatial data for these units were provided by Virginia Department of Game and Inland Fisheries (DGIF). The analysis extent was constrained to that of the Virginia counties, so that portions of the planning region and HUC12 units falling outside of the county boundaries were eliminated from the analysis. Each of the 21 planning region units was assigned an alphabetic code (e.g. Accomack-Northampton = "ACNO"). Nottoway County does not fall within the jurisdiction of any Virginia planning region and was not included in any of our analyses.

### *Species Data*

The source data for the species analysis consisted of three datasets, all of which were provided by DGIF: aquatic tier I-II plus species, terrestrial potential and confirmed species, and peer-reviewed HUC12 species. Within these datasets, individual species are identified by Biota of Virginia (BOVA) code.

### *Methods*

#### **Aquatic Species**

The aquatic species are represented in the source dataset by linear stream segments, or reaches. For each BOVA code present, the total length was calculated for all assigned reaches within the analysis extent. The dataset was then divided by the three analysis units, and the total BOVA length was summarized again by county, planning region, and HUC12. The BOVA percent of total length was calculated by dividing the species length for the analysis unit by the total species length.

#### **Terrestrial Species**

The terrestrial species are represented in the source dataset by area. For each BOVA code present, the total area was calculated within the analysis extent. The dataset was then divided by the three analysis units, and the total BOVA area was summarized again by county, planning region, and HUC12. The BOVA percent of total area was calculated by dividing the species area for the analysis unit by the total species area in Virginia.

#### **Peer-Reviewed HUC12 Species**

The peer-reviewed species are represented in the source dataset by 6<sup>th</sup> order hydrologic units. For each BOVA code present, the total area was calculated within the analysis extent. The dataset was then divided by the county and planning region analysis units, and the total BOVA area was summarized by county, planning region, and HUC12. The BOVA percent of total area was calculated by dividing the species area for the analysis unit by the total species area.

## **Priority SGCN**

For each planning region, priority species were identified as those SGCNs with a total planning region unit area or length  $\geq 10\%$  of the total SGCN area or length for Virginia. SGCN unit calculations were drawn from only one of the source datasets: if an SGCN was present in both the aquatic dataset and the HUC12 dataset, then the aquatic dataset took preference; and if an SGCN was present in the terrestrial dataset and the HUC12 dataset, then the terrestrial dataset took preference.