



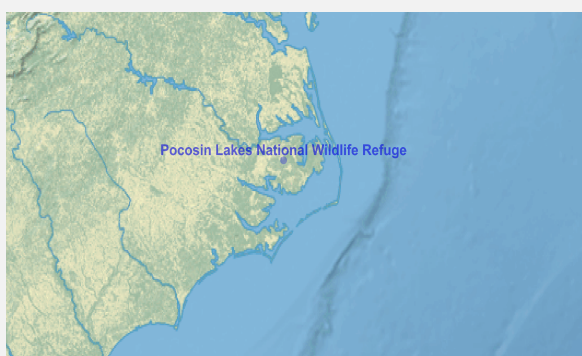
Ramsar Information Sheet

Published on 24 June 2025

Update version, previously published on : 17 January 2025

United States of America

Pocosin Lakes National Wildlife Refuge



Designation date	18 November 2024
Site number	2556
Coordinates	35°43'06"N 76°20'43"W
Area	47 000,00 ha

Color codes

Fields back-shaded in light blue relate to data and information required only for RIS updates.

Note that some fields concerning aspects of Part 3, the Ecological Character Description of the RIS (tinted in purple), are not expected to be completed as part of a standard RIS, but are included for completeness so as to provide the requested consistency between the RIS and the format of a 'full' Ecological Character Description, as adopted in Resolution X.15 (2008). If a Contracting Party does have information available that is relevant to these fields (for example from a national format Ecological Character Description) it may, if it wishes to, include information in these additional fields.

1 - Summary

Summary

The North Carolina Pocosin Lakes National Wildlife Refuge (NWR) covers approximately [44,600] hectares and is one of the largest contiguous wetland tracts in the State of North Carolina as well as on the Atlantic Coast of the USA. The refuge is named for the pocosin habitat that dominates the landscape and for the lakes that occur within the pocosin. A pocosin is a swamp on a hill dominated by a dense, shrubby plant community and deep organic soil, often peat. The site is situated on a peninsula that is bounded to the north by Albemarle Sound and to the south by Pamlico Sound, combining to form the second largest estuary in the USA. The majority of the wetlands in PLNWR are pocosins (including some pond pine canebrakes, a critically endangered ecosystem), but the site also includes substantial areas of bay forest, peatland Atlantic white cedar forest (an imperiled ecosystem), mixed pine flatwoods, hardwood swamp forest, cypress gum swamp and marshes, and three large natural lakes. The refuge is also adjacent to Pettigrew State Park, which contains a fourth large lake, Phelps Lake. Peat soil is a defining feature of most of the wetlands, with depths of up to five meters at the Refuge. The wetlands provide important habitat to one of the densest populations of black bear in the coastal regions of the southeastern USA, neotropical migratory birds, a large diversity of reptiles and amphibians including the northernmost population of American alligators, the only population of endangered red wolves in the wild in the USA, the federally listed northern long-eared bat, and the endangered red-cockaded woodpecker, which is uniquely adapted to pocosin habitat. The lakes provide wintering habitat to tens of thousands of waterfowl, including a substantial part of the Atlantic coast wintering population of tundra swans. The marsh areas transitioning to the estuaries provide nursery habitat to several fish species important to the Atlantic fishery.

2 - Data & location

2.1 - Formal data

2.1.1 - Name and address of the compiler of this RIS

Responsible compiler

Institution/agency	Department of the Interior, U.S. Fish and Wildlife Service
Postal address	5275 Leesburg Pike Falls Church, VA 22041-3803 United States

National Ramsar Administrative Authority

Institution/agency	Department of the Interior, U.S. Fish and Wildlife Service
Postal address	U.S Fish and Wildlife Service 1849 C Street, NW Washington, DC 20240 United States

2.1.2 - Period of collection of data and information used to compile the RIS

From year	1980
To year	2020

2.1.3 - Name of the Ramsar Site

Official name (in English, French or Spanish)	Pocosin Lakes National Wildlife Refuge
Unofficial name (optional)	Pocosin Lakes NWR

2.1.4 - Changes to the boundaries and area of the Site since its designation or earlier update

(Update) A. Changes to Site boundary	Yes <input type="radio"/> No <input checked="" type="radio"/>
(Update) B. Changes to Site area	No change to area
(Update) For secretariat only: This update is an extension	<input type="checkbox"/>

2.1.5 - Changes to the ecological character of the Site

(Update) 6b i. Has the ecological character of the Ramsar Site (including applicable Criteria) changed since the previous RIS?	Not evaluated
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2.2 - Site location

2.2.1 - Defining the Site boundaries

b) Digital map/image

<1 file(s) uploaded>

Former maps	0
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Boundaries description

Pocosin Lakes National Wildlife Refuge (NWR) is in Tyrrell, Washington, and Hyde Counties, North Carolina. The eastern edge of the refuge is on the Alligator River, just west of the Alligator River National Wildlife Refuge, and 43.5 km (27 miles) west of the Atlantic Ocean. The northern edge of the refuge is near U.S. Highway 64, 6.4 km (four miles) south of Albemarle Sound. The western edge of the refuge is just east of North Carolina Highway 45. The southern edge of the refuge is on the Intracoastal Waterway, 4.8 km (three miles) north of Mattamuskeet National Wildlife Refuge. The Ramsar Site boundaries were defined based on the boundaries of the National Wildlife Refuge, established in 1990.

Pocosin Lakes Refuge was established in 1990 when The Conservation Fund in conjunction with the Richard King Mellon Foundation donated over 93,000 acres to the U.S. Fish & Wildlife Service. The majority of the refuge consists of one contiguous piece with several small parcels of land that are not connected. Since 1990, the refuge has been restoring the natural hydrology to make the pocosins wet again. This will provide a healthy, functioning wetland; improving wildlife habitat, water quality, and sequestering (i.e., storing) tons of carbon and nitrogen that would have been released into the atmosphere and waterways.

2.2.2 - General location

a) In which large administrative region does the site lie?	State of North Carolina in the USA
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b) What is the nearest town or population centre?

Columbia, North Carolina

2.2.3 - For wetlands on national boundaries only

a) Does the wetland extend onto the territory of one or more other countries? Yes ☐ No ☒

b) Is the site adjacent to another designated Ramsar Site on the territory of another Contracting Party? Yes ☐ No ☒

2.2.4 - Area of the Site

Official area, in hectares (ha): 47000

Area, in hectares (ha) as calculated from GIS boundaries 47262.887

2.2.5 - Biogeography

Biogeographic regions

Regionalisation scheme(s)	Biogeographic region
Marine Ecoregions of the World (MEOW)	41. Virginian
Other scheme (provide name below)	Coastal and Piedmont Ecosystems
Other scheme (provide name below)	Eastern Temperate Forest

Other biogeographic regionalisation scheme

The Virginian Ecoregion is part of the Marine Ecoregions of the World (MEOW) scheme, specifically within the Temperate Northern Atlantic Realm and the Warm Temperate Northwest Atlantic Province. Geographically, it spans coastal and shelf waters from southern New Jersey to Cape Hatteras, North Carolina, serving as a transitional zone between the colder waters of the north and warmer southern waters. This ecoregion supports diverse habitats such as estuaries, sandy beaches, salt marshes, and coastal lagoons, providing critical environments for species like Atlantic menhaden, striped bass, and migratory marine mammals and sea turtles. While it hosts commercially and ecologically important species, it faces significant threats from coastal development, pollution, climate change, and overfishing. Conservation efforts aim to mitigate these pressures and safeguard the biodiversity and ecological integrity of the region, which is particularly vital in understanding the impacts of human activity and climate dynamics on marine systems (Spalding et al., 2007).

Reference: Spalding, M. D., Fox, H. E., Halpern, B. S., McManus, M. A., Molnar, J., Allen, G. R., ... & Robertson, J. (2007). Marine Ecoregions of the World: A bioregionalization of coastal and shelf areas. *BioScience*, 57(7), 573-583.

This region is part of the physiographic area known as the South Atlantic Coastal Plain and the US Fish and Wildlife Service administrative ecosystem known as the Coastal and Piedmont Ecosystems. It has been identified by the South Atlantic Landscape Conservation Cooperative as one of the highest conservation priorities in the Cooperative's region.

Reference: Smithsonian Environmental Research Center. (n.d.). The Piedmont and Coastal Plain Ecosystems. Smithsonian Ocean Portal. Retrieved from <https://ocean.si.edu>

The mid-Atlantic region where the refuge is located is also identified by the regionalisation scheme known as Eastern Temperate Forest.

Reference: Gilliam FS, Goodale CL, Pardo LH, Geiser LH, and Lilleskov, EA. 2011. Eastern temperate forests, Chapter 10. In: Pardo LH, Robin-Abbott MJ, Driscoll, CT, eds. Assessment of Nitrogen deposition effects and empirical critical loads of Nitrogen for ecoregions of the United States.

3 - Why is the Site important?

3.1 - Ramsar Criteria and their justification

- ☒ Criterion 1: Representative, rare or unique natural or near-natural wetland types

Hydrological services provided

Pocosins are the topographic high on the regional landscape along much of the inland coast in North Carolina and as such they are the main source of freshwater water for many coastal areas in North Carolina. One of the main hydrologic services they provide is a hydrologic head of freshwater that prevents saltwater intrusion from current coastal sea level rise.

The largest area of the wetland complex is the low pocosin, which has the deepest peat, is fed primarily by rainfall (ombrotrophic), and is thus nutrient poor. It is the source of water for the region as runoff drains slowly from low pocosins to shallow dystrophic lakes or the surrounding tall pocosins. The water that flows laterally into shallow lakes or into small streams then flows to the bay forest communities at the downstream end of pocosin systems. These bay forest sites are more nutrient rich (minerotrophic) since they are in contact with mineral soils and have nutrient inputs from the pocosin runoff. Shallow ground water transfers also are thought to take place among the components of the pocosin complex but no extensive studies have been done to quantify this. It is clear, however, that pocosins are the main source of freshwater on the coastal landscape where they cover large areas. The amount and timing of runoff from these wetlands is critical to downstream flows and estuarine water quality (Richardson 2010).

In natural pocosins, > 90% of water output is through evapotranspiration if the rainfall is primarily during the summer and fall, but shifts to runoff if precipitation occurs in winter and spring (Daniel 1981). The water storage capacity of pocosins is thus limited in the winter and early spring months when low evapotranspiration (ET) and high rainfall have caused the soil to become saturated. High evapotranspiration during the summer can lower the water table 60 to 90 cm below the land surface, giving the wetlands extensive storm water storage capacity (Gilliam and Skaggs 1981, Bridgham and Richardson 2003). Annual variation in rainfall and ET studied over several decades shows that runoff from pocosins can vary considerably during periods of drought or extreme rainfall. Following several years of high rainfall and reduced soil storage capacity, runoff reached nearly 75 cm/yr in wet years, while runoff dropped to near 10 cm/yr following low rainfall periods and higher ET (Gilliam and Skaggs 1981).

Carbon sequestration:

Duke University Wetland Center research has demonstrated that pocosin peats and carbon (C) storage are sustainable when restoration of hydrologic conditions closely match natural site conditions, especially when native fire-adapted plant species, which produce resistant C compounds—phenolics and aromatics—that enhance C sequestration and reduce greenhouse gases (GHG) losses, are re-established. Thus, both hydrologic and fire management are keys to maintaining fire-adapted native plant species, whose phenolic production in peats are the latchkey that controls C sequestration and long-term C storage (Wang et al., 2015, Flanagan et al 2020).

Consequently, the restoration of these ecosystems has extremely high potential for carbon sequestration, as they have been shown to not emit significant amounts of greenhouse gases back to the atmosphere, especially methane, when rewet (Richardson et al., 2014, Wang et al., 2015). It has also been shown that pocosins that have undergone reflooding and restoration on thousands of hectares at Pocosin Lakes Wildlife Refuge, with more natural hydrologic conditions, do not experience deep muck fires and lighter surface fires help preserve their vast stock of carbon (Flanagan et al., 2020).

Other ecosystem services provided

Hydrologic restoration and revegetation with native species are thus essential for maximizing pocosin C sequestration abilities and protection of the ancient C stocks often found in peat in depths up to 1-4 meters. A preliminary range of net annual C sequestration values, based on 5 years of research at Pocosin Lakes Wildlife Refuge, where hydrologic conditions and C fluxes were quantified on reference, restored, and drained blocks from (2012-2017), has shown that restoration of formally drained NC peatland sites (sequestration) minus drained sites losses produce conservative net annual estimates of C credits of 14 to 17 t CO₂-e ha⁻¹ yr⁻¹ (Richardson et al., 2014, unpublished data). These net C credit values are some of the largest ever recorded and demonstrate the great potential for NC peatlands to store carbon.

Pocosin Lakes National Wildlife Refuge contains representative examples of wetland types characteristic of the Eastern Temperate Forest biogeographic region, including pocosins, waterbodies with natural lake shorelines, such as Lake Phelps, permanent marshes, and swamp forests. These wetlands provide critical habitat for waterfowl and other key animal and plant species. This Site's unique landscapes also attract many visitors every year, providing important cultural services.

Other reasons

Peatlands are under-represented in the Ramsar List and are identified as particularly vulnerable and threatened by habitat loss and degradation. Natural remaining North Carolina Pocosin Peatlands cover approximately one-quarter of a million hectares and are unique, as they comprise the largest remaining, mostly contiguous, and largely intact pocosin peatlands in the world. Pocosin Lakes National Wildlife Refuge represents nearly 20% of the remaining peatlands. Large areas of peatland are normally of higher importance than small areas for their hydrological, carbon storage, and paleoecological value. While the North Carolina Pocosin Peatlands have been affected by past timbering, drainage and hydrological modification, road construction, and some agricultural and forestry uses, restoration of hydrology and natural communities is underway, facilitated by public ownership and management of the wetlands. North Carolina Pocosin Peatlands provide habitat for species intolerant of human disturbance, such as black bear and red wolf, and thus contribute to regional biodiversity.

In addition, the refuge contains the following:

- Permanent freshwater lakes: Wetlands in the biogeographic region where the site is located are representative (3ha).
- Permanent freshwater marshes/pools: Wetlands in the biogeographic region where the site is located are representative (399ha).
- Shrub dominated wetlands: Wetlands in the biogeographic region where the site is located are rare (25858ha).
- Freshwater tree dominated wetlands: Wetlands in the biogeographic region where the site is located are rare(15223ha).
- Permanent forested peatlands: Wetlands in the biogeographic region where the site is located are rare(1264ha).
- Ponds: These moist soil areas are managed (179ha).

☒ Criterion 2 : Rare species and threatened ecological communities

Optional text box to provide further information

The site directly or indirectly supports the following threatened ecological communities: Peatland Atlantic white cedar forest (imperiled), and pond pine canebrake (critically imperiled).

The site supports the following vulnerable, endangered, or critically endangered species: wood stork (*Mycteria americana*), shortnose sturgeon (*Acipenser brevirostrum*), roseate tern (*Sterna dougallii*), red wolf (*Canis rufus*), red-cockaded woodpecker (*Leuconotopicus borealis*), northern long-eared bat (*Myotis septentrionalis*), spotted turtle (*Clemmys guttata*), bald eagle (*Haliaeetus leucocephalus*), and the sensitive joint-vetch plant (*Aeschynomene virginica*). The refuge includes the northern range for the American alligator (*Alligator mississippiensis*) and provides habitat for the Bachman's sparrow (*Peucaea aestivalis*).

Through ecosystems benefits, including improved water quality flowing into the Pamlico Sound and Atlantic Ocean, the refuge indirectly benefits these vulnerable, endangered, or critically endangered species: West Indian manatee (*Trichechus manatus manatus*), hawksbill sea turtle (*Eretmochelys imbricata*), Kemp's ridley sea turtle (*Lepidochelys kempii*), leatherback sea turtle (*Dermochelys coriacea*), finback whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), right whale (*Eubalaena glacialis*), sperm whale (*Physeter macrocephalus*), green sea turtle (*Chelonia mydas*), and loggerhead sea turtle (*Caretta caretta*).

☒ Criterion 3 : Biological diversity

Justification

Pocosin Lakes National Wildlife Refuge, as part of the North Carolina Pocosin Peatlands, support populations of plant and animal species important for maintaining the biological diversity of the Eastern Temperate Forest biogeographic region. The wetlands provide habitat for the only wild population of endangered red wolves, the native wolf of the southern eastern temperate forest once extinct in the wild and now successfully re-established in the North Carolina Pocosin Peatlands and surrounding lands.

The large tracts of forested wetlands also provide habitat for one of the densest populations of black bear in the eastern temperate forest. Lakes in the area provide habitat to a large proportion of the wintering Atlantic coast population of tundra swans. Forested wetlands provide breeding habitat for a significant number of Wayne's black-throated green warblers.

☒ Criterion 4 : Support during critical life cycle stage or in adverse conditions

Optional text box to provide further information

Pocosin Lakes National Wildlife Refuge provides habitat for migratory, wintering waterfowl, including approximately 26,000 tundra swans, 80,000 snow geese, and over 25,000 dabbling and diving ducks (green-winged teal, ringed-neck duck, mallard, gadwall, hooded merganser, northern pintail, ruddy duck, canvasback, wood duck and other species). The dense pocosins provide sheltered refuge sites and denning sites for black bears, which exist at estimated densities as high as any reported in research literature. The refuge provides habitat for a specially adapted population of the endangered red-cockaded woodpecker, which has a higher tolerance of mid-story nesting trees than populations located in long leaf pine ecosystems.

☒ Criterion 5 : >20,000 waterbirds

Overall waterbird numbers 1,479,889 waterbirds

Start year 1988

End year 2007

Source of data: https://www.fws.gov/sites/default/files/documents/Pocosin_Lakes_NWR_CCP.pdf

Optional text box to provide further information

Data on ducks, snow and canada geese, tundra swans and coots were gathered from 1988 to 2005. Total counts of these animals was 1,479,889 which averages >87,000 per year. The lakes and lands managed for migratory waterfowl with the North Carolina pocosin Peatlands support well over 100,000 overwintering waterbirds. Peak winter waterfowl counts for the Pungo Unit of Pocosin Lakes National Wildlife Refuge in 2006-2007 were 90,000 snow and Canada geese, 38,000 tundra swans, and 60,000 ducks. Smaller but significant numbers of waterfowl use Lake Phelps, New Lake and estuarine marshes. This information can be found in the source provided.

Optional text box to provide further information

Pocosin Lakes National Wildlife Refuge lakes and lands managed for waterfowl support approximately 20% percent of the eastern population of tundra swans. The forested wetlands likely support a substantial percentage of the Wayne's black-throated green warbler (*Dendroica virens waynei*) population (well in excess of 1 percent) but census data are lacking.

☒ Criterion 7 : Significant and representative fish

Justification

The wetland provides critical habitat for fish species of the Mid-Atlantic Coastal Plain. The wetland complex provides nursery habitat for diverse fish species- such as Phelps Lake which hosts an endemic killifish (*Fundulus cf. diaphanus*) as well as a population of the Waccamaw killifish (*Fundulus waccamensis*) which is also endemic to the region. Lake Phelps holds significant populations of these species. These two species are also representative of healthy wetlands and water quality. These benefits contribute to other healthy populations of fish and global biological diversity.

☒ Criterion 8 : Fish spawning grounds, etc.

Justification

The tributaries of the Alligator and Scuppernong Rivers support spawning for anadromous and migratory species including striped bass, alewife, blueback herring, flounder and Atlantic menhaden. It is also an important area for wintering juvenile striped bass.

Optional text box to provide further information

The federally listed northern long-eared bat has been documented on the refuge but percentage of the population on the refuge is unknown at this time.

3.2 - Plant species whose presence relates to the international importance of the site

Phylum	Scientific name	Criterion 2	Criterion 3	Criterion 4	IUCN Red List	CITES Appendix I	Other status	Justification
Plantae								
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Aeschynomene virginica</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	Global Status G2: Imperiled Listed: US, MD, NJ, NC, PA	Natural Heritage Program of NC-Rare Plant List 2018 USDA Plants Database. The site provides refuge during droughts
TRACHEOPHYTA / LILIOPSIDA	<i>Amphicarpum amphicarpon</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	State Listed: MA, NY	USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Bacopa caroliniana</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	State Listed: NC	NC Plant Conservation Program
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Bacopa rotundifolia</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	LC	<input type="checkbox"/>	State Listed: IN	USDA Plants Database Rare or characteristic of the biogeographic region. The site provides refuge during droughts.
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Cardamine longii</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	Global Status G3: Vulnerable State Listed: CT, ME, MD, MA, NH, NJ, NY	Natural Heritage Program of NC-Rare Plant List 2018 USDA Plants Database. Rare or characteristic of the biogeographic region. The site provides refuge during droughts.
TRACHEOPHYTA / LILIOPSIDA	<i>Carex hyalinolepis</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	LC	<input type="checkbox"/>	State Listed: PA	USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / LILIOPSIDA	<i>Carex lupuliformis</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	State Listed: CT, IN, MA, MI, NJ, NY, OH, WI	USDA Plants Database Rare or characteristic of the biogeographic region. The site provides refuge during droughts.
TRACHEOPHYTA / LILIOPSIDA	<i>Carex mitchelliana</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	State Listed: NY, PA, RI	USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / LILIOPSIDA	<i>Eleocharis equisetoides</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	State Listed: CT, IN, MD, NJ, NY, RI, TN	USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / LILIOPSIDA	<i>Eleocharis robbinsii</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	LC	<input type="checkbox"/>	State Listed: IN, MD, PA	USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / LILIOPSIDA	<i>Epidendrum magnoliae</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	State Listed: FL, GA	USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / LILIOPSIDA	<i>Eriocaulon parkeri</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Global Status G2G3: Imperiled/Vulnerable State Listed: CT, ME, MD, MA, NC, PA	Natural Heritage Program of NC-Rare Plant List 2018 USDA Plants Database. Rare or characteristic of the biogeographic region.

Phylum	Scientific name	Criterion 2	Criterion 3	Criterion 4	IUCN Red List	CITES Appendix I	Other status	Justification
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Fraxinus caroliniana</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	EN	<input type="checkbox"/>		Carolina Ash (<i>Fraxinus caroliniana</i>) has most recently been assessed for the IUCN Red List of Threatened Species in 2017. <i>Fraxinus caroliniana</i> is listed as Endangered under criteria A3e+4ae.. It is vulnerable to the emerald ash bore but thrives in Pocosin wetlands which contain moist acidic soil. Specifically adapted to a certain habitat or conditions provided by the wetland.
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Fraxinus pennsylvanica</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	CR	<input type="checkbox"/>		Green Ash (<i>Fraxinus pennsylvanica</i>) has most recently been assessed for the IUCN Red List of Threatened Species in 2017. <i>Fraxinus pennsylvanica</i> is listed as Critically Endangered under criteria A3e+4ae.. Due to the severe impact of the emerald ash borer, <i>Fraxinus pennsylvanica</i> has experienced significant declines. Specifically adapted to a certain habitat or conditions provided by the wetland.
TRACHEOPHYTA / LILIOPSIDA	<i>Heteranthera multiflora</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	State Listed: PA	USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Hottonia inflata</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	State Listed: CT, IN, ME, MD, NJ, NY, OH, PA, RI, TN	USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Kalmia cuneata</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	Global Status G3: Vulnerable State Listed: NC	Natural Heritage Program of NC-Rare Plant List 2018 USDA Plants Database. Rare or characteristic of the biogeographic region. The site provides refuge during droughts
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Lilaeopsis carolinensis</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	Global Status G3G5: Vulnerable/Secured State Listed: NC	Natural Heritage Program of NC-Rare Plant List 2018 USDA Plants Database. Rare or characteristic of the biogeographic region. The site provides refuge during droughts
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Ludwigia alata</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Global Status G3G5: Vulnerable/Secured	Natural Heritage Program of NC-Rare Plant List 2018. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Ludwigia brevipes</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Global Status G2: Imperiled	Natural Heritage Program of NC-Rare Plant List 2018. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Ludwigia lanceolata</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	State Listed: NC	NC Plant Conservation Program. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Lycopus angustifolius</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	State Listed: MA, NY, PA, RI	USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Lysimachia asperulifolia</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	Global Status G3: Vulnerable. Federal Listed. State Listed: NC	Natural Heritage Program of NC. Rare Plant List 2018. USDA Plants Database. Rare or characteristic of the biogeographic region. The site provides refuge during droughts
MARCHANTIOPHYTA / JUNGERMANNIOPSIDA	<i>Metzgeria uncigera</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Global Status G3: Vulnerable. Federal Listed. State Listed: TN	Natural Heritage Program of NC. Rare Plant List 2018. USDA Plants Database. Rare or characteristic of the biogeographic region.

Phylum	Scientific name	Criterion 2	Criterion 3	Criterion 4	IUCN Red List	CITES Appendix I	Other status	Justification
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Myriophyllum laxum</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	Global Status G3: Vulnerable State Listed: GA, NC	Natural Heritage Program of NC. Rare Plant List 2018. USDA Plants Database. Rare or characteristic of the biogeographic region. The site provides refuge during droughts
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Nelumbo lutea</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	LC	<input type="checkbox"/>	State Listed: MI, NJ, PA	USDA Plants Database. Rare or characteristic of the biogeographic region. The site provides refuge during droughts
TRACHEOPHYTA / LILIOPSIDA	<i>Neottia bifolia</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	State Listed: FL, KY, NY, PA, TN, VT	USDA Plants Database. Rare or characteristic of the biogeographic region. The site provides refuge during droughts
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Oenothera perennis</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Global Status G2G3: Imperiled/Vulnerable. State Listed: CT	Natural Heritage Program of NC-Rare Plant List 2018 USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / LILIOPSIDA	<i>Panicum dichotomum</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Global Status G2G3: Imperiled/Vulnerable State Listed: FL, IL, IN, MA, OH, PA	Natural Heritage Program of NC-Rare Plant List 2018 USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Parietaria praetermissa</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Global Status G3G4: Vulnerable/Apparently Secured	Natural Heritage Program of NC-Rare Plant List 2018. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / LILIOPSIDA	<i>Peltandra sagittifolia</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Global Status G3G4: Vulnerable/Apparently Secured	Natural Heritage Program of NC-Rare Plant List 2018. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / LILIOPSIDA	<i>Platanthera blephariglottis</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	LC	<input type="checkbox"/>	State Listed: CT, FL, MD, NY, OH, RI	USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Polygonum glaucum</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	Global Status G3: Vulnerable. State Listed: CT, MD, MA, NJ, NY, RI	Natural Heritage Program of NC-Rare Plant List 2018 USDA Plants Database. Rare or characteristic of the biogeographic region. The site provides refuge during droughts
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Pycnanthemum setosum</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	State Listed: MD	USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / LILIOPSIDA	<i>Rhynchospora alba</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	LC	<input type="checkbox"/>	State Listed: IL, TN	USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / LILIOPSIDA	<i>Rhynchospora nitens</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	State Listed: IN, MD, MA, NY	USDA Plants Database. Rare or characteristic of the biogeographic region. The site provides refuge during droughts
TRACHEOPHYTA / LILIOPSIDA	<i>Rhynchospora scirpoides</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	State Listed: CT, IN, MD, MA, MI, NY, RI, WI	USDA Plants Database. Rare or characteristic of the biogeographic region. The site provides refuge during droughts
TRACHEOPHYTA / LILIOPSIDA	<i>Sagittaria montevidensis calycina</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	State Listed: ME, MA, NY, PA	USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / LILIOPSIDA	<i>Schoenoplectus acutus</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	LC	<input type="checkbox"/>	State Listed: CT, PA	USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / LILIOPSIDA	<i>Schoenoplectus etuberculatus</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Global Status G3G4: Vulnerable/Apparently Secured State Listed: MD, RI	Natural Heritage Program of NC-Rare Plant List 2018 USDA Plants Database. Rare or characteristic of the biogeographic region.

Phylum	Scientific name	Criterion 2	Criterion 3	Criterion 4	IUCN Red List	CITES Appendix I	Other status	Justification
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Thalictrum macrostylum</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Global Status G3G4: Vulnerable/Apparently Secured	Natural Heritage Program of NC-Rare Plant List 2018. Rare or characteristic of the biogeographic region.
BRYOPHYTA / BRYOPSIDA	<i>Thuidium allenii</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Global Status G3G5: Vulnerable/Secured State Listed: OH	Natural Heritage Program of NC-Rare Plant List 2018 USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Trichostema micranthum</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Global Status G2: Imperiled	Natural Heritage Program of NC-Rare Plant List 2018. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Utricularia olivacea</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	LC	<input type="checkbox"/>	State Listed: NJ, NC	USDA Plants Database Rare or characteristic of the biogeographic region. The site provides refuge during droughts
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Utricularia resupinata</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	LC	<input type="checkbox"/>	State Listed: CT, IN, ME, MD, MA, NJ, PA, RI, TN, VT	USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Vaccinium macrocarpum</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	State Listed: IL, TN	USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / MAGNOLIOPSIDA	<i>Viola brittoniana</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	State Listed: CT, ME, MA, PA	USDA Plants Database. Rare or characteristic of the biogeographic region.
TRACHEOPHYTA / LILIOPSIDA	<i>Yucca gloriosa</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	LC	<input type="checkbox"/>	State Listed: FL	USDA Plants Database. Rare or characteristic of the biogeographic region. The site provides refuge during droughts
Fungi								
ASCOMYCOTA / LECANOROMYCETES	<i>Anzia ornata</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Global Status G1G3: Critically Imperiled/Imperiled	Natural Heritage Program of NC-Rare Plant List 2018. Rare or characteristic of the biogeographic region.

3.3 - Animal species whose presence relates to the international importance of the site

Phylum	Scientific name	Species qualifies under criterion				Species contributes under criterion				Pop. Size	Period of pop. Est.	% occurrence ¹⁾	IUCN Red List	CITES Appendix I	CMS Appendix I	Other Status	Justification
		2	4	6	9	3	5	7	8								
Others																	
CHORDATA / MAMMALIA	<i>Balaenoptera physalus</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				LC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Rare or characteristic of the biogeographic region.
CHORDATA / MAMMALIA	<i>Canis lupus rufus</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>	EXP (US), T (NC)	Regularly supports a high percentage of the remaining population Rare or characteristic of the biogeographic region. The site provides suitable habitat during breeding season.
CHORDATA / REPTILIA	<i>Caretta caretta</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				VU	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	T (US), T (NC)	Rapid population decline. Rare or characteristic of the biogeographic region.
CHORDATA / REPTILIA	<i>Chelonia mydas</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				EN	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	T (US), T (NC)	High risk of extinction Rare or characteristic of the biogeographic region.
CHORDATA / REPTILIA	<i>Clemmys guttata</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				EN	<input type="checkbox"/>	<input type="checkbox"/>		Rare or characteristic of the biogeographic region.

Phylum	Scientific name	Species qualifies under criterion				Species contributes under criterion				Pop. Size	Period of pop. Est.	% occurrence 1)	IUCN Red List	CITES Appendix I	CMS Appendix I	Other Status	Justification
		2	4	6	9	3	5	7	8								
CHORDATA / MAMMALIA	<i>Corynorhinus rafinesquii macrotis</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>	SC (NC)	Rare or characteristic of the biogeographic region. https://www.ecfr.gov/current/title-50/chapter-I/subchapter-B/part-17/subpart-B/section-17.11#p-17.11(h)
CHORDATA / MAMMALIA	<i>Corynorhinus rafinesquii rafinesquii</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>	T (NC)	Rare or characteristic of the biogeographic region. https://www.ecfr.gov/current/title-50/chapter-I/subchapter-B/part-17/subpart-B/section-17.11#p-17.11(h)
CHORDATA / REPTILIA	<i>Dermochelys coriacea</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				WU	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	E (US), E (NC)	Rapid population decline. Rare or characteristic of the biogeographic region.
CHORDATA / REPTILIA	<i>Eretmochelys imbricata</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				CR	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Rare or characteristic of the biogeographic region.
CHORDATA / MAMMALIA	<i>Eubalaena glacialis</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				CR	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Rare or characteristic of the biogeographic region.
CHORDATA /	<i>Fundulus waccamensis</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				WU	<input type="checkbox"/>	<input type="checkbox"/>		endemic and holds a significant portion of this species population
CHORDATA / REPTILIA	<i>Lepidochelys kempi</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				CR	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	E (US), E (NC)	Regularly supports a high percentage of the population during portions of their lifecycle. Rare or characteristic of the biogeographic region. The site provides critical habitat during larval stages
CHORDATA / MAMMALIA	<i>Myotis septentrionalis</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				NT	<input type="checkbox"/>	<input type="checkbox"/>	T-4(d) (US), T (NC)	Likely to qualify as threatened in the near future. Rare or characteristic of the biogeographic region. https://www.ecfr.gov/current/title-50/chapter-I/subchapter-B/part-17/subpart-B/section-17.11#p-17.11(h)
CHORDATA / MAMMALIA	<i>Perimyotis subflavus subflavus</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>	SR (NC)	Rapid population decline. Rare or characteristic of the biogeographic region.
CHORDATA / MAMMALIA	<i>Physeter macrocephalus</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				WU	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Rare or characteristic of the biogeographic region.
CHORDATA / MAMMALIA	<i>Trichechus manatus</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				WU	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	T (US), T (NC)	Rapid population decline. Rare or characteristic of the biogeographic region.
Fish, Mollusc and Crustacea																	
CHORDATA / ACTINOPTERYGII	<i>Acipenser brevirostrum</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				WU	<input checked="" type="checkbox"/>	<input type="checkbox"/>	E (US), E (NC)	Rapid population decline. Rare or characteristic of the biogeographic region.
CHORDATA / ACTINOPTERYGII	<i>Acipenser oxyrinchus</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				CR	<input type="checkbox"/>	<input type="checkbox"/>	E (US), E (NC)	Rare or characteristic of the biogeographic region.
CHORDATA / ACTINOPTERYGII	<i>Fundulus diaphanus</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				LC	<input type="checkbox"/>	<input type="checkbox"/>	SR (NC)	Endemic to Lake Phelps and supports a significant portion of the fish sub species. Rare or characteristic of the biogeographic region. https://www.ncwildlife.org/protected-wildlife-species-north-carolina/open
MOLLUSCA / BIVALVIA	<i>Leptodea ochracea</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				NT	<input type="checkbox"/>	<input type="checkbox"/>	T (NC)	Likely to qualify as threatened in the near future. Rare or characteristic of the biogeographic region. https://www.ncwildlife.org/protected-wildlife-species-north-carolina/open
MOLLUSCA / GASTROPODA	<i>Vertigo alabamensis</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>	SR (NC)	Likely to qualify as threatened in the near future. Rare or characteristic of the biogeographic region. https://www.ncwildlife.org/protected-wildlife-species-north-carolina/open
Birds																	

Phylum	Scientific name	Species qualifies under criterion				Species contributes under criterion				Pop. Size	Period of pop. Est.	% occurrence 1)	IUCN Red List	CITES Appendix I	CMS Appendix I	Other Status	Justification
		2	4	6	9	3	5	7	8								
CHORDATA/ AVES	<i>Aix sponsa</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1738	1999-2000		LC	<input type="checkbox"/>	<input type="checkbox"/>		Important wintering site. Approximately 1,738 in the winter of 1999-2000 (Pocosin Lakes NWR CCP).
CHORDATA/ AVES	<i>Anas acuta</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1896	1999-2000		VU	<input type="checkbox"/>	<input type="checkbox"/>		Important wintering site. Approximately 1,896 in the winter of 1999-2000 (Pocosin Lakes NWR CCP).
CHORDATA/ AVES	<i>Anas carolinensis</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10873	1999-2000		LC	<input type="checkbox"/>	<input type="checkbox"/>		Important wintering site. Approximately 10,873 in the winter of 1999-2000 (Pocosin Lakes NWR CCP).
CHORDATA/ AVES	<i>Anas platyrhynchos</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9412	1999-2000		LC	<input type="checkbox"/>	<input type="checkbox"/>		Important wintering site. Approximately 9,412 in the winter of 1999-2000 (Pocosin Lakes NWR CCP).
CHORDATA/ AVES	<i>Anser caerulescens caerulescens</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	80000	2006-2007			<input type="checkbox"/>	<input type="checkbox"/>		Important wintering site. Approximately 80,000 in the winter of 2006-2007 (Pocosin Lakes NWR CCP).
CHORDATA/ AVES	<i>Aythya collaris</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1096	1999-2000		LC	<input type="checkbox"/>	<input type="checkbox"/>		Important wintering site. Approximately 1,096 in the winter of 1999-2000 (Pocosin Lakes NWR CCP).
CHORDATA/ AVES	<i>Aythya valisineria</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				LC	<input type="checkbox"/>	<input type="checkbox"/>		Important wintering site. Species was not included in last survey, new survey needs to be conducted for an accurate number.
CHORDATA/ AVES	<i>Charadrius melodus circumcinctus</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>	E (US), E (NC)	Likely to qualify as threatened in the near future. Rare or characteristic of the biogeographic region. https://www.ecfr.gov/current/title-50/chapter-I/subchapter-B/part-17/subpart-B/section-17.11#p-17.11(h)
CHORDATA/ AVES	<i>Charadrius melodus melodus</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>	T (US), T (NC)	Rare or characteristic of the biogeographic region. https://www.ecfr.gov/current/title-50/chapter-I/subchapter-B/part-17/subpart-B/section-17.11#p-17.11(h)
CHORDATA/ AVES	<i>Cygnus columbianus</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	38000	2006-2007		VU	<input type="checkbox"/>	<input type="checkbox"/>		Important wintering site. Approximately 38,000 in the winter of 2006-2007 (Pocosin Lakes NWR CCP).
CHORDATA/ AVES	<i>Laterallus jamaicensis</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				EN	<input type="checkbox"/>	<input type="checkbox"/>	SC (NC)	High risk of extinction Rare or characteristic of the biogeographic region. https://www.ncwildlife.org/protected-wildlife-species-north-carolina/open
CHORDATA/ AVES	<i>Lophodytes cucullatus</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	49	1999-2000		LC	<input type="checkbox"/>	<input type="checkbox"/>		Important wintering site. Approximately 49 in the winter of 1999-2000 (Pocosin Lakes NWR CCP).
CHORDATA/ AVES	<i>Mareca strepera strepera</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	255	1999-2000			<input type="checkbox"/>	<input type="checkbox"/>		Important wintering site. Approximately 255 in the winter of 1999-2000 (Pocosin Lakes NWR CCP).
CHORDATA/ AVES	<i>Oxyura jamaicensis</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	639	1999-2000		LC	<input type="checkbox"/>	<input type="checkbox"/>		Important wintering site. Approximately 639 in the winter of 1999-2000 (Pocosin Lakes NWR CCP).
CHORDATA/ AVES	<i>Picoides borealis</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>	E (US), E (NC)	Likely to qualify as threatened in the near future. Rare to biogeographic region. Midstory nesting trees for breeding https://www.ecfr.gov/current/title-50/chapter-I/subchapter-B/part-17/subpart-B/section-17.11#p-17.11(h)

1) Percentage of the total biogeographic population at the site

3.4 - Ecological communities whose presence relates to the international importance of the site

Name of ecological community	Community qualifies under Criterion 2?	Description	Justification
Evergreen shrub bog	<input checked="" type="checkbox"/>	An evergreen shrub bog is a nutrient-poor wetland dominated by dense shrubs like bays, sweetbay magnolia, and fetterbush, often with sphagnum moss. These unique ecosystems, found in poorly drained soils, support specialized species.	Evergreen shrub bogs are ecologically important due to their role in maintaining biodiversity, supporting rare and specialized species of plants and animals, and providing critical ecosystem services such as carbon sequestration and water filtration.
Peatland Atlantic white cedar forest	<input checked="" type="checkbox"/>	A peatland Atlantic white cedar forest is a wetland ecosystem dominated by Atlantic white cedar and underlain by peat soils, which store significant carbon and support unique plant and animal species.	Peatland Atlantic white cedar forests are imperiled due to habitat loss from land development, logging, and drainage for agriculture, which disrupts their delicate ecosystem. Additionally, climate change poses a threat.
Pond pine canebrake	<input checked="" type="checkbox"/>	A pond pine canebrake is a unique ecosystem characterized by the dominance of pond pine (<i>Pinus serotina</i>) and dense understory vegetation. These habitats are typically found in areas with wet, poorly drained soils such as floodplains, and swamp edges.	The pond pine canebrake ecosystem is considered critically imperiled due to its extremely limited range and the ongoing threats of habitat destruction, fire suppression, and invasive species.

4 - What is the Site like? (Ecological character description)

4.1 - Ecological character

The majority of the wetlands in Pocosin Lakes National Wildlife Refuge are Pocosin (including some pond pine canebrakes, a critically endangered ecosystem), but the Refuge also includes substantial areas of bay forest, peatland Atlantic white cedar forest (an imperiled ecosystem), mixed pine flatwoods, hardwood swamp forest, cypress gum swamp and marshes, and three large natural lakes. The pocosin wetlands that predominate, with their often peat soils, have enriched the flora and fauna, as well as the farmers, fishermen and foresters of the Albemarle Peninsula. Pocosin Lakes NWR is part of an extensive complex of pocosins (shrub wetlands), forested wetlands, and freshwater marshes interspersed with cropland. Farmers and logging companies have cleared and drained many of these wetlands in the past, but conservation agencies and organizations have acquired and protected them. They have restored the areas or allowed them to go through succession to native vegetation.

Visitors to the refuge have the opportunity to experience solitude, wildness, uninterrupted quiet, spirit and adventure, and observe the signs and the sounds of activity in the pocosin, marsh, and forested wetlands. Fish and wildlife resources have had a profound effect on recreation in the area. Tyrell, Hyde, and Washington Counties have always had an abundance of fish and game, due to its diversity of lands and waters. Early in history, sportsmen-established clubs were created in the area for the purpose of protecting game and wildlife. Later, as part of a comprehensive wildlife management program, Mattamuskeet, Swanquarter, and Pocosin Lakes NWRs were created to conserve and restore habitat for native wildlife and migratory birds. Fish and wildlife are the focuses of the refuge, but they are also important to the local economy. First, a commercial fishery is present in both the Albemarle and Pamlico Sounds and the Alligator River. Blue crab and flounder are the major species harvested. Second, hunting and fishing are economically important to local businesses, both directly as the local population spends money and indirectly as an attraction that draws sportsmen from outside the county.

Unfortunately, a general lack of regard for the conservation of fish and wildlife resources combined with wetland clearing and draining, has led to the loss of valuable fishery spawning grounds and the loss of habitat for many wildlife species. In the attempt to restore and protect some of these resources, Pocosin Lakes NWR serves an important role, not only by providing habitat for a diversity of plant and wildlife species, but also as a place where people can go to enjoy these resources, either through observation or through hunting or fishing. Local officials consider eco-tourism, hunting, fishing, wildlife observation and photography, and environmental interpretation elements of a desirable industry. As the population increases and the number of places left to enjoy wildlife decreases, the refuge may become even more important to the local community. It can benefit the community directly by providing recreational opportunities for the local population, and indirectly by attracting tourists from outside the county to generate additional dollars to the local economy. Over 8,000 hunting visits occur on Pocosin Lakes NWR each year. Approximately 1,500 anglers use the refuge every year. The majority of the refuge's 20,000 to 30,000 wildlife observers and photographers generally visit the Pungo Unit. This area of the refuge is known for its large concentration of wintering waterfowl and a dense population of black bear.

4.2 - What wetland type(s) are in the site?

Inland wetlands

Wetland types (code and name)	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type	Justification of Criterion 1
Fresh water > Lakes and pools >> O: Permanent freshwater lakes	Open water, natural lake shoreline	3	3	Representative
Fresh water > Lakes and pools >> Tp: Permanent freshwater marshes/pools	Permanent Marsh	3	399	Representative
Fresh water > Marshes on inorganic soils >> W: Shrub-dominated wetlands	Pocosin	1	25858	Rare
Fresh water > Marshes on inorganic soils >> Xf: Freshwater, tree-dominated wetlands	Hardwood riverine and nonriverine swamp forest, bay forest, and cypress/gum swamp	2	15223	Rare
Fresh water > Marshes on peat soils >> Xp: Permanent Forested peatlands	Peatland Atlantic White Cedar Forest	4	1264	Rare

Human-made wetlands

Wetland types (code and name)	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type
2: Ponds	Moist soil areas (managed wetlands)	1	179

Other non-wetland habitat

Other non-wetland habitats within the site	Area (ha) if known
Xeric sandhill scrub	112
Mixed pine flatwoods	3962

(ECD) Habitat connectivity

The refuge has high habitat connectivity due to no paved roads and a large number of animal corridors exist; there are no villages or public housing within the boundaries. The majority of the refuge is one contiguous piece with several smaller subsites.

4.3 - Biological components

4.3.1 - Plant species

Other noteworthy plant species

Phylum	Scientific name	Position in range / endemism / other
TRACHEOPHYTA/POLYPODIOPSIDA	<i>Anchistea virginica</i>	
TRACHEOPHYTA/LILIOPSIDA	<i>Arundinaria gigantea</i>	
TRACHEOPHYTA/LILIOPSIDA	<i>Arundinaria tecta</i>	
TRACHEOPHYTA/LILIOPSIDA	<i>Carex riparia</i>	
TRACHEOPHYTA/PINOPSIDA	<i>Chamaecyparis thuyoides</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Chamaedaphne calyculata</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Cyrilla racemiflora</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Gaylussacia bigeloviana</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Gaylussacia frondosa</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Gordonia lasianthus</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Ilex coriacea</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Ilex glabra</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Kalmia angustifolia carolina</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Lyonia ligustrina</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Lyonia lucida</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Magnolia virginiana</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Morella cerifera</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Nuphar advena</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Nuphar lutea</i>	
TRACHEOPHYTA/POLYPODIOPSIDA	<i>Osmundastrum cinnamomeum cinnamomeum</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Packera tomentosa</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Persea palustris</i>	
TRACHEOPHYTA/PINOPSIDA	<i>Pinus serotina</i>	
TRACHEOPHYTA/PINOPSIDA	<i>Pinus taeda</i>	
TRACHEOPHYTA/POLYPODIOPSIDA	<i>Pteridium aquilinum</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Rhus copallina</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Salix caroliniana</i>	
TRACHEOPHYTA/LILIOPSIDA	<i>Smilax laurifolia</i>	
TRACHEOPHYTA/PINOPSIDA	<i>Taxodium mucronatum</i>	
TRACHEOPHYTA/LILIOPSIDA	<i>Typha latifolia</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Vaccinium formosum</i>	
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Zenobia pulverulenta</i>	Endemic to mid-Atlantic coastal plain

Invasive alien plant species

Phylum	Scientific name	Impacts	Changes at RIS update
TRACHEOPHYTA/LILIOPSIDA	<i>Allium vineale</i>	Actual (minor impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Alternanthera philoxeroides</i>	Actual (minor impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Cardamine hirsuta</i>	Actual (minor impacts)	No change
TRACHEOPHYTA/MAGNOLIOPSIDA	<i>Myriophyllum aquaticum</i>	Actual (minor impacts)	No change
TRACHEOPHYTA/LILIOPSIDA	<i>Phragmites australis</i>	Actual (major impacts)	No change
TRACHEOPHYTA/LILIOPSIDA	<i>Spirodela punctata</i>	Actual (minor impacts)	No change

4.3.2 - Animal species

Other noteworthy animal species

Phylum	Scientific name	Pop. size	Period of pop. est.	% occurrence	Position in range /endemism/other
CHORDATA/REPTILIA	<i>Alligator mississippiensis</i>				Least Concern
CHORDATA/AVES	<i>Ammodramus henslowii</i>				Least Concern
CHORDATA/AVES	<i>Aquila chrysaetos</i>				Least Concern
CHORDATA/AVES	<i>Asio flammeus</i>				Least concern
CHORDATA/MAMMALIA	<i>Castor canadensis</i>				Least Concern
CHORDATA/AVES	<i>Colinus virginianus</i>				Near Threatened
CHORDATA/AVES	<i>Haliaeetus leucocephalus</i>				Threatened
CHORDATA/AVES	<i>Leuconotopicus borealis</i>				Threatened
CHORDATA/AVES	<i>Limnothlypis swainsonii</i>				Least Concern
CHORDATA/MAMMALIA	<i>Lontra canadensis</i>				Least Concern
CHORDATA/MAMMALIA	<i>Megaptera novaeangliae</i>				Least Concern
CHORDATA/AVES	<i>Mycteria americana</i>				Least Concern
CHORDATA/AVES	<i>Peucaea aestivalis</i>				Near Threatened
CHORDATA/AVES	<i>Setophaga discolor</i>				Least Concern
CHORDATA/AVES	<i>Setophaga virens</i>				Least Concern
CHORDATA/AVES	<i>Sitta pusilla</i>				Least Concern
CHORDATA/MAMMALIA	<i>Sorex longirostris fisheri</i>				Threatened
CHORDATA/AVES	<i>Sterna dougallii</i>				Least Concern
CHORDATA/MAMMALIA	<i>Ursus americanus</i>				
CHORDATA/MAMMALIA	<i>Vulpes vulpes fulvus</i>				Least Concern

Invasive alien animal species

Phylum	Scientific name	Impacts	Changes at RIS update
CHORDATA/MAMMALIA	<i>Canis latrans</i>	Actual (major impacts)	No change
ARTHROPODA/INSECTA	<i>Lymantria dispar</i>	Potential	No change
CHORDATA/MAMMALIA	<i>Myocastor coypus</i>	Actual (major impacts)	No change
CHORDATA/AVES	<i>Passer domesticus</i>	Potential	No change
ARTHROPODA/INSECTA	<i>Solenopsis invicta</i>	Actual (major impacts)	No change
CHORDATA/AVES	<i>Sturnus vulgaris</i>	Potential	No change
CHORDATA/MAMMALIA	<i>Sus scrofa</i>	Actual (major impacts)	No change

4.4 - Physical components

4.4.1 - Climate

Climatic region	Subregion
C: Moist Mid-Latitude climate with mild winters	Cfa: Humid subtropical (Mild with no dry season, hot summer)

Due to the coastal location and low elevation of the site, projected sea level rise will cause changes in hydrologic regime, salinity, and dominant vegetation of the site. These impacts are expected to gradually and continually unfold over the coming decades. Maintenance of the peatlands will slow saltwater intrusion on the coastal landscape as these systems maintain freshwater and provide a hydrologic pressure head of freshwater, which prevents saltwater intrusion.

4.4.2 - Geomorphic setting

a) Minimum elevation above sea level (in metres)

a) Maximum elevation above sea level (in metres)

7

Entire river basin

Upper part of river basin

Middle part of river basin

Lower part of river basin

More than one river basin

Not in river basin

Coastal

Please name the river basin or basins. If the site lies in a sub-basin, please also name the larger river basin. For a coastal/marine site, please name the sea or ocean.

Albemarle/Pamlico Estuary, Alligator River, Scuppernong River, Pungo River

4.4.3 - Soil

Mineral

(Update) Changes at RIS update

No change

Increase

Decrease

Unknown

Organic

(Update) Changes at RIS update

No change

Increase

Decrease

Unknown

No available information

Are soil types subject to change as a result of changing hydrological conditions (e.g., increased salinity or acidification)? Yes No

Please provide further information on the soil (optional)

Soils with more than 129.5 cm (51 inches) of muck over mineral soil identified in the refuge are Pungo (26,982 ha; 65 percent of land), Dorovan (1,474 ha; 3.5 percent), and Longshoal (5 ha). The following soils have surface layers of 40 to 129.5 cm of muck: Belhaven (6,673; 16 percent), Scuppernong (2,500 ha; 5.9 percent), and Ponzer (1,331 ha; 3.1 percent). These six soils make up 95 percent of the terrestrial area of the refuge. They are excessively wet, characterized by layers of peat over mineral soil, and are mostly unsuitable for agriculture. The source of water is rainfall and thus the peat soil is non-saline (Richardson 1981).

4.4.4 - Water regime

Water permanence

Presence?	Changes at RIS update
Usually permanent water present	No change

Source of water that maintains character of the site

Presence?	Predominant water source	Changes at RIS update
Water inputs from precipitation		No change

Water destination

Presence?	Changes at RIS update
Unknown	No change

Please add any comments on the water regime and its determinants (if relevant). Use this box to explain sites with complex hydrology.

A modified version of the hydrologic model DRAINMOD (Gregory et al. 1984) was utilized to simulate evapotranspiration (ET) and runoff for a typical pocosin in North Carolina for a 20-year period using climate data from 1955 to 1979 (Richardson and McCarthy 1994). The average rainfall for the coastal region was 123 cm but monthly and yearly distributions varied considerably. On the average the wettest months are July and August. Evaporation exceeds rainfall only during June but is close to rainfall in July and August. Average yearly rainfall compared to ET in most years shows that 66% (80 cm) of the annual precipitation input of 123 cm leaves pocosins as ET. Runoff is highest during the winter months and lowest during the summer months. Groundwater losses are less than 1% of rainfall (Heath 1975). In natural pocosins, nearly 70 % of water output is through evapotranspiration if the rainfall is during the summer and fall, but shifts to runoff if precipitation occurs in winter and spring (Daniel 1981). The water storage capacity of pocosins is thus limited in the winter and early spring months when low evapotranspiration and high rainfall have caused the soil to become saturated. High evapotranspiration during the summer can lower the water table 60 to 90 cm below the land surface, giving the wetlands extensive storm water storage. capacity (Richardson and McCarthy 1994, Wang et al., 2015). Hydrologically, undrained pocosin function as significant water storage systems on the landscape and primarily release water as ET or slowly diffuse freshwater runoff across a broad surface to the adjacent estuarine ecosystems. This regulation of freshwater may be their most important contribution to regional ecosystem stability. Daniel, C., Ill. 1981. Hydrology, geology and soils of pocosins: A comparison of natural and altered systems, pp. 69-108. In: Pocosin Wetlands: An Integrated Analysis of Coastal Plain Bogs in North_ Carolina. C.J. Richardson (ed.).

(ECD) Connectivity of surface waters and of groundwater

Due to the underlying peat thickness and extremely low hydraulic conductivity there is almost no surface and groundwater connection. Water budgets by Heath (1975) and Richardson and McCarthy (1994) show it to be less than 1%.

(ECD) Stratification and mixing regime

Water in the peatlands is stored in pore space. The acrotelem (living portion) has larger pore spaces and water slowly moves across the surface during intensive rainfall. The catotelem (decomposed peat) is sapric peat with virtually no hydraulic flow.

What is the Site like?, S4 - Page 4

4.4.5 - Sediment regime

Significant accretion or deposition of sediments occurs on the site ☒(Update) Changes at RIS update No change ☒ Increase ☐ Decrease ☐ Unknown ☐Sediment regime unknown ☐

Please provide further information on sediment (optional):

Pocosin vegetation is found on mineral, sandy-humus, and organic mucks and peats (Histosols, Terric or Typic Medisparist) (Bridgham and Richardson 1993). A number of studies including greenhouse bioassays (Wilbur and Christensen 1983), and fertilization studies in managed ecosystems (Ralston and Richter 1980), have suggested that phosphorus is the proximal limiting nutrient in pocosin ecosystems. It has also been shown that the ecosystem gradient from short pocosin to tall pocosin to bay forest represents a natural gradient of increasing P availability and decreasing soil N:P ratio. The N:P ratio, exchangeable P, peat depth, and bulk density also differ among pocosin sites. Exchange of hydrogen ions for cations results in low soil pH (pH < 4.0) (Bridgham and Richardson 1993; Wang et al., 2015), which, along with anaerobic conditions, preserves the organic constituent of the poorly drained peats. These soils are saturated or shallowly flooded primarily during the cool seasons.

(ECD) Water turbidity and colour High turbidity with high organics (> 100 mg/l DOC) with a dark tea colour

(ECD) Light - reaching wetland Annual Average solar radiation is 4.5 to 5 KWh/m2/day

(ECD) Water temperature Seasonal water temperature with a range of 15 (winter) to 30 C (summer) degrees Celsius.

4.4.6 - Water pH

Acid (pH<5.5) ☒(Update) Changes at RIS update No change ☒ Increase ☐ Decrease ☐ Unknown ☐Unknown ☐

Please provide further information on pH (optional):

These bog systems have a water pH that is between 3.9 and 5 pH due to the high amount of organic matter (>80%) and low concentrations of Ca and Mg.
Bridgham, S.D. and C.J. Richardson. 1993. Hydrology and nutrient gradients in North Carolina peatlands. Wetlands 13 (3):207-218.
Wang, H., C.J. Richardson, and M. Ho. 2015. Dual controls on carbon loss during drought in peatlands. Nature Climate Change 5:584-587. doi:10.1038/nclimate2643

4.4.7 - Water salinity

Fresh (<0.5 g/l) ☒(Update) Changes at RIS update No change ☒ Increase ☐ Decrease ☐ Unknown ☐Unknown ☐

Please provide further information on salinity (optional):

Pocosins are freshwater bogs that derive their water from rainfall. They can occasionally receive high levels of NaCl from hurricanes off the coast of North Carolina, but they maintain themselves as freshwater bogs, except where coastal canals are dug into the bog to allow saltwater intrusions. This has not happened at Pocosin Lakes as it is the topographic high for the region and is inland of other coastal wetlands.

(ECD) Dissolved gases in water

The wetland produces CO₂ mostly and is its main greenhouse gas and the water has some dissolved CO₂. The site only generates CH₄ in the winter or after major storms and then only in trace amounts. Recent measurements indicate it produces among the lowest levels of methane recorded for natural bogs due to recalcitrant carbon (high phenolics and aromatics) and low decomposition rates.
Richardson, C.J., N. Flanagan, H. Wang, and M. Ho. 2014. Impacts of peatland ditching and draining on water quality and carbon sequestration benefits of peatland restoration. For the Eastern North Carolina/Southeastern Virginia Strategic Habitat Conservation Team, U.S. Fish and Wildlife Service, Region 4 and The Nature Conservancy North Carolina Chapter. Final Project, November 2014. Duke University.
Wang, H., C.J. Richardson, and M. Ho. 2015. Dual controls on carbon loss during drought in peatlands. Nature Climate Change 5:584-587. doi:10.1038/nclimate2643

4.4.8 - Dissolved or suspended nutrients in water

Dystrophic ☒(Update) Changes at RIS update No change ☒ Increase ☐ Decrease ☐ Unknown ☐Unknown ☐

Please provide further information on dissolved or suspended nutrients (optional):

The most complete biogeochemistry research in pocosins was done by Bridgham and Richardson (1992, 1993, 2003) and Wang et al., (2015) where they looked at nutrient gradients, gas flux losses of CO₂ and CH₄ and the role of nutrient additions on decomposition and mineralization along a N and P nutrient availability gradient. Exchange of hydrogen ions for cations resulted in low soil pH < 4.0. Soil N:P ratio, total P and N, peat depth, and bulk density also differ among pocosin sites. Total soil P and PO₄-P contents and N:P ratios show a P-availability gradient, with larger soil P pools in the gum swamp, smaller soil P pools in the short pocosin, and soil P pools in the tall pocosin that were similar or slightly larger than in the short pocosin. Total soil N and NO₃-N contents were also greater in the gum swamp than in the other communities, although NH₄-N contents did not differ. The lower organic matter concentration and higher Mg, Ca, and K contents in the gum swamp.

(ECD) Dissolved organic carbon DOC is high and ranges 50 to 100 mg/L in runoff water.

(ECD) Redox potential of water and sediments Redox is poised and not exceptionally low due to a lack of alternate electron acceptors. The seasonal range is -50 to 2

(ECD) Water conductivity

Water conductivity is low 100-200 uS/cm due to a lack of cations

4.4.9 - Features of the surrounding area which may affect the Site

Please describe whether, and if so how, the landscape and ecological characteristics in the area surrounding the Ramsar Site differ from the site itself: i) broadly similar ☐ ii) significantly different ☒

Surrounding area has greater urbanisation or development ☐

Surrounding area has higher human population density ☐

Surrounding area has more intensive agricultural use ☒

Surrounding area has significantly different land cover or habitat types ☒

Please describe other ways in which the surrounding area is different:

The main difference in the surrounding area is that unlike the mostly restored Pocosin Lakes National Wildlife Refuge intensive vegetation clearing on thousands of hectares and a massive regional water drainage system of canals and pumps have been installed to provide the adjacent farm lands with flood control protection and thus much lower water tables. This has resulted in the region being subjected to high nutrients, lower water tables, pesticides, and increased decomposition.

4.5 - Ecosystem services

4.5.1 - Ecosystem services/benefits

Provisioning Services

Ecosystem service	Examples	Importance/Extent/Significance
Food for humans	Sustenance for humans (e.g., fish, molluscs, grains)	Low
Fresh water	Water for irrigated agriculture	Medium
Genetic materials	Genes for tolerance to certain conditions (e.g., salinity)	Medium

Regulating Services

Ecosystem service	Examples	Importance/Extent/Significance
Maintenance of hydrological regimes	Groundwater recharge and discharge	High
Climate regulation	Regulation of greenhouse gases, temperature, precipitation and other climatic processes	High
Hazard reduction	Coastal shoreline and river bank stabilization and storm protection	High

Cultural Services

Ecosystem service	Examples	Importance/Extent/Significance
Recreation and tourism	Recreational hunting and fishing	Medium
Scientific and educational	Educational activities and opportunities	Medium

Supporting Services

Ecosystem service	Examples	Importance/Extent/Significance
Biodiversity	Supports a variety of all life forms including plants, animals and microorganisms, the genes they contain, and the ecosystems of which they form a part	High
Soil formation	Accumulation of organic matter	High
Nutrient cycling	Carbon storage/sequestration	High
Pollination	Support for pollinators	High

Within the site: 34,000 (annual)

Outside the site: 68,515

Have studies or assessments been made of the economic valuation of ecosystem services provided by this Ramsar Site? Yes ☒ No ☐ Unknown ☐

Where economic studies or assessments of economic valuation have been undertaken at the site, it would be helpful to provide information on where the results of such studies may be located (e.g. website links, citation of published literature):

https://www.fws.gov/sites/default/files/documents/USFWS_Banking_on_Nature_2017.pdf

4.5.2 - Social and cultural values

- i) the site provides a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland

☒

Description if applicable

Pocosin Lakes has completed a major restoration on thousands of hectares of the refuge and has developed a water management plan that will be a model for the region.

Link to the Pocosin Lakes NWR Management Plan: https://www.fws.gov/sites/default/files/documents/Pocosin_Lakes_NWR_CCP.pdf

- ii) the site has exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland

☒

Description if applicable

Phelps Lake (adjacent to site) is an important archaeological site where over 30 dugout canoes have been found, the earliest dating to 2430 BC. These canoes are associated with pre-historic native Indian settlements in the area which illustrate the long history of a rich and productive wetland ecosystem here.

- iii) the ecological character of the wetland depends on its interaction with local communities or indigenous peoples

☒

Description if applicable

The Pocosin Lakes National Wildlife Refuge (PLNWR) is a regional asset for the local population in terms of recreation, ecotourism, hunting, and fishing. The refuge is in use by some local indigenous tribes for activities and hunting.

- iv) relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland

☐

4.6 - Ecological processes

(ECD) Primary production	Biomass data are reported in: Richardson, C.J., N. Flanagan, H. Wang, and M. Ho. 2014. Impacts of peatland ditching and draining on water quality and carbon sequestration benefits of peatland restoration.
(ECD) Nutrient cycling	See previous description of biogeochemical cycling and references
(ECD) Carbon cycling	Results from the Duke University Wetland Center Research to-date show that CH4 and N2O emissions at Pocosin Lakes NWR have a negligible contribution to global radiative balance since values were extremely low under all treatment conditions.
(ECD) Vegetational productivity, pollination, regeneration processes, succession, role of fire, etc.	Recent research suggests that biogeochemical and biological mechanisms that down-regulate decomposition rates in pocosin peatlands include (1) higher production of polyphenolic and aromatic compounds in the litter in the shrub/tree communities.
(ECD) Pressures and trends concerning any of the above, and/or concerning ecosystem integrity	Saltwater intrusion due to sea level rise and major canals in the region are a major concern, thus restoration and sustainability of these ecosystems on the coastal landscape are a high priority.

5 - How is the Site managed? (Conservation and management)

5.1 - Land tenure and responsibilities (Managers)

5.1.1 - Land tenure/ownership

Public ownership

Category	Within the Ramsar Site	In the surrounding area
National/Federal government	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Private ownership

Category	Within the Ramsar Site	In the surrounding area
Other types of private/individual owner(s)	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Other

Category	Within the Ramsar Site	In the surrounding area
Unspecified mixed ownership	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Provide further information on the land tenure / ownership regime (optional):

The land base for Pocosin Lakes National Wildlife Refuge is owned by the Federal government. It consists of a large contiguous piece and several small subsites. Neighboring land ownerships, not part of the refuge, include other federal lands, non-profit conservation lands, state owned conservation lands, and private and commercial land.

5.1.2 - Management authority

Please list the local office / offices of any agency or organization responsible for managing the site:

US Fish & Wildlife Service, Pocosin Lakes National Wildlife Refuge (Administrative Office)

Provide the name and/or title of the person or people with responsibility for the wetland:

Rebekah Martin, Project Leader

Postal address:

PO Box 329
Columbia, NC 27925

E-mail address:

pocosinlakes@fws.gov

5.2 - Ecological character threats and responses (Management)

5.2.1 - Factors (actual or likely) adversely affecting the Site's ecological character

Water regulation

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Drainage	unknown impact	Medium impact	<input checked="" type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change
Salinisation	unknown impact	Medium impact	<input checked="" type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change

Agriculture and aquaculture

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Annual and perennial non-timber crops	Medium impact	Medium impact	<input checked="" type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change

Natural system modifications

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Fire and fire suppression	High impact	High impact	<input checked="" type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change

Invasive and other problematic species and genes

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Invasive non-native/ alien species	High impact	High impact	<input checked="" type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change

Climate change and severe weather

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Habitat shifting and alteration	High impact	High impact	<input checked="" type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change

5.2.2 - Legal conservation status

National legal designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
National Wildlife Refuge	Pocosin Lakes National Wildlife Refuge	https://www.fws.gov/refuge/pocosin-lakes	whole

5.2.3 - IUCN protected areas categories (2008)

- Ia Strict Nature Reserve ☐
- Ib Wilderness Area: protected area managed mainly for wilderness protection ☐
- II National Park: protected area managed mainly for ecosystem protection and recreation ☐
- III Natural Monument: protected area managed mainly for conservation of specific natural features ☐
- IV Habitat/Species Management Area: protected area managed mainly for conservation through management intervention ☒
- V Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation ☐
- VI Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems ☐

5.2.4 - Key conservation measures

Legal protection

Measures	Status
Legal protection	Implemented

Habitat

Measures	Status
Habitat manipulation/enhancement	Partially implemented
Catchment management initiatives/controls	Partially implemented
Hydrology management/restoration	Partially implemented
Re-vegetation	Partially implemented
Land conversion controls	Partially implemented
Faunal corridors/passage	Partially implemented
Soil management	Partially implemented

Species

Measures	Status
Threatened/rare species management programmes	Partially implemented
Control of invasive alien plants	Partially implemented
Reintroductions	Implemented
Control of invasive alien animals	Partially implemented

Human Activities

Measures	Status
Regulation/management of recreational activities	Partially implemented
Communication, education, and participation and awareness activities	Partially implemented
Research	Partially implemented
Management of water abstraction/takes	Partially implemented
Regulation/management of wastes	Partially implemented
Livestock management/exclusion (excluding fisheries)	Partially implemented
Fisheries management/regulation	Partially implemented
Harvest controls/poaching enforcement	Partially implemented

5.2.5 - Management planning

Is there a site-specific management plan for the site? Yes

Has a management effectiveness assessment been undertaken for the site? Yes ☐ No ☒

If the site is a formal transboundary site as indicated in section Data and location > Site location, are there shared management planning processes with another Contracting Party? Yes ☐ No ☒

Please indicate if a Ramsar centre, other educational or visitor facility, or an educational or visitor programme is associated with the site:

No

URL of site-related webpage (if relevant): N/A

5.2.6 - Planning for restoration

Is there a site-specific restoration plan? Yes, there is a plan

5.2.7 - Monitoring implemented or proposed

Monitoring	Status
Water regime monitoring	Implemented
Water quality	Implemented
Soil quality	Implemented
Plant community	Implemented
Plant species	Implemented
Animal community	Implemented
Animal species (please specify)	Implemented
Birds	Implemented

6 - Additional material

6.1 - Additional reports and documents

6.1.1 - Bibliographical references

Bridgham, S.D. and C.J. Richardson. 1992. Mechanisms controlling soil respiration (CO₂ and CH₄) in southern peatlands. *Soil Biol. Biochem.* 24:(11) 1089-1099.

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Daniel, C., Ill. 1981. Hydrology, geology and soils of pocosins: A comparison of natural and altered systems, pp. 69-108. In: *Pocosin Wetlands: An Integrated Analysis of Coastal Plain Bogs in North Carolina*. C.J. Richardson (ed.). Hutchinson Ross, Inc., Stroudsburg, Penn. 364.

Flanagan NE, Wang H, Winton S, Richardson CJ. 2020. Low-severity fire as a mechanism of organic matter protection in global peatlands: Thermal alteration slows decomposition. *Glob Change Biol.* 2020;00:1

Gregory, J.D., R.W. Skaggs, R.G. Broadhead, R.H. Culbreath, J.R. Bailey and T. Foutz. 1984. Hydrologic and water quality impacts of peat mining in North Carolina. UNC Water Resources Research Institute Report No. 214. Raleigh, North Carolina.

Heath, R.C. 1975. Hydrology of the Albemarle-Pamlico region of North Carolina: a preliminary report on the impact of agricultural developments. USGS Water Resources Investigation, 75-9. 98 p. U.S. Geological Survey, Raleigh, North Carolina.

Ralston, C.W. and D.D. Richter. 1980. Identification of lower coastal plain sites of low fertility. *So. J. Applied Forestry* 4:84-88.

Richardson, C.J. (ed.) 1981. *Pocosin Wetlands: An Integrated Analysis of Coastal Plain Freshwater Bogs in North Carolina*. Van Nostrand Reinhold. New York, NY. 364 p

Richardson, C.J., N. Flanagan, H. Wang, and M. Ho. 2014. Impacts of peatland ditching and draining on water quality and carbon sequestration benefits of peatland restoration. For the Eastern North Carolina/Southeastern Virginia Strategic Habitat Conservation Team, U.S. Fish and Wildlife Service, Region 4 and The Nature Conservancy North Carolina Chapter. Final Project, November 2014. Duke University.

Richardson, C.J. and E.J. McCarthy. 1994. Effect of land development and forest management on hydrologic response in southeastern coastal wetlands: A review. *Wetlands* 14:56-71.

Wang, H., C.J. Richardson, and M. Ho. 2015. Dual controls on carbon loss during drought in peatlands. *Nature Climate Change* 5:584-587. doi:10.1038/nclimate2643

Wilbur, R.B. and Christensen, N.L. 1983. Effects of fire on nutrient availability in a North Carolina coastal plain pocosin. *The American Midland Naturalist* 110:54-61.

Gilliam FS, Goodale CL, Pardo LH, Geiser LH, and Lilleskov, EA. 2011. Eastern temperate forests, Chapter 10. In: Pardo LH, Robin-Abbott MJ, Driscoll, CT, eds. *Assessment of Nitrogen deposition effects and empirical critical loads of Nitrogen for ecoregions of the United States*.

6.1.2 - Additional reports and documents

i. taxonomic lists of plant and animal species occurring in the site (see section 4.3)

<1 file(s) uploaded>

ii. a detailed Ecological Character Description (ECD) (in a national format)

<no file available>

iii. a description of the site in a national or regional wetland inventory

<no file available>

iv. relevant Article 3.2 reports

<no file available>

v. site management plan

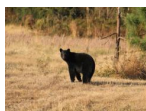
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vi. other published literature

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6.1.3 - Photograph(s) of the Site

Please provide at least one photograph of the site:



Black Bear (USFWS, 02-08-2017)



Brochure (USFWS, 01-08-2017)



Red Wolf (USFWS, 01-08-2024)



Gum Swamp (Curtis Richardson, 05-08-2014)



Peat Core (Curtis Richardson, 10-08-2016)



Short Pocosin (Curtis Richardson, 01-10-2014)



Tall Pocosin (Curtis Richardson, 13-08-2014)

6.1.4 - Designation letter and related data

Designation letter

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Date of Designation 2024-11-18