United States Department of the Interior

FISH AND WILDLIFE SERVICE

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Chris Saunders, Legislative Analysis Division
Agriculture and Forestry Awareness Commission
North Carolina General Assembly
300 N. Salisbury St., Suite 545
Raleigh, NC 27603-5925

Dear Mr. Saunders:

Thank you for the opportunity to speak before the North Carolina General Assembly's Agriculture and Forestry Awareness Study Commission meeting in Belhaven, North Carolina on February 11, 2016. We have included the questions and our answers below from both the field hearing and from follow-up questions received through Chris Saunders. We have also attached additional background information we hope you find helpful.

We appreciate the Study Commission's expressed interest in touring Pocosin Lakes NWR to learn more about our refuge management and hydrology restoration activities. We are also pleased to accept your invitation to present additional details regarding hydrologic management and restoration at Pocosin Lakes NWR for the Commission's April meeting. Mike Bryant, our Project Leader, Coastal North Carolina NWR Complex; his senior staff, Howard Phillips, Pocosin Lakes NWR Manager; and other senior U.S. Fish and Wildlife Service staff, Sara Ward, Ecologist at our Raleigh Field Office, are available to give a presentation and answer the Commissions' questions on the restoration project at Pocosin Lakes NWR.

Please let us know the Commission's preferred date to meet for a field tour and please keep us informed of plans, including the agenda, for the upcoming April Commission meeting in Raleigh. Let us know if you have any questions or need additional information. Refuge Manager Howard Phillips may be reached at 252-796-7517 and I may be reached at 404-679-7152. We look forward to meeting with you and the Study Commission again soon.

Very Sincerely,

/s/ *David Viker*

David Viker, Regional Chief,

National Wildlife Refuge System

Attachment

Attachment: Questions and Answers from North Carolina General Assembly Agriculture and Forestry Awareness Commission meeting in Belhaven, North Carolina on February 11, 2016, concerning Pocosin Lakes NWR

1) **Question: Please provide the Comprehensive Management Plans for the Pocosin Lakes and Mattamuskeet Refuges.**

   Answer: The Pocosin Lakes National Wildlife Refuge (NWR) Comprehensive Conservation Plan (CCP) is found at: http://www.fws.gov/southeast/planning/PDFdocuments/PocosinLakesFinalCCP/PocosinLakes%20FINAL%20CCP%20Edited.pdf

   The Mattamuskeet NWR CCP is found at: http://catalog.data.gov/dataset/mattamuskeet-national-wildlife-refuge-comprehensive-conservation-plan

   Established in 1991, the Pocosin Lakes NWR now totals over 110,000 acres within Hyde, Tyrrell, and Washington Counties. The majority of the refuge consists of pocosin habitat, characterized by deep, high organic-content soils (peat) and southeastern shrub bog vegetation. A significant portion of the Refuge was ditched prior to establishment, thus artificially drying the peat soils. This drying increases the risk of long-duration, catastrophic wildfire (from the ignition and burning the soil itself); the most recent example is the Evans Road Fire which occurred in 2008. To counter the effects of drainage, in the early 1990s the Service partnered with the Natural Resources Conservation Service to develop a hydrology restoration plan for the most significantly ditched and drained areas comprising about 35,500 acres, or less than a third of the Refuge (Hydrology Restoration Plan, USDA 1994). We have the required rewetting infrastructure (e.g. levees and water control structures or WCS) in place on an estimated 20,000 acres, or about 18% of the Refuge. Refuge staff members and partners have been implementing the plan for almost 25 years as funding has become available and the work is still in progress.

   The majority of Pocosin Lakes NWR is managed to meet biological goals outlined in the CCP including:

   - Wildlife Populations: Conserve, protect, and maintain healthy and viable populations of migratory birds, wildlife, fish, and plants, including Federal and State endangered and trust species.
   - Habitat: Restore, protect, and enhance pocosin wetlands and other natural habitats for optimum biodiversity. Intensively manage habitats specific to waterfowl on the Pungo Unit.

- Resource Protection: Protect and perpetuate refuge resources by limiting the adverse effects of human activities and development on refuge resources

Restoration of this unique wetland type is widely recognized for its multitude of benefits (beyond wildlife habitat) and is among the high priority actions in the North Carolina Coastal Habitat Protection Plan (Street et al. 2007). The wetland restoration work at Pocosin Lakes NWR has longstanding support of other natural resource managers in the state, as evidenced by its overt mention in the Albemarle-Pamlico Estuarine Study's (APES) 1994 Comprehensive Conservation and Management Plan. The restoration work at Pocosin Lakes NWR is also highlighted in the Tar-Pamlico River Basinwide Water Quality Plan (NCDWQ 1999, Section 3, Chapter 2). The restoration follows the NC Division of Coastal Management's Best Management Practices for the Hydrologic Restoration of Peatlands in Coastal North Carolina (Madden 2005), which highlights the PLNWR project as an example in its "Restoration Techniques" section. The natural resource benefits of the project prompted a 2006 partnership between the NC Department of Environmental Quality (formerly NCDENR) and the Service to restore the hydrology in the most severely drained portion of PLNWR and directly resulted in hydrologic restoration of 9,500 acres, thereby restoring the seasonally-flooded wetland conditions associated with functional pocosin ecosystems.

2) **Question: What environmental permits are required for managing the refuges? Are the Comprehensive Management Plans a component of the permits? If the Comprehensive Management Plans are not being followed, are there any consequences (monetary penalties, permit loss, etc.)?**

Answer: All required permits are being followed. There is no one blanket environmental permit required for overall management of a National Wildlife Refuge. Certain activities on a refuge, like implementing the peatland rewetting restoration described above, require permits. For example, the following permits and reviews are required: the U.S. Army Corps of Engineers requires a 404 Individual Permit, a 401 Water Quality Certification from the State of North Carolina and a Consistency Determination from the North Carolina Division of Coastal Management, a Section 7 consultation regarding endangered species and a Section 6 review to determine impacts to cultural and historic resources. Violating permit conditions can result in implications from revocation of the permit, to fines, and/or additional mitigation. During the development of the CCP requirements of the National Environmental Policy Act were fulfilled and are detailed in the CCP. Included in the development of the CCP was consultation and coordination with all applicable state and federal regulating agencies, and public review and comment of proposed management. Through the years since the

establishment of the Refuge and approval of the CCP, Pocosin Lakes NWR managers have met with adjacent landowners to understand and address their concerns.

3) **Question: You mentioned at the Commission meeting that USFWS has worked with the U.S. Geological Survey (USGS) to make sure that the Refuges are not flooding adjacent properties. Could you provide more information on those activities and findings?**

Answer: We're not causing flooding through our management. Flooding is being caused by rainfall. The extremely high rainfall we've had for two plus years, falling on and off Refuge, has caused flooding on and off Refuge. Adjacent lands have to bear the rain that falls on them directly, which is likely enough to cause flooding, and then they must also bear our water flowing through them on the way to the rivers/sounds because we're upstream of them, being a higher elevation.

While eastern North Carolina is relatively flat, the Refuge is slightly higher in elevation than many of the surrounding lands, i.e. the Refuge is located on a peat dome. Excess rainfall has to drain off the dome and the original drainage system moved water off the Refuge quickly, thereby flooding downstream landowners. Excessive rainfall, such as that associated with hurricanes, prolonged periods of rainfall, or even large storm events, can overwhelm the area's drainage system causing flooding. Restoration efforts promote rainfall retention in the dome's peat soils rather than allowing it to immediately drain out via the pre-establishment ditch system. However, the refuge cannot serve as a storm water retention area, which would be inconsistent with its purpose. In general, our hydrology restoration work involves placing flashboard riser WCSs and enhancing associated dikes (constructed during pre-establishment ditching) so as to manage water levels in the drainage system and raise the water table in the peat soil. Since the land is not flat, this has to be done across the dome at strategic elevation points.

As a general practice we do not restore the unit nearest our neighbors, to allow a protective buffer, unless through dialog with the landowner agreement is reached that wetter conditions are suitable for all parties. One notable exception is the planned "Clayton Blocks" 1,300-acre restoration area. In this case, we do plan to restore lands in close proximity to the refuge boundary; however, we will do so with confidence that it will not affect adjacent lands because 1) we are constructing a second berm interior to the existing canal and berm to hydrologically isolate our rewetting area, 2) that berm will be cored such that any seepage would be prevented from reaching adjacent lands and would instead drain out through ditch network and out to the Pungo River.

We continue to work towards understanding the altered peatland system better and look for ways to help alleviate the concerns of adjacent landowners while still achieving our goal of pocosin habitat restoration. The 1994 hydrology restoration plan was designed to restore hydrology on the refuge without negatively impacting adjacent lands. The CCP for Pocosin Lakes NWR identifies the necessity of hydrology restoration to meet the purpose of the Refuge and the mission of the National Wildlife Refuge System.

USDA-NRCS helped design the restoration for the original 35,000 acres outlined in the 1994 plan). Today, our restoration approach is generally based on the 1994 design; however, over the past 20-plus years, adaptive modification has been necessary. Accordingly, we are working on updated modeling and planning based on site-specific data we are gathering along with partners. USGS is partnering with us on the Clayton Blocks restoration, which was not included in the 1994 plan. USGS will help with monitoring pre- and post- restoration relative to demonstrate the benefits of rewetting. The Clayton Block demonstration project design was developed by FWS with review and reconnaissance by external partners and an independent hydrologist, and includes regulatory approval from the Army Corps.

4) **Question: Please provide data on areas where the water level is higher now around the Pocosin Refuge than it was 10 years ago.**

Answer: We do not have data going back 10 years. Water level data at many of the water control structures in the restoration areas have been recorded since late 2010. Those data reflect the drought in 2011 and the end of the drought that same year. The data also show that water levels on the Refuge are highly variable due to rainfall, water moving into the atmosphere from the land and plants, and other factors, typical of rainfall driven systems. We're currently determining the elevation of each WCS so that the data can be compared between WCSs. (Currently, the data can only be used to compare water levels at the individual structure over time and has limited broader information). Once we are able to compare between WCSs that information will be useful and can be broadly shared. We are also in the process of updating maps for interested individuals to better understand the restoration areas' size, location, and distance from one another.

Refuge restoration areas are located at a slightly higher elevation than surrounding lands. Water runs off of the peat dome - slowly if not ditched, much more rapidly when ditched. Improved drainage ditch maintenance in the surrounding area will increase flow off of adjacent lands. In recent months, high levels of rainfall have exceeded the capacity of the ditch system surrounding the Refuge.

As landowners, managers, and residents in the community, we share a deep concern about impacts to homes, crops, roads, and other facilities from the flooding. Installation of WCSs and dikes slow the rate at which water moves through the system. Moist peat soil more rapidly soaks up water than drained, dry peat soil. Dry peat soils are like a brand-new dry sponge that will not readily soak up water. We keep Refuge peat lands moist so they'll soak up water, thus lessening the impact of flooding events off refuge.

5) **Question: It appears that there is not much wildlife visible in the refuge – can you provide information on what species live in the Pocosin Refuge and whether their habitat is harmed by the water levels in the Refuge?**

Answer: Casual observations can be deceiving since wildlife is highly mobile, secretive, and adaptable. To determine abundance a systematic inventory and monitoring program is required. A comprehensive list of flora and fauna located in the Pocosin Lakes NWR can be found in the CCP referenced above. Data on select species are limited and small game populations can experience large fluctuations based on changes in weather patterns like drought or excessive rainfall. We are concerned, as well as our neighbors, that the wet cycle we are currently in and have been in for over two years may cause changes in the ecosystem. We set a board level designed to stop the artificial drainage of the soil during normal and below normal rainfall periods. In high rainfall periods, the water level is usually above the board level and drainage is occurring.

6) **Question: At the meeting you mentioned that some of the flooding was for ducks, geese, and swan. The brushy areas that are flooded are not conducive for those birds. Have you considered holding water in the interior blocks and channeling water to affected areas in the event of a fire?**

Answer: It is a misperception that the Refuge is being flooded. The peat soil is being rewetted to make it less flammable, to reduce subsidence and oxidation of the soil, and to improve the overall environmental health of the previously altered pocosin habitat on the Refuge. Accordingly, our restoration management units are not “held full” and are designed to allow water levels to maintain soil moisture and fluctuate naturally within limits to mimic seasonal pocosin wetland conditions. A higher water table and moist peat soils can help prevent catastrophic fires. Likewise, water management capability supports fire suppression activities in the event than an uncontrolled wildfire occurs. Our hydrology restoration strategy, informed by experienced hydrologists, is designed to retain sufficient levels of saturation in the peat soils to maintain healthy soils that support

habitats and are resistant to wildfire. This is soil conservation work for the benefit of public safety and wildlife conservation.

A smaller subset of the refuge, the ~ 12,000-acre Pungo Unit (formerly Pungo National Wildlife Refuge) was specifically established in 1963 to provide waterfowl habitat per the Refuge's establishing legislation, but that Unit is distinct and separate from our hydrology restoration units.

7) **Question: What are your potential strategies for working with USDA-NRCS and the Army Corps of Engineers to help alleviate drainage issues near the Pocosin Refuge?**

Answer: We have made refuge staff available for monthly meetings with neighboring landowners and remain willing to share our peatland rewetting plans and experiences with water management in ditched peatland systems to help our neighbors as they consider water management options on their lands. Our peatland rewetting restoration efforts are developed and reviewed by state and federal regulators, including the Army Corps of Engineers, to ensure consistency with environmental permitting requirements. The Service has in the past and remains committed to providing sufficient project design and implementation details for these regulatory reviews. We have worked closely with USDA on hydrology management since the refuge was established. The current hydrology restoration approach was informed by USDA Soil Conservation Service (now NRCS).

Additionally, we do not have authority to propose any type of water management on lands that are not within the boundaries of the Refuge. To do so would infringe on the rights and responsibilities of our neighbors who have the sole right to determine how they manage their property. We can share our hydrology restoration plan and experiences with water management on peat lands to help our neighbors as they consider water management on their lands. USDA has previously engaged willing landowners on complementary conservation or rewetting opportunities and we are supportive of those agreements. We respect the individual rights and responsibilities of our neighbors who have sole discretion over management of their property.

8) **Question: How many years does it take to saturate the peat soil around the Pocosin Refuge? The water is seeping under the road and onto farmland, and it appears the water table is at peak capacity.**

Answer: Rewetting of previously drained peat soils is a process that can only be achieved over time as rainfall is captured by the water control infrastructure; accordingly, the timing that desired soil conditions are achieved is dependent on the weather. Northeastern North Carolina is in the midst of a multiyear wet cycle characterized by higher than historical levels of rainfall. This increased rainfall has overwhelmed the existing drainage system which was set up well before the Refuge was established.

Saturation of the soil occurs when the water table is brought up in the soil; however, it takes prolonged saturation to overcome the hydrophobic nature of peat soil that has been dried out for a long period of time. Water must remain in the soil to maintain soil moisture conditions. Our hydrology restoration areas are typically interior of the refuge boundary. Where our land abuts private farmland, we have managed the hydrology in coordination with the adjacent landowner to avoid any seepage that would be intolerable to the adjacent owner.

9) **Question: Why is someone not managing the gates during heavy rainfall events to ensure that water in order to minimize drainage issues? If such efforts are currently being undertaken, please provide information on what is being done.**

Answer: Board levels in our water control structures are managed to retain moisture in the peat soil, not to minimize drainage issues. Minimizing drainage issues would require managing to maximize storm water retention. While some storm water retention benefits are realized from the restoration, maximizing storm water retention is not the purpose of the restoration work. Managing to maximize storm water retention would actually preclude us from obtaining many the soil conservation benefits the restoration work is designed to provide.

As we noted previously, excess water must run off of the peat dome, regardless of how much water we hold on the Refuge. Even if restoration areas were managed to maximize storm water retention, which would result in none of the targeted habitat benefits the refuge was established to restore, flooding would still occur on and around the Refuge during major storm events. The restoration areas simply cannot hold all of the storm water. At best, we could only hold the rain that falls on the restoration areas, but major events exceed even that capacity.

10) **Question: Please provide additional information on how flashboard risers are being used in the Pocosin Refuge. Howard Phillips stated that the risers are being used to achieve natural fluctuation, and the Co-Chairs would like a more practical explanation of what that means.**

Answer: We hold more water to ensure the peat stays wet, and this helps absorb some flood waters. Board levels in the riser structures are set so as to stop the artificial drainage through the ditch system of the soil in our hydrology restoration areas. Rainwater in excess of our soil saturation target can drain out. The dikes on the downstream side of the units have been raised to ensure rainfall in excess of the target board level doesn't overtop the dikes. By removing the artificial drainage component, the water level in the unit is then based on rainfall, evapotranspiration, and other natural factors.

11) **Question: What are your plans for reaching out to landowners surrounding the refuge in an effort to alleviate concerns that they have?**

Answer: Refuge management is very interested in conducting effective communication with neighbors. It is our policy to respond to every call and carefully consider concerns received. Everyone across the area is experiencing the stress that this historic wet cycle is causing. Refuge management has consulted with adjacent landowners often in the last several years about hydrology management as well as other issues. We have also made staff available for monthly landowner meetings as needed or desired by neighboring farmers. We will continue this open door policy for our neighbors and reach out to them as we continue to manage the Refuge based on our CCP and legal mandates. We will also be increasing proactive communication about restoration and overall refuge management through a variety of means.

12) **Question: Have we been burning the peat with prescribed fire?**

Answer: We have not conducted prescribed burns in our hydrology restoration areas. Our prescribed burning has been focused on the Pungo Unit, where our hydrology management is very different. We did have a prescribed burn several years ago that converted to a wildfire because it unexpectedly went in to the ground. Since then we have conducted prescribed burning on the Pungo Unit without ground fire by relying on better parameters and data predict ground fire potential.

13) Question: Tell us about the ownership and management of New Lake?

Answer: Approximately 80% of New Lake is part of the Refuge, the other 20% is privately owned by multiple persons. The land adjacent to about 45% of the shoreline is part of the Refuge, while the remainder is privately owned. This diverse ownership, together with the extremely rural nature of New Lake, makes management very complicated. It is our understanding from a past legal opinion that all owners would have to agree to target a different lake water level than what it has been; but being in a rainfall driven system, the lake level fluctuates. We know of only one functioning drainage outlet and that is Mooney Canal. The WCS in Mooney Canal is probably undersized; it was replaced by the Service in the 1990s when it failed. Increasing the drainage capacity of Mooney Canal (by adding a second WCS in it) should help in meeting the desires of all New Lake stakeholders. We suggest that all stakeholders meet, share their concerns, and agree on a management strategy. The Service is interested in holding a sufficient amount of water to be well positioned for the next drought, reducing the risks and hazards associated with the catastrophic wildfires this area has experienced in the past.

14) **Question: How are water control structure management decisions made?**

Answer: The wetland hydrology restoration on the refuge is achieved by installing water control structures with flashboard risers in the canals at one foot changes in elevation, placing earthen plugs in strategic V-ditches and raising the height of pre-existing levees. The earthen plugs and water control structures redirect water flow and raise the water table to mimic the natural hydrology of the pocosin and reverse the impacts of channelized flow from the artificial ditches. The use of these water control structures to attenuate flows and mitigate off-site water quality impacts is well documented; it is among the most frequently used and encouraged best management practice in the highly altered hydrologic network of eastern North Carolina.

15) Question: Are we managing consistent with our water management plan?

Answer: The 1994 hydrology restoration plan included a strategy for returning more natural hydrological conditions to approximately 35,500 refuge acres. We have been working with partners for nearly 25 years to implement those strategies (and to date only about 57 percent of the original scope of the plan, comprising 18% of the overall refuge acreage) has been completed Today, our restoration approach is generally based on the 1994 design and management strategies, but with the passage of time and our growing experience with the restoration units, we adaptation of our management approach in some areas to achieve the outcomes targeted in that plan has been necessary. Consistent with

the 1994 Hydrology Restoration Plan, our restoration actions are limited to portions of the refuge that are selected to avoid negative impacts to adjacent landowners excepting cases where water management easements have been secured or additional protective berms are used. In recognition of the lessons learned over time, we are currently in the process of developing a hydrology management plan and landscape scale monitoring strategy for the refuge that will by informed by available research and monitoring data, updated modeling, and our adaptive management.

16) **Question: What do we mean when we say natural hydrology/levels?**

Answer: We are attempting to mimic natural pocosin hydrology conditions using information from unaltered (or minimally altered) pocosins as a target. Unaltered pocosins undergo a natural seasonal flooding period in the winter and spring, dependent on rainfall, followed by water level drawdown during the drier summer months. Hydrologic restoration is the most critical overarching habitat management strategy for refuge pocosins. Altered hydrology has a great impact on the ability to manage the pocosin habitat for wildlife. The ditches and canals installed by previous property owners drained the deep, organic soil causing soil oxidation and decomposition. This process releases greenhouse gasses into the atmosphere and causes land subsidence. The drained soil also burns when wildfires occur, leading to potentially catastrophic fire damage and limiting the use of prescribed fire as a management tool. Finally, drained soil will not support the healthy hydrophytic plant communities typical of saturated organic soils or the wildlife populations that have evolved in those communities. Successful maintenance or management of the pocosin requires restoration of hydrology to rewet peat soils by stopping the artificial drainage of the soil and allowing water levels to fluctuate based more on rainfall, evapotranspiration, and other natural factors.

17) Question: Tell us about the breach in the new County Line Canal berm.

Answer: The breach has been repaired. The berm is part of a 2.5 mile long berm being constructed to stop water from flowing overland in to the County Line Canal for hydrology restoration purposes. Excess rainfall will still result in water entering the canal through WCS as it does now. However, the new berm will help retain rain water in the soil.

18) **Question: Mr. Jett Ferebee asked why the Refuge is flooding his farm and holding water as much as three feet higher near his property, inconsistent with what the Refuge's CCP calls for, and why are we pushing wolves off the Refuge on to his property?**

Answer: The Refuge is not holding water three feet higher near Mr. Ferebee's farm; there are no flashboard riser WCS on any of the canals in that part of the Refuge. Mr. Ferebee's farm is miles away from any of the hydrology restoration areas. Based on elevation data, it appears that overland flow of rainwater should drain to the south and east away from Mr. Ferebee's farm. Red Wolf Recovery Program biologists indicate that red wolves have not changed the way they use habitat at Pocosin Lakes since the hydrology restoration work began (and that work is only occurring on less than a third of the Refuge). The Refuge Manager has offered to look at the drainage in that area with Mr. Ferebee to see if any issues (that the Refuge can address) can be found. The targeted peatland restoration area is 35,500 acres. The CCP notes that 61,000 acres of pocosins will be managed (including forest, shrub, and herbaceous stages) to maintain it as a natural community; however, restoration is not required in all areas.