

Draft Compatibility Determination

Research

Mattamuskeet National Wildlife Refuge

Refuge Use Category

Research and Surveys

Refuge Use Types

Research

Scientific collecting

Surveys

Refuge

Mattamuskeet National Wildlife Refuge (NWR), North Carolina

Refuge Purposes and Establishing and Acquisition Authorities

Establishing and Acquisition Authority: The United States Government acquired the land in 1934 under the authority of the National Industrial Recovery Act (48 Statute 195). Mattamuskeet NWR was established that same year under Executive Order No. 6924.

Refuge Purpose: The purpose of Mattamuskeet NWR is to protect and conserve migratory birds and other wildlife resources through the protection of wetlands, in accordance with the following:

... as a refuge and breeding ground for birds and wild animals, and (2) that such portion as the Secretary of Agriculture [Interior] may deem proper be reserved for use as a shooting area, to be operated under a cooperative agreement or lease With regard to the waters ... the Secretary of Agriculture [Interior] ... may enter into a cooperative agreement or lease ... said waters may be used for fishing purposes ... Executive Order 6924, dated Dec. 18, 1934

... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds. 16 U.S.C. § 715d (Migratory Bird Conservation Act of 1929)

... for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. §742f(a)(4)

... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ... 16 U.S.C. §742f(b)(1) (Fish and Wildlife Act of 1956)

National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System, otherwise known as Refuge System, is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (Pub. L. 105-57; 111 Stat. 1252).

Description of Use

Is this an existing use?

Yes. This draft Compatibility Determination (CD) reviews and replaces the 2008 CD for the use of research.

What is the use?

The use involves research activities conducted by non-Fish and Wildlife Service (Service) personnel or authorized agents and includes planned, organized, and systematic investigation of a scientific nature; gathering of refuge natural resources or cultural artifacts for scientific purposes; and scientific inventory or monitoring. Researchers may include federal, state, and private entities, including non-Service federal agencies, state departments of natural resources, university personnel, non-governmental organizations, and independent contractors. Research activities would focus on priority species and habitats as identified in the refuge's approved Comprehensive Conservation Plan (U.S. Fish and Wildlife Service [USFWS] 2008a) and other step-down plans or would address landscape-level questions.

Is the use a priority public use?

No

Where would the use be conducted?

The entire refuge may be used for research activities, except for designated administrative, maintenance, and residential areas. The refuge totals 50,180 acres (Figure 1) and is dominated by Lake Mattamuskeet. The lake encompasses 40,276 acres, about 80 percent of the refuge's total acreage. Moist-soil units on the refuge

total 1,933 acres and are located mainly on the east and west sides of the refuge. Mixed pine hardwood forest is found on higher ground.

These habitats provide a valuable wintering area for waterfowl along the Atlantic Flyway. Thousands of Canada geese, snow geese, tundra swan and 22 species of ducks overwinter on the refuge annually. The refuge also provides habitat for formerly listed species such as the bald eagle and peregrine falcon. Deer, bobcats, otters, black bear, 240 species of birds and other wildlife species are indigenous to the area. The refuge and its surrounding waters support many species of resident and migratory fish and wildlife. Of these, 48 species are fish, 145 are birds, 48 are reptiles and amphibians, and 40 are mammals. The refuge supports wildlife species that are important from both a regional and a national standpoint. Its large size and vegetative diversity make the refuge a haven for species that require aquatic and wetland habitats.

The location of the research would vary depending on the research being conducted and would be identified in the permit issued for each project. Some areas may be temporarily off limits due to potential disturbance to migratory birds. For example, each year Lake Mattamuskeet and most impoundments are closed to the public during the winter to limit disturbance to wintering waterfowl. Research requests for access to these areas would be considered on a case-by-case basis.

Most studies and research projects are conducted on small areas (study plots) on the refuge to limit potential disturbance. Study areas and access routes may be restricted to designated portions of the refuge due to logistical constraints, to protect sensitive species, or at critical times of the year. Access to research areas would be through existing roads and trails.

When would the use be conducted?

The timing of the research would depend on the approved design of an individual research project. The refuge is open to public use from ½ hour before sunrise to ½ hour after sunset. Depending on the nature of the research, field work may occur at any time; research requests for access to the refuge outside of open hours would be considered on a case-by-case basis. Depending on the nature of the research, field work may occur at any time during open hours. Scientific research may be authorized on the refuge throughout the year, provided there are minimal conflicts with protection of trust resources or primary public use activities, such as closure of wintering waterfowl areas each year from November 1 to March 1 or during public hunts on the refuge.

How would the use be conducted?

Prospective researchers would be required to submit a research proposal to the refuge manager. The refuge manager would determine if the proposed research, survey, or collection would enhance refuge knowledge or better inform management actions. The refuge manager would make recommendations for information that

must be included in the research proposal and the scope of the project and would communicate expectations to the prospective researcher. Potential research methods include, but are not limited to, bird banding, mist netting, point count surveys, radio-telemetry tracking, cameras, recorders, other passive traps, and Unmanned Aircraft Systems (UAS) technology.

Projects that occur within the habitat of threatened or endangered (listed) species, or include the monitoring of same species, would be subject to a Section 7 informal consultation with the Raleigh Ecological Services Field Office under the Endangered Species Act of 1973 (87 Stat. 854, as amended; 16 U.S.C. 1531 et seq.). The approval of the Section 7 consultation is required before any research can be conducted on federally listed species or in areas listed species may occur. Research that could adversely affect critical habitat or listed species would not be permitted.

A research application (Service Form 3-1383-R: National Wildlife Refuge System Research and Monitoring Special Use Application and Permit) and detailed research proposal that follows the Mattamuskeet NWR study proposal guidelines (Appendix A) would be required from parties interested in conducting research on the refuge. The general conditions and requirements, as stated on FWS Form 3-1383-R, would apply to all approved projects. Additional refuge- or project-specific conditions may also apply to any approved research projects (Appendix B).

Each request would be evaluated on its own merit. Refuge staff may ask our regional refuge biologists, other Service divisions, state agencies, or academic experts to review and comment on proposals. The refuge manager would use sound professional judgment and ensure that the request would have minimal negative impacts to natural resources, cultural resources, or visitor services and would not violate refuge regulations. Extremely sensitive wildlife habitat areas would be avoided unless sufficient protection from research activities (i.e., disturbance, collection, capture, and handling) is implemented to limit the area and wildlife potentially impacted by the proposed research. If proposed research methods are evaluated and determined to have potential adverse impacts on refuge wildlife or habitat, then the refuge would determine the utility and need of such research to conservation and management of refuge, wildlife, and habitat. If the need was demonstrated by the research permittee and accepted by the refuge, then measures to minimize potential impacts (e.g., reduce the numbers of researchers entering an area, restrict research in specified areas) would be developed and included as part of the study design and on the SUP. Research activities would be modified to avoid harm to sensitive wildlife and habitat when unforeseen impacts arise.

If the project is approved, the refuge would issue a Special Use Permit (SUP) to the researcher. Any approved SUP would outline the framework in which the use could be conducted, including specific terms and conditions that the researcher(s) must follow related to the activity, location, duration, and time-of-year restrictions to ensure continued compatibility. All refuge rules and regulations must be followed

unless alternatives are otherwise accepted in writing by refuge management. Refuge staff would ensure compliance with the permit.

Research projects may be modified, redesigned, relocated, or terminated at any time upon determination by the refuge manager that the project is causing unanticipated adverse impacts to wildlife, wildlife habitat, approved priority public uses, or other refuge management activities. Refuge staff would conduct annual reviews of the research project to monitor researcher activities for potential impacts to the refuge and for compliance with conditions on the SUP. The refuge manager may terminate previously approved research and SUPs if adverse impacts are observed or if the researcher is not in compliance with the stated conditions.

Any research that would potentially cause soil disturbance would be reviewed by the Regional Archaeologist through a National Historic Preservation Act Section 106 consultation. This consultation ensures that no cultural or historic resources are damaged through implementation of an action.

Research projects using UAS technology would be considered using Federal Aviation Administration (FAA), Office of Aviation Services, and Department of Interior (DOI) Aviation Policy guidelines. The Operational Procedures Memorandum (OPM) #11 provides DOI policy, which is consistent with existing FAA policy and regulations. This OPM outlines roles, responsibilities, procedures, and guidelines for acquisition, certification, operator qualifications, training, and more.

DOI Aviation Policy uses 14 CFR 1.1 to define “Operational Control,” with respect to a flight, to mean: the exercise of authority over initiating, conducting, or terminating a flight. This definition is independent of aircraft ownership. Office of Aviation Services further interprets operational control in OPM-35; an aircraft can be considered under the Service’s exclusive direction and control when we exercise responsibility during the mission for dispatching the aircraft, including departure time, take-off and landing sites, and payload.

Currently the FAA asserts that federal agencies, state agencies, and universities are eligible to obtain a Certificate of Waiver or Authorization (COA). The COA includes, but is not limited to, the operational plan, risk management, airworthiness, airspace, pilot qualifications, frequencies, and communication plan. DOI operators are required to follow provisions of the sUAS Rule (Part 107), a COA, an emergency COA, or the DOI-FAA Memorandum of Agreement (2015). Non-DOI government agency or public university operators must follow the provisions of the sUAS Rule (Part 107) or obtain a COA. Any approved research SUP using UAS would include stipulations stating who has operational control; mission expectations; authorization to land and/or take-off on a NWR (as required by 50 CFR 27.34 – Aircraft); required compliance (e.g., National Environmental Policy Act, Section 7 consultation, Biological Opinion, an approved Project Aviation Plan, Wilderness Act compliance, etc.); reporting requirements; a customized map with terrain, facilities, sites, restrictions, etc.; and a description of acceptable levels of wildlife disturbance, including actions taken to avoid disturbance

and disturbance levels at which the operation must adjust course and procedures or abort the mission.

Aviation use on Mattamuskeet NWR is also covered under the Fire District 1 Station Aviation Management Plan, which is updated every three years or amended as needed. Any UAS operation under Service operational control would follow policy and guidelines outlined in the plan.

Why is this use being proposed or reevaluated?

This is an existing use that was evaluated in conjunction with the Mattamuskeet NWR Comprehensive Conservation Plan, Environmental Assessment, and associated Research CD and found to be compatible (U.S. Fish and Wildlife Service [USFWS] 2008a, 2008b).

Mattamuskeet NWR is a major landscape component of northeast North Carolina. As such, it is a significant natural area that can be promoted and used for environmental research. Immediately surrounding the refuge is largely private land that has been modified for the uses of residential, farming, and timber management. Thus, the refuge can serve as an important scientific research area where natural landscapes are sought or required. Other substantial state and federal natural areas suitable for research are within a 40- to 100-mile radius. As part of the Coastal North Carolina Refuge Complex, Mattamuskeet NWR staff would encourage researchers to also consider conducting research on the following refuges within the Coastal North Carolina Refuge Complex: Alligator River, Roanoke River, Currituck, Pea Island, Mackay Island, Pocosin Lakes, Swanquarter, and Cedar Island.

Availability of Resources

The analysis of cost for administering and managing each use will only include the incremental increase above general operational costs that we can show as being directly caused by the proposed use. Refuge support for research may take the form of funding; in-kind services such as housing, the use of other refuge facilities, vehicles, boats, or equipment; and direct assistance of refuge staff in collecting data, providing historical records, conducting management treatments, or providing other assistance as appropriate. Generally, the bulk of the cost for research for the refuge is incurred in staff time to review research proposals, coordinate with researchers, and write SUPs. In some cases, a research project may only require 1 day of staff time to write an SUP. In other cases, a research project may take an accumulation of weeks, as refuge staff must coordinate with students and advisors and accompany researchers during site visits. This support includes review of the proposal by the refuge manager and biologist, consultation and coordination with principal researcher and field staff, issuance of the SUP, review of progress reports, and other daily operational communications.

The refuge typically receives fewer than three research SUP requests per year. Based on recent permit requests, these requests are expected to take five hours of GS-9 coordination, writing, and review (\$235) and two hours of GS-12 Refuge Manager review time (\$138), for a total cost of \$373 annually. More complicated or involved requests would involve more staff time and incur higher costs.

Adequate staffing and funding exist to manage some level of research on the refuge. Discretionary use of staff time would be weighed through a cost-benefit analysis. Individual research proposals may be modified, delayed, or denied if staff have reached capacity or have inadequate time or resources to facilitate or monitor research on a refuge.

Anticipated Impacts of the Use

Potential impacts of a proposed use on the refuge's purposes and the Refuge System mission

The effects and impacts of the proposed use to refuge resources, whether adverse or beneficial, are those that are reasonably foreseeable and have a reasonably close causal relationship to the proposed use. This CD includes the written analyses of the environmental consequences on a resource only when the impacts on that resource could be more than negligible and therefore considered an "affected resource." Air quality, water quality, floodplains, and cultural resources will not be more than negligibly impacted by the action and have been dismissed from further analyses.

Research supports the purpose of the refuge and the Refuge System mission by providing valuable information on habitats, species, and human impacts. That information informs refuge management decisions. The refuge's goals and objectives are described in the Comprehensive Conservation Plan (CCP, USFWS 2008a). Research supports Wildlife Population Management Goals - "Maintain, enhance, and where necessary, restore healthy populations of migratory birds, wildlife, and fish, including federal and state listed species". Under Habitat Management Goals - "Protect and enhance terrestrial, wetland, and aquatic habitats associated with the Lake Mattamuskeet environment in the context of climate change and rising sea levels".

Short-term Impacts

Research activities may disturb fish and wildlife and their habitats (Knight and Cole 1991, Miller et al. 1998, Gill et al. 1996, 2001). For example, the presence of researchers can cause bald eagles to flush from resting and feeding areas, cause disruption of birds on nests or breeding territories, or increase predation on nests and individual animals as predators follow human scent or trails.

Capture efforts, such as for migratory bird banding, can cause disturbance, injury, or death to groups of wildlife or to individuals. The energy cost of wildlife disturbance

may be appreciable in terms of disruption of feeding, displacement from preferred habitat, and the added energy expenditure to avoid disturbance (White-Robinson 1982, Stockwell et al. 1991, Bélanger and Bédard 1995, Burger and Gochfeld 1998, González et al. 2006, Nolet et al. 2016). Disturbance would be weighed against the benefit(s) of the information derived that impact management decisions and the benefit(s) gained by the species being impacted. Researchers would be required to use methods that minimize disturbance, such as by using remote cameras that require only one trip in to set up and one for removal. Handling methods must be reviewed and approved by researcher's university Institutional Animal Care and Use Committee or similar non-university oversight committee.

The use of UAS as a tool among field biologists is increasing across the fields of conservation biology and wildlife management (Koh and Wich 2012, Chabot and Bird 2015). The application of UAS technology to wildlife can potentially add precision as compared to some traditional ground counts (Hodgson et al. 2016). However, more information is needed to assess the potential impacts of UAS on wildlife disturbance. While some studies have indicated surveys can be cost-effective and cover a wide study area with minimal disturbance (Jones et al. 2006, Chabot and Bird 2012, Sardà-Palomera et al. 2012, Vas et al. 2015), others observed wildlife responses to the aircraft (Ditmer et al. 2015, Dulava et al. 2015). As there is a need for more empirical evidence across a range of animals and environments, precaution should be practiced with using UAS technology in research efforts. Comprehensive recommendations as the basis for a code of best practice in the use of UAS for the purpose of animal research have been developed to supplement current standards in animal field research and reporting (Hodgson and Koh 2016). To manage risks, each research proposal that includes UAS technology would need project-specific stipulations outlined in the SUP to minimize anticipated disturbance impacts.

Sampling activities associated with many types of research activities can cause compaction of soils and the trampling of vegetation (Kuss 1986, Hammitt and Cole 1998, Roovers et al. 2004). Installation of posts, equipment platforms, collection devices, and other research equipment in open water may present a hazard if items are not adequately marked and removed at appropriate times or upon completion of the project. Short-term impact mitigation for sampling activities would be addressed in the SUP.

Researchers and scientists follow strict protocols to ensure the safety of the individual animals during capture and handling. Special conditions in the SUP would ensure studies or research on wildlife and habitat involve nondestructive sampling and survey methods, unless collection of a limited number of specimens is necessary for the project. Thus, there are no or minimal short-term direct and indirect impacts on the wildlife or habitat.

Scientific studies and research projects should not have any negative impacts on refuge public uses, especially wildlife-dependent priority public uses, as most research projects would occur outside of hunting and fishing areas. The potential for

research conducted on the refuge to conflict with refuge management activities (e.g., wildlife counts, maintenance activities) on the refuge is minimal since research activities would be coordinated to minimize conflict.

Long-term impacts

Direct mortality due to research will be managed to limit impacts and not to have impacts to overall populations levels. Long-term impacts are expected to be positive, as research results would likely provide information that would contribute to the understanding and conservation of the refuge's diverse natural resources. No long-term adverse impacts are expected from the research activities described. The refuge manager would reduce the likelihood of long-term impacts by modifying or denying SUPs for research that are likely to cause adverse long-term impacts, such as excessive wildlife disturbance, excessive destructive sampling techniques, or significant impacts on refuge management actions. In addition, permits for multi-year research projects would be reviewed on an annual basis, which would provide refuge staff the opportunity to identify adverse impacts and make modifications to the study design to address those impacts. Studies and research conducted by non-government researchers would involve a limited time frame (i.e., specific field seasons) and short duration (less than three years).

Cumulative impacts might occur if multiple research projects were allowed to occur on the same resources at the same time or if the duration of the research was excessive. In particular, the refuge would consider the potential impacts of non-Service research in conjunction with any Service-sponsored research or management activity taking place. No cumulative impacts are expected because the refuge manager would control the potential for cumulative impacts through the issuance of SUPs and prohibit multiple research projects from affecting any given area or species at one time.

Public Review and Comment

The draft CD will be available for public review and comment for 14 days from June 1, 2023, to June 15, 2023. The public will be made aware of this comment opportunity through an information bulletin to local newspapers, letters to potentially interested people, posting at the Hyde County Public Library, and postings on the Mattamuskeet NWR and Coastal North Carolina Refuge Complex websites and Facebook page.

Mattamuskeet NWR website: <https://www.fws.gov/refuge/mattamuskeet>

Coastal North Carolina Refuge Complex website and Facebook page:
<https://www.fws.gov/office/coastal-north-carolina-national-wildlife-refuges-gateway-visitor-center>

<https://www.facebook.com/USFWS.NC/>

The notice of availability and a hard copy of the CD will be posted at the Mattamuskeet Visitor Center (85 Mattamuskeet Road, Swan Quarter, North Carolina 27885) and the Refuge Complex Visitor Center (100 Conservation Way, Manteo, North Carolina 27954). Concerns expressed during the public comment period will be addressed in the final CD.

Determination

Is the use compatible?

Yes

Stipulations Necessary to Ensure Compatibility

1. Prior to initiation of any research or management studies on the refuge, the requesting agency or organization is required to apply for a permit by submitting Service Form 3-1383-R: National Wildlife Refuge System Research and Monitoring Special Use Application and Permit (Appendix A) and a detailed research proposal that follows the Mattamuskeet NWR study proposal guidelines (Appendix A) and Service Policy (4 RM 6, USFWS 1982).
2. Researchers must give the refuge at least 45 days to review proposals before the research begins. If the research involves the collection of wildlife, the refuge must be given 60 days to review the proposal.
3. Researchers must obtain all necessary scientific collecting, banding, and other permits required by state and federal entities before starting the research. Priority of approval would be based on studies that contribute to the enhancement, protection, use, preservation, and management of native wildlife populations and their habitat.
4. The criteria for evaluating a research proposal outlined in the "Description of Use" section above would be used when determining whether a proposed study would be approved on the refuge.
5. Approved research/study proposals would be issued an SUP with appropriate restrictions to lessen disturbance to wildlife and habitat, identify restricted areas, and other limits as needed.
6. Any research involving ground disturbance may require historic preservation consultation with the Regional Historic Preservation Officer and/or the State Historic Preservation Officer.
7. All research related SUPs would contain a statement regarding the Service's policy regarding disposition of biotic specimen. The current Service policy language in this regard is:

You may use specimens collected under this permit, any components of any specimens (including natural organisms, enzymes, genetic materials, or seeds), and research results derived from collected specimens for scientific or educational purposes only, and not for commercial purposes unless you have entered into a Cooperative Research and Development Agreement (CRADA) with us. We prohibit the sale of collected research specimens or transfers to third parties for commercial purposes. Breach of any of the terms of this permit would be grounds for revocation of this permit and denial of future permits. Furthermore, if you sell or otherwise transfer for commercial purposes collected specimens, any components thereof, or any products or research results developed from such specimens or their components without a CRADA, you would pay us a royalty rate of 20 percent of gross revenue from such sales. In addition to such royalty, we may seek other damages and injunctive relief against you (USFWS 2016).

8. Upon completion of a project, researchers are required to remove all research apparatus from the field.
9. Any research project may be terminated at any time for non-compliance with the SUP conditions. Research projects will be reviewed annually to monitor activities for potential impacts to the refuge and for compliance with conditions on the SUP.
10. The Service requires researchers to submit a final report to the refuge within one year of completion of their work. For long-term studies, we also may require annual or interim progress reports. All data collected on the refuge will be shared with the refuge. Researchers who publish the work in peer-reviewed publications are to provide copies to the refuge. All reports, presentations, posters, articles, or other publications would acknowledge the Refuge System and the refuge(s) as partners in the research.
11. No research project would be allowed to occur if:
 - a. it does not have an approved research proposal
 - b. it has significant negative impacts to endangered species, migratory birds, and other refuge trust resources; or
 - c. it compromises public health and safety.

Justification

The Service encourages research on national wildlife refuges to collect new information that would improve the quality of refuge and other Service management decisions; to expand the body of scientific knowledge about fish and wildlife, their habitats, the use of these resources, appropriate resource management, and the environment in general; and to provide the opportunity for students and others to learn the principles of field research. The refuge's goals and objectives are described

in the Comprehensive Conservation Plan (USFWS 2008a). Research supports the Wildlife Population Management Goals: "Maintain, enhance, and where necessary, restore healthy populations of migratory birds, wildlife, and fish, including federal and state listed species". In addition, research supports Habitat Management Goals: "Protect and enhance terrestrial, wetland, and aquatic habitats associated with the Lake Mattamuskeet environment in the context of climate change and rising sea levels".

The stipulations outlined above would help ensure that the use is compatible at Mattamuskeet NWR. Research, as outlined in this draft CD, would not conflict with the national policy to maintain biological diversity, integrity, and environmental health of the refuge. Based on available science and best professional judgement, the Service has determined that research at Mattamuskeet NWR, in accordance with the stipulations provided here, would not materially interfere with, or detract from, the fulfillment of the Refuge System mission or the purposes for which the refuge was established.

Signature of Determination

Refuge Manager Signature and Date

Signature of Concurrence

Assistant Regional Director Signature and Date

Mandatory Reevaluation Date

2033

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Figure

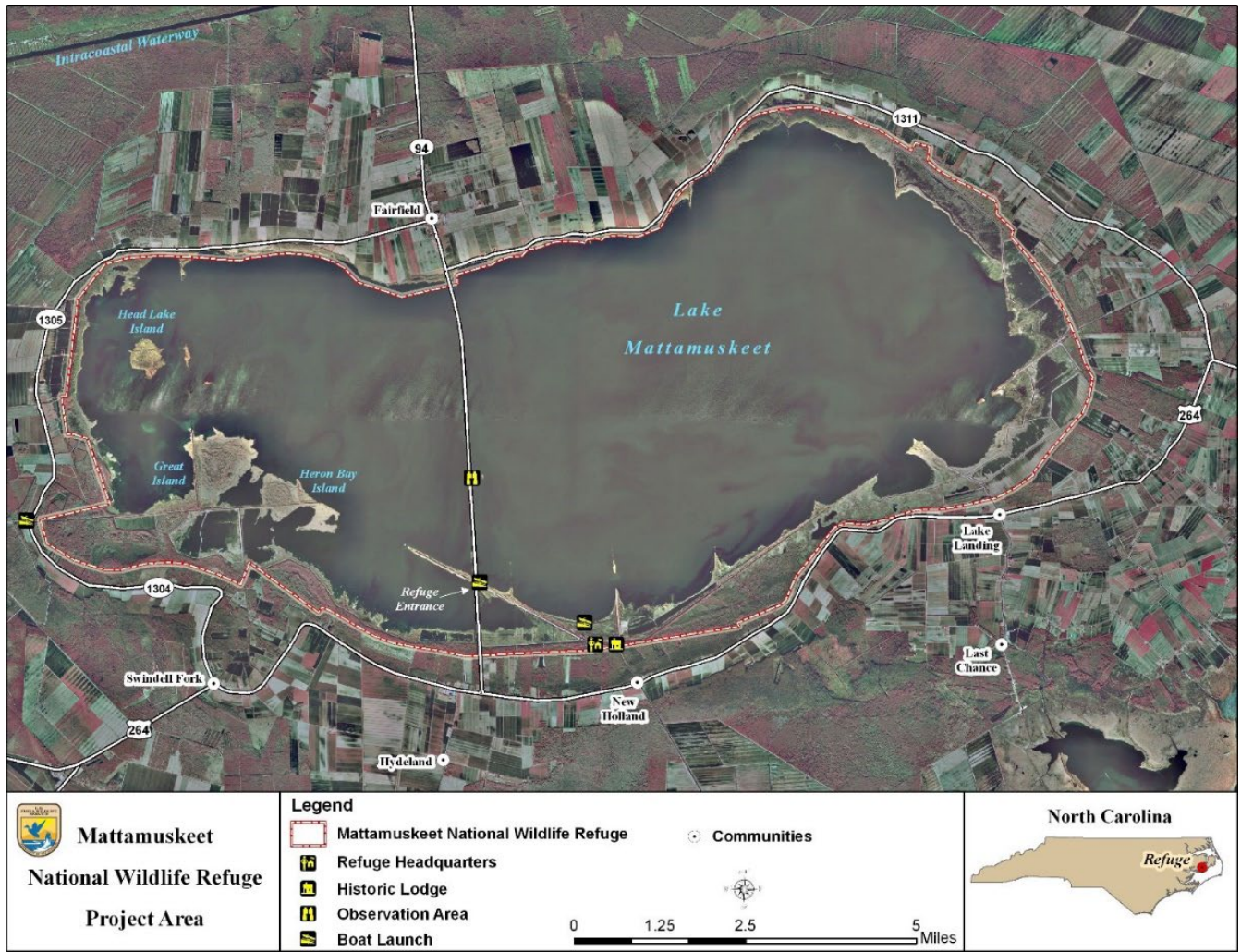


Figure 1. A satellite map of Mattamuskeet National Wildlife Refuge showing the locations of refuge headquarters, the historic lodge, observation areas, and boat launches.

APPENDIX A

Mattamuskeet National Wildlife Refuge research proposal guidelines

A research proposal including a justification and description of the work to be done on the refuge is required before approval of a special use permit. Below are the necessary requirements for a proposal to be considered. In addition, refuge staff reserves the right to ask more detailed questions before approving a project. Proposals should be submitted electronically as a Microsoft Word document or hard copy to the refuge manager.

Cover Page

The cover page must contain the following information:

- Title of proposal
- Current date
- Investigator(s)—name, title, organizational affiliation, address, telephone and fax numbers and e-mail address of all investigators or cooperators
- Proposed starting date
- Estimated completion date
- List of all partners and funding sources of the project
- Signatures of principal investigator(s) and other appropriate institutional officials

Abstract

The abstract should contain a short summary description of the proposed study, including reference to major points in the sections “Statement of Issue,” “Objectives,” and “Methods and Procedures.”

Statement of Issue

Provide a clear precise summary of the problem to be addressed and the need for its solution. This section should include statements of the importance, justification, relevance, timeliness, ability to be generalized, and contribution of the study. Describe how any products would be used, including any anticipated commercial use. What is the estimated probability of success of accomplishing the objective(s) within the proposed timeframe?

Objectives/Hypotheses

A very specific indication of the proposed outcomes of the project should be stated as objectives or hypotheses to be tested. Project objectives should be measurable. Provide a brief summary of what information would be provided at the end of the study and how it would be used in relation to the problem. These statements should flow logically from the statement of issue and directly address the management problem.

Establish data quality objectives in terms of precision, accuracy, representativeness, completeness, and comparability as a means of describing how good the data need to be to meet the project's objectives.

Study Area

Provide a detailed description of the geographic area(s) to be studied and include a clear map delineating the proposed study area(s) and showing specific locations where work would occur.

Methods and Procedures

This section should describe as precisely as possible, how the objectives would be met or how the hypotheses would be tested. Include detailed descriptions and justifications of the field and laboratory methodology, protocols, and instrumentation. Explain how each variable to be measured directly addresses the research objective/hypothesis. Describe the experimental design, population, sample size, and sampling approach (including procedures for sub-sampling). Summarize the statistical and other data analysis procedures to be used. List the response variables and tentative independent variables or covariates. Describe the experimental unit(s) for statistical analysis. Also include a detailed project time schedule that includes start, fieldwork, analysis, reporting, and completion dates.

Quality Assurance/Quality Control

Adequate quality assurance/quality control procedures help ensure that data and results are:

- Credible and not an artifact of sampling or recording errors.
- Of known quality.
- Able to stand up to external scientific scrutiny.
- Accompanied by detailed method documentation.

Describe the procedures to be used to ensure that data meet defined standards of quality and program requirements, errors are controlled in the field, laboratory, and office, and data are properly handled, documented, and archived. Describe the

various steps (e.g., personnel training, calibration of equipment, data verification and validation) that would be used to identify and eliminate errors introduced during data collection (including observer bias), handling, and computer entry. Identify the percentage of data that would be checked at each step.

Specimen Collections

Clearly describe the kind (species), numbers, sizes, and locations of animals, plants, rocks, minerals, or other natural objects to be sampled, captured, or collected. Identify the reasons for collecting, the intended use of all the specimens to be collected, and the proposed disposition of collected specimens. For those specimens to be retained permanently as voucher specimens, identify the parties responsible for cataloging, preservation, and storage, as well as the proposed repository.

Special Requirements, Permits, and Concerns

Provide information on the following topics where applicable. Attach copies of any supporting documentation that would facilitate processing of your application.

Refuge Assistance

Describe any refuge assistance needed to complete the proposed study, such as use of equipment or facilities or assistance from refuge staff. It is important that all equipment, facilities, services, and logistical assistance expected to be provided by the Service be specifically identified in this Section, so all parties are in clear agreement before the study begins.

Ground Disturbance

Describe the type, location, area, depth, number, and distribution of expected ground-disturbing activities, such as soil pits, cores, or stakes. Describe plans for site restoration of significantly affected areas.

Proposals that entail ground disturbance may require an archaeological survey and special clearance prior to approval of the study. You can help reduce the extra time that may be required to process such a proposal by including identification of each ground disturbance area on a U.S. Geological Survey 7.5-minute topographic map.

Site Marking and/or Animal Marking

Identify the type, amount, color, size, and placement of any flagging, tags, or other markers needed for site or individual resource (e.g., trees) identification and location. Identify the length of time it is needed and who would be responsible for removing it. Identify the type, color, and placement of any tags placed on animals (see special use permit for stipulations on marking and handling of animals).

Access to Study Sites

Describe the proposed method and frequency of travel to and within the study site(s). Explain any need to enter restricted areas. Describe the duration, location, and number of participants, and approximate dates of site visits.

Use of Mechanized and Other Equipment

Describe any vehicles, boats, field equipment, markers, or supply caches by type, number, and location. You should explain the need to use these materials and how long they are to be left in the field.

Safety

Describe any known potentially hazardous activities, such as electro-fishing, scuba diving, boating, aircraft use, wilderness travel, and wildlife capture, handling, or immobilization.

Chemical Use

Identify chemicals and hazardous materials that you propose using within the refuge. Indicate the purpose, method of application, and amount to be used. Describe plans for storage, transfer, and disposal of these materials and describe steps to remediate accidental releases into the environment. Attach copies of Hazardous Material Safety Data Sheets.

Animal Welfare

If the study involves animals, describe your protocol for any capture, holding, marking, tagging, tissue sampling, or other handling of these animals (including the training and qualifications of personnel relevant to animal handling and care). If it is required that your institutional animal welfare committee review your proposal, you must include a copy of their recommendations. Describe alternatives considered, and outline procedures to be used to alleviate pain or distress. Include contingency plans to be implemented in the event of accidental injury to or death of the animal. Include State and Federal permits. Where appropriate, coordinate with and inform State natural resource agencies.

Additional information or sections that may be requested for the proposal:

Literature Summary

This section should include a thorough but concise literature review of current and past research that pertains to the proposed research, especially any pertinent research conducted at refuges within the Coastal North Carolina Refuge Complex (Alligator River, Pea Island, Pocosin Lakes, Mackay Island, Roanoke River, Currituck, Mattamuskeet, Swanquarter, Cedar Island). A discussion of relevant legislation, policies, and refuge planning and management history, goals, and objectives should also be included.

Literature Cited

List all reports and publications cited in the proposal.

Peer Review

Provide the names, titles, addresses, and telephone numbers of individuals with subject - area expertise who have reviewed the research proposal. If the reviewers are associated with the investigator's research institution, or if the proposal was not reviewed, please provide the names, titles, addresses, and telephone numbers of three to five potential subject-area reviewers who are not associated with the investigator's institution. These individuals would be asked to provide reviews of the proposal, progress reports, and the draft final report.

Budget

The budget must reflect both funding and assistance that would be requested from the Service and the cooperator's contributions on an identified periodic (usually annual) basis.

Personnel Costs

Identify salary charges for principal investigator(s), research assistant(s), technician(s), clerical support, and others. Indicate period of involvement (hours or months) and pay rate charged for services. Be sure to include adequate time for data analysis and report writing and editing.

Fringe Benefits

Itemize fringe benefit rates and costs.

Travel

Provide separate estimates for fieldwork and meetings. Indicate number of trips, destinations, estimated miles of travel, mileage rate, air fares, days on travel, and daily lodging and meals charges. Vehicle mileage rate cannot exceed standard government mileage rates if Federal funds are to be used. Charges for lodging and meals are not to exceed the maximum daily rates set for the locality by the Federal government (contact Mattamuskeet National Wildlife Refuge for appropriate rates).

Equipment

Itemize all equipment to be purchased or rented and provide a brief justification for each item costing more than \$1,000. Be sure to include any computer-related costs. For proposals funded under a Service agreement or contract, the refuge reserves the right to transfer the title of purchased equipment with unit cost of \$1,000 or more to the Federal government following completion of the study. These items should be included as deliverables.

Supplies and Materials

Purchases and rentals under \$1,000 should be itemized as much as is reasonable.

Subcontract or Consultant Charges

All such work must be supported by a subcontractor's proposal also in accordance with these guidelines.

Indirect Charges

Identify the indirect cost (overhead) rate and charges and the budget items to which the rate is applicable.

Cooperator's Contributions

Show any contributing share of direct or indirect costs, facilities, and equipment by the cooperating research institution.

Outside Funding

List any outside funding sources and amounts.

Personnel and Qualifications

List the personnel who would work on the project and indicate their qualifications, experience, and pertinent publications. Identify the responsibilities of each individual and the amount of time each would devote. A full vita or resume for each principal investigator and any consultants should be included here.

Deliverables:

All deliverables must be submitted to refuge staff no later than six months after the end of the project. Any extensions must be added as an amendment to the special use permit. Copies of publications that may extend outside of this six-month period are still required as they become available. Interim deliverable timelines would be agreed on at the time of the issuing of the permit.

Deliverables that are required are as follows:

Reports and Publications

- Progress report(s) (usually quarterly, semiannually, or annually; may be required)
- Draft final and final report(s) (always required)
- The refuge manager appreciates opportunities to review manuscripts in advance of their publication.

Data Files

Provide any spatial (Geographic Information Systems [GIS]) and non-spatial data files that is generated and submitted as part of the research. Non-spatial data must be entered onto DVDs or an external data drive in Microsoft Access or Microsoft Excel. Spatial data, which includes Global Positioning System (GPS)-generated files, must be in a format compatible with the refuge's GIS system. A condition of the permit would be that the Service has access to and may utilize in future mapping and management all GIS information generated.

Metadata

For all non-spatial and spatial data sets or information products, documentation of information (metadata) describing the extent of data coverage and scale, the history of here, when, and why the data were collected, who collected the data, the methods used to collect, process, or modify/ transform the data, and a complete data dictionary must also be provided as final deliverables. Spatial metadata must conform to Service (FGDC) metadata standards.

Specimens and Associated Project Documentation

A report on collection activities, specimen disposition, and the data derived from collections must be submitted to the refuge following refuge guidelines.

Other:

Researchers must provide the refuge manager with all of the following:

- Copies of field notes/notebooks/datasheets.
- Copies of raw data (in digital format), including GIS data, as well as analyzed data.
- Copies of all photos (digital photos preferred), slides, videos, and films.
- Copies of any reports, theses, dissertations, publications or other material (such as news articles) resulting from studies conducted on refuge.
- Detailed protocols used in study.
- Aerial photographs.
- Maps/GIS data.
- Interpretive brochures and exhibits.
- Training sessions (where appropriate).
- Survey forms.
- Value-added software, software developed, and models.

Additional deliverables may be required of specific studies.

A FWS Research and Monitoring Permit Application Form (3-1383-R) is required in order to conduct research on the refuge. This application is available to download at:

<https://www.fws.gov/forms/3-1383-R.pdf>

Appendix B

Conditions for special use permits and authorized activities

1. The Permittee or authorized person, and all officers, agents, employees, representatives, and clients of the Permittee or authorized person, shall comply with all Refuge, Federal, State, and local regulations and conditions that apply to the special use activity. Failure to comply with any applicable regulation or condition, and all Federal laws, rules, and regulations governing National Wildlife Refuges and the area described in the Special Use Permit (Permit) or authorizing documents may result in revocation of the Permit or authorized activity and/or criminal prosecution. The Permit is non-transferable.
2. While engaged in a special use activity on the Refuge, the Permittee or authorized person, and his/her officers, agents, employees, or representatives, shall be in possession of a copy of the Permit or authorizing documents (including all attachments that contain conditions) and shall, upon request by an authorized Refuge official or by any authorized local, state, or federal law enforcement officer, display the copy authorizing their presence and activity on the Refuge and shall furnish any other licenses and identification documents as may be requested.
3. Any accident that results in a personal injury (i.e., an accident that requires professional medical treatment) shall be reported to the Refuge Manager within 24 hours of the accident.
4. Entry on the Refuge during nighttime hours (i.e., ½-hour after sunset to ½-hour before sunrise) is prohibited, **unless authorized in writing by the Refuge Manager.** Access to areas closed to the public is not allowed, unless authorized in writing by the Refuge Manager.
5. Vehicle travel shall only be on designated roads or routes of travel, **unless authorized in writing by the Refuge Manager.** Vehicles, boats, trailers, and other equipment shall be parked in such a manner that **roads and trails, including canoe trails and navigable waters, are not to be blocked.** Roads and trails need to be accessible to other Refuge visitors and to Refuge staff, cooperative farmers, fire trucks, emergency vehicles, maintenance equipment, and law enforcement patrols.
6. Vehicles with catalytic converters shall be restricted to paved roads, recently maintained gravel or dirt roads, or bare soil areas because of the high fire

potential. Vehicles with catalytic converter shall not be parked over high vegetation or other fire hazardous materials.

7. All **locked** Refuge gates shall be closed and locked upon entering and leaving Refuge property. Refuge gates should be left the way they are found (i.e., open, closed, either locked or unlocked as the case may be). All signs describing authorized and unauthorized entry through a gate shall be followed unless entry is allowed by this permit.
8. Refuge gate or building keys **shall not be loaned** to other agencies, companies, or persons. If there is a need for access by other persons, please have them contact the Refuge Manager. All Refuge keys shall be returned to the Refuge Manager, or a designated staff member, within 10 calendar days, after expiration or termination of the Permit or authorized activity.
9. All dogs (or any other pet) must be confined or on a leash while on the Refuge, **unless authorized in writing by the Refuge Manager**. Leashed pets must be under the immediate control of the Permittee or authorized person, or the leash must be secured to a stationary object. The leash shall not be in excess of 10 feet in length. Dogs are not allowed in areas where dogs are prohibited, unless authorized in writing by the Refuge Manager.
10. Possession or use of firearms, air guns, bows and arrows, cross bows, spears, or gigs; or illegal knives, weapons, or devices; or explosives of any type is prohibited on the Refuge when engaged in a special use activity, **unless authorized in writing by the Refuge Manager**.
11. Littering is prohibited. **All** materials brought into the Refuge shall be removed and properly disposed. Cans, bottles, candy wrappers, toilet paper, and other garbage and refuse shall not be left on the Refuge.
12. The Refuge Manager shall be contacted **before** any surface work is done. This includes mowing, road or trail improvements, digging, clearing or trimming of brush or vegetation, installation of structures, etc.
13. The use of herbicides and pesticides on Refuge property is prohibited, **unless authorized in writing by the Refuge Manager**. Unrestricted, over-the-counter type insect repellents may be used on or near the body and clothing to repel biting or stinging insects.

14. No permanent or semi-permanent markings shall be made on any Refuge building, structure, gate, post, sign, fence, tree, vegetation, or soil by either marking, painting, cutting, scratching, blazing, mowing, digging, or other destructive method, **unless authorized in writing by the Refuge Manager**. When needed, only temporary, removable markers (e.g., flagging tape, survey stakes, metal/paper/plastic tags, etc.) shall be used to mark site locations, plots, etc. Safety signs, informational signs, and any other signs required by law or regulation for the special use activity being conducted, shall be posted as required, **but only with prior authorization by the Refuge Manager**. All markers and signs shall be removed upon conclusion of the special use activity or upon expiration or termination of the Permit.
15. No permanent or semi-permanent fences, buildings, shelters, docks, piers, or other structures or facilities may be erected, built, or placed on the Refuge, **unless authorized in writing by the Refuge Manager**. No machinery, equipment, supplies, or materials may be placed or stored on the refuge, **unless authorized in writing by the Refuge Manager**.
16. All open fires are prohibited, **unless authorized in writing by the Refuge Manager**. Leaving an **authorized** open fire unattended or not completely extinguished is prohibited. Setting on fire or causing to be set on fire any timber, brush, grass, or other inflammable material, including camp or cooking fires, is prohibited, **unless authorized in writing by the Refuge Manager**. The use of cutting torches, arc welders, or any other open flame/sparking devices (which are required to conduct the special use activity) shall be exercised with caution and **only with prior authorization from the Refuge Manager**. When use of these devices is necessary, the operator(s) shall have **immediate access to appropriate fire control equipment** (e.g., fire extinguishers, shovels, etc.) and **immediate communication access to local emergency services** (e.g., cellular telephone, two-way radio, etc.). Tobacco smokers shall practice caution when smoking; shall completely extinguish all matches, cigars, cigarettes, and pipes; and shall dispose of same in a proper container (e.g., a vehicle ash tray).
17. The Refuge Manager should be contacted **immediately** at ***(252) 926-4021*** upon discovery of any **wildfire**, or any leak, spill, or break in a pipeline, power line, canal, or dike, or any other accident or incident that has the potential to have an adverse impact on the soil, wildlife, or plants in the area. Any unusual wildlife sightings or suspected illegal activities should be reported to the Refuge Manager.
18. It is unlawful to disturb, destroy, injure, collect, or take any wildlife, plant, natural object, mineral, cultural or historical feature, or public property on the Refuge,

unless authorized in writing by the Refuge Manager. State and federal collections or scientific use permit regulations and conditions also apply.

19. Wildlife shall not be harmed or harassed, and disturbance shall be kept to a minimum, this includes all snakes (poisonous and non-poisonous snakes), unless authorized in writing by the Refuge Manager. State and federal collections or scientific use permit regulations and conditions also apply.
20. Any research or monitoring activities involving ground disturbance may require historic preservation consultation with the Regional Office and/or State Historic Preservation Office. Researchers must obtain an Archeological Resource Protection Act permit from the Regional Office prior to obtaining a special use permit from the refuge.
21. All researchers would be required to obtain appropriate State and Federal permits for the capture and possession of protected species, for conducting regulated activities in wetlands, and for other regulated activities. Researchers may also need to provide an assurance of animal care form or an institutional animal approval form, if applicable.
22. Research collection activities must adhere to the Service's policy regarding disposition of biotic specimens:

You may use specimens collected under this permit, any components of any specimens (including natural organisms, enzymes, genetic materials or seeds), and research results derived from collected specimens for scientific or educational purposes only, and not for commercial purposes unless you have entered into a Cooperative Research and Development Agreement (CRADA) with us. We prohibit the sale of collected research specimens or transfers to third parties for commercial purposes. Breach of any of the terms of this permit would be grounds for revocation of this permit and denial of future permits. Furthermore, if you sell or otherwise transfer for commercial purposes collected specimens, any components thereof, or any products or research results developed from such specimens or their components without a CRADA, you will pay us a royalty rate of 20 percent of gross revenue from such sales. In addition to such royalty, we may seek other damages and injunctive relief against you (USFWS 2016). U.S. Fish and Wildlife Service. 2016. Director's Order No. 109, Amendment 11: Use of Specimens Collected on Fish and Wildlife Lands. March 31, 2016.

23. The use or possession of traps, snares, or other passive (i.e., unattended) collection devices, which are used to collect wildlife, is prohibited, unless

authorized in writing by the Refuge Manager. Each individual trap, snare, or passive collection device shall have a weather-resistant, permanent tag attached with the Permittee's, authorized persons, and/or organization's name legibly marked on the tag **or** shall have the Permittee's, authorized persons, and/or organization's name legibly marked, imprinted, or engraved on the trap, snare, or device.

24. Recreational and commercial uses of unmanned aerial vehicles (drones) are prohibited on the refuge. Permitted research projects using UAS technology would be considered using Federal Aviation Administration (FAA), Office of Aviation Services (OAS), and Department of Interior (DOI) Aviation Policy guidelines.
25. All researchers are required to submit a final report to the refuge upon completion of their work. If the study is long-term, an interim progress report would be required. Researchers who publish the results in peer-reviewed publications are to provide copies to the refuge. All reports, presentations, posters, articles or other publications would acknowledge the Refuge System and appropriate refuges as partners in the research, provided that the Service does not otherwise deem it appropriate to issue a disclaimer. The acknowledgement recognizes that the research could not have been conducted without the existence of the refuge and its support and cooperation. The research organization/agency or personnel in conjunction with the Service would retain the use and ownership of all data/reports.