

**Negotiated Rulemaking Advisory Committee for Off-Road Vehicle Management
At Cape Hatteras National Seashore**

**Final Report of the Proceedings
Submitted to the National Park Service on behalf of the Committee
by Patrick Field, Robert Fisher, and Ona Ferguson, Committee Facilitators
March 30, 2009**

This report is submitted by the facilitators to the National Park Service pursuant to Section VI (F) of the Final Groundrules of the Negotiated Rulemaking Advisory Committee for Off-Road Vehicle Management at Cape Hatteras National Seashore (Committee) adopted on January 4, 2008 and the Negotiated Rulemaking Act, 5 U.S.C. 561-570. This report outlines the Committee's process and the outcome of the Committee's work, and provides information, recommendations, and materials submitted by one or more Committee members as an addendum. As provided in Section 556(f) of the Negotiated Rulemaking Act all Committee members were given the opportunity to submit information, recommendations, and materials along with this report.

As required by Section 556 (g) of the Negotiated Rulemaking Act and the Federal Advisory Committee Act, 5 U.S. C. Appendix 2, documents which were made available to or prepared for or by the Committee and meeting summaries containing the required information have been maintained by the CAHA Superintendent, as the Designated Federal Official (DFO), and are available for public inspection.

Committee Process

The Committee was established through a feasibility assessment and convening process. A draft Negotiated Rulemaking Feasibility Report, based on 55 interviews, was released on June 17, 2005. The revised Report was released for public comment on December 16, 2005. The final Feasibility Report, released April 4, 2006, concluded that: “. . . a consensus-based negotiation to develop a management plan and proposed implementing regulations can be convened, can yield important benefits even if agreement is not reached, and has a modest chance of success. . . .” The National Park Service issued a Federal Register Notice of Intent to Establish a Negotiated Rulemaking Advisory Committee on June 29, 2007. The Secretary of the Interior signed the Charter establishing the Committee on November 26, 2007, and the National Park Service issued the Federal Register Notice of Establishment of the Committee, including Committee member names, on December 20, 2007.

The Committee convened its first meeting on January 3 and 4, 2008. Subsequently, the Committee held 10 additional meetings on the following dates: February 26-27, 2008, March 18-19, 2008, May 8-9, 2008, June 17-18, 2008, September 8-9, 2008, November 14-15, 2008, December 11-12, 2008, January 6-7, 2009, February 3, 2009, and February 26, 2009. The Committee established seven (7) subcommittees that undertook aspects of

the Committee's work. These subcommittees included: Agenda Planning; Natural Resources; Permits, Passes, and Fees; Routes and Areas; Socio-Economic Analysis; Vehicle Characteristics and Operations; and Village Closures. There also were a number of informal workgroups.

At the February 3, 2009 meeting, the Committee charged an Integration Group to develop a single proposal recommendation to the Committee for discussion at the final meeting. The Integration Group met in-person February 11-13 and 16-17, as well as via conference call on February 23 and 24. The Committee considered the work of the Integration Group in its final meeting and concluded its work on February 26, 2009. The Committee's work product can be found on the internet at: <http://parkplanning.nps.gov/parkHome.cfm?parkId=358>.

Committee Outcome

The Committee did not reach consensus on the concepts and language to be used as the basis for a proposed special regulation governing ORV use at the Seashore as contemplated by the Committee's Charter. The Committee in its Final Groundrules defined consensus as unanimous concurrence of the principals, or in the absence of the principal, his or her alternate.

As requested by the National Park Service and Committee members, the Committee discussed in detail, such issues as: 1) access to beach areas for commercial fishing and recreational activities; 2) providing for a variety of visitor experiences on the seashore, including both ORV and non-ORV experiences; 3) public safety; and 4) protection of the beach environment and the associated plant and wildlife resources. The Committee gathered extensive information and data on key issues, deliberated about key subjects related to a proposed regulation, reviewed and discussed the National Park Services' draft proposed National Environmental Policy Act (NEPA) ORV Management Alternatives (11/05/08) and developed numerous ideas and options for addressing the key issues.

Addenda to the Facilitators' Report

The Committee's Final Groundrules provided for the Committee, through the Facilitators, to transmit to NPS a report, and for Committee members to submit, as addenda to the report, additional information, recommendations, or materials. The following addenda to this report contain the additional information, recommendations, or materials as provided to the Facilitators by Committee members without alteration.

Addenda to the Final Report of the Proceedings of the Negotiated Rulemaking Advisory Committee for Off-Road Vehicle Management at Cape Hatteras National Seashore

Additional Information, Recommendations, and Materials Submitted to the National Park Service by Committee Members

<u>Addendum No.</u>	<u>Addendum Submitted/Supported By:</u>	<u>Dated/(# of Pages)</u>
1	Rob Milne and Dwight Rettie, Coalition of National Park Service Retirees	March 27, 2009 / 3 pages
2	North Carolina Wildlife Resources Commission	March 27, 2009 / 5 pages
3	Pete Benjamin, U.S. Fish and Wildlife Service	March 27, 2009 / 20 pages
4	American Sportfishing Association Avon Property Owners Association Cape Hatteras Anglers Club Cape Hatteras Business Allies Dare County Dare County Tourism Board DBA Outer Banks Visitor Bureau Hatteras Village Civic Association Hyde County (& Ocracoke Business & Civic Association) North Carolina Beach Buggy Association North Carolina Fisheries Association Outer Banks Chamber of Commerce Outer Banks Preservation Association Recreational Fishing Alliance Rodanthe-Waves-Salvo Civic Association United Four Wheel Drive Associations Watersports Industry Association, Inc.	March 27, 2009 / 77 pages
5	Walker Golder, Audubon North Carolina Sidney Maddock, National Audubon Society Jason Rylander, Defenders of Wildlife Derb Carter, Southern Environmental Law Center Destry Jarvis, Natural Resources Defense Council and The Wilderness Society	March 27, 2009 / 77 pages
6	Trip Forman and Matt Nuzzo, Water Sports Industry Association	March 27, 2009 / 1469 pages

Coalition of National Park Service Retirees

Addendum to the Final Report of the Proceedings of the Negotiated
Rulemaking Advisory Committee for Off-Road Vehicle Management at
Cape Hatteras National Seashore

Rob Milne and Dwight Rettie
Coalition of National Park Service Retirees

March 27, 2009

REPRESENTING THE COALITION OF NATIONAL PARK SERVICE RETIREES:

For reasons beyond our control, Rob Milne and Dwight Rettie were unable to participate fully in the last meetings of the Committee. Because we represented the Coalition of National Park Service Retirees, an organization with no institutional turf to protect, both Rob and Dwight have seen it as their role to represent present and prospective users of Cape Hatteras National Seashore and other areas subject to present and potentially future ORV use and other forms of motorized recreation. We specifically viewed our "clientele" as all of the American people, the ultimate owners of the National Park System.

We are disappointed that the negotiation process did not result in a consensus package to which everyone could agree. It was, indeed, a noble goal. Perhaps the bits and pieces on which there was agreement will serve as starting places for progress at informal resolution of other problems when possible. We were often impressed with the goodwill and open mindedness around the negotiating table. Negotiating about matters so deeply embedded in the local culture was inevitably difficult, especially during a period of economic crisis when separating out the effects of even small amounts of lesser ORV and beach use from the untoward effects of a national recession. Those effects are commingled to a degree impossible to separate.

We take away from this effort three lessons for CAHA and for other units of the National Park System that are now and may in the future be impacted by recreational forms having known or predictable long term adverse impacts on the environment and on the quality of visitors' experiences.

1. Cape Hatteras National Seashore is a classic example of a problem that has been known, visible and of concern to both visitors and park management for decades. The problem has, as a consequence, become more and more difficult to resolve. The same basic conditions exist elsewhere in the National Park System. Delay in stepping up to the problem makes it increasingly more difficult to resolve. NPS should inventory similar problems at other locations in the system and set some sort of process in motion to negotiate or otherwise resolve the issues between now and 2016. That goal does not seem unrealistic.

2. Park planning and management practices should afford a means by which future problems can be identified before they become acute conflicts or before they place park resources in danger of impairment.

3. As visitation grows CAHA and dozens of other National Park System sites will have an opportunity to look ahead and come seriously to grips with the reality that at some time in the future park use will reach saturation levels that will again raise the issue of "carrying capacity" of both the resource and the quality of visitors' experience. We acknowledge the theoretical and practical difficulties in designing any servicewide definitions and numerical indicators. Perhaps a servicewide system is unrealistic and focus should be on individual parks and sites. We are not troubled by differences in "carrying capacity" dependant on the inherent differences in park resources and visitor experiences. Nor do we believe all these answers must or can be resolved by 2016. We do urge that without such knowledge and standards, park managers

Coalition of National Park Service Retirees

should examine the merits of "capping" visitation by one means or another, to afford the needed time to develop more specific carrying capacity methods while beginning a public education effort so that when the date of ultimate saturation arrives, the public understands its necessity. Such levels may only be reached for short periods each season. Understanding that reality is also important for both visitors and park management.

It has been an honor and privilege to represent the Coalition of National Park Service Retirees at the negotiating table. We wish we had the wisdom or the magic wand that could have led to the consensus we know everyone would have preferred. Learning the nature and depth of other points of view was perhaps enough in itself.

Respectfully submitted,

Rob Milne, Committee Member
Dwight Rettie, Alternate

North Carolina Wildlife Resources Commission

Addendum to the Final Report of the Proceedings of the Negotiated
Rulemaking Advisory Committee for Off-Road Vehicle Management at
Cape Hatteras National Seashore

North Carolina Wildlife Resources Commission

March 27, 2009



Recommendations Pertaining to Night Driving on CAHA during the Sea Turtle Nesting Season

Introduction

The recommendations contained herein are interim concepts being presented by the North Carolina Wildlife Resources Commission at the request of the National Park Service. These concepts consider both biological and social issues related to beach driving on CAHA. These concepts are provided to indicate the current thinking of our agency, but by their very nature will require further development before being finalized. As indicated below, we agree that above-ambient lighting in CAHA and throughout Dare County impacts turtle populations more than human activity on the beach. We believe these recommendations reflect acceptable compromises between biological and social issues and provide a foundation from which opportunities to successfully address lighting, night driving, and wildlife population issues can be maximized.

Goals for Recovery

- Recovered population of sea turtle nests at CAHA = 200 nest annually
- Annual increase in sea turtle nests $\geq 2\%$ (or greater) annually, based on the past 5-yr average.
- Decrease the number of sea turtle takes associated with night driving activities to $< 3/\text{yr}$.
- Decrease the number of violations to sea turtle, bird and sea beach amaranth resources associated with night driving activities to $< 5/\text{yr}$.
- Show an average annual increase in loggerhead sea turtle nests of $\geq 2\%$ from the last 5 yr average.
- Reduce “takes”/yr. on individual sea turtles or individual eggs associated with night driving activities (i.e. hatchlings caught in tire ruts, disorientation due to lights associated with vehicles, eggs or hatchlings run over, etc.).
- Document an average of < 10 resource violations associated with night driving activities/yr.

Performance Objectives

Reduced lighting county-wide: Year 3 = 25% reduction from baseline; Year 5= 50% reduction from baseline; Year 10 = 75% reduction from baseline.

Assumptions and Background

- We are assuming that lighting (all sources) is affecting turtle nesting and hatchling survival at CAHA and throughout Dare County to a greater degree than is human activity on the beach.
- We are assuming the below biological criteria are reasonable and achievable and are accurate measures of a sustainable sea turtle nesting population.

North Carolina Wildlife Resources Commission

- Recovery criteria, as stated in the Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle, are: “(1)...statistical confidence (95 percent) that the annual rate of increase over a generation time of 50 years is 2 percent or greater resulting in a total annual number of nests of 14,000 or greater for this recovery unit (approximate distribution of nests is NC=14% [2,000], SC=66% [9,200], and GA=20% [2,800]); and (2) (t)his increase in number of nests must be a result of corresponding increases in number of nesting females (estimated from nests, clutch frequency, and remigration interval). CAHA historically accounts for approximately 10 percent of the nests laid in NC (although, the last two years – 2007 and 2008 – have seen percentages of 14.5 and 13.2, respectively, of the state-wide totals), the above range-wide objectives translate into a CAHA-specific objective of 200 nests per year within the next 50 years, with interim benchmarks based on an approximate 2 percent annual rate of increase.
- NPS establishes turtle friendly lighting restrictions on NPS property by May 2011.
- County establishes turtle friendly lighting program county-wide by May 2011.

Recommendations

Year 1 (est. implementation 2011) –

- Unrestricted night driving from Nov. 16th through April 30th, subject to resource closures.
- No night driving May 22nd through Sept. 15th between 1 hour after sunset until all beaches have been cleared in the morning by NPS personnel (or authorized personnel).
- Restricted night driving from May 1st through May 21st and again starting Sept. 16th through Nov. 15th between 1 hour after sunset until all beaches have been cleared in the morning by NPS personnel (or authorized personnel), subject to the following conditions:
 - Permits are required with associated education about turtles, lighting rules, and reporting (turtle activity or violations) guidelines.
 - Night driving permitted only on designated ORV routes to Bodie Island spit, Cape Point, Hatteras Inlet Spit and South Point Ocracoke (subject to resource closure).
 - Headlights only on during transit and not shining into bird nesting areas.
 - Other light restrictions as previously identified (i.e. no campfires, lanterns etc.)
 - NPS enforcement officer and technician on location and available to provide enforcement, education, and conduct basic monitoring and documentation of violations.

“Park and stay” option available at Bodie Island spit, one location at Ramp 23, 30, or 38, Cape Point, Hatteras Inlet Spit, and South Point Ocracoke (subject to resource closure).

Year 3, provided the following metrics are met;

1) Reduced problem beachfront lighting county-wide by 25% from baseline.

- Unrestricted night driving from Nov. 1st through April 30th, subject to resource closures.
- No night driving May 22nd through Labor Day between 1 hour after sunset until all beaches have been cleared in the morning by NPS personnel (or authorized personnel).
- Restricted night driving from May 1st through May 21st, and again from the Tuesday after Labor Day through October 31st between 1 hour after sunset until all beaches have been cleared by NPS personnel (or authorized personnel), subject to the following condition.

North Carolina Wildlife Resources Commission

- Permits are required with associated education about turtles, lighting rules, and reporting (turtle activity or violations) guidelines.
 - Night driving permitted only on designated ORV routes to Bodie Island spit, Cape Point, Hatteras Inlet Spit and South Point Ocracoke (subject to resource closure).
 - Headlights only on during transit and not shining into bird nesting areas.
 - Other light restrictions as previously identified (i.e. no campfires, lanterns etc.)
 - NPS enforcement officer and technician on location and available to provide enforcement, education, and conduct basic monitoring and documentation of violations.
- “Park and stay” option available at Bodie Island spit, one location at Ramp 23, 30, or 38, Cape Point, Hatteras Inlet Spit, and South Point Ocracoke (subject to resource closure).

Year 5, provided the following metrics are met;

- 1) Reduced problem beachfront lighting county-wide by 50% from baseline.
- Unrestricted night driving from Nov. 1st through April 30th, subject to resource closures.
 - No night driving the Tuesday after Memorial Day through the Friday before Labor Day between 1 hour after sunset until all beaches have been cleared in the morning by NPS personnel (or authorized personnel).
 - Restricted night driving from May 1st through Memorial Day, and again from the Saturday before Labor Day through October 31st between 1 hour after sunset until all beaches have been cleared by NPS personnel (or authorized personnel), subject to the following condition.
 - Permits are required with associated education about turtles, lighting rules, and reporting (turtle activity or violations) guidelines.
 - Night driving permitted only on designated ORV routes to Bodie Island spit, Cape Point, Hatteras Inlet Spit and South Point Ocracoke (subject to resource closure).
 - Headlights only on during transit and not shining into bird nesting areas.
 - Other light restrictions as previously identified (i.e. no campfires, lanterns etc.)
 - NPS enforcement officer and technician on location and available to provide enforcement, education, and conduct basic monitoring and documentation of violations.
 - “Park and stay” option available at Bodie Island spit, one location at Ramp 23, 30, or 38, Cape Point, Hatteras Inlet Spit, and South Point Ocracoke (subject to resource closure).

Year 10, provided the following metrics are met; If they are not met, NPS returns to one of the above management regimes depending on the level of progress indicated by the metrics.

- 1) Reduced problem beachfront lighting county-wide by 75% from baseline.
- Unrestricted night driving from Nov. 1st through April 30th, subject to resource closures.
 - No night driving the Tuesday after Memorial Day through the Friday before Labor Day between 1 hour after sunset until all beaches have been cleared in the morning by NPS personnel (or authorized personnel).
 - Restricted night driving from May 1st through Memorial Day, and again from the Saturday before Labor Day through October 31st between 1 hour after sunset until all

North Carolina Wildlife Resources Commission

beaches have been cleared by NPS personnel (or authorized personnel), subject to the following condition.

- Permits are required with associated education about turtles, lighting rules, and reporting (turtle activity or violations) guidelines.
 - Night driving permitted only on designated ORV routes to Bodie Island spit, Cape Point, Hatteras Inlet Spit and South Point Ocracoke (subject to resource closure).
 - Headlights only on during transit and not shining into bird nesting areas.
 - Other light restrictions as previously identified (i.e. no campfires, lanterns etc.)
 - NPS enforcement officer and technician on location and available to provide enforcement, education, and conduct basic monitoring and documentation of violations.
- “Park and stay” option available throughout CHNS subject to resource closures.

Needed Evaluations:

Conduct assessment to determine baseline lighting conditions (number of lights visible from the beach) throughout Dare County by 2010. May be able to use “Night Skies” data as part of baseline.

Continue to monitor number of sea turtle nests as in the past. Track % increases or decreases. Baseline is set using past 5-yr. average.

Establish scientifically defensible methods to track sea turtle “takes” and resource violations and monitor these for use in relaxing night driving restrictions.

U.S. Fish and Wildlife Service

Addendum to the Final Report of the Proceedings of the Negotiated
Rulemaking Advisory Committee for Off-Road Vehicle Management at Cape
Hatteras National Seashore

Summary Recommendations Regarding Rule Development for the
Regulation of Off-Road Vehicles at Cape Hatteras National Seashore

Presented By:

Pete Benjamin

Lead U.S. Fish and Wildlife Service Representative

to the Negotiated Rule-Making Committee

February 10, 2009

Updated March 27, 2009

Note: The following was first submitted to the Committee on February 10, 2009. It is provide here again for the record. The content is unchanged. However, we offer the following additional comments:

- 1) With respect to non-listed beach-nesting birds, the comments provided below remain valid with the additional comment that we note the buffer recommendations provided in the protocols prepared by the U.S. Geological Survey represent appropriate applications of the available scientific information regarding protection of these species.
- 2) With respect to night driving, we have been coordinating with the North Carolina Wildlife Resources Commission in an effort to develop a joint recommendation to present to the National Park Service. We have been unable to reach agreement on a joint recommendation in the time available. I feel that with additional coordination, agreement among the FWS and WRC could be reached, and we would be willing to pursue such agreement if the NPS so desires. As such the night driving recommendations attached to the end of this document represent only the views of the U.S. Fish and Wildlife Service. The attached recommendations replace those contained in the body of this document.

The remaining text is as originally submitted in February:

The purpose of this document is to summarize my views as the primary Fish and Wildlife Service representative on the Negotiated Rule-making Committee regarding the discussions that have taken place over the past year. As a Committee we have learned a great deal about the interests of the various Committee members and the many factors that will influence whatever action the National Park Service ultimately takes, and I feel there is sufficient information to allow me to firmly state my views regarding the type of alternative to which I could offer my consent. My Alternate and I have articulated these views throughout the course of the negotiations; but the flow of the negotiations has been such that we have not yet presented our recommendations comprehensively. This document will attempt to pull our views and

recommendations together in a single framework for the benefit of the NPS as you move forward.

To provide context let me say that in evaluating potential alternatives in terms of whether I could offer my consent if the question were put before the Committee I see my decision space as follows. At the low end (non-consent) would be an alternative that would be unlikely (in my estimation) to satisfy basic legal requirements or be within reasonable bounds as indicated by the available scientific information. An example would be an alternative that I think would approach the “jeopardy” threshold or be likely to result in a high amount of avoidable incidental take for one or more listed species. This is a very low bar to clear. Also near this end of the scale would be alternatives that deviate so substantially from existing recovery plans as to be, in my view, unsupported by the best available scientific information. At the high end (heartly consent) would be alternatives through which the NPS would be fully embracing endangered species recovery and conservation as a primary focus. Somewhere in between is a point below which I could not offer consent, as I would not feel comfortable lending the credence of my agency to the plan, but would be equally uncomfortable objecting because the alternative would be likely to meet the bare minimum standards of the statutes and policies under my purview. In that case, I would be inclined to abstain.

The Adaptive Management Framework

Since before the Committee was convened, and throughout its negotiations, I have advocated that NPS apply the concepts of Adaptive Management to the regulation of off-road vehicles at Cape Hatteras National Seashore. Per Secretary’s Order No. 3270, the Department of the Interior supports the use of Adaptive Management where appropriate conditions exist. As identified in the Order and the document “Adaptive Management: The U.S. Department of the Interior Technical Guide,” consideration of Adaptive Management is warranted when: “(a) there are consequential decisions to be made; (b) there is an opportunity to apply learning; (c) the objectives of management are clear; (d) the value of reducing uncertainty is high; (e) uncertainty can be expressed as a set of competing testable models; and (f) an experimental design and monitoring system can be put in place with a reasonable expectation of reducing uncertainty.”

All of these conditions clearly exist with respect to the ORV issue at CAHA, with the exception of (c) above. Though the NPS has yet to state specific management objectives with respect to ORV management and natural resource management at CAHA, it is obvious that such objectives must be clearly defined. These objectives need to describe NPS goals regarding natural resource conditions and visitor experience in concise, measurable terms.

As I see it, all the alternatives under consideration thus far (including those put forth by the natural resource interest groups) are very permissive in terms of ORV access. Most public lands within the breeding ranges of the subject species close preferred habitat to ORV use (if it is allowed at all) throughout the breeding season. By attempting to meet your obligations to conserve the Seashore’s natural resources while simultaneously affording a high amount of ORV access (including access to sensitive habitat) you are trying to codify something at CAHA that is unique as near as I can tell. If this effort is successful, CAHA would provide a unique visitor experience among East Coast public lands; or more accurately, the continuation of what is a

unique experience. I fully understand and support your efforts in this regard. But, at the risk of stating the obvious, balancing these two sets of goals is a very complicated task. I submit that it is too complicated to manage effectively in the absence of a robust Adaptive Management framework.

We have offered to assist NPS in developing natural resource goals and objectives for those species of fish and wildlife under our jurisdiction, recognizing that any decisions regarding adoption of such objectives are the sole purview of the NPS. While continuing to respect your obligations to determine natural resource goals, objectives and management strategies within the Seashore, I offer the following advice regarding appropriate goals and objectives for federally listed species that occur at CAHA in order to provide context and a framework for our overall management recommendations. The following are derived or taken directly from the recovery plans for the listed species occurring within CAHA. These plans represent the state-of-the-science with respect to these species, with the addition of a few references regarding piping plovers that have become available since the plan for that species was last revised in 1996.

Suggested Goals and Objectives

Piping Plovers:

I continue to encourage the NPS to adopt as its goal that you will meet your obligations under Section 7(a)(1) of the Endangered Species Act by contributing to the recovery of this species. This translates into the measurable objectives of managing the CAHA breeding population such that it is approaching the estimated carrying capacity of the habitat within CAHA within the next 10 years, and that productivity is such that CAHA is contributing positively to the Southern Recovery Unit's recovery criteria. According to Appendix B of the Piping Plover, Atlantic Coast Population, Revised Recovery Plan (1996), the estimated carrying capacity for breeding piping plovers at CAHA is 30 nesting pairs. Although this level of breeding activity has not been previously documented at CAHA, I note that the entire period for which reasonably accurate records have been kept at CAHA has been characterized by high levels of relatively uncontrolled human activity resulting in high levels of disturbance during the piping plover breeding season. I further note that NPS units elsewhere in the breeding range exceeded the estimated carrying capacity identified in Appendix B following the implementation of reasonable management measures (e.g., Assateague Island National Seashore. 2006. Management and monitoring of the piping plover, *Charadrius melodus* 2006 breeding season.). Further, we have seen a rapid increase in the number of breeding pairs over the past three years, following implementation of the Interim Strategy and Consent Decree. This indicates to me that habitat availability/suitability is not currently a limiting factor. All this leads me to conclude that 30 nesting pairs is a reasonable objective for CAHA. It also represents an explicit and testable assumption toward which future evaluation, monitoring, and research should be directed (i.e., The carrying capacity for breeding piping plovers at CAHA is 30 breeding pairs). It would be reasonable to adjust this goal modestly based on changed conditions at CAHA since the Recovery Plan was published.

Regarding productivity, the Recovery Plan indicates that an annual rate of 1.5 fledged chicks per pair is needed throughout the breeding range in order to recover the Atlantic Coast piping plover

population. The Recovery Plan also indicates that a rate of 1.25 fledged chicks per pair is needed to prevent population declines. While the productivity rates for past years on record at CAHA are generally much lower than these rates (as is the case for all sites in NC), the fact remains that these rates represent the best available scientific information regarding what is needed to contribute to the recovery of the species. So, I suggest 1.5 fledged chicks per pair per year as the recommended objective. As with the population objective above, this objective in and of itself embodies explicit and testable assumptions (i.e., that it is in fact an achievable rate that will provide for a growing population). In addition, many other testable assumptions relate to this measure, which have implications for management. For example, it is known that human disturbance is among the factors that affect productivity, and that management of human disturbance (including but not limited to management of ORV use) is beneficial. Given that management of ORV use is time consuming, costly and controversial, it would be worth assessing the extent to which human disturbance influences productivity relative to other factors. There would also be obvious benefit in exploring the extent to which different types of human activity influence productivity relative to each other and other factors. Additional learning in all of these areas (and others) would help in making better management decisions, and would inform any needed adjustments to the goals themselves.

Regarding non-breeding piping plovers, we know that piping plovers migrate through and winter at CAHA. We also know that while at CAHA these non-breeding birds utilize a mosaic of habitat at and near the Point and spits (both within CAHA and without). We further know that piping plovers spend approximately 70 percent of their annual life cycle in non-breeding status. This leads us to strongly believe that factors affecting survival during the non-breeding season are important to the survival and recovery of the species. All available evidence also indicates that the factors affecting piping plover fitness and survival during the non-breeding season are the same as those factors that have been well documented to affect breeding plovers, including human-caused factors subject to management control at CAHA. Indeed, in a recent study of Atlantic Canada piping plovers, adult survival during the non-breeding period was considered to be the single most important factor influencing population trends (Amirault et al., 2006; see also Melvin et al., 2006). As such, an appropriate goal would be to address factors subject to management control within CAHA such that the survival and fitness of non-breeding piping plovers is not adversely affected. This translates into an objective of minimizing disturbance of non-breeding piping plovers by human activity within CAHA, and a related objective of minimizing predation of non-breeding piping plovers within CAHA.

Sea Turtles:

As with piping plovers, I continue to encourage NPS to embrace your obligations under Section 7(a)(1) of the ESA and establish an explicit goal of contributing to the recovery of federally listed sea turtles that occur at CAHA. Per the newly revised Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle, the recovery criteria for the Northern Recovery Unit (Georgia to Virginia) are: “(1)...statistical confidence (95 percent) that the annual rate of increase over a generation time of 50 years is 2 percent or greater resulting in a total annual number of nests of 14,000 or greater for this recovery unit (approximate distribution of nests is NC=14% [2,000], SC=66% [9,200], and GA=20% [2,800]); and (2) (t)his increase in number of nests must be a result of corresponding increases in number of nesting females

(estimated from nests, clutch frequency, and remigration interval). Since CAHA historically accounts for approximately 10 percent of the nests laid in NC, the above range-wide objectives translate into a CAHA-specific objective of 200 nests per year within the next 50 years, with interim benchmarks based on an approximate 2 percent annual rate of increase. As with the goals and objectives for piping plover conservation, a set of testable assumptions are either inherent in or can be derived from this objective.

The criteria in the Recovery Plan focus on nesting females, which makes sense given the biology of this species. However, given that the role of CAHA with respect to sea turtle conservation is limited to nesting habitat, it would be appropriate to also establish objectives related to nesting success. These could be described in terms such as a desired percentage of non-relocated nests that produce hatchlings, or other similar measure. I stress the term “non-relocated” because in terms of conserving listed species we are striving to ensure that the habitat is sufficient to sustain the recovered population level. While nest re-location is a tool available to managers, the focus needs to be on management actions to promote habitat conditions that are favorable for the species’ long-term conservation.

Seabeach amaranth:

The NPS should embrace their obligations under Section 7(a)(1) of the ESA and establish an explicit goal of contributing to the recovery of federally listed seabeach amaranth. The recovery criteria identified in the Recovery Plan for Seabeach amaranth (*Amaranthus pumilus*), Rafinesque (1996), state that a “minimum of 75 percent of the sites with suitable habitat be occupied by seabeach amaranth populations for 10 consecutive years.” Cape Hatteras National Seashore has at least four seabeach amaranth sites – Bodie Island spit, Cape Point, Hatteras Inlet spits (Hatteras Island spit and North Ocracoke spit) and Ocracoke Inlet spits (Southern Ocracoke Island spit). Based on the stated recovery criteria, an appropriate goal would be to implement management control to promote and protect the occurrence of seabeach amaranth, at a minimum, at three of the four identified sites. As with the goals and objectives for the other species, a set of testable assumptions are either inherent in or can be derived from this objective.

Modeling

Models (empirical or conceptual) are essential components of an Adaptive Management framework. Please refer to page 12 of “Adaptive Management: The U.S. Department of the Interior Technical Guide” for a very good summary of why models are important. From my own experience, models articulate our understanding of how various factors (variables) interact to affect the resource we are attempting to manage. Models allow us to describe the relative importance of each factor, the uncertainty and risks surrounding each factor and its interrelation with other factors, and to make predictions regarding the effects of alternative management approaches relative to stated goals and objectives. Models help us identify which factors have the greatest potential influence on the resource under management (thereby helping to focus management actions) and the areas of greatest uncertainty (thereby helping to focus research needs). Models are essential tools for organizing scientific information, evaluating alternative management actions and selecting preferred options, organizing monitoring efforts, and identifying research needs. Models help pull all these activities together in a consistent, logical

and transparent framework that is grounded in science. For these reasons models also facilitate stakeholder understanding and input.

In short, you need models. I have been encouraging you to pursue this course since before the negotiated rule-making process began. I am not an expert in this area, but the Department has people with unquestionable expertise. I have provided NPS with their names. I continue to strongly encourage you to avail yourself of their expertise. If you would prefer, I can contact them on your behalf. To do Adaptive Management right you must do it from the start of a process. You cannot tack Adaptive Management on at the end. The Adaptive Management language currently presented in your November 5, 2008 ORV Management Alternatives represents, at best, half measures that will consume NPS resources without providing useful knowledge upon which to base future management decisions. It is already late in the game, but it is not too late. This situation cries out for the application of Adaptive Management, and models are the heart of an Adaptive Management approach.

Other Components of Adaptive Management

Without going into detail at this time, you will also need to build a detailed and specific monitoring protocol that will give you the information needed to measure outcomes, learn through doing, and refine your objectives and models. Additionally, you will need to commit resources to research targeted toward reducing uncertainty surrounding the assumptions upon which your models and management plans are based. This opportunity and commitment to learning, to me, represents one of the greatest potential benefits of this endeavor. Indeed the prospect for developing knowledge that could benefit the conservation of these species range-wide is a primary factor enabling me to consent to a management approach that varies substantially from those described in the recovery plans for these federally listed species.

A final thought regarding Adaptive Management: it requires stakeholder involvement. This is in part why I said earlier that it is already late in the game, even though a final rule is not due until Spring 2011. The Committee's work is near its end, but I think you are going to need some forum or body to afford continued stakeholder involvement throughout the remainder of this rule-making and beyond into implementation of any plan ultimately adopted.

My Bottom Line

The preceding was lengthy but necessary in order for the following specific comments and recommendations to be understood in their proper context. Specifically, IF the NPS were to embrace goals and objectives similar to those outlined above, commit to doing what is necessary to reach those goals, and commit to pursuing those goals via a true Adaptive Management framework, then, it would make little difference to me what specific actions you decide to employ at any given time on any given beach. Under such conditions I would be confident that you were using the best available science and an effective set of decision-support tools to help guide your day-to-day management decision-making. In short, I would be likely to consent to any alternative that embraces the above principles. Conversely, I will likely find it very difficult to consent to any alternative that does not. As I see it, you have an opportunity here to build something really new and substantial that would truly integrate science, management and

stakeholder involvement. Missing this opportunity would represent a substantial loss in my view, and a substantial departure from the kind of science-based decision making that my agency advocates. This would likely prevent me from offering my consent, and the best I'd be likely to offer the Committee would be my abstention.

Nonetheless, with science-based decision making in an Adaptive Management environment, you start with what you know or think you know and work from there. As such, I offer the follow site-specific recommendations as a summary of what the current state of the science indicates or suggests, as taken from the recovery plans for these species.

Specific Management Recommendations

Actions to protect federally threatened and endangered species, by law, must be based on the best scientific information available. (Measures to protect non-listed natural resources also should be based on the best scientific information available.) As stated above, the best scientific information for listed species is generally encapsulated in the species' recovery plan. For older recovery plans, additional, more recent, scientific literature was considered in the development of these protective measures. Literature cited in the recovery plans are incorporated by reference. Additional literature not cited in the recovery plans is referenced below.

Piping Plover

The protection measures for the piping plover are drawn largely from Appendix G of the piping plover Recovery Plan (1996) which is limited to prohibitions of take under section 9 of the ESA, and may not include measures to satisfy potential legal mandates under other portions of the ESA (e.g., section 7) or Executive Orders (e.g., 11644 and 11989). Furthermore, Appendix G is primarily guidance for the protection of breeding piping plovers. Additional information is provided for non-breeding piping plovers.

Pre-nesting Areas:

All suitable piping plover nesting and courtship habitat should be identified by a qualified biologist and delineated with symbolic fencing consisting of wooden posts, bird usage signs, strings, and flagging tape on or before 15 March each year. Pre-nesting areas should include the areas of moist soil habitat, permanent and ephemeral ponds or pools, ocean backshore, dunes, dry sand flats, overwashes, blowouts, and the ocean tidal zone.

All vehicular access into or through posted nesting habitat should be prohibited.

Monitoring should be conducted at least once every two days from 15 March to 15 April, and then daily from 16 April to 15 July, to determine if any birds are exhibiting pre-nesting and/or breeding behavior.

The pre-nesting areas should remain in place until the later of 15 July or two weeks after the last shorebird (e.g., least tern, black skimmer, American oystercatcher, or Wilson's plover chick) within the area has fledged and no other nesting activities by any species are observed, as

U.S. Fish and Wildlife Service

determined by two consecutive monitoring events conducted over at least two days. [Other shorebirds are selected here as a measure to determine the last nesting activity because piping plovers may be difficult to detect.]

All unposted sites should be posted immediately upon detection of breeding behavior (i.e., within the same day), including but not limited to territorial behavior, courtship, mating, scrapes, or other nest-building activities.

These recommendations are essentially similar to the measures identified in your November 5, 2008, CAHA ORV Resource Protection Tables, Species Management 1 (SM1) and Species Management 2 (SM2). A potentially significant difference between the above and SM1/SM2 is the distinction between “recent breeding area” and “all potential habitat.” We do not understand the practical difference, and recommend that “all potential habitat” be treated the same. We also recommend that instead of stating that pre-nesting closures will be “removed” following cessation of nesting activity, that they will be “rolled back” to become “non-breeding buffers”.

As applied to specific sites within CAHA, we recommend the following modifications to the proposed SM2 procedures.

At Bodie Island, much of the best foraging habitat is the wet sand and ephemeral pools near the inlet. Maintenance of a corridor around the entire inlet would result in a high probability of disturbance of pre-nesting birds in the inlet area. We would recommend that baseline management be to terminate the corridor at the point of the inlet/ocean interface beginning March 15. Also, it appears possible to maintain a narrow access corridor to the northwest corner of the “bait pond”.

At South Beach, monitoring data are sparse but the condition of the habitat indicates that the area provides suitable and potentially valuable foraging habitat for pre-nesting plovers. As such we recommend as baseline management conditions the opening of a back dune road with parking and walk-overs.

At Hatteras Inlet, we recommend as the baseline management condition establishment of a high beach corridor from where the spur roads empties onto the ocean beach to the vicinity of the inlet, in order to provide some undisturbed ocean intertidal foraging habitat.

At South Ocracoke, similar to Bodie Island spit, we recommend as the baseline management condition that you terminate the corridor at the point of the inlet/ocean interface beginning March 15.

At this point I think it may be useful to illustrate the type of decision-making that could be achievable under a robust Adaptive Management framework. This is just an example for illustration purposes, and it is very simplistic in that it only considers piping plover pre-nesting habitat management. Nonetheless, let’s assume that the population objective for breeding piping plovers is 30 nesting pairs, based on the numbers provided in Appendix B of the Recovery Plan. Let’s also assume that it is March 2012 and during the 2011 breeding season there were 20 pairs of plovers as follows: Bodie Island 3; Cape Point 10; Hatteras Spit 2; Ocracoke (north and south)

5. Assuming that we have done some analysis and affirmed that the numbers from Appendix B remain reasonable site-specific targets (again being simplistic) then it would be reasonable to conclude at the beginning of the 2012 season that Cape Point is approaching its projected carrying capacity, and presumably there is relatively limited opportunity for additional population growth here as compared to Ocracoke or Bodie Island. So a reasonable management response would be to implement SM2 management at Cape Point with the intent of maintaining access to the greatest extent possible without experiencing a decline in the number of breeding pairs (i.e., the site-specific objective is to hold the population steady at Cape Point). At the same time you would be implementing SM1 standards at Bodie Island and Ocracoke; predicting that these sites offer the best opportunities for continued growth toward your overall objective. I feel that this type of management is only achievable after you have built the Adaptive Management framework through which you have documented your assumptions and established reasonable science-based goals and objectives; have developed models that enable you to make detailed predictions regarding the effects of management actions, characterize uncertainty, evaluate risk, and that provide a framework for assimilation of monitoring data and research findings; and have clearly defined management protocols that have been carefully refined through experience and knowledge.

Protection of Nests:

The recovery plan suggests that a 50 meter buffer around a piping plover nests will be adequate to prevent harassment of the majority of incubating piping plovers, but also acknowledges that available data indicate that larger buffers are needed in some locations of the plover's Atlantic Coast range, especially in the Southern Recovery Unit. At this time we recommend that a 50 meter-radius around nests above the high tide line should be delineated with warning signs and symbolic fencing and all non-essential access (pedestrian and vehicles) prohibited. However, we strongly encourage the NPS to evaluate whether this buffer is sufficient to protect the nests and whether such a buffer will allow them to meet stated goals. We also recommend that the NPS reference Assateague Island National Seashore's Piping plover Management Plan (1993) for additional information on increasing nest site buffers.

Prior to hatching, vehicles may pass by plover nests along designated vehicle corridors established along the outside edge of plover nesting habitat as long as a 50 meter buffer remains between the vehicle corridor and the nest. Vehicles may also park outside delineated nesting habitat, if beach width and configuration and tidal conditions allow. Vehicle corridors or parking areas should be moved, constricted, or temporarily closed if territorial, courting, or nesting plovers are disturbed by passing or parked vehicles or if disturbance is anticipated because of unusual tides or expected increases in vehicle use during weekends, holidays, or special events.

Only persons engaged in rare species monitoring, management, or research activities should enter posted areas. These areas should remain fenced as long as viable eggs are present. Fencing around nests should be expanded in cases where the standard 50 meter-radius is inadequate to protect incubating adults or eggs from harm or disturbance.

U.S. Fish and Wildlife Service

In cases where the nest is located less than 50 meters above the high tide line, fencing should be situated at the high tide line, and a qualified biologist should monitor responses of the birds to passersby, documenting his/her observations in clearly recorded field notes.

If nests are discovered outside fenced areas, fencing should be extended to create a 50 meter buffer to prevent disturbance to incubating adults, eggs, or unfledged chicks.

These preceding recommendations are similar to the measures identified in your Resource Protection Tables, SM1 and SM2. A notable difference between the above and SM1/SM2 is the closure that results from a nest buffer that falls within the intertidal zone. We commend your proposal to implement a full beach closure under such circumstances and do not necessarily advocate for less should you feel that a complete closure is warranted. However, we note that a less restrictive (to access) buffer that extends to the high tide line is a potentially plausible alternative that can be explored as sufficiently protective using Adaptive Management. Another potentially significant difference between the above and SM1/SM2 is the distinction between “nests occurring outside existing closures” and those occurring within existing closures. We recognize that a 50 meter nest buffer likely will be encompassed within the existing closure, but we recommend that nests be evaluated to ensure at least a 50 meter buffer around the nest is maintained.

As applied to specific sites within CAHA, we recommend corridors as described above, subject to closure by nest buffers. However, the illustrative type of decision-making scenario described above regarding the implementation of SM2 at Cape Point could be applied in providing additional access through the intertidal zone. Once again, though, this type of management is only achievable after you have built the Adaptive Management framework through which you have documented your assumptions and established reasonable science-based goals and objectives; have developed models that enable you to make detailed predictions regarding the effects of management actions, characterize uncertainty, evaluate risk, and that provide a framework for assimilation of monitoring data and research findings; and have clearly defined management protocols that have been carefully refined through experience and knowledge.

Protection of Chicks:

Sections of beaches where unfledged piping plover chicks are present should be temporarily closed to all vehicles not deemed essential. Areas where vehicles are prohibited should include all dune, beach, and intertidal habitat within the chicks' foraging range.

A vehicle free area should extend 1000 meters on each side of a line drawn through the nest site and perpendicular to the long axis of the beach. The resulting 2000 meter-wide area of protected habitat for plover chicks should extend from the ocean-side low water line to the bay-side low water line or to the farthest extent of dune habitat if no bay-side intertidal habitat exists.

A pedestrian free area should extend 300 meters on each side of a line drawn through the nest site and perpendicular to the long axis of the beach. The resulting 600 meter-wide area of protected habitat for plover chicks should extend from the ocean-side low water line to the bay-side low water line or to the farthest extent of dune habitat if no bay-side intertidal habitat exists.

A monitoring program should be implemented to gather basic data on location, population size, foraging areas, and success of breeding piping plovers and other imperiled species. However, this type of monitoring program is not a sufficient replacement for the implementation of Adaptive Management.

These recommendations are essentially similar to the measures identified in your Resource Protection Tables, SM1 and SM2. A potentially significant difference between the above and SM1/SM2 is the uncertainty of the buffer zone to protect piping plover chicks. In SM1 a 1000 meter buffer is established “based on observation of bird behavior and terrain conditions” at each site. Exactly how do these conditions (bird behavior or terrain conditions) determine whether a 1000 meter buffer is needed and what is the alternative? Similarly, under SM2 the buffer is reduced (to 500 meter for ORVs, and 200 meters for pedestrians) two weeks after hatching, and once again observed behavior of the brood determines whether a reduced buffer can be employed. We do not understand the reasoning for reducing established buffers with minimal observations (e.g., once daily for SM1) or after a set period of time (e.g., two weeks after hatching for SM2) when such criteria offer little information on the effects of the management action. We recommend a 1000 meter buffer be established in all situations. We also recommend that Adaptive Management be used to determine when and under what conditions an alternative buffer might be warranted. As applied to specific sites within CAHA, we recommend corridors as described above, subject to closure by buffers to protect chicks.

Timing of Vehicle Restrictions in Chick Habitat:

Restrictions on the use of vehicles in areas where unfledged plover chicks are present should begin on or before the date that hatching begins and continue until chicks have fledged. For purposes of vehicle management, plover chicks are considered fledged at 35 days of age or when observed in sustained flight for at least 15 meters, whichever occurs first.

When piping plover nests are found before the last egg is laid, restrictions on vehicles should begin on the 26th day after the last egg is laid. This assumes an average incubation period of 27 days, and provides a 1 day margin of error.

When plover nests are found after the last egg has been laid, making it impossible to predict hatch date, restrictions on vehicles should begin on 15 May (the earliest probable hatch date). If the nest is discovered after 15 May, then restrictions should start immediately. If hatching occurs earlier than expected, or chicks are discovered from an unreported nest, restrictions on vehicles should begin immediately.

If the nest is monitored at least twice per day, at dawn and dusk by a qualified biologist, vehicle use may continue until hatching begins, subject to the protection buffers discussed above and the nighttime restrictions below. Nests should be monitored at dawn and dusk to minimize the time that hatching may go undetected if it occurs after dark. Whenever possible, nests should be monitored from a distance with spotting scope or binoculars to minimize disturbance to incubating plovers.

U.S. Fish and Wildlife Service

If ruts are present that are deep enough to restrict movements of plover chicks, then restrictions on vehicles should begin at least 5 days prior to the anticipated hatching date of plover nests. If a plover nest is found with a complete clutch, precluding estimation of hatching date, and deep ruts have been created that could reasonably be expected to impede chick movements, then restrictions on vehicles should begin immediately.

The above recommendations for the protection of chicks are generally similar to the SM1/SM2 measures identified by NPS. Regarding the language that states: "Points and spits would only be accessible from 7 a.m. - 7 p.m. as long as unfledged chicks are in the area and if buffers can be maintained. The 7 a.m. opening may be delayed until the chicks have been located." We recommend that the phrase "Points and spits" be replaced with "Areas with unfledged chicks", and that the 7 am to 7 pm timeframe be adjusted to be consistent with the Sea Turtle protection measures in the effected area, using which ever is the more restrictive.

Non-breeding Areas:

Suitable interior habitats should be closed to pedestrians and vehicles year-round with a 100 meter buffer to vehicle and pedestrian use to protect essential resting and foraging habitats. Access to the Point or spits would be maintained. These areas in conjunction with the nearby islands would provide valuable high beach roosting habitat as well as sound side intertidal, mudflat, and ephemeral moist sand foraging habitat. Additionally, since we know that non-breeding piping plovers use a mosaic of habitat within a few kilometers of the Point and spits, and that it is important to maintain access to all habitat types (including ocean intertidal habitat) we would recommend that efforts be made to provide disturbance-free ocean intertidal habitat in the vicinity of the Point and the spits. This could be in the form of high beach ORV corridors and/or inter-dunal roads that route vehicles around select areas of ocean inter-tidal habitat. I do not believe we know enough at this time to determine objectively how much of this habitat type is needed to sustain non-breeding birds or where specifically the preferred ocean intertidal foraging habitat is located (other than to say it is in the general vicinity of the Point (specifically South Beach) and the spits). As such, I would recommend that every effort be made to provide this habitat, and I would also agree that there is insufficient evidence to support complete closure of any area to ORV access for the purpose of providing undisturbed ocean intertidal foraging habitat at this time.

A monitoring program should be implemented on the 5th, 15th, and 25th of each month to gather basic data on location, population size, and habitat use by non-breeding plovers as well as other important shorebirds. The non-breeding plover season extends from 1 July to 31 May. However, this type of monitoring program is not a sufficient replacement for the implementation of Adaptive Management.

These recommendations are similar to the measures identified in your Resource Protection Tables, SM1 and SM2. A potentially significant difference between the above and SM1/SM2 is the difference between available ocean intertidal habitats. Another potential difference between the above and SM1/SM2 is the monitoring of non-breeding piping plovers. We understand the difficulties of identifying and distinguishing migrating piping plovers from nesting piping plovers during the spring and fall. However, the proposed monitoring may miss two to three

U.S. Fish and Wildlife Service

months of the migration period, and thus important information on the use of CAHA by migrating piping plovers. We recommend that surveys for non-breeding piping plovers begin on 1 July according to the schedule describe above and continue through 31 May, noting that numbers during the “shoulder” months may include breeding birds. Furthermore, we recommend that all piping plover habitats be monitored rather than just “pre-established locations” to truly understand the use of CAHA by non-breeding piping plovers.

Other Measures:

Notwithstanding the thoughtful comments by fellow Committee members on behalf of dog owners, the fact is that dogs pose a serious threat to beach-nesting birds and sea turtle nests. As such, pets should be prohibited within all natural resources closure areas and should not be permitted within 100 m of any resource closure area between 1 April and 15 November. Furthermore, pets should be leashed and under the control of their owner at all times. Perhaps there is an opportunity to create more “pet friendly” beaches elsewhere within CAHA, or to work with the villages and/or counties to provide such amenities within the broader Outer Banks community.

Kite flying should be prohibited within 200 meters of all piping plover nesting or territorial adult or unfledged juvenile piping plovers between 1 April and 31 August.

Fireworks should be prohibited on beaches where piping plovers nest from 1 April until all chicks are fledged.

Other Beach-Nesting Birds

I am going to continue to demure from making any site specific recommendations regarding management of other beach nesting birds, because I feel that others on the Committee, such as the NC Wildlife Resources Commission, have far greater site-specific knowledge than do we. However, I will say generally that protection of these species is warranted and should be done within the same Adaptive Management framework described above; although it appears to me that there is relatively less readily available information upon which to base specific objectives for these species, which may make developing a framework somewhat more complicated – though not impossible. Also, I am willing to assist you in attempting to reconcile the differences that exist between the ORV groups’ recommendations and the Environmental groups’ recommendations at those areas other than the spits and the Point (e.g., the area north of Avon and the ocean beach along Ocracoke). It is these areas where non-listed species (i.e., beach nesting and non-breeding birds other than piping plovers) appear to be driving the discussion. In these areas I tend to believe it would be reasonable to designate routes through these areas SO LONG AS it is clearly understood that those routes are subject to closure (including potential pre-nesting closures). I have heard several representatives from the ORV groups state repeatedly that this is understood. Under an Adaptive Management framework a decision process similar to the above example could be used to determine which of these areas would be subject to pre-nesting closures during a given season, and I like the idea of a management approach that is progressively more permissive to access as milestones toward objectives are achieved.

Sea Turtles

The protection measures for sea turtles are drawn largely from the second revised (2008) loggerhead recovery plan, and from the Volusia County HCP (2008). Nighttime restrictions are based on emergence data of sea turtles presented in Neville et al. (1988) and Witherington et al. (1990). Protection measures may differ for different sea turtle species. The following measures do not preclude implementation of additional measures to protect those species.

A monitoring program also should be implemented to gather basic data on nesting locations, population size, nesting success, and hatching success of sea turtles. However, this type of monitoring program is not a sufficient replacement for the implementation of Adaptive Management.

Protection of Nesting Areas, Nests, and Hatchlings:

Surveys should begin monitoring for nesting sea turtles beginning 1 May and continue through 31 August (or two weeks after the last sea turtle nesting activity is found, whichever is later). All sea turtle nests should be located each morning, assessed according to NCWRC guidelines (2006), and immediately posted with symbolic fencing. The sea turtle closure should be a minimum of 10 meters by 10 meters around the nest.

At day 50 of the incubation cycle, the closure should be expanded to encompass the area 20 meters duneward of the nest site down to the tide line. The width of the closures (running parallel to the shoreline) also should be expanded to 25 meters each side of the nest. The nest sites should be monitored daily for hatching activity after day 50 of the incubation cycle.

Silt fencing should be installed at day 50 of the incubation cycle if any sources of light pollution from villages or other structures have the potential to disorient hatchlings. The fencing should be placed in a “U” shape behind the nest and extend oceanward to the high tide line. Vehicle ruts that have the potential to impede hatchlings emerging from nests and attempting to reach the ocean must be removed.

Light Restrictions:

Lanterns or auxiliary lights and fixed lights of any kind burning for more than 5 minutes should be prohibited on beaches from 1 May through 15 November.

Campfires should be prohibited from 1 May through 15 November.

Night Driving Restrictions:

The following recommendations regarding night driving are the major difference between our recommendations for baseline management and the SM1/SM2 proposal. These recommendations are based on our current state of knowledge and as such we recommend them as the baseline against which other options should be evaluated. In general, night time vehicular

U.S. Fish and Wildlife Service

traffic on nesting beaches should be minimize and controlled to protect sea turtles engaged in nesting behavior, their nests, and their young.

From 1 May through 15 November, all non-essential vehicles should be prohibited on the beach from 10 pm until the following morning. The beach will be opened to non-essential vehicles each morning only after being checked for nesting activity and after new nests have been adequately protected by the sea turtle patrol staff.

From 1 September through 15 November, National Park Service may authorize and regulate non-essential vehicle access after 10 pm (until the next morning) if the beach is continuously patrolled throughout the night by sea turtle patrol staff during those hours. The patrols should look for all hatching activity, including monitoring for unknown nests, and potential late season nesting activity. If vehicle access is granted during the period from 1 September through 15 November, light restrictions must remain in effect.

From 16 November through 30 April, the beach is open to all non-essential vehicles in accordance with National Park Service policies.

It is my view that these recommendations could be modified considerably if put into the broader context of overall light management throughout Dare County. Including the broader lighting issues in the above-mentioned Adaptive Management framework would provide the proper analytical structure to support decisions to provide greater night access to select portions of the Seashore. As mentioned above with respect to piping plover nesting I could foresee a scenario under which the NPS could scientifically justify a decision to maintain night access to the Point or other such area while continuing to make acceptable progress toward defined goals via cooperative light management throughout the County, and focused management elsewhere within CAHA.

Seabeach Amaranth

The protection measures for Seabeach amaranth are drawn largely from the species' recovery plan (1996). The following measures do not preclude implementation of additional measures to protect the species.

Potential suitable seabeach amaranth habitat in the vicinity of the inlet spits and Cape Point should be identified by a qualified biologist and delineated with symbolic fencing consisting of wooden posts and string on or before 1 June. We recognize that these areas may be encapsulated within shorebird nesting areas and may not warrant additional symbolic fencing. However, protections for seabeach amaranth plants should not be removed before the plant has senesced (typically 1 December).

These recommendations are similar to the measures identified in your Resource Protection Tables, SM1 and SM2. A potentially significant difference between the above and SM1/SM2 is the protection of potential suitable seabeach amaranth habitat in the vicinity of the Point and

spits and outside of existing resource closures. We recommend that “potential habitat” in these areas be protected, especially if they lay outside of other resource closures. We also recommend that seabeach amaranth areas within other resource closures be protected using symbolic fencing following cessation of nesting activity or otherwise any opening of the “other” natural resource closure.

Conclusion

To sum up, the above specific recommendations and comments are provided to illustrate how our current state of knowledge applies to the specific conditions that exist within CAHA, and should represent the starting point from which future decisions are made under an Adaptive Management framework. All that said, I reiterate that it really would not matter to me what specific measures were implemented on a given beach at any given time if NPS were to embrace the goals and Adaptive Management principles identified above. However, I caution that our state of knowledge regarding management of these species is relatively advanced. These recommendations are founded on a relatively robust body of scientific research and management experience. While I think you may be able to avoid “jeopardy” doing otherwise, unless you embrace the Adaptive Management approach I have advocated you will have a very difficult time producing credible scientific justifications for deviating substantially from these recommendations while meeting the NPS mandates of avoiding adverse impacts. The “balance” for which you strive is a worthy goal, and I will continue to support you to the best of my ability. But it is a very ambitious goal and you are going to need to make effective use of the very best tools at your disposal to reach it, and in my mind Adaptive Management is the best tool for this job.

References

- Amirault, D.L., Shaffer, F., Baker, K., Boyne, A., Calvert, A., McKnight, J., and P. Thomas. 2006. Preliminary results of a five year banding study in eastern Canada: support for expanding conservation efforts to non-breeding sites? In: Rabon, D.R. (compiler). Proceedings of the Symposium on the Wintering Ecology and Conservation of Piping Plovers. U.S. Fish and Wildlife Service, Raleigh, NC. [Available on the Internet at: http://www.fws.gov/raleigh/pdfs/ES/Amirault_Article.pdf]
- Assateague Island National Seashore. 1993. Piping plover Management Plan Assateague Island National Seashore. National Park Service.
- Assateague Island National Seashore. 2006. Management and monitoring of the piping plover, *Charadrius melodus* 2006 breeding season. National Park Service.

U.S. Fish and Wildlife Service

- Ecological Associates. 2008. Habitat Conservation Plan – A Plan for the Protection of Sea Turtles on the Beaches of Volusia County, Florida (June Revision). County of Volusia, FL.
- Melvin, S.M. and J.P. Gibbs. 1994. Viability analysis for the Atlantic Coast population of piping plovers. Unpublished report to the U.S. Fish and Wildlife Service, Sudbury, Massachusetts. 16 pp.
- Melvin, S., Hecht, A., Amirault, D., and J.P. Gibbs. 2006. Survival rates during non-breeding periods: the “Achilles’ heel” of piping plover recovery efforts. In: Rabon, D.R. (compiler). Proceedings of the Symposium on the Wintering Ecology and Conservation of Piping Plovers. U.S. Fish and Wildlife Service, Raleigh, NC. [Available on the Internet at: http://www.fws.gov/raleigh/pdfs/ES/Melvin_Abstract.pdf]
- National Marine Fisheries Service and U.S. Fish and Wildlife Service. 2008. Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle (*Caretta caretta*), Second Revision. National Marine Fisheries Service, Silver Spring, MD.
- Neville, A., Webster, W.D., Gouveia, J.F., Hendricks, E.L., Hendricks, I., Marvin, G., and Marvin, W.H., 1988. The effects of nest temperature on hatchling emergence in the loggerhead sea turtle (*Caretta caretta*). Proceedings of the Eighth Annual Workshop on Sea Turtle Conservation and Biology (Schroeder, B.A., compiler). 24-26 February 1988, Fort Fisher, North Carolina.
- North Carolina Wildlife Resources Commission. 2006. Handbook for sea turtle volunteers in North Carolina. Coastal Faunal Diversity Program, North Carolina Wildlife Resources Commission, Raleigh, NC.
- U.S. Fish and Wildlife Service. 1996. Piping Plover (*Charadrius melodus*), Atlantic Coast Population, Revised Recovery Plan. Hadley, MA. 258 pp.
- Witherington, B.E., Bjorndal, K.A., and McCabe, C.M. 1990. Temporal pattern of nocturnal emergence of loggerhead turtle hatchlings from natural nests. *Copeia* 1990(4):1165-1168.

Recommendations Regarding Night Driving on CAHA from the FWS

Goals for Recovery:

- Achieve recovery criteria for loggerhead sea turtle nesting at CAHA as portion of North Carolina total goal (200 nests annually at CAHA by 2058).
- Achieve an annual population growth rate of 2%.
- Maximize nest hatching success and hatchling survival.

Assumptions and Background:

- We are assuming that lighting (all sources) is affecting turtle nesting and hatchling survival at CAHA and throughout Dare County.
- We are assuming the biological criteria described herein are reasonable and achievable and are accurate measures of a sustainable sea turtle nesting population.
- Recovery criteria, as stated in the Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle, are: “(1)...statistical confidence (95 percent) that the annual rate of increase over a generation time of 50 years is 2 percent or greater resulting in a total annual number of nests of 14,000 or greater for this recovery unit (approximate distribution of nests is NC=14% [2,000], SC=66% [9,200], and GA=20% [2,800]); and (2) (t)his increase in number of nests must be a result of corresponding increases in number of nesting females (estimated from nests, clutch frequency, and remigration interval). CAHA historically accounts for approximately 10 percent of the nests laid in NC (although, the last two years – 2007 and 2008 – have seen percentages of 14.5 and 13.2, respectively, of the state-wide totals), the above range-wide objectives translate into a CAHA-specific objective of 200 nests per year within the next 50 years, with interim benchmarks based on an approximate 2 percent annual rate of increase.
- Hatching success at CAHA (all nests), based on 8-year average, is 60%. Desired increases in the number of nests amount to maintaining greater than 60% hatching success of non-relocated nests.
- Desired increases in the number of hatchlings reaching the ocean unassisted are greater than 95%. This provides a standard by which to measure the efficacy of the lighting restrictions and possibly predator controls.
- NPS establishes turtle friendly lighting restrictions on NPS property by May 2011.
- County establishes turtle friendly lighting program county-wide by May 2011.

Performance Objectives (metrics for success):

- Reduced lighting county-wide: Year 3 = 25% reduction from baseline; Year 5= 50% reduction from baseline; Year 10 = 75% reduction from baseline.
- Decrease the number of violations to sea turtle, bird and sea beach amaranth resources associated with night driving activities to less than 5/yr.
- Decrease the amount of incidental take of sea turtle adults and hatchlings (e.g., disorientation of females, disturbed nests, hatchlings trapped in ruts) associated with night driving activities to less than 2% of total nests/yr.
- Increase the number of sea turtle nests by 2% (or greater) annually, based on the past 5-yr average.
- Increase the number of hatchlings reaching the ocean unassisted to >95% (all nests).

U.S. Fish and Wildlife Service

Proposed Strategy for Balancing ORV access and Sea Turtle Conservation:

Year 1 (est. implementation 2011) –

- Night driving from Nov. 16th through April 30th, subject to other provisions.
- Restricted night driving from May 1st through Nov. 15th between ½ hour after sunset until all beaches have been cleared by NPS personnel (or authorized personnel), subject to the following conditions:
 - Night driving permitted only on designated ORV routes and areas, subject to other restrictions, and only to the following areas – Bodie Island spit; one location at Ramp 23, 30, or 38 (i.e., approximately one mile around ramp open); and, Hatteras Inlet spit.
 - NPS enforcement officer and technician on location and available to provide enforcement, education, and conduct basic monitoring and documentation of biological information, including violations.
 - Permits are required with associated education about turtles, lighting rules, and reporting (turtle activity or violations) guidelines.
 - Headlights only on during transit and not shining into bird nesting areas. Other light restrictions as previously identified (i.e., no campfires, lanterns, etc.).
 - This is not a suitable replacement for Adaptive Management (see USFWS's Summary Recommendations Regarding Rule Development for the Regulation of Off-Road Vehicles at Cape Hatteras National Seashore, dated February 10, 2009 for additional information on the use of Adaptive Management).

Year 3 (provided the above metrics are met); same as Year 1 with the following changes –

- Night driving from Sept. 1st through April 30th, subject to other provisions.
- Restricted night driving from May 1st through Aug. 31st between ½ hour after sunset until all beaches have been cleared by NPS personnel (or authorized personnel), per the above conditions.

Year 5 (provided the above metrics are met); same as Year 3 with the following changes –

- Restricted night driving from May 1st through Aug. 31st between ½ hour after sunset until 1 hour after sunrise (or earlier if beaches are cleared by NPS personnel or authorized personnel), subject to the following condition.
 - Night driving permitted only on designated ORV routes and areas, subject to other restrictions, and only to the following areas – Bodie Island spit; one location at Ramp 23, 30, or 38; east beach of Cape Point; Hatteras Inlet spit; and, spit at south end of Ocracoke Island).

Year 10 (provided the above metrics are met); same as Year 5 with the following changes –

- Night driving from first Friday before Labor Day through Memorial Day, subject to other provisions.
- Restricted night driving from the first Tuesday after Memorial Day through the last Thursday before Labor Day between ½ hour after sunset until 1 hour after sunrise (or earlier if beaches are cleared by NPS personnel or authorized personnel).

U.S. Fish and Wildlife Service

Achievement of the above performance objectives ensures implementation of the following incremental strategies for ORV access and sea turtle conservation. Failure to meet performance standards would indicate that the next sequential stage could not be implemented and the performance standards met. Thus, failure to meet performance standards suggests continuation of the current strategy or reversal to a previous strategy in which performance measures were being met until such time that the limiting factors are addressed. Because the performance measures are based on certain assumptions, we recommend that the following be evaluated to determine if such measures are appropriate or achievable and to ensure success in implementing the successive stages of the strategy:

- Conduct assessment to determine whether population goal and population growth are appropriate.
- Conduct assessment to determine whether hatching success and hatchling survival performance measures are appropriate.
- Conduct assessment to determine baseline lighting conditions (number of lights visible from the beach) throughout Dare County by 2010. The recent “Night Skies” data may be used as part of baseline.
- Implement a monitoring protocol or periodic evaluation to determine rates of disorientation/misorientation of adult and hatchling sea turtles and track changes in these rates through time and in response to changes in management practices.
- Implement a monitoring protocol or periodic evaluation to determine rates of take to sea turtles and their nests and track changes in these rates through time and in response to changes in management practices.
- Conduct an assessment of habitat conditions focusing on beaches with a history of high rates of nest failure with the intent of identifying and implementing habitat improvement projects.

UFWDA et al.

Addendum to the Final Report of the Proceedings
of the Negotiated Rulemaking Advisory Committee
for Off-Road Vehicle Management at
Cape Hatteras National Seashore

American Sportfishing Association
Avon Property Owners Association
Cape Hatteras Anglers Club
Cape Hatteras Business Allies
Dare County
Dare County Tourism Board DBA Outer Banks Visitor Bureau
Hatteras Village Civic Association
Hyde County (& Ocracoke Business & Civic Association)
North Carolina Beach Buggy Association
North Carolina Fisheries Association
Outer Banks Chamber of Commerce
Outer Banks Preservation Association
Recreational Fishing Alliance
Rodanthe-Waves-Salvo Civic Association
United Four Wheel Drive Associations
Watersports Industry Association, Inc.

March 27, 2009

1.0 BACKGROUND.

In 1937, during the Great depression, Congress established the Cape Hatteras National Seashore Recreational Area. The enabling legislation for the National Recreational Seashore states, in part, “said area shall be, and is, established, dedicated, and set apart as a national seashore recreational area for the benefit and enjoyment of the people and shall be known as the Cape Hatteras National Seashore Recreational Area”.¹ A purpose of the national seashore was to lift the spirit of economically distressed citizens who could not otherwise afford other forms of recreation. The enabling legislation excepted certain portions of the seashore recreational area from protection as a primitive wilderness area as contemplated and required by the Organic Act. Those portions excepted from protection were, “those areas deemed to be especially adaptable for recreational uses, particularly swimming, boating, sailing, fishing, and other recreational activities similar in nature”.² Due to the nature of the activities specifically identified in the enabling legislation, the location of those areas necessarily included all waters and shorelines of the recreational area.

In 1952 with the completion of paving NC Highway 12 from Whalebone Junction to Oregon Inlet and from Pea Island’s northern boundary to Hatteras Village, visitation began to grow within the park. On October 27, 1952, Conrad Wirth, then Director of the National Park Service, wrote the people of the outer banks a letter assuring the people in the villages within the seashore that vehicular access was guaranteed and the task of serving the visitors to the seashore should make the economy flourish. (See Exhibit A) Since before the founding of the seashore motor vehicles have been the typical form of transportation on the seashore beaches. From 1952 when access ramps were installed until 1978 vehicles have been used from the border with Nags Head to Ocracoke Inlet. In 1978 ORV use in Pea Island was stopped and due to heavy pedestrian traffic seasonal closures to ORV from Memorial Day to Labor Day were imposed within village limits.

In 1972, executive Order 11644 directed all national parks to prepare an ORV plan to insure environmental sustainability and enjoyable use for future generations of Americans. In 1978 NPS, Manteo, produced an approved draft ORV management plan, forwarded the plan to the Regional Office in Atlanta where approval was never completed and the document failed to be recorded in the Federal Register and signed by the Secretary of the Interior. Due diligence was done by the local communities and NPS in completing their required task, implementing the 1978 plan and revising the plan in proper intervals. No safety issues of visitors and few conflicts between users have occurred between ORV’s and other users within the seashore.

The Redwoods Act of 1978 reiterated the purposes of the Organic Act by stating, “Authorization of activities shall not be exercised in derogation of the values and purposes for which these various areas have been established, ***except as may have been or shall be directly and specifically provided by Congress***” (emphasis added).³ In the case of Cape Hatteras National Seashore Recreational Area, Congress did in fact specifically except areas whereby the no impairment standard and the no-derogation of values standard was to be applied on balance with

¹ 16 USC 459a-1.

² 16 USC 459a-2.

³ 16 USC 1.

the legislatively protected rights of recreation. The Organic Act gives broad discretion in determining what avenues best achieve the Organic Act's mandate.

The following final report proposes management actions and ORV regulations that achieve the Organic Act and subsequent Redwoods Act mandates and fall well within the agency's broad discretion to balance no-impairment of park values with the legislatively protected rights of recreation at the waterline and within the water as memorialized by the Enabling Legislation.

2.0 INTRODUCTION.

The following report evaluates the long established cultural values of Off-Road Vehicle (ORV) use while establishing criteria in forming an ORV management policy that maintains the cultural, resource protection, and diverse visitor experience for management of Cape Hatteras National Seashore Recreational Area (CAHA). The goal of this proposal integrates uses of the seashore for enjoyment of its many diverse visitors while ensuring adequate protection for natural resources.

There is no need to have conflict between conserving the resources and values and providing for the enjoyment of them. The NPS has a duty not only to ensure that resources are conserved but to resist the lure to swing the "protection" pendulum too great a distance from its mandate to provide for the enjoyment of resources. One such lure is "ease of implementation". Managing Cape Hatteras National Seashore under the Organic Act, its Enabling Legislation and other legal mandates is not intended to be easy or cheap. It can however be practicable and reasonable. Such an approach appears below.

The proposal below balances the need to conserve natural resources with the mandate to provide for the enjoyment of them. It gives consideration to natural resource management within the context of all recreational uses of the beach, particularly emphasizing the distinct needs for ORV access and management.

1. Some ORV users enjoy a trip to the beach to transverse an area free of the confines of roads.
2. Most ORV users access the beach areas to reach an area to recreate outside the vehicle.
 - A. Distance to get to an area requires vehicular access due to distance from highway.
 - B. Equipment needed for recreating in area of beach accessed. (Beach toys, umbrellas, beach chairs, coolers, fishing equipment, water-sports boards, cameras and binoculars)
 - C. Enables visitors with disabilities and families with infants and young children to enjoy beach activities.
 - D. Elderly and health disadvantaged are able to enjoy beach activities.
 - E. The principle activity aided by ORV access on these beaches is best described as multiple use. This concept has developed over many years of public experience. ORV operation provides the flexibility to respond to the rapid weather and ecological changes that occur along these shifting strands of sand. Weather, wind, and waves often dictate where and when a particular recreation will be practiced.

The proposal also gives consideration to year round and seasonal pedestrian use. Seasonal ORV use is contemplated only in non-peak visitation times of the year in front of villages. Year round pedestrian closures are contemplated where pedestrian visitors can easily access and use beaches free of ORV traffic.

3.0 ORV MANAGEMENT ACTIVITIES.

Attached as Exhibit B is a table of *ORV Management Activities*. All activities and sub-issues that appear on the *ORV Management Activities* in Exhibit B are included for consideration in this proposal. However, in addition to the ORV Management Activities listed in the table at Exhibit B please see the following supplemental narrative for specific management activities. Below are only those items requiring additional clarification or justification.

3.1 ORV ACCESS –

3.1.1 OCEANSIDE RAMPS – ramps are indicated on *ORV Designated Routes And Areas Maps* (see Exhibit C). Ramps exist or are proposed at intervals to provide access while maintaining resource protections. The purpose of additional ramps is to provide access beyond the necessary protection closures to avoid situations in the past where an area becomes “effectively” closed because there is no practical ingress or egress into a land locked area.

Ramps are maintained at two lanes wide because deep loose sand at ramps often requires continuous forward motion to avoid getting the ORV stuck. The necessity of continuous forward motion requires greater safety precautions to avoid interaction between vehicles, and between vehicles and pedestrians.

“High Use Ramps” include the following: 2/4, 23, 34, 38, 44, 49, 55, 59, 70, and 72.

3.1.2 RECREATIONAL VALUES - The purpose of this section is to demonstrate the desired recreational experiences and needs sought by the visiting public and the relevance of ORV accessibility. Each of these areas contains essential elements, such as physical attributes, and the obvious need for ORV accessibility in order for visitors to enjoy the sought-out experience.

Recreational uses are indicated on *Recreational Use Maps* (see Exhibit D).

3.1.2.1 **Criteria** These criteria are vital for the desired visitor experiences which have been traditionally expected and are a part of what makes this particular seashore uniquely attractive. (Desired visitor experience is not limited to those out of town visitors on whom the local and state economy is almost completely dependent upon, but also includes the residents that

reside within and adjacent to the boundaries of the Seashore, the most frequent visitors to the Seashore.)

Visitor experience will be significantly impaired if access is denied to the majority of those who seek out these recreational opportunities. Impaired visitor experience results in less visitation which results in economic devastation to the eight villages located within the boundaries of the Seashore itself, along with broader reaching impacts to neighboring towns, local and state governments. The NEPA process requires economic impact analysis. The final plan must take into consideration economic, historical and logistical use in order to be viable.

The purpose of the Executive Order 11644 was to “...*establish policies and provide for procedures that will ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands and to minimize conflicts among the various uses of those lands”.* It was not intended to be used to prevent the public from recreating on and enjoying the use of public lands.

It is imperative that ORV use be recognized for exactly what it is: A historical means of access to an area especially attractive for recreational opportunities. The use of an ORV is not considered a recreational activity in this Seashore. These recreational opportunities sought, allow the public to enjoy the Seashore’s resources and values. Denying access to recreational opportunities, many of which are specifically protected in the Enabling Legislation, denies the Seashore’s current visitors the opportunity to enjoy the park’s resources and values and denies future generations the opportunity to enjoy the park’s resources in direct violation of Park Services Management Policies. The recreational activities outlined below are activities which do not cause harm or impairment to the parks resources or values, nor do they cause “unacceptable impacts”. All of these recreational activities are historic and traditional uses and meet the requirements outlined in the U.S.C. Code (5)

3.1.2.2. **Birdwatching/Wildlife Viewing**

Birding opportunities abound within the Seashore; however viewing shorebirds can only take place at the shore, where the birds are present. A wide variety of shorebirds is preferable. The areas denoted on the maps have been identified with the assistance of the Cape Hatteras Bird Club, in particular Neal and Pat Moore and “*The North Carolina Birding Trail*” publication, which includes input from David Allen, NCWRC and Walker Golder from Audubon.

3.1.2.3. **Fishing**

Access to the shoreline is first and foremost when it comes to essential elements required in order to participate in this recreational opportunity. Second is the off-shore structure, current, etc. associated with that shoreline. Surf fishing opportunities abound, but offshore structure dictate where the best areas are for fishing especially when one is targeting specific types of fish. Fish are migratory and do not necessarily remain in one location. Many visitors target only those fish that are edible, while many others fish solely for sport and practice catch and release. Large Red Drum, the most targeted game fish from the surf and the state fish of North Carolina, has to be released by law. The majority of those who surf fish target both types of fish. No matter the preference, access to the key fishing areas is vital to the enjoyment of surf fishing. There are at least 9 surf fishing tournaments held within the Seashore each year and bring much needed business during the shoulder seasons. Teams can wait as long as 17 years to get into these tournaments.

The areas denoted on the map were identified by members of the Cape Hatteras Anglers Club, and with input from local fishing enthusiasts and tackle shop employees. It should be noted that The Dare County Parks and Recreation Department also offers surf fishing camps during the summer to our youth, utilizing ORV areas as well as piers. Without ORV access there would be no place for them to park in order to teach children about fishing.

3.1.2.4 . **Horseback riding**

Access to ORV areas is vital to equine interests as a result of current park policy which limits horses to ORV areas. While recognizing that the local management policy may be modified to permit horses in non-ORV areas, the accessibility of the non-ORV areas is still critical for those accessing the beach via horseback. Not all local horse owners have trailers to transport their horses to other areas. Furthermore, it is time consuming and more costly to transport horses rather than riding them. Allowing horses in areas that are seasonally closed in front of the villages is dangerous for both the public and the horses and will cause user conflicts. The largest equestrian user on Hatteras Island accesses the beach via trails in the woods near her residence and has a very successful established riding business that provides a unique visitor experience to hundreds of park visitors every year via horseback. She cannot relocate this business. Many of the horse owners volunteer their time and horses to the local community by participating in school events, parades, girl scouts, therapeutic riding and working with disadvantaged students. The areas denoted on the maps were identified by Equine Adventures, local horse owners and equestrian interests from Hyde County, Mainland Dare County and Currituck County.

3.1.2.5. **Shelling**

Shelling/beachcombing is a huge attraction, especially for those who cannot partake in more strenuous physical activities. In 1965, the Scotch Bonnet was named the state shell of North Carolina. Scotch Bonnet shells wash ashore in abundance on North Carolina's Outer Banks as a result of Gulf Stream moving tropical waters close to the North Carolina coast. After storms, hundreds of Scotch Bonnets may be washed ashore on the Outer banks especially between Cape Hatteras and Cape Lookout due to the close proximity of the Gulf Stream to that section of the coast. They are rare elsewhere in the state. Seeking Scotch Bonnets is an attraction which draws many shell enthusiasts to our Seashore, along with the wide variety of other shells to be found. Shell beds naturally appear and disappear from week to week. ORV access is vital to seeking out shell beds. The points and spits, as well as the South facing beach, are prime shelling areas. Shelling/beachcombing information denoted on the maps were identified by Dewey Parr, native resident, business owner, and local shell authority- www.outerbanksshells.com as well as information gathered from the North Carolina Shelling Club and from VisitNC.com.

Sea Glass collecting has emerged as the newest form of beachcombing and the North American Sea Glass Association (NASGA) has developed as a result of the popularity of Sea Glass collecting. *By The Sea Jewelry* is owned by Linda Jereb who has lived in the Outer Banks for over 20 years. She was one of the founding members of NASGA. One of the current board members, Richard LaMotte, author of *Pure Sea Glass* has visited the Outer Banks numerous times for book signings and has given lectures about Sea Glass at the NC Aquarium in Manteo. NASGA also works closely with The American Shore & Beach Preservation Association and recognizes that the shores, beaches, and other coastal resources of America provide important quality-of-life assets within the reach of the largest possible number of people in accordance with the ideals of a democratic nation. NASGA is dedicated to preserving, protecting and enhancing the beaches, shores and other coastal resources of America. They pursue their mission by means of:

- Protecting and improving healthy and diverse recreational opportunities.
- Managing, protecting and enhancing environmental resources.
- Encouraging responsible and sustainable economic development.
- Preserving aesthetic values.
- Reducing damage from natural hazards and human activities.
- Mitigating human impacts to natural processes.

3.1.2.6. **Swimming**

Where there is water visitors want to swim. Areas in front of villages and campgrounds have a higher seasonal swimming use due to easy access by those renting Oceanside homes, motel rooms or campgrounds, not necessarily due to preference. Public parking is very limited and/or non-existent for visitors who are not renting an Oceanside house. The maps highlight the most desirable and safest areas for swimming due to off-shore structure, water temperature, and the presence of lifeguards. It should be noted that despite a life guarded beach designation on the map for the Village of Buxton, seldom in the past 8 years has there actually been a lifeguard on duty there. It is sporadic and one year the lifeguard quit mid-season and was not replaced. The areas denoted on the maps were identified by the NPS maps designating life guarded beaches and by Judy Swartwood (a local motel owner) based on her experience with the visiting public, listening to the needs and desires of mothers like herself of young children, and her own experiences in seeking safe areas for her son to swim.

3.1.2.7. Watersports

Without water there are no water sports. Again, access to the shoreline is the essential element needed. Access to the areas of shoreline that provide the best recreational opportunities for watersports is critical. Watersports most enjoyed by visitors to our Seashore include kayaking, kite boarding, paddle boarding, skim boarding, body boarding, surfing and windsurfing. Each of these activities is dependent on shoreline access and has varying requirements based on wind direction, open water, water depths, consistent wave action, or curved shoreline. Shoreline access is especially vital in seeking these areas that are primarily dependent on wind direction and speed. Watersports competitions also draw large numbers of out of town visitors. Watersports areas denoted on the maps were identified by Trip Foreman and Matt Nuzzo, local experts representing the Watersports Industry Association, Inc.

3.1.2.8. Visitor and Recreational Use Authorities

3.1.2.8.1. **The Cape Hatteras National Seashore Recreational Area Enabling legislation** The Cape Hatteras National Seashore Recreational Area Enabling legislation(1. (Aug. 17, 1937, ch. 687, Sec. 4, 50 Stat. 670; June 29,1940, ch. 459, Sec. 1, 54 Stat. 702; Mar. 6, 1946, ch. 50, 60 Stat. 32.) emphasizes recreational opportunities for visitors to the Seashore, **“except for certain portions of the area, deemed to be especially adaptable for recreational uses, particularly swimming, boating, sailing, fishing, and other recreational activities of similar nature, which shall be developed for such uses as needed, the said area**

shall be permanently reserved as a primitive wilderness and no development of the project or plan for the convenience of visitors shall be undertaken which would be incompatible with the preservation of the unique flora and fauna or the physiographic conditions now prevailing in this area . . .’

3.1.2.8.2. NPS Management policies: Section 1.4.6 What Constitutes Park Resources and Values “The “park resources and values” that are subject to the no-impairment standard include:

- * the park’s scenery, natural and historic objects, and wildlife, and the processes and conditions that sustain them, including, to the extent present in the park: the ecological, biological, and physical processes that created the park and continue to act upon it; scenic features; natural visibility, both in daytime and at night; natural landscapes; natural sound scrapes and smells; water and air resources; soils; geological resources; paleontological resources; archeological resources; cultural landscapes; ethnographic resources; historic and prehistoric sites, structures, and objects; museum collections; and native plants and animals;
- * appropriate opportunities to experience enjoyment of the above resources, to the extent that can be done without impairing them;
- * the park’s role in contributing to the national dignity, the high public value and integrity, and the superlative environmental quality of the national park system, and the benefit and inspiration provided to the American people by the national park system; and
- * any additional attributes encompassed by the specific values and purposes for which the park was established”

3.1.2.8.3. Organic Act. Enjoyment of Park Resources and Values: “The fundamental purpose of all parks also includes providing for the enjoyment of park resources and values by the people of the United States. The enjoyment that is contemplated by the statute is broad; it is the enjoyment of all the people of the United States and includes enjoyment both by people who visit parks and by those who appreciate them from afar. It also includes deriving benefit (including scientific knowledge) and inspiration from parks, as well as other forms of enjoyment and inspiration. Congress, recognizing that the enjoyment by future generations of the national parks can be ensured only if the superb quality of park resources and values is left unimpaired, has provided that when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be

predominant. This is how courts have consistently interpreted the Organic Act. 1.4.5 (1.)”

3.1.2.8.4. **Management Policies 2006** Enjoyment of Park Resources and Values “The fundamental purpose of all parks also includes providing for the enjoyment of park resources and values by the people of the United States. The enjoyment that is contemplated by the statute is broad; it is the enjoyment of all the people of the United States and includes enjoyment both by people who visit parks and by those who appreciate them from afar. It also includes deriving benefit (including scientific knowledge) and inspiration from parks, as well as other forms of enjoyment and inspiration. Congress, recognizing that the enjoyment by future generations of the national parks can be ensured only if the superb quality of park resources and values is left unimpaired, has provided that when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant. This is how courts have consistently interpreted the **Organic Act. 1.4.5 (1.)**”

3.1.2.8.5 **1.4.7.1 Unacceptable Impacts are those that are:**

- * inconsistent with a park’s purposes or values, or
- * impede the attainment of a park’s desired future conditions for natural and cultural resources as identified through the park’s planning process, or
- * create an unsafe or unhealthful environment for visitors or employees, or
- * diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values, or
- * unreasonably interfere with:
 1. park programs or activities, or
 2. an appropriate use, or
 3. the atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park.
 4. NPS concessionaire or contractor operations or services.”

3.1.2.8.6. **U.S.C. Code**

16 U.S.C. Section 1a-1 states, “The authorization of activities shall be conducted in the light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been

established, except as may have been or shall be directly and specifically provided by Congress.”

3.1.3 **HIGH RECREATIONAL VALUE LOCATIONS** – Some locations on the seashore possess particularly high recreational value for various types of recreation. These areas are as follows:

3.1.3.1 **Bodie Island Spit** –

- a. (Easter through January) - High use on holiday's and summer for family gatherings
- b. High use for fishing from May through January.
- c. Close proximity to highly populated northern towns, cities, and villages draws many year round visitors.

3.1.3.2 **North Beach Rodanthe to Cape Point**

- a. (March 15 to January) – Fishing
- b. (March through December) –Watersports, favorite area of locals and visiting family
- c. (Year-round) - Bird watching

3.1.3.3 **Cape Point to the Frisco Village line**

- a. (March to January) – Fishing
- b. (May to September)- Favorite “locals” and visitor family gathering area, watersports, swimming, snorkeling, sunbathing, birding, shelling and horseback riding

3.1.3.4 **Frisco Village East Line to Ramp 55**

- a. (March-January) – Fishing
- b (May-September)- Family gathering, watersports, crabbing, bird-watching, shelling

3.1.3.5 **Ramp 55 to/including Hatteras Spit**

- a. (March-January) – Fishing
- b. (May-September)- Family gathering, watersports, crabbing, bird-watching, shelling

3.1.3.6 **Ramp 59 to/including North end of Ocracoke (Hatteras Inlet)**

- a. (March-December) – Fishing, watersports
- b. (Year Round) – Bird watching and shelling

3.1.3.7 **Ramp 59 to Ramp 67**

- a. (Year Round) – Shelling
- b. (March –January) - Fishing
- c. (May – September) – Swimming, watersports, fishing, sunbathing

3.1.3.8 **Ocracoke Day Use line (South end) to Ramp 70**

- a. (March-January) – Fishing
- b. (Year Round) – Shelling and bird watching
- c. (May-September) – Local and visitor family gathering, swimming, watersports, crabbing, clamming

3.1.3.9 **Ramp 72 to/including South Point of Ocracoke (Ocracoke Inlet/Spit)**

- a. (March-December) – Fishing
- b. (Year Round) – Shelling
- c. (April-October) – Local and visitor gatherings, swimming, surfing, watersports, sunbathing, and horseback riding

3.1.3.10 **Sound-side**

- a. Salvo Day Use Area –
 - i. (Year round) Water-sports
 - ii. (May-September) Fishing, crabbing, family gathering for swimming and wading
- b. Sound Access 46
 - i. (Year Round) Water Sports
 - ii. (May-September) Fishing, crabbing, family gathering for swimming and wading
 - iii. (Waterfowl hunting season) Traditional “locals” hunting area
- c. Sound Access 48
 - i. (Year Round) Water Sports
 - ii. May-September) Fishing, crabbing, family gathering for swimming and wading
 - iii. (Waterfowl hunting season) Traditional “locals” hunting area
 - iv. (June-September) Small boat launching area for sound fishing
- d. Sound Access 52 (Little Kinnakeet Life Saving Station) 3 access roads
 - i. (Year Round) Water Sports
 - ii. (May-September) Fishing, crabbing, family gathering for swimming and wading
- e. Sound Access 57
 - i. (May-September) Fishing, crabbing, family gathering for swimming and wading
 - ii. (Waterfowl hunting season) Traditional “locals” hunting area
- f. Sound access 58
 - i. (Year Round) Water Sports

- ii. (May-September) Fishing, crabbing, family gathering for swimming and wading
- iii. (Waterfowl hunting season) Traditional “locals” hunting area
- iv. (June-September) Small boat launching area for sound fishing and waterfowl hunting
- g. Sound Access “ The Haul Over”, Access 59 (KitePoint), Access 60
 - i. (Year Round) Water Sports
 - ii. (May-September) Fishing, crabbing, family gathering for swimming and wading, scallop harvesting
 - iii. (Waterfowl hunting season) Traditional “locals” hunting area
 - iv. (June-September) Small boat launching area for sound fishing and waterfowl hunting
- h. Access behind Hatteras Coast Guard Station - . (Year Round) Fishing, Clamming, Crabbing, Small Boat Launching, Scallop harvesting
- i. Access Cable Crossing off pole road - (Year Round) Fishing, Clamming, Crabbing, Small Boat Launching, Scallop harvesting
- j. Access Spur Road off pole road
 - i. (Year Round) Fishing, Clamming, Crabbing, Small Boat Launching
 - ii. (May-September) Family Gathering for beachcombing, shelling, children swimming and wading, bird watching
- j. Ocracoke Island Borrow Pit Road –
 - i. (Year Round) Fishing, Clamming, Crabbing, Small Boat Launching
 - ii. May-September) Family Gathering for beachcombing, shelling, kid swimming, scallop harvesting
- k. Ocracoke Island Cockrell Creek - (Year Round) Fishing, Clamming, Crabbing, Small Boat Launching, Commercial Fishing
- l. Ocracoke Island Quark Hammock - (Year Round) Commercial Fishing
- m. Ocracoke Island Scrag Cedar Rd. - (Year Round) Fishing, Clamming, Crabbing, Small Boat Launching, Commercial Fishing
- n. Ocracoke Island *New Access if ownership dispute can be settled where old access road was* - (Year Round) Fishing, Clamming, Scallop harvesting, Crabbing, Small Boat Launching, Commercial Fishing
- o. Ocracoke Island Reopen sound-side access at South boundary of village on ramp 72 to sound-side of inlet
 - i. (Year Round) Fishing, Clamming, Crabbing, Small Boat Launching
 - ii. (May-September) Family Gathering for beachcombing, shelling, kid swimming, bird watching, scallop harvesting

- p. Ocracoke Island. Reopen sound-side off ramp 72 to sound-side of inlet
 - i. (Year Round) Fishing, Clamming, Crabbing, Small Boat Launching
 - ii. (May-September) Family Gathering for beachcombing, shelling, kid swimming, bird watching

3.2 HOURS OF ALLOWABLE ORV OPERATION ON BEACH

3.2.1 See Exhibit E *Nighttime Beach Access During Sea Turtle Nesting & Hatchling Season*. Nighttime beach access which prohibits the movement of stationary vehicles between the hours of 10:00 p.m. and 6:00 a.m. is not prohibited by the Recovery Plan for the Northwest Atlantic Population of the Loggerhead Turtle Recovery Plan. Utilization of the beach between the hours of 10:00 p.m. and 6:00 a.m. will not jeopardize the recovery of the Loggerhead Sea Turtle and will minimize degradation of nesting habitat in compliance with the recovery plan. Such utilization between 10:00 p.m. and 6:00 a.m. and between May 27 and August 28 is particularly suitable for Cape Hatteras National Seashore Recreational Area in light of the historical statistics of turtle nesting and hatching locations and times of day at Cape Hatteras.

Only twice in the past 11 years have turtle nests been recorded within the unit prior to May 27, representing only two tenths of one percent (0.20%) of all turtle nests in eleven years.

During the same 11 year period only 11 nests remained after August 28, representing just over one percent (1%) of all turtle nests. In over half of the 11 years reported zero nests remained after August 28. Nighttime driving after August 28 does not equate to zero protection of turtle nests. All other protection measures at each nest site would continue to be employed. Furthermore, beach closures around a nest to the surf line would continue to be employed during the hatching period for any nests remaining after August 28.

3.3 ORV ROUTES – Visitors accessing the Seashore by ORV must drive only on areas and routes designated open for ORVs and must comply with posted restrictions. ORV routes/areas will be a designated area seaward from the toe of the dune or vegetation line to the water line. ORV access will be prohibited in all areas of the seashore not designated open as an ORV area or route. Routes and areas designated open, as well as those designated closed to ORV is presented in Exhibit C – *ORV Designated Routes and Areas Map*.

3.4 ORV USE AREAS – A list of all routes and areas designated open to ORV use, as well as points of ingress and egress via ramp are listed in Exhibit F *Routes and Areas Table*.

3.5 SAFETY CLOSURES – Safety closures were recommended in order to establish objective criteria upon which the NPS can temporarily close segments of a beach that pose a

safety hazard to ORVs or their drivers as well as criteria for reopening closed segments. The emphasis on the criteria is to balance safety with the desire to only close the beach in situations where the threat of life and property destruction is imminent. The pedestrian safety recommendations were based on a desire to reduce the likelihood of unsafe pedestrian vehicle interaction. These recommendations mimic vehicle regulations and driving etiquette most commonly understood while driving on-highway or during front-country driving with the belief that such regulations and etiquette will be second nature to ORV drivers and thus compliance will occur consistently. See Exhibit G *Safety Closures* for a complete list of safety closures and criteria for closures and re-opening.

3.6 RESOURCE PROTECTION MEASURES –

Resource protection buffers, breeding, and non-breeding protection measures are outlined in Exhibit I, *Resource Protection Table*. Buffers and other protection measures outlined in Exhibit I are based on scientific studies supporting these recommended buffers and protection measures.

3.6.1. **Wintering buffers:** Wintering buffers should allow ORV use to the greatest extent possible when balancing the need for protection of birds with the need to maintain open sandy beaches needed for Colonial Waterbirds (CWB).

“To assure that important sites where nesting birds are successful and where management is possible, we recommend that ORV traffic be allowed in such key colony sites as Cape Point, Hatteras Inlet, Power Squadron Spit, and the west end of Shackleford Island during the fall and winter to assist in maintaining the bare or nearly bare upper beach habitat necessary for nesting terns and skimmers. Terns and skimmers that nest on bare or nearly bare sites need the most assistance.”⁴

“We make the following recommendations to help enhance the populations of CAHA [Cape Hatteras] and CALO...At present, beach closures are unnecessary and are not likely to favorably impact breeding piping plovers on the islands.”⁵

3.6.2. **Pass-through corridors:** pass-through corridors are particularly well suited at Cape Hatteras National Seashore Recreational Area due to the lower latitude and environment in North Carolina.

“Our brief study of piping plover breeding biology has revealed that factors affecting reproductive success in North Carolina are different than those in northern regions. Being along the edge of the piping plover's breeding range and at a lower latitude, the environment at North Carolina seashores is likely to have different conditions for survival and reproduction. Storms in the early part of the

⁴ Jaime A. Collazo, J.R. Walters, and J.F. Parnell, Factors Affecting Reproduction and Migration of Waterbirds on the North Carolina Barrier Islands, Final Report to the National Park Service Cape Hatteras and Cape Lookout Seashores (1995).

⁵ Jaime A. Collazo, J.R. Walters, and J.F. Parnell, Factors Affecting Reproduction and Migration of Waterbirds on the North Carolina Barrier Islands, Final Report to the National Park Service Cape Hatteras and Cape Lookout Seashores (1995).

breeding season cause breeding losses and delays, and high temperatures, especially late in the breeding season, impose heat stress that may indirectly cause chick mortality. For these reasons, productivity goals set in the recovery plan (1.5 fledged chicks/pair/year), established from studies of more northern populations, are probably unrealistic for North Carolina.”⁶

Flushing of incubating American Oystercatchers (AMOY) should not be dispositive in determining whether pass-through corridor widths should be adjusted.

“Regression models showed that there was little or no association between ORV traffic and the rate at which incubating oystercatchers made trips to and from their nests or the percent time they spent incubating.”⁷

3.6.3 Vegetation control measures: Vegetation control measures should be implemented at Cape Point and be strongly considered for Bodie Island.

“We make the following recommendations to help enhance the populations of CAHA [Cape Hatteras] and CALO... Continue vegetation removal at Cape Point along the south shore of the brackish pond. To delay the re-growth of vegetation in these treated areas, **it** may be beneficial to use raking machinery after disking to prevent vegetative growth from cuttings. Growth of vegetation in other piping plover foraging and nesting areas of CAHA should be monitored; additional areas may need to be maintained. Preservation of interior wet and mud flats on CAHA is critical; otherwise piping plovers may only find suitable foraging habitat along the ocean intertidal zone where human disturbance is a problem.”⁸

3.6.4. Non-breeding Migratory Shorebird Protection Measures: Extraordinary protection measures consisting of large segments or a sizable percentage of protection area within Cape Hatteras National Seashore are unwarranted for non-breeding migratory shorebirds, particularly where protection measures are greater than those measures afforded to species which have been vetted through the listing process under the Endangered Species Act. For example, large segments of ORV and/or pedestrian free beaches during migration season are unwarranted for Red Knots at Cape Hatteras. Red Knots are not a listed species under the Endangered Species Act nor is the species listed in North Carolina as protected species. The numbers of Red Knots that utilize Cape Hatteras is very few, accounting for less than 3% of the population. This proposal provides adequate levels of protected shoreline in relation to the potential for positive impact upon the relatively low numbers of individuals using Cape Hatteras as a migratory stop-over. Thus, the additional protection measures provided for in this proposal compared to past practices are sufficient to meet the burden of non-impairment.

⁶Jaime A. Collazo, J.R. Walters, and J.F. Parnell, Factors Affecting Reproduction and Migration of Waterbirds on the North Carolina Barrier Islands, Final Report to the National Park Service Cape Hatteras and Cape Lookout Seashores (1995).

⁷Conor P. McGowan, Simons, T.R., *Effects of Human Recreation on the Incubation Behavior of American Oystercatchers*, The Wilson Journal of Ornithology 118(4): 485-493, 2006, at 489.

⁸Jaime A. Collazo, J.R. Walters, and J.F. Parnell, Factors Affecting Reproduction and Migration of Waterbirds on the North Carolina Barrier Islands, Final Report to the National Park Service Cape Hatteras and Cape Lookout Seashores (1995).

“This study documents that moderate numbers of Red Knot use the Outer Banks during migration and in winter. Morrison and Harrington (1992) estimated the North American population of Red Knots at 180,000. The vast majority of these birds stage in Delaware Bay during spring (Clark et al. 1993), with small concentrations noted at other sites along the Atlantic Coast (Hicklin 1987, Marsh and Wilkinson 1991). On the Outer Banks, over 4,700 knots were counted in May and June 1992, with 73% on North Core Banks. Not accounting for turnover, the Outer Banks host 2-3% of the estimated North American Red Knot population during spring. The importance of the Outer Banks as a wintering area is less understood. Censuses indicated that >500 knots wintered each year, the northernmost sizeable wintering aggregation on the Atlantic Coast. The largest known wintering group in North America is on the Gulf Coast of Florida, where a mean of 6300 ± 3400 were detected in 1980-82 (Harrington et al. 1988).”⁹

3.7 PERMIT – A special use permit for ORV users is not required. However, many ORV users comply with permit requirements when they perceive value in exchange for the burden of a permit. Value in exchange for the burden of a permit includes ease of access to restrooms, air stations, well-maintained ramps, or adequate law enforcement, for example. The price structure of a permit should be as low as possible to afford access for all people who desire it. The money spent by users for the permit will be detracted from the amount of money users will spend in the local economy so be mindful that the original promises of the National Park Service to the people of the islands to work cooperatively with them so that they may enjoy “the prosperity [they] so rightfully deserve because of long occupancy on [the] lands” within the Recreational Area.¹⁰

3.8 CARRYING CAPACITY – Carrying capacity decisions should not be made in the absence of peer reviewed studies or visitor use capacity planning. If carrying capacity is implemented as a visitor control measure in the future it should be done only after the determination of desired conditions, selection of indicators and standards that reflect the desired conditions, and monitoring of the indicators and standards. Carrying capacity under this methodology will not specify the total number of visitors that the Recreational Area, as a whole, can accommodate at one time; will not be driven by existing capacity of infrastructure; and should not be static but instead rely upon visitor use patterns, desired visitor experiences, and the dynamic ecological changes experienced at Cape Hatteras. In order that carrying capacity management is successful it must consider, “1) that recreationists seek multiple satisfactions from recreation and, depending on these, encounters with others might add, detract, or be neutral in their effect on those experiences; 2) satisfaction is a function of more than use level – the type, frequency, and location of encounters are important intervening variables; 3) clearly stated objectives are essential to identifying carrying capacities; and 4) the emphasis on management needs to be on outputs – the experiential and environmental conditions desired –

⁹ Dinsmore, S.J. and J.A. Collazo. 1995. Seasonal numbers, distribution and population dynamics of shorebirds on the outer banks of North Carolina. In Factors Affecting Reproduction and Migration of Waterbirds on the North Carolina Barrier Islands. Final Report to the National Park Service.

¹⁰ Conrad Wirth, Director, National Park Service, 1952, letter to the people of Ocracoke, Hatteras, and Bodie Islands. See also Exhibit A.

not on the inputs such as use levels”.¹¹ Management should not focus on “how much is too much”, but focus on what kinds of conditions are appropriate and acceptable in different settings. Finally, part of the decision-making matrix on carrying capacity must consider the specific park legislation where at Cape Hatteras there is a legislative guarantee to ocean access, including ORV access.¹²

3.9 OFF-ROAD VEHICLE REQUIREMENTS - Off-road vehicle requirements appear in Exhibit I, *Off-road Vehicle Requirement and Characteristics*.

3.10 SPEED LIMITS – A speed limit of 15 mph is implemented uniformly within the Recreational Area, except where otherwise posted. A uniform speed limit facilitates consistency and driver compliance.

3.11 ECONOMIC IMPACTS –

Salt water recreational anglers contributed more than \$31 billion to the U.S. economy in 2006. North Carolina ranks 3rd at \$2 billion, falling only behind Florida and Louisiana.

Worldwide numbers of watersports enthusiasts that visit Cape Hatteras and consider it one of the top venues in the world for their sport(s): 500,000 kiteboarders, 450,000 windsurfers, 20 million surfers, nearly 3x that number of kayakers. World Champions that visit Cape Hatteras annually : Kelly Slater 9x World Surfing Champion, CJ Hobgood : Former World Surfing Champion, Aaron Hadlow 5 x Kiteboarding World Champion, Robby Naish 23x World Windsurfing Champion, Jimmy Buffett World Lifestyle Champion also an avid Surfer and Fisherman.

4.0 CONCLUSION

Please take into consideration this proposal when formulating a preferred alternative, taking into account the legal sufficiency and scientific support for the ideas presented above. Thank you for the opportunity to participate in this meaningful work and for the chance to help guide ORV management at Cape Hatteras National Seashore Recreational Area.

Those organizations listed on the cover page of this Addendum to the Final Report of the Proceedings of the Negotiated Rulemaking Advisory Committee constitute the full list of signatories to this document.

¹¹ Stankey, G.H. and S.F. McCool. 1984. Carrying capacity in recreational settings: Evolution, appraisal and application. *Leisure Sciences* 6(4): 453-473.

¹² Management Policies 2006, National Park Service, p. 99.

EXHIBIT A

Retyped from copies of The Coastland Times, Manteo, N. C.

Friday, October 31, 1952 The Coastland Times, Manteo, N.C.

A LETTER TO THE PEOPLE OF THE OUTER BANKS

When I visited with you earlier this month, I told you that we would study further some of the problems that were bothering you and see if some adjustments in the boundary of the Cape Hatteras National Seashore Recreational Area could be made to meet our joint problems more satisfactorily. This we have done. Rather than make another three-day trip to your Islands, I believe that the best way to get the results of these studies to all of you in a clear and concise way is to print them in your local paper. Victor Meekins has agreed to see that every family on Ocracoke, Hatteras, and Bodie Islands, south of Whale Bone, gets a copy.

This issue of The Coastland Times contains a set of maps and descriptions which show in detail the new boundary lines for the Cape Hatteras National Seashore Recreational Area. In general, the new lines leave more room for expansion around the towns and they bring in the boundary at Pamlico Sound to within 150 feet of the shores of Ocracoke and Hatteras Islands. The new boundary lines have the approval of the Secretary of the Interior; and I have discussed them with Mr. George Ross, Director, North Carolina Department of Conservation and Development, who also approves of them.

During the week of October 6, I met with many of you individually and in public meetings held in the towns of Ocracoke, Hatteras, Avon, and Rodanthe, to answer questions about the Cape Hatteras National Seashore Recreational Area project. We discussed its purposes, boundary lines, and the programs for its acquisition and development. Congressman Herbert C. Bonner and others joined in several of the meetings and discussions. You asked many questions; many of these were on how the establishment of the Recreational Area would affect you personally, your business, or your property. I hope, and believe that those questions were answered to the satisfaction of those who asked them.

In the public meetings, you brought out four main points:

1. Many of you were uncertain as to just where the Recreational Area boundary lines would be around the communities and felt that not enough room was being left for community expansion.
2. There was the question as to the rights of individuals to continue commercial and sport fishing.
3. There was concern as to whether your present hunting rights would be affected.
4. There was a feeling that once the Recreational Area is established the local people would be denied access to the ocean beach.

I wish to re-emphasize the answers to these questions, with the aid of the accompanying maps.

As to the first question, I promised you that we would restudy the boundaries and change them if necessary and desirable. The study was based on a personal visit to all of the communities and the Recreational Area, as well as the statement made to me by many local people personally and in public meetings. Our studies showed that the old Recreational Area boundary lines were too confining, so we have changed them in all cases by moving the boundary lines around the communities close to the ocean. On the ocean side of the towns, the new, approved boundary

EXHIBIT A

Retyped from copies of The Coastland Times, Manteo, N. C.

lines include in the Recreational Area only those lands along the ocean which are necessary to protect and control the sand dunes, to re-establish them where necessary, and hold them to protect the communities from the intrusion of the ocean. The National Park Service intends to resume the sand fixation work that it started in the 1930's and more firmly establish the dunes. The boundary line has also been changed on the Sound Side. It has been moved in to a distance of 150 feet from the shore lines of Ocracoke and Hatteras Islands, except in front of the communities, and the offshore islands outside of that line are eliminated from the Recreational Area. The boundary line of the Cape Hatteras National Seashore Area does not extend in front of the communities on the Sound side. In the case of Bodie Island it was more practical to describe a meets and bounds line, as shown on the accompanying maps, than it was to use an irregular line 150 feet offshore.

In regard to fishing and hunting (questions 2 and 3), - under the basic legislation authorizing the Cape Hatteras National Seashore Recreational Area, fishing and hunting rights in the Sound were reserved to the people. That being the case there is no real need to include Pamlico Sound waters in the Recreational Area. This is so because the North Carolina fishing and hunting laws and regulations and those of the Federal Government which have been in effect for a great many years in the Sound area will still apply to waters both inside and outside the Recreational boundaries. Therefore, the new boundary line in the Sound has been set only 150 feet offshore from Hatteras and Ocracoke Islands. That is purely an arbitrary distance. It brings the line close enough in so that everyone can know definitely where it is. Due to the irregularity of the shore line, it may be necessary to make minor adjustments in some places so that any small offshore islands will be either wholly in or wholly out of the Recreational Area. In other words, the line won't split any islands.

The following larger islands are excluded from the Recreational Area:

Off Bodie Island – those among others: Pond, Grun, House, Warren, Headquarters, Bells, Bowser, Cedar, Cutoff and Herring Shoal, Big Tim, and Little Tim Islands.

Off Hatteras Island – these among others: both Great Island, Midgett, Noache, Bull, Big, and Kings Islands.

Off Ocracoke Island – these among others: Outer Green, Cockrel, and Negro Islands.

The guarantee in the laws relating to hunting and continuation of commercial fishing in the waters of the Sounds will apply within this 150 offshore strip exactly as they do outside of it. The State and Federal fishing and hunting regulations within this strip cannot be affected by any National Park Service regulation.

The law says that hunting will be permitted on Ocracoke Island, at the waters of the Sounds and on not more than 2,000 Island Refuge and its waters. The law requires the Secretary of the Interior to designate the 2,000 acre hunting area would be selected by a committee composed of two representatives of the State of North Carolina, to be designated by the Governor, and one each from the Fish and Wildlife Service and the National Park Service of the Department of the Interior. The National Park Service will move toward the establishment of this committee and the designation of these lands at the earliest possible moment, after the lands have been acquired. Of course, no part of the 2,000 acres will be in the Pea Island Refuge.

EXHIBIT A

Retyped from copies of The Coastland Times, Manteo, N. C.

Concerning access to the beach (question 4), - - when I met with you I explained that when the lands for the Recreational Area are acquired and become public property there will always be access to the beach for all people, whether they are local residents or visitors from the outside. However, it will be necessary to establish certain regulations, such as to designate places for vehicles to get to the beach in order to reduce said dune erosion to a minimum; to manage ocean fishing where large numbers of bathers are using the beach; and to confine bathing to certain areas. These latter are safety measures, as it would be dangerous to permit surf fishing where there are large numbers of people in bathing and, likewise, fishermen would not want bathers to interfere with their fishing.

With the changed boundary lines in the Sound and the enlargement of the areas excluded for community expansion, as indicated on the accompanying maps the establishment of the committee to determine the 2,000 additional acres of land on the islands to be open to hunting, and making clear the problem of access to the ocean beach, I feel that we have found a reasonable solution that meets the needs of the Recreational Area. I might add that if, at any time, the State is in a position to build a road on Ocracoke, we can easily reach agreement on the right-of-way for it.

Now a word concerning the future development of the Area. As state above, the National Park Service proposes to resume the sand fixation work; to re-establish the natural plant and wild-life within the area; and to provide access to the beach for everybody. We plan also to tell the story of the sea. Cape Hatteras has perhaps one of the most interesting and heroic sea histories in the entire United States, if not the world. It is the plan of the National Park Service to establish a museum to tell the story of the sea, and especially the part that the Cape Hatteras coast line and you people have played in it. The fascinating history of the Outer Banks, combined with the story that is told at the Wright Memorial and at Fort Raleigh on Roanoke Island will make this part of the North Carolina one of the most important tourist objectives in the United States.

As our plans move forward we will call upon the people of the communities on Ocracoke, Hatteras, and Bodie Island to work with us in establishing the museum. Many of you have relics of the past and stories of great accomplishments handed down through your families that are needed to record and relate this history. It is hoped that when the museum is ready you will see fit to donate or loan appropriate objects for exhibit purposes. When our plans are formulated in more detail they will be made known to you, and we are going to ask for your advice and suggestions.

The National Park Service has always believed in free enterprise, and has practiced it in all the area of the National Park System. In the case of the Cape Hatteras National Seashore Recreational Area, we expect the people in the communities on the Islands of Ocracoke, Hatteras and Bodie to take care of the tourists. No developments for tourists accommodations are planned or will be permitted on government property. Consequently, the property within the communities will, without any doubt, have an increasing commercial value because of the existence of the Recreational Area; its greatest value will be for use in taking care of the public.

EXHIBIT B	
ORV Management Activities Table	
MANAGEMENT ACTIVITY	X
ORV Access	<p>Visitors accessing the Seashore by ORV must use only designated beach access ramps and soundside access roads to enter designated ORV routes.</p> <p>ORV access is provided via oceanside ramps and access points (18 minimum) located off NC-12.</p> <p>Oceanside Ramps See ORV Routes and Areas Table for details, EXHIBIT F</p> <p>Seashore staff maintains ramps and signage.</p> <p>Soundside Access Existing soundside ramps would remain open</p> <p>Signage/posts would be installed at the primitive parking areas and boat launch areas to prevent damage to vegetation and other soundside resources.</p> <p>Add 1 soundside ORV access on Bodie Island. Plus all ramps would be constructed/maintained with a clay & shell surface. All ramps would be maintained at 2 lanes wide for the safety of visitors.</p> <p>Interdunal Roads Two lane, interdunal routes have been designated as follows in EXHIBIT F. Plus all ramps would be constructed/maintained with a clay & shell surface. All ramps would be maintained at 2 lanes wide for the safety of visitors. If any road is a one lane interdunal road it must have passing turnouts.</p> <p><i>Bodie Island Ranger District</i> To be determined with design/access of new ramp 2 & 3. (replacing current ramps 2 & 4)</p> <p><i>Hatteras Island Ranger District</i> Cape Point between Ramp 44 to Ramp 45 Extend interdunal road west of Ramp 45 to Ramp 49. Establish new Ramps at Drain Road, 46, 47, and 48 off of interdunal road. See EXHIBIT C</p> <p>Maintain Pole Road, crossover roads on either side of Isabell washover, Bone Rd. & Spur Rd. to allow for safe 2 way passage.</p> <p><i>Ocracoke Island Ranger District</i> All current soundside access routes to be kept open with maintenance to allow safe access for ORV & PED Reopen soundside access @ So boundry of Village. Reopen soundside access from ramp 72 south of spur around SW end of dune in non-breeding season.</p>

MANAGEMENT ACTIVITY		X
Hours of Allowable ORV	August 26 - May 26: Designated ORV	
Operation on Beach	routes & areas open to ORV use 24 hours a day.	
	May 27- August 25: All potential sea turtle nesting habitat (ocean intertidal zone, ocean backshore & dunes) closed to non-essential ORV use from 10:00 pm until 6:00 am.	
		X
ORV Routes	Visitors accessing the Seashore by ORV must drive only on marked ORV routes and comply with posted restrictions.	
	ORV beach routes would be a designated area seaward from the toe of dune or vegetation line to water line.	
	Refer to ORV Designated Routes and Areas Maps EXHIBIT C	
ORV Use Areas	ORV access would be prohibited in all areas of the Seashore except where routes and areas are specifically designated.	
	Refer to Routes and Areas Table EXHIBIT F	
		X
Safety Closures	See Safety Closures EXHIBIT G	
		X
Administrative ORV Closures	No administrative closures would be established.	
		X
Ramp Characteristics	"High-use" ramps, including but not limited to Ramps 2/4, 23, 34, 38, 44, 49, 55, 59, 70, 72, add, toilet facilities, predator proof dumpsters and fish cleaning stations. 2-lanes wide with shell/clay base Standard regulatory signs and information boards at all ramps Gates at all ramps and access points Designated air down area with hardened surface (e.g., shell/clay base)	
		X
Wintering Closures	Based on an annual wintering habitat assessment conducted after the breeding season, wintering areas are established while allowing an access corridor (pedestrian and pedestrian/ORV) as identified in the Use Areas Table. At the spits and Cape Point access will be maintained via ocean shoreline and interdunal roads.	

MANAGEMENT ACTIVITY	X
Resource Protection Buffers	See EXHIBIT H, <i>Resource Protection Table</i>
	X
Permit Requirements	Permits required for ORV use on beaches and ramps of Cape Hatteras National Seashore Recreational Area. No limit on number of permits.
	X
Permit Distribution	Available in-person at various locations and on-line
	X
Permit Issuance Requirements	ORV owners must read the rules and regulations governing ORV use at the seashore. The owner would sign for their permit in acknowledgment that they understood the rule and that all drivers will abide by the rules and regulations governing ORV use at the seashore, including beach driving safety and resource closure requirements.
	X
Permit number limits	No limit on the number of permits granted per year.
	X
Permit types	* Special Use Permit. Daily, weekly, or annual.
	* Special free "nighttime ORV access" permit required for specified locations. See EXHIBIT E. Special Use Permit must be obtained prior to receiving "nighttime beach access" permit. Nighttime Beach Access only required from May 27 through August 25.
	* Special free "Self-contained Vehicle" permit. See EXHIBIT I.
	* Commercial Fishing Permit
	X
Permit fees	\$7/day/vehicle; \$20/week/vehicle; or \$30/year/vehicle
	X
Permit form	Permit affixed to vehicle in a manner approved by NPS.
	X
Permit Revocation	A permit may be revoked after conviction for violation of applicable park regulations or terms and conditions of the permit, for period of time commensurate with the violation(s).
	X
Beach Parking	Parking is allowed in any configuration so long as parked vehicles do not interfere with the clear and safe passage of a single lane of traffic.
	X
Vehicle Carrying Capacity Determination	Vehicle carrying capacity will not be established until such time as a carrying capacity visitor use plan or study is completed by NPS.

MANAGEMENT ACTIVITY		X
Temporary Emergency Beach Closures	The NPS retains the authority to implement a temporary emergency beach closure is any of the following conditions are observed:	
	* ORV traffic backing up on the beach access ramps, either on-or off-beach bound, which threatens to impede traffic flow for a significant length of time	
	* ORV traffic on beach is parked in such a way that 2-way traffic is impeded for a significant length of time	
	* Multiple incidents of disorderly behavior are witnesses by NPS and conflicts can not otherwise be mitigated.	
		X
Seasonal Element related to Carrying Capacity	Applicable only May 15 to September 15.	
		X
Periodic Review of Carrying Capacity	Visitation, crowding, and safety monitored periodically to determine if implementation of carrying capacity is warranted. Once implemented, carrying capacity limits would be reviewed every 2 years. Review to include NPS and the appointed FACA committee at least every 2 years and more often if requested.	
		X
Areas of Implementation	Would apply to all areas of the seashore. Carrying capacity requirement only implemented if carrying capacity plan is finalized and increased visitation results in crowding threshold being met.	
		X
Off-Road Vehicle Requirements	See EXHIBIT I, <i>Off-Road Vehicle Requirements and Characteristics</i>	
		X
Equipment Requirements	See EXHIBIT I, <i>Off-Road Vehicle Requirements and Characteristics</i>	
		X
Speed Limits	15 mph (unless otherwise posted). Emergency vehicles exempt when responding to a call.	
		X
Non-ORV Areas	Non-ORV areas as designated in the ORV Routes and Areas Table. See EXHIBIT F.	
		X
Parking Areas for Non-ORV Access	Any new parking areas to be located near Non-ORV Areas and located away from eroding areas or potential inlet areas.	
	New parking areas will implement environmentally appropriate design standards to minimize stormwater runoff.	
	New or expanded parking areas for oceanside locations are identified in ORV Routes and Areas Table. See EXHIBIT F.	

MANAGEMENT ACTIVITY		X
Non-ORV Parking	* Each site would have a boardwalk or other appropriate pedestrian route for crossing the dune.	
Area Characteristics	* Parking areas with 25 or more parking spaces would have waste receptacles and toilet facilities.	
	* Access provided for mobility impaired at select locations.	
		X
Alternative Transportation	Alternative transportation is not provided at the seashore.	
		X
Restroom Facilities	At all locations with 25 or more spaces	
		X
Pets	Pets are to be regulated by 36 CFR §2.13	
	See also special considerations for pets at EXHIBIT H, <i>Resource Protection Table</i> .	
	Dog walking or "doggie park" areas should be established to provide alternatives for pet owners to minimize pet/resource conflicts.	
		X
Beach Fires	Beach fires are allowed per 36 CFR §2.13 and prohibited 12:00 midnight to 6:00am. No fires are allowed within 100 meters of a known turtle nest.	
		X
Nighttime Beach Use	Camping*, as defined in 36 CFR 1.4 is prohibited on seashore beaches per Superintendent's Compendium §2.10(a). A new order will be issued to allow for Self-Contained Vehicles according to EXHIBIT I, <i>Off-Road Vehicle Requirements and Characteristics</i> .	
	ORV use at night is allowed except as outlined in EXHIBIT E, <i>Nighttime Beach Access During Sea Turtle Nesting & Hatching Season</i> .	
	* Camping means the erecting of a tent or shelter of natural or synthetic material, preparing a sleeping bag or other bedding material for use, parking or a motor vehicle, motor home, or trailer, or mooring of a vessel for the apparent purpose of overnight occupancy. (36 CFR §1.4).	
		X
Boat Access	Launch sites, as designated under 36 CFR § 3.8(a)(2), are identified in the Superintendent's Compendium.	
	Launching or recovery of vessels is prohibited within resources closures.	
		X
Commercial Fishing Vehicles	Authorized by permit, plus may be authorized by special use permit to access non-ORV areas and night driving restricted areas if there is no resource conflict.	
		X
Law Enforcement (LE)	To be determined by NPS	

MANAGEMENT ACTIVITY		X
Staffing	To be determined by NPS	
(including RM, sign crew, LE, Maintenance, and others?)		
		X
Materials	To be determined by NPS	
	Discontinue use of carsonite stakes as they increase sea turtle false crawls.	
		X
Advisory Committee	An advisory committee shall be established to review the ORV Management plan annually or more often if requested by the superintendent. The committee shall consist of a reasonable cross sectional representation of the visitors to Cape Hatteras National Seashore Recreational Area.	

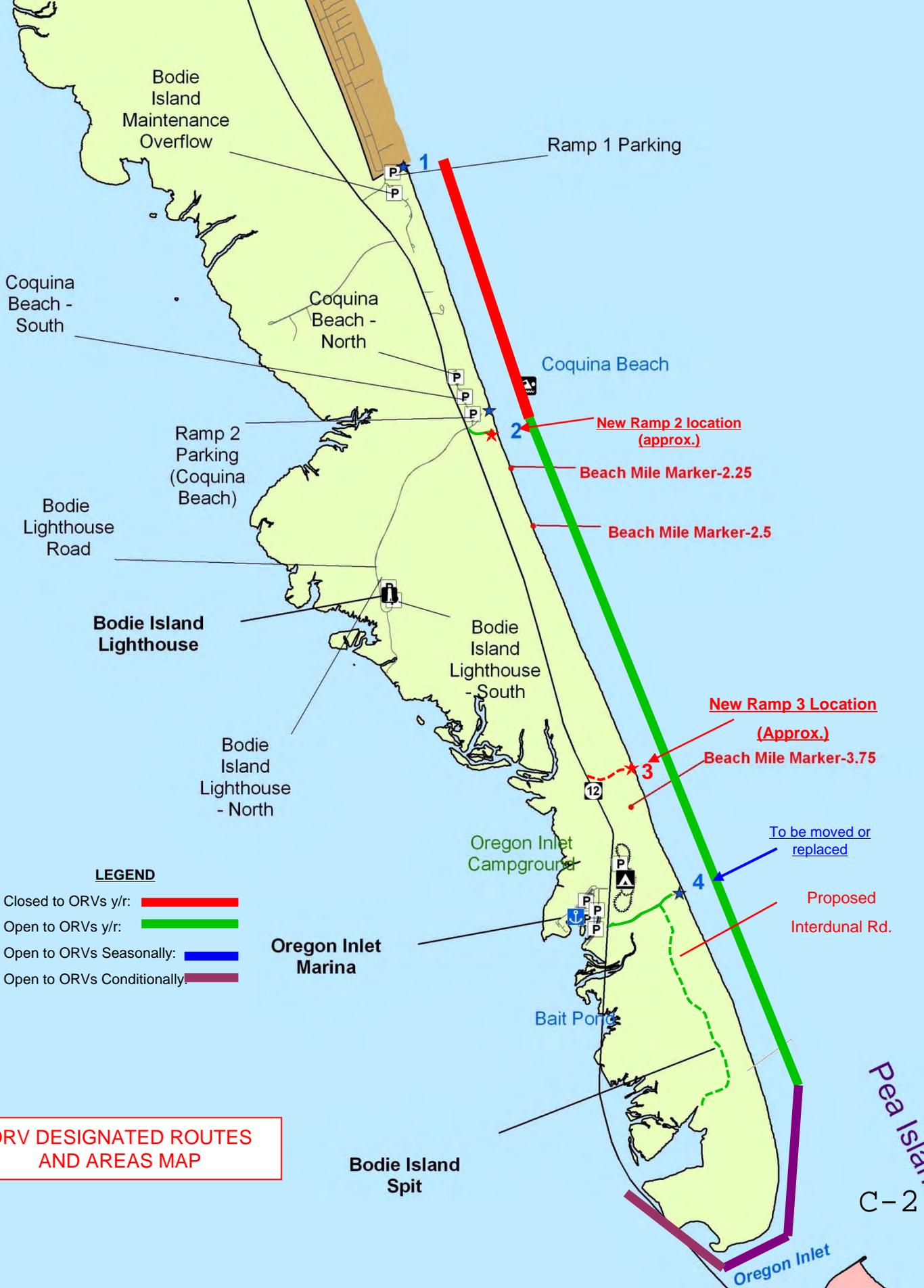
EXHIBIT C

ORV DESIGNATED ROUTES AND AREAS MAP

LEGEND

- Closed to ORVs y/r: 
- Open to ORVs y/r: 
- Open to ORVs Seasonally: 
- Open to ORVs Conditionally: 

Note: “Open to ORVs Conditionally” in the legend above means that the area is designated open to ORVs but special management considerations will govern management during breeding season for listed species or species of special concern.



LEGEND

- Closed to ORVs y/r: █
- Open to ORVs y/r: █
- Open to ORVs Seasonally: █
- Open to ORVs Conditionally: █

ORV DESIGNATED ROUTES AND AREAS MAP

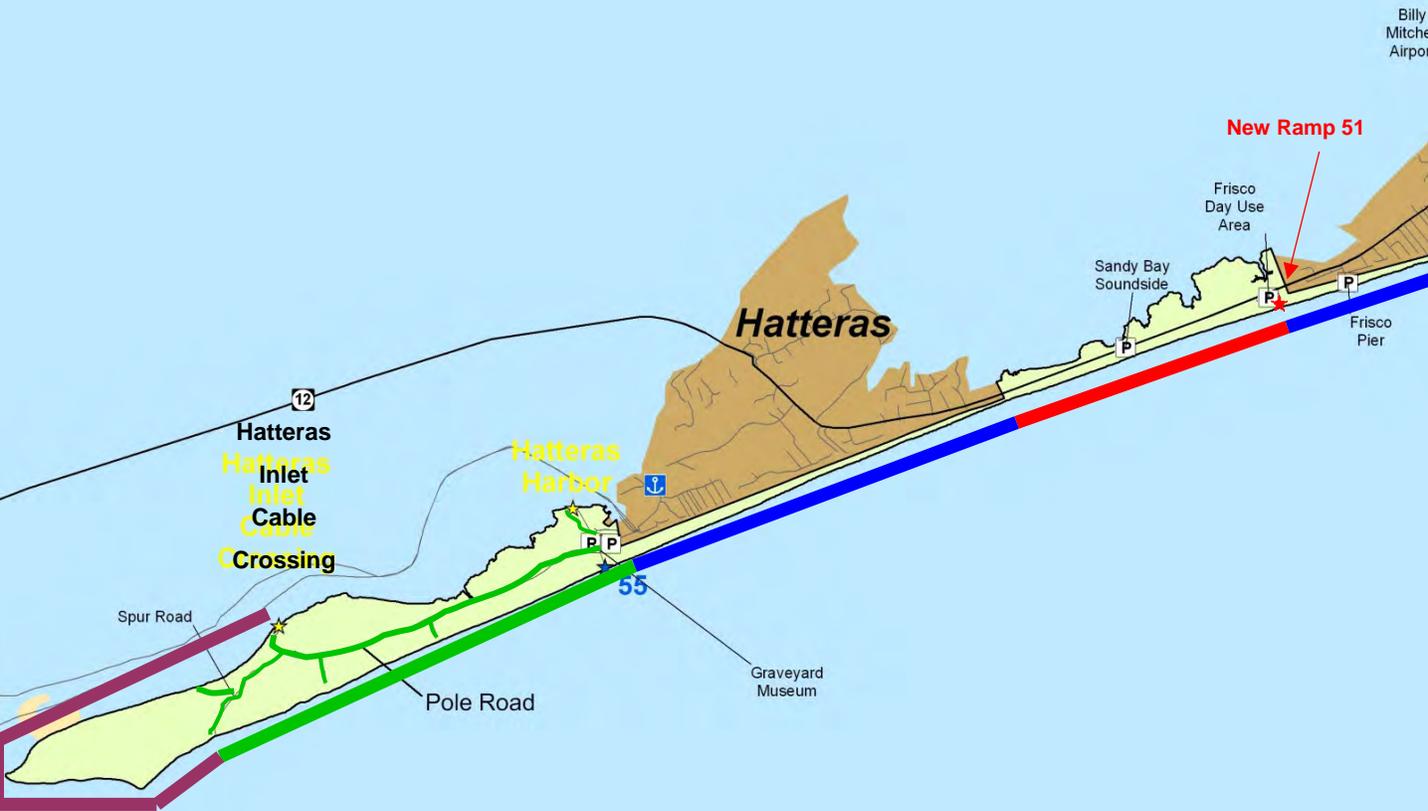
Note: Pea Island NWR shall be considered as an addition to any area designated as pedestrian-only.



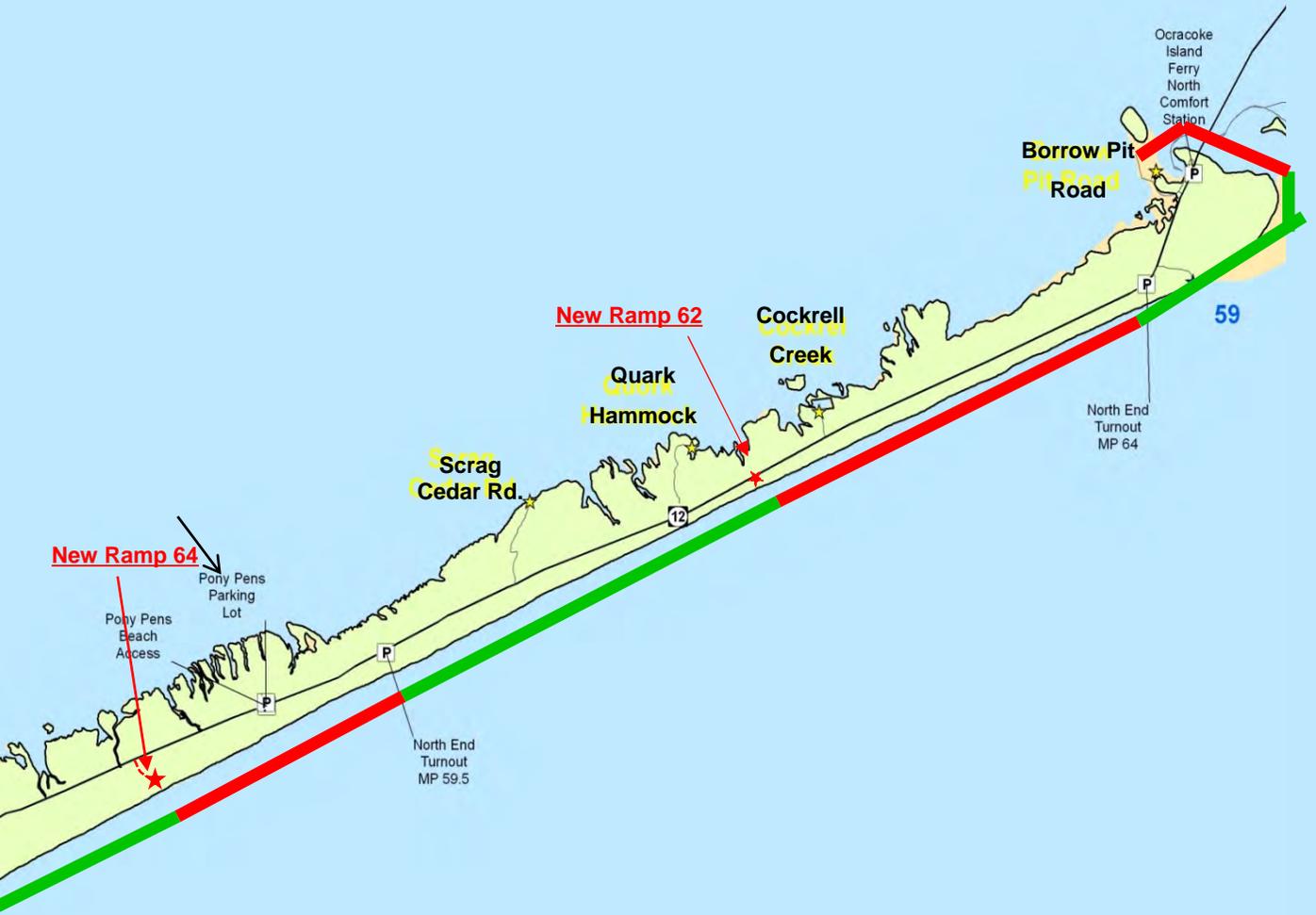
ORV DESIGNATED ROUTES AND AREAS MAP



ORV DESIGNATED ROUTES AND AREAS MAP



ORV DESIGNATED ROUTES AND AREAS MAP



ORV DESIGNATED ROUTES AND AREAS MAP

**ORV DESIGNATED ROUTES
AND AREAS MAP**

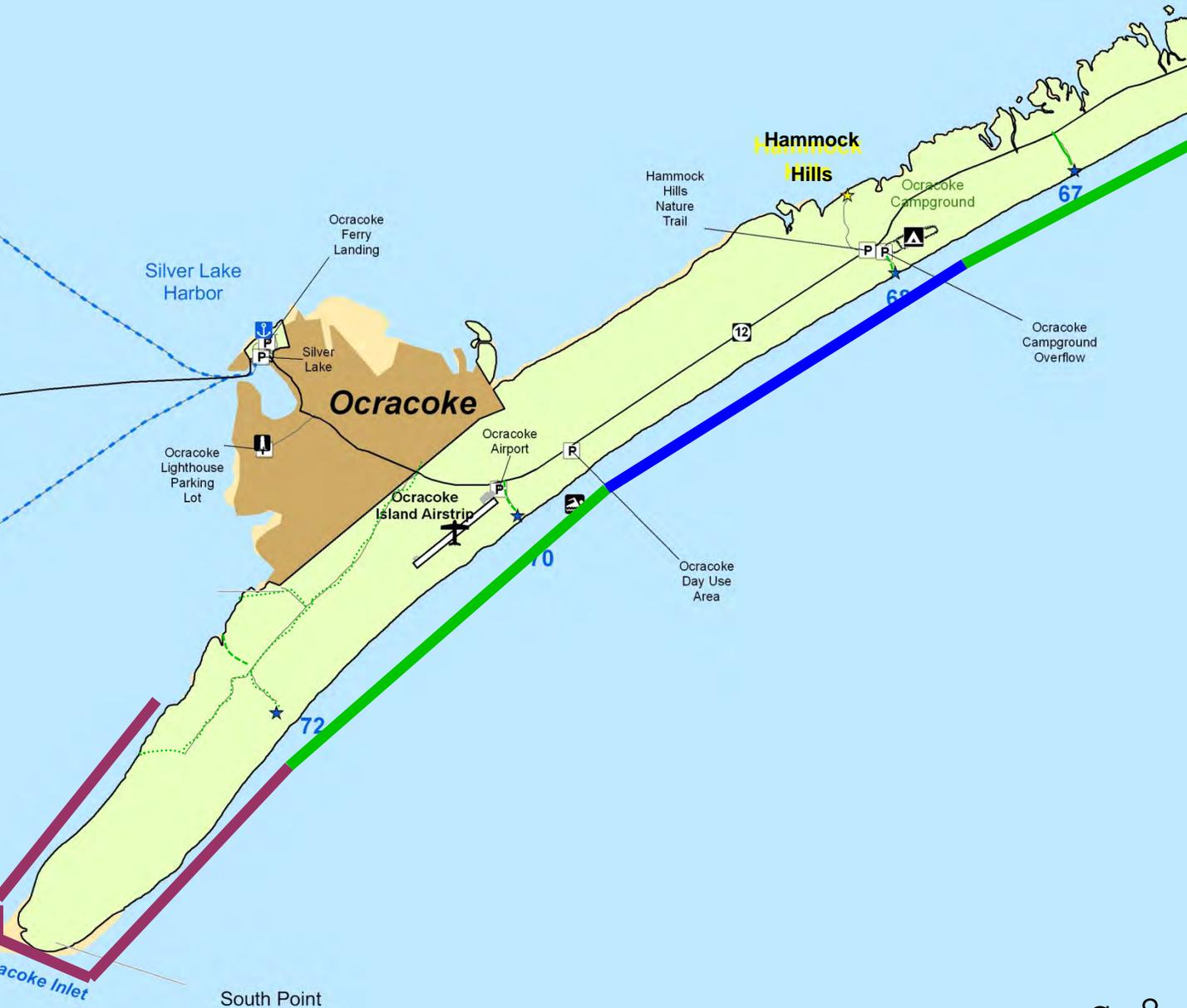


EXHIBIT D

RECREATIONAL USE MAPS

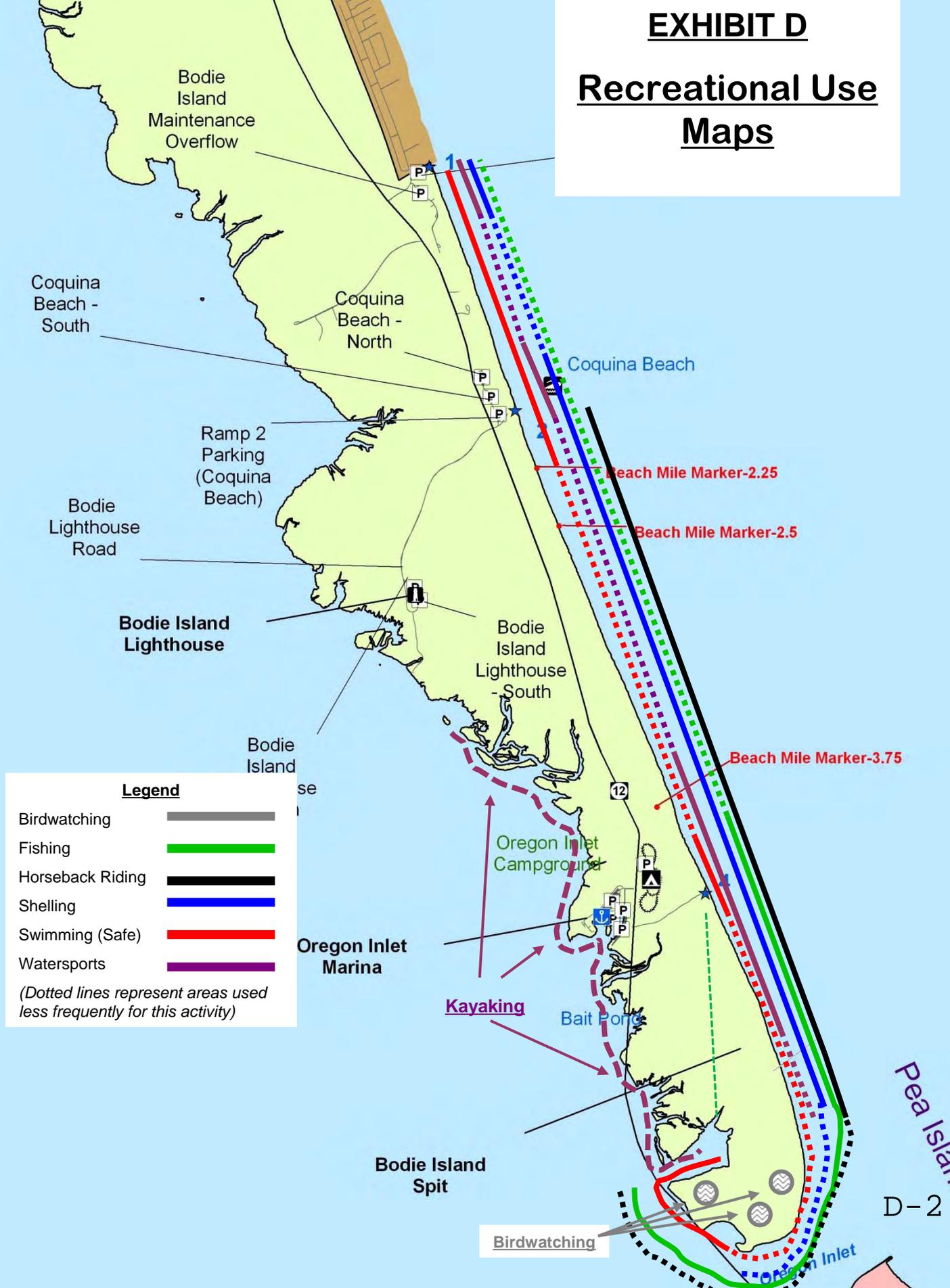
Legend

Birdwatching	
Fishing	
Horseback Riding	
Shelling	
Swimming (Safe)	
Watersports	

(Dotted lines represent areas used less frequently for this activity)

EXHIBIT D

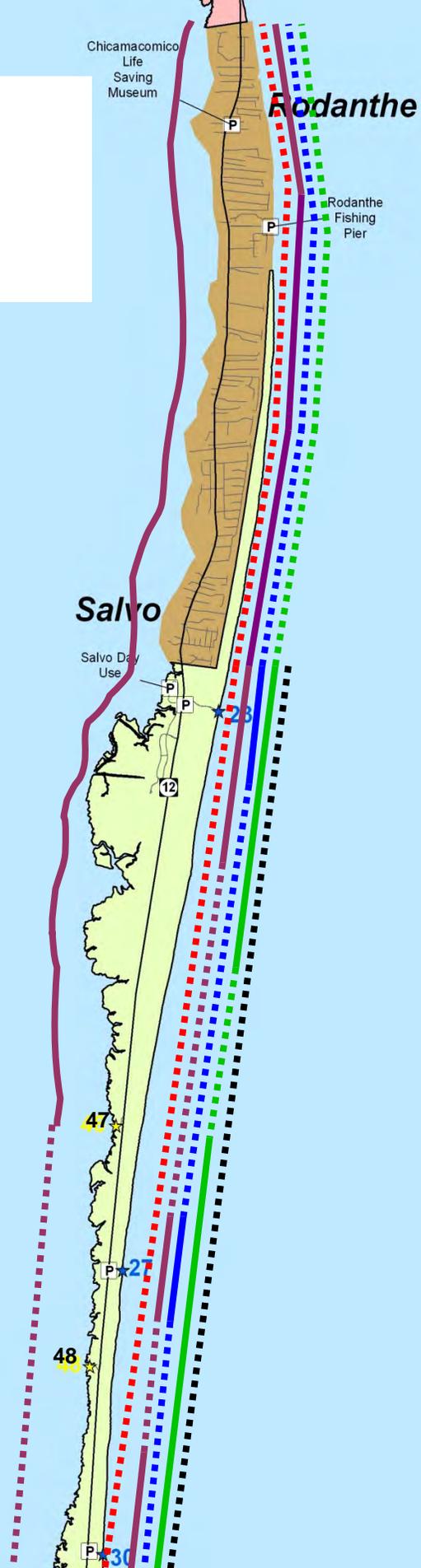
Recreational Use Maps



Legend

- Fishing █
- Horseback Riding █
- Shelling █
- Swimming (Safe) █
- Watersports █

(Dotted lines represent areas less frequently for this activity)



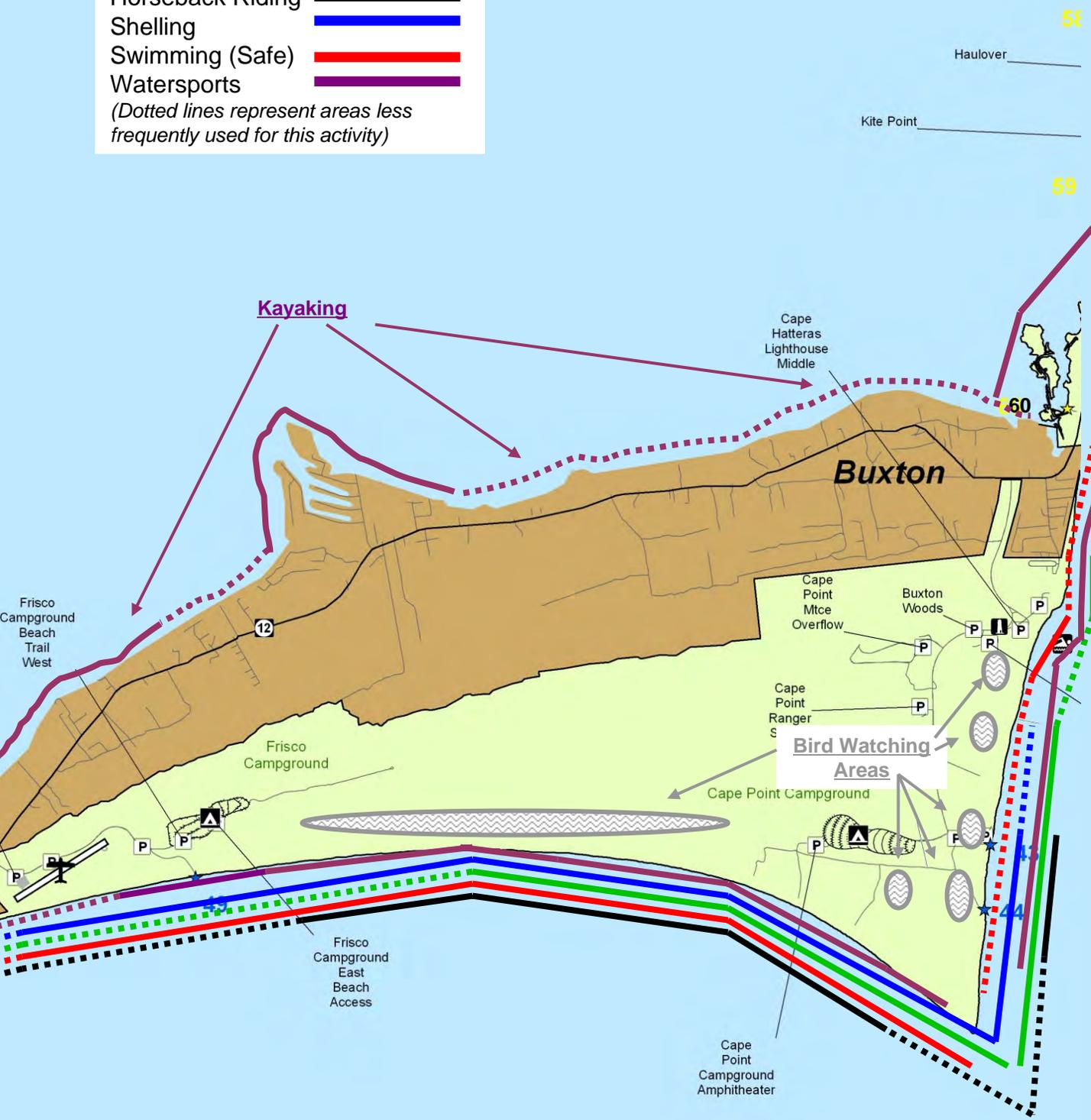
- Legend**
- Birdwatching 
 - Fishing 
 - Horseback Riding 
 - Shelling 
 - Swimming (Safe) 
 - Watersports 
- (Dotted lines represent areas less frequently used for this activity)*



Legend

- Birdwatching
- Fishing
- Horseback Riding
- Shelling
- Swimming (Safe)
- Watersports

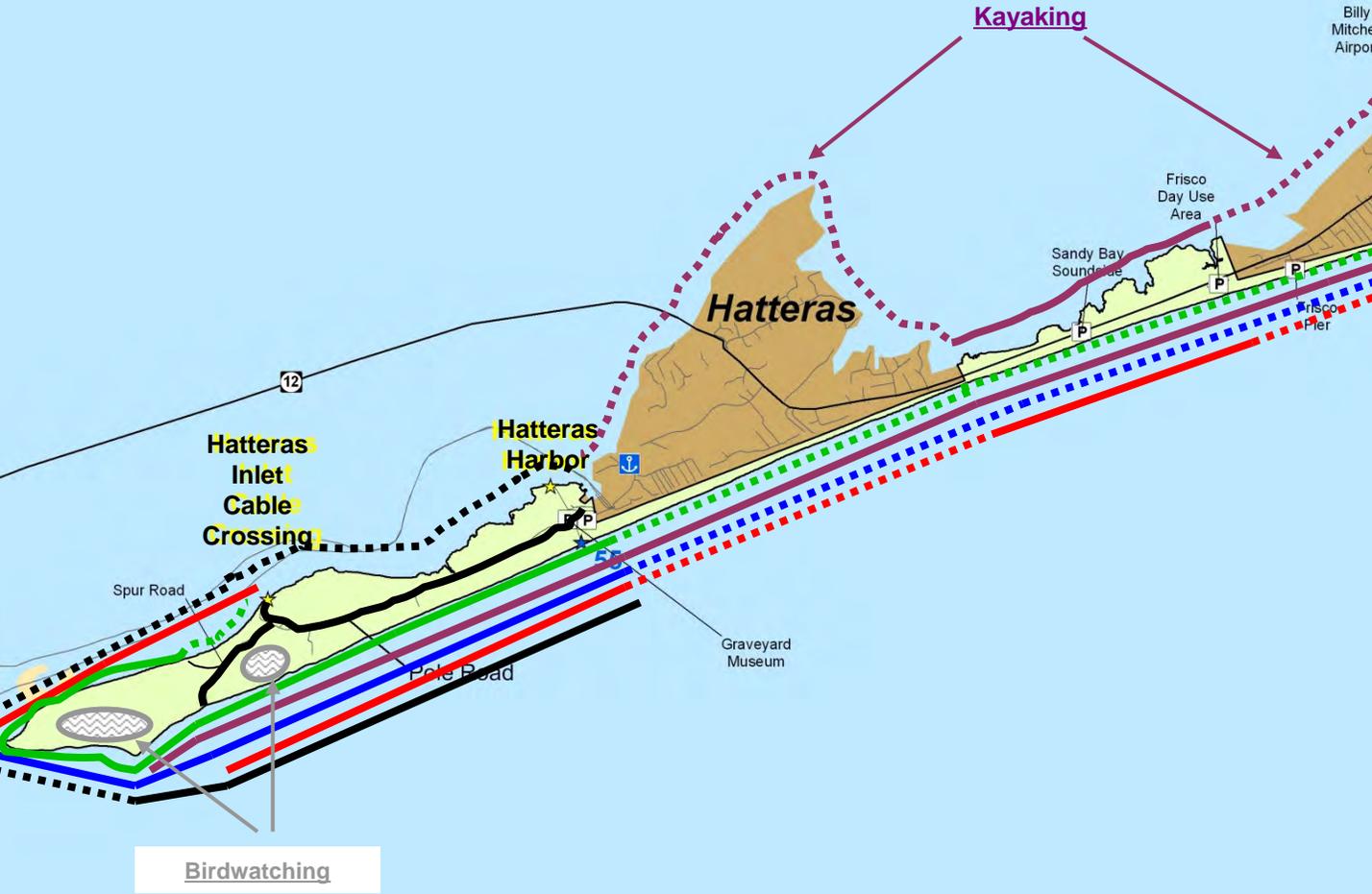
(Dotted lines represent areas less frequently used for this activity)



Legend

- Birdwatching 
- Fishing 
- Horseback Riding 
- Shelling 
- Swimming (Safe) 
- Watersports 

(Dotted lines represent areas less frequently used for this activity)



Legend

- Birdwatching
- Fishing
- Horseback Riding
- Shelling
- Swimming (Safe)
- Watersports

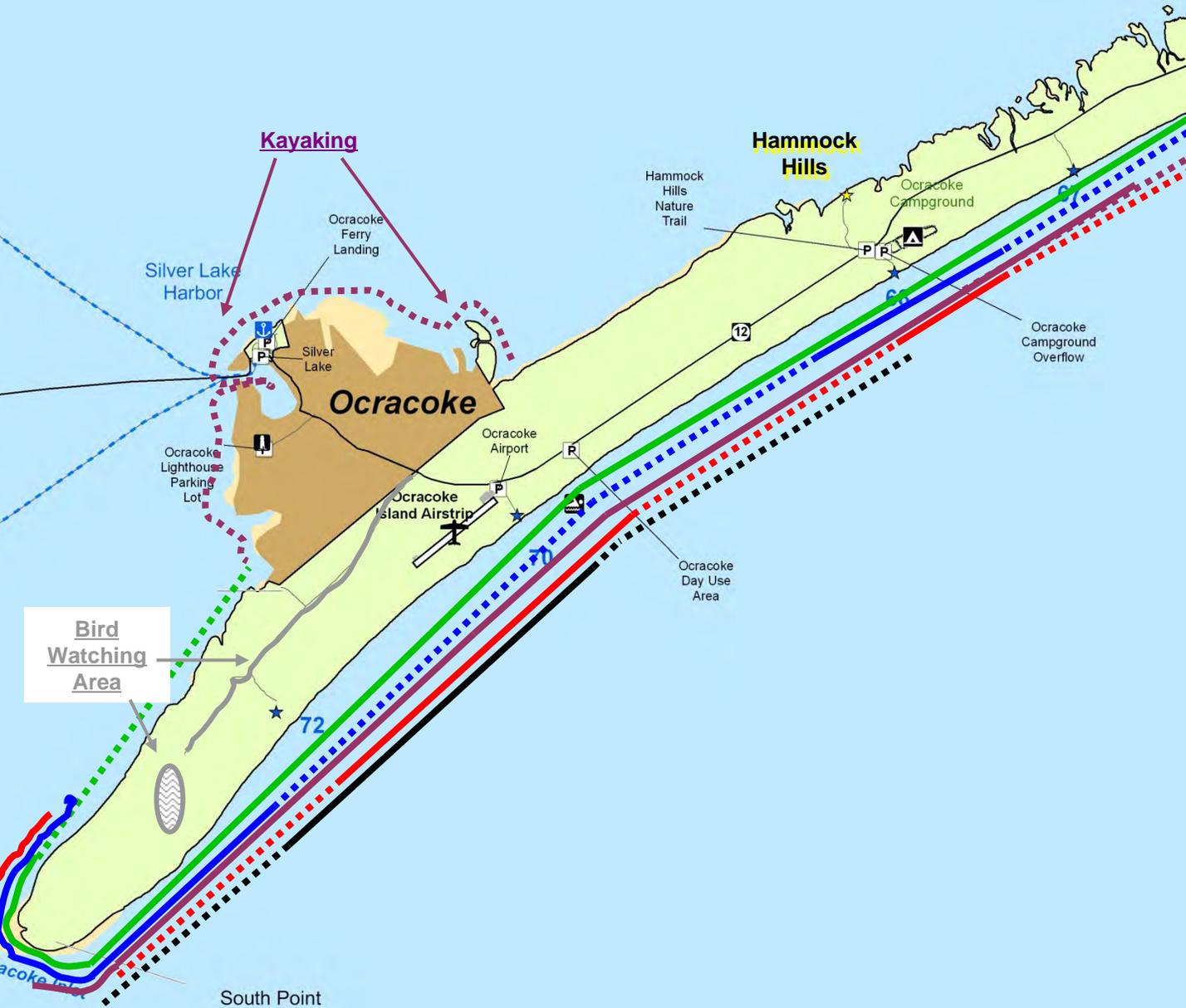
(Dotted lines represent areas less frequently used for this activity)



Legend

- Birdwatching
- Fishing
- Horseback Riding
- Shelling
- Swimming (Safe)
- Watersports

(Dotted lines represent areas less frequently used for this activity)





KITE SURF STANDUP STYLE
REALWATERSPORTS.COM

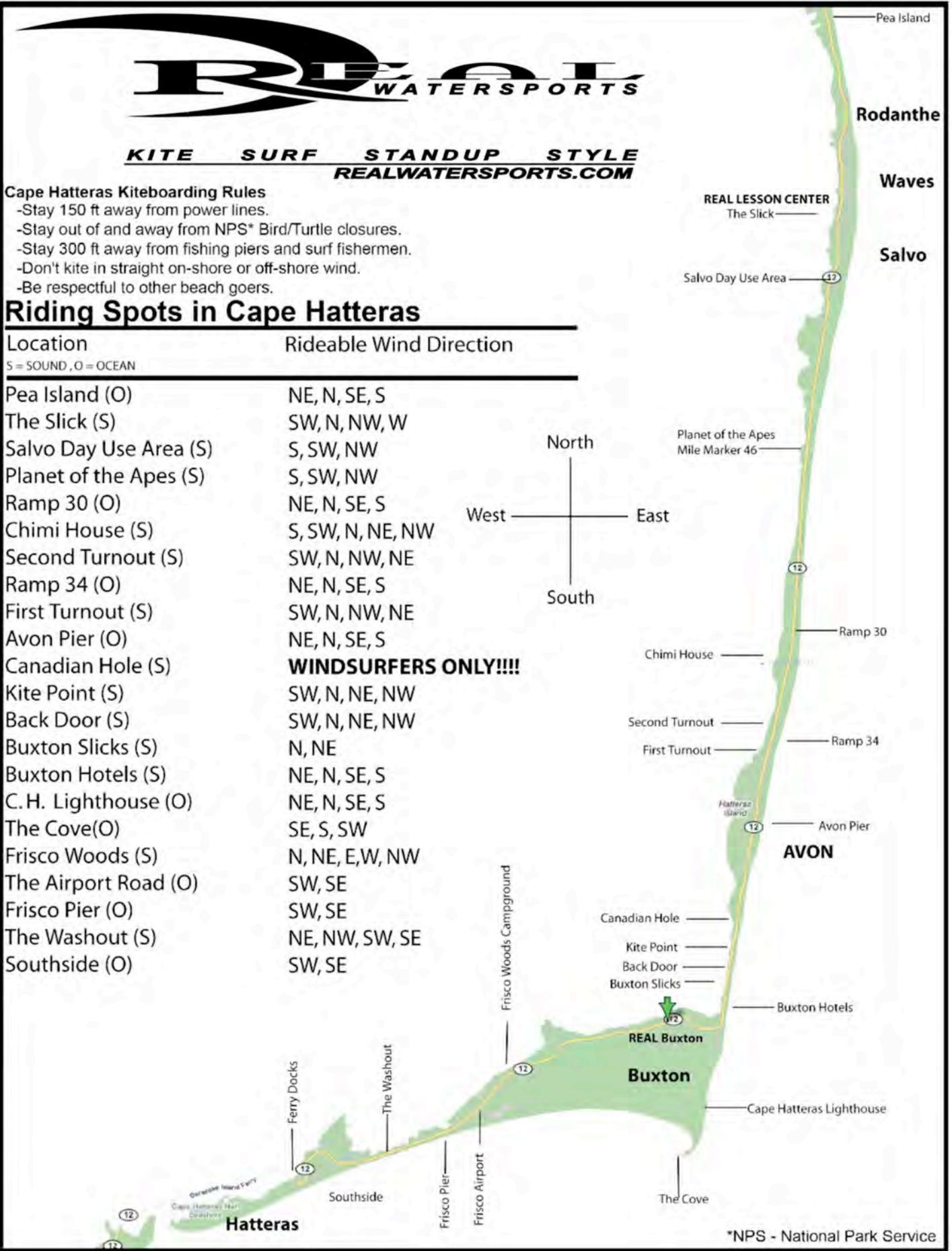
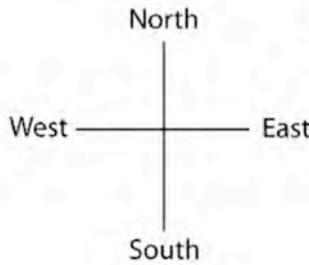
Cape Hatteras Kiteboarding Rules

- Stay 150 ft away from power lines.
- Stay out of and away from NPS* Bird/Turtle closures.
- Stay 300 ft away from fishing piers and surf fishermen.
- Don't kite in straight on-shore or off-shore wind.
- Be respectful to other beach goers.

Riding Spots in Cape Hatteras

Location	Rideable Wind Direction
----------	-------------------------

Pea Island (O)	NE, N, SE, S
The Slick (S)	SW, N, NW, W
Salvo Day Use Area (S)	S, SW, NW
Planet of the Apes (S)	S, SW, NW
Ramp 30 (O)	NE, N, SE, S
Chimi House (S)	S, SW, N, NE, NW
Second Turnout (S)	SW, N, NW, NE
Ramp 34 (O)	NE, N, SE, S
First Turnout (S)	SW, N, NW, NE
Avon Pier (O)	NE, N, SE, S
Canadian Hole (S)	WINDSURFERS ONLY!!!!
Kite Point (S)	SW, N, NE, NW
Back Door (S)	SW, N, NE, NW
Buxton Slicks (S)	N, NE
Buxton Hotels (S)	NE, N, SE, S
C. H. Lighthouse (O)	NE, N, SE, S
The Cove (O)	SE, S, SW
Frisco Woods (S)	N, NE, E, W, NW
The Airport Road (O)	SW, SE
Frisco Pier (O)	SW, SE
The Washout (S)	NE, NW, SW, SE
Southside (O)	SW, SE



*NPS - National Park Service



KITE SURF STANDUP STYLE
REALWATERSPORTS.COM

Surfing Spots in Cape Hatteras

Location	Off-Shore Wind Direction
Ranger Station	SW, W, NW
S-Turns	SW, W, NW
Mirlo Beach	SW, W, NW
Ramp 23	SW, W, NW
Ramp 27	SW, W, NW
Ramp 30	SW, W, NW
Ramp 34	SW, W, NW
Avon Pier	SW, W, NW
Askins Creek	SW, W, NW
Old Road	SW, W, NW
Buxton Hotels	SW, W, NW
Cape Hatteras Lighthouse	SW, W, NW
Baby Beach	SW, W, NW
Joe P Beach	SW, W, NW
The Point	SW, W, NW
The Cove	NW, N
Frisco Airport Rd.	W, NW, N, NE
Frisco Pier	W, NW, N, NE

* requires 4x4 vehicle or an extended walk

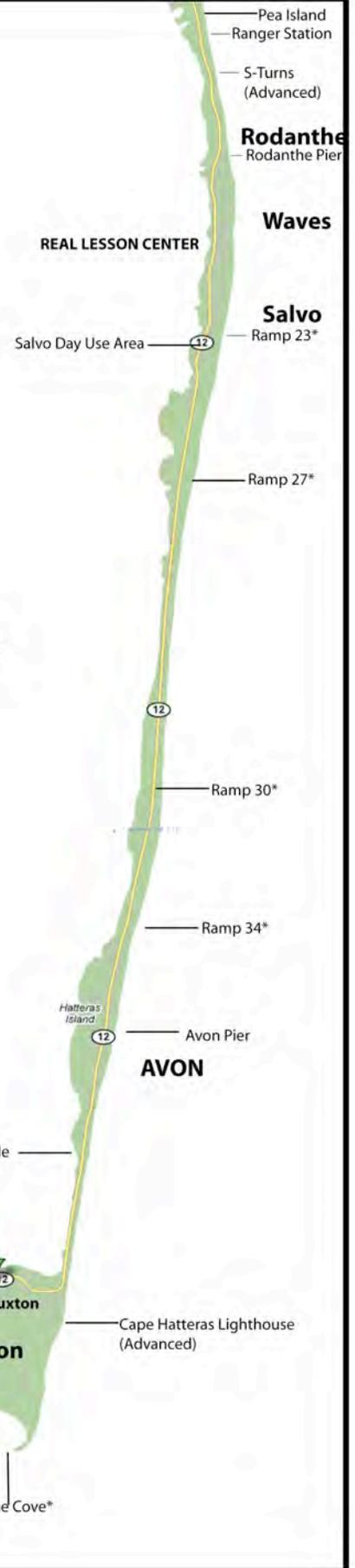
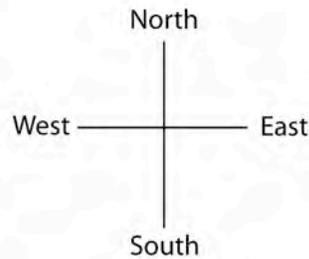


EXHIBIT E

Nighttime Beach Access During Sea Turtle Nesting and Hatchling Season

Acknowledgement

Numerous factors may affect sea turtles, turtle behavior, and turtle habitat including natural factors (ocean water quality, water temperature, storm events, predators, etc.), general human activity on beaches, artificial lighting (stationary in particular), and ORVs. Though the scope and focus of this plan is ORV management, this is not to imply numerous other management actions are not necessary and important to maintain and improve turtle populations on CAHA.

General Goals of Nighttime ORV Access, Seasonal Restrictions, and Turtle Management

- Protect the sea turtles and contribute to the recovery of the species. More specific goals include:
 - Reduce the potential for false crawls due to night activity on the beach;
 - Reduce the potential for female turtles not emerging onto the beach due to night activity on the beach;
 - Reduce the potential for hatchling disorientation, when attempting to return to the sea, due to night activity on the beach;
 - Reduce potential direct impact to hatchlings seeking to reach the ocean, especially those hatchlings emerging from undiscovered/unmarked nests.
 - Reduce potential direct impact to nesting females.
- Protect the opportunity for access.

Overview of Nighttime ORV Access Program

- In general, night driving would be prohibited during the dates of May 27 and August 25;
- In general, night driving would be prohibited during the times of 10:00 p.m. to 6:00 a.m.
- Night driving on specific designated routes to spits and points that are not otherwise closed due to bird breeding activity would occur with nighttime restrictions from May 27 to August 25, with sufficient NPS monitoring.
- Specifically, in four areas of the Park (Bodie Island Spit, Cape Point, Hatteras Spit and South Point Ocracoke), provided those areas are not otherwise closed due to bird breeding activity, limited access for appropriate nighttime access and appropriate recreational activity, with significant restrictions, would be permitted from May 27 to August 25. At the designated location(s), drivers would have to park and stay parked at night, with lighting restrictions. Fishing or other appropriate recreation (i.e., stargazing) would occur though vehicles must remain parked until the area reopens to ORV access at 6:00 a.m.
- Night driving on all routes and areas would occur without nighttime restrictions from August 26 until May 26.

EXHIBIT E

Monitoring

- Daily sea turtle patrols will begin on May 1. Patrol will continue until September 15, or two weeks after the last sea turtle nest or crawl is found, whichever is later.
- Conduct daily morning surveys by ATV/UTVs and possibly ORVs for crawls and nests on all beaches before onset of heavy public ORV use. Morning surveys must begin on the beach no later than twilight. Daily surveys for nests end September 15, or two weeks after the last sea turtle nest or crawl was found, whichever is later. Periodic monitoring (e.g., every two to three days) for unknown nesting and emerging hatchlings will occur in areas of high visitation.
- Monitoring will also occur for post-hatchling washbacks during periods when there are large quantities of seaweed washed ashore or following severe storm events. Nest observations stop when all nests have hatched or excavations indicate that any nests remaining are not viable.
- At approximately 50-55 days into incubation, NPS will expand closures around a nest to the surf line, establish the filter fencing, and monitor the nest daily for signs of hatchling emergence.
- Using personnel with local turtle experience survey the ocean beaches each year to identify problems of poor nesting sites and appropriate relocation areas.

General Management

- In general, NPS will follow the guidance found in the NCWRC Handbook for Sea Turtle Volunteers until such time as NPS develops site-specific guidelines for the unit and can transition to solely implementing such NPS guidelines.
- May 27 – August 25: The general park wide approach to sea turtle management during these dates includes the following:
 - All potential sea turtle nesting habitat (ocean intertidal zone, ocean backshore, and dunes) will be closed to non-essential ORV use from 10:00 p.m. until 6:00 a.m.. Pedestrian use of beaches from 10:00 p.m. until 6:00 a.m. is allowed. All users, whether arriving via foot or via ORV, must comply with turtle etiquette regarding use of lights, prohibition of campfires, approach of turtles or nests, etc. as outlined below.
 - Areas of beach shall be cleared by turtle patrol prior to allowing ORV morning access. NPS shall provide sufficient personnel to meet the 6:00 a.m. standard. The turtle patrols will place as a first priority patrolling those areas that are currently open to ORV access, and as necessary, further prioritize those open areas within the spits and points.
 - Early morning monitoring will be done in the most effective and efficient fashion possible. This may include an initial sweep for marking of new nests and false crawls followed by a second sweep for detailed fencing, more permanent protections, etc.; beginning patrols at first twilight on the beach; and so forth.

EXHIBIT E

- Signaling of some kind should be established at ORV access ramps to indicate if the beach is closed. This may be signage, traffic-light lights, or so forth.
 - The Park shall seek, in partnership with the NCWC, Dare County, and a volunteers program to provide for at least 8 separate turtle patrols per day during the turtle-nesting season.
 - The Park shall provide for sufficient and necessary enforcement to ensure the beach is cleared at night by 10:00 p.m., and that any violators are found and receive appropriate penalties.
 - Nest closures and buffers are described in the *Resource Protection Table*, EXHIBIT H.
- August 26 – Date of Last Hatching: Designated ORV routes and areas are open to ORV use 24 hours a day subject to other natural resource closures. NPS will conduct night nest monitoring/watch during expected hatching to ensure the safety of hatchlings in any areas open to ORV use with turtle nests present. The NPS will work to establish a nest watch program with volunteers under appropriate supervision.
 - The Park will install filter fencing for managing light and will provide for an appropriate buffer around turtle nests to ensure hatchlings may make their way to the sea. Filter fencing should be no further from the nest than 5 meters to ensure light from distances further away from the nests is filtered.
 - Resources Management staff will examine all sea turtle nests after hatching to determine productivity rates.
 - Excavate nests in the evening a minimum of 72 hours after hatching event.
 - In cases where hatching events or dates were unknown, unearth nest cavities 80–90 days after the lay date, or later if eggs are still viable.
 - Any live hatchlings found during excavations will be released at dusk or after dark on the same day as excavation.
 - Date of Last Hatching – May 26: Designated ORV routes and areas are open to ORV use 24 hours a day subject to other natural resource closures.

Site Specific Management for Nighttime ORV Access

- General Requirements for Nighttime ORV Access of Bodie Island, Cape Point, Hatteras Inlet, and South Point Ocracoke - May 27 to August 25: Bodie Island Spit, Cape Point, Hatteras Inlet and South Point Ocracoke, if not otherwise closed due to bird breeding activity, are open to nighttime ORV access. The following additional restrictions apply within said ORV routes/areas.
 - All ORVs must obtain an ORV Special Use Permit, See EXHIBIT B for details.
 - All ORVs must also obtain a Special Use Permit for Nighttime ORV Access.
 - Nighttime ORV Access Permits will be accompanied by education about sea turtles, their protection, the rules of nighttime access, and a phone number to report any violations or specific turtle behavior (nesting, false crawls, etc.).
 - In areas open to nighttime ORV access, campfires, use of vehicle headlights (other than as below), auxiliary lights, vehicle battery powered spotlights, or

EXHIBIT E

lanterns that cast light in a 360 degree direction are prohibited, except as needed in a true emergency situation. Intermittent use of lighting (5 minutes or less) is limited to handheld flashlights, headlamps or other battery powered lighting devices that cast a one-directional beam of light.

- Headlights may only be used when in transit and will be turned off when the vehicle is parked.
 - Drivers and pedestrian should not approach turtles or turtle nests and should not aim any lights including flash photography toward adult sea turtles or hatchlings.
 - NPS will conduct night monitoring of the specific ORV routes and areas open to nighttime ORV access, with at least one monitor per ranger district, to identify, record, and monitor nesting females and record false crawls.
 - Incentives should be established for beach users to report any turtle activity.
 - Limitation on numbers of vehicles for areas open to nighttime ORV access.
- Number of Vehicles per Nighttime ORV Access Area The number of vehicles allowed in Nighttime ORV Access areas will be limited and such limitations will be established in the Superintendent's Compendium under the authority of 36 CFR § 1.5, subject to periodic review by NPS, and adjusted as appropriate (could be increased if no negative impacts to resources are determined or decreased if needed to protect park resources). The limitation on number of vehicles will be as follows:
 - Bodie Island Spit limit – 25 vehicles
 - Cape Point: Vehicle limit – 50 vehicles
 - Hatteras Inlet Vehicle limit – 25 vehicles
 - Ocracoke South Point limit – 25 vehicles
 - Special Use Permit for Nighttime ORV Access. The above areas will be accessible by ORV only before 10:00 p.m., subject to resource closures for bird breeding activity or turtle nests, and subject to terms and conditions of a special use permit, which include the following:
 - Such vehicles must have a special use permit for “Nighttime ORV Access” which will be in addition to any standard beach access permit.
 - Appropriate recreation would include fishing, stargazing, or other passive activities.
 - Permitted vehicles must arrive at the site no later than 10:00 p.m. and remain parked within the designated area with headlights off until the beach is cleared by turtle patrol, which shall be by 6:00 a.m..
 - Under rare circumstances, should a Nighttime ORV Access permittee need to leave the beach during the night due to a serious emergency, they must make a call to Dare County central dispatch (473-3444) or 911. Dispatch information will be listed on the nightly permit.
 - Parking areas at the respective nighttime ORV access areas will be designated by NPS law enforcement staff and marked with signage (e.g., posts or barricades) that will be maintained by the LE staff. Permittees must park their vehicles only in the designated area. Such areas will be contained and shall prevent vehicles from being spread up or down large sections of beach.
 - Pets are prohibited

EXHIBIT E

- Campfires, use of vehicle headlights, vehicle battery powered spotlights, or lanterns that cast light in a 360 degree direction are prohibited, except as needed in a true emergency situation. Intermittent use of lighting is limited to handheld flashlights, headlamps or other battery powered lighting devices that cast a one-directional beam of light.
- Drivers and pedestrians should not approach turtles or turtle nests and should not aim any lights, including flash photography, toward adult sea turtles, hatchlings, or into a nest enclosure.
- Special use permits will be issued one night at a time and must be obtained in person at a designated NPS permit issuing station (locations TBD). If NPS issuing stations are scheduled to be closed due to day of the week or known holiday, NPS must make permit available the business day immediate occurring before the day the permit issuing station is closed.
- Each vehicle must have a functional portable toilet.
- If it appears that there is routinely more demand for permits than the vehicle limits allow NPS may impose a limit on the number of nights in a row an individual may obtain a nighttime ORV access permit. If a permit is obtained but permittee will not utilize permit for that day the permit must be returned to the permit issuing station prior to the time the permit station closes.
- NPS retains the right to refuse issuance of nighttime ORV access permits when adverse weather conditions are forecasted that pose dangerous conditions that will, or are likely to, lead to safety measures that would require evacuation from the beach between the hours of 10:00 p.m. and 6:00 a.m.
- NPS may utilize volunteer hosts at nighttime ORV access areas as a management tool to monitor compliance with the permit requirements.
- If a permittee, or individual accompanying a permittee, violates the terms and conditions of the permit, including any natural resource protection rules or any of the above provisions, the violator is subject to a citation and the person's privilege to obtain a night-access permit will be revoked for the remainder of the season.
-

Education and Outreach

The NPS will develop an appropriate, robust, and effective turtle education and outreach program to help inform all beach users, regardless of the means they use to access the beach, regarding turtle species, their behavior, and all appropriate human behavior to ensure the success of nesting and hatching of turtles on Cape Hatteras National Seashore.

Research and Knowledge Base

The NPS will commit sufficient resources to the monitoring, science, and adaptive management approach to build a detailed, thorough knowledge of turtle management on Cape Hatteras National Seashore to be used for future management of sea turtles at Cape Hatteras and to share that knowledge with others within the state, other Parks, and up and down the Atlantic Seashore.

EXHIBIT E

Volunteer Program

The NPS will develop an appropriate and effective volunteer program to increase its access to resources, to inform and educate interested members of the public, and to help advance the recovery of turtle species. To the greatest extent possible, the NPS will also partner with Dare County and such state agencies as the North Carolina Wildlife Resources Commission (NCWRC) to maximize resources and abilities to achieve the goals noted above. Volunteers may assist with turtle patrols and may also serve as nest watchers during hatching.

Stationary Lighting within the Control of the NPS

The NPS will work with USFWS, the NCWRC, and appropriate others to develop turtle-friendly lighting at all NPS facilities that might affect lighting on or near the beach, as well as require all concessionaires with potential impact to utilize the same lighting through their special use permits.

Predator Control

Under a separate process, NPS will develop and implement a predator control plan for predators of turtles, particularly hatchlings, in order to reduce harm and death to hatchlings.

Commercial Fishing

Commercial fishing permittees regulated pursuant to 36 CFR 7.58(b)(2) are not subject to the provisions of this ORV regulation during times or periods when beach use occurs while engaged in commercial fishing from seashore beaches. Appropriate requirements for protection of turtles will be managed separately through the commercial fishing special use permit.

Adaptive Management

Objective: To determine the effect of management at Cape Hatteras on nesting rate, hatching success, sea-finding by hatchlings (prevalence of misorientation/disorientation and trapping by obstacles), and proportion of false crawls.

Proposal: Identify the “management category” of each ocean beach segment as one of the following:

1. ORV areas (ORV/pedestrian segments, open to ORV use during daylight hours)
2. Non-ORV areas (pedestrian only segments)
3. Resource Areas that are closed from (date) to (date) to all ORV and pedestrian use (control segments)
4. Village

EXHIBIT E

Monitor and Document the following information:

1. Turtle species
2. Nest vs. false crawl
3. Document nests lost to storms, overwash, predators, etc.
4. Dates and times of activities (nest, false crawls, hatching)
5. Location (physical description and GPS location)
6. Management category (ORV, Non-ORV, Resource Area, other Resource Closures, or Experimental, Villages) of the nest site at the time it was laid
7. If nest needs to be relocated and, if so, why and where (new physical description and GPS location), number of eggs relocated, and time of day
8. Necessary protective measures for nest and hatchlings
9. Information regarding any resource closure violations, predation, hatchling misorientation, trapping by obstacles, or possible “take” incidents
10. Information regarding any post hatching nest excavation and analysis
11. Visitor use in terms of number of visitors using the beach from May 1 to October 31, kinds of use, night use, kinds of night activities, and other appropriate socio-economic data.
12. Examine all nests after hatching to determine productivity rates. Excavate nests in the evening a minimum of 72 hours after hatching event. In cases where hatching events or dates were unknown, unearth nest cavities 80–90 days after the lay date, or later if the eggs are still viable (i.e., late season nests). Any live hatchlings found during excavations will be released after dark on the same day as excavation.

Evaluate:

1. Compare the number and proportion of nests, false crawls, hatchling misorientation/disorientation incidents, predation incidents, lost nests, and hatchling emergence rate that occur in the respective management categories. Document in annual sea turtle report.
2. Evaluate data over multiple years to help determine management actions chosen in terms of dates, times, and restrictions, to the extent possible, against such criteria as nests, false crawls, and others noted above, generally related to risk management, overall impact, etc.
3. Conduct periodic review and evaluate trends every 5 years and include a summary of that analysis in the annual sea turtle report for the respective year. Review results with USFWS. (Note: Loggerhead and green turtles typically nest every 2-3 years, so this would allow for a minimum of two nesting cycles to be considered.)

Adapt:

1. If no significant effect of recreation at a particular site is found, recreational restrictions can be varied systematically to distinguish the effects of type and level of activity. This might include changing dates, times, and locations. On the other hand, if no effect is detected, then the next round of experiments could entail allowing similar night access to other selected sites. Any change in management would require consultation with USFWS and NCWRC, prior to implementation.

Further Studies to Consider:

EXHIBIT E

1. Design a systematic research study to monitor and determine the effects, if any, of night access on sea turtle nesting at Cape Hatteras.

Alternative Management To the extent practicable, please utilize the report, presented to NPS under separate cover as part of the Negotiated Rulemaking record, entitled CHNSRA TURTLE PROGRAM.

EXHIBIT F - Routes and Areas Table

EXHIBIT F		
Routes & Areas Table		
Oceanside Location	Approx Map Color Mileage Code	NOTES
ORV Use Areas (YR = ORV permitted Year Round) All areas subject to temporary resource/safety closures		
Bodie Island (approx 6.1 miles)		
Ramp 1 (Town of Nags Head/NPS boundary) south 2 miles (includes Coquina Beach)	2 or less	Add 25 parking places @ Ramp 1 & expand parking @ Coquina Beach Ped access
Ramps		Ramp 2 moves So. For ped safety. Ramp 4 moves No. due to bridge construction
From 2 miles so of NPS bondry to Ramp 4	1.5	
Ramp 4 to "Bait Pond" , (Bodie Island Spit, a Traditional & Cultural Recreational Area)	2.6	Open July 15 - March 15 Open (restricted) March 16 - July 14 *see specific plan for Bodie Island Spit access during Breeding season. (SM2)
		Establish Ped/ORV access corridor which may include a pass thru to Bodie Island spit. Delineate the corridor with posts placed 150 ft. above the high tide line.
Bodie Island - Soundside Access		
		Add at least 1 soundside access (ORV & Ped combined) somewhere between North boundary of CAHA and Oregon Inlet
Pea Island NWR (approx 15 miles)		
Pea Island NWR	15	PINWR & NCDOT should cooperate to provide roadside & other parking with walkovers wherever practice to provide public with access to beaches.
Hatteras Island (approx 42.6 miles)		
South Boundary PINWR to South boundary Village of Salvo	5.3	Designated open to ORV. Seasonal closure for ORV use 5/15 to 9/15
South boundary Salvo to Ramp 27	4.4	Add ramps @ "24" & "26" (Ramp 23 as is)
Ramp 27 to new Ramp "28"	1	Add new Ramp "28" with Ped facilities & parking
Ramp 28 to North boundary of Avon	5.5	Add new Ramp "32" opp Little Kinnekeet Light Station (Ramps 30 & 36 as is).
North boundary Avon to South boundary Avon	3.8	Designated open to ORV. Seasonal closure for ORV use 5/15 to 9/15
South boundary Avon to new ramp "39"	2	Add new Ramp 39 within 100 ft North of Haulover access road
Ramp "39" to Buxton North Boundary	1.7	
Hatteras Island cont'		

Oceanside Location	Approx Map Color	NOTES
ORV Use Areas (YR = ORV permitted Year Round)	Mileage	All areas subject to temporary resource/safety closures
North Boundary to South Boundary Buxton	0.6	Designated open to ORV. Seasonal closure for ORV use 5/15 to 9/15
South Boundary Buxton to 0.7 mile North of Ramp 43	1	Add new Ramp "41" @ Coast Guard Station
0.7 mile North of Ramp 43 to 44	1.1	
Ramp 44 to Ramp 45 (Cape Point, a Traditional & Cultural Recreational Area)	2.4	Open July 15 - March 15 Open (restricted) March 16 - July 14 *see specific plan for Cape Point access during Breeding season. (SM2)
		Establish Ped/ORV access corridor which may include a pass thru to Cape Point. Delineate the corridor with posts placed up to 150 ft above the high tide line.
Ramp 45 to North Boundary Frisco. (South Beach, a Traditional & Cultural Rec Area)	4.6	Add new interdunal road from Ramp 45 to Ramp 49. Add three new ramps between Ramps 45 and 49 to be numbered 46, 47, and 48.
No. Boundary Frisco to So. Boundary Frisco	1	Designated open to ORV. Seasonal closure for ORV use 5/15 to 9/15 Add new Ramp "51" @ So. Boundary Frisco
Ramp "51" to Hatteras Village No. Boundary	2	
No. Boundary Hatteras VII. to So. Boundary Hatteras VII.	1.3	Designated open to ORV. Seasonal closure for ORV use 5/15 to 9/15
So. Boundary Hatteras VII. To So. Exit of Pole Road	2.2	
Pole Road around Inlet beach to Cable Crossing	2.7	Open July 15 - March 15 Open (restricted) March 16 - July 14 *see specific plan for Hatteras Inlet access during Breeding season. (SM2)
(A Traditional & Cultural Recreational Area)	42.6	Establish Ped/ORV access corridor which may include a pass thru to Hatteras Inlet. Delineate the corridor with posts placed 150 ft above the high tide line.
Hatteras Island - Soundside Access & Interdunal road		
		All current soundside access routes (including Pole Road, Spur Road, Bone Road, Little Kinnakeet & others) are to be kept open with reasonable maintenance to allow safe, year round, access to both ORV & Ped. Boat launching to be allowed @ Sound access # 48 & #58, behind Coastguard station & at Cable Crossing.

Oceanside Location	Approx Map Color	NOTES
ORV Use Areas (YR = ORV permitted Year Round) All areas subject to temporary resource/safety closures	Mileage Code	
Ocracoke Island (approx 19.8 miles)		
Borrow Road to Mid point of Spit	2	
Mid Point of Spit to Ramp "59"	1.2	
Ramp "59" to new Ramp "62"	2.7	Add Ramp "66" with parking & Ped Access
Ramp "62" to 1 mi. No of Pony Pens	2	
1 Mi. No. Of Pony Pens to 1 Mi. So. of Pony Pens	2	
1 Mi. So of Pony Pens to Campground	1.5	
Campground to Ocracoke Day Use Area	3.1	Designated open to ORV. Seasonal closure for ORV use 5/15 to 9/15
Ocracoke Day Use Area to 0.5 mi. So. Of Ramp 72	2.7	
0.5 mi. So of Ramp 72 around Ock. Inlet A traditional & Cultural Recreational Area	2.6	Open July 15 - March 15 Open (restricted*) March 16 - July 14 *see specific plan for Ocracoke Inlet (South Point) access during Breeding season.
	19.8	SM2 Establish Ped/ORV access corridor which may include a pass thru to Ocracoke Inlet. Delineate the corridor with posts placed 150 ft above the high tide line.
Ocracoke Island - Soundside access & Interdunal roads		
		All current soundside access routes are to be kept open with reasonable maintenance to allow safe access to both ORV & Ped.
		Reopen soundside access @ So. Boudry of Ocracoke Village from Ramp 72 road bed for both ORV & Ped.
		Reopen soundside access from Ramp 72 road bed south of spur to Ramp 72 (around SW end of dunes in non breeding season).
Milage Summary (approx)		
Closed to ORV's	29.4	Red = designated closed to ORV
ORV open with seasonal restrictions	10.3	Purple = designated open to ORV subject to restrictions
Open Year Round Villages (Ped YR & ORV seasonally)	28.7	Green = designated open to ORV
	15.1	Blue = designated open to ORV seasonally
	83.5	

EXHIBIT G

SAFETY CLOSURE

ORV SAFETY CLOSURE

PURPOSE: Ensuring the safety of the public when natural conditions within a specific area of CAHA present a clear and imminent threat of (a) significant bodily injury or death to the driving public or other CAHA users or (b) significant damage to personal property, primarily vehicles and their contents.

SCOPE: May be applied within any routes, trails, and areas designated for ORV driving.

TRIGGERS FOR CLOSURE: Conditions listed below may trigger an ORV Safety Closure in the event of a clear and imminent threat of significant bodily injury or death; and/or damage to personal property, primarily vehicles and their contents. Examples of hazards that could justify a closure include, but are not limited to:

- deep beach cuts which block the beach from dune to surf with no obvious way around;
- obstacles, such as exposed stumps, shipwrecks, or debris that cannot be safely by-passed or that block the entire width of the beach and cannot be easily removed;
- severe beach slope that puts vehicles in an unsafe gradient position that increases the chances of the loss of vehicular control.
- A high concentration of pedestrian users coupled with a narrow beach

Triggers do not include:

- a narrow beach, by itself;
- tides which block access through portions of beaches occur periodically and predictably and are an obvious, easily avoidable hazard;
- hazards blocking only a portion of the beach, where safe passage is available around the hazard.

While the above criteria provide the rationale for what does or does not constitute a "safety closure," the Superintendent retains the authority under 36 CFR §1.5 (a) to close all or a portion of a park area to all public use or to a specific use or activity, based upon a determination that such action is necessary for the maintenance of public health and safety, protection of environmental or scenic values, protection of natural or cultural resources, aid to scientific research, implementation of management responsibilities, equitable allocation and use of facilities, or the avoidance of conflict among visitor use activities. For any such closures implemented, the public will be notified in accordance with the public notice requirements identified in 36 CFR § 1.7.

CAHA PERSONNEL ACTION: Providing for the public safety is the responsibility of all CAHA employees. The following is expected of CAHA personnel.

- Law enforcement (LE) rangers should have the authority to enact closures consistent with the triggers noted above.
- Non-emergency service staff, when encountering safety hazards, should establish initial safety precautions and contact the LE ranger staff to evaluate the situation and

EXHIBIT G

establish any necessary ORV Safety Closures.

- Where hazards block only a portion of the beach, staff will mark and post the hazard to direct ORV traffic safely around the hazard.

MONITORING: ORV Safety Closures shall be monitored on a weekly basis.

DEMARCATIION: ORV Safety Closures shall be clearly marked by posts and signs indicating the area is closed to ORV use. The signs used for this purpose shall indicate that safety is the reason for the closure.

ORV SAFETY CLOSURE NOTIFICATION AND CONTINUANCE: Any employee initiating an emergency ORV safety closure will notify their supervisor immediately. The Superintendent and Division Chief will be notified as soon as possible of any such emergency ORV safety closure. As soon as possible after the initial closure has been established, but no later than one week, the employee will complete a "Closure Request Form" and submit the form for final approval through the chain of command. Such form should include the coordinates of the closure, the specific reasons for the closure, the dates of action, and the employee taking action. Completion of a "Closure Request Form" will only be required when a complete beach closure is established and does not apply to any modification of the ORV corridor width that does not preclude access. As long as the area is closed, the form shall be updated weekly to include a brief description of the condition of the area based on the weekly monitoring.

TRIGGERS FOR RE-OPENING: Sufficient diminishment, reduction or elimination of the conditions and hazards described under *TRIGGERS FOR CLOSURE* would constitute the trigger for re-opening a closure. ORV safety closures are intended to be in effect only as long as visitor safety or personal property is clearly and imminently threatened.

STAKEHOLDER INPUT: The Park shall establish and maintain a standing stakeholder advisory committee pursuant to the Federal Advisory Committee Act (FACA) with representatives from various sections/geographies of the Park representing diverse and balanced interests to provide input to the Park on, among other things, safety closures and openings.

EXHIBIT G

PEDESTRIAN SAFETY

Due to ambient level of natural sounds on the beach (from surf, wind, etc.), and other inherent distractions in the beach setting, pedestrians may not be attentive to or aware of moving vehicles (ORVs) on the beach, especially those vehicles approaching from the sides or from behind. It is the legal responsibility of the ORV operator to always give pedestrians the right of way on the beach. The following federal regulations currently apply to motor vehicle operation in the vicinity of pedestrians:

36 CFR § 4.20 *RIGHT OF WAY*

An operator of a motor vehicle shall yield the right of way to pedestrians, (saddle and pack animals, and vehicles drawn by animals). Failure to yield the right of way is prohibited.

36 CFR § 4.22 *UNSAFE OPERATION*

(b) The following are prohibited:

(3) Failing to maintain that degree of control of a motor vehicle necessary to avoid danger to persons, property or wildlife.

In addition, the following measures apply (*assuming a parkwide ORV speed limit of 15 mph*):

- 1) When approaching or passing a pedestrian(s) on the beach, ORVs shall move to the landward side of the available ORV driving corridor to the extent practicable without driving on the toe of the dune or the dune itself in order to yield the wider portion of the beach corridor to the pedestrian(s).
- 2) ORVs shall slow to 5 mph (or the slowest possible speed to maintain traction without exceeding the overall speed limit) when traveling within 10 meters (30 ft) or less of pedestrians at any location on the beach at any time of year.
- 3) Pedestrians should not block access ramps and should use pedestrian ramps/boardwalks where available. If a pedestrian walkover is not available, pedestrians should walk to the side of ORV ramps, not in the tire tracks.
- 4) Pedestrians should avoid establishing their stationary area on the sand where vehicle tracks exists as the tracks are a clear indication of the most frequently traversed segment of the sand by vehicles.

EXHIBIT H - Resource Protection Table

Survey Time and Frequency	Piping Plover	American Oystercatcher	Colonial Waterbirds
<p>All Bird Species</p>	<p>Species Management 1 (SM1): Will use larger, longer lasting buffers with less monitoring to alleviate the need for constant monitoring and frequent fencing changes. Will be used at locations which would likely be closed anyway if SM2 buffers were used. Estimated staffing requirements TBD by NPS.</p> <p>Species Management 2 (SM2): Will use smaller buffers and require more frequent monitoring and fencing changes. Will be used at selected inlets, Cape Point and West to Ramp 47, and, at the discretion of NPS, at other locations in which more labor intensive management would provide access. Estimated staffing requirements TBD by NPS.</p> <p>Pass-through Corridors: At a limited number of locations (TBD), a smaller buffer may be used as part of a controlled study with adequate monitoring to determine if a smaller buffer for an ORV pass-through corridor is adequate to prevent disturbance.</p>	<p>March 15 – July 15 survey recent breeding areas (last three years) two times per week. Turtle patrol will take over monitoring after July 15th.</p> <p>If an AMOY nests in a pre-nesting closure at one of the points or spits in an area which requires an expended buffer (e.g., nest inside pre-nesting closure but buffer not adequate) and the nest is over-washed or predated, the buffer expansion shall be removed to the established pre-nesting closure.</p>	<p>April 1 – July 15 survey recent breeding areas (last three years) two times per week. Turtle patrol will take over monitoring after July 15th.</p> <p>If a colony is established in a pre-nesting closure at one of the points or spits in an area which requires an expanded buffer (e.g., colony inside pre-nesting closure but buffer not adequate) and the colony is over-washed or predated, the buffer expansion shall be removed to the established pre-nesting closure.</p>
<p>Pre-Nesting Surveys</p>	<p>By March 1, all potential habitats will have been evaluated. PIPL prenesting closures will be recommended based upon that habitat evaluation. Those closures will installed by March 15.</p> <p>March 15 – July 15: survey recent breeding areas (last three years) three times per week (or every other day). Survey potential new and or former habitat two times per week. Survey for Wilson’s plover during piping plover surveys.</p> <p>The PIPL pre-nesting areas will be surveyed 3 times per week if piping plovers are present in the area. To mitigate disturbance to nesting birds, surveys may need to be curtailed.</p>	<p>March 15 – July 15 survey recent breeding areas (last three years) two times per week. Turtle patrol will take over monitoring after July 15th.</p> <p>If an AMOY nests in a pre-nesting closure at one of the points or spits in an area which requires an expended buffer (e.g., nest inside pre-nesting closure but buffer not adequate) and the nest is over-washed or predated, the buffer expansion shall be removed to the established pre-nesting closure.</p>	<p>April 1 – July 15 survey recent breeding areas (last three years) two times per week. Turtle patrol will take over monitoring after July 15th.</p> <p>If a colony is established in a pre-nesting closure at one of the points or spits in an area which requires an expanded buffer (e.g., colony inside pre-nesting closure but buffer not adequate) and the colony is over-washed or predated, the buffer expansion shall be removed to the established pre-nesting closure.</p>

	<p>Pre-nesting buffers will not be modified in cases where the beach erodes into the buffered habitat.</p>		
<p>Pre-Nesting Buffers</p>	<p><u>SM1</u>: Resource closures will not allow ORV or pedestrian access. <u>SM2</u>: Areas designated as SM2 may have a designated ORV and/or pedestrian access corridor. In areas open to ORV use, delineate the ORV corridor with posts placed up to 100 feet above the high tide line, or as designated in a site specific plan (e.g., Bodie Island Spit, Cape Point, and South Point). During the breeding season, pets are prohibited in pass-through corridors or at the points and spits.</p>	<p><u>SM1</u>: Pre-nesting closures will be installed by March 15 in areas that had nest(s) in the past 3 years, if habitat is still suitable. Closures will be removed if no breeding activity is seen in the area by July 15, or 2 weeks after the site is abandoned by AMOY, whichever comes later. <u>SM2</u>: Pre-nesting closures will not be established prior to the</p>	<p><u>SM1 & SM2</u>: Pre-nesting closures will not be established for CWB. Note: CWBs do not return to exactly the same location every year making it difficult to establish a pre-nesting closure for them under SM1. Also, most will be in Resource Areas.</p>

	<p>week period, whichever comes later.</p>	<p>bird's arrival.</p>	
<p>Courtship/Mating Surveys:</p>	<p>If PIPL, AMOY, or CWB are observed exhibiting territorial or courtship behavior in recent breeding habitat, observe 3 times per week. If scrapes are observed in the absence of courtship behavior, survey three times per week. Survey potential new habitat 2 times per week.</p>		
<p>Courtship/Mating Buffers:</p>	<p>If courtship or copulation is observed outside of existing pre-nesting closures, establish or expand buffer to ensure 50 m buffer for the observed birds. Buffer will be increased if flushing occurs due to human disturbance.</p> <p>Designate an ORV or pedestrian access corridor as identified. In the case of ORV pass-through corridor, pets restricted to vehicle while vehicle is in corridor. In the case of pedestrian use of corridor, pets must be on leash no longer than that</p>	<p><u>SM1</u>: Pre-nesting closures will have already been established for the majority of returning birds. Pre-nesting closures will be evaluated to determine the adequacy of their placement. For observed activity outside of pre-nesting closures by pairs with known nesting history, buffers will be established when one observation or scraping or territorial has been documented or if a scrape is being maintained. For birds with unknown nesting history, such buffers will be</p>	<p><u>SM1</u>: If scraping is observed outside of existing closures, a 200 meter buffer will be established around the scrape locations. Closure establishment will be based on the locations of scrapes and not locations for copulation or "fish flashing".</p> <p>Consider using SM2 buffer and survey frequency at sites in which the smaller buffer would still allow access.</p> <p><u>SM2</u>: If scraping is observed outside a resource closures, a buffer will be established around the scrape location. Buffer will be 100 meters for least terns and 200 meters if the colony contains</p>

	<p>necessary to keep pet within 1 foot of keeper.</p>	<p>established when three such observations occur. Based on bird behavior and suitable habitat, a 200 meter buffer will be established around the bird activity.</p> <p><u>SM2</u>: For observed breeding activity outside of pre-nesting closures by pairs of <u>known</u> nesting history, closure will be installed when one observation of scraping or territorial behavior have been documented or if a scrape is being maintained. For observed breeding activity outside of pre-nesting closure by pairs of <u>unknown</u> nesting history, closure will be installed when three separate observations of scraping or territorial behavior have been documented or if a scrape is being maintained. Based on bird behavior and suitable habitat, a 150 meter pedestrian/ORV buffer or a 75 meter buffer ORV pass-through buffer will be established around the bird activity.</p> <p>Designate an ORV or pedestrian access corridor as identified. In the case of ORV pass-through corridor, pets restricted to</p>	<p>common terns, gull-billed terns or black skimmers. For an ORV pass-through, buffer will be 50-75 meters for LETE and 75 meters if other CWB are present.</p> <p>If, in the judgment of NPS Resources Management staff, a colony has abandoned a territory and established a new territory at another location, the buffer may be removed at the abandoned territory.</p> <p>Designate an ORV or pedestrian access corridor as identified. In the case of ORV pass-through corridor, pets restricted to vehicle while vehicle is in corridor. In the case of pedestrian use of corridor, pets must be on leash no longer than that necessary to keep pet within 1 foot of keeper.</p>
--	---	--	---

		<p>vehicle while vehicle is in corridor. In the case of pedestrian use of corridor, pets must be on leash no longer than that necessary to keep pet within 1 foot of keeper.</p>	
<p>Nesting Surveys:</p>	<p>Observe nests daily from a distance that does not disturb the birds, based on professional judgment. Approach nests once per week to observe and record data.</p>	<p><u>SM1:</u> Observe nests at least three times per week from a distance. For incubating birds that cannot be observed from a distance, check nests on a weekly basis (or as staff is available). <u>SM2:</u> Observe nests daily from a distance that does not disturb the birds, based on professional judgment. For incubating birds that cannot be observed from a distance, check nests every three days.</p>	<p>Colonies will be surveyed by foot during the “peak” nesting period which is during the last week of May and the first week of June. <u>SM1:</u> Observe colonies at least three times per week from a distance. For incubating birds that cannot be observed from a distance, check colonies on a weekly basis. <u>SM2:</u> Observe nests daily from a distance that does not disturb the birds, based on professional judgment. For incubating birds that cannot be observed from a distance, check colonies every three days.</p>
<p>Nesting Buffers:</p>	<p><u>All Species:</u> The park retains the discretion to expand buffers under SM1 and SM2 depending on staffing and bird behavior. In unprotected areas, a closure will be established immediately when a nest with egg(s) is found. When nesting occurs in the immediate vicinity of paved roads, parking lots, campgrounds, building and other facilities, NPS retains the discretion to provide resource protection to the maximum extent possible while still allowing those sites to remain operational. Buffers will remain in place for 2 weeks after a nest is lost to determine if pair will re-nest, if no other species nesting in area. After August 1, closures will be removed if all nesting is complete.</p>		

	<p><u>SM1 & SM2</u>: Establish 50 m buffer/closure around piping plover nests occurring outside existing closures. If flushing off nest occurs due to human disturbance, buffer will be increased using flexible increments dependent on observed bird behavior. If the buffer falls within the intertidal zone a full-beach closure will result.</p> <p>Designate an ORV or pedestrian access corridor as identified. Pets restricted.</p>	<p>Establish buffer/closure based on adult's reaction to human disturbance.</p> <p><u>SM1</u>: Buffer will be the same as four courtship and mating – 200 meters.</p> <p><u>SM2</u>: Buffer around nests will be a minimum of 150 m for pedestrians/ORVs; or 75 m for an ORV pass-through. If flushing off nests occurs due to pedestrian disturbance, pass-through will be limited only to ORV. If flushing off nests occurs due to ORV activity, buffer will not be increased.</p>	<p><u>SM1</u>: Use buffer of 200 m. Consider using SM2 buffer and survey frequency at sites in which the smaller buffer would still allow access.</p> <p><u>SM2</u>: Use buffer of 100 m for least terns and 200 m if the colony contains common terns, gull-billed terns or black skimmers; or for an ORV pass-through, a minimum of 50-75 meters for LETE and 75 meters if other CWB present. If flushing off nest(s) occurs due to pedestrian disturbance, pass-through will be limited only to ORV.</p> <p><u>All</u>: Establish buffer immediately when a nest is located. Increase buffer in flexible increments if necessary to prevent human disturbance. If the buffer falls within the intertidal zone a full-beach closure will result. Closures will be removed when areas have been abandoned for a two week period. After July 15 the 2-week removal period will no longer be required for closure removal.</p>
--	---	--	---

<p>Adult Foraging Surveys & Buffer:</p>	<p>For breeding adults (with an associated scrape or nest territory) foraging outside of a closure on two consecutive surveys, establish or expand the buffer using flexible increments based on observed bird behavior to include foraging site if the foraging area is associated with a pre-nesting closure. These closures are intended to provide foraging opportunities close to breeding sites. Remove closure if no foraging observed for a 2-week period during the breeding season, or when associated breeding activity has concluded.</p>	<p>No additional buffers/closures.</p>	<p>No additional buffers/closures.</p>
<p>Unfledged Chicks Surveys:</p>	<p><u>SM1</u>: Observe brood once daily. <u>SM2</u>: Observe brood am and pm daily. Have monitor(s) present during periods of ORV or pedestrian access. Observations end once chicks have fledged. Chicks are considered fledged at 35 days or are observed in sustained flight of >15 m.</p>	<p><u>SM1</u>: Observe brood at a minimum every other day. <u>SM2</u>: Observe brood once daily. Observations end once the chicks have fledged. Chicks are considered fledged if they have been observed to be proficient in flying or observed in sustained flight of >30 m.</p>	<p>Colonies will be surveyed by foot during the “peak” hatching period which should fall 21 days after initial nest counts. A follow-up survey by foot should be conducted during the “peak” fledge which should fall 20 days after hatch counts. <u>SM1</u>: Observe colony weekly. <u>SM2</u>: Observe colony at two-three day intervals; or daily if shoreline is open to ORV use. Observations end after no unfledged chicks have been observed on two consecutive occasions. Closure can be removed after all chicks have fledged.</p>

<p>Unfledged Chick Buffers:</p>	<p><u>SM1:</u> Establish a minimum 1000 meter buffer on either side of brood based on observation of bird behavior and terrain conditions at site. No ORV or pedestrian access until all chicks have fledged.</p> <p><u>SM2:</u> For the first 2 weeks after hatching, establish a 1000 m buffer for ORVs and pedestrians on either side of the brood.</p> <p>Based on observed behavior (i.e., mobility of the brood) at the discretion of park management, the buffer can be reduced after the first two weeks to 500 m for ORVs and 200 m for pedestrians. It will be up to the discretion of the park whether or not the area can be opened to pedestrians. If the chicks are highly mobile the 1000 meter buffer may need to be maintained. Buffer moves with chicks. Vehicle may be allowed to pass through portions of the protected area that are considered inaccessible to PIPL chicks because of steep topography, dense vegetation, or other naturally occurring obstacles. Points and spits would only be accessible from 7 a.m. to 7 p.m. as long as unfledged chicks are in the area and if buffers can be maintained. The 7 a.m. opening may</p>	<p><u>SM1:</u> Establish a 300 meter buffer when unfledged chicks are present. Closure would be removed 2 weeks after fledging. Consider using SM2 buffer and survey frequency at sites in which the smaller buffer would still allow access.</p> <p><u>SM2:</u> Establish a 200 meter buffer around the unfledged chick(s) location. Adjust/increase buffer as needed when chicks are mobile. ORV access would not be allowed until 2 weeks after AMOY chicks have fledged (observed flight of 30 meters); a pedestrian corridor may be established prior to 2 week requirement for access to the points and spits.</p> <p>Points and spits would only be accessible 7 a.m. – 7 p.m. as long as unfledged chicks are in the area and if buffers can be maintained. The 7 a.m. opening may be delayed until the chicks have been located.</p>	<p><u>SM1:</u> Use 200 m buffer. If chicks move outside of the buffer, it will be adjusted to include an additional 100 meters from the chick(s) location outside of the closure. Consider using SM2 buffer and survey frequency at sites in which the smaller buffer would still allow access.</p> <p><u>SM2:</u> Establish a 200 meter buffer around the chick(s) location. Adjust buffer as needed when chicks are mobile. Monitor daily if shoreline in front of colony open to ORV use.</p>
--	--	---	--

	<p>be delayed until the chicks have been located.</p>		
	<p>Reopen access corridor outside of pre-nesting area after chicks fledge (except for AMOYs where the area will remain closed to ORVs for an additional 2 weeks). During breeding season, pets are prohibited in pass-through corridors or at the points and spits. Remove pre-nesting closure 2 weeks after all chicks in the area have fledged.</p>		
<p>Non-breeding / Wintering Survey</p>	<p>NPS will monitor presence, abundance and behavior of migrating and wintering PIPL, AMOY, WIPL, and REKN at the points and spits July 1 through May 31 following the existing NPS winter monitoring protocol. In addition, the International Shorebird Survey (ISS) protocol will be used to document other migrating/wintering species.</p>		
<p>Non-breeding / Wintering Buffers</p>	<p>Annual habitat assessment will be conducted after all birds have fledged from the area. Winter closures will be based on habitat used by wintering PIPLs in the past 3 years, the presence of birds at the beginning of the migratory season, and the suitable habitat types based on the results of the annual survey. All winter closures will be installed no later than September 15th. Actual locations of suitable foraging and resting habitat may change periodically due to natural processes. Access will be maintained to inlet shoreline via the ocean shoreline. (Exact terminus and configuration of access corridor TBD by NPS resource management staff based on an annual habitat assessment).</p>	<p>No closures.</p>	<p>No closures.</p>
<p>Data Collected</p>	<p>GPS will be used to document nest locations.</p>	<p>GPS will be used to document nest locations.</p>	<p>GPS will be used to document colony locations.</p>

	<p>Record locations where territorial/courtship behavior occurs, including scrape locations. Estimate where adult and chick foraging occurs. Chicks should never be disturbed to obtain this information.</p>	<p>Record presence and abundance of birds. Assess productivity and known reasons for nest failure.</p>	<p>Record presence and abundance of birds.</p>
<p>Sea Turtles (a minimum of 7 field personnel is required to meet the daily monitoring requirements on the Park's 67 miles of shoreline)</p>			
<p>Survey Time and Frequency</p>	<p>Sea turtle patrol will begin on May 1. Patrol will continue until September 15, or two weeks after the last sea turtle nest or crawl is found, whichever is later. Conduct daily morning surveys by ATV/UTVs and possibly ORVs for crawls and nests on all beaches before onset of heavy public ORV use. Daily surveys for nests end September 15, or two weeks after the last sea turtle nest or crawl was found, whichever is later. Periodic monitoring (e.g., every two to three days) for unknown nesting and emerging hatchlings will continue, especially in areas of high visitation from that date until November 15. Monitoring will also occur for post-hatchling washbacks during periods when there are large quantities of seaweed washed ashore or following severe storm events. Nest observations stop when all nests have hatched or excavation indicates that the nest was not viable. Once a light filter fence is installed, monitor nests daily for signs of hatchling emergence.</p>		
<p>Data Collected</p>	<p>Follow the North Carolina Wildlife Resources Commission Handbook and record: -Turtle species -Nest vs. false crawl -nests lost to storms, overwash, predators, etc. -Location (physical description and GPS location) -management category (ORV, Non-ORV, Resource Area, other Resource Closures, Villages) -If nest needs to be relocated and, if so, why and where (new physical description and GPS location), number of eggs relocated, and time of day</p>		

	<p>-Necessary protective measures for nest and hatchlings</p> <p>-Information regarding any post hatching nest excavation and analysis</p> <p>Examine all nests after hatching to determine productivity rates. Excavate nests in the evening a minimum of 72 hours after hatching event. In cases where hatching events or dates were unknown, unearth nest cavities 80–90 days after the lay date. Any live hatchlings found during excavations will be released after dark on the same day as excavation.</p> <p>For strandings the following will be recorded: species, location, measurements, and signs of human interactions. Samples and photos will be collected when necessary. Necropsies will be conducted when possible.</p>
<p>Nest Closures/ Buffers</p>	<p>Establish a buffer approximately 10 meters square with symbolic fencing and signage around nest. Closure size may be modified due to environmental conditions at the nest site.</p> <p>Approximately 50– 55 days into incubation, closures expanded to the surf line. The width of the closure based on the type and level of use in the area of the beach where the nest was laid:</p> <ol style="list-style-type: none"> a. Vehicle-free areas with little or no pedestrian traffic – 25 meters wide (total width); b. Villages or other areas with high levels of day use –50 meters wide (total width); c. Areas with ORV traffic –105 meters wide (total width). <p>Opposite the surf line on the landward side of the closure, expand the closed area to 15 meters where possible, but no less than 10 meters landward from the nest. Traffic detours behind the nest area clearly marked with signs and reflective arrows.</p> <p>Where present within closure, vehicle tracks manually smoothed with rakes or a steel mat attached to an ATV, so as not to impede hatchlings attempting to reach the surf.</p> <p>Use light filtering fence no more than 5 meters behind nests nearing hatch dates to block light pollution from the villages and vehicles operating on the beach after dark.</p> <p>If multiple nests are located near each other (within 150 feet), and have similar hatch dates (14 days), then closures will encompass all nests in the area, and will not be removed until all nests within the closure have hatched.</p>
<p>Nest Relocation</p>	<p>By April 15th, areas deemed unsuitable for turtle nests (i.e. high erosion rate) will be identified by Park staff. Maps and descriptions of these areas will be analyzed by NCWRC prior to nesting season.</p> <p>When a nest is found, staff assesses need for nest relocation and follows relocation guidance identified in the NCWRC handbook.</p> <p>If it is determined the nest will not be relocated, it will be immediately protected with a symbolic fencing and signs and will measure approximately 10 meters by 10 meters in size. Closure size may vary at the discretion of staff due to the</p>

	<p>environmental factors at a nest location.</p> <p>If a nest is threatened by an imminent storm event, NPS will consult with NCWRC to determine appropriate action.</p>
Light Management	<p>Establish turtle friendly lighting standards and/or reduce light for all Seashore (NPS) structures.</p> <p>Encourage concessioners to install turtle friendly lighting.</p> <p>Develop educational material to inform visitors about their impact on the success of sea turtle nests.</p>
Research	<p>Support research efforts looking at the sex ratios of sea turtles.</p> <p>Respond to sea turtle strandings in a timely manner, and report all information, pictures, and signs of human interaction to NCWRC.</p> <p>Necropsies of strandings will be done when possible.</p>
Seabach Amaranth	
Survey Time and Frequency	<p>August An annual survey of potential habitat will be conducted. Some bird closure areas may not be surveyed due to the potential to disturb nesting birds. Some areas may not be surveyed until just prior to re-opening an area to ORV traffic.</p> <p>July– September Before opening any species closure or identifying alternate ORV corridors, survey for seedlings/plants.</p> <p>End observations when all plants have died back.</p>
Data Collected	<p>Record location of all individual plants or plant clusters using a GPS and note if the plant is located in an area open or closed to recreational use.</p>
Buffers	<p>April 15 – November 30 If a plant/seedling is found outside of an existing closure, the Seashore will erect symbolic fencing with signage creating a 10 meter by 10 meter buffer around the plant. If plants are located next to each other, the area will be expanded to create one enclosure protecting several plants.</p> <p>If a SBA is found during the survey prior to reopening a bird closure to ORV and pedestrian use, the Seashore will protect the SBA as described above and reopen the areas of the bird closure where no plants exist.</p> <p>Areas reopened if no plants are present by September 1. Where plants occur, the closed areas will be reopened after the plants have died.</p>

Shorebird / Waterbird Buffer Summary

Species	Breeding Behavior/ Nest Buffer	ORV Pass-through	Unfledged Chicks
	SM1 / SM2	SM2 only	SM1 / SM2
Piping Plover	50 m / 50 m	50 m	1000 m / 200-1000 m
American Oystercatcher	200 m / 150 m	75 m	300 m / 200 m
Least Terns	200 m / 100 m	50-57 m	300 m / 200 m
Other Species CWB	200 m / 200 m	75 m	300 m / 200 m

EXHIBIT I

Vehicle Characteristics, Equipment and Operations

I. GENERAL

ENFORCEMENT: Such regulation shall be enforced by the NPS according to graduated law enforcement principles.

STAKEHOLDER INPUT: The Park shall establish and maintain a standing stakeholder advisory [FACA] committee with representatives from various sections/geographies of the Park representing diverse and balanced interests to provide input to the Park on, among other things, ORV-related issues via a standing ORV subcommittee.

ESSENTIAL VEHICLES: Essential vehicles are allowed in non-ORV areas, and within resource closures subject to guidelines in Essential Vehicles section of Appendix G of the U.S. Fish and Wildlife Service Piping Plover (*Charadrius melodus*), Atlantic Coast Population, Revised Recovery Plan (USFWS 1996a, as cited in the strategy/EA). To the extent practicable, emergency response vehicle operators will consult with trained resources management staff regarding protected species before driving into or through resource closures; however, prior consultation may not always be practical.

In the event of an emergency, the protection of human life takes precedence over all other management activities.

Essential vehicles will avoid driving within turtle nest closures.

COMMERCIAL FISHING: ORV operations by commercial fishermen will be addressed in the Commercial Fishing CFR (CFR 7.58) and any associated permits.

II. VEHICLE CHARACTERISTICS

PURPOSE: Manage and regulate the type of vehicle allowed to drive on CAHA beaches.

SCOPE: Applied for all driving on all routes, trails, and areas designated for ORV driving.

VEHICLE CHARACTERISTICS: All vehicles must exhibit the following characteristics to drive on the Park's beaches. Drivers are responsible for ensuring their vehicles meet these characteristics.

1. All vehicles must be registered, licensed, and insured and comply with inspection regulations within the state, country or province where the vehicle is registered.
2. Four-wheel drive vehicles are allowed.
3. Motorcycles are allowed.
4. Two wheel drive vehicles are allowed after the operator obtains a special use permit.
5. All-Terrain Vehicles (ATVs) are prohibited. ATVs are defined as a type of off-highway

EXHIBIT I

vehicle that travels on three or more low-pressure tires; has handle-bar steering; is less than or equal to 50 inches in width; and has a seat designed to be straddled by the Operator.

6. The Park Superintendent will determine the acceptability of new or state of the art vehicles (those that are not listed in items 2-5) for driving on CAHA as needed, with input from the standing advisory group and/or state law.
7. There is a three axle maximum for vehicles (this is the axle maximum for the powered vehicle only and does not include the additional number of axles on towed trailers).
8. Any trailers are limited to no more than two axles.
9. The maximum vehicle length is thirty (30') feet (this is the maximum length for the powered vehicle and does not include the additional length of a towed trailer).
10. Tires must be U.S. Department of Transportation listed and/or approved tires only.

III. REQUIRED AND RECOMMENDED EQUIPMENT

PURPOSE: To identify special equipment required and recommended to safely operate a vehicle on the beach

REQUIRED EQUIPMENT: All vehicles operated on the beach shall contain the following required equipment.

1. A low-pressure tire gauge effective down to 5 psi.
2. A shovel
3. A jack
4. A jack support
5. Trash bag or container
6. A flashlight
7. Copy of the current NPS ORV regulations and map.

HIGHLY RECOMMENDED EQUIPMENT: The following equipment is recommended but not required.

1. A full size spare tire
2. First aid kit
3. Fire extinguisher
4. Tow strap with loop ends, no hooks, with a rating capacity at or above the GVW of item being recovered or moved unless vehicle is equipped with an operable electric or hand winch

IV. VEHICLE OPERATIONS

PURPOSE: Ensuring the safety of all public users of the Park and protection of Park resources.

SCOPE: Applied for all driving on all routes, trails, and areas designated for ORV driving.

EXHIBIT I

DRIVER'S LICENSE: All drivers must carry a valid driver's license.

SPEED LIMITS: The speed limit on CAHA beaches is 15 mph year-round, unless otherwise posted.

TIRE PRESSURE: When driving on designated routes, tire pressure must be lowered sufficiently to maintain adequate traction within the posted speed limit. Twenty (20) psi is recommended for most vehicles. The softer the sand, the lower the pressure needed. When you return to paved roads, inflate the tires to normal as soon as possible.

RIGHT OF WAY: Right of way shall be as follows:

1. A vehicle exiting the beach via a Ramp or Interdunal Road has the right of way until reaching state-regulated roads.
2. When traveling parallel to the ocean or sound, the vehicle with the water to its right side has the right of way.
3. Vehicles must yield to pedestrians at all times, including on beaches and ramps.

SELF-CONTAINED VEHICLE CAMPING: Self contained vehicle camping is allowed in CAHA and will be managed under a special use permit system. The special use permit will be an addition to any other broad beach access permit or pass system required.

The special use permit will include a fee whose price will be determined under NPS rules, regulations, and policies regarding a value of service determination.

Self-contained vehicle camping is limited to designated areas in the beach environment only. At all designated times there will be at least one designated area on each of the three islands (Bodie, Hatteras & Ocracoke) contained within CAHA. These areas include Oregon Inlet Campground, Cape Point Campground, and Ocracoke Campground.

For the purpose of this CAHA-specific regulation, a self-contained vehicle camper is defined as follows:

- Self-contained vehicle campers must meet the ORV characteristics and requirements.
- Self-contained vehicles must be 4WD only. 2WD campers are prohibited.
- Self-contained vehicles are limited to a maximum length of thirty feet (30') including front racks and rear decks.
- Self-contained vehicles must have a self-contained water or chemical toilet and a separate permanently installed holding tank for both black and grey water, each with a minimum capacity of 3 days waste.
- Tents and camping trailers are prohibited.

There will be no limit to the total number of available self-contained vehicle permits.

EXHIBIT I

The number of self-contained vehicle campers allowed to camp in CAHA at any one time will be limited by the space available in the designated self-contained vehicle camping areas. The camping space limits are as follows:

- Oregon Inlet Campground: not more than 100 spaces
- Cape Point Campground: not more than 100 spaces
- Ocracoke Campground: not more than 50 spaces

Other than the parking space for self-contained vehicles, the NPS will provide no additional services other than garbage and septage dumping services. The experience is intended to be a primitive, beach camping experience within appropriate self-contained vehicles. When possible, the only access to the camping will be via a four-wheel drive only path or road (i.e., access to Cape Point Campground only via the interdunal road).

Self-contained camping will be allowed from November 1 until March 31.

Self-contained camping permits will be offered either weekly or annually.

There will be a self-contained camping limit of no more than seven consecutive days/six nights) in any one visit.

There will be a self-contained camping limit of no more than one visit per month.

All self-contained beach camping spaces are available on a first-come, first-served basis.

All self-contained vehicles arriving for an overnight stay must check in/register via a system to be determined before entering the self-contained camping area. An overnight authorization must be displayed at all times the vehicle is in the designated self-contained camping area.

Self-contained vehicles **MUST** exit the self-contained camping area after no longer than 72 consecutive hours in order to empty holding tanks and gray water at an established septage dumping facility.

Any permittee who violates the terms and conditions of the self-contained vehicle (SCV) permit is subject to being cited for the violation, will have his/her SCV permit revoked, and may be denied from obtaining any ORV related permit at CAHA for a period of at least one year.

Generally, the NPS will work to discourage illegal camping on any and all NPS properties via signage, education, information, and/or other appropriate and effective means

OTHER RELEVANT REGULATIONS: Other pertinent and relevant federal or state regulations include:

- Camping is only allowed at designated areas. (36 CFR 2.10)
- Obstructing traffic on park roads is prohibited. (36 CFR 4.13)
- Driving under the influence of alcohol or drugs is prohibited. (36 CFR

EXHIBIT I

- 4.23)
- All drivers and passengers are required to wear seatbelts. (36 CFR 4.15)
- A valid state driver's license is required for all operators of motor vehicles on park roads. (36 CFR 4.2)
- Operating a motor vehicle without due care or at a speed greater than which is reasonable and prudent considering wildlife, traffic, weather, road and light conditions and road character is prohibited. (36 CFR 4.22)
- Operators of motor vehicles involved in accidents resulting in property damage, personal injury, or death shall immediately report the accident to park rangers. (36 CFR 4.4)
- The operators of authorized emergency vehicles, when responding to an emergency or when pursuing or apprehending an actual or suspected violator of the law may disregard traffic control divides, exceed the speed limit, and obstruct traffic. (36 CFR 4.3)

**Addendum to the Final Report of the Proceedings of the Negotiated Rulemaking Advisory
Committee for Off-Road Vehicle Management at Cape Hatteras National Seashore**

March 27, 2009

Prepared and submitted by:

Walker Golder, Audubon North Carolina

Sidney Maddock, National Audubon Society

Jason Rylander, Defenders of Wildlife

Derb Carter, Southern Environmental Law Center

Destry Jarvis, Natural Resources Defense Council and The Wilderness Society

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

Cape Hatteras National Seashore is one of seven National Seashores on the Atlantic coast. Approximately 67 linear miles of barrier islands and associated habitats within the Seashore represent approximately 21 % of the entire barrier island coastline of North Carolina. The Seashore is a critical link in the migratory pathway of 22 species of shorebirds and 15 species of waterbirds; provides vital breeding habitat for 2 species of sea turtles and 8 species of water and shorebirds; provides habitat essential to sustaining wintering waterbird and shorebird populations; and supports--or supported--a once-thriving population of seabeach amaranth (*Amaranthus pumilis*), a federally-threatened plant species.

The Seashore is critical to state, regional, continental, and global populations of shorebirds and waterbirds. In 2004, the Seashore was recognized as a globally significant Important Bird Area by the American Bird Conservancy and the National Audubon Society for migrant and wintering shorebirds. It is recognized as continentally and state significant for nesting waterbirds and shorebirds. Audubon North Carolina considers Cape Hatteras National Seashore to be one of the most important sites for North Carolina's waterbirds and shorebirds, and is the most seriously threatened of North Carolina's 96 Important Bird Areas.

In a relatively short period of time, the Seashore has gone from one of the most important places for waterbirds and shorebirds to the most threatened. There have been significant and dramatic declines in breeding pairs of shorebirds and colonial waterbirds in the past 10 years, and even more significant declines if you look back 20 years. With the exception of Piping Plover, which has recently rebounded, the Seashore is presently experiencing the lowest number nesting waterbirds and shorebirds in the past 30 years, and it is probable that the present number of nesting waterbirds and shorebirds are all-time historic lows. The reasons for these declines are evident and can be categorized into three primary causes: human disturbance, predation, and habitat loss resulting from lack of adequate protection from vehicles and the associated anthropogenic disturbances.

Prior actions by the National Park Service regarding shorebird and waterbird protection within Cape Hatteras National Seashore have jeopardized breeding and non-breeding waterbirds and shorebirds, and other natural resources. These actions primarily concern inadequate protection measures to protect nesting waterbirds and shorebirds from human disturbances.

It is critically important that Cape Hatteras National Seashore implement an ORV regulation that protects shorebirds and waterbirds, and their habitats. It is also important for protection measures to be based on the current science and the biological needs of the species in question. The peer-reviewed scientific literature is clear and the recommendations developed by biologists who are among the leading experts in their respective fields are also clear. Furthermore, the guiding laws and policies are clear.

In addition to an inadequate protection plan for waterbirds and shorebirds the Seashore's present management of vehicular traffic jeopardizes the safety of people. In 2004, the five-year-old son of a Hatteras Island property owner was nearly killed by a reckless off-road vehicle operator while playing on the beach in front of his home. In the past seven years, several areas of beach that were historically closed to vehicles and managed as pedestrian only beaches, where people could enjoy the beach without tire ruts or fearing for their personal safety, have been opened to

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

vehicles. In addition, in 2007, areas of beach were opened and closed at will in an attempt to balance the amount of beach closed to vehicles for safety and resource protection with the amount of area opened to vehicles. The opening of beaches in front of residential developments jeopardizes public safety and one's ability to enjoy the beach in front of their residence or rental property.

ORV Management Plan

Presidential Executive Order 11644 (1972), amended by Executive Order 11989 (1977), requires certain federal agencies that permit off-road vehicle (ORV) use on federal lands to "develop and publish...regulations prescribing operating conditions for off-road vehicles on public lands. These regulations shall be directed at protecting resource values, preserving public health, safety, and welfare, and minimizing use conflicts." In a press release dated July 18, 2007 the National Park Service stated: "Despite previous efforts since the late 1970s, the National Park Service (NPS) has yet to develop an ORV management plan or regulation that would provide the necessary management and regulatory framework to manage ORV use at the Seashore."

ORV use within Cape Hatteras National Seashore is a serious threat to birds, sea turtles, other wildlife, plants, and plant communities, especially those species that depend on dune, beach, intertidal and associated habitats. The impacts of ORVs on barrier islands and wildlife are clear and well known, and have been documented in more than 200 scientific studies. The actions necessary to protect wildlife, plants, and the habitats they depend on are equally clear.

In order for wildlife to continue to exist on the Seashore's beaches, the species and the habitats they require to meet their energetic and reproductive needs during all life stages must be protected. The species are sensitive to off-road vehicle activity and the associated human disturbances and are presently jeopardized by ORV use and the associated human disturbances.

NPS Laws and Policies

NPS Management Policies 2006

The national park system was created to conserve unimpaired many of the world's most magnificent landscapes, places that enshrine our nation's enduring principles, and places that remind us of the tremendous sacrifices Americans have made on behalf of those principles. They are the most remarkable collection of places in America for recreation and learning. Visitors can immerse themselves in places where events actually happened and enjoy some of the most significant natural and historic places in America. These are places that offer renewal for the body, the spirit and the mind. As required by the 1916 Organic Act, these special places must be managed in a special way—a way that allows them to be enjoyed not just by those who are here today, but also by generations that follow. Enjoyment by present and future generations can be assured only if these special places are passed on to them in an unimpaired condition. And that is the challenge that faces all the employees of the National Park Service. It is a challenge eagerly embraced, but employees must have the tools required to perform the job successfully. The Management Policies contained in these pages represent one of the most important tools available. Through their judicious and consistent application, these

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

policies will set a firm foundation for stewardship that will continue to earn the trust and confidence of the American people.

Underlying Principles

The National Park Service adhered to a number of principles in preparing this 2006 edition of *Management Policies*. The key principles were that the policies must:

- comply with current laws, regulations and executive orders;
- prevent impairment of park resources and values;
- ensure that conservation will be predominant when there is a conflict between the protection of resources and their use;
- maintain NPS responsibility for making decisions and for exercising key authorities;
- emphasize consultation and cooperation with local/state/tribal/federal entities;
- support pursuit of the best contemporary business practices and sustainability;
- encourage consistency across the system —“one national park system”;
- reflect NPS goals and a commitment to cooperative conservation and civic engagement;
- employ a tone that leaves no room for misunderstanding the National Park Service’s commitment to the public’s appropriate use and enjoyment, including education and interpretation, of park resources, while preventing unacceptable impacts;
- pass on to future generations natural, cultural, and physical resources that meet desired conditions better than they do today, along with improved opportunities for enjoyment.

GENERAL AUTHORITIES & GUIDANCE

16 USC § 1 – NPS Organic Act

- “The service thus established shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified, except such as are under the jurisdiction of the Secretary of the Army, as provided by law, by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, **which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.**”

16 USC § 3. Rules and regulations of national parks...

- “[*The Secretary of the Interior*] may also provide in his discretion for the destruction of such animals and of such plant life as may be detrimental to the use of any said parks, monuments, or reservations.”

NPS Management Policies 2006

1.4.4 The Prohibition on Impairment of Park Resources and Values

While Congress has given the Service the management discretion to allow impacts within parks, that discretion is limited by the statutory requirement (generally enforceable by the federal courts) that the **Park Service must leave park resources and values unimpaired unless a particular law directly and specifically provides otherwise.** This, the cornerstone of the Organic Act, establishes the primary responsibility of the National Park Service. It ensures that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities for enjoyment of them.

The impairment of park resources and values may not be allowed by the Service unless directly and specifically provided for by legislation or by the proclamation establishing the park. The relevant legislation or proclamation must provide explicitly (not by implication or inference) for the activity, in terms that keep the Service from having the authority to manage the activity so as to avoid the impairment.

1.4.7.1 Unacceptable Impacts

The impact threshold at which impairment occurs is not always readily apparent. Therefore, **the Service will apply a standard that offers greater assurance that impairment will not occur. The Service will do this by avoiding impacts that it determines to be unacceptable.** These are impacts that fall short of impairment, but are still not acceptable within a particular park's environment. Park managers must not allow uses that would cause unacceptable impacts; they must evaluate existing or proposed uses and determine whether the associated impacts on park resources and values are acceptable.

1.5 Appropriate Use of the Parks

In its role as steward of park resources, the National Park Service must ensure that park uses that are allowed would not cause impairment of, or unacceptable impacts on, park resources and values. **When proposed park uses and the protection of park resources and values come into conflict, the protection of resources and values must be predominant.**

1.4.7.2 Improving Resource Conditions within the Parks

The Service will also strive to ensure that park resources and values are passed on to future generations in a condition that is as good as, or better than, the conditions that exist today. In particular, **the Service will strive to restore the integrity of park resources that have been damaged or compromised in the past.** Restoration activities will be guided by the natural and cultural resource-specific policies identified in chapters 4 and 5 of these *Management Policies*.

4.4.1 General Principles for Managing Biological Resources

The National Park Service will maintain as parts of the natural ecosystems of parks all plants and animals native to park ecosystems. The Service will successfully maintain native plants and animals by

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur;
- restoring native plant and animal populations in parks when they have been extirpated by past human-caused actions; and
- minimizing human impacts on native plants, animals, populations, communities, and ecosystems, and the processes that sustain them.

4.4.2 Management of Native Plants and Animals

Whenever possible, natural processes will be relied upon to maintain native plant and animal species and influence natural fluctuations in populations of these species. The Service may intervene to manage populations or individuals of native species only when such intervention will not cause unacceptable impacts to the populations of the species or to other components and processes of the ecosystems that support them. The second is that at least one of the following conditions exists:

- Management is necessary
 - because a population occurs in an unnaturally high or low concentration as a result of human influences (such as loss of seasonal habitat, the extirpation of predators, the creation of highly productive habitat through agriculture or urban landscapes) and it is not possible to mitigate the effects of the human influences;
 - to protect specific cultural resources of parks;
 - to accommodate intensive development in portions of parks appropriate for and dedicated to such development;
 - to protect rare, threatened, or endangered species;
 - to protect human health as advised by the U. S. Public Health Service (which includes the Centers for Disease Control and the NPS public health service program);
 - to protect property when it is not possible to change the pattern of human activities; or
 - to maintain human safety when it is not possible to change the pattern of human activities.

Or,

- Removal of individuals or parts thereof
 - is part of an NPS research project described in an approved management plan, or is part of research being conducted by others who have been issued a scientific research and collecting permit;
 - is done to provide plants or animals for restoring native populations in parks or cooperating areas without diminishing the viability of the park populations from which the individuals are taken; or
 - meets specific park management objectives.

4.4.2.1 NPS Actions That Remove Native Plants and Animals

Whenever the Service removes native plants or animals, manages plant or animal populations to reduce their sizes, or allows others to remove plants or animals for an authorized purpose, the Service will seek to ensure that such removals will not cause unacceptable impacts on native resources, natural processes, or other park resources. Whenever the Service identifies a possible need for reducing the size of a park plant or animal population, the Service will use scientifically valid resource information obtained through consultation with technical experts, literature review, inventory, monitoring, or research to evaluate the identified need for population management; the Service will document it in the appropriate park management plan.

In addition, the Service will manage such removals to prevent them from interfering broadly with

- natural habitats, natural abundances, and natural distributions of native species and natural processes
- rare, threatened, and endangered plant or animal species or their critical habitats
- scientific study, interpretation, environmental education, appreciation of wildlife, or other public benefits
- opportunities to restore depressed populations of native species
- breeding or spawning grounds of native species

Where the need to reduce animal populations may be due to persistent human/animal conflicts, the Service will determine whether or not it can eliminate or mitigate the conflicts by modifying or curtailing the conflicting visitor use or other human activities. Where visitor use or other human activities cannot be modified or curtailed, the Service may directly reduce the animal population by using several animal population management techniques, either separately or together. These techniques include relocation, public hunting on lands outside a park or where legislatively authorized within a park, habitat management, predator restoration, reproductive intervention, and destruction of animals by NPS personnel or their authorized agents. Where animal populations are reduced, destroyed animals may be left in natural areas of the park to decompose unless there are human safety concerns regarding attraction of potentially harmful scavengers to populated sites or trails or other human health and sanitary concerns associated with decomposition.

4.4.2.2 Restoration of Native Plant and Animal Species

The Service will strive to restore extirpated native plant and animal species to parks whenever all of the following criteria are met:

- Adequate habitat to support the species either exists or can reasonably be restored in the park and if necessary also on adjacent public lands and waters; once a natural population level is achieved, the population can be self-perpetuating.
- The species does not, based on an effective management plan, pose a serious threat to the safety of people in parks, park resources, or persons or property within or outside park boundaries.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- The genetic type used in restoration most nearly approximates the extirpated genetic type.
- The species disappeared or was substantially diminished as a direct or indirect result of human-induced change to the species population or to the ecosystem.
- Potential impacts upon park management and use have been carefully considered.

4.4.2.3 Management of Threatened or Endangered Plants and Animals

The Service will survey for, protect, and strive to recover all species native to national park system units that are listed under the Endangered Species Act. The Service will fully meet its obligations under the NPS Organic Act and the Endangered Species Act to both proactively conserve listed species and prevent detrimental effects on these species. To meet these obligations, the Service will

- cooperate with both the U. S. Fish and Wildlife Service and the NOAA Fisheries to ensure that NPS actions comply with both the written requirements and the spirit of the Endangered Species Act. This cooperation should include the full range of activities associated with the Endangered Species Act, including consultation, conferencing, informal discussions, and securing all necessary scientific and/or recovery permits;
- undertake active management programs to inventory, monitor, restore, and maintain listed species' habitats; control detrimental nonnative species; manage detrimental visitor access; and reestablish extirpated populations as necessary to maintain the species and the habitats upon which they depend;
- manage designated critical habitat, essential habitat, and recovery areas to maintain and enhance their value for the recovery of threatened and endangered species;
- cooperate with other agencies to ensure that the delineation of critical habitat, essential habitat, and/or recovery areas on park-managed lands provides needed conservation benefits to the total recovery efforts being conducted by all the participating agencies;
- participate in the recovery planning process, including the provision of members on recovery teams and recovery implementation teams where appropriate;
- cooperate with other agencies, states, and private entities to promote candidate conservation agreements aimed at precluding the need to list species; and
- conduct actions and allocate funding to address endangered, threatened, proposed, and candidate species.

The National Park Service will inventory, monitor, and manage state and locally listed species in a manner similar to its treatment of federally listed species to the greatest extent possible. In addition, the Service will inventory other native species that are of special management concern to parks (such as rare, declining, sensitive, or unique species and their habitats) and will manage them to maintain their natural distribution and abundance.

The Service will determine all management actions for the protection and perpetuation of federally, state, or locally listed species through the park management planning process, and will include consultation with lead federal and state agencies as appropriate.

4.4.4.2 Removal of Exotic Species Already Present

All exotic plant and animal species that are not maintained to meet an identified park purpose will be managed—up to and including eradication—if (1) control is prudent and feasible, and (2) the exotic species

- interferes with natural processes and the perpetuation of natural features, native species or natural habitats, or
- disrupts the genetic integrity of native species, or
- disrupts the accurate presentation of a cultural landscape, or
- damages cultural resources, or
- significantly hampers the management of park or adjacent lands, or
- poses a public health hazard as advised by the U. S. Public Health Service (which includes the Centers for Disease Control and the NPS public health program), or
- creates a hazard to public safety.

High priority will be given to managing exotic species that have, or potentially could have, a substantial impact on park resources, and that can reasonably be expected to be successfully controlled. Lower priority will be given to exotic species that have almost no impact on park resources or that probably cannot be successfully controlled. Where an exotic species cannot be successfully eliminated, managers will seek to contain the exotic species to prevent further spread or resource damage.

The decision to initiate management should be based on a determination that the species is exotic. For species determined to be exotic and where management appears to be feasible and effective, superintendents should (1) evaluate the species' current or potential impact on park resources; (2) develop and implement exotic species management plans according to established planning procedures; (3) consult, as appropriate, with federal, tribal, local, and state agencies as well as other interested groups; and (4) invite public review and comment, where appropriate. Programs to manage exotic species will be designed to avoid causing significant damage to native species, natural ecological communities, natural ecological processes, cultural resources, and human health and safety. Considerations and techniques regarding removal of exotic species are similar to those used for native species (see 4.4.2.1 NPS Actions That Remove Native Plants and Animals).

Natural Resource Management and Protection

In 2002, an estimated 2.25 million people visited Cape Hatteras National Seashore; 91,907 vehicles were driven on Cape Hatteras National Seashore beaches (Vogelsong 2003). The peak visitor use periods for the Seashore coincides with the peak nesting season for waterbirds, shorebirds, and sea turtles; peak migration period for Piping Plover and other shorebirds; and the germination, growth, flowering, and seed dispersal of seabeach amaranth (*Amaranthus pumilis*), a federally-threatened plant species.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

Nesting waterbirds and shorebirds, and migrating or wintering shorebirds, are very sensitive to human disturbances. Human disturbance is listed as one of the most significant threats to shorebirds and waterbirds in the applicable species and conservation plans including, but not limited to the following: (Atlantic Coast Piping Plover Recovery Plan, Recovery Plan For The Northwest Atlantic Loggerhead Sea Turtle, American Oystercatcher Conservation Plan, Red Knot Conservation Plan, US Shorebird Conservation Plan, North American Waterbird Conservation Plan, and numerous scientific studies).

Human disturbances have been shown to cause abandonment of nesting territories, abandonment of active nests, abandonment of entire nesting sites, increased nest failure, increased chick mortality, decreased foraging efficiency in shorebirds, decreased foraging duration by shorebirds, alteration of resting and roosting behaviors, and local population declines. Shorebirds have been found to be especially sensitive to vehicles and disturbances.

Natural resource protection, management, or conservation plans or strategies for Cape Hatteras National Seashore must adequately provide for the protection of shorebirds and waterbirds (breeding and non-breeding), and their habitats, from off-road vehicles and human disturbances. Nesting habitat and sites for sea turtles and habitat for seabeach amaranth must also be protected. Failure to provide adequate protection for breeding, migrating and wintering birds, nesting sea turtles, seabeach amaranth, and other native plants and plant communities will result in impairment of these species. Habitats these species depend on for survival at critical points in their life cycles are also impacted by vehicles.

In 2005, at the request of Cape Hatteras National Seashore, biologists with the US Geological Survey, Patuxent Wildlife Research Center, developed management and protection protocols (hereafter “protocols”) for Piping Plover, American Oystercatcher, colonial waterbirds, sea turtles, and seabeach amaranth at Cape Hatteras National Seashore. The authors of the protocols are among the leading experts in their respective fields. These documents outlined three options for protection:

- Option A: Highest level of Protection
- Option B: Moderate Protection
- Option C: Minimum Protection

The protocols present the state of the resource in the Seashore, state of present resource management or protection measures implemented by the Seashore, and the predicted effects of implementing each option. The protocols also provide guidelines for surveys and monitoring, data collection, data management, adaptive resource management, and education and outreach.

The result of the past natural resource protection measures implemented by the Seashore has been low productivity of beach-nesting birds, numbers of beach-nesting waterbirds and shorebirds at or near all-time lows, direct human caused mortality of chicks, and abandonment of nests and nesting sites due to inadequate management and protection. The result of Alternative E as presented by National Park Service in November 2008 and the Interim Plan will have similar results.

Waterbird and Shorebird Populations

Eight species of waterbirds and shorebirds presently nest or have previously nested on Cape Hatteras National Seashore beaches, dunes, overwash fans, and other early succession barrier island habitats. All are state or federally listed as species of conservation concern. These include:

Nesting waterbird and shorebird species at Cape Hatteras National Seashore

Shorebirds	Conservation Status
Piping Plover	Federally Threatened NC Threatened USSCP: Highly Imperiled SERR-USSCP: Extremely High Priority Species
American Oystercatcher	NC Species of Special Concern USSCP: Species of High Concern SERR-USSCP: Extremely High Priority Species
Wilson’s Plover	NC Species of Special Concern USSCP: Species of High Concern SERR-USSCP: High Priority Species
Least Tern	NC Species of Special Concern NAWCP: Species of High Concern SEWCP: Continental Conservation Interest-Management Attention
Common Tern	NC Species of Special Concern NAWCP: Species of Low Concern SEWCP: Regional Conservation Interest-Management Attention
Gull-billed Tern	NC Threatened NAWCP: Species of High Concern SEWCP: Continental Conservation Interest-Management Attention
Black Skimmer	NC Species of Special Concern NAWCP: Species of High Concern SEWCP: Continental Conservation Interest-Management Attention

USSCP=US Shorebird Conservation Plan

SERR-USSCP=Southeastern Coastal Plain Regional Report-US Shorebird Conservation Plan

NAWCP=North American Waterbird Conservation Plan

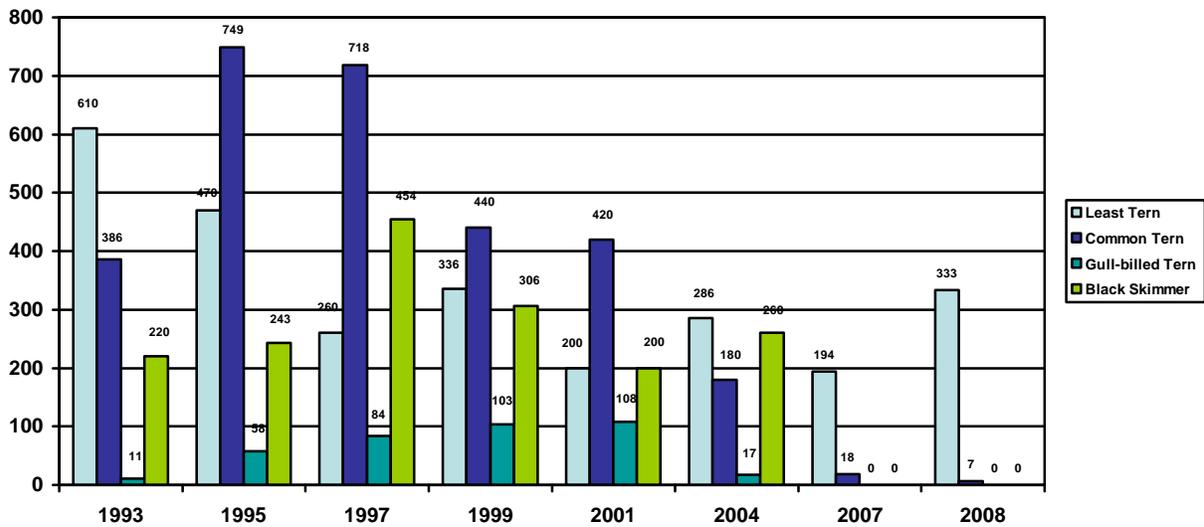
SEWCP=Southeastern US Waterbird Conservation Plan

- Continental Conservation Interest (on the Continental WatchList): (a) Species with multiple causes for concern across their entire range; (b) Moderately abundant or widespread species with declines or high threats, and (c) Species with restricted distributions or low population size.
- Regional Conservation Interest (non-WatchList; but Total Score \geq 19): (a) high regional concern (AI+PT \geq 8); (b) high regional threats (TB+TN \geq 7, or TB or TN=5), (d) taxa – subspecies and populations – of regional conservation interest

- not otherwise included in categories above; (c) high regional responsibility as measured by percent of global, continental, or regional populations.
- Management Attention = Management or other on-the-ground conservation Actions needed to reverse or stabilize significant, long-term population declines in species that are still relatively abundant.

Overall, the numbers of breeding pairs of waterbirds that nest on the Seashore’s beaches have declined significantly over the past 10 years; two species have been extirpated (Table 1). Without the long-term implementation of adequate, science-based protection measures, the potential for loss of the majority of waterbirds within the Seashore due to single catastrophic event (predator, human disturbance or vandalism) is high. The Seashore’s proposed approach to management of this natural resource is inconsistent with the most basic principles of management of colonial waterbirds.

Table 1. Waterbird nests at Cape Hatteras National Seashore from 1993 to 2008.

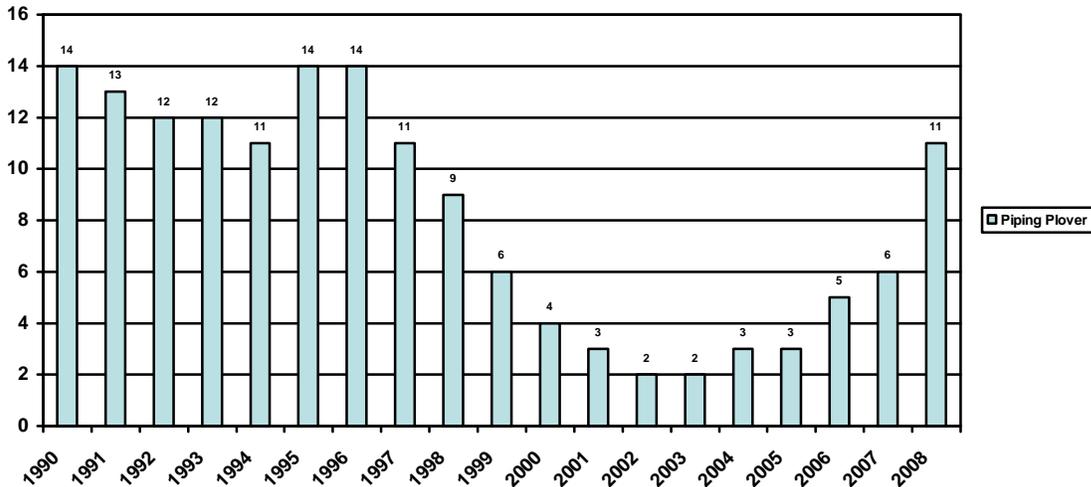


Nesting shorebirds within the Seashore, specifically Piping Plover (Table 4) and American Oystercatcher (Table 5), have also experienced population declines in the past decade. Data regarding nesting by other shorebird species, specifically Wilson’s Plover and Willet, are insufficient to assess population trends. Historically, Wilson’s Plover in North Carolina was “one of the most common and widely distributed beach-nesting birds” (Pearson et al. 1919). While a Wilson’s Plover pair was seen on Ocracoke in 2008, no nests or chicks were seen, leading to a concern that this species, as a breeding population, has been extirpated from the Seashore.

The present increasing trend in breeding pairs of Piping Plovers is encouraging. However, the number of breeding pairs of Piping Plovers within the Seashore still remains lower than a decade

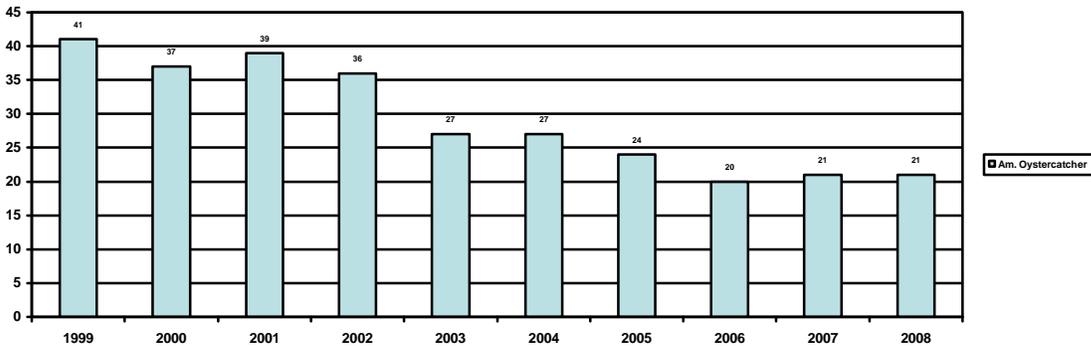
ago when 14 breeding pairs were documented at the Seashore. Moreover, even the high of 14 pairs is well below the estimated capacity of 30 breeding pairs (USFWS 1996). Adequate, science-based protection measures during all life stages, following the recommendation of experts and the Atlantic Piping Plover Recovery Plan, is essential to recovery of this Federally-threatened species.

Table 4. Piping Plover nesting pairs at Cape Hatteras National Seashore 1990-2008.



The trends in American Oystercatchers breeding at Cape Hatteras National Seashore from 1999 to 2007 show that the species has steadily declined during the period (Table 5). Data prior to 1999 is incomplete for this species.

Table 5. American Oystercatchers nesting pairs at Cape Hatteras National Seashore 1999-2008.



Human Disturbance, Off-road Vehicles, and other Disturbances

Human disturbance has been defined as “any activity that changes the contemporaneous behavior or physiology of one or more individuals” (Nisbet 2000). The definition was proposed for waterbirds, but it is applicable to breeding and non-breeding shorebirds as well.

There is a wealth of knowledge about waterbirds and shorebirds and their responses to human disturbance. These are outlined in numerous publications. National, regional, and state conservation plans list human disturbance as a significant threat to waterbirds and shorebirds (Brown et al. 2001, Hunter et al. 2006, Hunter et al. 2000, Hunter et al. 2002, Kress and Hall 2000, Kushlan et al. 2002, Parnell and Shields 1990, Schulte et al. 2006, USFWS 1996). Research published in peer-reviewed scientific literature also list human disturbance as a significant threat to nesting waterbirds and shorebirds, and as a contributing factor to decreased productivity (Burger 1981, Burger 1994, Burger 1995, Burger and Gochfeld 1991, Burger et al. 1995, Carney and Sydeman 1999, Erwin 1980, Erwin 1989, Flemming et al. 1988, Laferty et al. 2006, McGowan and Simons 2006, Melvin et al. 1994, Nisbet 2000, Parnell et al. 1998, Rodgers and Smith 1995, Safina and Burger 1983, Sabine et al. 2005, Sabine et al. 2006, among many others). Furthermore, species accounts in *The Birds of North America* series of publications identify human disturbance as a key threat to terns, Black Skimmers and shorebirds (Nol and Humphrey 1994, Thompson et al. 1997, Gochfeld and Burger 1994, Nisbet 2002, Parnell et al. 1995, Haig and Elliot-Smith 2004, Corbat and Bergstrom 2000). The management recommendations developed specifically for the National Park Service and Cape Hatteras National Seashore also list human disturbance as a significant threat (Buckley and Buckley 1976, Erwin 2005, Meyers 2005, and Cohen 2005).

Human disturbance can result in egg loss, chick mortality, nest abandonment, nesting site or colony abandonment, premature fledging or nest evacuation, slow growth or reduced body mass of nestlings, behavior alterations, overall lowered reproductive success, prevention of access by shorebird chicks to foraging habitat, and reduced foraging efficiency. It is especially damaging during the breeding season. Disturbance at the time when nesting birds begin courtship, territory establishment, and nest building can lead to the abandonment of otherwise suitable nesting habitat. It can lead to the abandonment of individual nests or the abandonment of entire colonies in the case of waterbirds. Disturbance during incubation frequently causes an incubating or brooding adult to leave its nest or chicks, which exposes eggs or chicks to environmental conditions such as heat, cold, rain, and blowing sand, all of which can kill embryos developing within eggs and kill chicks. Disturbance also exposes eggs and chicks to avian predators such as gulls and crows; mammalian predators such as raccoon, fox, or mink; or ghost crabs. Disturbance can also cause adults to become separated from chicks, which increases a chick's vulnerability to predators and temperature stress, such as occurred in 2006 and resulted in the death of two American Oystercatcher chicks near Hatteras Inlet.

With an estimated 2.25 million visitors annually to Cape Hatteras National Seashore and an estimated 91,907 vehicles using Seashore beaches annually (Vogelsong 2003), waterbirds, shorebirds, and their habitats must be protected from all sources of human disturbance if they are to have a chance at survival and successful nesting. From early May to mid August 2007, there were 477 violations of bird closures at the Seashore (Table 8). The majority were pedestrian violations (360), followed by ORVs (47), dogs (44), and other (26).

Table 8. Violations of bird closures at the Seashore from early May to mid August 2007.

	ORV	Pedestrian	Dog	Other
Bodie Island	10	81	18	11
Hatteras Island	20	218	14	9

Ocraocke Island	17	61	12	6
Total	47	360	44	26

While these violations are not all by ORVs, some may be indirectly tied to ORV use, such as people who drive to remote locations and walk into closures or let their dog off the leash. As the U.S. Fish and Wildlife Service has noted, “vehicles extend impacts to remote stretches of beach where human disturbance would be very slight if access were limited to pedestrians” (USFWS 1996).

Erwin (1989) in a study conducted on North Carolina and Virginia beaches recommended that all waterbird nesting sites should be posted prior to the arrival of nesting birds. For North Carolina, the North Carolina Wildlife Resources Commission recommends that all waterbird nesting sites should be posted on or before April 1st. Shorebirds may initiate nesting prior to April 1st, therefore the North Carolina Wildlife resources Commission recommends that Piping Plover, American Oystercatcher, and Wilson’s Plover nesting sites be posted by March 15th.

Several studies have addressed the reaction of nesting birds to human disturbances and provide recommended minimum setback distances (Table 9). These recommended setback distances are the minimum distances at which recreation activity (including people and vehicles) should be kept from incubating birds and adults with chicks.

Table 9. Setback (buffer) distances for placement of symbolic fencing from waterbird and shorebird nests.

Species	Minimum Setback
Common Tern	200m (Erwin 1989, Rodgers and Smith 1995)
Least Tern	100m (Erwin 1989)
Black Skimmer	200m (Erwin 1989, Rodgers and Smith 1995)
Piping Plover	50m ¹ (USFWS 1996); 200m (Loegering 1992, Avery et al. 2004)
American Oystercatcher	150 m during incubation (Sabine et al. 2005)
Additional recommendations:	1. increase setback distances 100m early in the nesting cycle (during courtship, nest building, territory establishment) due to heightened sensitivity of terns and skimmers to disturbances during this period (Erwin 1989)
	2. increase setback distances an additional 100m in areas where dogs are permitted (Hunter et al. 2006)
	3. For nesting Piping Plovers, increase buffer zones from 50m to 100m any place that disturbance of plovers by recreation is observed, then increase to 200m if disturbance persists (Cohen 2005).

¹ USFWS noted that “fencing should be expanded in cases where the 50-meter radius is inadequate to protect incubating adults or unfledged chicks from harm or disturbance. Data from various sites distributed across the plovers’ Atlantic Coast range indicate that larger buffers may be needed in some locations....”(USFWS 1996:192). As an example, USFWS noted that “Assateague Island National Seashore established 200 meter buffer zones around most nest sites and primary foraging areas” (USFWS 1996: 192).

Studies addressing the reactions of shorebirds and waterbirds to the presence of dogs are limited. Dogs have been observed killing black skimmer chicks (W. Golder pers. obs.) and anecdotal observations of the reaction of nesting birds to the presence of dogs suggest that nesting birds are disturbed at greater distances by the presence of a dog (W. Golder pers. obs.). Dogs off leash have been reported to be a significant problem at the Seashore and the regulations pertaining to such have been “loosely enforced” (Cohen 2005). The Southeast US Waterbird Conservation Plan recognizes that dogs can be a significant threat to nesting waterbirds and recommends an increase of 100m of additional buffer distance in areas where dogs are permitted (Hunter et al. 2006).



This dog, which was brought to Hatteras Spit in an ORV during the nesting season, was let off leash and was observed chasing a Sanderling; the dog’s owner is visible in the background, as is a posted nesting area (Sidney Maddock, Pers. Obs. 2003).

Off-road and other motorized vehicles present additional sources of disturbance that can kill adults and chicks, kill developing embryos in eggs, cause abandonment of nests, and destroy habitat. The threat is serious in areas where vehicle use is unregulated, where buffer distances are insufficient to protect mobile chicks, where buffer distances are insufficient to protect incubating adults from disturbance, where speed limits are in excess of 15 mph, and where birds are concentrated at roosts, foraging areas, and nesting areas. A study of Piping Plover mortality from off-road vehicles (Melvin et al. 1994) found that Piping Plover chicks were killed by off-road vehicles on beaches with “relatively little” vehicle traffic (20 or less vehicles passes/day) or beaches that were managed to protect chicks from vehicles; on beaches during daylight hours

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

where monitors were stationed to guide vehicles safely past chicks; on beaches that required a “look-out” to walk in front of all vehicles; on beaches with warning signs; and on beaches open only to monitoring and law enforcement vehicles.

The behavior of waterbird and shorebird chicks makes them especially vulnerable to mortality from vehicle traffic. When alarmed, chicks will often lie prone on the sand, and often seek a depression, shell or wrack to hide, and remain very still until the threat passes. When tire ruts are present in areas with waterbird or shorebird chicks, chicks often seek shelter in the tire ruts and then may be unable to climb out of the tire ruts due to soft sand. Furthermore, chicks are small, cryptic in color, and extremely difficult to see; and nearly impossible to see from a moving vehicle.



In 2005, a study of American Oystercatchers at Cape Hatteras and Cape Lookout National Seashores documented five deaths of chicks by vehicles (McGowan and Simons 2006). In 2005, at least one colony of terns and black skimmers in the process of courting, establishing territories and building nests, abandoned their nesting site due to chronic vehicle disturbance (W. Golder and S. Maddock pers. obs.). In 2006, two American Oystercatchers chicks at Cape Hatteras National Seashore died when they became separated from parents as a result of disturbance by vehicles (Simons et al. 2006).

In regards to Piping Plovers, the *Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the Endangered Species Act* (USFWS 1996) states:

“Unrestricted use of motorized vehicles on beaches is a serious threat to piping plovers and their habitats. Vehicles can crush eggs (Wilcox 1959; Tull 1984; Burger 1987b; Patterson et al. 1991; United States of America v. Breezy Point Cooperative, Inc., U.S. District Court, Eastern District of New York, Civil Action No. CV-90-2542, 1991; Shaffer and Laporte 1992), adults, and chicks. In Massachusetts and New York, biologists documented 14 incidents in which 18 chicks and 2 adults were killed by vehicles between 1989 and 1993 (Melvin et al. 1994). Goldin (1993) compiled records of 34 chick mortalities (30 on the Atlantic Coast and 4 on the Northern Great Plains) due to vehicles. Many biologists that monitor and manage piping plovers believe that many more chicks are killed by vehicles than are found and reported (Melvin et al. 1994). Beaches used by vehicles during nesting and brood-rearing periods generally have fewer breeding plovers than

available nesting and feeding habitat can support. In contrast, plover abundance and productivity has increased on beaches where vehicle restrictions during chick-rearing periods have been combined with protection of nests from predators (Goldin 1993; S. Melvin, pers. comm., 1993).

Typical behaviors of piping plover chicks increase their vulnerability to vehicles. Chicks frequently move between the upper berm or foredune and feeding habitats in the wrack line and intertidal zone. These movements place chicks in the paths of vehicles driving along the berm or through the intertidal zone. Chicks stand in, walk, and run along tire ruts, and sometimes have difficulty crossing deep ruts or climbing out of them (Eddings et al. 1990, Strauss 1990, Howard et al. 1993). Chicks sometimes stand motionless or crouch as vehicles pass by, or do not move quickly enough to get out of the way (Tull 1984, Hoopes et al. 1992, Goldin 1993). Wire fencing placed around nests to deter predators (Rimmer and Deblinger 1990, Melvin et al. 1992) is ineffective in protecting chicks from vehicles because chicks typically leave the nest within a day after hatching and move extensively along the beach to feed (see [Table 1](#)).

Vehicles may also significantly degrade piping plover habitat or disrupt normal behavior patterns. They may harm or harass plovers by crushing wrack into the sand and making it unavailable as cover or a foraging substrate, by creating ruts that may trap or impede movements of chicks, and by preventing plovers from using habitat that is otherwise suitable (MacIvor 1990, Strauss 1990, Hoopes et al. 1992, Goldin 1993).”

Protection for nesting colonial waterbirds

In 2005, the USGS Patuxent Wildlife Research Center prepared and submitted to Cape Hatteras National Seashore a document entitled *Monitoring and Protection Protocols for Colonially Nesting Waterbirds at Cape Hatteras National Seashore, North Carolina* (Erwin 2005). This document clearly outlined actions that should be taken by the Seashore to protect, manage, and monitor colonial waterbirds within the Seashore.

The protocols developed by Erwin (2005) are consistent with the five goals were outlined in Management of North Carolina’s Colonial Waterbirds (Parnell and Shields 1990). These include: 1. maintain stable reproductive populations; 2. recover species presently in declining or low numbers; 3. discourage problem species that have a strong, negative effect on native species; 4. encourage a dispersed nesting population; and 5. provide special attention to endangered, threatened, and special concern species. Adherence to the basic goals outlined in this document should also be goals of the Seashore.

Protection for colonial waterbirds that nest within the Seashore requires the development of a management and implementation plan or strategy that is consistent with recommendations that result from scientific studies of the species of birds and recommendations within conservation plans such as the Atlantic Piping Plover Recovery Plan, Southeast U.S. Waterbird Conservation

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

Plan, North American Waterbird Conservation Plan, United States Shorebird Conservation Plan, American Oystercatcher Conservation Plan and similar documents developed by objective biologists with demonstrated expertise in shorebird and waterbird biology, conservation, and management.

The recommendations in the conservation plans and those presented in the document by Erwin (2005) are based on research conducted by experienced and objective scientists. These recommendations are clear and based on science, experience, and expertise of the authors, and therefore should be followed. Significant deviations from the recommendations of experts will jeopardize these species at the Seashore.

Protection for nesting Piping Plovers

In 2005, the USGS Patuxent Wildlife Research Center prepared and submitted to Cape Hatteras National Seashore a document entitled *Management and Protection Protocols for the Threatened Piping Plover (Charadrius melodus) on Cape Hatteras National Seashore, North Carolina* (Cohen 2005). In addition, the Atlantic Piping Plover Recovery Plan (USFWS 1996) provides recommendations regarding the protection of adults, nests, chicks, and habitats. These documents clearly outline actions that should be taken by the Seashore to protect, manage, and monitor Piping Plovers within the Seashore. The recommendations provided are consistent with these recommendations and should be fully implemented to provide necessary protection for Piping Plovers.

Protection for American Oystercatchers

The American Oystercatcher is listed as a “Species of High Concern” in the US Shorebird Conservation Plan (Brown et al. 2001). Primary threats to this species are habitat loss, human disturbance, and predation by non-native predators and species closely associated with human activity (Schulte et al. 2006). Human disturbance has been implicated as a significant contributor to low reproductive success and high predation rates in studies conducted in North Carolina and Georgia (McGowan 2004, McGowan and Simons 2006, Davis et al. 2001, Sabine 2005, Sabine et al. 2005, Shulte et al. 2006, Simons 2004, Simons et al. 2006). Davis et al. (2001) also found that oystercatchers avoid nesting in areas with high human disturbance. Novick (1996) and Davis (1999) documented lower nesting success for American Oystercatchers in North Carolina in areas where disturbance was high. McGowan (2004) found that the presence of vehicles on beaches contributed to chick mortality and higher predation rates. McGowan (2005), Simons et al (2005), and Sabine (2005) documented lower nest survival and higher chick mortality in high disturbance sites.

Studies of American Oystercatchers nesting at Cape Hatteras and Cape Lookout National Seashores (Simons et al. 2006) documented mortality of American Oystercatcher chicks every year since 2004 and found that lower fledging success of chicks on beaches where vehicles and pedestrians were permitted. Simons et al. (2006) found a difference in behavior of chicks in full beach closures and those in partial beach closures. Chicks in partial beach closures spent more time in dunes, which subjects them to temperature stress, reduces the amount of foraging time, and increases the risk of mortality from predation, a risk that increases at night if vehicles, dogs, or people are present. Fledging success was found to be higher on full closure beaches was 48%,

while fledging success on beaches open to vehicle and/or pedestrian activity was 27%. The study explained their findings:

“...Very young chicks are highly mobile, much more so than previously believed. Within 24 hours of hatching, adults begin bringing their chicks to the waterline to feed, particularly after dark. This pattern continues throughout the chick-rearing stage. At night, chicks were always located at the waterline or on the open beach. During the day chicks spent most of their time hiding in the dunes. Movement between the dunes and the waterline places young chicks at considerable risk from vehicle traffic. We regularly observed chicks hiding in vehicle tracks in response to adult alarm calls and also observed chicks, and even some adults, running or flying directly into the headlights of oncoming vehicles at night. Shortly after we initiated the radio tracking study, we documented the mortality of a brood of two-day old chicks that were run over by an ATV on North Core Banks. We had radio-tagged the recently hatched brood at the nest on 16 June 2005.

That same evening the chicks were relocated hiding in seaweed at the tide line with the adult pair. The following morning we tracked the transmitter signals to a similar location and found two of the chicks crushed in a fresh ATV tire track, just above the high tide line (Figure 8).

On 23 May 2006 two three-day old chicks near Hatteras inlet on Cape Hatteras National Seashore died of exposure and depredation after their parents were disturbed by vehicle traffic after dark. The parents brought the chicks down to the tideline at sunset and were subsequently disoriented and frightened off by vehicle headlights. One of the chicks was found the next morning nearly dead of hypothermia, while the other had been killed by a ghost crab....

After the chicks were killed by a vehicle in 2005, Cape Lookout National Seashore initiated a policy under which they closed sections of beach with unfledged chicks to vehicle traffic, and re-routed traffic around the birds via the interdune road. No additional deaths from vehicle traffic have been documented on Cape Lookout since this policy went into effect. After the beach sections were closed, chicks were regularly observed on the open beach and at the tide line during daylight hours, suggesting that vehicle traffic was altering chick behavior and foraging patterns. Cape Hatteras National Seashore implemented a policy of completely closing sections of beach with oystercatcher broods in 2005 and no chick mortality due to vehicles was documented. In 2006 this policy was changed to allow vehicle traffic past some of the broods and two chicks died following vehicle disturbance as described above...” (Simons et al. 2006)

In 2005, the USGS Patuxent Wildlife Research Center prepared and submitted to Cape Hatteras National Seashore a document entitled *Management, Monitoring, and Protection Protocols for American Oystercatchers at Cape Hatteras National Seashore, North Carolina* (Meyers 2005). This document clearly outlines actions that should be taken by the Seashore to protect, manage, and monitor American Oystercatchers within the Seashore. The Seashore should take action and implement Option B: Moderate Protection.

Protection for non-breeding shorebirds

The Seashore is a critical migratory stopover and wintering area for North American shorebirds. A study of migrating and wintering shorebirds on the Outer Banks of North Carolina concluded:

“Our findings confirm that the Outer Banks of North Carolina provide a critical link in the migratory path of several shorebird species (e.g., Sanderling, Whimbrel). If habitat loss or alteration were to occur, portions of their Atlantic Flyway populations could be negatively affected, perhaps contributing to further population decline (Howe et al. 1989). The threatened Piping Plover, which depends on the Outer Banks for breeding habitat, could also be affected by such habitat changes. Given the regional significance of this area, efforts to ensure the continued availability of habitat for shorebirds amidst demands for development and recreational uses should constitute a conservation priority.” (Dinsmore et al. 1998)

Habitats that support migrating and wintering shorebirds deserve protection from human disturbance, which is a key contributing factor in the loss and degradation of habitat for non-breeding shorebirds (Brown et al. 2001). Most species of shorebirds are long distance migrants that may migrate hundreds to several thousand miles from breeding areas to winter areas. The habitats utilized along the migration route are essential to their survival during migration and winter, and their return to breeding areas in good condition for breeding.

The southward migration of shorebirds, often called “fall” migration, begins during the first week July and continues until December, at which time many shorebirds have arrived at wintering areas. The wintering period includes December to early March. The northward migration of shorebirds, often called “spring” migration, continues until the end of May.

Cape Hatteras National Seashore is critical to migrant shorebirds and waterbirds that utilize habitats within the Seashore during migration and during winter. Off-road vehicle use and human disturbances have been shown to have a significant negative impact on these species. These impacts include but are not limited to: direct mortality of adults from vehicle strikes, displacement of individuals, abandonment of otherwise suitable habitat, disruption of foraging time and behavior, disruption of resting and roosting time, destruction of foraging habitat, loss of habitat, and reduced prey base. Vehicle use on the Seashore beaches affects the distribution, abundance, and survival of migrating and wintering shorebirds and is a direct threat to the species that depend on habitats within the Seashore. High numbers of vehicles and the associated recreation, such as presently exists at many areas within the Seashore, renders key areas unavailable to these species and results in loss of habitat for these species. Disturbance that reduces foraging, resting and roosting time, forces species to forage in sub-optimal habitats, displaces species from otherwise suitable habitat, and increases energy expenditure threatens the survival of these species. (Nichols and Baldassarre 1990, Goss-Custard et al. 1996, Burton et al. 1996, Pienkowski 1982, Zonick 2000, Haig and Oring 1985, Harrington 2008, Burger 1986, Pfister 1992, Burger et al. 1995, Burger et al 2007, Elliot and Teas 1996, Vega 1988, among others).



Shorebirds roosting on beach

Studies in Delaware conclude it is imperative to keep people and dogs off beaches while shorebirds are foraging (Burger et al 2007). Data from Cape Lookout, Cape Hatteras, Assateague Island, Texas, Delaware, Massachusetts, and New Jersey beaches show reduced number of shorebirds on beaches with vehicles (Burger 1986, Burger 1981, Pfister 1992, Collazo et al. undated, Barbee 1994). Harrington (2008) concluded that inlets are critical to many species of shorebirds, especially species of conservation concern, during migration and winter, and that inlets should be protected from human disturbances. Off-road vehicles have been shown to have a direct negative impact on important prey for migrating and wintering shorebirds (Schlacher et al. 2008a, Schlacher et al. 2008b). Off-road vehicles have been shown to affect the behavior of resting, roosting, and foraging shorebirds in a manner that may threaten their survival and reproductive fitness (Tarr 2008, Burger 1986, Burger 1981, Pfister 1992, Gochfeld 1991, Thomas 2000, Niles et al. 2007, Piersma and Baker 2000, Burton et al. 1996, among others)

Vehicle use at the inlets, Cape Point, South Beach, and important shorebird habitat on the ocean facing beaches is at such a level that it presents a serious impairment to migrant and wintering shorebirds and waterbirds. We consider these impacts clear and definite impairment of these natural resources and allowing such destructive practices as vehicle use and the associated human disturbances is inconsistent with the laws and policies of National Park Service units such as Cape Hatteras National Seashore. For this reason, protection of habitats for migrating and wintering shorebirds by excluding vehicular traffic and other recreation activities known to impact shorebirds and waterbirds is warranted and critically important to the protection of these natural resources.



Vehicle use at Bodie Island

Shorebird Species: Sanderling, Red Knot, Willet, Whimbrel, Marbled Godwit, American Oystercatcher, Black-bellied Plover, Semipalmated Plover, Piping Plover, Wilson's Plover, Western Sandpiper, Dunlin, Least Sandpiper, Pectoral Sandpiper, Stilt Sandpiper, Semipalmated Sandpiper, Short-billed Dowitcher, Ruddy Turnstone, Greater Yellowlegs, Lesser Yellowlegs, Red Phalarope, Wilson's Phalarope, Red-necked Phalarope.

Waterbird Species: Common Tern, Black Tern, Caspian Tern, Least Tern, Black Skimmer, Gull-billed Tern

Key sites that support significant concentrations of migrating and wintering shorebirds include the soundside wet sand and/or mud flats, algal flats, ephemeral pools/ponds, the ocean beach, and the associated ocean intertidal zone associated with Bodie Island Spit, Hatteras Spit, Cape Point, South Beach, and all of Ocracoke Island; and the ocean beach from toe of the dune to ocean water line between Salvo and Avon, Avon and Buxton, Lighthouse Beach to Frisco Village, Ramp 55 to Hatteras Inlet, and Ocracoke Island.

Conclusion

We participated in the Negotiated Rulemaking process, providing information, sharing our expertise regarding beach nesting birds and pedestrian concerns, and extensively discussing the various proposals and counterproposals. We participated and negotiated in good faith. We hoped a consensus alternative could be reached. Unfortunately, there was just too much distance between the proposals from the ORV caucus and the environmental/pedestrian caucus.

As outlined in this document, the threats regarding ORV use and the associated human disturbance are well known, and the steps to address ORV use and the human disturbance also are well known. Implementation of adequate, science-based protection of the Seashore's natural resources is essential to the recovery of species that have declined significantly over the past decade and longer. This is equally critical to sustaining populations of natural resources on the Seashore and leaving these resources unimpaired for future generations.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

The National Park Service has basic legal mandates that it is required to follow at Cape Hatteras National Seashore, and the law is clear: **When proposed park uses and the protection of park resources and values come into conflict, the protection of resources and values must be predominant.** Likewise, in determining whether there is a conflict, the NPS must use the best available science. If the impacts of actions or activities, such as ORV use or human disturbance, are unknown or not fully understood for some resources, then the National Park Service cannot allow such activities to occur within the Seashore. Furthermore, we believe that failure to protect breeding and non-breeding birds during all life stages, sea turtles, plants, plant communities, and the habitats upon which they depend while they are on the Seashore constitutes impairment of these species (Webster's Dictionary: Impair--To diminish in strength, value, quantity or quality: harm).

We hope the National Park Service will implement an ORV regulation that adequately protects natural resources on the Seashore and we look forward to working with the National Park Service on these matters in the future.

The following tables present a balance between natural resource protection and responsible ORV use on Cape Hatteras National Seashore. These are the minimum measures that must be implemented to allow ORV use on Cape Hatteras National Seashore.

Off-road vehicle operation at Cape Hatteras National Seashore

Topic	
Permits	<ul style="list-style-type: none"> - ORV Special Use permit required - Education required - fees should be reasonable and set for cost recovery to include resource management costs necessitated by ORV use. - -
Vehicle/Operations Characteristics	<ul style="list-style-type: none"> - Motorcycles, ATVs, and UTVs prohibited on all beaches - Adopt vehicle operations and characteristics as approved by full committee on December(?) 2008
Villages	<ul style="list-style-type: none"> - North (East facing) villages open to vehicles seasonally with dates to be determined by NPS. - Frisco and Hatteras villages closed year round. -
Park Funding	<ul style="list-style-type: none"> - Recommend increase in operations funding for NPS-CAHA unit
Natural Resources	<ul style="list-style-type: none"> - see attached: “Required Natural Resource Protection” - All designated ORV routes are subject to closure for the protection of natural resources as described in the “Required Natural Resource Protection” table.
<p>Routes</p> <p>All routes are subject to closure to protect natural resources as described in “Required Natural Resource Protection” table below.</p>	<ul style="list-style-type: none"> - <u>Bodie Island:</u> <ul style="list-style-type: none"> a. S. Nags Head to approximately 0.75 mi south of ramp 2 closed to vehicles (pedestrian area) b. Approximately 0.75mi south of ramp 2 to ramp 4 designated as ORV route. c. Ramp 4 to inlet, inlet facing beach, soundside, and all soundside wet sand/mud flats and all interior areas closed to vehicles (resource area) - <u>Hatteras Island:</u> <ul style="list-style-type: none"> a. Southern boundary of Salvo Village to 2.0mi south of Ramp 23

Topic	
	<p>designated as ORV route.</p> <ul style="list-style-type: none"> b. 2.0 mi south of Ramp 23 to 1.0 mi north of ramp 34 closed to vehicles (resource area) c. 1.0mi north of Ramp 34 to Avon Village designated as ORV route. d. 1.0 mi centered on the haulover between Avon and Buxton closed to vehicles (pedestrian area) e. Beach between Avon and Buxton, except for 1.0mi centered on the haulover as described in “d” designated as ORV route. f. Restore historic pedestrian only area restored from south groin at Buxton to ramp 43 closed to vehicles (pedestrian area) g. Ramp 43 to Ramp 45 designated as ORV route. Route extends only within 50m of mean high water. h. Ramp 45 to 0.5 mi east of Ramp 49 closed to vehicles (resource area); no upper beach route; interdunal road from ramp 45 to ramp 49 is acceptable i. Ramp 49 to Ramp 55 closed to vehicles. j. Ramp 55 to 0.5mi west of ramp 55 designated as ORV route. k. 0.5 mi west of Ramp 55 to Hatteras Inlet, inlet facing beach, and soundside 0.5mi east toward Hatteras Village closed to vehicles (resource area); Pole Road and soundside access roads are acceptable. <p>- Ocracoke Island:</p> <ul style="list-style-type: none"> a. Ramp 62 to Hatteras Inlet, inlet facing beach, all soundside wet sand/mud flats and all interior areas closed to vehicles (resource area). b. Ramp 62 to ramp 64 designated as ORV route. c. Ramp 64 to ramp 67 closed to vehicles (resource area). d. Ramp 67 west 0.5mi designated as ORV route e. Eastern edge of Ocracoke Campground to 0.5 mi east of ramp 70 closed to vehicles from 15 March to 1 December (resource area). f. Ramp 70 to 0.25mi west of ramp 72 designated as ORV route. g. 0.25mi west of ramp 72 to 1.25mi west of ramp 72 closed to vehicles with bypass route 10m in width, 75m from mean high water, pass through only, open seasonally from 1 September to 15 March (resource area).

Topic	
	<p>h. Mid-point of Ocracoke Inlet beach to soundside and north toward Ocracoke Village for 1.0mi, including all interior areas closed to vehicles (resource area). Designated ORV route from 1.25mi west of ramp 72 to mid-point of Ocracoke Inlet beach extends only within 50 of mean high water.</p>

Required Natural Resource Protection

Survey Time and Frequency	Piping Plover	American Oystercatcher and Wilson’s Plover	Colonial Waterbirds
All Species	<p><u>Zone of ocean backshore at least 10m wide and running the length of the Seashore is closed to ORV use. This zone should be adjacent to the toe of the primary dune wherever a primary dune exists.</u></p>		
All Bird Species	<p><u>Species Management 1 (SM1):</u> Will use larger, longer lasting buffers with less monitoring to alleviate the need for constant monitoring and frequent fencing changes. Will be applied at all resource areas other than Cape Point and S. Ocracoke. Estimated staffing requirements TBD by NPS.</p> <p><u>Species Management 2 (SM2):</u> Will use smaller buffers and require more frequent monitoring and fencing changes. Will be applied at Cape Point and S. Ocracoke only at the discretion of NPS. Estimated staffing requirements TBD by NPS.</p> <p>This method is less predictable for Seashore visitors, relies on variable closure and opening dates depending on presence of birds, requires additional skilled staff, and requires additional resources.</p> <p>If NPS is unable to survey, monitor, or protect areas as described, unable to implement SM1 as described, or determines that SM1 or SM2 are inadequate to protect natural resources, then NPS will implement USGS Protocol Option A or B for breeding species.</p> <p>NPS is committed to implementing science-based resource protection and management practices. NPS also recognizes</p>		

	<p>that new or additional data, and scientific studies, may indicate that species management and protection actions should be altered to adequately protect natural resources.</p> <p>Disturbance is defined as follows: “Human disturbance is any activity that changes the contemporaneous behavior or physiology of one or more individuals within a breeding colony of waterbirds” (Nisbet 2000). This definition shall be applied to nesting Colonial Waterbirds, Piping Plover, Wilson’s Plover, American Oystercatcher, and non-breeding shorebirds.</p> <p>Dogs are prohibited within 100 meters of all natural resource closures, including all natural resource areas for migrating and wintering shorebirds. Pet restrictions and leash regulations will be strictly enforced.</p>		
<p>Pre-Nesting Surveys</p>	<p>SM1, SM 2: By March 1, all potential habitats will have been evaluated. PIPL prenesting closures will be recommended based upon that habitat evaluation. Those closures will be installed by March 15.</p> <p>March 15 – July 15: Survey prenesting areas at least 3 times per week. Outside of prenesting areas and existing closures, survey suitable habitat 3 times per week; more often if breeding PIPL are observed in the area. If prenest closures allow pedestrian and/or ORV access corridors, survey daily.</p> <p>Survey for Wilson’s plover during piping plover surveys.</p> <p>Prenesting buffers will not be modified in cases where the beach erodes into the buffered habitat.</p>	<p>SM1: March 15 – July 15 survey historic breeding areas (last ten years) at least 3 times per week..</p> <p>SM2: March 15 – July 15 survey historic breeding areas (last ten years) at least 3 times per week. If/when AMOY pairs are observed in an area, survey site daily.</p> <p>As of May 1 turtle staff will observe for AMOYs during daily patrols. Turtle patrol will take over monitoring after July 15th. If pre-nesting closures allow pedestrian and/or ORV access corridors, survey daily.</p> <p>Bodie Island, Cape Point &</p>	<p>SM1: April 1 – July 15 survey historic Least Tern, Common Tern, and Gull-billed Tern breeding areas (last ten years) at least 3 times per week. April 1 – Aug 15 survey historic Black Skimmer breeding areas (last ten years) at least 3 times per week.</p> <p>SM2: April 1 – July 15 survey historic Least Tern, Common Tern, and Gull-billed Tern breeding areas (last ten years) at least 3 times per week. April 1 – Aug 15 survey historic Black Skimmer breeding areas (last ten years) at least 3 times per week If/when CWB are observed in an area, observe daily.</p> <p>As of May 1 turtle staff will observe for CWBs during daily patrols (i.e., survey for CWB while observing for AMOY.) Turtle patrol will take over monitoring after July 15th. If pre-nesting closures allow pedestrian and/or ORV access corridors,</p>

	<p>Bodie Island, Cape Point & South Beach, Hatteras Inlet, N & S Ocracoke Island, and historic nesting areas active in the past 10 years:</p>	<p>South Beach, Hatteras Inlet, N & S Ocracoke Island, and historic nesting areas active in the past 10 years:</p>	<p>survey daily.</p> <p>Bodie Island, Cape Point & South Beach, Hatteras Inlet, N & S Ocracoke Island, and historic nesting areas active in the past 10 years:</p>
<p>Pre-Nesting Buffers</p>	<p><u>SM1</u>: Areas designated as SM1 Resource Areas will not allow ORV or pedestrian access during the pre-nesting period.</p> <p><u>SM2</u>: Areas designated as SM2 may have a narrow ORV (where permitted) and/or pedestrian access corridor until nesting activity (including but not limited to territorial behavior, courtship, mating, scraping, confirmed scrapes, and other breeding or nest building activities) is observed. Standard buffer distances in Table 1 will apply immediately upon observation of nesting activity and will not be reduced to allow an ORV or pedestrian corridor. Pre-nesting closures will be established at all nesting sites active in the previous 10 years.</p> <p>Bodie Island: Due to location of waterbird colonies and shorebird nesting sites, and the location of nesting habitats for these species, the closure of the pedestrian corridor will begin at the northernmost boundary of the pre-nesting closures as delineated in Alt E. Cape Point: North side corridor to be not more than 50m wide; Hatteras Inlet: pre-nesting closure to include all suitable nesting habitat (dune to ocean) and nesting sites active in the past 10 years; S. Ocracoke: established as described above (page 13, revised map 2/13/09); N. Ocracoke: pre-nesting closure to include all suitable nesting habitat (dune to ocean) and nesting sites active in the past 10 years.</p> <p>Deliberate attempts to harass or disturb birds, or vandalize fencing, will result in immediate closure of the corridor.</p>		

	<p>SM1/SM2: In February or March of each year, NPS natural resource staff will conduct an annual assessment of piping plover breeding habitat to plan pre-nesting closures in historic breeding areas that are adapted to current habitat and physiographic conditions. Historic breeding areas will be closed by posting symbolic fencing by March 15. Closures will be removed if no breeding activity is seen in the area by July 15, or 2 weeks after chicks in the area have fledged, whichever comes later.</p>	<p>SM1/SM2: Pre-nesting closures will be installed by March 15 in areas that had nest(s) in the past 10 years, if habitat is still suitable. Closures will be removed if no breeding activity is seen in the area by July 15, or 2 weeks after the site is abandoned by AMOY or Wilson’s Plover, whichever comes later.</p>	<p>SM1/SM2: Pre-nesting closures will be established for CWB by April 1 in areas that had a colony (or colonies) in the past 10 years, if habitat is still suitable. Closures will be removed if no breeding activity is seen in the area by July 31, or two weeks after the site has been abandoned by CWB, whichever comes later.</p> <p>NPS natural resource staff will conduct an annual assessment of colonial waterbird breeding habitat to plan pre-nesting closures that are adapted to current habitat and physiographic conditions.</p>
<p>Courtship/Mating Surveys:</p>	<p><u>All areas with pre-nesting closures and pedestrian and/or ORV corridors will be surveyed daily from establishment to removal of the pre-nesting closure.</u></p> <p><u>SM1:</u> If PIPL, AMOY, WIPL, or CWB are observed exhibiting territorial or courtship behavior in suitable habitat, or if scrapes are observed in the absence of courtship behavior, observe 3 times per week. Survey potential new habitat 2 times per week; increase to 3 times week once birds are observed in the area.</p> <p><u>SM2:</u> PIPL monitored as described for SM1. If AMOY or CWB are observed exhibiting territorial or courtship behavior in suitable habitat, or if scrapes are observed in the absence of courtship behavior, observe daily. Survey potential new habitat 2 times per week; increase to 3 times per week once birds are observed in the area.</p>		
<p>Courtship/Mating Buffers:</p>	<p><u>SM1, SM2:</u> If courtship or copulation is observed outside of existing prenesting closure, or inside the closure but within 50 m of the closure boundary, establish or expand buffer to ensure 50 m buffer for the observed birds. Buffer will be increased in 50 m increments if disturbance occurs.</p>	<p><u>SM1:</u> Outside of existing pre-nesting closure, or inside the closure but within 300 m of the closure boundary, if one observation of scraping or territorial behavior has been documented or if a scrape is being maintained, a 300 meter</p>	<p><u>SM1:</u> Outside of existing pre-nesting closure, or inside the closure but within 300 m of the closure boundary, if one observation of scraping or territorial behavior has been documented or if scrapes are being maintained, a 300 meter buffer will be established around the scrape locations.</p>

	<p>If nest buffer is less than 75 m observe nesting activity daily to determine if disturbance is occurring. Observations will continue until 50 passages of pedestrians or vehicles within 10m of the closure boundary are recorded. If no disturbance is observed, observations can be terminated. At the first disturbance, buffer will be expanded by 50 m if human disturbance is observed. Observations; observations will continue until 50 additional passages are documented and buffer will be expanded by an additional 50 m if human disturbance occurs again.</p>	<p>buffer will be established around the bird activity. <u>SM2</u>: Outside of existing pre-nesting closure, or inside the closure but within 150 m of the closure boundary, if one observation of scraping or territorial behavior has been documented or if a scrape is being maintained, a 150 meter pedestrian/ORV buffer will be established around the bird activity Courtship site will be monitored daily and the buffer will be adjusted as needed. Buffer will be increased in 50 m increments if disturbance occurs. If, in the judgment of NPS Resources Management staff, a pair has abandoned a territory and established a new territory at another location, the buffer may be removed at the abandoned territory after two weeks with no activity.</p>	<p><u>SM2</u>: Outside of existing pre-nesting closure, or inside the closure but within the buffer distance prescribed below of the closure boundary, if one observation of scraping or territorial behavior has been documented or if scrapes are being maintained, establish a buffer around the scrape location. Buffer will be 100 meters for least terns and 200 meters if the colony contains common terns, gull-billed terns or black skimmers. Colony will be monitored daily as new nest sites are being established and buffers will be adjusted as needed. Buffer will be increased in 50 m increments if disturbance occurs.</p>
<p>Nesting Surveys:</p>	<p>Nesting survey (walk-through to look for nests) conducted every 3 days.</p>	<p>Nesting survey (walk-through to look for nests) conducted when observations suggest a nest is present.</p>	<p>Colonies will be surveyed by foot during the “peak” nesting period which is during the last week of May and the first week of June.</p>
<p>Nest Observation:</p>	<p><u>SM1</u>, <u>SM2</u>: Observe nests daily</p>	<p><u>SM1</u>: Observe nests at least 3</p>	<p><u>SM1</u>: Observe colonies at least three times</p>

	<p>from a distance that does not disturb the birds, based on professional judgment. Approach nests once per week to observe and record data.</p> <p>If nest buffer is less than 75 m observe nest daily to determine if disturbance is occurring. Observations will continue until 50 passages of pedestrians or vehicles within 10m of the closure boundary are recorded. If no disturbance is observed, observations can be terminated. At the first disturbance, buffer will be expanded by 50 m if human disturbance is observed. Observations; observations will continue until 50 additional passages are documented and buffer will be expanded by an additional 50 m if human disturbance occurs again.</p>	<p>times per week from a distance. For incubating birds that cannot be observed from a distance, check nests on a weekly basis (or as staff is available).</p> <p><u>SM2</u>: Observe nests daily from a distance that does not disturb the birds, based on professional judgment. For incubating birds that cannot be observed from a distance, check nests every 3 days.</p>	<p>per week from a distance. For incubating birds that cannot be observed from a distance, check colonies on a weekly basis.</p> <p><u>SM2</u>: Observe nests daily from a distance that does not disturb the birds, based on professional judgment. For incubating birds that cannot be observed from a distance, check colonies every three days.</p>
<p>Nesting Buffers:</p>	<p><u>All species</u>: The park retains the discretion to expand buffers under SM1 and SM2 depending on staffing and bird behavior. In unprotected areas, a closure will be established immediately when a nest with egg(s) is found. When nesting occurs in the immediate vicinity of paved roads, parking lots, campgrounds, buildings and other facilities, NPS retains the discretion to provide resource protection to the maximum extent possible while still allowing those sites to remain operational. Buffers will remain in place for 2 weeks after a nest is lost to determine if pair will re-nest, if no other species nesting in area.</p> <p><u>SM1, SM2</u>: NPS shall not reduce buffers to accommodate ramp access. After July 31, closures will be removed outside of prenesting closures two weeks after all nesting is complete or all chicks in area have fledged, whichever is later.</p> <p>Deliberate attempts to harass or disturb birds, or vandalize fencing, shall result in immediate expansion of the buffer by</p>		

	50m for the first act, an additional 100m for the second act, and 500m for the third act.		
<p><u>SM1, SM2</u>: Establish 50 m buffer around piping plover nests occurring outside existing closures. If bird leaves nest due to human disturbance, buffer will be increased in 50 m increments until disturbance is abated. If the nest buffer falls within the intertidal zone a full-beach closure will result.</p> <p>If buffer is adequate to prevent human disturbance, a designated ORV or pedestrian access corridor can be maintained during incubation. During breeding season, pets are prohibited in pass-through corridors or at the points and spits.</p> <p>If nest buffer is less than 75 m observe nest daily to determine if disturbance is occurring. Observations will continue until 50 passages of pedestrians or vehicles within 10m for the closure boundary are recorded. If no disturbance is observed, observations can be terminated. At the first disturbance, buffer will be expanded by 50 m if human disturbance is observed. Observations will continue until 50 additional passages are documented and buffer will be expanded by an additional 50 m if human disturbance</p>	<p><u>SM1</u>: Use buffer of 300 m.</p> <p><u>SM2</u>: Use buffer of 150 m around nests occurring outside of existing closures.</p> <p><u>All</u>: Establish buffer immediately when nest is located. Increase buffer in 50 meter increments if necessary to prevent human disturbance. If the buffer falls within the intertidal zone a full-beach closure will result.</p> <p>For AMOY nests that occur inside a pre-nesting closure at one of the points or spits <u>and</u> requires a buffer expansion of the pre-nesting area, if the nest is lost due to overwash or predation, the buffer expansion shall be removed to the original pre-nesting closure after two weeks with no activity.</p>	<p><u>SM1</u>: Use buffer of 300 m for all species.</p> <p><u>SM2</u>: Use buffer of 100 m for least terns and 200 m if the colony contains common terns, gull-billed terns or black skimmers.</p> <p><u>All</u>: Establish buffer immediately when nest/colony is located. Increase buffer in 50 meter increments if necessary to prevent human disturbance. If the buffer falls within the intertidal zone a full-beach closure will result.</p> <p>Colony will be monitored daily for presence of new nesting activity and buffers will be adjusted as needed.</p> <p>For a colony that occurs inside a pre-nesting closure at one of the points or spits <u>and</u> requires buffer expansion of the pre-nesting area, if the colony is over-washed or predated, the buffer expansion shall be removed to the original pre-nesting closure after two weeks with no activity.</p>	

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

	occurs again.		
Pass-through Corridors during Courtship/Mating and Incubation	n/a	n/a	n/a
Adult Foraging Surveys & Buffer:	Survey suitable piping plover breeding habitat 3 times per week to monitor for adults (with an associated scrape or nest territory) foraging outside of an existing closure. If observe foraging outside of existing closure, survey site <u>daily</u> . If observe foraging outside of buffer on two consecutive surveys, establish or expand the buffer using flexible increments based on observed bird behavior to include foraging site if the foraging area is associated with a prenesting closure. These closures are intended to provide foraging opportunities close to breeding sites. Remove closure if no foraging observed for a 2-week period during the breeding season, or when associated breeding activity has concluded.	No additional buffers/closures.	No additional buffers/closures.
Unfledged Chicks Surveys:	<u>SM1</u> .: Observe brood once daily. <u>SM2</u> .: Observe brood at least 1 hour each in am and pm daily. Have monitor(s) present during periods of ORV or pedestrian access. Observations end once chicks have fledged. Chicks are considered	<u>SM1</u> .: Observe brood at a minimum every other day. <u>SM2</u> .: Observe brood once daily. Observations end once the chicks have fledged. Chicks are	Colonies will be surveyed by foot during the “peak” hatching period which should fall 21 days after initial nest counts. A follow-up survey by foot should be conducted during the “peak” fledge which should fall 20 days after hatch counts.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

	<p>fledged at 35 days or are observed in sustained flight of >15 m.</p>	<p>considered fledged if they have been observed to be proficient in flying or observed in sustained flight of >30 m.</p>	<p><u>SM1</u>: Observe colony every other day. Tern and skimmer chicks will often move 100m or more from their colony site, often toward the nearest shoreline. <u>SM2</u>: Observe colony daily. Observations end after no unfledged chicks have been observed on 3 consecutive survey days. Closure can be removed after August 31 or two weeks after all chicks have fledged, whichever is later.</p>
<p>Unfledged Chick Buffers:</p>	<p><u>SM1</u>: Establish a minimum 1000 meter buffer on either side of brood based on observation of bird behavior and terrain conditions at site. No ORV or pedestrian access until all chicks have fledged. <u>SM1</u>: For the first 2 weeks after hatching, establish a 1000 m buffer for ORVs . Based on mobility of the brood, at the discretion of park management, the buffer can be reduced after the first two weeks to 500 m for ORVs and 200 m for pedestrians (at Cape Point and South Point). Points and spits would only be accessible from 7 a.m. to 7 p.m. as long as unfledged PIPL chicks are in the area and only if prescribed buffers can be maintained. The 7 a.m. opening (shall) be delayed until the chicks have been located. If chicks are</p>	<p><u>SM1</u>: Establish a 300 meter buffer when unfledged chicks are present. Include foraging and roosting habitat from the ocean (low water line) to the dune (or sound shoreline, if applicable), if accessible. Closure would be removed 2 weeks after fledging (observed flight of 30 meters);.</p> <p>The closure will extend for 300m on each side of a line drawn through the nest site and perpendicular to the long axis of the beach. The resulting closure will extend from the ocean side low water line to the bayshore low water line or to the dune line if no bayshore habitat exists.</p>	<p><u>SM1</u>: Use 300 m buffer. If chicks move outside of the buffer, it will be adjusted to include an additional 200 meters from the chick(s) location outside of the closure.</p> <p><u>SM2</u>: Establish a 200 meter buffer around the chick(s) location. Adjust buffer as needed when chicks are mobile. Monitor daily if shoreline in front of colony open to ORV use.</p>

	<p>highly mobile, the 1000 m buffer may need to be maintained. Buffer moves with chicks. Vehicles may be allowed to pass through portions of the protected area that are considered inaccessible to PIPL chicks because of steep topography, dense vegetation, or other naturally occurring obstacles.</p> <p>SM1/SM2: The closure will extend for 1000m on each side of a line drawn through the nest site and perpendicular to the long axis of the beach. The resulting closure will extend from the ocean side low water line to the bayshore low water line or to the dune line if no bayshore habitat exists.</p>	<p><u>SM2</u>: Establish a 200 meter buffer around the unfledged chick(s) location. Include foraging and roosting habitat from the ocean (low water line) to the dune (or sound shoreline), if accessible. Adjust/increase buffer as needed when chicks are mobile. Buffer moves with chicks.</p> <p>The closure will extend for 200m on each side of a line drawn through the nest site and perpendicular to the long axis of the beach. The resulting closure will extend from the ocean side low water line to the bayshore low water line or to the dune line if no bayshore habitat exists.</p> <p>All: ORV access would not be allowed until 2 weeks after AMOY chicks have fledged (observed flight of 30 meters);</p>	
<p>SM1/SM2: Reopen access corridor outside of pre-nesting area after chicks fledge (except for AMOYs where the area will remain closed to ORVs for an additional 2 weeks). Dogs are prohibited within 100m of all natural resource closures established for breeding birds and chicks. Closure can be removed after July 31 or two weeks after all chicks have</p>			

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

	<p>fledged, whichever is later, except for site with Black Skimmers. At sites with Black Skimmers, closure can be removed after August 31 or two weeks after all chicks have fledged, which ever is later.</p>
<p>Non-breeding / Wintering Survey</p>	<p>NPS will monitor presence, abundance and behavior of migrating and wintering PIPL, AMOY, WIPL, and REKN 3 times per month at the points and spits July 1 through May 31 following the existing NPS winter monitoring protocol. In addition, the International Shorebird Survey (ISS) protocol will be used to document other migrating/wintering species. NPS will document the distribution and abundance of migrating and wintering shorebirds within the Seashore, following the International Shorebird Survey (ISS) protocols.</p> <p>Non-breeding shorebird surveys will begin on July 1 and continue until May 31.</p> <p>Survey sites TBD, but should include Cape Point, South Beach, all inlet spits (ocean and soundside habitats), and selected ocean facing beaches between Buxton and Salvo, Hatteras Village to Hatteras Inlet, and Ocracoke.</p>
<p>Non-breeding / Wintering Areas</p>	<p>Non-breeding and wintering areas will be considered natural resource protection areas.</p> <p>Cape Point and Inlets: An annual migrating/wintering habitat assessment will be conducted at the points and spits by NPS. Migrating/wintering <u>resource closures</u> will be established and will be based on foraging, resting, and roosting habitats used by migrating and wintering Piping Plovers, Red Knots, and other shorebirds in the past 10 years, and suitable habitat types based on the results of the annual surveys. ORV use will not be permitted within 75m of mean high water at terminus of Pole Road, Hatteras Inlet. S. Ocracoke: Corridor passing non-breeding/ wintering ocean beach closure will be pass-through only.</p> <p>Other Areas: To benefit Red Knots, Willets, Sanderlings, Black-bellied Plovers, Piping Plovers, and all other species of migrating and wintering shorebirds, NPS will establish resource protection areas for migrating and wintering shorebirds (open to pedestrians, unless closed for breeding birds or other reasons) that will provide relatively less disturbed foraging, resting, and roosting areas for migrating and wintering birds.</p> <p><u>Migrating/wintering resource closures will be maintained year round. Dogs will be prohibited within 100m of all migrating/wintering resource closures.</u> The following activities are compatible with the non-breeding/wintering shorebird resource protection areas: fishing, beach walking, birding, kayaking, kite boarding, paddle boarding, photography, picnicking, sailing, shelling, stargazing, sunbathing, surfing, swimming, wildlife viewing and wind surfing.</p> <p>The activities listed above singly or collectively could result in disturbance that is incompatible with protection of habitat for migrating and wintering shorebirds. Human disturbance in these areas will have to be monitored and should any single activity or collective activities become excessive (definition TBD), NPS will implement seasonal or additional restrictions on compatible uses.</p> <p>Within 12 months of the implementation of ORV regulations, NPS will initiate a study of migrating/wintering resource areas in cooperation with USGS or major university. Should this study or future research indicate additional restrictions are needed, NPS will implement such restrictions.</p>

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

<p>Data Collected</p>	<p>Collect data as recommended by USGS (<i>Cohen 2005</i>) and use GPS to document nest locations.</p> <p>Record locations where territorial/ courtship behavior occurs, including scrape locations.</p> <p>Estimate where adult and chick foraging occurs. Chicks should never be disturbed to obtain this information.</p>	<p>Collect data as recommended by USGS (<i>Meyers 2005</i>) and use GPS to document nest locations.</p>	<p>Collect data as recommended by USGS (<i>Erwin 2005</i>) and use GPS to document colony locations.</p>
<p>Future Research</p>	<p>Species Management protocols as outlined in this table will not prevent qualified biologists or ornithologists associated with a major university from conducting scientific research that will add to the existing knowledge of species or improve resource protection within the Seashore.</p>		
<p>Goals, Objectives, and Desired Conditions</p>	<p>NPS will develop goals, objectives, and desired conditions of all species of breeding birds within the Seashore, taking into consideration the best available scientific data regarding habitat conditions, historical distribution and abundance of breeding populations, carrying capacity of breeding species, fledging success, and productivity. NPS will work to achieve these goals, which may require additional resource protection measures at some or all locations. NPS will develop these goals in cooperation with USFWS, USGS, and NCWRC.</p>		
<p>Sea Turtles NPS will follow monitoring recommendations in the Atlantic Loggerhead Recovery Plan.</p>			
<p>Survey Time and Frequency</p>	<p>Sea turtle patrol will begin on May 1, unless leatherback nests have been reported within the state, in which case CAHA will follow the direction of NCWRC. Patrol will continue until September 15, or two weeks after the last sea turtle nest or crawl is found, whichever is later.</p> <p>Conduct daily morning surveys by ATV/UTVs and possibly ORVs for crawls and nests on all beaches before public ORV use. Daily surveys for nests end September 15, or two weeks after the last sea turtle nest or crawl was found, whichever is later. Periodic monitoring (e.g., every two to three days) for unknown nesting and emerging hatchlings will continue, especially in areas of high visitation from that date until November 15.</p> <p>Monitoring will also occur for post-hatchling washbacks during periods when there are large quantities of seaweed washed ashore or following severe storm events. Nest observations stop when all nests have hatched or excavation indicates that the nest was not viable.</p>		

	Once a light filter fence is installed, monitor nests daily for signs of hatchling emergence.
Data Collected	<p>Follow the North Carolina Wildlife Resources Commission Handbook and record:</p> <ul style="list-style-type: none"> -Turtle species -Nest vs. false crawl -Location (physical description and GPS location) -If nest needs to be relocated and, if so, why and where (new physical description and GPS location), number of eggs relocated, and time of day -Necessary protective measures for nest and hatchlings -Information regarding any post hatching nest excavation and analysis <p>Examine all nests after hatching to determine productivity rates. Excavate nests in the evening a minimum of 72 hours after hatching event. In cases where hatching events or dates were unknown, unearth nest cavities 80–90 days after the lay date. Any live hatchlings found during excavations will be released after dark on the same day as excavation.</p> <p>For strandings the following will be recorded: species, location, measurements, and signs of human interactions. Samples and photos will be collected when necessary. Necropsies will be conducted when possible.</p>
Nest Closures/ Buffers	<p>Establish a buffer approximately 10 meters by 10 meters with symbolic fencing and signage around nest. Closure size may be modified due to environmental conditions at the nest site.</p> <p>Approximately 50– 55 days into incubation, closures expanded to the surf line. The width of the closure based on the type and level of use in the area of the beach where the nest was laid:</p> <ol style="list-style-type: none"> a. Vehicle-free areas with little or no pedestrian traffic – 25 meters wide (total width); b. Villages or other areas with high levels of day use –50 meters wide (total width); c. Areas with ORV traffic –105 meters wide (total width). <p>Opposite the surf line on the landward side of the closure, expand the closed area to 15 meters where possible, but no less than 10 meters landward from the nest. Pedestrian traffic detours behind the nest area clearly marked with signs and reflective arrows.</p> <p>Where present within closure, vehicle tracks manually smoothed with rakes or a steel mat attached to an ATV, so as not to impede hatchlings attempting to reach the surf.</p> <p>Use light filtering fence behind nests nearing hatch dates to block light pollution from the villages and vehicles operating on the beach after dark.</p> <p>If multiple nests are located near each other (within 150 feet), and have similar hatch dates (14 days), then closures will encompass all nests in the area, and will not be removed until all nests within the closure have hatched.</p>

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

Night Driving Restrictions	<p>Night driving restrictions will begin May 1st and continue until November 15th.</p> <p>Beach routes will be closed to ORV use from 30 minutes after sunset and will remain closed until nest search by sea turtle patrol has been completed and nests are marked with symbolic fencing. NPS will attempt to open each section of beach as soon as possible each morning.</p>
Nest Relocation	<p>By April 15th, areas deemed unsuitable for turtle nests (i.e. high erosion rate) will be identified by Park staff. Maps and descriptions of these areas will be analyzed by NCWRC prior to nesting season.</p> <p>When a nest is found, staff assesses need for nest relocation and follows relocation guidance identified in the NCWRC handbook.</p> <p>If it is determined the nest will not be relocated, it will be immediately protected with a symbolic fencing and signs and will measure approximately 10 meters by 10 meters in size. Closure size may vary at the discretion of staff due to the environmental factors at a nest location.</p> <p>If a nest is threatened by an imminent storm event, NPS will consult with NCWRC to determine appropriate action.</p>
Light Management	<p>Establish turtle friendly lighting standards and/or reduce light for all Seashore (NPS) structures.</p> <p>Encourage concessioners to install turtle friendly lighting.</p> <p>Develop educational material to inform visitors about their impact on the success of sea turtle nests.</p>
Research	<p>Support research efforts looking at the sex ratios of sea turtles.</p> <p>Respond to sea turtle strandings in a timely manner, and report all information, pictures, and signs of human interaction to NCWRC.</p> <p>Necropsies of strandings will be done when possible.</p>
Seabeach Amaranth	
Survey Time and Frequency	<p>August</p> <p>An annual survey of potential habitat will be conducted. Some bird closure areas may not be surveyed due to the potential to disturb nesting birds. Some areas may not be surveyed until just prior to re-opening an area to ORV traffic.</p> <p>July– September</p> <p>Before opening any species closure or identifying alternate ORV corridors, survey for seedlings/plants.</p> <p>End observations when all plants have died back.</p>
Data Collected	<p>Record location of all individual plants or plant clusters using a GPS and note if the plant is located in an area open or closed to recreational use.</p>

Buffers	<p>April 15 – November 30</p> <p>If a plant/seedling is found outside of an existing closure, the Seashore will erect symbolic fencing with signage creating a 10 meter by 10 meter buffer around the plant. If plants are located next to each other, the area will be expanded to create one enclosure protecting several plants.</p> <p>If a SBA is found during the survey prior to reopening a bird closure to ORV and pedestrian use, the Seashore will protect the SBA as described above and reopen the areas of the bird closure where no plants exist.</p> <p>Areas reopened if no plants are present by September 1. Where plants occur, the closed areas will be reopened after the plants have died.</p>
----------------	---

Table 1. Shorebird / Waterbird Buffer Summary

Species	Breeding Behavior/ Nest Buffer	Unfledged Chicks
	SM1 / SM2	SM1 / SM2
Piping Plover	50 m / 50 m	1000 m / 200-1000 m
American Oystercatcher	300 m / 150 m	300 m / 200 m
Least Terns	300 m / 100 m	300 m / 200 m
Other Species CWB	300 m / 200 m	300 m / 200 m

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

Waterbird and Shorebird Literature

Updated: 26 March 2009

- Anders, F. J. and S. Leatherman. 1987. Effects of off-road vehicles on coastal foredunes at Fire Island, New York, USA. *Environmental Management* 11: 45-52.
- Anders, F. J. and S. P. Leatherman 1987. [Environmental Management](#) 11: 183-189.
- Anders, F. J. & S. P. Leatherman, 1987. Disturbance of beach sediment by off-road vehicles. *Environmental Geology and Water Science* 9: 183–189.
- Anderson, D. W. and J. O. Keith. 1980. The human influences of seabird nesting success: conservation implications. *Biological Conservation* 18:65–80.
- Anderson, S. H. 1995. Recreational disturbance and wildlife populations. p. 157-168, in R. L. Knight and K. J. Gutzwiller eds. *Wildlife and Recreationists*. Island Press, Washington, D. C.
- Arehart-Treichel, J. 1979. Can the barrier beaches be saved? *Science News* 115:1 10-13.
- Atkinson, P. W., A. J. Baker , K. A. Bennett , N. A. Clark, J. A. Clark , K. B. Cole , A. Dekinga , A. Dey , S. Gillings , P. M. Gonzalez , K. Kalasz , C. D. T. Minton , J. Newton , L. J. Niles , T. Piersma , R. A. Robinson and H. P. Sitters. 2007. Rates of mass gain and energy deposition in red knot on their final spring staging site is both time- and condition-dependent. *Journal of Applied Ecology* 44: 885-895.
- Avery, A. L., T. Penn, E. Savage, and H. Hollis. 2004. Piping Plover monitoring and management summer 2004 report and 2005 plans for beach nesting shorebirds. USFWS, Chincoteague National Wildlife Refuge, VA.
- Baker, A. J., P. M. Gonzalez, T. Piersma, L. J. Niles, I. L. S. Nascimento, P. W. Atkinson, N. A. Clark, C. D. T. Minton, M. K. Peck, and G. Aarts. 2004. Rapid population decline in Red Knots: fitness consequences of decreased refueling rates and late arrival in Delaware Bay. *Biological Sciences* 271: 875-882.
- Bart, J., S. Brown, B. Harrington & R.I.G. Morrison. 2007. Survey trends of North American shorebirds: population declines or shifting distributions? *J. Avian Biol.* 38: 73–82.
- Baskin, J. M. and C. C. Baskin. 1998. Seed dormancy and germination in the rare plant species *Amaranthus pumilis*. *Castanea* 63: 493-494.
- Baudains, T. P. and P. Llyod. 2007. Habituation and habitat changes can moderate the impacts of human disturbance on shorebird breeding performance. *Animal Conservation* 10: 400-407.

- Beale, C. M. and P. Monaghan. 2004. Human disturbance: people as predation-free predators? *Journal of Applied Ecology* 41: 335-343.
- Bednekoff, P. A. and A. I. Houston. 1994. Optimizing fat reserves over the entire winter: A dynamic model. *Oikos* 71: 408-415.
- Bergstrom, P. W. 1988. Breeding biology of Wilson's Plovers. *Wilson Bulletin* 100: 25-35.
- Blodget, B.G. 1978. The effect of off-road vehicles on Least Terns and other shorebirds. University of Massachusetts/National Parks Service Cooperative Research Unit Report No. 26. 79 p.
- Blumstein, D.T. 2003. Flight-initiation distance in birds is dependent on intruder starting distance. *Journal of Wildlife Management* 67: 852-857.
- Blumstein, D. T., L. L. Anthony, R. Harcourt, and G. Ross. 2003. Testing a key assumption of wildlife buffer zones: is flight initiation distance a species-specific trait? *Biological Conservation* 110:97- 100.
- Blumstein, D. T., E. Fernandez-Juricic, P. A. Zollner, and S. C. Garity. 2005. Interspecific variation in avian responses to human disturbance. *Journal of Applied Ecology* 42: 943-953.
- Boellstorff, D. E. D. W. Anderson, H. M. Ohlendorf and E. J. O'Neill. 1988. Reproductive effects of nest-marking studies in an American White Pelican colony. *Colonial Waterbirds* 11:215-219.
- Boersma, P.D., Parrish, J.K. 1998. Threats to seabirds: research, education, and societal approaches to conservation. In: Marzluff, J.M., Sallabanks, R. (Eds.), *Avian Conservation: Research and Management*. Island Press, Washington, DC , pp. 237-259.
- Boettcher, R., T. Penn, R.R. Cross, K. T. Terwilliger, and R. A. Beck. 2007. An Overview of the Status and Distribution of Piping Plovers in Virginia. *Waterbirds* 30: 138-151.
- Boland, J. M. 1990. Migration in North American Shorebirds: Intra- and Interspecific examples. *Condor* 92: 284-290.
- Botton, M. L., R. E. Loveland, and T. R. Jacobsen. 1994. Site selection by migratory shorebirds in Delaware Bay, and its relationship to beach characteristics and abundance of horseshoe crab (*Limulus polyphemus*) eggs. *The Auk* 111(3): 605- 616.
- Bowles, A. E. 1995. Responses of wildlife to noise. pp. 109-156. In: Knight, R. L. and K. J. Gutzwiller. (eds.) *Wildlife and Recreationists: Coexistence through Management and Research*. Island Press: Washington, D.C.

- Boyle, S. A. and F. B. Samson. 1985. Effects of non-consumptive recreation on wildlife: a review. *Wildlife Society Bulletin* 13:110-116.
- Brodhead, J. M. and P. J. Godfrey. 1977. Off road vehicle impact in Cape Cod National Seashore: disruption and recovery of dune vegetation. [*International Journal of Biometeorology* 21: 299-306.](#)
- Brodhead, J.M.; Godfrey, P.J. 1979a. The effects of off-road vehicles on coastal dune vegetation in the Province Lands, Cape Cod National Seashore. University of Massachusetts/National Parks Service Cooperative Research Unit Report No. 32. 212 p.
- Brodhead, J.M.; Godfrey, P.J. 1979b. Effects of off-road vehicles on plants of a northern marsh. Final Report 1974.1977. University of Massachusetts/National Parks Service Cooperative Research Unit Report No. 33. 65 p.
- Brown, A. C. & A. McLachlan, 2002. Sandy shore ecosystems and the threats facing them: some predictions for the year 2025. *Environmental Conservation* 29: 62–77.
- Brown, S., S. Schulte, B. Harrington, B. Winn, J. Bart and M. Howe. 2005. Population size and winter distribution of eastern American Oystercatchers. *Journal of Wildlife Management* 69: 1538-1545.
- Brown, S., C. Hickey, B. Gill, L. Gorman, C. Gratto-Trevor, S. Haig, B. Harrington, C. Hunter, G. Morrison, G. Page, P. Sanzenbacher, S. Skagen, N. Warnock. 2000. National Shorebird Conservation Assessment: Shorebird Conservation Status, Conservation Units, Population Estimates, Population Targets, and Species Prioritization. Manomet Center for Conservation Sciences. <http://www.Manomet.org/USSCP/files.htm>
- Brown, S., C. Hickey, B. Harrington, and R. Gill, Eds. 2001. *The U. S. Shorebird Conservation Plan*, 2nd ed. Manomet Center for Conservation Sciences, Manomet, MA.
- Buckley, P. A., and F. G. Buckley. 1976. Guidelines for the protection and management of colonially nesting waterbirds. North Atlantic Regional Office, National Park Service, Boston, Massachusetts.
- Buckley, P. A. and F. G. Buckley. 1984. Seabirds of the north and middle Atlantic coast of the United States: their status and conservation. Pages 101-133 *in* Status and conservation of the world's seabirds. (Croxall, J. P., P. G. H. Evans, and R. W. Schreiber, Eds.) Tech. Publ. No. 2., Internl. Council Bird Preserv. Cambridge, UK.
- Buehler, D. M and A. J. Baker. 2005. Population divergence times and historical demography in red knots and dunlins. *Condor* 107: 497-513.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Buick, A.M.; Paton, D.C. 1989. Impact of off-road vehicles on the nesting success of Hooded Plovers *Charadrius rubricollis* in the Coorong region of South Australia. *Emu* 89: 159-172.
- Burger, J. 1981. The effect of human activity on birds at a coastal bay. *Biological Conservation* 21:231-241.
- Burger, J. 1981. Effects of human disturbance on colonial species, particularly gulls. *Colonial Waterbirds* 4: 28-36.
- Burger, J. 1982. The role of reproductive success in colony-site selection and abandonment in Black Skimmers (*Rynchops niger*). *Auk* 99: 109-115.
- Burger, J. 1982. An overview of proximate factors affecting reproductive success in colonial birds: concluding remarks and summary of panel discussion. *Colonial Waterbirds* 5: 58-65.
- Burger, J. 1982. Jamaica Bay Studies: I. Environmental determinants of abundance and distribution of Common Terns (*Sterna hirundo*) and Black Skimmers (*Rynchops niger*) at an east coast estuary. *Colonial Waterbirds* 5: 148-160.
- Burger, J. 1984. Colony stability in Least Terns. *Condor* 86:61-67.
- Burger J. (ed.) 1984. Abiotic Factors Affecting Migrant Shorebirds. Plenum Press, New York, pp. 1-73.
- Burger, J. 1986. The effect of human activity of shorebirds in two coastal bays in Northeastern United States. *Environmental Conservation* 13: 123-130.
- Burger, J. 1987. Physical and Social determinants of nest-site selection in Piping Plover in New Jersey. *Condor*. 89: 811-818.
- Burger, J. 1988. Jamaica Bay Studies VIII: An overview of abiotic factors affecting several avian groups. *Journal of Coastal Research* 4: 193-205.
- Burger, J. 1988. Effects of demolition and beach clean-up operations on birds on a coastal mudflat in New Jersey. *Estuarine, Coastal and Shelf Science*. 27: 95-108.
- Burger, J. 1989. Least tern populations in coastal New Jersey: monitoring and management of a regionally-endangered species. *Journal of Coastal Research* 5:801-811.
- Burger J. 1991. Foraging behavior and the effect of human disturbance on the Piping Plover *Charadrius melodus*. *Journal of Coastal Research* 7: 39-52.
- Burger, J. 1994. The effect of human disturbance on foraging behavior and habitat use in piping plover (*Charadrius melodus*). *Estuaries*. 17(3): 695-701.

- Burger, J. 1994. Nocturnal foraging behavior of breeding piping plovers (*Charadrius melodus*) in New Jersey. *Auk* 111: 579-587.
- Burger, J. 1995. Beach recreation and nesting birds. Pages 281-295 in *Wildlife and recreators: coexistence through management and research* (R.L. Knoght and K.J. Gutzwiller, Eds.). Island Press, Washington, D.C.
- Burger J. 1998. Effects of motorboats and personal watercraft on flight behavior over a colony of Common Terns. *Condor*. 100:528–534.
- Burger, J. and M. Gochfeld. 1990. Nest site selection in Least Terns (*Sterna antillarum*) in New Jersey and New York. *Colonial Waterbirds* 13: 31-40.
- Burger, J. and M. Gochfeld. 1991. Reproductive vulnerability: parental attendance around hatching in Roseate (*Sterna dougallii*) and Common (*S. hirundo*) Terns. *Condor* 93: 125-129.
- Burger, J. and M. Gochfeld. 1991. *The Common Tern: Its Breeding Biology and Social Behavior*.
- Burger, J., and M. Gochfeld. 1991. Human activity influence and diurnal and nocturnal foraging of Sanderlings (*Calidris alba*). *Condor* 93:259–265.
- Burger, J. and M. Gochfeld. 1994. Predation and effects of humans on island-nesting seabirds. Pp. 39-67 in *Seabirds on Islands: threats, case studies and action plans*. (D. N. Nettleship, J. Burger and M. Gochfeld, eds.). BirdLife International, BirdLife Conservation Series No. 1. Cambridge, U.K.
- Burger, J. and M. Gochfield. 1998. Effects of ecotourists on bird behaviour at Loxahatchee National Wildlife Refuge, Florida. *Environmental Conservation* 25:13-21.
- Burger J., and M. Gochfeld. 1998. Effects of ecotourists on bird behavior at Loxahatchee National Wildlife Refuge, Florida. *Environmental Conservation*. 25:13–21.
- Burger J., and M. Gochfeld. 1990. Nest site selection in Least Terns (*Sterna antillarum*) in New Jersey and New York. *Colonial Waterbirds* 13: 31-40.
- Burger, J., S. A. Carlucci, C. W. Jeitner, and L. Niles. 2007. Habitat choice, disturbance and management of foraging shorebirds and gulls at a migratory stopover. *Journal of Coastal Research* 25:1159-1166.
- Burger, J., M. A. Howe, D. C. Hahn, J. Chase. 1977. Effects of tidal cycles on habitat selectioun and habitat portioning by migrating shorebirds. *Auk* 94: 743-758.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Burger, J., C. Jeitner, K. Clark, and L. J. Niles. 2004. The effect of human activities on migrant shorebirds: successful adaptive management. *Environmental Conservation* 31: 283–288.
- Burger, J., M. Gochfeld, and L. J. Niles. 1995. Ecotourism and birds in coastal New Jersey: contrasting responses of birds, tourists, and managers. *Environmental Conservation* 22:56–65.
- Burger, J., L. Niles and K.E. Clark. 1997. Importance of beach, mudflat and marsh habitats to migrant shorebirds on Delaware Bay. *Biological Conservation* 79: 283- 292.
- Burger, J., I. C. T. Nisbet, C. Safina and M. Gochfeld. 1996. Temporal patterns of reproductive success in the endangered Roseate Tern (*Sterna dougallii*) nesting on Long Island, New York, and Bird Island, Massachusetts. *Auk* 113: 131-142.
- Burger, J., M. A. Howe, D. C. Hahn, and J. Chase. 1977. Effects of tide cycle on habitat selection and habitat partitioning by migrating shorebirds. *Auk* 94: 743-758.
- Burger, J., S. A. Carlucci, C. W. Jeitner, and L Niles. 2007. Habitat Choice, Disturbance, and Management of Foraging Shorebirds and Gulls at a Migratory Stopover. *Journal of Coastal research* 23: 1159-1166.
- Burger, J., K. Parsons, D. Wartenberg, C. Safina, J. O'Connor, and M. Gochfeld. 1994. Biomonitoring Using Least Terns and Black Skimmers in the northeastern United States. *Journal of Coastal Research*, 10: 39-47
- Burns, J. G. and R. C. Ydenberg. 2002. The effects of wing loading and gender on the escape flights of Least Sandpipers (*Calidris minutilla*) and Western Sandpipers (*Calidris mauri*). *Behavioral Ecology and Sociobiology* 52: 128-136.
- Burton, N.H.K. 2007. Landscape approaches to studying the effects of disturbance on waterbirds. *Ibis* 149: 95–101.
- Burton, N. H. K., M. J. S. Armitage, A. J. Musgrove, and M. M. Rehfisch. 2002. Impacts of man-made landscape features on numbers of estuarine waterbirds at low tide. *Environmental Management* 30: 857-864.
- Burton, N. H. K., M. M. Rehfisch, and N. A. Clark. 2002. Impacts of disturbance from construction work on the densities and feeding behavior of waterbirds using the intertidal mudflats of Cardiff Bay, U.K. *Environmental Management* 30:865–871.
- Burton, N.H.K., P. R. Evans, M.A. Robinson. 1996. Effects on shorebird numbers of disturbance, the loss of a roost site and its replacement by an artificial island at Hartlepool, Cleveland. *Biological Conservation* 77, 193–201.
- Butler, R. W., N. C. Davidson, R. I. G. Morrison. 2001. Global-scale shorebird distribution in relation to productivity of near-shore ocean waters. *Waterbirds* 24: 224-232.

- Butler, R. W., F. S. Delgado, H. Cueva, V. Pulido, B. K. Sandercock. 1996. Migration routes of the Western Sandpiper. *Wilson Bulletin* 108: 662-672.
- Cairns, W. E. 1982. Biology and breeding behavior of breeding Piping Plovers. *Wilson Bulletin* 94: 531-545.
- Calvert, A. M., D. L. Amirault, F. Shaffer, R. Elliot, A. Hanson, J. McKnight, and P. D. Taylor. 2006. Population assessment of an endangered shorebird: the Piping Plover (*Charadrius melodus melodus*) in eastern Canada. *Avian Conservation and Ecology - Écologie et conservation des oiseaux* 1(3): 4. [online] URL: <http://www.ace-eco.org/vol1/iss3/art4/>
- Cameron, S. and D. Allen. 2004. American Oystercatcher breeding distribution and population estimate in North Carolina. *North Carolina Wildlife Resources*, Raleigh, North Carolina, USA.
- Cameron, S. E., D. H. Allen, M. M. Lyons, J. R. Cordes, and S. B. Maddock. 2005. Compilation and assessment of Piping Plover wintering and migratory staging area data in North Carolina. *Proceedings of the Symposium on the Wintering Ecology and Conservation of Piping Plovers*. 5pp.
- Cape Cod National Seashore. 1993. Piping Plover nest found trampled by pedestrian.. News release. Cape Cod national Seashore, South Wellfleet, Massachusetts. 2 pp.
- Cardoni, D. A., M. Favero, and J. P. Issach. 2008. Recreational activities affecting the habitat use by birds in Pampa's wetlands, Argentina: Implications for waterbird conservation. *Biological Conservation* 141: 797-806.
- Carlson, L. H., and P. J. Godfrey. 1989. Human impact management in a coastal recreation and natural area. *Biological Conservation* 49:141-156.
- Carney, K. M., and W. J. Sydeman. 1999. A review of human disturbance effects on nesting colonial waterbirds. *Waterbirds* 22:68-79.
- Castro, G., J. P. Myers, R. E. Ricklefs. 1992. Ecology and energetics of sanderlings migrating to four latitudes. *Ecology* 73: 833-844.
- Clapp, R. B., D. Morgan-Jacobs, and R. C. Banks. 1983. Marine birds of the southeastern United States and Gulf of Mexico, pt. 3: Charadriiformes. FWS/OBS-83/30, U.S. Fish and Wildl. Serv., Div. Biol. Serv. Washington, D. C.
- Clark, K.E. and L. Niles. 2000. U.S. Shorebird Conservation Plan: [Northern Atlantic Regional Shorebird Plan](#), Version 1, U.S. Fish and Wildlife Service. Online at: <http://www.fws.gov/shorebirdplan/RegionalShorebird/RegionalPlans.htm> (accessed 16 May 2006).

- Clark, K. E., L. Niles, and J. Burger. 1993. Abundance and distribution of migrant shorebirds in Delaware Bay. *Condor* 95: 694-705.
- Cohen, J. B., E. H. Wunker, and J. D. Fraser. 2008. Substrate and Vegetation Selection by Nesting Piping Plovers. *Wilson Journal of Ornithology* 120: 404–407.
- Cohen, J. B. 2005. Factors limiting Piping Plover nesting pair density and reproductive output on Long Island, New York. Ph.D. Dissertation, VA Polytechnic Institute and State University. Pp. 251.
- Cohen, J. B. 2005. Management and protection protocols for the threatened Piping Plover (*Charadrius melodus*) on Cape Hatteras National Seashore, North Carolina. USGS Patuxent Wildlife Research Center.
- Cohen, J. B., J. D. Fraser and D. H. Catlin. 2006. Survival and site fidelity of Piping Plovers on Long Island, New York. *Journal of Field Ornithology* 77: 409–417.
- Cole, D. N., and P. B. Landres. 1995. Indirect effects of recreation on wildlife. p. 183-202, IN: R. L. Knight and K. J. Gutzwiller eds. *Wildlife and Recreationists*. Island Press, Washington, D. C.
- Cole D. N., and R. L. Knight. 1991. Wildlife preservation and recreational use: conflicting goals of wildland management. *Transactions of the North American Wildlife and Natural Resources Conference* 56:233-237.
- Coleman, R.A., N.A. Salmon and S. J. Hawkins. 2003. Sub-dispersive human disturbance of foraging oystercatchers *Haematopus ostralegus*. *Ardea* 53: 263–268.
- Collazo, J. A., D. A. O’Harra, and C. A. Kelly. 2002. Accessible habitat for shorebirds: Factors influencing its availability and conservation implications. *Waterbirds* 25: 13-24.
- Collazo, J. A., J. R. Walters, and J. F. Parnell. Undated. Factors affecting reproduction and migration of waterbirds on the North Carolina barrier islands. Final report to the National Park Service – Cape Hatteras and Cape Lookout Seashores . NC State University, Raleigh, North Carolina.
- Colwell, M.A., Dafunsky, T., Fox-Fernandez, N.W., Roth, J.E. & Conklin, J.R. 2003. Variation in shorebird use of diurnal, high-tide roosts: how consistently are roosts used? *Waterbirds*, 26, 484–493.
- Colwell, M. A. 1993. Shorebird community patterns in a seasonally dynamic estuary. *Condor* 95: 104-114.
- Colwell, M. A. and K. D. Sundeen. 2000. Shorebird distributions on ocean beaches of northern California. *Journal of Field Ornithology* 71: 1-15.

- Colwell, M. A., T. Danufsky, N.W. Fox-Fernandez, J. E. Roth, J. R. Conklin. 2003. Variation in shorebird use of diurnal, high-tide roosts: How consistently are roosts used? *Waterbirds* 26: 484-493.
- Corbat, Carol A. and Peter W. Bergstrom. 2000. Wilson's Plover (*Charadrius wilsonia*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/516>
- Corbat, C. A., and P. W. Bergstrom. 2000. Wilson's Plover (*Charadrius wilsonia*). In *The Birds of North America*, No. 516 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.
- Cornelius, C., S. A. Navarrete and P. A. Marquet. 2001. Effects of human activity on the structure of coastal marine bird assemblages in central Chile. *Conservation Biology* 15: 1396–1404.
- Cowgill, R. W. 1989. Nesting success of Least Terns on two South Carolina barrier islands in relation to human disturbance. *Chat* 53: 82–87.
- Cox, J. H., H. F. Percival, S. V. Colwell. 1994. Impact of vehicular traffic on beach habitat and wildlife at Cape San Blas, Florida. Technical Report 50, Florida Coop Fish and Wildlife Research Unit.
- Cross, R. R. 1996. Breeding ecology, success, and population management of the Piping Plover (*Charadrius melodus*) at Chincoteague National Wildlife Refuge, Virginia. MS Thesis, The College of William and Mary, Williamsburg, VA. 214 pp.
- Culik, B., D. Adelung and A. J. Woakes. 1990. The effect of disturbance on the heart rate and behaviour of Adelie Penguins (*Pygoscelis adeliae*) during the breeding season. Pages 177-182 in *Antarctic ecosystems: Ecological change and conservation* (K. R. Kerry and G. Hempel. Eds.). Springer Verlag, Berlin, Germany.
- Cuthbert, F.J., Wires, L.R. and K. Timmerman. 2003. Status Assessment and Conservation Recommendations for the Common Tern (*Sterna hirundo*) in the Great Lakes Region. U.S. Department of the Interior, Fish and Wildlife Service, Ft. Snelling, MN.
- Davenport, J. & J. L. Davenport. 2006. The impact of tourism and personal leisure transport on coastal environments: a review. *Estuarine, Coastal and Shelf Science* 67: 280–292.
- Davidson, N.C., & Rothwell, P.I. 1993. Human disturbance to waterfowl on estuaries: conservation and coastal management implications of current knowledge. In: *Disturbance to waterfowl on estuaries*. N. Davidson & P. Rothwell, Eds. Wader Study Group Bull. 68: 97-106.

- Davis, M. B. 1999. Reproductive success, status and viability of the American Oystercatcher (*Haematopus palliatus*). Unpublished M.S. Thesis, North Carolina State University, Raleigh, North Carolina.
- Davis, M. B., T. R. Simons, M. J. Groom, J. L. Weaver and J. R. Cordes. 2001. The breeding status of the American Oystercatcher on the east coast of North America and breeding success in North Carolina. *Waterbirds* 24: 195-202
- Dias, M. P., J. P. Grandadeiro, M. Lecoq, C. D. Santos, and J. M. Palmeirim. 2006. Distance to high-tide roosts constrains the use of foraging areas by dunlins: Implications for the management of estuarine wetlands. *Biological Conservation* 131: 446-452.
- Dinsmore, S. J., A. A. Collazo, and J. R. Walters. 1998. Seasonal numbers and distribution of shorebirds on North Carolina's Outer Banks. *Wilson Bulletin*, 110:171-181.
- Dinsmore, S. J. and J. A. Collazo. 2003. The influence of body condition on local apparent survival of spring migrant Sanderlings in coastal North Carolina. *Condor* 105: 265-473.
- Dodd, S.L. & M. A. Colwell. 1998. Environmental correlates of diurnal and nocturnal foraging patterns of nonbreeding shorebirds. *Wilson Bulletin* 110: 182-189.
- Donaldson, G.M., C. Hyslop, R. I. G. Morrison, H. L. Dickson, and I. Davidson., eds. 2000. "[Canadian Shorebird Conservation Plan](#)," Canadian Wildlife Service, Ottawa, Ontario.
- Dowling, B. & Weston, M. 1999. Managing a breeding population of the hooded plover *Thinornis rubricollis* in a high use recreational environment. *Bird. Conserv. Int.* 9, 255-270.
- Drake, K.R., J.E. Thompson, K.L. Drake, and C. Zonick. 2001. Movements, habitat use, and survival of nonbreeding Piping Plovers. *Condor* 103: 259-267.
- Dunn, P. O., T. A. May, M. A. McCullough, and M. A. Howe. 1988. Length of stay and fat content of migrant Semipalmated Sandpipers in eastern Maine. *Condor* 90: 824-835.
- Elias, S.P., J. D. Fraser, P. A. Buckley. 2000. Piping plover brood foraging ecology on New York barrier islands. *Journal of Wildlife Management* 64: 346-354.
- Elias-Gerken, S.P. 1994. Piping plover habitat suitability on central Long Island, New York barrier islands. M.S. Thesis. Virginia Polytechnic Institute and State University, Blacksburg, Virginia. 48 pp.
- Elliott-Smith, Elise and Susan M. Haig. 2004. Piping Plover (*Charadrius melodus*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/002>

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Ellison, L. N. and L. Cleary. 1978. Effects of human disturbance on breeding of Double-crested Cormorants. *Auk* 95: 510-517.
- Elphick, Chris S. and T. Lee Tibbitts. 1998. Greater Yellowlegs (*Tringa melanoleuca*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/355>
- Erwin, R. M. 1977. Foraging and breeding adaptations to different food regimes in three seabirds: The Common Tern, *Sterna hirundo*, Royal Tern *Sterna maxima*, and Black Skimmer *Rynchops niger*. *Ecology* 58: 389-397.
- Erwin, R.M. 1996. Dependence of waterbirds and shorebirds on shallow-water habitats in the Mid-Atlantic coastal region: An ecological profile and management: Recommendations. *Estuaries* 19(2A): 213-219.
- Erwin, R. M. 1980. Breeding habitat use by colonially nesting waterbirds in two mid-Atlantic U.S. regions under different regimes of human disturbance. *Biological Conservation* 18: 39-51.
- Erwin, R. M. 1989. Responses to human intruders by birds nesting colonies: experimental results and management guidelines. *Colonial Waterbirds* 12:104-108.
- Erwin, R. M., D. H. Allen, and D. Jenkins. 2003. Created versus natural coastal islands: Atlantic waterbird populations, habitat choices, and management implications. *Estuaries* 26: 949-955.
- Erwin, R. M., G. M. Haramis, D. G. Krementz and S. L. Funderburk. 1993. Resource protection for waterbirds in Chesapeake Bay. *Environmental Management* 17: 613-619.
- Erwin, R. M., J. D. Nichols, T. B. Eyler, D. B. Stotts, and B. R. Truitt. 1998b. Modeling colony-site dynamics: A case study of gull-billed terns (*Sterna nilotica*) in coastal Virginia. *Auk* 115: 970-978.
- Erwin, R. M., and D. C. Smith. 1985. Habitat comparisons and productivity in nesting common terns on the mid-Atlantic coast. *Colonial Waterbirds* 8: 155-165.
- Erwin, R. M. 1996. Dependence of waterbirds and shorebirds on shallow-water habitats in the Mid-Atlantic coastal region: An ecological profile and management recommendations. *Estuaries and Coasts* 19: 213-219.
- Erwin, R. M. 2005. Monitoring and protection protocols for colonially nesting waterbirds at Cape Hatteras National Seashore, North Carolina. USGS Patuxent Wildlife Research Center.
- Erwin, R. M. 1977. Black skimmer breeding ecology and behavior. *Auk* 94: 709-717.

- Erwin, R. M., J. Galli, and J. Burger. 1981. Colony site dynamics and habitat use in Atlantic Coast seabirds. *Auk* 98: 550-561.
- Erwin, R. M., B. R. Truitt, and J. E. Jimenez. 2001. Ground-nesting waterbirds and mammalian carnivores in the Virginia barrier island region: running out of options. *Journal of Coastal Research* 17: 292-296.
- Eyler, T. B., R. M. Erwin, D. B. Stotts, and J. S. Hatfield. 1999. Aspects of hatching success and chick survival in gull-billed terns in coastal Virginia. *Waterbirds* 22: 54-59.
- Farmer, A. H. and A. H. Parent. 1997. Effects of the landscape on shorebird movements at spring migration stopovers. *Condor* 99: 698-707.
- Farmer, A. H. and J. A. Wiens. 1998. Optimal migration schedules depend on the landscape and the physical environment: A dynamic modeling view. *Journal of Avian Biology* 29: 405-415.
- Farmer, A. H. and J. A. Wiens. 1999. Time-energy trade-offs in Pectoral Sandpiper (*Calidris melanotos*) migration. *Ecology* 80: 2566-2580.
- Fernández-Juricic, E., Jimenez, M. D. and E. Lucas. 2001. Alert distance as an alternative measure of bird tolerance to human disturbance: implications for park design. *Environmental Conservation* 28:263-269.
- Finney, S. K., J. W. Pearce-Higgins and D. W. Yalden. 2005. The effect of recreational disturbance on an upland breeding bird, the Golden Plover *Pluvialis apricaria*. *Biological Conservation* 121: 53-63.
- Fitzpatrick S. and Bouchez B. 1998. Effects of recreational disturbance on the foraging behaviour of waders on a rocky beach. *Bird Study* 45: 157-171.
- Flemming, S. P., R. D. Chiasson, P.C. Smith, P. J. Austin-Smith and R. P. Bancroft. 1988. Piping Plover status in Nova Scotia related to its reproductive and behavioral responses to human disturbance. *Journal of Field Ornithology* 59: 321-330.
- Foin, T. C., S. P. D. Riley, A. L. Pawley, D. R. Ayres, T. M. Carlsen, P. J. Hodum, and P. V. Switzer. 1998. Improving recovery planning for threatened and endangered species. *BioScience* 48: 177-184.
- Fraser, J. D., S. E. Keane, and P. A. Buckley. 2005. Pre-nesting use of intertidal habitats by Piping Plovers on South Monomoy Island, Massachusetts. *Journal of Wildlife Management* 69: 1731-1736.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Frid, A., and L. M. Dill. 2002. Human-caused disturbance stimuli as a form of predation risk. *Conservation Ecology* 16. <http://www.ecologyandsociety.org/vol6/iss1/>. Accessed 2003 Oct 10.
- Gabrielson, G. W. and E. N. Smith. 1995. Physiological responses of wildlife to disturbance. Pages 95-107 *in* R. L. Knight and K. J. Gutzwiller, ed. *Wildlife and Recreationists: coexistence through management and research*. Island Press, Washington, D. C. 372pp.
- Galbraith, H., R. Jones, R. Park, J. Clough, S. Herrod-Julius, B. Harrington and G. Page. 2002. Global climate change and sea level rise: potential losses of intertidal habitat for shorebirds. *Waterbirds* 25(2): 173-183.
- Gill, J. A., W. J. Sutherland and A. R. Watkinson. 1996. A method to quantify the effects of human disturbance on animal populations. *Journal of Applied Ecology* 33:786-792.
- Gill, J. A., K. Norris and W. J. Sutherland. 2001. Why behavioral responses may not reflect the population consequences of human disturbance. *Biological Conservation* 97: 265–268.
- Gill, J. A., W. J. Sutherland, and K. Norris. 2001. Models can predict shorebird distribution at different spatial scales. *Biological Sciences* 268: 369-376.
- Gochfeld, M. 1983. Colony site selection by Least Terns: Physical attributes of sites. *Colonial Waterbirds* 6: 205-213.
- Gochfeld, M. and J. Burger. 1994. Black Skimmer (*Rynchops niger*). *In* The Birds of North America, No. 108 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- Godfrey, P., S. Leatherman, and P. Buckley. 1978. Impact of offroad vehicles on coastal ecosystems. Pages 581-600 *in* Proceedings of the Symposium on Technical, Environmental, Socio-economic and Regulatory Aspects of Coastal Zone Planning and Management 1978. San Francisco, CA.
- Godfrey, P. J. and Godfrey, M. 1981. Ecological effects of off-road vehicles on Cape Cod. *Oceanus*. 23: 56-67
- Goldin, M. R. 1993. Effects of human disturbance and off-road vehicles on piping Plover reproductive success and behavior at Breezy Point, Gateway National Recreation Area, New York. MS Thesis. University of Massachusetts, Amherst, Massachusetts. 128 pp.
- Goldin, M. R. and J. V. Regosin. 1998. Chick behavior, habitat use, and reproductive success of piping plovers at Goosewing Beach, Rhode Island. *Journal of Field Ornithology* 69: 228-234.
- Goodloe, S. 1986. Viewpoint: Off-road vehicle damage to public lands. *Rangelands* 8: 107-108.

- Goodrich, L. J. 1982. The effects of disturbance on reproductive success of the Least Tern (*Sterna albifrons*). M.S. thesis, Rutgers State Univ., New Brunswick, NJ.
- Goss-Custard, J. D., R. T. Clarke, K. B. Briggs, B. J. Ens, K.-M. Exo, C. Smit, A. J. Beintema, R. W. G. Caldow, D. C. Catt, N. A. Clark, S. E. A. Le V. Dit Durell, M. P. Harris, J. B. Hulscher, P. L. Meininger, N. Picozzi, R. Prys-Jones, U. N. Safriel, A. D. West. 1995. Population Consequences of Winter Habitat Loss in a Migratory Shorebird. I. Estimating Model Parameters. *Journal of Applied Ecology* 32: 320-336.
- Goss-Custard, J. D., R. T. Clarke, S. E. A. Le V. Dit Durell, R. W. G. Caldow, B. J. Ens. 1995. Population Consequences of Winter Habitat Loss in a Migratory Shorebird. II. Model Predictions. *Journal of Applied Ecology* 32: 337-351.
- Goss-Custard, J.D., 2003. Fitness, demographic rates and managing the coast for shorebird populations. *Wader Study Group Bulletin* 100, 183–191. Goss-Custard, J.D., Durell, S.E.A. le
- Goss-Custard, J.D., P. Triplet, F. Sueur, A.D. West. 2006. Critical thresholds of disturbance by people and raptors in foraging wading birds. *Biological Conservation* 127: 88-97.
- Goss-Custard, J.D., and N. Verboven. 1993. Disturbance and feeding shorebirds on the Exe estuary. *Wader Study Group Bull.* 68: 59-66.
- Goss-Custard, J. D., R. A. Stillman, A. D. West, R. W. G. Caldow, P. Triplet, S. E. A. le V. dit Durell, S. McGrorty. 2004. When enough is not enough: shorebirds and shellfishing. *Proceedings: Biological Sciences* 271: 233-237.
- Gratto-Trevor, Cheri L. 2000. Marbled Godwit (*Limosa fedoa*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the *Birds of North America Online*: <http://bna.birds.cornell.edu/bna/species/492>
- Gratto-Trevor, Cheri L. 1992. Semipalmated Sandpiper (*Calidris pusilla*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the *Birds of North America Online*: <http://bna.birds.cornell.edu/bna/species/006>
- Groom, J. D., L. B. McKinney, L. C. Ball & C. S. Winchell. 2007. Quantifying off-highway vehicle impacts on density and survival of a threatened dune-endemic plant. *Biological Conservation* 135: 119–134.
- Gutzwiller, K. J. 1995. Recreational disturbance and wildlife communities. p. 169-181, IN: R. L. Knight and K. J. Gutzwiller eds. *Wildlife and Recreationists*. Island Press, Washington, D. C.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Haig, S. M., C. L. Ferland, F. J. Cuthbert, J. Dingledine, J. P. Goossen, A. Hecht, and N. McPhillips. 2005. A complete species census and evidence for regional declines in Piping Plovers. *Journal of Wildlife Management* 69: 160-173.
- Haig, S. M., and E. Elliott-Smith. 2004. Piping Plover. *The Birds of North America Online*. (A. Poole, Ed.) Ithaca: Cornell Laboratory of Ornithology; Retrieved from The Birds of North American Online database:
http://bna.birds.cornell.edu/BNA/account/Piping_Plover/.
- Haig, S. M. and L. W. Oring. 1985. The distribution and status of the piping plover throughout the annual cycle. *Journal of Field Ornithology* 56: 334-345.
- Haig, S.M. and L.W. Oring. 1988a. Distribution and dispersal in the Piping Plover. *Auk* 105: 630–638.
- Haig, S. M. and L. W. Oring. 1988. Mate, site, and territory fidelity in Piping Plovers. *Auk* 105: 268-277.
- Haig, S. M., L. W. Oring, P. M. Sanzenbacher, O. W. Taft. 2002. Space Use, Migratory Connectivity, and Population Segregation among Willets Breeding in the Western Great Basin. *Condor* 104: 620-630.
- Haig, S. M. and J.H. Plissner. 1993. Distribution and abundance of piping plovers: Results and implications of the 1991 International census. *Condor* 95: 145-156.
- Hancock, T. E. and P. E. Hosier. 2003. Ecology of a threatened species *Amaranthuis pumilis* Rafinesque. *Castanea* 68: 236-244.
- Hand, J. L. 1980. Human disturbance in Western Gull *Larus accidentalis livens* colonies and possible amplification by intraspecific predation. *Biological Conservation* 18: 59-63.
- Harrington, B. A. 2008. Coastal inlets as strategic habitat for shorebirds in the southeastern United States. DOER Technical Notes Collection. ERDC TN-DOER-E25. Vicksburg, MS: U.S. Army Engineer Research and Development Center.
<http://el.erd.usace.army.mil/dots/doer/>.
- Harrington, B. A. 2001. Red Knot (*Calidris canutus*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/563>
- Harrington, B. A., J. M. Hagan, and L. E. Leddy. 1988. Site fidelity and survival differences between two groups of New World red knots *Calidris canutus*. *Auk* 105: 439-445.
- Harrington, B.A. and N. Drilling. 1996. Investigations of effects of disturbance to migratory shorebirds at migration stopover sites on the U.S. Atlantic Coast. Contract report to U.S. Fish & Wildlife Service, Region V, Nongame Program. 87pp.

- Harrington, B. A., S C. Brown, J. Corven, and J. Bart. 2002. Collaborative Approaches to the Evolution of Migration and the Development of Science-Based Conservation in Shorebirds. *Auk* 119: 914-921.
- Harrington, B. A. 2003. Shorebird management during the non-breeding season – an overview of needs, opportunities, and management concepts. *Wader Study Group Bull.* 100: 59-66.
- Haysmith, L. and J. D. Hunt. 1995. Nature tourism: impacts and management. Pages 203-219 in R. L. Knight and K. J. Gutzwiller, ed. *Wildlife and Recreationists: coexistence through management and research.* Island Press, Washington, D. C. 372pp.
- Hecker, S. 2008. The Piping Plover as an Umbrella Species for the Barrier Beach Ecosystem. Pages 59-74 in *Saving Biological Diversity Balancing Protection of Endangered Species and Ecosystems*, Robert A. Askins, Glenn D. Dreyer, Gerald R. Visgilio and Diana M. Whitelaw (eds.). Springer Science.
- Helmets, D. L. 1992. *Shorebird Management Manual.* Western Hemisphere Shorebird Reserve Network, Manomet, Massachusetts.
- Hernández, D. 2005. *Conservation and Foraging Dynamics of Migratory Shorebirds.* Unpublished Ph.D Dissertation. Rutgers University, New Brunswick, New Jersey. 176 pp.
- Hill, D., D. Hockin, D. Price, G. Tucker, R. Morris, and J. Treweek. 1997. Bird Disturbance: Improving the Quality and Utility of Disturbance Research. *Journal of Applied Ecology* 34: 275-288.
- Hitchcock, C. L. and C. Gratto-Trevor. 1997. Diagnosing a Shorebird Local Population Decline with a Stage-Structured Population Model. *Ecology* 78: 522-534.
- Holmes, R. T. and F. A. Pitelka. 1998. Pectoral Sandpiper (*Calidris melanotos*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/348>
- Hoopes E.M. 1993. Relationships between human recreation and piping plover foraging ecology and chick survival. MS Thesis, University of Massachusetts, Amherst, Massachusetts, 106 pp.
- Hoopes, E.M. 1994. Breeding ecology of piping plovers nesting at Cape Cod National Seashore - 1994. National Park Service, South Wellfleet, Massachusetts. 34 pp.
- Hoopes, E.M. 1995. Piping plover nest distribution with respect to concrete walkways at the Breezy Point Cooperative, New York, 1991-1994. Report for the U.S. Fish and Wildlife Service, Sudbury, Massachusetts. 6 pp.

- Hoopes, E.M., C.R. Griffin, and S. M. Melvin. 1989. Atlantic Coast Piping Plover winter distribution survey. Unpublished report to the U.S. Fish and Wildlife Service, Newton Corner, Massachusetts. 6pp.
- Hoopes, E.M., C.R. Griffin, and SM. Melvin. 1991. Relationships between human recreation and piping plover foraging ecology and chick survival. Unpublished report. University of Massachusetts, Amherst, Massachusetts. 77 pp.
- Hosier, P. E., M. Kochhar, and V. Thayer. 1981. Off-Road vehicle and pedestrian track effects on the Sea-approach of hatchling Loggerhead Turtles. *Environmental Conservation*. 8: 158-161.
- Hosier, P. E. and T. E. Eaton. 1980. The impact of vehicles on dune and grassland vegetation on a southeastern North Carolina barrier beach. *Journal of Applied Ecology* 17:173-182.
- Houghton, L. M. 2005. Piping Plover population dynamics and effects of beach management practices on piping plovers at West Hampton Dunes and Westhampton Beach, New York. PhD. Dissertation, Virginia Polytechnic Institute and State University, Blacksburg, VA. 162pp.
- Howe, M., J. Bart, S. Brown, C. Elphick, R. Gill, B. Harrington, C. Hickey, G. Morrison, S. Skagen, and N. Warnock, eds. 2000. A Comprehensive Monitoring Program for North American Shorebirds. Manomet Center for Conservation Sciences.
<http://www.Manomet.org/USSCP/files.htm>
- Howe, M. A., P H. Geissler, and B. A. Harrington. 1989. Population trends of North American shorebirds based on the International Shorebird Survey. *Biological Conservation*. 49: 185-199.
- Hunter, W. C., L. Peoples, and J. Collazo. 2000. South Atlantic coastal plain partners in flight bird conservation plan. Retrieved from http://www.blm.gov/wildlife/plan/pl_03_10.pdf
- Hunter, W. C., J. Collazo, B. Noffsinger, B. Winn, D. Allen, B. Harrington, M. Epstein, and J. Saliva. 2005. Southeastern Coastal Plains-Caribbean Region Shorebird Plan: Version 1.0 (Revised October 3, 2005).
http://www.acjv.org/documents/shorebird_plan_se_car.pdf
- Hunter, W. C., W. Golder, S. Melvin, and J. Wheeler. 2006. Southeast United States regional waterbird conservation plan. Retrieved from
<http://www.fws.gov/birds/waterbirds/SoutheastUS/>.
- Isaksson, D., J. Wallander and M. Larsson. 2007. Managing predation on ground-nesting birds: The effectiveness of nest exclosures. *Biological Conservation* 136: 136-142.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Ikuta, L. A. and D. T. Blumstein. 2003. Do fences protect birds from human disturbances? *Biological Conservation* 112: 447-452.
- Ingle, C., Y. Leung, C. Monz, and H. Bauman. 2003. Monitoring visitor impacts in coastal National Parks: A review of techniques. In *Protecting Our Diverse Heritage: The Role of Parks, Protected Areas, and Cultural Sites*. (Proceedings of the George Wright Society/National Park Service Joint Conference, April 14–18, 2003, San Diego, California.) D. Harmon, B.M. Kilgore, and G.E. Vietzke, eds. Hancock, Mich.: The George Wright Society, 228–233.
- Iverson, G. C., S. E. Warnock, R. W. Butler, M.A. Bishop, and N. Warnock. 1996. Spring Migration of Western Sandpipers along the Pacific Coast of North America: A Telemetry Study. *Condor* 98: 10-21.
- Iverson, R. M., B. S. Hinckley, R. M. Webb, and B. Hallet. 1981. Physical Effects of Vehicular Disturbances on Arid Landscapes. *Science* 212: 915-917.
- Jehl, Jr., J. R., J. Klima and R. E. Harris. 2001. Short-billed Dowitcher (*Limnodromus griseus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/564>
- Johnson, C. M. and G. A. Baldassarre. 1988. Aspects of the wintering ecology of Piping Plovers in coastal Alabama. *Wilson Bulletin* 100: 214-223.
- Jones, L. K. 1997. Piping plover habitat selection, home range, and reproductive success at Cape Cod National Seashore, Massachusetts. MSc. Thesis, University of Massachusetts Amherst. 96 pp.
- Kirby, J. S., C. Clee and V. Seager. 1993. Impact and extent of recreational disturbance to wader roosts on the Dee estuary: some preliminary results. *Wader Study Group Bulletin* 68: 53–58.
- Klein, M. L, S. R. Humphrey and F. Percival. 1995. Effects of ecotourism on distribution of waterbirds in a wildlife refuge. *Conservation Biology* 9: 1454-1465.
- Knight, R. L., and D. N. Cole. 1991. Effects of recreational activity on wildlife in wildlands. *Transactions North American Wildlife and Natural Resource Conference* 56:238-247.
- Knight, R. L., and D. N. Cole. 1995. Factors that influence wildlife responses to recreationists. p. 71-79, IN: R. L. Knight and K. J. Gutzwiller eds. *Wildlife and Recreationists*. Island Press, Washington, D. C.
- Knight, R. L. and D. N. Cole. 1995. Wildlife responses to recreationists. Pages 71-79 in R. L. Knight and K. J. Gutzwiller, ed. *Wildlife and Recreationists: coexistence through management and research*. Island Press, Washington, D. C. 372pp.

- Knight, R. L. and K.J. Gutzwiller (Eds.). 1995. Wildlife and recreationists: coexistence through management and research. Island Press. Washington DC and Covelo CA.
- Knight, R.L., D.P. Anderson, and N.V. Marr. 1991. Responses of an Avian Scavenging Guild to Anglers. *Biological Conservation* 56:195-205.
- Knight, R. L. and S. A. Temple. 1995. Origin of wildlife responses to recreationists. Pages 81-91 in R. L. Knight and K. J. Gutzwiller, ed. *Wildlife and Recreationists: coexistence through management and research*. Island Press, Washington, D. C. 372pp.
- Knight, R. L., and S. A. Temple. 1995. Wildlife and recreationists: Coexistence through management. p. 327-333, IN: R. L. Knight and K. J. Gutzwiller eds.. *Wildlife and Recreationists*. Island Press, Washington, D. C.
- Kotliar, N.B. and J. Burger. 1984. The use of decoys to attract Least Terns to abandoned colony sites in New Jersey. *Colonial Waterbirds* 7: 134-138.
- Kress, S. W. and C. S. Hall. 2002. [Tern Management Handbook: Coastal Northeastern United States and Atlantic Canada](#). U.S. Fish and Wildlife Service, Hadley, MA
- Kress, S.W. 1983. The use of decoys, sound recordings, and gull control for re-establishing a tern colony in Maine. *Colonial Waterbirds* 6: 185-196.
- Krogh, M. G. and S. H. Schweitzer. 1999. Least Terns nesting on natural and artificial habitats in Georgia, USA. *Waterbirds* 22: 290-296.
- Kushlan, J. A. 1983. Special species and ecosystem preserves: colonial waterbirds in U. S. National Parks. *Environmental Management* 7: 201-207.
- Kushlan, J. A., M. J. Steinkamp, K. C. Parsons, J. Capp, M. A. Cruz, M. Coulter, I. Davidson, L. Dickson, N. Edelson, R. Elliot, R. M. Erwin, S. Hatch, S. Kress, R. Milko, Miller S., K. Mills, R. Paul, R. Phillips, J. e. Saliva, B. Sydeman, J. Trapp, J. Wheeler, and K. Wohl. 2002. *Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1*. Waterbird Conservation for the Americas, Washington, D. C. 78 pp.
- Kuss, F. R., A. R. Graefe, and J. J. Vaske. 1990. Visitor impact management: A review of research. National Parks and Conservation Association, Washington, D. C.
- Lafferty, K. D. 2001. Birds at a southern California beach: seasonality, habitat use and disturbance by human activity. *Biodiversity and Conservation* 10:1949–1962.
- Lafferty, K. D. 2001. [Disturbance to wintering western snowy plovers](#). *Biological Conservation* 101:315-325

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Laferty, K. D., D. Goodman, and C. P. Sandoval. 2006. Restoration of breeding by Snowy Plovers following protection from disturbance. *Biodiversity and Conservation* 15: 2217-2230.
- Larson, R. A. 1995. Balancing wildlife viewing with wildlife impacts: A case study. Pages 257-270 in R. L. Knight and K. J. Gutzwiller, ed. *Wildlife and Recreationists: coexistence through management and research*. Island Press, Washington, D. C. 372pp.
- Larson, M.A., Ryan, M.R. and R. K. Murphy. 2003. Assessing recovery feasibility for piping plovers using optimization and simulation. *Wildlife Society Bulletin Vol. 31*: 1105-1116. 2003.
- Larson, M. A., M. R. Ryan, and B. G. Root. 2000. Piping Plover survival in the Great Plains: An updated analysis. *Journal of Field Ornithology* 71: 721-729.
- Lauro, B. and J. Tancredi. 2002. An Examination of Predatory Pressures on Piping Plovers Nesting at Breezy Point, New York. *Waterbirds* 25: 401-409.
- Leatherman, S. P. 1997. Beach rating: A methodological approach. *Journal of Coastal Research* 13: 253-258.
- LeDee, O. E. 2005. Winter distribution of Piping Plovers on the U.S. Gulf of Mexico: An analysis of habitat characteristics at major wintering sites. MS Thesis. University of Minnesota. 46 pp.
- Le Fer, D., J. D. Fraser, and C. D. Kruse. 2007. Piping Plover chick foraging, growth, and survival in the Great Plains. *Journal of Wildlife Management* 72: 682-687.
- Leseberg, A. P. A. R. Hockey, and D. Loewenthal. 2000. Human disturbance and the chick-rearing ability of African Black Oystercatchers (*Haematopus moquini*): a geographical perspective. *Biological Conservation* 96: 379-385.
- Liddle, M.J.; Greig-Smith, P. 1975a. A survey of tracks and paths in a sand dune ecosystem. I. Soils. *Journal of Applied Ecology* 12: 893-908.
- Liddle, M.J.; Greig-Smith, P. 1975b. A survey of tracks and paths in a sand dune ecosystem. II. Vegetation. *Journal of Applied Ecology* 12: 909-930.
- Liddle, M.J.; Moore, K.G. 1974. The microclimate of sand dune tracks: the relative contribution of vegetation removal and soil compression. *Journal of Applied Ecology* 11: 1057-1068.
- Loegering, J. P. 1992. Piping Plover breeding biology, foraging ecology and behavior on Assateague Island National Seashore, Maryland. MS Thesis, VA Polytechnic Institute and State University, Blacksburg, VA. 246 pp.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Loegering, J. P. and J. D. Fraser. 1995. Factors affecting piping plover chick survival in different brood-rearing habitats. *Journal of Wildlife Management* 59: 646-655.
- Lord, A., J. R. Waas, J. Innes, and M. J. Whittingham. 2001. Effects of human approaches to nests of northern New Zealand dotterels. *Biological Conservation* 98: 233-240.
- Lord, A., J. R. Waas, and J. Innes. 1997. Effects of human activity on the behaviour of Northern New Zealand dotterel *Charadrius obscurus aquilonius* chicks. *Biological Conservation* 82, 15-20.
- Lowther, P. E., H. D. Douglas, and C. L. Gratto-Trevor. 2001. Willet (*Catoptrophorus semipalmatus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/579>
- Luckenbach, R. A. and R. B. Bury. 1983. Effects of off-road vehicles on the biota of the Algodones dunes, Imperial County, California. *Journal of Applied Ecology* 20: 265-286.
- Lyons, J. E. and S. M. Haig. 1995. Fat Content and Stopover Ecology of Spring Migrant Semipalmated Sandpipers in South Carolina. *Condor* 97: 427-437.
- Macwhirter, B., P. Austin-Smith, Jr. and D. Kroodsmas. 2002. Sanderling (*Calidris alba*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/653>
- Manfredo, M. J. 1989. Human dimensions of wildlife management. *Wildlife Society Bulletin* 17:447-449.
- Manuwal, D. A. 1978. Effects of man on marine birds: a review. Pages 140-160 in *Wildlife and people: the proceedings of the John S. Wright Forestry Conference*. Department of Forestry and Natural Resources and the Cooperative Extension Service, Purdue University, IN.
- Maron, J. L. and J. P. Myers. 1985. Seasonal Changes in Feeding Success, Activity Patterns, and Weights of Nonbreeding Sanderlings (*Calidris alba*). *Auk* 102: 580-586.
- Mathews, G. V. T. 1982. The control of recreational disturbance. Pages 325-330 in D. A. Scott, editor. *Managing wetlands and their birds, a manual of wetland and waterfowl management*. Proceedings 3rd Tech. Meeting on Western Palearctic Migratory Bird Management, Biologische Station Rieselfelder Münster, Federal Republic of Germany, 12-15 Oct. 1982.
- Maxson, S.J. 2000. Interspecific Interactions of Breeding Piping Plovers: Conservation Implications. *Waterbirds* 23: 270-276.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

McCollough, M. A. 2000. Piping Plover Assessment. Maine Department of inland fisheries and wildlife. 42pp.

McGowan C. P. 2004. Factors affecting nesting success of American Oystercatchers (*Haematopus palliatus*) in North Carolina. M.S. Thesis, North Carolina State University, Raleigh, NC.

McGowan, C. P. and T. R. Simons. 2006. Effects of human recreation on the incubation behavior of American Oystercatchers. *Wilson Journal of Ornithology*, 118:485-493.

McGowan, C. P. 2004. Factors affecting nesting success of American Oystercatchers (*Haematopus palliatus*) in North Carolina. MS Thesis. North Carolina State University, Raleigh, North Carolina, USA.

McGowan, C. P., T. R. Simon, W. Golder, and J. Cordes. 2005. A comparison of American Oystercatcher reproductive success on barrier beach and river island habitats in coastal North Carolina. *Waterbirds* 28:150-155.

McCrary M.D. and Pierson M.O. 2000. Influence of human activity on shorebird beach use in Ventura County, California. In: Brown D.R., Mitchell K.L. and Chang H.W. (ed.), Fifth California Islands Symposium, OCS Study, MMS 99-0038. Santa Barbara, CA, pp. 424-427.

McLean, E. F. 1993. Human impacts on beach use by wintering and migrating birds in lower Chesapeake Bay. Unpublished M. A. Thesis. College of William and Mary, Williamsburg, VA. 48 pp.

Medeiros, R., J. A. Ramos, V. H. Paiva, A. Almeida, P. Pedro, and S. Antunes. 2007. Signage reduces the impact of human disturbance on little tern nesting success in Portugal. *Biological Conservation* 135: 99-106.

Melvin, S. M., A. Hecht, and C. R. Griffin. 1994. Piping Plover mortalities caused by off-road vehicles on Atlantic Coast beaches. *Wildlife Society Bulletin* 22: 409-414.

Melvin, S. M., C. R. Griffin, and L. H. MacIvor. 1991. Recovery strategies for piping plovers in managed coastal landscapes. *Coastal Management* 19: 21-34.

Meyers, J. M. 2005. Management, monitoring, and protection protocols for American Oystercatchers at Cape Hatteras National Seashore, North Carolina. USGS Patuxent Wildlife Research Center.

Mizrahi, D.S. 2002. Shorebird Distribution along New Jersey's Southern Atlantic Coast: Temporal Patterns and Effects of Human Disturbance. Final report, U.S. Fish and Wildlife Service.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Molina, K. C. and R. M. Erwin. 2006. Distribution and conservation status of the Gull-billed Tern (*Gelochelidon nilotica*) in North America. *Waterbirds* 29: 271-295.
- Monz, C. A., E. A. Young and Y. Leung. 2004. Monitoring the impacts of visitors to shorebird populations in the NPS coastal and barrier island network areas. Proceedings of the 2004 Northeastern Recreation Research Symposium. P. 373-377.
- Morris, R. D., H. Blokpoel and G. D. Tessier. 1992. Management efforts for the conservation of common tern *Sterna hirundo* colonies in the Great Lakes: Two case histories. *Biological Conservation* 60: 7-14.
- Morrison, R.I.G., B.J. McCaffery, R.E. Gill, S.K. Skagen, S.L. Jones, G.W. Page, C.L. Gratto-Trevor, and B.A. Andres. 2006. Population estimates of North American shorebirds. *Wader Study Group Bull.* 111: 67-85.
- Morrison, R. I. G., R. Gill, B. Harrington, S. Skagen, G. W. Page, C. L. Gratto-Trevor and S. M. Haig. 2001. Estimates of Shorebird Populations in North America. Occasional paper No. 104, Canadian Wildlife Service, Ottawa, Ontario. 64 pp.
- Morrison, R.I.G., R.E. Gill, B.A. Harrington, S. Skagen, G.W. Page, C.L. Gratto-Trevor & S.M. Haig. 2000. Population estimates of Nearctic shorebirds. *Waterbirds* 23: 337–354.
- Morrison, R.I.G., Y. Aubry, R.W. Butler, G.W. Beyersbergen, C. Downes, G.M. Donaldson, C.L. Gratto-Trevor, P.W. Hicklin, V.H. Johnston & R.K. Ross. 2001a. Declines in North American shorebird populations. *Wader Study Group Bull.* 94: 34–38.
- Morse, J. A., A. N. Powell, and M. D. Tetreau. 2006. Productivity of Black Oystercatchers: Effects of recreational disturbance in a National Park. *Condor* 108: 623-633.
- Morton, J. M. 1996. Effects of human disturbance on the behavior and energetics of nonbreeding sanderlings. Dissertation. Virginia Polytechnic and State University, Blacksburg, VA.
- Moss, D. and D. P. McPhee. 2006. The impacts of recreational four-wheel driving on the abundance of the Ghost Crab (*Ocypode cordimanus*) on subtropical beaches in SE Queensland. *Coastal Management* 34: 133–140.
- Myers, J. P. 1983. Conservation of migrating shorebirds: staging areas, geographic bottlenecks and regional movements. *Am. Birds* 37:23-25.
- Myers, J.P. et al. 1987. Conservation strategy for migratory species. *American Scientist* 75: 19-26.
- Myers, J. P., R. I. G. Morrison, P. Z. Antas, B. A. Harrington, T. E. Lovejoy, M. Sallaberry, S. E. Senner, and A. Tarak. 1987. Conservation strategy for migratory species. *American Scientist* 75: 19-26.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Nebel, S. and J. M. Cooper. 2008. Least Sandpiper (*Calidris minutilla*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/115>
- Nester, L. R. 2006. Effects of off-road vehicles on the nesting activity of loggerhead sea turtles in North Carolina. MSc. Thesis, University of Florida. 81pp.
- Nettleship, D. N. 2000. Ruddy Turnstone (*Arenaria interpres*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/537>
- Nicholls, J.L. 1989. Distribution and other ecological aspects of piping plovers wintering along the Atlantic and Gulf Coasts. M.S. thesis, Auburn University; Auburn, Alabama.
- Nicholls, J.L., and G.A. Baldassarre. 1990a. Winter distribution of piping plovers along the Atlantic and Gulf Coasts of the United States. *Wilson Bulletin* 102(3):400-412.
- Nicholls, J.L., and G.A. Baldassarre. 1990b. Habitat associations of piping plovers wintering in the United States. *Wilson Bulletin* 102(4):581-590.
- Niedoroda, A.W. 1979. The geomorphologic effects of off-road vehicles on coastal ecosystems of Cape Cod, Massachusetts. University of Massachusetts/National Park Service Cooperative Research Unit Report No. 17.
- Niles, L. J., H. P. Sitters, A. D. Dey, P. W. Atkinson, A. J. Barker, K. A. Bennett, K. E. Clark, N. A. Clark, C. Espoz, P. M. Gonzalez, B. A. Harrington, D. E. Hernandez, K. S. Kalasz, R. Matus, C. D. T. Minton, R. I. G. Morrison, M. K. Peck, and I. L. Serrano. 2007. Status of the Red Knot (*Calidris canutus rufa*) in the western hemisphere. Report to USFWS, Ecological Services, Region 5, Pleasantville, NJ, USA. 287 pp.
- Nisbet, I. C. T. 1977. Noise and disturbance. Pages 671-673 in *Coastal ecosystem management* (J. R. Clark, Ed.). John Wiley & Sons, New York.
- Nisbet, I.C.T. 1979. Conservation of marine birds of northern North America – A summary. Pages 305- 315 in *Conservation of Marine Birds of Northern North America*. U.S. Fish and Wildl. Serv. Wildl. Res. Rep. 11. Seattle, WA.
- Nisbet, I. C. T. 1995. *Marine birds of the eastern United States: Status and Conservation*. Prepared for Stichting Greenpeace Council, Amsterdam, The Netherlands. 84 pp.
- Nisbet, I, C. T. 2000. Disturbance, habituation, and management of waterbird colonies. *Waterbirds* 23: 312–322.
- Nisbet, I. C. T. 2002. Common Tern (*Sterna hirundo*). In *The Birds of North America*, No. 618 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

- Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society
- Nisbet, Ian C. 2002. Common Tern (*Sterna hirundo*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/618>
- Noel, B. L. and C. R. Chandler. 2008. Spatial Distribution and Site Fidelity of Non-breeding Piping Plovers on the Georgia Coast. *Waterbirds* 31: 241-251.
- Nol, E. 1989. Food supply and reproductive performance of the American Oystercatcher in Virginia. *Condor* 91: 429-435.
- Nol, E., A. J. Baker and M. D. Cadman. 1984. Clutch initiation dates, clutch size, and egg size of the American Oystercatcher in Virginia. *Auk* 101: 855-867.
- Nol, E. and M. S. Blanken. 1999. Semipalmated Plover (*Charadrius semipalmatus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/444>
- Nol, E. and R. C. Humphrey. 1994. American Oystercatcher (*Haematopus palliatus*). In *The Birds of North America*, No. 82 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- Nol, E. and R. C. Humphrey. 1994. American Oystercatcher (*Haematopus palliatus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/082>
- Nol, E., Truitt, B, Allen, D., Winn, B., and T. Murphy. 2000. A survey of wintering American Oystercatchers from Georgia to Virginia, U.S.A., 1999. *Wader Study Group Bull.* 93: 46-50.
- Noel, B. L., C. R. Chandler, and B. Winn. 2007. Seasonal abundance of nonbreeding Piping Plovers on a Georgia barrier island. *Journal of Field Ornithology* 78: 420-427.
- Nordstrom, K. F., R. Lampe, and L. M. Vandemark. Reestablishing Naturally Functioning Dunes on Developed Coasts. *Environmental Management* 25: 37-51.
- Novick J. S. 1996. An analysis of human recreation impacts on the reproductive success of American Oystercatchers (*Haematopus palliatus*): Cape Lookout National Seashore, North Carolina. Unpublished M.S. Thesis, Duke University, Durham, North Carolina.
- Nudds, R.L. and D.M. Bryant. 2000. The energetic cost of short flight in birds. *Journal of Experimental Biology* 203, 1561–1572.
- Olson, C.R., Vleck, C.M. & Vleck, D. 2006. Periodic cooling of bird eggs reduces embryonic growth efficiency. *Physiological and Biochemical Zoology* 79, 927–936.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Parnell, J.F., W.W. Golder, M. A. Shields, T. L. Quay, and T. M. Henson. 1997. Changes in nesting populations of colonial waterbirds in coastal North Carolina 1900-1995. *Colonial Waterbirds* 20: 458-469.
- Parnell, J. F., W. W. Golder, and T. Henson. 1995. 1993 Atlas of colonial waterbirds of North Carolina estuaries. NC Sea Grant Publication, UNC-SG-95-02, Raleigh, North Carolina.
- Parnell, J. F. and M. A. Shields. 1990. Management of North Carolina's colonial waterbirds. UNC Sea Grant Publication UNC-SG-90-03, Raleigh, North Carolina.
- Parnell, J. F. and D. A. McCrimmon. 1984. 1983 supplement to Atlas of colonial waterbirds of North Carolina estuaries. UNC Sea Grant Publication, UNC-SG-84-07, Raleigh, North Carolina
- Parnell, J. F., and R. F. Soots, Jr. 1979. Atlas of colonial waterbirds of North Carolina estuaries. UNC Sea Grant Publication, UNC-SG-78-10, Raleigh, North Carolina
- Parnell, J. F., D. G. Ainley, H. Blokpoel, B. Cain, T. W. Custer, J. L. Dusi, S. Kress, J. A. Kushlan, W. E. Southern, L. E. Stenzel, and B. C. Thompson. 1988. Colonial waterbird management in North America. *Colonial Waterbirds* 11(2): 129-169.
- Parnell, J. F., R. M. Erwin, and K. C. Molina. 1995. Gull-billed Tern (*Sterna nilotica*). In *The Birds of North America*, No. 140 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.
- Parnell, J. F., R. M. Erwin and K. C. Molina. 1995. Gull-billed Tern (*Sterna nilotica*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the *Birds of North America Online*: <http://bna.birds.cornell.edu/bna/species/140>
- Patterson, M. E., J. D. Fraser, and J. W. Roggenbuck. 1991. Factors affecting piping plover productivity on Assateague Island. *Journal of Wildlife Management* 55: 525-531.
- Patterson, M.E., J.D. Fraser, and J.W. Roggenbuck. 1990. Piping plover ecology, management, and research needs. *Virginia Journal of Science* 41(4A):419-426.
- Paulson, D. R. 1995. Black-bellied Plover (*Pluvialis squatarola*). *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the *Birds of North America Online*: <http://bna.birds.cornell.edu/bna/species/186>
- Pearson, T. G., C. S. Brimley, and H. H. Brimley. 1942. *Birds of North Carolina*. Bynum Printing Co., New York.
- Pearson, T. G., C. S. Brimley, and H. H. Brimley. 1919. *Birds of North Carolina*. Edwards and Broughton Printing Co., Raleigh, NC.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Peters, K. A., and D. L. Otis. 2005. Using the risk-disturbance hypothesis to assess the relative effects of human disturbance and predation risk on foraging American oystercatchers. *Condor* 107: 715–724.
- Peters, K. A. and D. Otis. 2006. Wading Bird Response to Recreational Boat Traffic: Does Flushing Translate into Avoidance? *Wildlife Society Bulletin* 34(5):1383 -1391.
- Peters, K. A., and D. L. Otis. 2005. Shorebird roost-site selection at two temporal scales: is human disturbance a factor? *Journal of Applied Ecology* 44: 196-209.
- Pfister, C., Kasprzyk, M.J. and Harrington, B.A. 1998. Body fat levels and annual return in migrating Semipalmated Sandpipers. *Auk* 115: 904-915.
- Pfister, C., B. A. Harrington, and M. Lavine. 1992. The impact of human disturbance on shorebirds at a migration staging area. *Biological Conservation* 60: 115-126.
- Pienkowski, M. W. 1992. The impact of tourism on coastal breeding waders in western and southern Europe: an overview. *Wader Study Group Bull.* 68: 92-96.
- Piersma, T. and A. J. Baker. 2000. Life history characteristics and the conservation of migratory shorebirds. p. 105-124. *In* Gosling, L. M. and W. J. Sutherland [eds.], *Behaviour and Conservation*. Cambridge University Press. Cambridge.
- Pfister, C., B. A. Harrington, and M. Lavine. 1992. The impact of human disturbance on shorebirds at a migration staging area. *Biological Conservation* 60:115–126.
- Placyk, J. S., Jr., and B. A. Harrington. 2004. Prey abundance and habitat use by migratory shorebirds at coastal stopover sites in Connecticut. *Journal of Field Ornithology* 75: 223-231.
- Plissner, J. H. and S. M. Haig. 2000. Status of a broadly distributed endangered species: results and implications of the second International Piping Plover Census. *Canadian Journal of Zoology* 78: 128-139.
- Plissner, J. H. and S. M. Haig. 2000. Viability of piping plover *Charadrius melodus* metapopulations. [Biological Conservation](#) 92: 163-173.
- Prange, S., S. D. Gehrt and E. P. Wiggers. 2003. Demographic factors contributing to high raccoon densities in urban landscapes. *Journal of Wildlife Management* 67: 324-333.
- Preissler, H. K., A. A. Ager and M. J. Wisdom. 2006. Statistical methods for analyzing responses of wildlife to human disturbance. *Journal of Applied Ecology* 43: 164–172.
- Quan, R. C., X. Wen, and X. Yang. 2002. Effects of human activities on migratory waterbirds at Lashihai Lake, China. *Biological Conservation* 108:273–279.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Rappole J. H. 1981. Management possibilities for beach-nesting shorebirds in Georgia. Pages 114-126 *in* Proceedings of Nongame and Endangered Wildlife Symposium. Technical Bulletin WL15 (R. R. Odom and J. W. Guthrie, Eds.), Georgia Department of Natural Resources, Athens.
- Recher, H. F. 1966. Some aspects of the ecology of migrant shorebirds. *Ecology* 47: 393-407.
- Reese, J. G. 1977. Reproductive success of Ospreys in central Chesapeake Bay. *Auk* 94: 202-221.
- Rickard, C.A.; McLachlan, A.; Kerley, G.I.H. 1994. The effects of vehicular and pedestrian traffic on dune vegetation in South Africa. *Ocean and Coastal Management* 23: 225-247.
- Roberts G., and P. R. Evans. 1993. Responses of foraging Sanderlings to human approaches. *Behaviour*. 126:29-43.
- Rodgers, J. A., Jr., and H. T. Smith. 1995. Set-back distances to protect nesting bird colonies from human disturbance in Florida. *Conservation Biology* 9:89-99.
- Rodgers, J. A. Jr., and H. T. Smith. 1997. Buffer zone distances to protect foraging and loafing waterbirds from human disturbance in Florida. *Wildlife Society Bulletin* 25(1):139-145.
- Rodgers, J. A., and S. T. Schwikert. 2002. Buffer-zone distances to protect foraging and loafing waterbirds from disturbance by personal watercraft and outboard-powered boats. *Conservation Biology* 16: 216-224.
- Rodgers, J. A. and S. T. Schwikert. 2003. Buffer zone distances to protect foraging and loafing waterbirds from disturbance by airboats in Florida. *Waterbirds* 26: 437-443.
- Rogers, D. I., P. F. Bailey, T. Piersma, J. A. Van Gils, and K. G. Rogers. 2006. High-tide habitat choice: insights from modelling roost selection by shorebirds around a tropical bay. *Animal Behaviour* 72: 563-575.
- Rogers, D., C. Hassell, and J. Lewis. 2006. Shorebird disturbance on the beaches of Roebuck Bay, 2005-2006: Conservation implications and recommendations. A report by Broome Bird Observatory for the WA Department of Conservation and Land Management, NHT and the Shorebird Conservation Project/WWF Australia. 40pp.
- Rogers, D.I., T. Piersma and C.J. Hassell. 2006. Roost Availability May Constrain Shorebird Distribution: Exploring the Energetic Costs of Roosting and Disturbance Around a Tropical Bay. *Biological Conservation*. 133: 225-235.
- Rogers, D. I. 2003. High-tide roost choice by coastal waders. *Wader Study Group Bulletin* 100: 73-79

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Ruhlen, T. D., S. Abbott, L. E. Stenzel, and G. W. Page. 2003. Evidence that human disturbance reduces Snowy Plover chick survival. *Journal of Field Ornithology*. 74:300-304.
- Ruiz, G. M., P. G. Connors, S. E. Griffin, and F. A. Pitelka. 1989. Structure of a wintering Dunlin population. *Condor* 91:562-570.
- Sabine, J. B., III. 2005. Effects of human activity and predation on breeding American Oystercatchers. MS Thesis, The University of Georgia, Athens, Georgia, USA.
- Sabine, J. B., III., J. M. Meyers, C. T. Moore, and S. H. Schweitzer. 2008. Effects of human activity on behavior of breeding American Oystercatchers, Cumberland Island National Seashore, Georgia, USA. *Waterbirds* 31: 70-82.
- Sabine, J.B., S.H. Schweitzer and J.M. Meyers. 2006. Nest fate and productivity of American Oystercatchers, Cumberland Island National Seashore, Georgia. *Waterbirds* 29(3): 308–314.
- Safina, C. and J. Burger. 1983. Effects of human disturbance on reproductive success in the Black Skimmer. *Condor* 85:164–171.
- Saino, N., M. Romano, R. P. Ferrari, R. Martinelli, A. P. Møller. 2005. Stressed mothers lay eggs with high corticosterone levels which produce low-quality offspring. *Journal of Experimental Zoology Part A Comparative Experimental Biology* 303A: 998-1006.
- Schlacher, T. A., D. Richardson, and I. McClean. 2008. Impacts of off-road vehicles (ORVs) on macrobenthic assemblages on sandy beaches. *Environmental Management* 41:878–892
- Schlacher, T. A. and L. M.C. Thompson. 2008. Physical Impacts Caused by Off-Road Vehicles to Sandy Beaches: Spatial Quantification of Car Tracks on an Australian Barrier Island *Journal of Coastal Research* 24: 234–242
- Schlacher, T. A., L. M. C. Thompson, and S. J. Walker 2008. Mortalities caused by off-road vehicles (ORVs) to a key member of sandy beach assemblages, the surf clam *Donax deltoids*. *Hydrobiologia* 610: 345-350
- Schlacher, T. A. and L. M. C. Thompson. 2007. Exposure of fauna to off-road vehicle (ORV) traffic on sandy beaches. *Coastal Management* 35: 567–583.
- Schlacher, T. A., L. M. C. Thompson, and S. Price. 2007. Vehicles versus conservation of invertebrates on sandy beaches: quantifying direct mortalities inflicted by offroad vehicles (ORVs) on ghost crabs. *Marine Ecology – Evolutionary Perspective* 28: 354–367.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Schneider, D. C., and B. A. Harrington. 1981. Timing of shorebird migration in relation to prey depletion. *Auk* 98:801-811. Senner, S., and M. A. Howe. 1984. Conservation of Nearctic shorebirds. Pages 379-421 in *Shorebirds: Breeding behavior and populations* (J. Burger and B. L. Olla, Eds.). Plenum Press, New York.
- Schulte, S., S. Brown, and the American Oystercatcher Working Group. 2006. Version 1.0. American Oystercatcher Conservation plan for the United States Atlantic and Gulf Coasts. Retrieved from <http://www.ncsu.edu/project/grsmgis/AMOY/Research.htm>.
- Schulz, R. and M. Stock. 1993. Kentish Plovers and tourists: competitors on sandy coasts. *Wader Study Group Bull.* 68: 83-91.
- Senner, S. E. and M. A. Howe. 1984. Conservation of Nearctic shorebirds. *Behavior Marine Animals.* 5:379-421.
- Shepherd, P. C. F. and J. S. Boates. 1999. Effects of a commercial baitworm harvest on Semipalmated Sandpipers and their prey in the Bay of Fundy Hemispheric Shorebird Reserve. *Conservation Biology* 13: 347–356.
- Sidele, J.G., K. Mayne, and E.N. McPhillips. 1991. Protecting the piping plover under section 7 of the Endangered Species Act. *Environmental Management* 15(3):349- 356.
- Simons, T. R., S. Schulte, J. Cordes, M. Lyons, and W. Golder. 2004. American Oystercatcher (*Haematopus palliatus*) research and monitoring in North Carolina. Annual report, North Carolina Cooperative Fish and Wildlife Research Unit, Department of Zoology, North Carolina State University, Raleigh, North Carolina, USA.
- Simons, T. R., S. Schulte, J. Cordes, M. Lyons, and W. Golder. 2006. American Oystercatcher (*Haematopus palliatus*) research and monitoring in North Carolina : 2006 Annual report. North Carolina Cooperative Fish and Wildlife Research Unit, Department of Zoology, North Carolina State University, Raleigh, North Carolina, USA.
- Skagen, S.K. 2006. Migration stopovers and the conservation of Arctic-breeding Calidridine sandpipers. *Auk* 123(2): 313–322.
- Skagen, S. K. 1997. Stopover ecology of transitory populations: the case of migrant shorebirds. *Ecological Studies* 125:244-269.
- Skagen, S., J. Bart, B. Andres, S. Brown, G. Donaldson, B. Harrington, V. Johnston, S.L. Jones & R.I.G. Morrison. 2003. Monitoring the shorebirds of North America: towards a unified approach. *Wader Study Group Bull.* 100: 102–104.
- Skagen, S. K., S. Brown, and R. Johnson. 2005. Implications of different shorebird migration strategies for habitat conservation. Pages 680–683 in *Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight*

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

Conference, vol. 2 (C. J. Ralph and T. D. Rich, Eds.). U.S. Department of Agriculture, Forest Service, General Technical Report PSW-GTR-191.

- Skagen, S.K., D.A. Granfors, and C.P. Melcher. 2008. On determining the significance of ephemeral continental wetlands to North American migratory shorebirds. *Auk* 125.
- Skagen, S. K., C. P. Melcher, and E. Muths. 2001. The interplay of habitat change, human disturbance and species interactions in a waterbird colony. *American Midland Naturalist* 145:18–28.
- Skagen, S.K., P.B. Sharpe, and R.G. Waltermire. 1999. *Biogeographical profiles of shorebird migration in midcontinental North America*. U.S. Geological Survey Biological Science Report 2000–0003, Fort Collins, Colorado. <http://www.fort.usgs.gov/shorebirds> (accessed 10 May 2006).
- Skeel, Margaret A. and E. P. Mallory. 1996. Whimbrel (*Numenius phaeopus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/219>
- Soulliere, G. J., B. A. Potter, D. J. Holm, D. A. Granfors, M. J. Monfils, S. J. Lewis, and W. E. Thogmartin. 2007. Upper Mississippi River and Great Lakes Region Joint Venture Waterbird Habitat Conservation Strategy. U.S. Fish and Wildlife Service, Fort Snelling, MN. 68pp.
- Smit, C., and G. J. M Visser. 1993. Effects of disturbance on shorebirds: a summary of existing knowledge from the Dutch Wadden Sea and Delta area. *Wader Study Group Bulletin* 68, 6–19.
- Staine, K. J. and J. Burger. 1994. Nocturnal foraging behavior of breeding piping plovers (*Charadrius melodus*) in New Jersey. *Auk* 111: 579-587.
- Stephenson, G. 1999. Vehicle impacts on the biota of sandy beaches and coastal dunes: A review from a New Zealand perspective. New Zealand Department of Conservation, Wellington, New Zealand, ISBN 0.478.21847.8 48pp.
- Stillman, R. A., and J. D. Goss-Custard. 2002. Seasonal changes in the response of oystercatchers *Haematopus ostralegus* to human disturbance. *Journal of Avian Biology* 33:358–365.
- Stillman, R. A., A. D. West, R. W. G. Caldow and S. E. A. Le V. Dit Durell. 2007. Predicting the effect of disturbance on coastal birds. *Ibis* 149: 73–81.
- Stolen, E. D. 2003. The effects of vehicle passage on foraging behavior of wading birds. *Waterbirds* 26:429–436.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Strauss E. 1990. Reproductive success, life history patterns, and behavioral variation in a population of piping plovers subjected to human disturbance (1982–1989). PhD, Tufts University, Medford, Massachusetts, 143 pp.
- Taylor, E. C., R. E. Green, and J. Perrins. 2007. Stone-curlews *Burhinus oedicephalus* and recreational disturbance: developing a management tool for access. *Ibis* 149: 37-44.
- Thomas, G. H., R. B. Lanctot, and T. Szekely. 2006. Can intrinsic factors explain population declines in North American breeding shorebirds? A comparative analysis. *Animal Conservation* 9: 252-258.
- Thomas, K., R. G. Kvitek, and C. Bretz. 2003. Effects of human activity on the foraging behavior of Sanderlings *Calidris alba*. *Biological Conservation* 109:67–71.
- Thompson, Bruce C., Jerome A. Jackson, Joanna Burger, Laura A. Hill, Eileen M. Kirsch and Jonathan L. Atwood. 1997. Least Tern (*Sterna antillarum*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/290>
- Thomsen, S. K. 2006. A GIS-based analysis of human disturbance on piping plover abundance, distribution and productivity on the barrier islands of Long Island, New York. Division III Project, Hampshire College, NY 29pp.
- Thompson, B. C., J. A. Jackson, J. Burger, L. A. Hill, E. M. Kirsch, and J. L. Atwood. 1997. Least Tern (*Sterna antillarum*). *In* *The Birds of North America*, No. 290 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.
- Thompson, B. C., J. A. Jackson, J. Burger, L. A. Hill, E. M. Kirsch and J. L. Atwood. 1997. Least Tern (*Sterna antillarum*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/290>
- Tibbitts, T. L. and W. Moskoff. 1999. Lesser Yellowlegs (*Tringa flavipes*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/427>
- Traut, A. H., J. M. McCann, and D. F. Brinker. 2006. Breeding Status and Distribution of American Oystercatchers in Maryland. *Waterbirds* 29: 302-307.
- Tremblay, J. and L. N. Ellison. 1979. Effects of human disturbance on breeding of Black-crowned Night Herons. *Auk* 96: 364-369.
- Truitt, B.R. and B. Brown. 2000. Stopover Biology of Red Knots - Virginia Barrier Islands. Report to the U.S. Fish and Wildlife Service, 5 Pp.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Trulio, L. A. and J. Sokale. 2008. Foraging shorebird response to trail use around San Francisco Bay. *Journal of Wildlife Management* 72: 1775-1780.
- Trulio, L. 2005. Understanding the Effects of Public Access and Recreation on Wildlife and their Habitats in the Restoration Project Area. San Jose State University.
- U.S. Fish and Wildlife Service. 2003. Recovery Plan for the Great Lakes Piping Plover (*Charadrius melodus*). Ft. Snelling, Minnesota. viii + 141 pp.
- U.S. Fish and Wildlife Service. 1998. 1997 status update: U.S. Atlantic Coast piping plover population. Sudbury, Massachusetts.
- U.S. Fish and Wildlife Service. 1996. Piping Plover (*Charadrius melodus*), Atlantic Coast Population, Revised Recovery Plan. Hadley, Massachusetts. 258 pp.
- U.S. Fish and Wildlife Service [FWS]. 1988. Great Lakes and Northern Great Plains Piping Plover Recovery Plan. U.S. Fish and Wildlife Service; Twin Cities, Minnesota.
- U.S. Shorebird Conservation Plan April 10, 2000: revised September 30, 2002. Retrieved from <http://www.fws.gov/shorebirdplan/RegionalShorebird/RegionalPlans.htm>.
- U.S. Fish and Wildlife Service. 1993. Endangered and threatened wildlife and plants; *Amaranthus pumilus* (seabeach amaranth) determined to be threatened. Federal Register 58(65): 18035-18041.
- Van Der Merwe, D. and D. van der Merwe. 1991. Effects of off-road vehicles on the macrofauna of a sandy beach. *South African Journal of Science* 87: 210-213.
- Van Der Valk, A.G. 1974. Environmental factors controlling the distribution of forbs on foredunes in Cape Hatteras National Seashore. *Can. J. Bot.* 52:1057-1073.
- Van Gils, J. A., P. F. Battley, T. Piersma, and R. Drent. 2005. Reinterpretation of Gizzard Sizes of Red Knots World-Wide Emphasises Overriding Importance of Prey Quality at Migratory Stopover Sites. *Biological Sciences* 272: 2609-2618.
- Vaske, J.J., D. J. Decker, and M.J. Manfredo. 1995. Human Dimensions for Wildlife Management: An integrated framework for coexistence. Pages 71-79 in R. L. Knight and K. J. Gutzwiller, ed. *Wildlife and Recreationists: coexistence through management and research*. Island Press, Washington, D. C. 372pp.
- Verhulst, S., K. Oosterbeek, and B. J. Ens. 2001. Experimental evidence for effects of human disturbance on foraging and parental care in oystercatchers. *Biological Conservation* 101, 375-380.
- Warnock, N., and M. A. Bishop. 1998. Spring stopover ecology of migrant Western Sandpipers. *Condor* 100:456-467.

- Warnock, Nils D. and Robert E. Gill. 1996. Dunlin (*Calidris alpina*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/203>
- Warnock, S., and J. Y. Takekawa. 1995. Habitat preferences of wintering shorebirds in a temporally changing environment: western sandpipers in the San Francisco Bay estuary. *Auk* 112:920–930.
- Warnock, N., G. W. Page and L. E. Stenzel. 1995. Non-migratory movements of Dunlins on their California wintering grounds. *Wilson Bull.* 107: 131–139.
- Watson, J. J., G. I. H. Kerley, and A. McLachhlan. 1996. Human activity and potential impacts on dune breeding birds in the Alexandria coastal Dunefield. *Landscape and Urban Planning* 34: 315-322.
- Watson, J.J. 1992. Dune breeding birds and off-road vehicles. *The Naturalist* 36 (3): 8.12.
- Wearing, S., Neil, J., 1999. *Ecotourism: Impacts, Potentials and Possibilities*. Reed Educational and Professional Publishing Ltd, Oxford.
- Weber, T.P. and A. I. Houston. 1997. Flight costs, flight range and the stopover ecology of migrating birds. *Journal of Animal Ecology* 66: 297-306.
- Wemmer, L. C., U. Ozesmi, and F. J. Cuthbert. 2001. A habitat-based population model for the Great Lakes population of the piping plover (*Charadrius melodus*). *Biological Conservation* 99: 169-181.
- West, A. D., Goss-Custard, J. D., Stillman, R. A., Caldow, R. W. G., Durell, S. E. A le V. dit, McGrorty, S., 2002. Predicting the impacts of disturbance on wintering waders using a behaviour based individuals model. *Biological Conservation* 106, 319–328.
- West, A. D. and R. W. G. Caldow. 2006. The development and use of individuals-based models to predict the effects of habitat loss and disturbance on waders and waterfowl. *Ibis* 148: 158-168.
- Weston, M. A. and M. A. Elgar. 2007. Responses of Incubating Hooded Plovers (*Thinornis rubricollis*) to Disturbance. *Journal of Coastal Research* 23: 569-576.
- Wilke, A. L., D. F. Brinker, B. D. Watts, A. H. Traut, R. Boettcher, J. M. McCann, B. R. Truitt, and P. P. Denmon. American Oystercatchers in Maryland and Virginia, USA: Status and Distribution. *Waterbirds* 30: 152-162.

Audubon North Carolina, National Audubon Society, Defenders of Wildlife, Southern Environmental Law Center, Natural Resources Defense Council, The Wilderness Society

- Williams, A. J., V. L. Ward, and L. G. Underhill. 2004. Waders respond quickly and positively to the banning of off-road vehicles from beaches in South Africa. *Wader Study Group Bull.* 104: 79-81.
- Wilson, W. H. 1994. Western Sandpiper (*Calidris mauri*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/090>
- Wilson, Jr., W. H. 1993. Conservation of stop-over areas for migratory waders: Grays Harbor, Washington. *Wader Study Group Bull.* 67:37-40.
- Winn, B., F. Sanders, S. Cameron, and N. Douglass. 2006. The distribution and population estimate of wintering Marbled Godwits in the southeastern United States. *Wader Study Group Bull.* 109: 12.
- Wolcott, T. G., and D. Wolcott. 1984. Impact of off-road vehicles on macroinvertebrates of a mid-Atlantic beach. *Biological Conservation* 29: 217-240.
- Yasue, M. 2005. The effects of human presence, flock size and prey density on shorebird foraging rates. *Journal of Ethology* 23: 199–204.
- Yasue, M. 2006. Environmental factors and spatial scale influence shorebirds' responses to human disturbance. *Biological Conservation* 128: 47-54.
- Zonick, C. A. 2000. The winter ecology of Piping Plovers (*Charadrius melodus*) along the Texas Gulf coast. PhD Dissertation, University of Missouri, Columbia. 168pp.
- Zonick, C. A. 1997. The use of Texas barrier island washover pass habitat by Piping Plovers and other coastal waterbirds. Report to Texas Parks and Wildlife Dept. and U. S. Fish and Wildlife Service.