**Appendix N**

USFWS

*Aerial View of Refuge*

# Chincoteague NWR: Recreational Beach Structured Decision Making Process, Locating the Best Site for a Recreational Beach and Parking Lot

# Chincoteague National Wildlife Refuge: Locating the Best Site for a Recreational Beach and Parking Lot

## Summary Report

*A Structured Decision Making process to identify beach segments with the least amount of wildlife use and greatest public use attributes.*

*November 2011*

# Table of Contents

# Background

Chincoteague National Wildlife Refuge (CNWR) was established under authority of the Migratory Bird Conservation Act in 1943. The Assistant Secretary of the Interior determined U.S. Fish and Wildlife Service (FWS) ownership of this land was necessary for protection during nesting and migration seasons of all those species of wildlife determined as being of great value as a source of food, or in destroying of injurious insects, or nevertheless in danger of extermination through lack of adequate protection (U.S. District Court, 1943).

Access to Assateague Island, CNWR, for recreational use and related development was authorized by Congress under Public Law 85-57 in June 1957. The law provided for construction of a bridge and road to the refuge as well as recreational facilities on the southeastern shore of the island. The Chincoteague-Assateague Bridge and Beach Authority (a political subdivision of the Commonwealth of Virginia) developed and managed beach front recreational facilities and provided visitor services (USFWS 1993).

In September 1965, Congress approved the Assateague Island Seashore Act (P.L. 89-195) establishing Assateague Island National Seashore (ASIS). The National Seashore's boundaries were drawn to encompass CNWR. The Act provided the Virginia portion of Assateague Island National Seashore be managed by the National Park Service (NPS) for general purposes and follow the laws and regulations applicable to national wildlife refuges, including administration for public recreation use in accordance with the provisions of the Refuge Recreation Act (P.L. 87-714) (USFWS 1993).

The NPS acquired the Chincoteague-Assateague Bridge and Beach Authority and other rights in 1966 after the national seashore was established. Since the 1966 acquisition, the NPS managed public recreation activity at the Toms Cove Hook beach as an agent of the FWS, which owns the beach as part of CNWR (USFWS 1993). In 1976, Congress amended the National Wildlife Refuge System Administrative Act (P.L. 94-223) giving the FWS primary responsibility for the administration of lands and waters included within the National Wildlife Refuge System. This clarified the role of the FWS at CNWR although the majority of refuge lands lay within the boundary of Assateague Island National Seashore (USFWS 1993).

A 2001 Interagency Agreement between FWS and NPS specified the NPS role on the Virginia portion of Assateague Island National Seashore. Today, NPS continues to manage public recreation within an "assigned public beach area". FWS has primary responsibility for managing the wildlife resources within this area, allowing beach and other recreational use in compliance with the Refuge Recreation Act (Public Law 87-714).

Wind, waves, and storm surges are constantly shaping and re-shaping the Refuge's barrier islands in a natural dynamic process. Strong waves and storm surges can erode entire beaches back to the dune line, or break through this protective barrier and overwash sand and salt water onto back dunes, flats, or wetlands. Natural dune location is determined by the frequency and extent of storms, and the rate at which prevailing winds and vegetation can rebuild dunes. The coastal edge of barrier islands progressively moves westward in a process called shoreline retreat. Sand is rolled across the dunes and marshes, and deposited into bays on the backside of the islands, such as Toms Cove on Assateague. This process, sometimes described as the "barrier island rolling over onto itself," will be accelerated with predicted climate change and sea level rise. For every one-foot rise in sea level, barrier islands move 100 to 1,000 feet inland (USFWS 1988).

Assateague Island is more than 37 miles long. The southern 17 miles are managed as Chincoteague NWR. Early 18$^{th}$ century maps show a smaller Assateague Island. It has developed southward as a series of re-curved spits deposited by currents that erode sands from northern beaches. Toms Cove Hook is a sand spit that has accreted since the 1850s (CNWR 2008). Assateague Island National Seashore staff continues to track this southward growth by mapping the entire shoreline twice a year.

Based on early 1950s photos in Refuge Annual Narratives, and accounts from a flight over the island in 1941 (NPS 2003), Assateague was historically a low, overwashed island with some low natural dunes. Conditions are unfavorable for the natural development of a tall dune system because strong waves and storm surges erode beaches back to the dune line, and create breaks in the dune line (CNWR 1993). During the 1950s, Refuge maintenance staff constructed several miles of "beach dikes" by bulldozing sand and installing sand fences to create dunes in order to facilitate building the Wash Flats and Old Fields Impoundments. These beach dikes were periodically blown out or washed out by storms, and repairs were frequent during the 1950s (Refuge Annual Narratives).

After a March 1962 nor'easter took out most of Assateague Island's "beach dikes", an artificial dune was created along the entire ocean-side of the island. It was constructed by bulldozing a dike of sand five feet high by 30 feet wide at base. A four foot high sand fence was placed on top of the dune to catch additional sand, and by 1963 wind-blown sand had been deposited against the fence to increase the height of the dune. In spots where insufficient sand was available to push up the dune, a larger dike was built that was approximately 6-7 feet high and 180-200 feet at the base with a 20:1 slope on the surf side; sand fence placed on top caught an additional four feet of drift sand (Refuge Annual Narrative 1962 and 1963).

From the 1960s into the 1990s, staff attempted to maintain the dune line in critical areas to protect impoundments and public use facilities from overwash and storm surges by repairing blowouts in the dunes, planting beach grass, and using fencing to encourage sand accumulation. For instance, high seas from Hurricane Gloria, in the fall of 1985, overwashed several portions of the dune line near Old Fields Impoundment and east of B Pool. These low gaps were filled in with sand before winter storms could cause more extensive damage. In January 1992, a nor'easter destroyed much

of the artificial dune line south of the parking lots; north of the beach parking lots portions of the artificial dunes were either overwashed or lost. Following the 1992 storm, about 2.5 miles of dunes between the north beach parking lot and D-Dike) were reconstructed and planted with beach grass (CNWR 1993 & Refuge Annual Narrative). After implementation of the 1993 Master Plan, maintaining the artificial dune line was de-emphasized, and occurred in selected areas to provide protection to facilities and wildlife habitat (CNWR 1993).

At present, Assateague Island's artificial dune system ranges from non-existent south of the beach parking lots, to well-developed with small gaps ocean-side of North Wash Flats and Old Fields Impoundments. Wash over occurs frequently in the Overwash Area, and in the parking lots. Overwash is common between autumn and spring, when nor'easters and prevailing winter winds scour the shoreline. Storm systems that occur during the highest lunar tides of the month can send sand filled waves over the beach, scouring everything in their paths, moving huge loads of sand from the ocean shoreline, depositing them in the cove side overwash fan. In summer, these events are less common. Prevailing winds blow sand from the overwash fan back to the beach, and littoral currents bring new sand from the north to further rebuild the beach face. Storm overwash has also occurred at numerous points along Wild Beach, sending sand and saltwater into the back dunes and barrier flats. These overwash events create ideal nesting substrate for piping plovers and terns; plover broods also forage in ponds that form in natural depressions behind the dunes.

Overwash at the terminus of Beach road due to the December 2009 Nor'easter (Nor'Ida).

The table below lists the notable storm events that have occurred since the late 1800's. Few severe storms are recorded previous to the 1990's; however Assateague Island has experienced an increase in severe storm activity in recent history. Most of the storm events have impacted the infrastructure (roads, parking lots and buildings) associated with the recreational beach.

| **1800's** | **1900 – 1999** (100 years) | **2000 – 2011** (12 years) |
|---|---|---|
| 1878 - September Gale | 1933 – August Hurricane | 2000 – December Snowstorm |
| 1888 - Great Blizzard | 1936 – September Hurricane | 2003 – North American Blizzard |
| | 1962 – Ash Wednesday Storm | 2005 – North American Blizzard |
| | 1976 – NE U.S. Blizzard | 2006 – Late November Nor'easter |
| | 1984 – November Nor'easter | 2007 – April Nor'easter |
| | 1991 – 'Perfect Storm' | 2009 – November Nor'easter (Nor'Ida) |
| | 1993 – 'Storm of the Century' | 2009 – December Nor'easter |
| | 1994 – Christmas Nor'easter | 2010 – March Winter Storm |
| | 1996 – North American Blizzard | 2010 – November Nor'easter |
| | 1997 – April Fools' Day Blizzard | 2010 – December Blizzard |
| | | 2011 – January Blizzard |
| | | 2011 – Hurricane Irene |
| | | 2011 – October Nor'easter |

It is important to have an understanding of the history of storm occurrences and the effect they have had on the barrier beach. These changes in the beach front and dune system need to be considered while determining the best location for a recreational beach. The refuge is seeking to find an area of the beach that can maintain the infrastructure associated with a recreational beach and remain intact after storm events. The cost of rebuilding roads, parking lots, buildings etc. has become increasingly prohibitive.

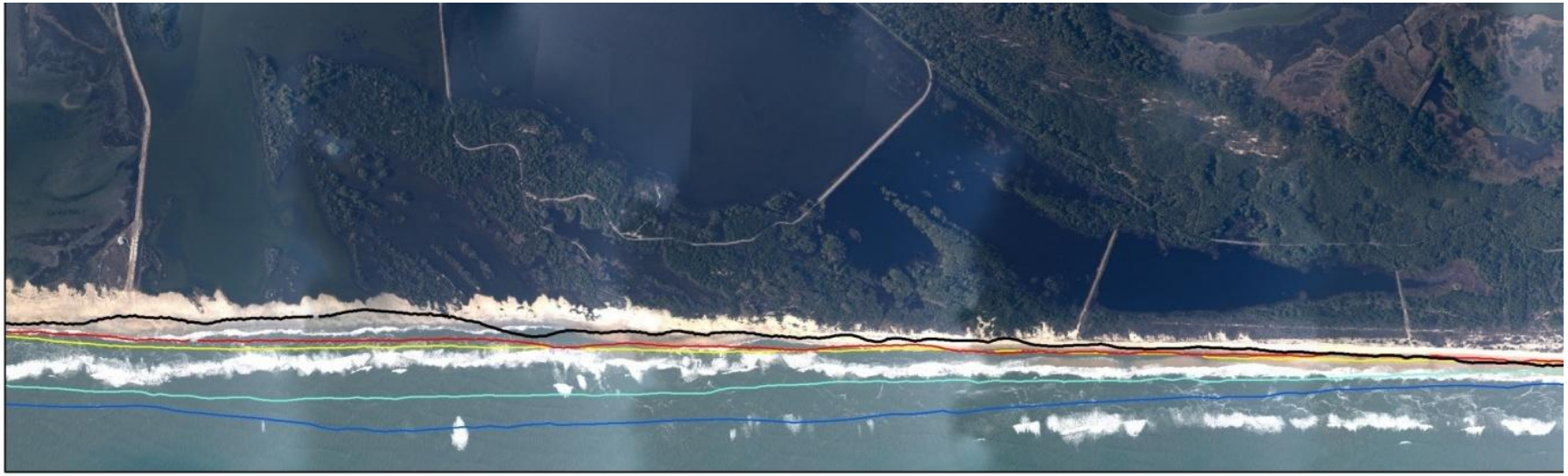
Storm damage to the Tom's Cove Visitor Center and parking lot #1 (December 1992).

1991 Photo of parking lot and recreational beach.

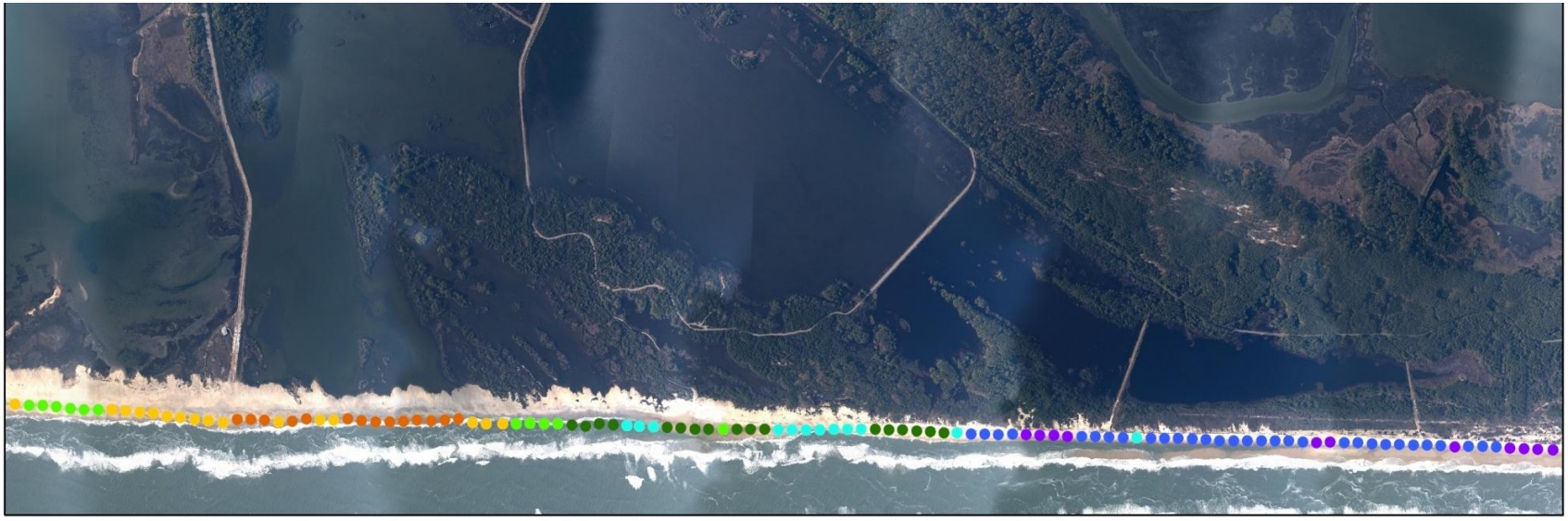
As a result of severe storms, the beach front has narrowed and the shoreline is moving westward. The 1991 photo shows the parking area and visitor center that was located behind the artificial dunes. Storm activity removed the dunes, parking lots and buildings. The second photo (2003) shows the deposition of sand that is building the island in its westward movement. Using artificial dunes in an attempt to 'protect' the beach front only temporarily prevents the natural barrier beach process from occurring. The red lines in the photos delineate the 2008 road to the parking lots.

2003 Photo of parking lot and recreational beach.

The westward movement of the beach can be seen in the photo below. This is an aerial photo taking in 2009. The far left side of the photo shows the road to the recreational beach and the remainder of the photo shows the stretch of beach to the north. The colored lines represent the location of the shoreline over the past 68 years, beginning with the blue line in 1942 to last year (the black line).



The shoreline is in a constant state of flux. Through time, some areas of the beach experience higher rates of change than other more stable areas of beach. The National Park Service's Assateague Island National Seashore (ASIS) has been recording the rate of shoreline change (linear regression rate) of the high-water shoreline twice a year from 1997 to 2008. The rate of change is measured in meters (3.28 feet) per year. The majority of the beach has been experiencing a negative rate of change (loss of beach).



# Problem Statement

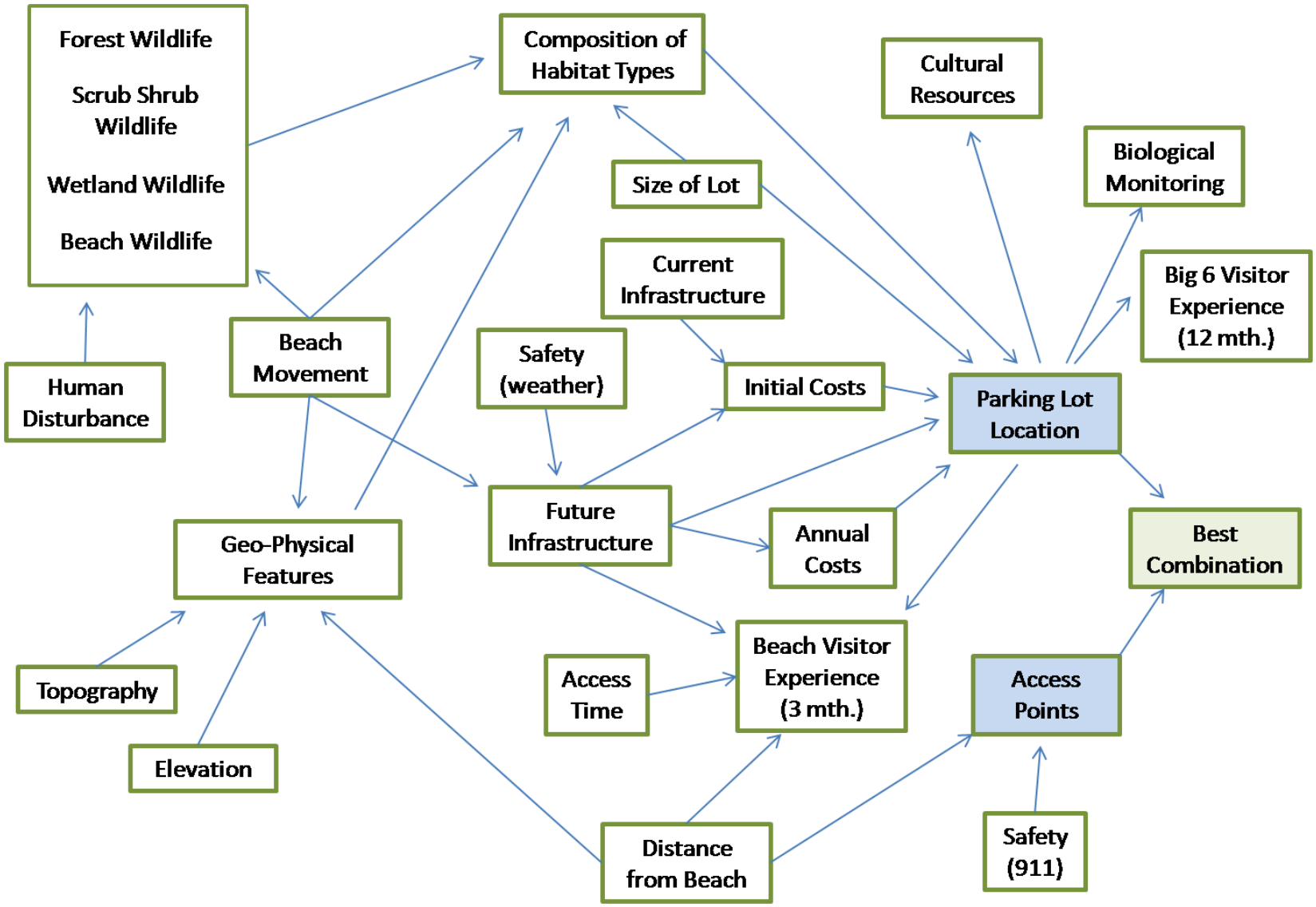
Workshop participants took some time to discuss the aspects of the problem and to develop a clear problem statement. It was determined that the refuge would like to continue to provide the same amount of recreational beach as it has in the past, approximately 1 mile. They want to provide access to the beach in a manner that has the least amount of impact to wildlife and habitat. The ocean is washing away the current recreational beach and parking lots, the refuge would like to explore the feasibility of relocating to a more stable section of beach. The scope of area to consider for relocation was determined to be Assateague Is. Providing access to a recreational beach and providing parking are two separate issues. It was decided to first identify appropriate segments of beach for a recreational beach and then explore parking scenarios. The following problem statement was developed to guide the SDM process:

> ***What is the most responsible and sustainable (20-50 years) combination of a parking lot and access to a one mile recreational beach on Assateague Island with the least impact to wildlife and habitat?***

# Conceptual Model

A conceptual model is sometimes helpful to identify all the components of a complex problem. It is also used to ensure all the workshop participants have a mutual understanding of the problem or current conditions. While a conceptual model is being developed, participants can identify aspects of the problem that are important to them. The visual diagram demonstrates the interconnectedness of all the problem components.

The conceptual model built for this problem is on the following page.


Forest Wildlife
Scrub Shrub Wildlife
Wetland Wildlife
Beach Wildlife
Composition of Habitat Types
Cultural Resources
Biological Monitoring
Size of Lot
Current Infrastructure
Big 6 Visitor Experience (12 mth.)
Human Disturbance
Beach Movement
Safety (weather)
Initial Costs
Parking Lot Location
Future Infrastructure
Annual Costs
Best Combination
Geo-Physical Features
Topography
Elevation
Access Time
Beach Visitor Experience (3 mth.)
Access Points
Distance from Beach
Safety (911)

# Objectives

Workshop participants brainstormed the objectives for a recreational beach. The issues they are concerned about related to managing a recreational beach: things they want to provide; things they want to ensure are not negatively impacted; things to consider, etc.

- Consideration of visitor safety, EMS vehicles, disabled visitor access/drop-off
- Proximity to existing infrastructure (restrooms, roads, electricity, etc.)
- Wildlife guilds/habitats:
    - Wildlife dependent upon sparsely vegetated beach and dune habitat (beach nesting birds, turtle nests, wildlife)
    - Waterbird use of wetlands (shorebird, waders, waterfowl)
    - Forest dependent wildlife (birds, DFS, etc.)
    - Shrub-scrub dependent wildlife
- Expected longevity of beach (island/beach migration rate)
- Ability to have some direct access
- Initial cost
- Cost of annual maintenance (fiscal sustainability)
- Consider impact to mandated recreation (Big 6)
- Maintain the visitor's experience as it is currently
- Impact on local economy
- Cultural resources – (unknown constraints)

Objectives are used to build a consequence table; they become the criterion which allows for a comparison to be made between potential recreational beach segments. The objectives are measured and used to identify the beach segments that best meet the criterion. On the second day of the workshop, we reviewed the objectives, refined them and determined how each would be measured. Influence diagrams were developed for each objective, to help identify measurable attributes.

Through the process, the above items evolved into the following list of objectives and sub-objectives.

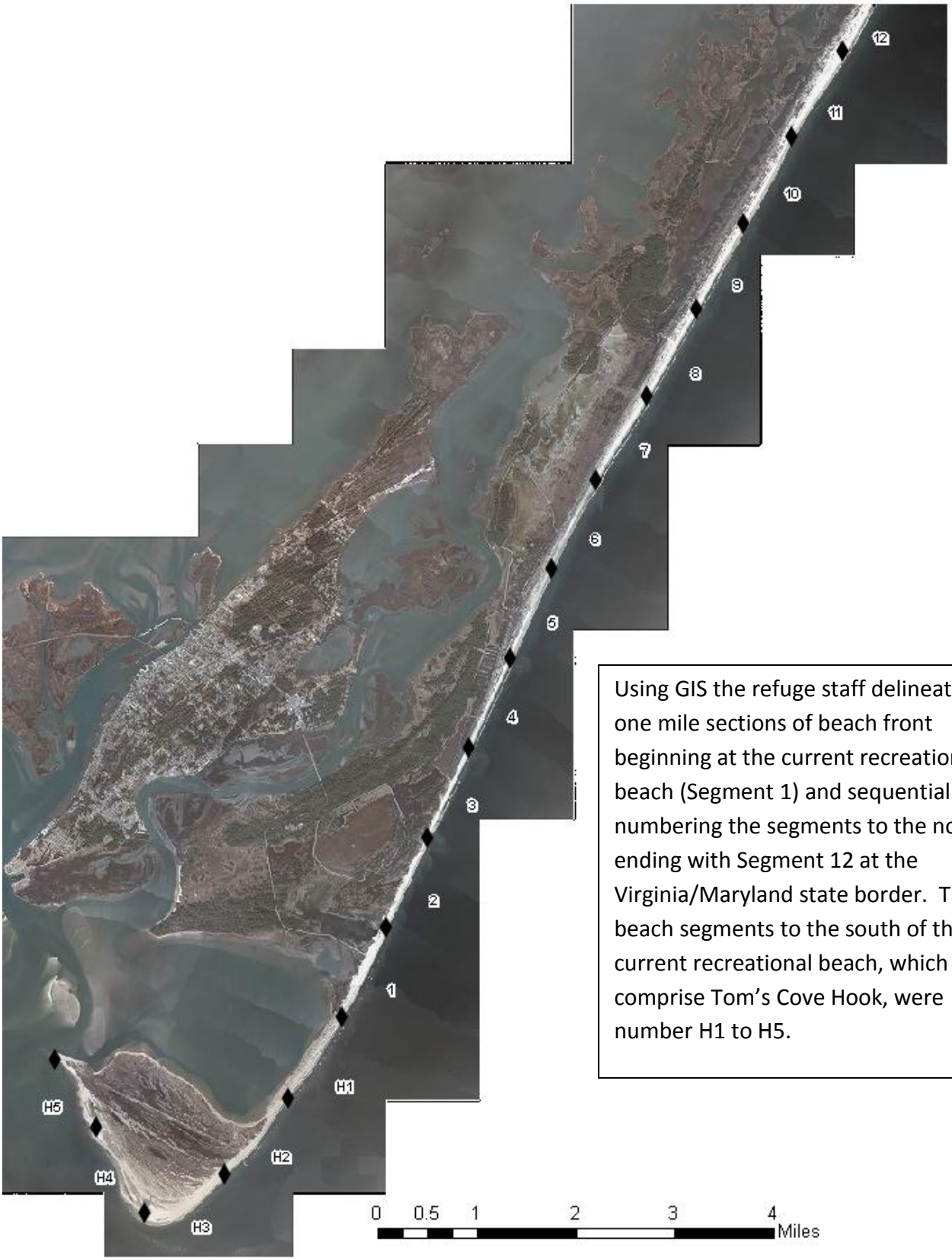
1. Wilderness Status
2. Wildlife Dependent on Sparsely Vegetated Habitat
    a. Amount of use during migration
    b. Amount of non-breeding (winter) bird use
    c. Amount of breeding use

3. Additional Legal Mandates
4. Waterbird Use of Wetlands
    a. Level of waterbird use
    b. Cumulative use of beach segment
5. Forest Dependent Wildlife
6. Shrub-scrub Dependent Wildlife
7. Expected Longevity of Infrastructure
8. Proximity to Existing Infrastructure
9. Visitor Safety and Experience
10. Habitat Acreage Change
11. Recreational Beach Visitor Experience
12. Cultural Resources
13. Initial Costs
14. Cost of Annual Maintenance

These were used to score each of the beach segments and resulted in the selection of a few segments which were then used to develop parking lot scenarios. Influence diagrams were built for some of the objectives to assist with determining the data needed for scoring. The data and process used to score each of the objectives is described in this section.

A simple scoring method was developed. For each Objective and Sub-objective, the group identified the best information they had to measure the objective and developed categories if necessary. The categories, such as High, Medium, and Low, were given a numerical score. The objective scores are added, the segments with the highest score represent the best segments to locate a recreational beach.

The refuge wants to find the best location for a recreational beach, therefore objectives that reflect features that are desirable for a recreational beach such as, close proximity to existing infrastructure, visitor safety, and easy access have scores where high = 3 and low = 1. It is just the reverse for wildlife and habitat objectives. To answer the Problem Statement, the refuge needs to locate areas with the least amount of impact to wildlife and habitat. Therefore objectives that reflect wildlife or habitat features have scores where high levels of use = 1 and low levels of use = 3. Segments that have a low impact to wildlife get a higher score.




Using GIS the refuge staff delineated one mile sections of beach front beginning at the current recreational beach (Segment 1) and sequentially numbering the segments to the north, ending with Segment 12 at the Virginia/Maryland state border. The beach segments to the south of the current recreational beach, which comprise Tom's Cove Hook, were number H1 to H5.

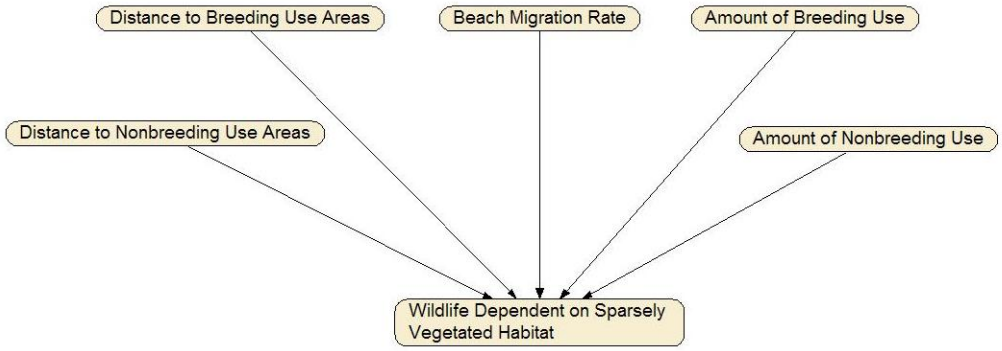
# 1. Wilderness

Portions of the Assateague Island Wilderness Proposal are located within CNWR. The proposal includes 1,740 acres in CNWR and ASIS of which 882 acres are south of the Maryland/Virginia state line, extending from mean low water (MLW) along the Atlantic Ocean to MLW along Chincoteague Bay. Congress has not yet acted on the proposal. Wilderness lands or lands that have been proposed for Wilderness have restrictions. There is limited human activity, restricted mechanical operations and restrictions on building structures.

This was the first Objective of the consequence table because it removes these beach segments from further analysis. Beach segments that fall within the area that is being proposed for Wilderness cannot be considered as areas for a recreational beach. In the consequence table these beach segments received a 'Y' for yes (Segments 9 – 12, the northern portion of the refuge beach). Beach segments that are not in the proposed Wilderness area received an 'N' for no, and continued to be scored for the next Objective.

# 2. Wildlife Dependent on Sparsely Vegetated Habitat

Influence diagram depicting elements that affect wildlife dependent on sparsely vegetated habitat.




## a. Amount of Breeding Use (shorebirds, sea turtles, plants).

Chincoteague NWR is an important breeding area for beach nesting birds and species dependent on sparsely vegetated habitat. The Federally Threatened piping plover nest

during the summer months, as well as, State listed species such as the least tern. Sea turtles use the beach to lay their eggs. Areas of the Federally Threatened sea beach amaranth have become established and need to remain undisturbed to thrive. This period of plant and animal reproduction overlaps with the time of heaviest human use. It is critical that the breeding use score represents all species dependent upon this habitat.

Breeding shorebirds were grouped together. Segments with more than 20 nests have a high level of use and received a breeding score of 3. Segments with 10-19 nests have a medium level of use and received breeding score of 2. Segments with 1-9 nests have a low level of use and received a breeding score of 1. Segments with no use received a breeding score of 0.

**Breeding Use on Sparsly Vegetated Habitat**

| Segment # | Bird Score | Sea Turtle Score | Amaranth Score | Average Score | Final Score | Matrix Score |
|---|---|---|---|---|---|---|
| 1 | 1 | 0 | 0 | 0.33 | L | 3 |
| 2 | 1 | 1 | 0 | 0.67 | L | 3 |
| 3 | 0 | 1 | 0 | 0.33 | L | 3 |
| 4 | 0 | 1 | 0 | 0.33 | L | 3 |
| 5 | 1 | 1 | 1 | 1.00 | M | 2 |
| 6 | 1 | 1 | 1 | 1.00 | M | 2 |
| 7 | 3 | 1 | 1 | 1.67 | H | 1 |
| 8 | 1 | 1 | 0 | 0.67 | L | 3 |
| 9 | 0 | 1 | 1 | 0.67 | L | 3 |
| 10 | 0 | 1 | 2 | 1.00 | M | 2 |
| 11 | 1 | 1 | 3 | 1.67 | H | 1 |
| 12 | 1 | 0 | 3 | 1.33 | M | 2 |
| H1 | 3 | 2 | 0 | 1.67 | H | 1 |
| H2 | 2 | 3 | 0 | 1.67 | H | 1 |
| H3 | 3 | 3 | 1 | 2.33 | H | 1 |
| H4 | 3 | 3 | 0 | 2.00 | H | 1 |
| H5 | 3 | 0 | 0 | 1.00 | M | 2 |
| Score | 0 - 0.9 = L | 1.0 - 1.5 = M | > 1.5 = H | | | |

**Shorebird Nest Scale**
- Null = 0 nests
- Low = 1 - 9 nests
- Med = 10 - 19 nests
- High = ≥ 20 nests
- Shoreline segments

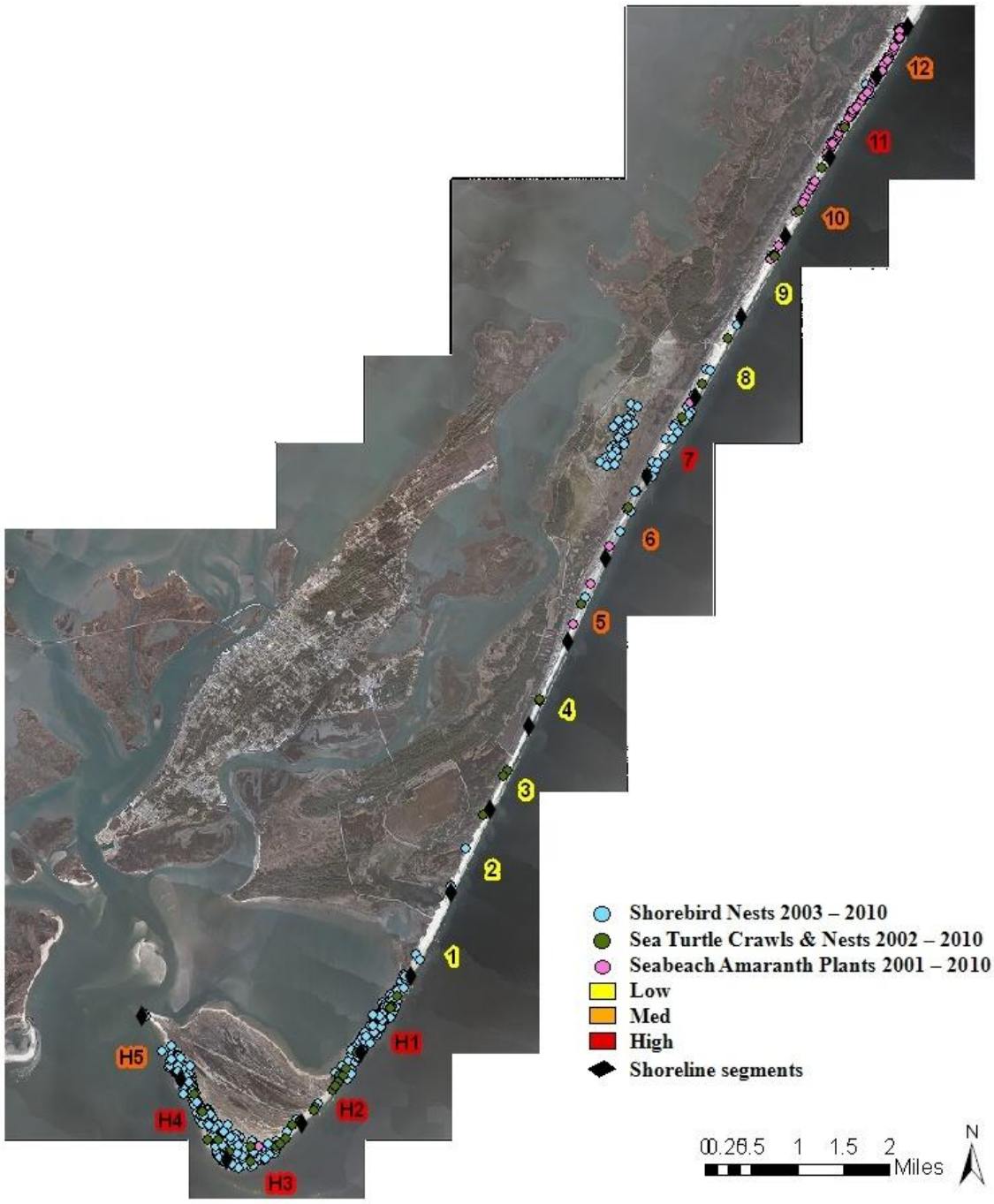
**Sea Turtle Activity Scale**
- Null = 0 crawls or nests
- Low = 1 - 2 crawls or nests
- Med = 3 - 4 crawls or nests
- High = ≥ 5 crawls or nests
- Shoreline segments

**Seabeach Amaranth Scale**
- Null = 0 plants
- Low = 1 - 9 plants
- Med = 10 - 19 nests
- High = ≥ 20 plants
- Shoreline segments

Sea turtles and sea beach amaranth were given category scales of high, med and low reflective of their abundance. The biological scores were placed into an excel table. The biological scores were averaged for each segment. Segments with a biological average of 0.0 -0.9 had a low level of use and received a matrix score of 3. Segments with a biological

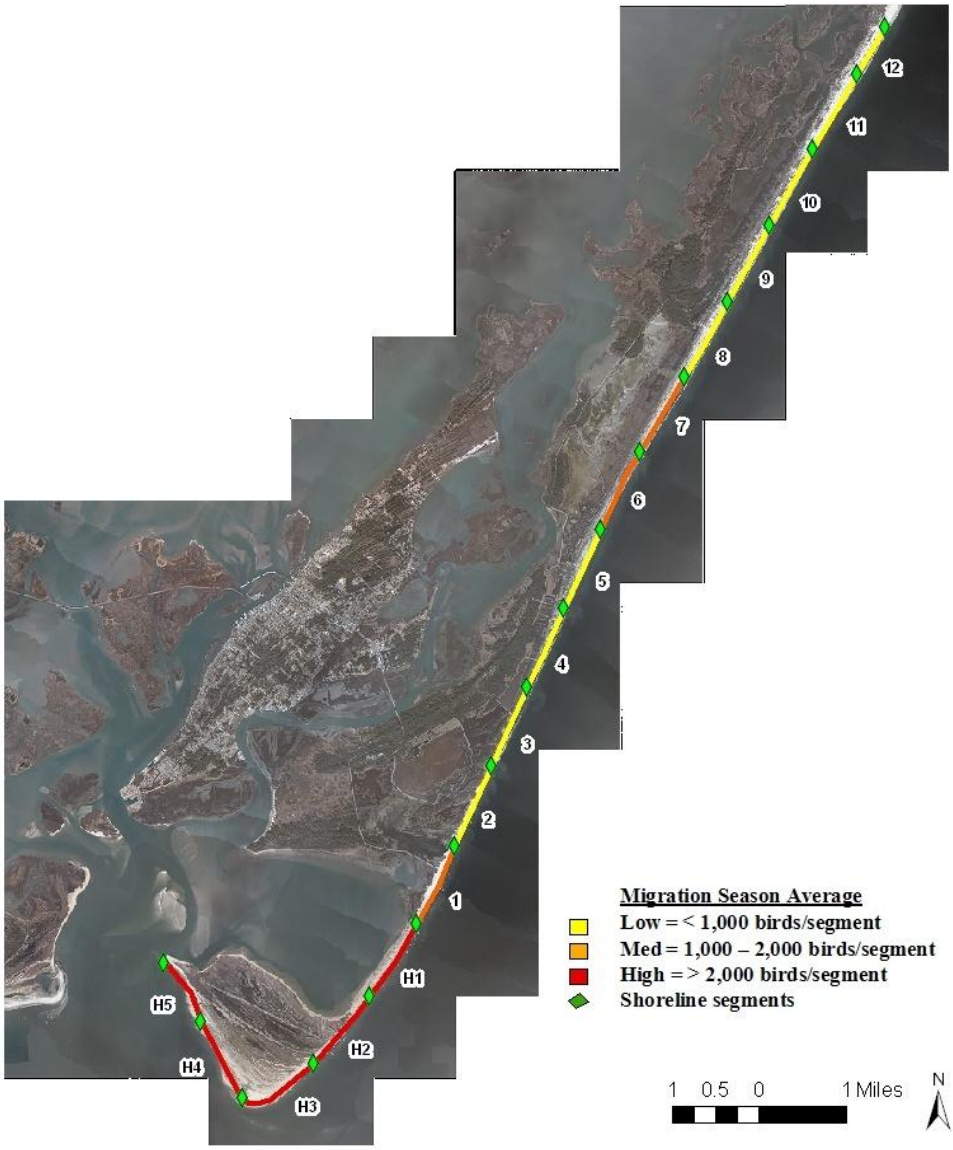
average of 1.0-1.5 had a medium level of use and received a matrix score of 2. Segments with a biological average of >1.5 had a high level of use and received a matrix score of 1.

Generalized locations for nesting shorebirds, sea turtles and sea beach amaranth plants, (blue, green and purple dots) along with the level of averaged breeding use (red, orange and yellow numbers) for beach segments.



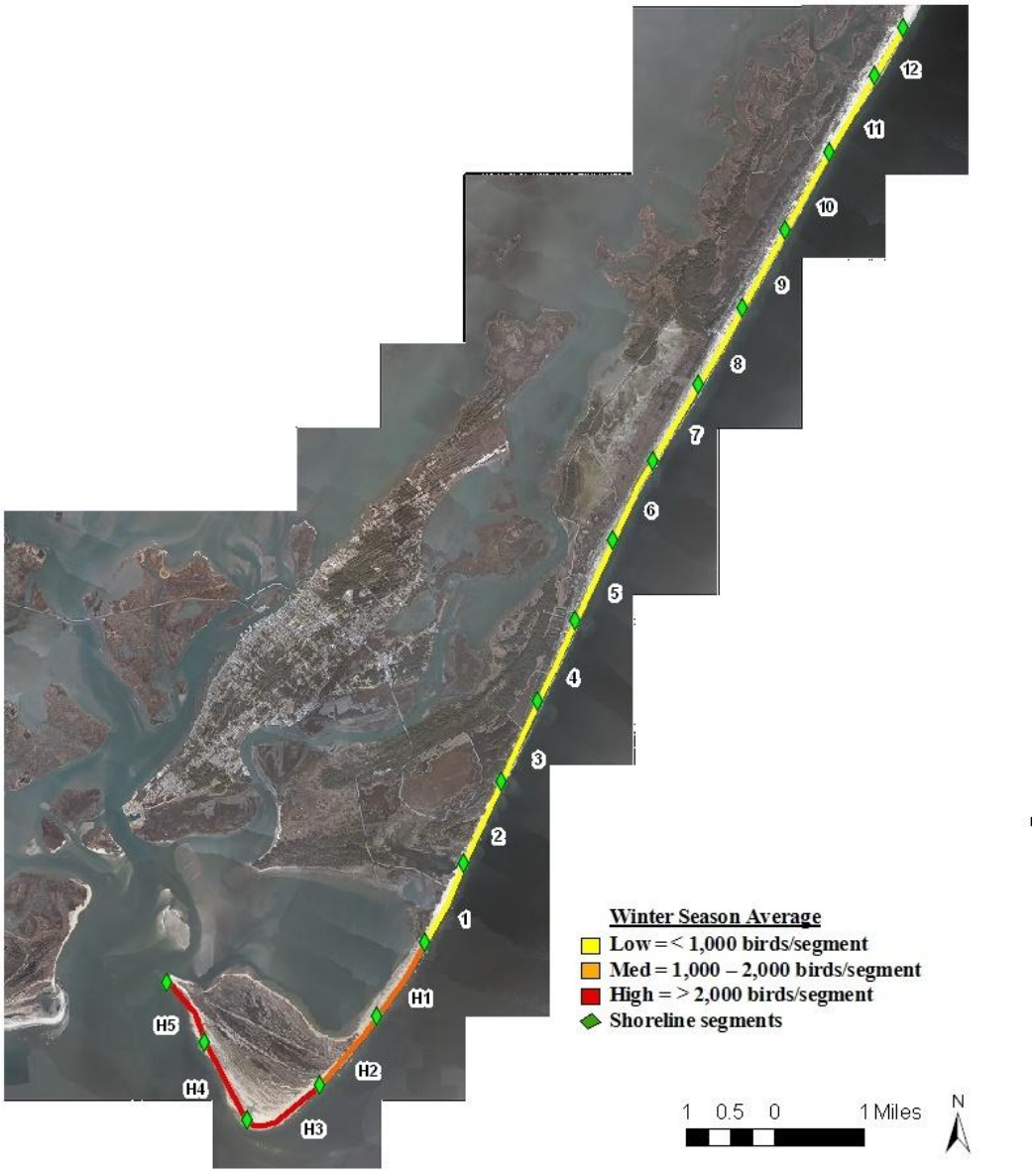
## b. Amount of shorebird use during migration.

The refuge has been conducting shorebird migration surveys since 1991. This data was summarized and each segment received a score based on the average level of use that has been observed. Segments that had an average use of <1000 birds displayed a low level of use and received a score of 3. Segments that had an average use of 1000 – 2000 birds represent a medium level of use and received a score of 2. Segments with high levels of use, > 2000 birds, received a score of 1.



## c. Amount of Non-Breeding Bird Use (winter beach use).

The refuge has been conducting shorebird surveys during the winter season with the same observer that performs the migration surveys. We applied the same scoring we used for shorebird use during migration.



## 3. Additional Mandates

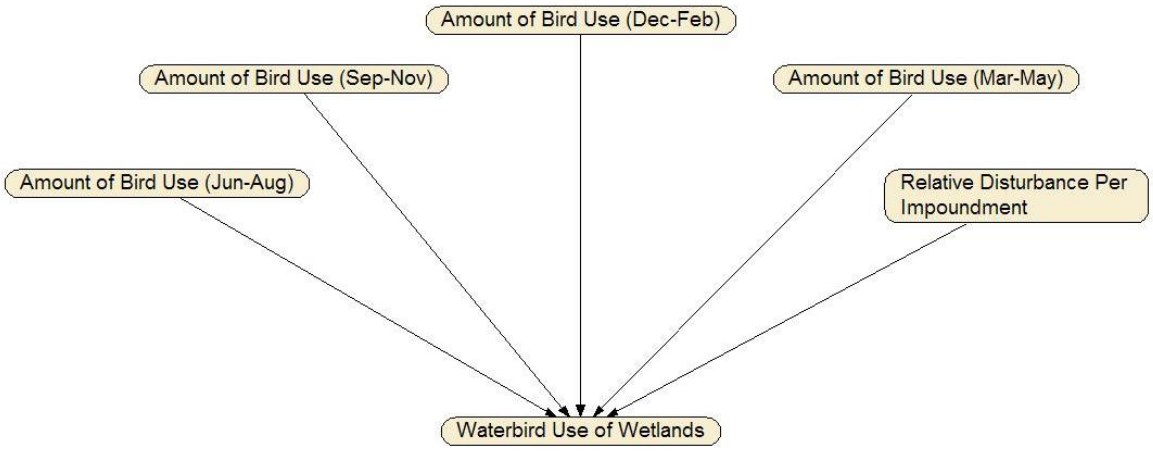
This objective recognizes mandates that the refuge is required to meet. It includes legal and policy obligations such as the Endangered Species Act. Beach Segments H1 – H5 receive a 'Y' for yes in the matrix because of piping plover monitoring and management activities, as stated in the 2008 USFWS Biological Opinion and Intra-Service Section 7 Biological Evaluation.

In addition, the NASA controlled airspace that overlays the Tom's Cove Hook and Overwash would preclude development of public use infrastructure due to potential flight hazards. Currently, refuge visitors are restricted from access on the Hook and Overwash during a scheduled launch event.

Due to the additional mandates placed on Segments H1-H5, these segments do not proceed to the next Objective.

## 4. Waterbird Use of Wetlands

Influence diagram for elements that affect waterbird use of refuge wetlands.



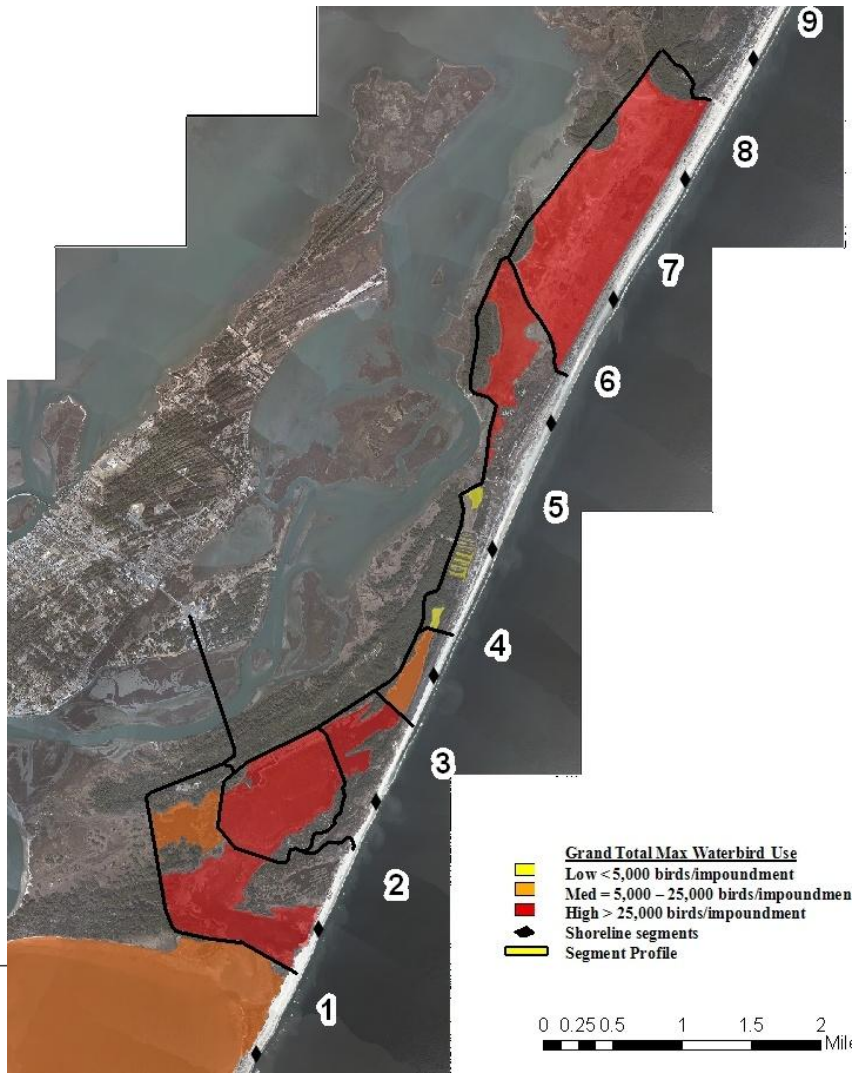

### a. Level of Waterbird Use

Chincoteague NWR manages 10 freshwater impoundments. These wetlands along with Tom's Cove (saltwater wetlands) support waterfowl, shorebirds and wading birds (waterbirds) during different times of the year. The impoundments provide food and resting areas for migrating

waterfowl and shorebirds, as well as, food during the wading bird breeding season. The refuge wanted to include the potential impact beach visitors would have on waterbirds using the impoundments by ranking the level of use for each impoundment.

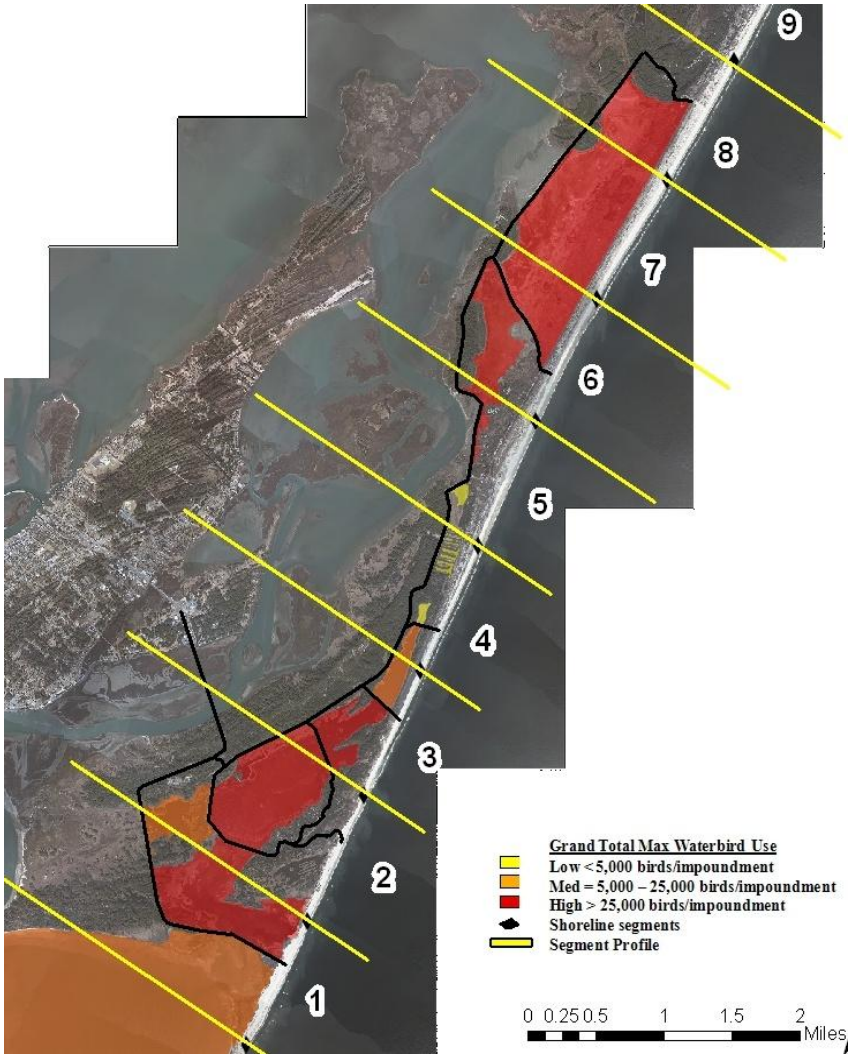
The refuge analyzed waterbird data from 2005 to 2009. From this data, they developed the following table and map of maximum waterbird use for each wetland. Each wetland (Tom's Cove and 10 impoundments) received a relative rank according to the level of use: <5,000 birds/impoundment = low; medium = 5,000 – 25,000; and high = > 25,000. The map shows the rank for each wetland (yellow = low, orange = medium, red = high). The rank was then converted into a score for the matrix. Wetlands with a high level of use were given a 1, medium a 2, and low a 3. Recall that we are scoring for the least impact to wildlife, therefore wetlands with low use get a higher score.

| Waterbird Use of Wetlands | | |
|---|---|---|
| **Impoundment/ Wetland** | **Total Max Waterbird Use** | **Rank** |
| **Tom's Cove** | 20970 | M |
| **F-Pool'** | 29298 | H |
| **A-Pool** | 6047 | M |
| **B-South Pool** | 132191 | H |
| **B-North Pool** | 26739 | H |
| **C-Pool** | 7973 | M |
| **D-Pool** | 121 | L |
| **Farm Fields** | 1910 | L |
| **E-Pool** | 3312 | L |
| **South Wash Flats** | 25343 | H |
| **North Wash Flats** | 26695 | H |



For the purposes of this analysis, the refuge has been split into beach segments. Each of the segments contains one or two wetlands. Beach segments 1 – 8 (the other segments have been removed from the analysis based on earlier criteria) received a score which was the average score of the two wetlands within that segment, or just the score if only one wetland was in the segment. These are listed in the table (and entered into the matrix) followed by the map of beach segments and wetlands within each segment.

| Waterbird Use of Wetlands per Segment (color combo) | | | |
|---|---|---|---|
| **Segment Profile #** | **Wetland 1** | **Wetland 2** | **Average Score** |
| 1 | 2 | 1 | 1.50 |
| 2 | 2 | 1 | 1.50 |
| 3 | 2 | 1 | 1.50 |
| 4 | 2 | 3 | 2.50 |
| 5 | 3 | 1 | 2.00 |
| 6 | 1 | 1 | 1.00 |
| 7 | 1 | | 1.00 |
| 8 | 1 | | 1.00 |

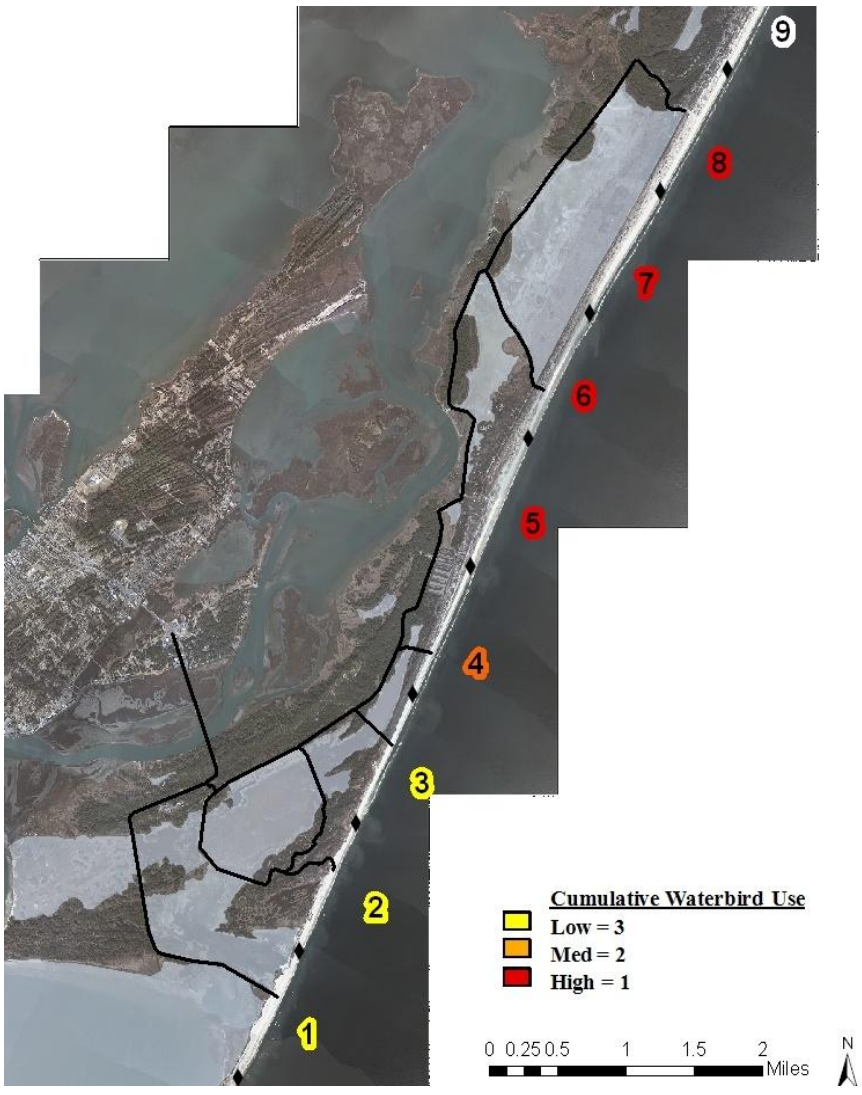


## b. Cumulative Use to Beach Segment

| Cumulative waterbird max use along route to beach segment | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Segment Profile #** | **Impound 1** | **Impound 2** | **Impound 3** | **Impound 4** | **Impound 5** | **Impound 6** | **Impound 7** | **Impound 8** | **Sum** | **Matrix Score** |
| 1 | 1 | 2 | 2 | | | | | | 5.00 | 3.00 |
| 2 | 1 | 2 | 1 | 1 | | | | | 5.00 | 3.00 |
| 3 | 1 | 1 | 2 | | | | | | 4.00 | 3.00 |
| 4 | 1 | 1 | 2 | 3 | 3 | | | | 10.00 | 2.00 |
| 5 | 1 | 1 | 2 | 3 | 3 | 3 | 1 | | 14.00 | 1.00 |
| 6 | 1 | 1 | 2 | 3 | 3 | 3 | 1 | 1 | 15.00 | 1.00 |
| 7 | 1 | 1 | 2 | 3 | 3 | 3 | 1 | 1 | 15.00 | 1.00 |
| 8 | 1 | 1 | 2 | 3 | 3 | 3 | 1 | 1 | 15.00 | 1.00 |

An access road to the recreational beach will cause some disturbance based on the number of cars that travel to the beach. In order to assess the level of relative disturbance to waterbirds using the wetlands, we developed a score for the each segment based on the wetlands that an access road would pass as it traverses the refuge to the beach segment.

In the table below, each wetland (impoundment columns) receives a score based on the level of waterbird use. Then each section (segment profile rows) received a sum of those use levels. The sums were converted into a matrix score of 3 for sums of 0-5 (low cumulative sums i.e. low disturbance), 2 for sums 6-10, and 1 for sums 11-15 (high cumulative sums).



## 5. Forest Dependent Wildlife

The federally endangered Delmarva Peninsula fox squirrel (DFS), were translocated to Assateague Island from 1968-1971 to encourage recovery. The population has increased and expanded from the initial release sites on Lighthouse Ridge and Headquarters areas to all suitable loblolly pine habitats on the Refuge. The population is considered stable and estimated at 200 animals. Management consists of maintaining nest boxes, mowing roadside grasses to reduce vehicle/DFS collisions, thinning forest understory, and monitoring/controlling southern pinebark beetle outbreaks when they threaten habitat. Population estimates are made biannually with mark-recapture techniques. DFS are now a candidate species for delisting.

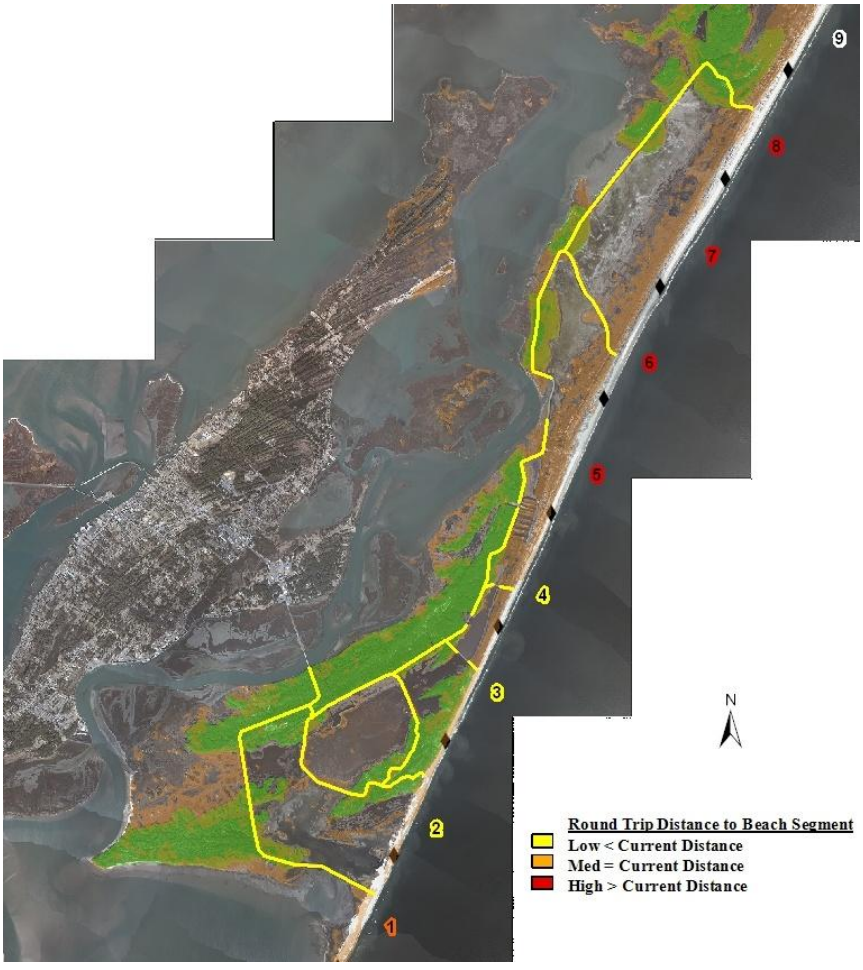

| Delmarva Fox Squirrel (Forest) Habitat | | | |
|---|---|---|---|
| **Segment Profile #** | **Miles of Forest Habitat in route to and from beach segment** | **Rank** | **Matrix score** |
| 1 | 1.96 x 2 = 3.920 | M | 2 |
| 2 | 2.363 + .84 = 3.203 | L | 3 |
| 3 | 1.7575 x 2 = 3.515 | L | 3 |
| 4 | 2.274 x 2 = 4.548 | H | 1 |
| 5 | 3.34 x 2 = 6.680 | H | 1 |
| 6 | 3.891 x 2 = 7.782 | H | 1 |
| 7 | 3.891 x 2 = 7.782 | H | 1 |
| 8 | 5.439 x 2 = 10.878 | H | 1 |

The access road to the recreational beach bisects forested areas. The analysis needed to reflect the potential negative impacts an access road may have on the squirrel population, which are car collisions and reduced habitat. To assess this, the refuge measured the linear distance through forested habitat the current access road bisects (approx. 4 miles round trip).

Using GIS, the refuge delineated the path an access road would take to and from each beach segments 1-8, and measured the linear distance that would pass through forested habitat. The results are in the table above. Paths that were less than the current access road distance through forested habitat were given a rank of low and matrix score of 3 (less impact than current conditions). Paths equal to 4 miles received a rank of medium and score of 2, and those longer than 4 miles where ranked as a high level of impact and received a score of 1.

## 6. Scrub-Shrub Dependent Wildlife

Scrub-shrub is a critical coastal habitat. The majority of this habitat, covering 2,872 acres (roughly 25- 30%) of Assateague Unit, extends north and south on barrier flats and backdunes, gradually merging on the east with dune grasses of the beach/dune community, and on the west with marshes or forests. Small pockets of this habitat are scattered throughout Assateague Island. Shrubs, small trees, and vines are predominant plant forms. Common species include wax myrtle, northern bayberry, black cherry, Canada serviceberry, blackberry, poison ivy, and greenbrier. Evergreens are less frequent, but include red cedar and American holly.



Bird species that depend on shrubs and other early-successional habitats are declining in the eastern U.S. due to loss of habitat. Shrubs provide an abundance of insect food for breeding birds, and berries during the fall migration and/or throughout the winter. The large number of yellow-rumped warblers that winter on the Refuge, as well as tree swallows feed on wax myrtle berries.

The refuge has not specifically conducted surveys in the scrub-shrub habitat. The primary concern is the loss of habitat due to the access road that would traverse through the scrub-shrub and reduce its value to wildlife. Therefore, we used a similar measurement, ranking and score system applied to the forested habitat.

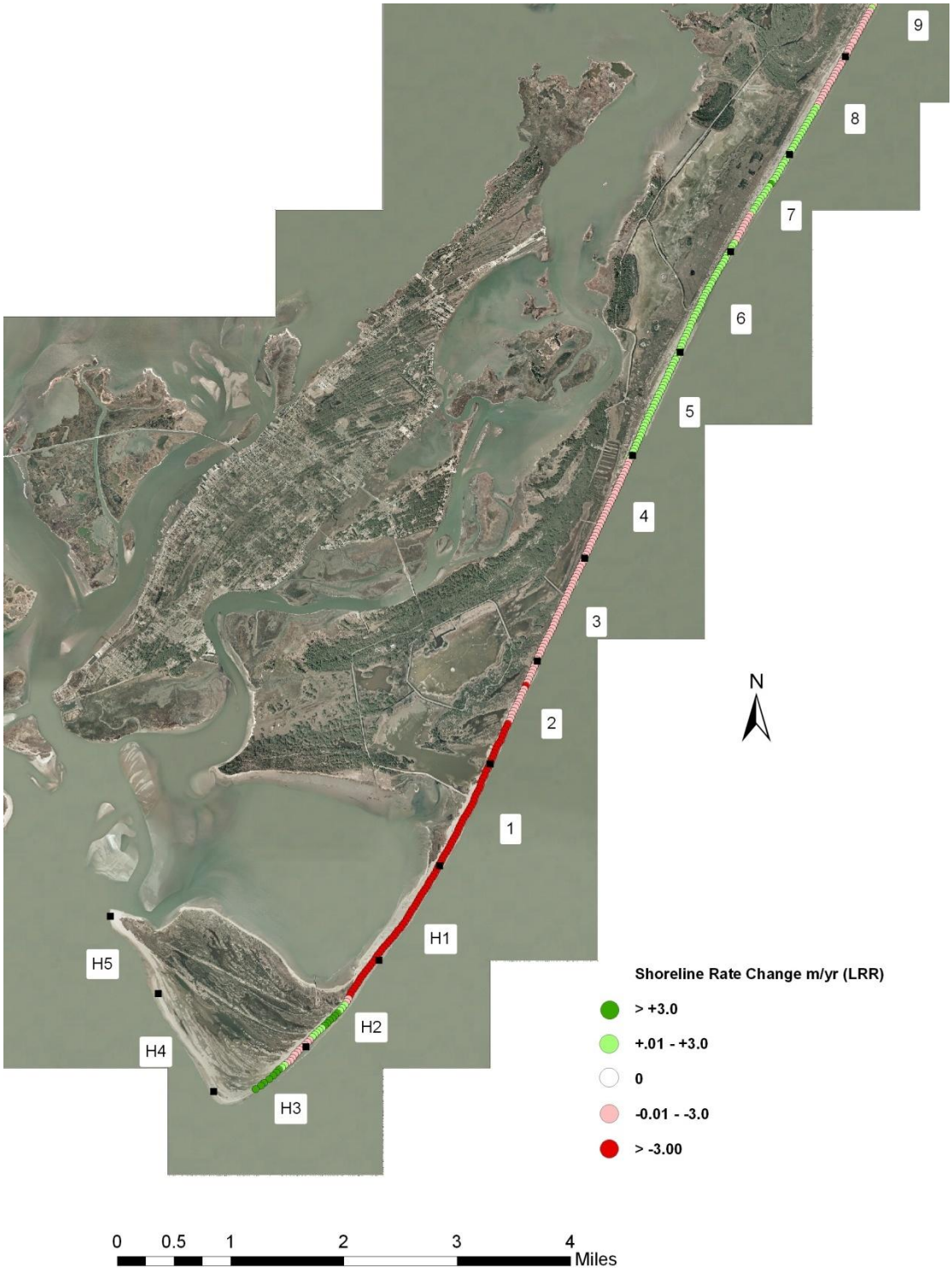
| Miles of Scrub Shrub Habitat | | | |
|---|---|---|---|
| **Segment Profile #** | **Miles of Scrub Shrub Habitat in route to and from beach segment** | **Rank** | **Matrix score** |
| 1 | 2.88 x 2 = 5.76 | M | 2 |
| 2 | 3.82 + .84 = 4.66 | L | 3 |
| 3 | 1.89 x 2 = 3.78 | L | 3 |
| 4 | 2.31 x 2 = 4.62 | L | 3 |
| 5 | 3.61 x 2 = 7.22 | H | 1 |
| 6 | 5.75 x 2 = 11.50 | H | 1 |
| 7 | 5.75 x 2 = 11.50 | H | 1 |
| 8 | 7.26 x 2 = 14.52 | H | 1 |

Using GIS, the refuge delineated the path an access road would take for beach segments 1-8, and measured the linear distance that would pass through scrub-shrub habitat. The results are in the table below. Paths that were less than the current access road distance (approx. 6 miles round trip) were given a rank of low and matrix score of 3 (less impact than current conditions). Paths equal to 6 miles received a rank of medium and score of 2, and those longer than 6 miles where ranked as a high level of impact and received a score of 1.

## 7. Expected Longevity of Infrastructure

Due to the destruction from storm activity in recent years, meeting participants wanted to include a measurement that would reflect a level of permanence for the road, parking lots and structures associated with a recreational beach. After some discussion, it was decided to use the ASIS's beach migration rates. Each segment has 32 dots which represent a rate of change for that portion of the beach. These ranged from slow accretion (green + 3 meters/year) to rapidly decreasing (red – 3 meters/year). For beach segments 1-8, the dots were summed for each rate of shoreline change and used to derive at a score for the matrix. The rate of change was then converted to the matrix score (see chart below). For example, segment profile #2 illustrates a rate of change of 43.75% or fourteen dots and a rate of change of 56.25% or eighteen dots for a total of 100% or 32 dots. Each rate of change score was then converted to the new matrix score and then averaged to create the matrix score.

| Shoreline Change | | | | | | |
|---|---|---|---|---|---|---|
| **Segment Profile #** | **> -3.0** | **-0.01 - -3.0** | **0** | **+0.01 - +3.0** | **> +3.0** | **Matrix score** |
| | **= -2** | **= -1** | **= 0** | **= 1** | **= 2** | |
| 1 | 32 = 100% | | | | | -2 |
| 2 | 14 = 43.75% | 18 = 56.25% | | | | -1.44 |
| 3 | | 32 = 100% | | | | -1 |
| 4 | | 32 = 100% | | | | -1 |
| 5 | | | | 32 = 100% | | 1 |
| 6 | | | | 32 = 100% | | 1 |
| 7 | | 9 = 28.125% | | 22 = 68.75% | 1 = 3.125% | 0.47 |
| 8 | | 16 = 50% | | 16 = 50% | | 0 |


9
8
7
6
5
4
3
2
1
H1
H2
H3
H4
H5
N
Shoreline Rate Change m/yr (LRR)
> +3.0
+.01 - +3.0
0
-0.01 - -3.0
> -3.00
0 0.5 1 2 3 4
Miles

## 8. Proximity to Existing Infrastructure

There are a number of utilities needed for the comfort of recreational beach users, such as running water and electricity. The refuge currently has utilities at the Wildlife Loop Parking Lot; these would need to be run to the new recreational beach location. The National Park Service has a Visitor Center at Tom's Cove which has utilities. The Tom's Cove VC is approximately 2.5 miles from the Wildlife Loop Parking Lot. In an attempt to gauge the relative cost of running utilities to the different beach sections, each beach segment received a score according to its distance from the Wildlife Loop Parking Lot. If a segment was further than 2.5 miles from the Wildlife Loop Parking Lot, it received a score of 1 (least desirable condition because it was further than the Tom's Cove VC). A segment received a score of 2 if it was equal to 2.5 miles and a score of 3 if it was shorter than 2.5 miles (closer than the Tom's Cove VC). The distances were calculated using GIS and the scores entered into the matrix.

## 9. Visitor Safety and Experience

Visitor Safety and Experience is comprised of four sub-objectives. These four sub-objectives are to score visitor issues such as safety in the form of how quickly the Emergency Medical Services would be able to respond to an emergency at the recreational beach. The placement of a recreational beach in one of the beach segments will have some level of impact on other visitor services such as walking trails and hunting areas. The quality of the recreational beach visitor's experience is addressed in another set of sub-objectives, these sub-objectives are to score use by non-recreational beach visitors.

## a. Response Time by Emergency Medical Services (EMS)

The amount of time that is estimated for EMS to respond to a visitor's need was scored based on current response time estimates and the distance to the beach segment from the beginning of the Wildlife Loop Parking Lot. The Refuge's visitor services staff and Town representatives estimated the current response time to be approximately 5-10 minutes. The distance to each of the beach segments was reviewed and was given a rank of high, medium or low based on the distance to the beach segment. A segment was scored 3 (high) if the response time would be less than 5 minutes, 2 if it would be 5-10 minutes (medium) and a score of 1 (low) if the response time would be greater than 10 minutes. These scores were entered into the matrix.

| Distance to Beach Segment | | | |
|---|---|---|---|
| **Segment Profile #** | **Distance to beach segment (Beginning at Wildlife Loop Parking Lot) in miles** | **Rank** | **Matrix score** |
| 1 | 2.550 | M | 2 |
| 2 | 1.650 | H | 3 |
| 3 | 1.640 | H | 3 |
| 4 | 2.100 | H | 3 |
| 5 | 2.310 | H | 3 |
| 6 | 5.940 | L | 1 |
| 7 | 5.940 | L | 1 |
| 8 | 7.490 | L | 1 |

## b. Points of Interest along Route to Beach

As people travel to the beach, there are opportunities to view wildlife and points of interest like the historic lighthouse. Depending upon the beach segment, an access route will have different points of interest. The refuge developed a list of 'Points of Interest' based on past requests by visitors to see refuge resources. Many visitors come to the refuge to see the ponies, the historic lighthouse and visitor center. The opportunity to see a variety of wildlife is based on the habitats that the access route travels through. The refuge's freshwater wetlands, saltmarsh

and borrow ditches provide habitat for waterfowl, shorebirds and wading birds and opportunities to visitors to view them. The Wildlife Loop and forested habitat provide additional opportunities to view upland wildlife.

| | Beach Profile # | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Points of interest** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Pony viewing | 1 | | | | 1 | 1 | 1 | 1 |
| Forest | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Lighthouse access | 1 | | | | | | | |
| VCS | 1 | | | | | | | |
| Freshwater wetlands | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Salt marsh | 1 | | | | 1 | 1 | 1 | 1 |
| Borrow ditches | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Wildlife Loop | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Total | 7 | 4 | 4 | 4 | 6 | 6 | 6 | 6 |

The number of points of interest was summed for each of the Beach Segments. The Segment was given a rank of high, medium or low and translated to a matrix score. Segments with medium were given a score of 2, and segments with high received a score of 3 (more points, more desirable).

| Points of Interest along Route to Beach | | | |
|---|---|---|---|
| **Segment Profile #** | **Points of interest along route to beach** | **Rank** | **Matrix score** |
| 1 | 7.000 | H | 3 |
| 2 | 4.000 | M | 2 |
| 3 | 4.000 | M | 2 |
| 4 | 4.000 | M | 2 |
| 5 | 6.000 | H | 3 |
| 6 | 6.000 | H | 3 |
| 7 | 6.000 | H | 3 |
| 8 | 6.000 | H | 3 |

## c. Traffic to Beach Impact on Trails

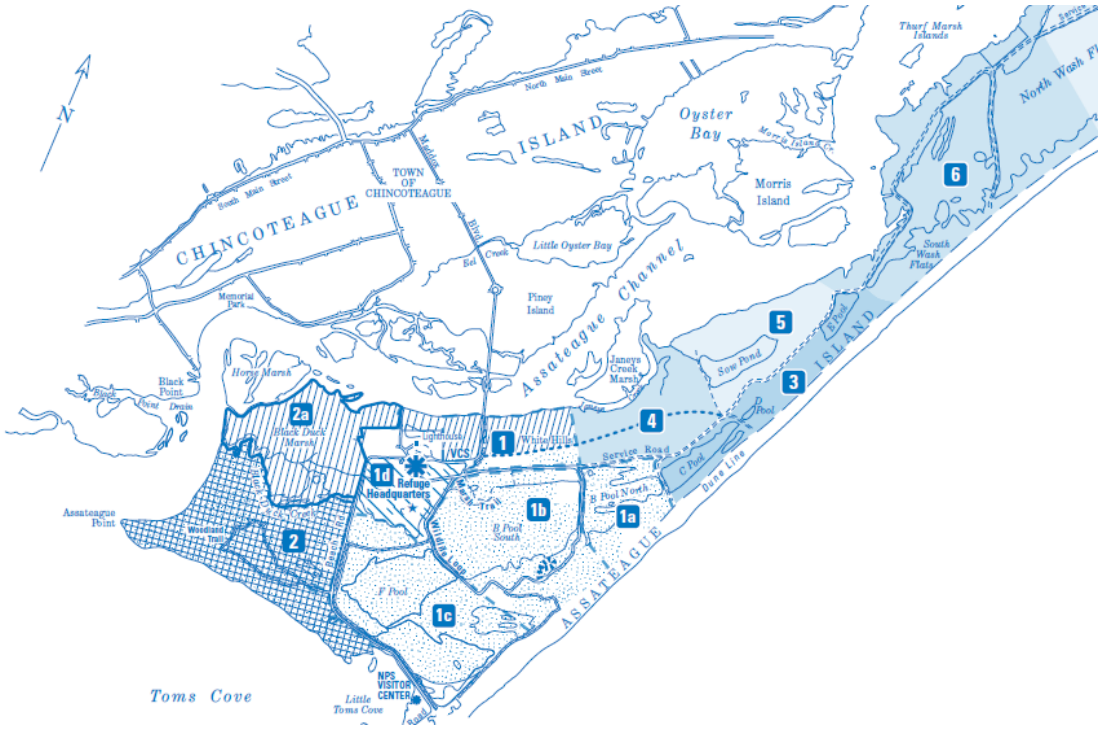
An access route to the recreational beach will use existing roads and trails to minimize habitat impacts and construction costs. Depending on the route to a beach segment, there may be sections of walking/biking trails that will include traffic to and from the beach. Currently, the refuge offers 4.5 miles of walking/biking trails with no automobile traffic.

Using GIS, the refuge obtained the length of walking/biking trails that would coincide with automobile traffic for each beach segment. Segments with routes that would result in less than 4.5 miles of traffic free trail were ranked low and given a matrix score of 1. Segments with a similar amount of traffic free trail (4.5 miles) were ranked medium and scored 2. Segments with routes that would provide more than 4.5 miles of traffic free trails ranked high and were given a matrix score of 3.

| Traffic to beach impact on trails | | |
|---|---|---|
| **Segment Profile #** | **Rank** | **Matrix score** |
| 1 | M | 2 |
| 2 | L | 1 |
| 3 | H | 3 |
| 4 | H | 3 |
| 5 | H | 3 |
| 6 | H | 3 |
| 7 | H | 3 |
| 8 | H | 3 |

## d. Impacts to Existing Hunting Areas

The Refuge has many hunt areas that provide a variety of opportunities to hunters. An access road bisecting a hunt unit would have a negative impact to that unit due to restrictions that are required to keep non-hunting visitors safe.




For beach segments 1-8, a one was given to the Hunt Zone that would be biscected by an access route to that beach segment. The ones were summed and each beach segment received a rank of low (matrix score of 3) if the sum was zero; medium rank if 1-5, and a high rank (matrix score of 1, least desirable) if greater than 5.

| Hunting Zones Impacted | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Segment Profile #** | **Zone 1** | **Zone 1a** | **Zone 1b** | **Zone 1c** | **Zone 1d** | **Zone 2** | **Zone 2a** | **Zone 3** | **Zone 4** | **Zone 5** | **Zone 6** | **Zone 7** | **Zone 8** | **Zone 9** | **Zone 10** | **Zone 11** | **Zone 11a** | **Sum** | **Rank** | **Matrix Score** |
| 1 | | | | | | | | | | | | | | | | | | | L | 3.00 |
| 2 | | 1 | 1 | 1 | 1 | | | | | | | | | | | | | 4.00 | M | 2.00 |
| 3 | | 1 | 1 | | | | | 1 | 1 | | | | | | | | | 4.00 | M | 2.00 |
| 4 | | 1 | 1 | | | | | 1 | 1 | 1 | | | | | | | | 5.00 | M | 2.00 |
| 5 | | 1 | 1 | | | | | 1 | 1 | 1 | 1 | | | | | | | 6.00 | H | 1.00 |
| 6 | | 1 | 1 | | | | | 1 | 1 | 1 | 1 | 1 | | | | | | 7.00 | H | 1.00 |
| 7 | | 1 | 1 | | | | | 1 | 1 | 1 | 1 | 1 | | | | | | 7.00 | H | 1.00 |
| 8 | | 1 | 1 | | | | | 1 | 1 | 1 | 1 | 1 | 1 | | | | 1 | 9.00 | H | 1.00 |

# Selection of Beach Segments

The 24 objectives and sub-objectives where grouped into 4 categories: Wildlife, Shoreline Change, Access Route, and Parking Lot Location. The workshop participants were managers, biologists, and Town of Chincoteague planner charged to develop a method of determining 'where' on the barrier beach a recreational beach would have the least amount of impact on wildlife and habitat. The refuge beach was divided into 1 mile segments and numbered 1 – 12 (current recreational beach – the MD/VA border) and H1 – H5 (Tom's Cove hook). Beach segments were evaluated according to the criteria developed for an objective (or sub-objective), given a rank (usually high, medium or low) according to the scale developed for that objective, and the rank was translated into a numberical score (usually 1, 2, or 3) that was entered into a matrix (a consequence table).

Scoring for the matrix can be confusing because we are seeking areas of the beach where there is less wildlife activity and less disturbance to habitat, and are also looking for areas of the beach which would provide an enhanced experience to recreational visitors. Scores for wildlife and habitat result in a high score for undesirable conditions (low wildlife use/low habitat impact). Where as scores for public use result in high scores for desirable conditions (short EMS response time, many points of interest, etc.).

The beach segments were first scored with the Wildlife objectives. During this scoring beach segments dropped out of further analysis based on legal restrictions and high levels of wildlife

use. The remaining segments (#1 - #8) continued through the scoring of Shoreline Change and Access Route objectives.

From the analysis, beach segments #2, 3, and 4, received the highest scores, indicating this is the area of beach in which a reacreational beach would have the least impact on wildlife and habitat and provide a quality recreational beach experience in the most responsible and sustainable manner. This information was used by the Fish and Wildlife Service to develop draft alternatives for public consideration and discussion. See Appendix 1.

# "Fine Tuning" – Site Selection

During the workshop, participants identified objectives that contribute to determining the best location for an access road and parking lot. This location will be determined by future engineer planning, and was beyond the scope of this workshop, which was to evaluate the biological aspects of the location of a recreational beach. The full criteria will be used in determining any future infrastructure development (i.e. parking lots, restrooms, visitor contact station, roads, etc.).

## A. Habitat Acreage Change

Workshop participants felt it was necessary to consider the amount of habitat that would be lost or gained by relocating the access road and parking lot area. For each of the main habitat types, beach, wetland, forest and shrub-scrub, the change in acreage needs to be calculated and entered into the matrix table. Some habitats may need to be weighted higher, such as shrub-scrub, because the refuge does not have a lot of it and many migrating species are dependent upon this habitat type. The change in acreage may need to be converted to a score, rather than entering just the +/- acreage.

## B. Recreational Beach Visitor Experience

The following sub-objectives were developed to assess the quality of experience a recreational beach visitor would have for different parking lot location scenarios. The current recreational

beach is located in Beach Segment 1. The refuge staff used the ranking and scores below to fill out the matrix for the current recreational beach.

### 1. Direct Access for Mobility Impaired

This is either 'yes' or 'no' to the question, 'Is there direct access for people who are mobility impaired?' A 'yes' receives a score of 3 (most desirable) and a 'no' receives a score of 1. The current recreational beach received a 3.

### 2. Distance to Shelter

This objective assesses the distance a recreational beach visitor would have to travel to reach shelter from the beach. Shelter is defined as a covered shelter which could protect a visitor during a sudden rain storm, or the protection of a visitor's automobile. If the distance is < 50 yards receives 3 (most desirable); 50-100 yds. receives 2; and a distance of >100 yds. receives a 1 (least desirable). The current recreational beach received a 3.

### 3. Mode of Transportation

How a visitor arrives at the beach is important. Some transportation options are viewed as more convenient than others and visitors generally like to have the option of more than one mode of transportation. Modes of transportation include: personal automobile, bicycle, motorcycle, walking, shuttle bus, etc. This objective provides a score for the transportation options a visitor has depending on the parking lot scenario. Five modes of transportation receive a 5; four receives 4; three modes receive 3; two receives 2; and one receives a 1. The current recreational beach received 3.

### 4. Convenience

The workshop participants wanted to assess the level of 'convenience' a parking lot scenario provides a recreational beach visitor. This objective attempts to assess the amount of time it would take to reach the beach from the parking lot and the distance a visitor would have to travel from an access point. It is based on the number of parking spaces available and the mode of transport to the beach. If a parking lot scenario provides the same number of parking spaces that currently exist, it receives a 3. If a parking lot scenario provides a combination of parking spaces near the beach and alternative transport from another location, it receives a 2. If the parking lot scenario is not near the recreational beach and can only be accessed by alternative transportation, the scenario receives a 1.

### 5. Off-Road Vehicle Fishing Access

The ability to access fishing areas using an off-road vehicle (ORV) is highly valued by visitors fishing on the beach. The refuge wanted to include this objective to reflect the additional

use of a recreational beach by fishermen. This is simply a score of 2 for 'yes, there is ORV access', and a score of 1 for 'no, there is no ORV access'.

## C. Cultural Resources

The construction of an access road and parking lot areas will most likely involve disturbance to the upper levels of soil. Grading and ground removal, if needed, could potentially impact cultural resources. In 1989, USFWS regional archeologists conducted an archeological reconnaissance in which they surveyed the refuge and produced a report. Based on this report, regional archeologists would be able to determine whether or not construction associated with an access road and parking lots would impact cultural resources. The parking lot scenario would receive a score of 2, if it is in an area where it is unlikely to impact cultural resources. A scenario would receive a score of 1, if it is in an area that will impact cultural resources.

## D. Initial Cost

The initial costs of new construction associated with an access road, parking lots areas and structures should be included in parking lot scenarios. The participants did not go into detail on how this would be done, just expressed the need to include some type of cost estimate that could be translated into a score for the matrix.

## E. Cost of Annual Maintenance

Similar to Initial Costs, workshop participants felt that an estimate of annual maintenance costs should be included in the evaluation of parking lot scenarios. Annual costs may include maintenance of the access road (based on its length), storm repairs (due to the rate of beach movement), building up keep, etc. As biologists, the participants did not get into the details of how this would be estimated, but wanted to include a cost estimate that could be translated into a score for the matrix.

## Appendix 1. Beach Segment Matrix

| | Objectives | One Mile Recreational Beach Segments from the Current Rec. Beach to the MD/VA Border and Tom's Cove Hook | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Beach Seg. 1 Current** | **Beach Seg. 2** | **Beach Seg. 3** | **Beach Seg. 4** | **Beach Seg. 5** | **Beach Seg. 6** | **Beach Seg. 7** | **Beach Seg. 8** | **Beach Seg. 9** | **Beach Seg. 10** | **Beach Seg. 11** | **Beach Seg. 12** | **Beach Seg. H1** | **Beach Seg. H2** | **Beach Seg. H3** | **Beach Seg. H4** | **Beach Seg. H5** |
| Wildlife | | | | | | | | | | | | | | | | | | |
| | **1. Wilderness (proposed)?** | N | N | N | N | N | N | N | N | Y | Y | Y | Y | N | N | N | N | N |
| | | | | | | | | | | | | | | | | | | |
| | **2. Wildlife Dependent on Sparsely Veg. Habitat** | | | | | | | | | | | | | | | | | |
| | a. Amount of breeding use | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 3 | | | | | 1 | 1 | 1 | 1 | 2 |
| | b. Amount of use during migration | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | | | | | 1 | 1 | 1 | 1 | 1 |
| | c. Amount of non-breeding (winter) bird use | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | | | | | 2 | 2 | 1 | 1 | 1 |
| | *Subtotal* | *8* | *9* | *9* | *9* | *8* | *7* | *6* | *9* | | | | | *4* | *4* | *3* | *3* | *4* |
| | | | | | | | | | | | | | | | | | | |
| | **3. Additional Mandates** | | | | | | | | | | | | | Y | Y | Y | Y | Y |
| | | | | | | | | | | | | | | | | | | |
| | **4. Waterbird Use of Wetlands** | | | | | | | | | | | | | | | | | |
| | a. Level of Waterbird Use | 1.5 | 1.5 | 1.5 | 2.5 | 2 | 1 | 1 | 1 | | | | | | | | | |
| | b. Cumulative use to beach segment | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | | | | | | | | | |
| | *Subtotal* | *4.5* | *4.5* | *4.5* | *4.5* | *3* | *2* | *2* | *2* | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | **5. Forest Dependent Wildlife** | | | | | | | | | | | | | | | | | |
| | *Subtotal* | *2* | *3* | *3* | *1* | *1* | *1* | *1* | *1* | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **6. Shrub-scrub Dependent Wildlife** | | | | | | | | | | | | | | | | | |
| | *Subtotal* | *2* | *3* | *3* | *3* | *1* | *1* | *1* | *1* | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | ***Sum of Wildlife Subtotals*** | *16.5* | *19.5* | *19.5* | *17.5* | *13.0* | *11.0* | *10.0* | *13.0* | | | | | | | | | |
| **Shoreline Change** | **7. Expected Longevity of Infrastructure** | | | | | | | | | | | | | | | | | |
| | *Is route to Beach Segment Sustainable?* | | | | | | | | | | | | | | | | | |
| | ***Shoreline Change Rate*** | -2.00 | -1.44 | -1.00 | -1.00 | 1.00 | 1.00 | 0.47 | 0.00 | | | | | | | | | |
| **Access Route** | | | | | | | | | | | | | | | | | | |
| | **8. Proximity to Existing Infrastructure** | | | | | | | | | | | | | | | | | |
| | *Subtotal* | *2* | ***3*** | ***3*** | ***3*** | ***3*** | ***1*** | ***1*** | ***1*** | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | **9. Visitor Safety and Experience** | | | | | | | | | | | | | | | | | |
| | a. Response time by EMS | 2 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | | | | | | | | | |
| | b. Points of interest along route to beach | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | | | | | | | | | |
| | c. Traffic to beach impact on trails | 2 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | | | | | | | | | |
| | d. Impacts to existing Hunting Areas | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | | | | | | | | | |
| | *Subtotal* | *10* | *8* | *10* | *10* | *10* | *8* | *8* | *8* | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | ***Sum of Access Route*** | *12* | *11* | *13* | *13* | *13* | *9* | *9* | *9* | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | ***Cumulative Subtotals*** | ***26.5*** | ***29.1*** | ***31.5*** | ***29.5*** | ***27.0*** | ***21.0*** | ***19.5*** | ***22.0*** | | | | | | | | | |

## Appendix 2. List of Workshop Participants / Invitee

| **Participants** | **Agency** | **Telephone** |
|---|---|---|
| | | |
| Bill Neville | Town of Chincoteague | 757-336-6519 |
| Lou Hinds | Chincoteague NWR | 757-336-6122 |
| Kim Halpin | Chincoteague NWR | 757-336-6122 |
| Kevin Holcomb | Chincoteague NWR | 757-336-6122 |
| Amanda Daisey | Chincoteague NWR | 757-336-6122 |
| Sue Rice | Eastern Shore of VA NWR | 757-331-2760 |
| Hal Laskowski | USFWS, Region 5 | retired |
| Jennifer Casey | USFWS, Region 5 | 603-482-3415 |
| Bill Thompson | USFWS, Region 5 | 413-253-8200 |
| Jack Kumer | NPS - Assateague Island National Seashore | 410-629-6070 |
| Ruth Boettcher | VA - Division of Game & Inland Fisheries | 757-787-5911 |
| Michael Stroeh | Coastal Delaware NWR Complex | 302-653-9345 |
| | | |
| **Invitee** | | |
| | | |
| Jim McGowan | County of Accomack, Director of Planning | 757-787-5726 |
| Trish Kicklighter | NPS - Assateague Island National Seashore | 410-629-6080 |
| Bill Hulslander | NPS - Assateague Island National Seashore | 410-629-6061 |
| Todd Englemeyer | VA - Division of Game & Inland Fisheries | |