Final Report

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The views expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Department of Commerce, NOAA or any of its subagencies.

TABLE OF CONTENTS

Executive Summary Page 3

Products:

1) Work Plan
Agendas and Meeting Summaries Page 5
Questionnaire Responses Page 9

2) Spatial Analysis of Seaside Waterbirds Page 13
Shorebird Survey- Spring Migration

3) Recommendations Page 28

EXECUTIVE SUMMARY

The FY 2008 SAMP Project Team members included Steve Parker, Barry Truitt and Alex Wilke of The Nature Conservancy's Virginia Coast Reserve (TNC), Laura McKay and Nick Meade of the Virginia Coastal Zone Management Program (VA-CZM), Dave Burden of the Eastern Shore Keeper, Tony Watkinson, Hank Badger and Jim Wesson of the Virginia Marine Resources Commission (VMRC), Mark Luckenbach and Marcia Berman of the Virginia Institute of Marine Science (VIMS), Heather Lusk and Pete Terry of Terry Brothers Seafood, and Tom Walker of JC Walker & Sons Seafood. The purpose of the Project was to: 1) map, analyze, and interpret the current status and trends in the uses, economic values, and beneficial eco-system functions associated with state owned and other habitats in the seaside bays of Virginia's Eastern Shore; 2) to re-evaluate these uses in light of current and projected conditions, and 3) to recommend guidelines for the allocation of resources in a manner that optimizes the environmental and socio-economic benefits derived from Virginia's barrier island lagoon system.

The Nature Conservancy's work included organizing the Project Team, developing a draft work plan, convening meetings which reviewed and compiled spatial data, uses and biological resources, including avian distribution surveys, provided by VIMS, VMRC, TNC, Shore Keeper and William and Mary's Center for Conservation Biology. The Team analyzed the public shellfish ("Baylor") ground delineations in terms of the current geomorphology and biological productivity of the seaside. In a series of Team meetings, VIMS, with the assistance of other Team members and also using VA-CZM's Coastal Gems mapping, overlaid various layers on the Baylor grounds. The Baylor grounds survey has not been updated since it was created in the 1880's, even though the seaside barrier islands, inlets, marshes, mud and sand flats are among the most dynamic and shifting marine habitats in the world and have been constantly moving and changing since the 1880's.

Through discussions and VIMS data on 209 sq. km. of Baylor, the Project Team learned that, because of the dynamic nature of the seaside bays on Virginia's Eastern Shore, approximately 37% of the current Baylor grounds are no longer suitable as shellfish habitat. There have been significant changes in the biological make up of the seaside bays in this time period as well. In the early 1930's a pandemic in the North Atlantic Ocean killed off most of the eelgrass on the seaside. This valuable and widespread marine grass, which supported a commercially important bay scallop industry and other shell and fin fish, was extirpated from the seaside in less than a year. Oyster harvests experienced a slower, but just as significant, decline as a result of overharvest and disease. The distribution of the native oyster population shifted from man-made reefs to less commercially valuable "clump" oysters growing in the extensive seaside marshes. In short, both the physical and biological character of the seaside bays changed in many ways, while the Baylor Survey was unaltered for over a century.

The Project Team was also able to characterize and discuss positive information regarding habitats on the seaside of Virginia's Eastern Shore and shape recommendations. Consensus among team members was reached on several important conclusions: 1) Water quality is

excellent on the seaside and has the demonstrated ability to support high biological productivity and opportunities for both commercial culture of seafood and marine habitat restoration. Both culture and restoration can serve to further enrich the ecosystem. The seaside system is very different from the Chesapeake Bay and could require different management approaches; 2) the health and distribution of biological resources on the seaside are excellent and the seaside has high conservation values for wildlife, particularly waterbirds. There are strong connections between the overall health of the marine system (blue infrastructure) and the land (green infrastructure) and protecting these connections is important to the community and its local economy; 3) Clam aquaculture is currently a $40-50-million industry and provides steady income for hundreds of working families; the cultivation of oysters by a variety of methods in also proving successful; 4) restoration and protection of native oyster reefs, greatly aided by the nearly 3.2 billion wild oysters surviving in the seaside bay marshes, is working and nearly 60 acres are under restoration; 5) eelgrass restoration has been an outstanding success, with over 4,000 acres in ten years, and promises to provide productive habitat for crabs, finfish and bay scallops. Restoration of bay scallops is being investigated by Team members; 6) much of Baylor's public grounds on the seaside are not producing shellfish; 7) it would be beneficial for the Project Team to do a closer analysis of Magothy and Chincoteague Bays. The Project Team made these recommendations and VA-CZM approved them for the FY 2009 SAMP funding; 8) the Baylor Survey is clearly out of date on the seaside, and new perspectives on how to add flexibility to managing commercial harvest, particularly aquaculture, and enhance the overall productivity of the seaside ecosystem is important; 9) additional recommendations regarding guidelines for spatial management and use allocations will require broader community participation, education and outreach, as well as additional information on shellfish distribution, densities, bathymetry and substrate types. Geo-spatial data and maps from VIMS on shellfish distribution and cumulative resource distribution and from TNC on shorebird distributions including the 2010 spring migration have been sent to VA-CZM and will be made available on the Coastal Gems Website: http://www.deq.state.va.us/coastal/coastalgems.html.

PRODUCTS:

The Project included specific deliverables, including organizing and conducting Project Team meetings, summarizing meeting results, preparing spatial analysis of waterbirds and shorebirds of the seaside of Virginia's Eastern Shore and making recommendations for follow on work by the Protect Team.

1) Work Plan: Meeting Agendas and Summaries

Seaside Special Area Management Plan Meeting
Wednesday 12/2/09: 11 AM to 1:30 PM
VIMS Lab, Wachapreague, Virginia
Draft Agenda

Welcome and Introductions	Laura McKay
Review of Seaside Spatial Planning SAMP	Steve Parker
Review of Current Spatial Data:	Nick Meade
Updates	Dave Burden, Marcia Berman and Mark Luckenbach
Other New Data Needs: What's Missing?	Group
New Spatial Allocation Scenarios What's Needed?	Group
Next Meeting	Group

Special Area Management Plan 1
December 2, 2009 Meeting Summary- VIMS Wachapreague Lab
Attending: Marcia Berman, Dave Burden, Mark Luckenbach, Laura McKay, Nick Meade, Steve Parker, Pete Terry, Barry Truitt, Tony Watkinson, Jim Wesson

- Reviewed grant project parameters
- Reviewed goals of Project: review 1880's marine zoning on seaside in light of a dynamic system, new economics of aquaculture, new understanding of ecological system and values, new technologies, and the need to anticipate and avoid conflicts between user/stakeholders.
- Group discussion: restoration goals needed; % of coverage for eelgrass and oyster reefs; need to look more closely at wetlands- area, quality and open water; need for new wetland data- last inventory was 1970's; analyze/compare changes in system.
- Looked at Baylor maps and oyster coverage; need locations of state set asides for oyster and eelgrass restoration sites.
- Reviewed shellfish mapping on the seaside: delineated reefs based on 2002/2007 aerials, followed by 30 hrs of flyovers at 300'; ground truth of questionable reefs and randomly sampled others; 877km2 mapped- all reefs, inc. state and private = .4%; combined with biomass sample, est. # of oysters is 3.2-billion; limited potential habitats; apparently Baylor inaccuracies/unsuitabilities. Number of oysters in marsh?
- Tentative conclusions/hypotheses: 1) current designation of public shellfish grounds do not reflect location of living oysters; 2) aquaculture is limited in terms of potentially

suitable grow out ground; 3) need more specifics for actual and potential oyster and SAV restoration/habitats and eco-tourism access.

- Provisional plan for more study: 1) determine suitability of Baylor grounds for oyster restoration; 2) Evaluate current use(s) of leased areas; 3) map suitable SAV areas; 4) map suitable "other" uses ie: shorebirds, tourism, wild harvest, dredging.
- Addressed the background of Baylor: set aside in 1880's as productive ground for citizens/watermen; private sector would then invest in less productive areas to improve yield/value; 50% of all seafood value is aquaculture- fast growing, dynamic business; challenges from dynamic natural system; oyster industry changed by eelgrass blight- flats available for culture; a more flexible management needed to reflect natural dynamics and new culture practices.
- Suggested there are Baylor areas good for wild harvest, bottom cages, clam culture, SAV, etc.
- Suggested using Wesson's model from bayside on seaside.
- Need for finer scale data followed; bathymetry needed.
- **Suggestions for future steps:** 1) articulate real and perceived management problems with current system; 2) gather GIS to quantify magnitude of problems (ie: flexibility, low productivity, inappropriate sites, state/private ownership issues, poaching)- select ½ dozens "strips" of bottom as sample areas and study closely, then analyze as possibly representative of character and magnitude of the problems. 3) identify specific policy changes and strategies to address current management problems; 4) generate maps (exactly what/how not finalized) to illustrate/educate; 5) clarify need for changes in management; recommend policies to make changes; establish process that recognizes need for flexible management plan; 6) try to predict suitability for different uses.
- Characterized this as Performance Based Zoning; not lines but suitabilities.
- Suggested starting with high priority areas and the needs of the public.
- Discussion followed: 1) identify unproductive areas within leased grounds that can't be traded directly for productive grounds- simplify re-application/re-location to protect user- how big a problem is this?; 2) Baylor boundaries do not accurately reflect distributions of wild public shellfish beds; can this be remedied with legislation that redefines the method of identifying public grounds? 3) Source of funds for state to properly implement/manage/enforce?
- Highlighted need for emphasis on marshes/productivity in the future; maps are a good vehicle to communicate problems/conflicts; need for statistical confidence.
- Discussed the need for management objectives; to articulate importance of sustainable ecological system health- what makes that happen? Need to describe characteristics and goals.

Seaside Special Area Management Plan Meeting
Thursday January 21, 2010 10 AM to 2 PM
Eastern Shore National Wildlife Refuge, Kiptopeke, Virginia
Draft Agenda

10:00 AM:	Welcome and Overview-	Laura McKay
10:10 AM:	Review summary of 12/09 meeting -	Steve Parker
10:30 AM:	Updates:	Marcia Berman Dave Burden Mark Luckenbach
11:45 AM:	Marine Spatial Planning Definition	Group
12:15 PM:	Brainstorm problems, information/data needs, new spatial allocation scenarios, policy approaches.	Group
1:45 PM:	Wrap up, next steps	Laura McKay

Special Area Management Plan 1
January 21, 2010 Meeting Summary- Eastern Shore NWR Visitor Center
Attending: Marcia Berman, Dave Burden, Mark Luckenbach, Laura McKay, Nick Meade, Steve Parker, Pete Terry, Barry Truitt, Tony Watkinson, Jim Wesson

- New Section 309 SAMP coming up; meeting with Coastal Policy Team to determine goals.
- Coastal GEMS requires TNC/VMRC oyster and eelgrass sanctuaries and set asides.
- Suggested data/image summary showing dynamic change in system would be valuable.
- Agreed that SAMP Phase 2 should continue and broaden SAMP1 work/stakeholders.
- Reviewed work on blue infrastructure data analysis, priority conservation areas, living resources and map linkages with upland priority conservation areas with DGIF. Suggested we need to include climate change impacts and vulnerability in future conservation planning. Review of existing data sets and updates from DGIF and VIMS; digging into data to understand DGIF methodologies, sources, and values to avoid overlap and "double counting". Suggested starting with and focusing on priority conservation areas.
- Include shallow water resource use conflict model to seaside in SAMP2
- Suitability analysis ("Best Places") is important for to understand for aquaculture, restoration, wild harvest, fishing, other recreation. Need to determine scale at which system is to be managed and how. Certain "hot spots" appear clear and are relatively stable.
- How does this relate to Baylor and public use? Baylor seems completely inflexible. Should not be talking about a more inflexible system. Suggested a system where the state assigns uses for a limited time with periodic review; analytic process of use suitability is good; develop information to help legislature value certain areas; current system inflexible, inefficient, and costing Commonwealth and its people.
- Reviewed the purpose of SAMP program: to develop new policies. Baylor will be the focus of the legislature; develop recommendations and guidelines, decision-making tools.

- Discussed about aerial survey on recreational use and how feedback is minimal at landings and on the water.
- Discussed Del. Lewis resolution for VIMS to study of suitability, appropriateness and productivity of public grounds and working with current SAMP process. Ultimately, SAMP may recommend policy and process changes that may require legislative action(s).
- The resolution helps establish a distinction between bayside and seaside, which is in line with the SAMP 1 process, too.
- Discussed method and timeline for the proposed study, should the resolution pass: a) analyze several "swathes" to identify and illustrate the unsuitability situation over two years ending 11/2011. Mentioned an alternative approach of taking 2-3 specific lagoons where knowledge is relatively good (ie: Hog Island, Spider Crab, Chincoteague Bays).
- Discussed a definition of Coastal and Marine Spatial Planning as a tool or approach to suitability analysis and stakeholder participation to develop new policies; seaside could provide a good demonstration of CMSP feasibility and attract funding to do the work. Reviewed definition as: *"Coastal and Marine Spatial Planning is a comprehensive, adaptive, flexible, integrated, ecosystem-based, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean and coastal areas. CMSP identifies areas most suitable for various types or classes of activities in order to reduce conflicts among uses, reduce environmental impacts, facilitate compatible uses, and preserve critical ecosystem services to meet economic, environmental, security, and social/community/cultural objectives."*
- A Questionnaire was discussed along with the need for people to respond in order to help the group move forward. The group went over various potential conflicts and mutual interests of the stakeholders, the need for more dialogue and good information.
- The longevity/sustainability of resources is important; can resources be allocated as a percentage of uses? We can only deal with ecological snap shots; how is resiliency and adaptation built into the process? Bathymetry is needed; how can we work on spatial allocations as a group? SAMP2 could look at the management needs of each lagoon- apply data we have now, determine what needs to be managed and how.
- Next meeting to focus on elements and process (ie: questionnaire) and determine what is and what is not important and what changes can be recommended. SAMP2 can then focus on specific planning tools and scenarios, resiliency and adaption, and outreach strategies.

Seaside Special Area Management Plan Meeting
Monday, February 22, 2010 10 AM to 2:30 PM
Eastern Shore National Wildlife Refuge, Kiptopeke, Virginia

Draft Agenda

10:00 AM:	Welcome and Overview-	Laura McKay
10:15 AM:	Updates:	
	Alex Wilke	
	Marcia Berman	
	Dave Burden	
	Mark Luckenbach	
10:45 AM:	Evaluation and Discussion of Questionnaire Responses	Group
12:15 PM:	Prioritize Questionnaire Responses	Group
1:15 PM:	Brainstorm new planning and policy approaches	Group
2:15 PM:	Wrap up, next steps	Laura McKay

Compilation of Questionnaire Responses:

Project Team members were asked to fill out a questionnaire. Results from two of the questions are prioritized below:

1) What specific problems exist with the current system?

a) Significant areas within Baylor are largely "barren" and could be put to better use for conservation, restoration, recreation or shellfish aquaculture,

b) Insufficient or the wrong space is available for shellfish aquaculture

c) Insufficient space or inadequately protected space is available for restoration, conservation and perhaps recreation

d) In short the management system is old and inflexible while the natural system is very dynamic across short distances and short periods of time.

a) The survey boundaries outlined by Baylor no longer adequately delineate productive shellfish grounds.

b) The shellfish aquaculture industry is limited by availability appropriate growing areas, some of which may currently be included within the Baylor survey boundaries. Under the current system, this available area appears to be decreasing.

c) Areas that are appropriate for restoration of sea grasses and scallops have not been identified and protected

d) The current leasing system lacks flexibility in moving lease boundaries in response to changing conditions.

a) Conservation planning and resource management may not be a priority among local governments
b) Regulation of public bottom is antiquated and not reflective of economic or conservation goals
c) Better data must be collected to answer fundamental questions on the state of the resources.
d) SAMP to date has paid little attention to climate change issues

a) Too many "inactive" private shellfish leases exist in the coastal bays.
b) Too many leases are not used for shellfish propagation as required by law but are used for destructive practices like clam dredging.
c) Inadequate rents are charged annually for the lease by the State – lease program does not generate adequate revenues for management and enforcement.
d) There is no on-the-water law enforcement and patrol.
e) There is very little "active" management of shellfish resources by the State, i.e. open and closed areas, rotational harvest areas, etc.
f) No consideration is given to managing/balancing the scale of aquaculture activities with other ecosystem values and uses.
g) Marine resources in VA are managed by laws largely written in the late 1800s.

a) flexibility
b) not all resources viewed equally
c) not all uses viewed equally
d) do nothing?? No Action Alternative should be examined.

a) Lack of communication/cooperation between agencies regarding enforcement of existing resource protection strategies. Lack of collective priorities, objectives and strategies regarding enforcement.
b) No formal system for taking into account and mitigating the impacts that one activity (e.g. aquaculture activities) may have on other resources of importance (e.g. nesting birds). No system for measuring existing impacts.
c) Lack of a comprehensive evaluation of the web of targets, threats and their sources associated with what's happening on the seaside (e.g, increasing aquaculture, potentially increasing ecotourism activities, SLR, etc.). Without this, there's no way to proceed with a percentage based delineation system of allocating space on the seaside for different resources. Not that that is the best solution to the problems.

a) System dates to 1880's: now are different times, goals/needs, knowledge, technologies, economy.
b) Many geo-morphological and biological changes in 120-plus years.
c) Single species (ie: oysters) has been focus, not broader system-wide productivity.
d) Very low flexibility in managing a dynamic system; very low funding for science, management and enforcement; dis-incentive to maximize output on leased grounds-leases too cheap.

2) How would you change the current system to solve these problems?

a) The Virginia Marine Resources commission, possibly with the advice of an advisory board, should be granted the authority to reclassify public shellfish grounds (including adding new areas from currently unassigned bottom) and on a case by case basis re-evaluate the appropriate uses of areas currently designated as Baylor grounds.
b) VMRC should undertake a comprehensive survey to define appropriate sites and set goals for seagrass and scallop restoration
c) There may be administrative procedures which VMRC can implement which would add flexibility in defining lease boundaries.

a) Increase stakeholder awareness regarding importance of preserving natural systems for both economic and conservation purposes.
b) Propose new regulation or management strategies for public bottom. New data would be required to reduce uncertainty regarding the distribution, type and quantity of the current resources present in the system.
c) Review existing products and refocus if necessary. Efforts to date may have missed the mark.
d) Climate change and sea level rise, in particular should be a major consideration in any conservation planning initiative.

a) The State institute ecosystem-based management of our marine resources (throw away the antiquated code(s).
b) State implement a system of ecosystem based management with adequate staff and funding.
c) State charge annual lease payment sufficient to generate funds for management and enforcement.
d) State increase law enforcement staffing at VMRC that is necessary to protect and manage marine resources.

a) Re-evaluate use suitability, needs & goals with new spatial planning tools and stakeholder allocation approaches.
b) Include information on protecting/enhancing ecological productivity and resiliency of system; establish no/low impact areas to maintain habitats, population diversity and genetic health of system.
c) Monitor and adapt needs/uses/policies/regulations frequently (5 yrs?); use information-based methodology for use/space re-allocation and conflict avoidance.
d) Develop dedicated funding (use fees?) for state to flexibly research, implement, monitor, regulate and revise management and use allocations.

a) Look at whether there are any locations that need to be set aside for a long period of time for a particular use and ensure they are protected for that use and their boundaries are clear.
b) With the remaining space, determine what percentage should be in each use and what characteristics that use will require.
c) Allocate the space to those percentage uses by convening a panel of experts to make the recommendations, a public hearing to gather comments and finally adoption of the plan by the Marine Resources Commission.
d) Create a local management body that can convene monthly or as needed to hear requests to deviate from the boundaries and make recommendations to MRC for approval.

a) establish process for review of changing conditions and recognize various uses
b) identify/evaluate resource conditions
c) identify/evaluated all uses
d) identify best use of resources

a) Develop an agreement among all stakeholders regarding collective priorities for resource protection and enforcement, including individual responsibilities to uphold. Agencies with law enforcement capability are charged with taking the lead on this.

2) Seaside Special Area Management Plan: Avian Distribution Evaluation

Alexandra Wilke, Bird Conservation Specialist, The Nature Conservancy

PURPOSE

The purpose of this project is to compile and present existing spatial distribution data for avian resources within the seaside barrier island/lagoon system of Virginia's Eastern Shore. The spatial data will be used as a tool with which partners developing the Virginia Coastal Zone Management Program's Seaside Special Area Management Plan (SAMP) can analyze and interpret existing uses of the seaside bays of Virginia's Eastern Shore.

The spatial data presented in this report has been provided by multiple agencies and organizations for use in the development of the Seaside SAMP. Every effort has been made to accurately reference the sources of all data and provide recommended citation information. Data provided by partners and included in this report will be used solely to inform members of the Seaside SAMP project team as they work to create a plan which recommends regulatory and other guidelines to increase economic productivity, enhance ecosystem health, and resolve potential conflicts on the seaside of Virginia's Eastern Shore. The results of this preliminary avian distribution evaluation are part of the first step of the SAMP process and will be refined and integrated with other spatial distribution information (e.g. aquaculture) as the process continues and the Seaside SAMP project team and outside partners review all spatial distributions combined.

METHODS

Most of the avian distribution shapefiles presented in this report for were obtained from various partners of the VCZMP and are based on the results of actual on-the-ground surveys of avian distribution within a given time frame (e.g. locations of breeding pairs). A few shapefiles were created specifically for this project and are instead based on the distribution of suitable and/or occupied habitats for certain suites of birds (e.g. important foraging mudflats for migrating shorebirds). Identification of these habitats were based both on existing survey information for bird use of those habitats and on expert opinion. In these cases, habitats were remotely digitized using ArcMap 9.3 with reference to aerial imagery from 2002, 2006, 2007 and 2009, as well as the National Wetlands Inventory. All resulting shapefiles are summarized in this report and in combination represent the final product for the avian distribution evaluation portion of the SAMP process. Summaries of the available bird distribution shapefiles are organized by seasonal use: breeding, migration and wintering.

Finally, because our collective knowledge of bird use of all habitats within Virginia's seaside barrier island/lagoon system is incomplete, the Seaside SAMP project team must take into account that areas not identified as occupied or important for bird use by this process may not necessarily be dismissed as unsuitable avian habitat. Vast areas of Virginia's seaside marshes are used by many avian species throughout the year but characterizing and mapping that use is difficult because of the dynamic nature of the system. For example, shorebird roosting sites during high tide may be found throughout the lagoon system but are difficult to map as bird use

of these areas varies with each tidal cycle depending on tidal height, time of day, wind speed and direction and a variety of other factors known and unknown. Another example of habitat that is nearly impossible to accurately map is wrack deposits throughout the marsh system. These sometimes vast areas of deposited, dead vegetation material on top of the marsh provide nesting and roosting habitat for many species of birds. The location and extent of these floating wrack mats changes annually and seasonally.

The following acronyms for VCZMP partners are used throughout this report:
CCB – Center for Conservation Biology, College of William and Mary and Virginia Commonwealth University
TNC – The Nature Conservancy
VCZMP – Virginia Coastal Zone Management Program
USDA – U.S. Department of Agriculture
USFWS – U.S. Fish and Wildlife Service
UVA-LTER – University of Virginia, Long-term Ecological Research project
VDCR – Virginia Department of Conservation and Recreation
VDGIF – Virginia Department of Game and Inland Fisheries
VIMS – Virginia Institute of Marine Science

RESULTS

Two maps are provided at the end of this section. One depicts the entire seaside, the other shows a more close up view of select Seaside Bays in Northampton County.

Breeding Distributions

American Oystercatcher (*Haematopus palliatus*)
Data source(s): TNC, VDGIF, USFWS, CCB, VDCR, UVA-LTER, USDA
Relevant citation: Wilke et al. 2009
Name of shapefile: AMOY_2008
Type of shapefile: point
Contact information: Alexandra Wilke, The Nature Conservancy, awilke@tnc.org

The distribution information presented in this report for breeding American Oystercatchers in Virginia represents the results of a statewide survey in 2008. Breeding oystercatchers occur throughout coastal Virginia including the shorelines of the Chesapeake Bay, but over 80 percent of the breeding territories are found within the seaside barrier island/lagoon system. The distribution information presented here represents only the pairs or breeding territories documented during the survey (not single, unpaired birds or flocks). Each point location represents a breeding territory and specifically indicates either an American Oystercatcher pair, nest or brood.

The first statewide survey for breeding American Oystercatchers was conducted in 2003. This represented the first comprehensive effort to document breeding locations of American

Oystercatchers throughout coastal Virginia. Previous survey efforts focused only on the barrier islands in the state. Details on survey methodology are provided in Wilke et al. (2005). The survey was repeated in 2008 using the same methodology. Survey efforts documented observations of all American Oystercatchers, including information on nesting pairs or evidence of breeding (e.g., nests, young, territorial behavior), single birds or flocks of birds and GPS coordinates.

A total of 692 American Oystercatcher breeding territories were documented during the 2008 statewide survery. Fifty-one percent of the territories were documented on the state's barrier islands and 32 percent were documented within the salt marshes of the seaside lagoon system. The final estimate of the number of breeding American Oystercatcher pairs in Virginia in 2008 was 731, which included additional pairs documented at sites where American Oystercatcher breeding success was also being monitored.

Piping Plover (*Charadrius melodus*)
Data source(s): VDGIF, TNC, USFWS
Relevant citation: Smith et al. 2009
Shapefile name: PIPL_2009
Type of shapefile: point
Contact information: Ruth Boettcher, Virginia Department of Game and Inland Fisheries, ruth.boettcher@dgif.virginia.gov

The distribution information presented in this report for breeding Piping Plovers in Virginia includes data from both the annual Virginia Plover Survey as well as from regular monitoring efforts of breeding success of Piping Plovers at some sites (but not all sites monitored). Distribution information obtained during the annual survey effort represents a snap-shot in time, while information from more frequent monitoring efforts often includes breeding pairs that were not detected during the annual survey. The origin of data (annual survey or monitoring efforts) from each site is indicated within the attributes of the shapefile. Each point location represents a breeding territory and specifically indicates either a Piping Plover pair, nest or brood.

The 24th annual Virginia Plover Survey was conducted in coastal Virginia in 2009. The purpose of the annual survey is to document the occurrence of the federally threatened Piping Plover and state endangered Wilson's Plover in Virginia and to document the locations of nesting territories or pairs. The survey takes place from 1-9 June each year and the geographic scope of the survey encompasses the known historical range of Piping Plovers in the state, including 17 sites bordering the Atlantic Ocean and three sites along the western shoreline of the Chesapeake Bay (one of which was not surveyed in 2009 due to logistical constraints – Plum Tree National Wildlife Refuge). During the annual survey, most sites are surveyed by foot and all observations of both species of plovers are recorded on standardized data forms. The information recorded for each observation includes: the number of plovers observed, the status of the bird(s) (unmated single adult, mated single adult, mated pair), presence of a nest or brood, and GPS coordinates.

The extent of efforts to monitor the breeding success of Piping Plovers in Virginia varies on an annual basis depending on resource constraints. Generally speaking, in recent years, multiple agencies and organizations in Virginia have monitored the breeding success of as many Piping Plover pairs as possible in order to evaluate the overall statewide breeding success. VDGIF submits this information annually to be included in the range-wide evaluation of breeding success of the Atlantic Coast population of Piping Plovers, a federally threatened species, as guided by the Recovery Plan for that population. Methods for monitoring Piping Plover breeding success vary by agency/organization but generally include a minimum of weekly site visits to document the status of nesting pairs and to determine reproductive endpoints such as hatching success, fledging success and productivity (number of young fledged per pair).

A total of 182 Piping Plover breeding pairs were recorded during the 2009 survey. The data presented here represents a total of 188 breeding territories due to additional breeding pairs documented during monitoring efforts at some sites. The final estimate for the number of breeding Piping Plover pairs in Virginia in 2009, including monitoring information from all available sites, was 193 pairs.

Wilson's Plover (*Charadrius wilsonia*)
Data source(s): VDGIF, TNC, USFWS
Relevant citation: Smith et al. 2009
Shapefile name: WIPL_2009
Type of shapefile: point
Contact information: Ruth Boettcher, Virginia Department of Game and Inland Fisheries, ruth.boettcher@dgif.virginia.gov

The distribution information presented in this report for breeding Wilson's Plovers in Virginia includes data from both the annual Virginia Plover Survey as well as from regular monitoring efforts of breeding success of Wilson's Plovers at one site. Distribution information obtained during the annual survey effort represents a snap-shot in time, while information from more frequent monitoring efforts often includes breeding pairs that were not detected during the annual survey. The origin of data (annual survey or monitoring efforts) from each site is indicated within the attributes of the shapefile. Each point location represents a breeding territory and specifically indicates either a Piping Plover pair, nest or brood.

The 24th annual Virginia Plover Survey was conducted in coastal Virginia in 2009. The purpose of the annual survey is to document the occurrence of the federally threatened Piping Plover and state endangered Wilson's Plover in Virginia and to document the locations of nesting territories or pairs. Wilson's Plovers were first included in the Virginia Plover survey in 1988, therefore 2009 represents the 22nd annual survey for this species in the state. The survey takes place from 1-9 June each year and the geographic scope of the survey encompasses the known historical range of Piping Plovers in the state, including 17 sites bordering the Atlantic Ocean and three sites along the western shoreline of the Chesapeake Bay (one of which was not surveyed in 2009 due to logistical constraints – Plum Tree National Wildlife Refuge). During the

annual survey, most sites are surveyed by foot and all observations of both species of plovers are recorded on standardized data forms. The information recorded for each observation includes: the number of plovers observed, the status of the bird(s) (unmated single adult, mated single adult, mated pair), presence of a nest or brood, and GPS coordinates.

The extent of efforts to monitor the breeding success of Wilson's Plovers in Virginia varies on an annual basis depending on resource constraints. Generally speaking, in recent years, multiple agencies and organizations in Virginia have monitored the breeding success of as many Wilson's Plover pairs as possible in order to evaluate the overall statewide breeding success. Methods for monitoring Wilson's Plover breeding success vary by agency/organization but generally include a minimum of weekly site visits to document the status of nesting pairs and to determine reproductive endpoints such as hatching success, fledging success and productivity (number of young fledged per pair).

A total of 37 Wilson's Plover breeding pairs were recorded during the 2009 survey. The data presented here represents a total of 39 breeding territories due to additional breeding pairs documented during monitoring efforts at one site. The final estimate for the number of breeding Wilson's Plover pairs in Virginia in 2009, including monitoring information from all available sites, was 40 pairs.

Colonial waterbirds
Data source(s): CCB, VDGIF, TNC, USFWS, USGS, VDCR, UVA
Relevant citation: Watts and Paxton 2009
Shapefile name: CCBDB_09_04_2008ColonialWaterbirdPopEstimates
Type of shapefile: point
Contact information: Bart Paxton, Center for Conservation Biology, bjpaxt@wm.edu

This distribution information represents the results of nearly 550 surveys of 250 colonial waterbird colonies, comprised of 24 species known to nest in Virginia, conducted during the breeding season of 2008 in coastal Virginia. Those species include: Great Black-backed Gull (GBBG; *Larus marinus*), Herring Gull (HERG; *L. argentatus*), Laughing Gull (LAGU; *L. atricilla*), Gull-billed Tern (GBTE; *Sterna nilotica*), Caspian Tern (CATE; *S. caspia*), Royal Tern (ROYT; *S. maxima*), Sandwich Tern (SATE; *S. sandvicensis*), Forster's Tern (FOTE; *S. forsteri*), Common Tern (COTE; *S. hirundo*), Least Tern (LETE; *S. antillarum*), Black Skimmer (BLSK; *Rynchops niger*), Double-crested Cormorant (DCCO; *Phalacrocorax auritus*), Brown Pelican (BRPE; *Pelecanus occidentalis*), White Ibis (WHIB; *Eudocimus albus*), Glossy Ibis (GLIB; *Plegadis falcinellus*), Great Blue Heron (GBHE; *Ardea Herodias*), Great Egret (GREG; *A. alba*), Snowy Egret (SNEG; *Egretta thula*), Tricolored Heron (TRHE; *E. tricolor*), Little Blue Heron (LBHE; *E. caerulea*), Cattle Egret (CAEG; *Bubulcus ibi*), Green Heron (GRHE; *Butorides virescens*), Black-crowned Night Heron (BCNH; *Nycticorax nycticorax*), and Yellow-crowned Night Heron (YCNH; *Nyctanassa violacea).*

The 2008 survey followed comprehensive surveys of all colonial nesting waterbird species in the state's coastal plain in 1993 and 2003. Because of logistical and financial constraints the 2008 data does not include surveys of all Great Blue Heron or Great Egret colonies. Surveys were

conducted by foot, air or boat using a variety of methods. Each point location represents the approximate location of the colony and does not account for the maximum extent of the colony boundaries. Attribute data for each colony includes estimates of the number of nesting pairs of each species present.

Overall, 60,758 breeding pairs of 24 species were recorded at 250 colonies in coastal Virginia in 2008. The barrier island/lagoon system of the Eastern Shore supported 74% and 70% of all breeding pairs and colonies, respectively.

Bald Eagles
Data source(s): CCB
Relevant citation: Watts and Byrd 2009
Shapefile name: EasternShore_BAEA_2009
Type of shapefile: point
Contact information: Bart Paxton, Center for Conservation Biology, bjpaxt@wm.edu

The following description has been extracted verbatim from the metadata provided with the shapefile representing locations of breeding Bald Eagles in Virginia provided for this project by the Center for Conservation Biology.

> *Bald eagles have been surveyed within the Virginia portion of the Chesapeake Bay for more than 50 years. The survey was initiated in 1956 as a volunteer-based ground survey by the National Audubon Society following the realization that eagles were declining throughout much of their North American range. With funding from the U.S. Fish and Wildlife Service, the survey became a systematic aerial survey in 1962 and has followed the same protocols to the present. Jackson Abbott and Fred Scott conducted the survey from 1962 through 1976. In 1977, the Virginia Department of Game and Inland Fisheries took over the funding of the survey. Mitchell Byrd directed the survey between 1977 and 2000 and continues to participate. Bryan Watts has conducted the survey since 1992 and took over responsibility for the survey in 2001. Support for the 2009 survey was provided by the Center for Conservation Biology.*
>
> *The Virginia Bald Eagle Survey is conducted annually to 1) monitor the recovery of the bald eagle in Virginia, 2) document the status, distribution, and productivity of breeding bald eagles in Virginia, 3) provide information to the government agencies charged with the management and protection of the Virginia Bald Eagle population, 4) provide information to land holders about the status of Bald Eagles on their properties, and 5) increase our understanding of Bald Eagle natural history in Virginia.*
>
> *The Virginia Bald Eagle survey measures breeding activity and productivity via a standard 2-flight approach. The first flight is conducted between late February and mid-March to locate active nests. A high-wing Cessna 172 aircraft is used to*

systematically overfly the land surface at an altitude of approximately 100 m to detect eagle nests. All Bald Eagle nests detected are plotted on 7.5 min topographic maps and given a unique alpha-numeric code. Each nest is examined to determine its condition and activity status. The second survey flight is conducted from late April through mid-May to check active nests for productivity and to locate any re-nesting attempts. Nests with no coordinates associated with them were reported to us without exact location.

Peregrine Falcons (*Falco peregrinus*)
Data source(s): CCB
Relevant citation: Mojica et al. 2009
Shapefile name: EasternShore_PEFA_2009
Type of shapefile: point
Contact information: Libby Mojica, Center for Conservation Biology, ekmojica@wm.edu

The distribution information for breeding Peregrine Falcons in Virginia provided for this project by the Center for Conservation Biology represents locations of active and inactive Peregrine Falcon nesting structures along the Eastern Shore of Virginia in 2009. Of the 21 known pairs documented in Virginia in 2009, 12 occurred on the Eastern Shore and 11 inactive or destroyed nesting platforms were also identified. Each point represents the location of a nesting structure and attribute data indicates the status of that structure in 2009.

Black Rail (*Laterallus jamaicensis*)
Data source(s): CCB, VDGIF
Relevant citation: Smith et al. 2008
Shapefile name: n/a
Type of shapefile: n/a
Contact information: Bart Paxton, Center for Conservation Biology, bjpaxt@wm.edu

No distribution data is included for breeding Black Rails in this report. During the breeding seasons of 2007 and 2008, the Center for Conservation Biology surveyed 328 locations throughout coastal Virginia where Black Rails have been historically documented or where appropriate habitat was located. Eighty-nine of those locations were located within the seaside barrier island/lagoon system of the Eastern Shore. No Black rails were detected at any of these points.

High-marsh breeding birds
Data source(s): CCB
Relevant citation: Paxton 2007a
Shapefile name: High Marsh Breeding_2006
Type of shapefile: point
Contact information: Bart Paxton, Center for Conservation Biology, bjpaxt@wm.edu

The distribution information for high-marsh breeding birds in Virginia provided for this project by the Center for Conservation Biology represents survey results from 80 250m transects within 40 different high-marsh patches on the Eastern Shore of Virginia. Each transect was surveyed at least three times during the breeding season of 2006 in order to document bird species using high-marsh patches and to examine the effect of an invasive plant, the common reed (*Phragmites australis*), on high-marsh breeding bird communities. Each point indicates the species of bird detected along a transect.

From Bart 2007a:

> *A total of 87,500 m of transects were surveyed, resulting in 2,950 detections of 81 species. The most commonly detected species were Red-winged Blackbirds, Willets, Seaside Sparrows, Common Yellowthroats, and Sharp-tailed Sparrows. Two of these species, the Seaside Sparrow and Sharp-tailed Sparrow, are species of high conservation concern. Seaside and Sharp-tailed Sparrows were found in significant numbers within large high-marsh patches on the northern portion of Virginia Delmarva Peninsula, regardless of P. australis presence. However these species rarely, if ever, utilized P. australis, and still required large patches of high-marsh grass and high-marsh shrub habitat.*

<u>Seaside lagoon nesting habitat</u>
Data source(s): TNC
Relevant citation: this report
Shapefile name: Lagoon_Nesting_Habitat
Type of shapefile: polygon
Contact information: Alexandra Wilke, The Nature Conservancy, awilke@tnc.org

This distribution information represents the locations of suitable nesting habitat for several species of ground nesting waterbirds or shorebirds distributed throughout Virginia's seaside lagoon system. Many of the areas were identified based on knowledge of existing breeding bird territories or colonies as documented during breeding season monitoring efforts. Others were identified based on expert knowledge of available, suitable habitat. These nesting areas within the marshes of the lagoon system are generally topographic high spots that are not flooded with each tidal cycle and are suitable for supporting breeding ground-nesters, such as American Oystercatchers, Great Black-backed Gulls, Herring Gulls, Laughing Gulls, Gull-billed Terns, Caspian Terns, Royal Terns, Sandwich Terns, Forster's Terns, Common Terns, and Black Skimmers . The types of habitats include oyster shell rakes formed along salt marsh edges or in open water, fringing sand beaches along marsh edges, and sandy/shrubby topographic high spots within marshes. This layer does not represent the more dynamic nesting (and roosting) habitat associated with wrack deposits on top of the marshes. These mats of dead vegetation provide nesting habitat for species like Forster's Terns, American Oystercatchers and Laughing Gulls and can sometimes support very large numbers of nesting birds but are difficult to digitize because the location and size of these areas change as tides and storm events redistribute the wrack material. The distribution information for breeding colonial waterbirds presented in this

report provides an example of how these types of breeding locations are distributed throughout the seaside marshes in a given year.

Migration distributions

Shorebird foraging areas
Data source(s): TNC, CCB
Relevant citation: this report
Shapefile name: Shorebird_flats
Type of shapefile: polygon
Contact information: Alexandra Wilke, The Nature Conservancy, awilke@tnc.org

This distribution information represents the locations of important mudflats used by foraging shorebirds and other bird species throughout the year, but particularly during spring and fall migration. Many of the areas were identified based on knowledge of extensive use of the mudflats by migrating shorebirds as documented during aerial surveys of these areas during low tide (CCB and TNC, unpubl. data). Others were identified based on expert knowledge of available, suitable foraging habitat used by migrating shorebirds. Mudflat boundaries were remotely digitized using GIS by examining aerial imagery of the project area from different years, the most recent being 2009, combined with referencing wetland boundaries from the National Wetlands Inventory and using local knowledge of intertidal mud flat boundaries.

Wintering distributions

American Oystercatcher Roost Sites
Data source(s): TNC, VDGIF, USFWS
Relevant citation: this report
Shapefile name: AMOY_Roost_Sites
Type of shapefile: polygon
Contact information: Alexandra Wilke, The Nature Conservancy, awilke@tnc.org

This distribution information represents a comprehensive inventory of all known wintering roost sites used by American Oystercatchers in coastal Virginia. Each polygon displayed represents the approximate boundary of a roost site known to be used by American Oystercatchers. Boundaries were digitized using 2009 aerial imagery combined with expert knowledge of the location of roost sites. Because not all roost sites are used simultaneously, the information presented represents all known roost sites as opposed to presenting distribution information from an actual survey of roosting birds.

Similar to other shorebird species, American Oystercatchers gather in communal, high-tide roosting flocks during the non-breeding season. Surveys during the non-breeding season and resighting records of banded oystercatchers have revealed that a high degree of roost site fidelity is exhibited by wintering flocks and individual birds. This behavior facilitates the task of

identifying these important roosting areas and obtaining wintering population size estimates because birds are concentrated on known roost sites during high tide.

Extensive data exist on locations of wintering high-tide oystercatcher roosts in Virginia. Eighty-five active roost sites have been identified throughout the extensive and remote marshes of the Virginia barrier island/lagoon system. Oystercatcher roost sites in Virginia include oyster shell rakes formed along salt marsh edges or in open water, fringing sand beaches along marsh edges, inlet beaches, exposed sand or mud flats and topographic high spots within marshes. Less is known about the availability of potential roost sites and the presence of wintering oystercatchers along the Chesapeake Bay shorelines of the states, although recent aerial surveys suggest that no significant roost sites exist in these areas (TNC and VDGIF, unpublished data).

<u>High marsh wintering birds</u>
Data source(s): CCB
Relevant citation: Paxton 2007b
Shapefile name: High marsh winter
Type of shapefile: point
Contact information: Bart Paxton, Center for Conservation Biology, bjpaxt@wm.edu

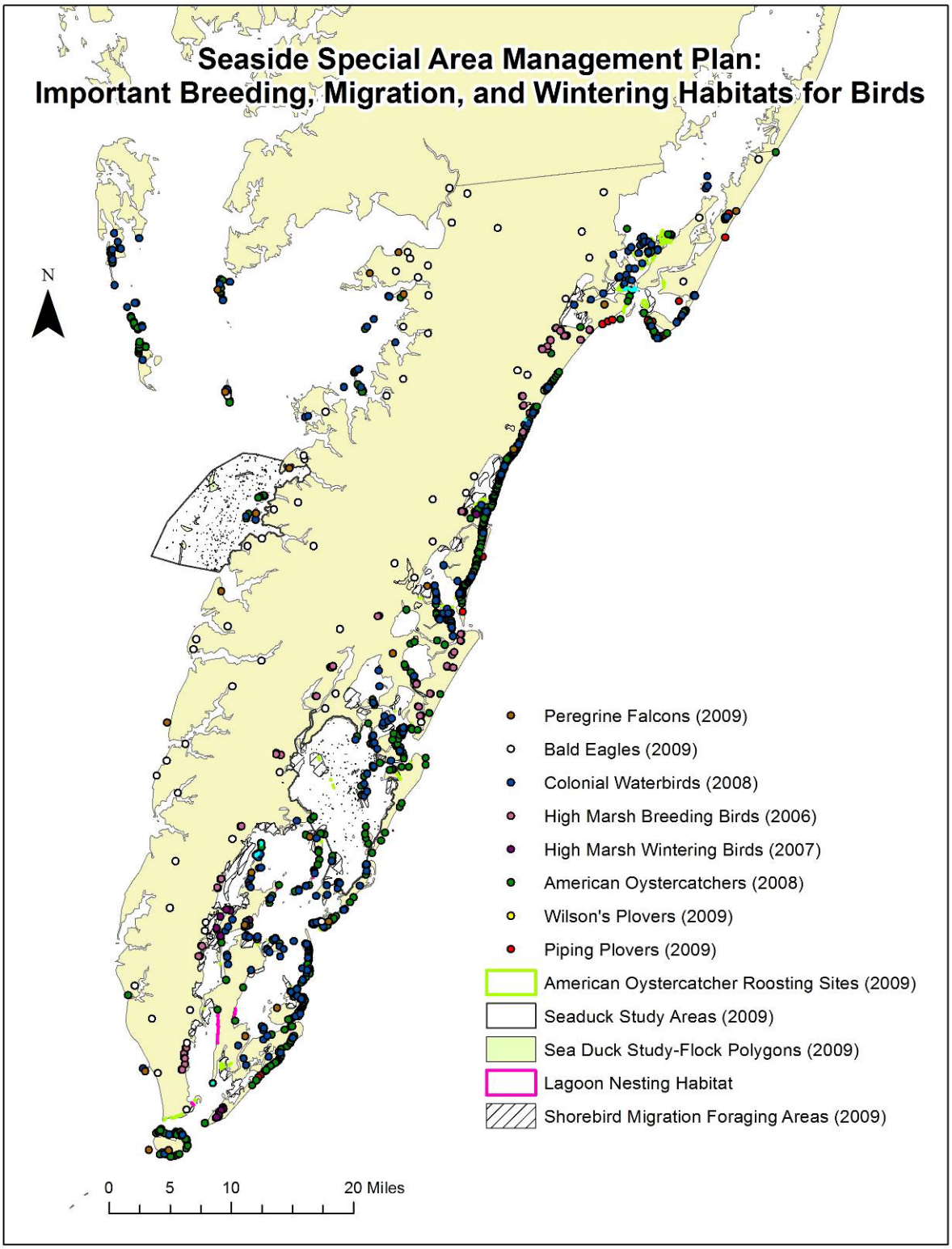
The distribution information for high-marsh wintering birds in Virginia provided for this project by the Center for Conservation Biology represents survey results from 99 250m transects within 55 different high-marsh patches on the Eastern Shore of Virginia. Each transect was surveyed at least two times between 6 December 2006 and 1 March 2007, most were surveyed three times, in order to document bird species using high-marsh patches and to examine the effect of an invasive plant, the common reed (*Phragmites australis*), on high-marsh wintering bird communities. Each point indicates the species of bird detected along a transect.

From Bart 2007b:

> *A total of 66,000 m of transects were surveyed, resulting in 1,364 detections of 63 species. The most commonly detected species were Yellow-rumped Warblers, Sharp-tailed Sparrow, and American Robins. Four species of high conservation concern; Sharp-tailed Sparrow, Marsh Wrens, Sedge Wrens and Seaside Sparrows, were found in significant numbers within marsh study sites. Sharp-tailed Sparrows, Marsh Wrens, and Sedge Wrens were detected along the entire gradient of the large marsh patches in the northern portion of the Virginia Delmarva Peninsula to the smaller marsh patches in the southern portion of the Virginia Delmarva Peninsula, regardless of P. australis presence. However, while these species were detected within P. australis, they were most often detected within marsh grass habitats. Detections of Seaside sparrow were restricted mainly to the marsh patches on Parramore Island, and were never detected within P. australis.*

Seaducks
Data source(s): VIMS
Relevant citation: Ross and Luckenbach 2009
Shapefile name: Sea Duck Study-flock polygons; Seaduck study areas
Type of shapefile: polygon
Contact information: College of William and Mary, Virginia Institute of Marine Science, Eastern Shore Laboratory, pg@vims.edu

This information (Sea Duck Study-flock polygons) represents the distribution and size of foraging Surf Scoter (*Melanitta perspicillata*) and Long-tailed Duck (*Clangula hyemalis*) flocks as documented during aerial and boat-based surveys conducted by the Virginia Institute of Marine Science from October 2008 through April 2009. The accompanying shapefile (Seaduck study areas) defines the study area in Hog Island Bay which did not encompass the entire seaside lagoon system of the Eastern Shore. Results from the study suggest that Hog Island Bay provides important winter and migratory foraging areas for both species (data suggested that Long-tailed ducks used the study are throughout the winter while Surf Scoters used the study area as temporary staging areas). The study also suggests that the minimum water depth for foraging for both species was 1m at mean higher high water, indicating that these areas are intertidal based on the tidal range of Hog Island Bay.


Seaside Special Area Management Plan:
Important Breeding, Migration, and Wintering Habitats for Birds
N
Peregrine Falcons (2009)
Bald Eagles (2009)
Colonial Waterbirds (2008)
High Marsh Breeding Birds (2006)
High Marsh Wintering Birds (2007)
American Oystercatchers (2008)
Wilson's Plovers (2009)
Piping Plovers (2009)
American Oystercatcher Roosting Sites (2009)
Seaduck Study Areas (2009)
Sea Duck Study-Flock Polygons (2009)
Lagoon Nesting Habitat
Shorebird Migration Foraging Areas (2009)
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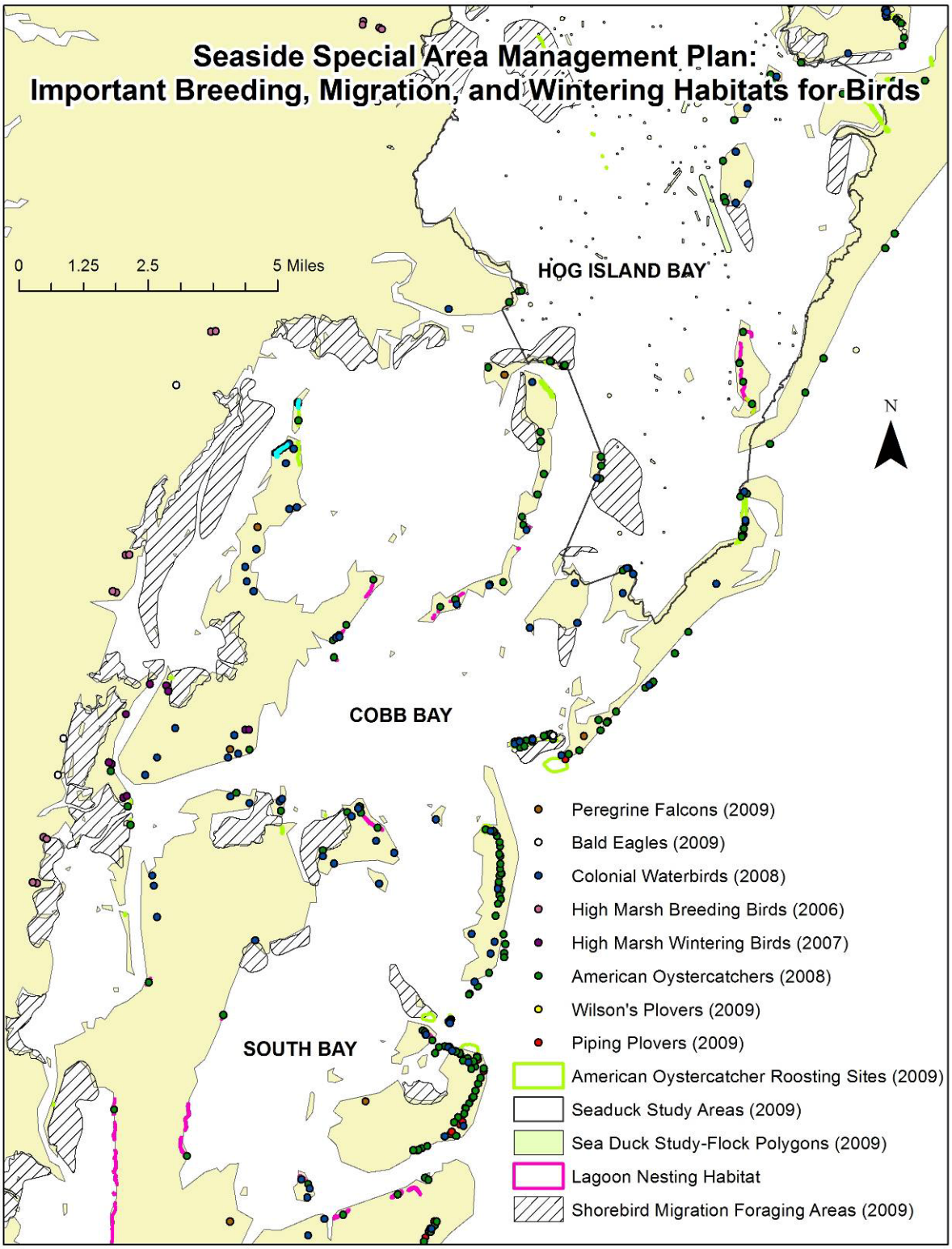
5
10
20 Miles


Seaside Special Area Management Plan:
Important Breeding, Migration, and Wintering Habitats for Birds
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2.5
5 Miles
HOG ISLAND BAY
COBB BAY
SOUTH BAY
N
Peregrine Falcons (2009)
Bald Eagles (2009)
Colonial Waterbirds (2008)
High Marsh Breeding Birds (2006)
High Marsh Wintering Birds (2007)
American Oystercatchers (2008)
Wilson's Plovers (2009)
Piping Plovers (2009)
American Oystercatcher Roosting Sites (2009)
Seaduck Study Areas (2009)
Sea Duck Study-Flock Polygons (2009)
Lagoon Nesting Habitat
Shorebird Migration Foraging Areas (2009)

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3) Recommendations

The Project Team accomplished an overview and evaluation of avian resource use throughout the lagoon system of Virginia's Eastern Shore by The Nature Conservancy, along with a large scale spatial analysis of Baylor grounds and clam aquaculture in Hog Island Bay (Luckenbach), and an evaluation of priority conservation areas on the seaside (Berman) by the Virginia Institute of Marine Science. A survey of recreational uses was also undertaken (Burden). The Project Team concluded that the Baylor Survey was outdated and in some ways counterproductive for today's economic and environmental conditions, and that the dynamic changes that occur on the seaside could be more productively managed by a more flexible system that increases overall ecosystem health and economic and natural productivity. Using suitability analysis and spatial planning tools to create possible overlays of aquaculture leases, waterbird distributions, eelgrass and oyster restoration sites, the Project Team concluded that all these uses were essentially compatible and that conflict between uses and user/stakeholders could be eased by use of ecosystem based spatial planning tools and broader stakeholder communications. Spatial planning and other GIS tools are also capable of accommodating the dynamic and changing nature of the seaside lagoon system.

Project Team discussions of the spatial inventories, the questionnaire results and current regulatory and management goals and conditions indicated that, while marine spatial planning is a valid approach to increasing management effectiveness, there was not sufficient data to support making specific recommendations or providing guidelines to policy makers. The Team determined that SAMP 2- FY 2009 will focus in more detail in terms of wild shellfish production and aquaculture on public leased and unassigned grounds in Hog Island, Chincoteague and Magothy Bays by VIMS; that The Nature Conservancy will organize a comprehensive review and goal-setting effort for native oyster and eelgrass restoration on the seaside, as well as updating and refining avian spatial distributions; and that the Project Team will continue to evaluate the compatibility and potential conflicts of expanded aquaculture, restoration, wild harvest and recreational uses, using marine spatial planning and other GIS tools. Trials by VIMS to re-introduce bay scallops to the seaside system will also be integrated into the Project Team's assessment work.