

A Conservation Action Plan for the American Oystercatcher (*Haematopus palliatus*)

for the Atlantic and Gulf Coasts of the United States

Version 2.1, February 2010

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Oystercatcher Working Group⁴



NOTE about Version 2.1:

The only difference between Version 2.1 (February 2010) and Version 2.0 (November 2007) is the addition of a Spanish executive summary.

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EXECUTIVE SUMMARY

The American Oystercatcher, *Haematopus palliatus*, a large shorebird, is classified as a Species of High Concern in shorebird conservation plans for the Eastern and Gulf coasts of the United States because of its small overall population (11,000 individuals), widespread habitat loss, and the threats it faces both during the breeding and non-breeding seasons (Brown et al. 2001). The species occurs only in the coastal zone in areas that support intertidal shellfish beds. While other populations, including distinct subspecies, of American oystercatchers occur elsewhere, the present plan address only the population on the East and Gulf coasts. Future revisions to this plan will incorporate populations throughout the entirety of the species' range, including the Caribbean, Central and South America.

The major threats to the health of the species are

- Loss of habitat from coastal development
- Disturbance, from human recreational activities, at all stages of the birds' annual cycle
- Elevated predation from predators associated with human activities
- Contamination of their primary food sources by non-point pollution and/or oil spills
- Effects of global climate change, especially rising sea-levels

Conservation activities recommended to address these threats include

- Identification and protection of existing habitat
- Creation of new habitat through carefully designed use of dredge-spoil materials
- Management of existing protected areas to reduce predation and disturbance
- Control of predator populations, especially in the nesting season
- Monitoring of population status and trend to measure conservation effectiveness.

Because American Oystercatchers share habitat with other coastal specialist birds, conservation efforts for Oystercatchers will benefit these other species, and *vice-versa*.

Considerable research is needed to refine knowledge of the population dynamics and limiting factors that affect American Oystercatchers, and specific recommendations are provided in this document. Suggestions are also made for methods to evaluate the effect of conservation actions.

RESUMEN EJECUTIVO

El *Haematopus palliatus*, una ave playera de gran tamaño, está clasificada como una Especie de Alta Preocupación en planes de conservación para aves playeras de las Costas Atlántica y Golfo de los Estados Unidos debido a su población pequeña (11.000 individuos), la pérdida generalizada de su hábitat, y las amenazas que enfrenta en las temporadas de reproducción y no-reproducción (el invierno) (Brown *et al.* 2001). Esta especie se encuentra únicamente en zonas costeras y playas con abundantes moluscos. Aunque otras poblaciones, incluyendo subespecies distintas, del *H. palliatus* ocurren en otras partes del hemisferio, este plan se enfoca únicamente en la población de la subespecie de las Costas Atlántica y Golfo. Futuras revisiones del plan se incorporarán las poblaciones de todo el rango de la especie, incluyendo las del Caribe, Centroamérica, y Suramérica.

Las principales amenazas para la especie son:

- La pérdida de hábitat debido al desarrollo en áreas costeras.
- La perturbación por las actividades humanas de recreo por todo el ciclo anual de vida de las aves.
- Incremento de la depredación por poblaciones de animales asociadas a actividades humanas.
- Contaminación de las fuentes primarias de alimentación por polución y derrames de petróleo.
- Aumento del nivel del mar y otros efectos del cambio climático global.

Actividades de conservación recomendadas para hacer frente a estas amenazas incluyen:

- Identificación y protección de las áreas de hábitat existentes
- Creación de nuevos hábitats, a través del uso cuidadoso de diseños de dragados.
- Manejo de las áreas protegidas existentes para reducir la depredación y perturbación.
- Control de las poblaciones depredadoras, especialmente en temporada de anidación.
- Monitoreo del estatus y la tendencia de las poblaciones para evaluar la efectividad de la conservación.

Porque *H. palliatus* comparte los mismos hábitats costeros con otras aves, los esfuerzos de conservación que son enfocados en el *H. palliatus* benefician a estas especies de aves también, ya que.

El desarrollo considerable de investigaciones es necesario para obtener mayores conocimientos de las dinámicas de la población y los factores limitantes que afectan al *H. palliatus*. Las recomendaciones específicas se presentan en este documento. Se sugirieren los métodos también para evaluar el efecto de las acciones de conservación.

INTRODUCTION

The American Oystercatcher (*Haematopus palliatus*) is a large shorebird that inhabits coastal islands and salt marshes throughout the year, and occurs in the largest concentrations along the southeastern United States coast. It is listed as a Species of High Concern in the U.S. Shorebird Conservation Plan (Brown et al 2001). Two races are recognized in North America. The nominate race, *Haematopus palliatus palliatus*, nests on barrier beaches, sandbars, spoil islands, shell islands, and marsh islands from Nova Scotia to eastern Mexico. In winter, flocks occur from central New Jersey southward. Smaller populations occur in the Caribbean, and coastally south to Argentina and Chile. The western race, *Haematopus palliatus frazeri*, is found from Southern California to western Mexico. This plan focuses on the North American populations of *H. p. palliatus* (Figure 1). Additional plans under development will address additional populations and subspecies.

American Oystercatchers warrant conservation planning for several reasons.

1. Low population size: The East Coast population comprises only about 11,000 birds (Brown *et al.* 2005);
2. Widespread habitat loss: Oystercatchers are restricted to a narrow range of coastal habitat, and development of barrier islands and marshes is a serious concern for the future of the species;
3. Threats during the breeding and non-breeding seasons. In addition to direct habitat loss, remaining populations face pressure from recreational disturbance, increases in nest predators, potential contamination of food resources, and alteration of habitat through beach stabilization.

Unfortunately, the relative impact of each threat on oystercatcher populations is poorly understood. A thorough understanding of oystercatcher population dynamics is needed to identify how these threats affect different life stages and where conservation actions should be targeted to have the greatest impact.

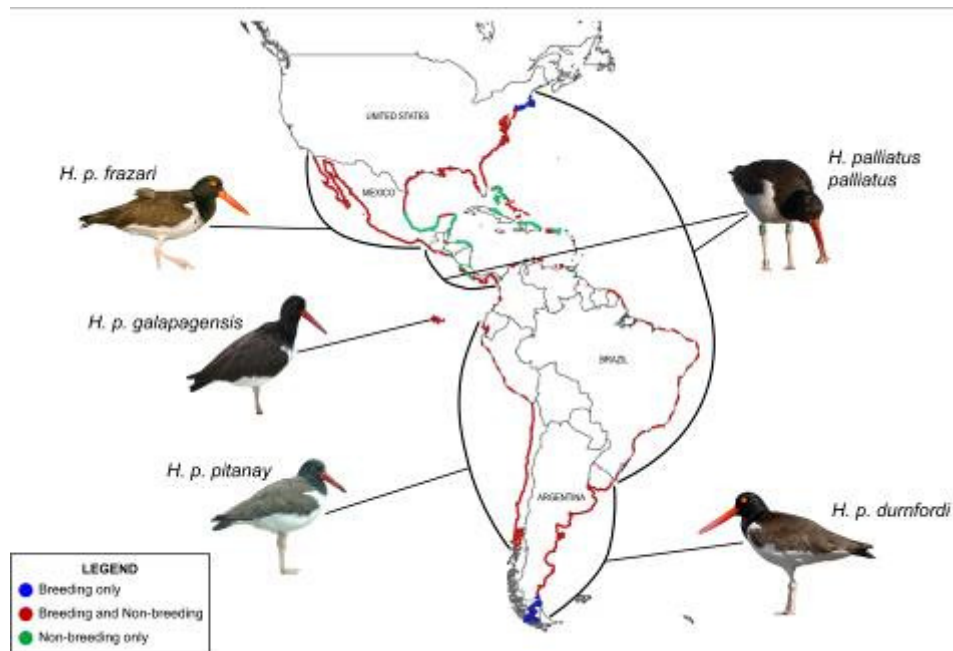


Figure 1: The range of the American Oystercatcher, *Haematopus palliatus*, including subspecies found in the Americas and their breeding and non-breeding ranges. Courtesy of Ted Simons and Wendy Moore, North Carolina State University.

This document focuses on *H. p. palliatus* in the United States, which for present purposes we refer to as “American Oystercatcher” or sometimes simply as “oystercatchers.” This plan summarizes our current knowledge of their life history, distribution, and population trend, describes current threats, lists research and management needs, and outlines recommended conservation actions.

MANAGEMENT STATUS AND NATURAL HISTORY

Taxonomy

Two races of the American Oystercatcher are recognized in North America. *Haematopus palliatus palliatus* is found on the East and Gulf Coasts of North America, in the Caribbean, and locally in Central America. *H. p. frazari* is found on the west coast from southern California to Mexico (Nol and Humphrey 1994). This report focuses on *H. p. palliatus*, the eastern race, in the main portion of its breeding and wintering areas along the east coast and the Gulf coast of the United States. Three other races of oystercatchers are recognized, including *H. p. durnfordi* in Argentina, *H. p. pitanay* in western South America, and *H. p. galapagensis* in the Galapagos Islands (Hayman *et al.*, 1986). Conservation issues for other subspecies are addressed in a separate document under development, which will cover the entire range of the species.

Natural History

The large orange-red bill and contrasting black, brown, and white pattern of the American Oystercatcher give this shorebird, the largest in the Americas, a distinctive appearance. Oystercatchers use this laterally compressed bill to feed on bivalves and other marine invertebrate (Sabine 2005, Nol 1989). They open bivalves by rapid stabbing to sever the adductor muscle that holds the shells together (Nol and Humphrey 1994). Because of this specialized diet, American Oystercatchers are primarily found in coastal areas that support intertidal shellfish beds.

During the breeding season oystercatchers are highly territorial, with territories ranging in extent from a few meters up to nearly a kilometer of beach, depending on local conditions and neighboring pairs (McGowan *et al.* 2005). Oystercatchers form pair-bonds that last the length of the breeding season, April through early August (S. Schulte, unpublished data). Pair-bonds may break during the non-breeding season as birds migrate to different locations. In the southern part of the range many pairs do not migrate and remain together throughout the winter (F. Sanders, pers. comm., B. Winn, Pers. comm.). American Oystercatchers typically show strong breeding site fidelity; both males and females usually return to the same breeding territory annually (Nol 1989). A breeding female lays from two to four eggs in a shallow scrape and incubates them for about 27 days. During this time the nest is vulnerable to washout, predation, and disturbance.

Newly hatched chicks are precocial and can move out of the nest within a few hours of hatching (S. Schulte, unpublished data). It typically takes oystercatcher chicks 35 days to develop flight capability, during which time they are also vulnerable to predation as well as direct and indirect human impacts. Unlike other shorebird chicks, oystercatchers do not feed themselves immediately after hatching. Because of their specialized diet, adult oystercatchers must open shellfish and feed their young until well after fledging (Nol and Humphrey 1994).

During the non-breeding season, oystercatchers gather in flocks, typically on remote coastal islands and marshes. Juveniles and sub-adults may remain in these non-breeding flocks during the summer months (F. Sanders, pers. comm.). There are very limited data on natal fidelity and average age of first breeding for American Oystercatchers. The similar European Oystercatcher, *Haematopus ostralegus*, typically has delayed-maturity, with first breeding at 3-5 years. American Oystercatchers apparently have a similar life history. Two- and three-year old birds may return to their natal site during the breeding season (McGowan *et al.* 2005), but most birds probably do not establish a territory and nest until they are at least four years old.

American Oystercatchers may regularly live over 10 years and possibly as long as 30 to 40 years (Nol and Humphrey 1994). The similar *H. ostralegus* can live up to 40 years (Ens *et al.* 1992).

Population estimate and trend

Historically, American Oystercatchers were probably widespread on the Atlantic Coast and may have nested as far north as Newfoundland and Labrador (Nol and Humphrey 1994). In the 1800s market hunting and eggging reduced the population and extirpated the species from the Northeast. With the passage of the Migratory Bird Treaty Act of 1918 (16 U.S.C. § 703-712),

populations rebounded and oystercatchers began to move back into northern breeding areas (Nol and Humphrey 1994). In Virginia and the Carolinas these populations have begun to decline again (Davis *et al.* 2001).

Until recently, population estimates for American Oystercatchers in the United States focused on the Atlantic coast and were compiled from multiple survey efforts. An estimate of 3,248 breeding adults on the Atlantic coast was assembled from state breeding surveys (Davis *et al.* 2001). In 1999, a coordinated boat survey of winter roost sites in the southeastern Atlantic states resulted in an estimate of 7,700 individuals (Nol *et al.* 2000). Both estimates may have undercounted birds. For example, earlier breeding surveys in Virginia did not include birds nesting in less accessible marsh habitat (Wilke *et al.* 2005), while winter boat surveys did not include birds wintering north of Virginia.

During the 2002 to 2003 non-breeding season, the Manomet Center for Conservation Sciences conducted an aerial survey in cooperation with members of the American Oystercatcher Working Group. The survey covered the Atlantic and Gulf Coasts, and encompassed the entire winter range of the eastern race of American Oystercatcher, *H. p. palliatus*, in the United States. The survey resulted in a population estimate of $10,971 \pm 298$ individuals, with 8,500 wintering on the Atlantic Coast (Brown *et al.* 2005).

While this aerial survey provided a reliable population estimate at a single point in time, tracking and projecting population trends is more complex and requires a better understanding of the population dynamics of the species. Current information on population trends comes primarily from state and local surveys which often vary in methodology and coverage. Although survey data show that oystercatchers are continuing their range expansion in the Northeast (Nol *et al.* 2000), numbers are declining in core Mid-Atlantic breeding areas (Mawhinney and Benedict 1999; Davis *et al.* 2001).

To address this seeming contradiction of simultaneous range expansion and population decline, members of the American Oystercatcher Working Group have initiated a large-scale cooperative color banding and monitoring effort. This study will help determine patterns of survival, movement, and dispersal, which are critical to understanding and predicting population trends at multiple spatial scales.

Distribution and abundance

American Oystercatchers are confined to a narrow band of coastal habitat. The breeding range of *H. p. palliatus* extends from New England to the U.S. Gulf coast, the Caribbean, and Central America (Nol and Humphrey 1994). The core of this range consists of remote areas of the mid-Atlantic Coast, especially the largely undeveloped Eastern Shore of Virginia. Although numbers on Virginia beaches have been reported as declining in recent years (Williams *et al.* 2000, Davis *et al.* 2001), a 2003 survey of Virginia's coastal plain recorded 588 breeding pairs, still the highest of any state, with 89% of those pairs occurring within the coastal lagoon system and along the barrier islands (Wilke *et al.* 2005).

The wintering range of *H. p. palliatus* extends southward along the Atlantic coast from central New Jersey to Mexico and the Caribbean. A few birds are seen regularly in mild winters north to New England. Although aggressively territorial during the breeding season, oystercatchers form large roosting flocks in the fall and winter. The distribution of wintering flocks is discontinuous (Figure 2). In the mid-Atlantic, flocks occur from Great Bay to Stone Harbor, New Jersey, and from Chincoteague Bay to Fisherman's Island on Virginia's eastern shore. In North Carolina, the primary wintering areas are the marshes along the intracoastal

waterway and islands near Cape Lookout and Cape Fear.

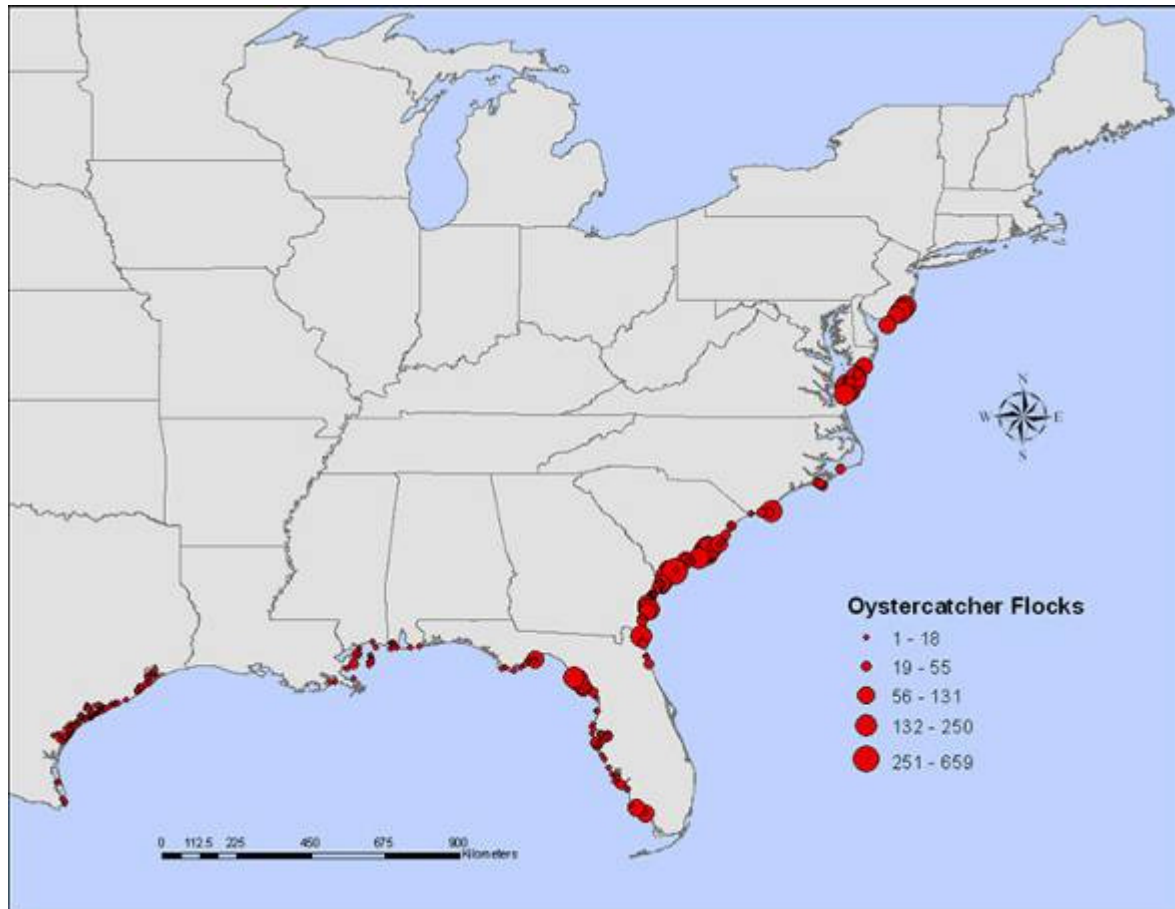


Figure 2. The distribution and abundance of American Oystercatchers wintering in the Eastern United States as measured with aerial surveys in winter 2002-2003 (Brown *et al.* 2005).

The South Carolina coast is the heart of the oystercatcher's winter range. Boat and aerial surveys have documented over 3500 individuals wintering in the state, approximately one-third of the total population (Brown *et al.* 2005; Sanders *et al.* 2004). Over half of these birds winter in the Cape Romain area, where flocks can contain over 700 birds (Sanders *et al.* 2004). South of the Charleston River, flocks occur in most coastal bays and inlets of South Carolina, Georgia (Winn 2000), and northeast Florida, as far south as Daytona Beach.

On the Gulf Coast of Florida, oystercatchers winter from the Ten Thousand Islands of the Everglades to Apalachicola Bay on the panhandle. Most flocks are concentrated near Cedar Key, Tampa Bay, and Cape Romano. The islands of Cedar Key and the Lower Suwannee River support the highest density of wintering oystercatchers in the state. In January, 2003, the Manomet aerial survey found 790 birds (Brown, unpubl. data), while the 2001-2002 Christmas Bird Count for Cedar Key recorded 1,085 birds (National Audubon Society 2002). Oystercatcher numbers drop off substantially west of Apalachicola Bay. Pairs and small flocks are scattered among the offshore islands and marshes of Alabama, Mississippi, and eastern Louisiana. Oystercatchers are absent in winter west of Grand Isle, Louisiana to Galveston, Texas. Fewer

than 350 oystercatchers winter in Texas, virtually all of which occur between Galveston and Corpus Christi Bays.

Migration

In late July and August oystercatchers begin to gather in staging flocks before fall migration. American Oystercatchers are short distance, partial migrants. Most individuals migrate from breeding territories in the fall, though some only move to nearby roost sites adjacent to feeding habitat. Migration occurs gradually from the end of August through November. On Monomoy Island, Massachusetts, oystercatcher numbers in staging flocks peak in late August and early September (Schulte and Brown 2003). In Georgia, oystercatcher numbers at stopover sites peak in mid-September and October (B. Winn, pers. comm.). Latitude influences which individuals migrate; most oystercatchers breeding north of New Jersey move south for the winter (Brown *et al.* 2005). In central and southern breeding areas it is less clear what factors influence the decision to migrate or remain as a resident. Recent banding data from North Carolina show that this decision is highly individual. Even within a family group some members may choose to migrate, while others remain near their nesting site all winter (Simons, unpublished data). During migration, as in the rest of the year, oystercatchers stay strictly within the coastal zone. Although banding records have shown that some oystercatchers cross the Florida peninsula during migration, oystercatchers do not use interior sites during migration.

Northward migration begins in late winter. On the Outer Banks of North Carolina, oystercatchers begin to arrive on breeding territories in late February (Schulte, unpublished data). In Massachusetts, birds begin to arrive by the end of March (Nol and Humphrey 1994).

Major habitats

Traditional breeding habitat includes accreting undeveloped barrier beaches, sandbars, shell rakes, and to some extent, salt marsh islands. In recent years, more extensive nesting in salt marsh habitat has been documented (Wilke *et al.* 2005, Shields and Parnell 1990, Lauro and Burgur 1989). Oystercatchers have also been found nesting in non-traditional habitats, including dredge spoil islands, and even rooftops in Florida and North Carolina (R. Paul, pers. comm., J. Fussell, pers. comm.). Nesting density varies widely by location and habitat type. On remote barrier beaches density may vary, but is generally highest near prime feeding territories, especially on sand flats near inlets (McGowan *et al.* 2005). A recent study comparing nesting success on barrier beaches and dredge spoils found an average density of 0.6 pairs per kilometer of shoreline on barrier islands, while on dredge spoil islands in the Cape Fear River of North Carolina, oystercatchers nested in densities as high as 10.6 pairs per kilometer of shoreline (McGowan *et al.* 2005).

Dredge spoil islands may contain very high densities of nesting oystercatchers, but it is unclear whether the birds nesting in this habitat are more productive than those in more traditional sites. Hatching success was higher on the dredge spoil islands than on barrier beaches (McGowan *et al.* 2005), but overall nesting success was similar, indicating that birds on dredge spoil islands were having difficulty raising chicks.

After the breeding season, many oystercatchers move off of breeding territories, and gather in roosting flocks at the edges of marshes and sand flats. In the southeast states some

resident pairs remain on breeding territories throughout the year (F. Sanders, unpubl. data., B. Winn unpubl. data). Oystercatchers typically roost on sites that are near feeding areas, and not connected to the mainland (Brown *et al.* 2005). In the mid-Atlantic and Southeast, oystercatchers commonly use shell rakes as winter roost sites (Brown *et al.* 2005; Murphy and Sanders n.d.). Other habitat types used by wintering oystercatcher include small sandy islands, inlet beaches and accreting sand spits, edges and interior mudflats on marsh islands, and occasionally long docks and jetties.

Shell rakes are another habitat type of high importance to oystercatchers. In the mid-Atlantic and Southeast, shell rakes are used by nesting oystercatchers (Murphy and Sanders n.d., B. Winn unpubl. Data) and serve as roost sites for the majority of wintering flocks (Brown *et al.* 2005). Shell rakes along the Intracoastal Waterway are owned by the US Army Corp of Engineers and are not specifically protected from mining or other use. In Virginia, oystercatchers make extensive use of use shell rakes in the seaside lagoon system as both nesting and winter roost sites (Wilke *et al.* 2005).

CONSERVATION THREATS

Patterns of land use in the coastal zone are changing. Population growth is widespread along the Atlantic seaboard, and is expected to increase significantly, particularly in the southeastern states (Crossett *et al.* 2004). At the same time, recreational use of the coastal zone is on the rise. Many visitors to the coast seek out undeveloped beaches. As coastal islands and beaches are developed, more visitors are concentrated onto the remaining undeveloped areas. These anthropogenic changes place growing pressure on natural communities along the coast. As coastal species compete with humans and each other for use of the remaining habitat, the inherent ability of a species to adapt rapidly to exploit alternative habitats and resources may be critical in determining persistence in a changing environment. Beach nesting birds are particularly vulnerable, as their nesting season typically runs from April to August which coincides with the peak of human activity.

Nest predation

Every study of the breeding success of American oystercatchers has identified predation as a major source of nest failure (Davis 1999, McGowan 2004, Nol 1989, Novick 1996, Sabine *et al.* 2005, Schulte and Brown 2003, Wilke and Watts, 2004). Confirmed nest predators from these studies in Massachusetts, Virginia, North Carolina, and Georgia include Raccoon, (*Procyon lotor*), Red Fox (*Vulpes vulpes*), Coyote (*Canis latrans*), feral cats (*Felis catus*), Bobcat (*Lynx rufus*), American Mink (*Mustela vison*), Herring Gull (*Larus argentatus*), Great Black-backed Gull (*Larus marinus*), Laughing Gull (*Larus atricilla*), American Crow (*Corvus brachyrhynchos*), Fish Crow (*Corvus ossifragus*), and Ghost Crab (*Ocypode quadrata*).

Eight years of nest monitoring on barrier beaches in North Carolina showed that mammalian nest predators were responsible for more than 50% of nest failures in cases where the cause of failure could be identified (McGowan *et al.* 2005). Raccoons and feral cats were the primary predators in this area, and both of these species thrive in the presence of humans. Researchers on Cumberland Island National Seashore recently used video monitoring to document sources of oystercatcher nest failure. They also found that raccoons were the primary

nest predator on the island (Sabine *et al.* 2005).

Human disturbance

As the human population in coastal areas increases and more people turn to beaches and waterways for recreation, impacts on oystercatcher populations will become more pronounced. Researchers have documented a negative relationship between human disturbance and reproductive success in African Black Oystercatchers (*Haematopus moquini*, Jeffery 1987) and Canarian Black Oystercatchers (*Haematopus meadewaldoi*, Hockey 1987). The effects of human disturbance on nesting success, density, and survival of American Oystercatchers are not completely understood, but several studies have documented lower nest survival and higher chick mortality in high-disturbance sites (McGowan 2004, Sabine 2005). Novick (1996) and Davis (1999) documented lower nesting success for American Oystercatchers in North Carolina in areas where human disturbance was higher. Davis also noted that oystercatchers avoid nesting in areas with high levels of human activity. As more people make use of beaches, sandbars, and other nesting habitat, many undeveloped areas may become effectively unusable. McGowan (2004) found evidence to suggest that American Oystercatchers disturbed by vehicles on the beach suffered higher rates of nest predation. Disturbance is therefore a growing concern for many land managers as human activity increases. Beach disturbance is highest during the summer when pedestrian, vehicle, and boat traffic are at their peak.

Disturbance also affects oystercatchers at wintering and staging sites. Peters and Otis (2005) used focal animal sampling to relate vigilance behavior to boat and predator activity. They found that oystercatchers showed increased vigilance during periods of increased boat and predator activity, suggesting that boat traffic could be a source of stress for wintering oystercatchers.

Oystercatchers in winter flocks normally use several roost sites among which they move depending on tide level and wind direction (Truitt, B., Sanders, F.A., Winn, B., pers. comm.). Roost sites near developed areas can be subjected to high levels of disturbance. Recreational boaters are often the source of disturbance at roost sites, especially in southern areas where they can operate year-round. The impact of this disturbance on survival and site use is unknown.

Habitat loss from development

Coastal development, disturbance and displacement from recreational activity, increased sedimentation and pollution of food resources, and altered predator communities are serious threats to oystercatcher populations in North America. Commercial and residential development of barrier islands has already destroyed significant areas of traditional nesting, foraging, and roosting habitat throughout the range of the species. Shoreline development affects nearby habitat as well. Oystercatchers tend to nest at higher densities and fledge more chicks when they have direct access to foraging areas (Nol 1989; Ens *et al.* 1992). Roads and artificial dunes along nesting beaches can prevent access to marshes and flats along the back side of islands and thereby severely reduce habitat quality. Nesting and roosting sites can also be lost when jetties and revetments alter the normal process of longshore transport of sand and cause significant erosion of adjacent beaches. Hardened shorelines also alter or stop overwash processes on barrier islands which are the fundamental disturbance events that create open beach habitat

preferred by many beach-nesting bird species.

Food resources and contamination

Damage to food resources is a potentially serious threat to the species. Oystercatchers feed primarily on bivalves, which accumulate toxins and are susceptible to changes in sedimentation (Bretz *et al.* 2002, Andres 1999). Growing development along the coast can lead to increases in non-point source pollution and sedimentation rates in estuaries (Basnyat *et al.* 1999). Oil spills are another potential source of damage to shellfish beds as well as direct mortality of foraging birds (Andres 1996).

Global climate change and sea level rise

American Oystercatchers are an obligate coastal species, and use low-lying coastal habitats for nesting and roosting, and also as wintering areas. This makes them particularly vulnerable to effects of sea level rise. The Intergovernmental Panel on Climate Change predicts that global temperature will rise between 1.4 and 5.8°C (2.5 and 10.4°F) by 2100, a temperature increase that is likely without precedent in the last 10,000 years (IPCC 2001). As a result of thermal expansion of ocean water and increased melting of landfast ice, sea level is expected to rise between 0.09 and 0.88 meters (0.3 to 2.9 feet) by 2100. In addition, global climate change is expected to include increased severity of coastal storms (IPCC 2001), which can both damage habitat and destroy nests. These factors can be expected to affect oystercatcher habitat, but the specific impacts are difficult to predict accurately without detailed study. Overwash is known to destroy nests when storms occur during the nesting season, and can also destroy beach habitat. Storms can also have the effect of building barrier island or beach habitat, or removing vegetation that made it unsuitable for nesting, so the overall effects are difficult to predict. Detailed study of projected sea level rise and storm surge, compared to elevations at important breeding and wintering areas, is an important area of future research. In addition, effects of sea level rise on availability of food sources are unknown, but potentially serious, since oystercatchers depend on foraging for shellfish and other marine organisms, often at low tide, and the ability of these organisms to adjust rapidly to rising sea levels is unknown.

CONSERVATION STRATEGIES AND ACTIONS

Desired Condition: Population Goal

We do not have adequate information about the former population status of American Oystercatchers on which to base rigorous population goals. However, it is clear that the population declined dramatically in historical times. In addition, the current population is isolated on a small ribbon of habitat along the coast which is highly vulnerable to development and loss from sea level rise. Therefore it is prudent to set a goal of increasing the current population size to offset expected future decreases from habitat loss. We recommend that the

population be stabilized and then gradually increased from its current level to at least 1.5 times its current size.

Conservation and Management Actions

Given limited resources, conservation strategies must focus on actions that will have the maximum positive effect on population growth and sustainability. Although we have identified many of the threats to the population, current information is insufficient to predict how oystercatcher populations will respond to changes in levels of each of these threats. To understand the functional response to specific changes, it is necessary to understand the population dynamics of the American Oystercatcher. Much of the basic demography of American Oystercatchers is still unknown. While nesting success has been monitored at a number of sites, survival, transition, and dispersal rates are still unknown. Some potential conservation actions and basic research needs have been identified by members of the American Oystercatcher Working Group and are outlined below.

While considerable research remains to be done to effectively steer conservation of American Oystercatchers, some general recommendations have emerged from research and monitoring of oystercatchers on the Atlantic coast. At present, it would be premature to attempt a complete list a set of actions that would result in recovery and stability of oystercatcher populations. Thus, the following should not be taken as the solution to concerns about American Oystercatcher populations, but as a first or intermediate step in their conservation, subject to ongoing evaluation and refinement as new information becomes available.

1) Identify and protect emerging habitats.

An important and increasingly threatened habitat type is emerging sandbars and sand-spits. Sandbars may be an excellent habitat type because they are often close to feeding areas and have fewer ground predators than the adjacent mainland or large islands. Rapidly increasing recreational use of coastal islands has resulted in ever increasing pressure on this habitat type (B. Winn pers. comm.). Recreational boaters are a source of disturbance for birds nesting on these small islands. Little Egg Island Bar in the Altamaha Delta in Georgia is an example of a site that was heavily disturbed by boaters before being acquired by the Georgia DNR (B. Winn, pers. comm.). These islands should be closed to the public during the breeding season, and careful monitoring and enforcement should lead to significantly increased use by beach nesting birds. Under current state regulations it is unclear how much protection can be afforded to this type of emerging habitat (B. Winn, pers comm.), so acquisition and management of these habitats may be an important part of oystercatcher conservation.

Shell rakes should also be managed for oystercatchers. The majority of shell rakes are located on state-owned land and managed by agencies like the Virginia Marine Resources Commission (VMRC). VMRC's management plan for these lands addresses restrictions to protect nesting birds but also recognizes that conflict between public use and nesting birds is not currently an issue. In reality, there is little on the ground management of these lands aside from bird counts and productivity monitoring in particular areas (A. Wilke, pers comm.), so disturbance should be measured and managed as much as possible wherever shell rakes are used by oystercatchers.

2) *Identify and protect key existing habitat areas.*

Several key breeding and wintering locations currently lack protection. Site specific information is mapped and listed under [Important Breeding and Wintering Sites](#) below. Sites that have significant numbers of wintering birds but are currently unprotected, include Folly Island South Carolina (195 birds), the Intracoastal Waterway near Hilton Head South Carolina (145 birds), and the Intracoastal Waterway near Amelia Island in Florida (200 birds).

3) *Manage existing protected areas to reduce disturbance.*

Although much of the remaining habitat for American Oystercatchers is on public land or is managed by private conservation organizations, birds at these sites are still under pressure from predators and disturbance (Schulte unpublished data, Wilke *et al.* 2005, Sabine 2005). Eliminating or reducing human disturbance at breeding sites can be difficult and controversial, but may be important in ensuring local persistence of the species through higher fledging rates and increased density of nesting pairs. More study is needed to fully document the impact of disturbance at breeding and wintering sites. Land managers with the ability to carry out predator control and to limit human disturbance should implement programs for both issues whenever feasible.

4) *Control populations of nest predators.*

Nest predators, especially meso-carnivores like Red and Gray foxes, Raccoons, and feral cats, are the primary source of nest failure at many sites. These predators thrive in the presence of humans and can quickly learn to hunt shorebird eggs and chicks. Trapping and other removal methods have been effective at improving nesting success in the short term at some sites (Simons *et al.* 2005). One long term study is underway in Virginia and preliminary results show large increases in nest- and chick-survival in predator control areas (A. Wilke, pers. comm.). A consistent policy of control of non-native and artificially abundant predators could have significant positive effects on oystercatcher breeding success.

5) *Create and maintain new habitat.*

If oystercatcher populations are limited by nesting sites, creating new nesting habitat may allow young birds to acquire territories sooner and contribute more offspring over the course of their lifetime. Oystercatchers readily use dredge spoil islands for nesting and roosting. Design and placement of new islands may be crucial. In some areas the U.S. Army Corp. of Engineers is working with state agencies and private organizations to build and maintain dredge spoil islands that will support colonial nesting birds (McGowan *et al.* 2005, S. Cameron, pers. comm.). These islands seem to benefit oystercatchers because their basic habitat requirements are similar, but placement of the island in relation to oystercatcher foraging areas and gull colonies may be important to maximizing productivity. Pairs raising chicks on islands close to foraging habitat and away from nest predators may be more successful (MacGowan *et al.* 2005). Opportunities to use dredge spoil for oystercatcher habitat creation should be pursued by state and federal agencies.

6) *Outreach campaign.*

Outreach and education are critical to the long-term health of the population of oystercatchers because so many different recreational groups use the same habitats where oystercatchers nest, roost, and feed. The primary targets of educational outreach efforts aimed at reducing human

disturbance should be marinas, beachgoers, and other segments of the recreating public that use beachfront habitats.

7) Monitor current populations to measure success of management efforts.

Monitoring of American Oystercatcher populations is currently fragmented and carried out piecemeal by partners, generally without dedicated funding to ensure ongoing efforts. The effectiveness of management efforts cannot be measured without dedicated funding to determine population status and trend.

Implementation of these conservation measures for American Oystercatchers will provide benefits for the entire barrier island/salt marsh community. There is a large ecological overlap with other species in these habitats, including Piping Plovers (*Charadrius melodus*), Wilson's Plovers (*Charadrius wilsonia*), and many colonial nesting terns. These species will benefit from conservation actions taken at wintering, migration, and breeding sites. Partnering with efforts to conserve these species will help maximize the overall effect of conservation actions in the coastal zone.

Current Conservation Activities for American Oystercatcher

Partner	Site Name	Predator Control	Monitoring	Human Disturbance Management	Nest Success Study	Land Acquisition	Other
Monomoy Island National Wildlife Refuge	Monomoy NWR	X*	X	X*	X		
Massachusetts Division of Fish and Wildlife	Coastal beaches, islands, and salt marshes		X	X			
Manomet Inc.	Coast-wide monitoring, species conservation planning		X				X
Connecticut Department of Natural Resources	Beaches and islands		X*	X*			
Rutgers, The State University of New Jersey	NJ barrier beaches, saltmarshes and inlet/dredge-spoil islands		X		X		X
New York Department of Natural Resources	Long Island Sound		X*	X*			
The Nature Conservancy in Virginia	Eastern Shore	X	X	X	X	X	X
Virginia Department of Game and Inland Fisheries	Seaside marshes and coastal plains	X	X		X	X	X
	Barrier islands	X	X	X	X		X
North Carolina State University, Shiloh Schulte	Cape Hatteras and Cape Lookout National Seashores		X	X	X		
North Carolina Wildlife Resources Commission	NC Coast		X	X			
	Oregon Inlet and Bogue Sound				X*		
	Cumberland Island, Camden Co., GA		X	X		X	X
	south end roost (incidental)						
South Carolina Department of Natural Resources	Cape Romain Region		X		X		X
	Cape Romain NWR			X			
	State managed seabird islands			X			
	Dewees Island			X			
Florida Fish and Wildlife Conservation Commission	Coastal sites		X	X	X		
Doris and Patrick Leary	North Florida wintering sites: NE Atlantic Coast and Upper Gulf Coast, S. Amelia River shell rake roost, Sawpit creek shell rake roost, Horseshoe Beach, Shired Island, Shell Mound, ICW, St. Johns County and Cedar Key		X	X		X	X
	Cumberland Island, GA						

* Incidental activities for AMOY as a result of conservation work (Colonial Waterbird Survey, Piping Plover and tern management).

Proposed Conservation Activities for American Oystercatcher

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	10 Year Total
Conservation Actions for Breeding Habitat											
A. Identify and protect new habitat	95,000	95,000	95,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	320,000
B. Identify and protect existng habitat	40,000	40,000	40,000								120,000
C. Manage protected areas to reduce predation on nests and chicks	263,333	263,333	263,333	145,000	145,000	145,000	145,000	145,000	145,000	145,000	1,804,999
D. Manage protected areas to reduce human disturbance	117,000	117,000	117,000	77,000	77,000	77,000	77,000	77,000	77,000	77,000	890,000
E. Create and maintain new habitat (dredge spoil)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	100,000
F. Outreach	63,500	53,500	10,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	162,000
Conservation Actions for Non-breeding Habitat											
A. Identify and protect key areas	626,000	51,000	51,000	1,000	1,000						730,000
B. Identify and protect shell rakes/monitor disturbance	51,000	51,000	51,000	21,000	21,000	20,000	20,000				235,000
C. Manage existing protected areas to reduce human disturbance	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	275,000
D. Outreach	10,000										10,000
Address Critical Knowledge Gaps											
A. Reduce critical knowledge gaps regarding demographics and limiting factors	391,666	386,666	266,666	186,000	146,000	70,000	70,000	70,000	70,000	70,000	1,726,998
B. Determine and monitor population size and trend	245,000	213,000	196,000	196,000	196,000	195,000	195,000	195,000	195,000	195,000	2,021,000
C. Combine genetics/stable isotope study to determine connectivity and movements between populations	15,000	15,000	15,000	15,000							60,000
D. Foraging studies	50,000	50,000	50,000	10,000	10,000	10,000					180,000
E. Breeding status and biology of AMOY on Chesapeake Bay	40,000	40,000									80,000
F. Egg/chick rearing program	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	100,000
G. Initiate long-term breeding banding program	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	300,000
H. Disturbance study	50,000	50,000	50,000	50,000	50,000						250,000
I. Nest success in alternate habitat study	35,000	35,000	35,000	35,000	35,000						175,000
K. Coordinator to implement management and monitoring efforts coastwide.	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	800,000
Totals	2,249,999	1,617,999	1,397,499	903,500	848,500	684,500	674,500	654,500	654,500	654,500	10,339,997

Note: Appendix 3 details the new projects identified by the working group and state partners.

Research Questions with Management Implications

There are important gaps in our understanding of what limits the population of American Oystercatchers, which must be addressed before populations can be effectively managed. These questions include:

- 1) What are the recruitment and stage-specific (adult, sub-adult, juvenile) survival rates of oystercatchers? What are the most important factors affecting recruitment and stage-specific survival?
- 2) What is the overall population growth rate? Do growth rates vary among local and regional sites? Do certain demographic rates have significant impact on population growth?
- 3) Are oystercatchers shifting to alternate nesting habitats in response to habitat loss and disturbance? Do fecundity, recruitment, and survival rates of oystercatchers using beach habitat on barrier islands differ from those of oystercatchers using alternate habitat?
- 4) Do patterns of dispersal of juvenile and subadult oystercatchers affect recruitment rates? Are there differences between the sexes in site selection, dispersal distance, and rates of return to breeding sites?
- 5) What factors influence site selection, movement, and local and regional distribution during the non-breeding season?
- 6) What is the effect of human disturbance on chick growth and fledging success?
- 7) What is the effect of human disturbance on winter roost site use? Are local overwintering populations limited by lack of available roost sites in high disturbance areas?
- 8) What food resources are used in each season across the range of the species? What resources are critical for survival and reproductive success? Are foraging areas affected by non-point source runoff and other contaminants, and will they be adversely affected by sea level rise? Which sites are at the greatest risk?
- 9) Do contaminants affect survival and reproduction of oystercatchers?
- 10) How will nesting, roosting, and wintering habitats be affected by projected increases in sea level and storm activity due to global climate change?

Monitoring Program Needs

There is currently no overall monitoring program to address changes in population size of American Oystercatchers. An initial effort showed that a combination of ground counts and aerial counts can effectively measure the population of oystercatchers on winter roost sites (Brown et al. 2005). This monitoring effort should be repeated every 5-10 years to determine changes in population size, and could profitably be combined with surveys for other conspicuous shoreline birds like Black Skimmers. In addition, the breeding and wintering survey monitoring carried out by each state should be continued, or expanded where necessary, to provide an ongoing measure of the size of each breeding population and the health of each wintering area.

EVALUATION

Evaluating the success of conservation actions is a difficult proposition given the current lack of critical information on American Oystercatcher population trend, and the reproductive rate needed to ensure stable populations. The South Atlantic Migratory Bird Initiative plan sets population targets to maintain or increase populations of high priority species based on current estimates of population levels (Watson and McWilliams 2004). This approach is intuitively appealing, but it relies on two key assumptions. The first is that current estimates of breeding populations are close to the true values. Even with high confidence in the accuracy of the population estimates, they only apply for the area sampled. In Virginia, the state population estimate nearly doubled when marsh habitats were included in the survey (Wilke *et al.* 2005). The second assumption is that we know what population level is necessary to ensure persistence. This implies knowledge of the carrying capacity of the available habitat, and the population structure and demography of the species. This information is critical to understanding population trajectory and evaluating the success of conservation actions, and should be the focus of ongoing research projects.

Although there is much we still need to learn about oystercatcher ecology and population dynamics, if we wait to take action until all the questions are answered, conservation of the species may become unattainable. At the same time, acting without sufficient knowledge may result in expenditures of effort and money for relatively little conservation gain. Therefore, it is vital for conservation and management actions to have defined, measurable objectives and to be implemented in an hypothesis-driven, adaptive framework that allows for iterative evaluation and adjustment. As specific research questions are addressed, the results will help steer land and resource managers toward the most effective strategies for conservation.

Agencies and organizations that manage oystercatcher habitat should set an objective of maintaining or increasing current oystercatcher populations on their managed lands. The specific management goals will vary by site, but should include maintaining an annual fecundity equal to or exceeding the critical level identified through demographic modeling. Hypotheses about the effects of specific management actions on fledging rates should be generated and management actions implemented in such a way as to permit the testing of additional hypotheses. This adaptive approach is an iterative process through which conservation and management actions are constantly evaluated and adjusted to more efficiently address explicit objectives. This process should be used to quantify the effects of habitat creation or restoration, predator trapping, beach closures, and other actions.

Individual conservation projects should also be evaluated with respect to more limited and short term goals. For example, when projects aim to reduce predation through predator control, rates of nest success should be monitored both before and after treatments are applied. When creation of new habitat is the goal, then both numbers of nesting birds and nesting success should be monitored, and compared to reference habitats of similar types. These individual projects should then be evaluated in the larger context of adaptive management described above.

IMPORTANT BREEDING AND WINTERING SITES





IMPORTANT SITE LISTS BY STATE:**Massachusetts***Monomoy Island National Wildlife Refuge and South Beach, Chatham:*

Breeding: 30 – 35 pairs (Monomoy), 7-10 pairs (South Beach).

Non-Breeding: Up to 215 birds use this site in the fall as a pre-migration staging area, making this site one of the largest staging areas in the Northeast.

Location Description: Monomoy NWR and South Beach are in Chatham, MA at the elbow of Cape Cod. South Beach is an accreting spit of barrier beach that extends southward from Chatham. The islands of Monomoy NWR are separated by a strip of intertidal channels and mudflats. The primary roosts at this site are on the West side of South Beach and the North end of North Monomoy Island.

Ownership and Conservation Status: South Beach is part of Cape Cod National Seashore, but is managed cooperatively with the Town of Chatham. Monomoy is owned and managed by the USFWS. Monomoy NWR is a designated wilderness area and is a regionally important site in the Western Hemisphere Shorebird Reserve Network. Increased public use of the site, especially on South Beach, may impact nesting success and value as a roost site.

Nantucket Harbor and Great Point, Nantucket

Breeding: ~ 40 pairs.

Non-breeding: Staging flock of 15-20 birds

Location Description: The strip of barrier beach and salt marsh extending from Great Point, to Nantucket Harbor supports one of the highest densities of nesting oystercatchers in the Northeast.

Ownership and Conservation Status: The USFWS owns Great Point; the majority of this site is owned by the Nantucket Trustees of Reservation and the Nantucket Conservation Foundation.

New York*Jones Beach State Park*

Breeding: unknown

Non-breeding: ~200

Location Description: Jones Beach State Park is located in the SW corner of Long Island. The west end of the park is more remote and is used by oystercatchers primarily in the fall as a pre-migration roosting and feeding area.

Ownership and Conservation Status: The park is owned by the State of New York and managed by the New York State Office of Parks, Recreation and Historic Preservation.

Fire Island National Seashore

Breeding: unknown

Non-breeding: unknown

Location Description: Fire Island National Seashore consists of 26 miles of barrier island and salt marsh off the south shore of Long Island, NY. This site is used by oystercatchers primarily as breeding habitat.

Ownership and Conservation Status: The site is owned and managed by the National Park Service. Increased recreational use of the seashore may impact numbers of nesting pairs and nesting success at this site.

New Jersey

Great Bay Boulevard Wildlife Management Area (WMA)

Breeding: present, but numbers unknown

Non-breeding: 250

Location Description: Located near Tuckerton, NJ, this 3,965 acre WMA is composed primarily of salt marsh habitat. The site supports one of the largest wintering populations of oystercatchers in the state.

Ownership and Conservation Status: Great Bay Boulevard WMA is owned by the State of New Jersey and Managed by the NJ division of Fish and Wildlife.

North Brigantine Natural Area

Breeding: Present, but unknown numbers

Non-breeding: 140

Location Description: On the North end of Brigantine Island, two miles of barrier beach/dune/salt marsh are conserved as the North Brigantine Natural Area. The North end of the Natural Area is used as a winter roost site.

Ownership and Conservation Status: Owned by the State of New Jersey and managed by the NJ division of Parks and Forestry. Threats include heavy summer and fall recreational use, and mammalian and avian nest predation.

Absecon inlet - city of Brigantine, NJ

Breeding: unknown

Non-breeding: 225 (11/25/2002)

Location description: The primary roost site is a small inlet beach at the edge of a marsh on the Southwest end of Brigantine Island. Feeding areas are extensive marshes in the sound behind Brigantine Island.

Ownership and conservation Status: The roost site beach is owned by the City of Brigantine and is open for public access. This site is designated a B2 natural heritage priority site (very high biodiversity significance) by the New Jersey Natural Heritage Program. The majority of the marshes used for feeding are owned by the state of New Jersey. Potential threats at this site include disturbance by humans and dogs accessing the site from the city of Brigantine, and the potential for developing or altering the adjacent privately owned land.

Seaview Harbor Marina Beach – Longport, and Great Egg Harbor Inlet

Breeding: 17 in 2006 (Tom Virzi pers. comm., 1 Seaview Harbor, 16 Great Egg Harbor Inlet)

Non-breeding: 100

Location Description: This site is a small beach located just inside Great Egg Harbor Inlet. The beach is used strictly for winter roosting as heavy summer recreational use precludes nesting.

Ownership and Conservation Status: The beach is privately owned by Seaview Harbor Marina. There is potential for development or alteration of the beach, as well as increased winter use by humans.

Stone Harbor Point, including Nummy Island and Champagne Island

Breeding: 38 pairs in 2006 (Tom Virzi pers. comm., 19 at Stone Harbor Point, 11 Nummy Island, and 8 Champagne Island).

Non-breeding: 254

Location Description: Stone Harbor point is an undeveloped spit of barrier island extending southward from the town of Stone Harbor. Nummy Island is an adjacent marsh island composed of approximately 350 acres of saltmarsh, sandflats, and sandbars.

Ownership and Conservation Status: Stone Harbor point is owned by the town of Stone Harbor and is maintained as a public beach. Beach nesting birds on the point are monitored by NJ Audubon. Nummy Island is part of the township of Lower.

Island Beach State Park and adjacent Sedge Island Marine Conservation Zone

Breeding: 41 pairs

Location Description: Includes barrier beach, saltmarsh, and dredge spoil habitats. Most breeding Oystercatchers used saltmarsh or dredge spoil habitats for nesting.

Ownership and Conservation Status: Island Beach is a State Park located south of Seaside Park, New Jersey. Island Beach State Park is one the last remaining undeveloped barrier beaches in the State. The NJ Division of Parks and Forestry manages the ten-mile long coastal dune system. Recreational use is high, especially during the summer months. A major threat to beach-nesting birds is the allowance of off-road vehicles in the southern natural area of the Park.

Adjacent to the southern natural area of Island Beach State Park is the Sedge Island Marine Conservation Zone. This area was established to protect the expanse of saltmarsh adjacent to the

Park in Barnegat Bay on the north side of Barnegat Inlet. The Conservation Zone is managed by the NJ Division of Fish and Wildlife. Like Island Beach, threats include a high level of recreational use during the summer months.

Edwin B. Forsythe National Wildlife Refuge, Holgate Division and adjacent saltmarsh
Breeding: 77 pairs in 2006 (Tom Virzi, pers. comm.)

Location Description: The Refuge includes barrier beach and saltmarsh habitats located around Little Egg Inlet. The Holgate Division is located at the southern tip of Long Beach Island, on the north side of Little Egg Inlet. It is 2.5 miles long, and consists of more than 400 acres of barrier beach, dunes, and tidal saltmarsh. This area is one of the last remaining undeveloped barrier beaches in the State. The part of the Refuge located on the south side of Little Egg Inlet is the only isolated, undeveloped barrier island in New Jersey – Little Beach.

Ownership and Conservation Status: Part of the National Wildlife Refuge system. Oystercatchers breed on the barrier beaches at Holgate and Little Beach, and throughout the saltmarsh islands adjacent to both barrier islands. Access to Little Beach is restricted; there is no bridge joining this island with the mainland or adjacent islands and landing boats is prohibited. The Holgate Division is open to recreational use during winter months, including the use of off-road vehicles. However, this area is closed to all access during the breeding season. The major threat to beach-nesting birds in the Holgate Division is the high density of mammalian predators on Long Beach Island, which provides a constant source of recruitment despite predator control efforts.

Virginia

Eastern Shore of Virginia

Breeding: ~ 525 pairs

Non-breeding: ~1800

Location description: The barrier island and intra-coastal salt marsh system of Virginia's Eastern Shore is the longest stretch of undeveloped coastline on the Eastern Seaboard. This region has traditionally been the heart of the breeding range of the American Oystercatcher, and supports the second largest wintering population in the country.

Ownership and Conservation Status: This region was considered one "super site" because virtually all of the contiguous habitat is owned and managed by Non-governmental organizations and state or federal agencies, and is managed for the benefit of wildlife. Seven of Virginia's 14 barrier islands are wholly owned and managed by The Nature Conservancy Virginia Coast Reserve. Three islands are owned by the USFWS and are managed by Chincoteague and Fisherman Island National Wildlife Refuges. Wallops Island is owned by NASA but its wildlife resources are managed by Chincoteague NWR. Wreck Island is owned and managed by the Virginia Department of Conservation and Recreation Natural Heritage Program. Portions of the remaining two islands are owned by TNC and USFWS, with only a few private inholdings on one of the two. Future development on any of the islands is unlikely because of ownership status

and/or regulatory constraints. The vast majority of the salt marsh islands of the lagoon system west of the barrier islands is owned by the Commonwealth of Virginia and managed by the Virginia Marine Resources Commission.

The barrier island chain has been recognized as a Site of International Importance within the Western Hemisphere Shorebird Reserve Network and the Virginia Coast Reserve has been designated as a Man and the Biosphere Reserve by the United Nations Educational, Scientific, and Cultural Organization.

Management needs and threats to the site: Avian and mammalian predators pose the most immediate threat to breeding populations and to a lesser extent, wintering birds. A longer term threat to this area is development pressure on the mainland portion of Virginia's eastern shore. The human population is growing on the Eastern Shore and an increased human presence has considerable potential to affect the Oystercatcher population throughout this region. Management agencies are stepping up education and outreach actions and posting of breeding sites in order to mitigate any increases in visitor use on the islands. Loss of marsh habitat due to sea level rise is a threat to birds breeding and wintering in the lagoon system. Loss and/or change of habitat on the barrier islands due to habitat dynamics is a less understood phenomenon and may or may not be a threat to breeding birds.

Bay – Western Shore

Breeding: 21 pairs

Non-breeding: unknown; likely less than 100

Location Description: This area is characterized by privately owned shorelines with sandy beaches and adjacent marshes. Many of the beaches are used heavily for recreation and have been modified by development and erosion control structures. Suitable habitat for nesting and wintering oystercatchers is sparsely distributed.

Ownership and Conservation Status: Much of the area is in private ownership.

Bay – Accomack Shore

Breeding: 42 pairs

Non-breeding: unknown; likely less than 100

Location Description: This area is characterized by high and low marsh habitat with marsh islands and edges fringed with sandy beaches.

Ownership and Conservation Status: The Chesapeake Bay shorelines and islands of Accomack County are owned by a mixture of NGO, state and federal agencies but much of the area is in private ownership and affords no protection to nesting birds.

Management needs and threats to the site: Very little is known about the breeding biology of oystercatchers in this area. Initial studies are needed to determine site specific productivity levels and factors affecting reproductive success. Aerial flights over the area during the early winter have not identified any wintering flocks of oystercatchers in this area. However, additional surveys are needed later in the season to confirm the presence or absence of winter roosts.

North Carolina

Cape Hatteras National Seashore

Breeding: ~ 30 pair

Non-breeding: 20-30

Location Description: Cape Hatteras National Seashore spans 72 miles of the Outer Banks of North Carolina which define the scope of Albemarle and Pamlico Sounds. The Seashore includes Bodie, Hatteras, and Ocracoke islands and is characterized by wide, accreting barrier beaches backed by interdunal scrub and narrow strips of salt marsh on the sound side. State Route 12 runs the length of the Seashore.

Ownership and Conservation Status: The Seashore is owned and managed by the National Park Service. Management concerns at this site include increased recreational use of the seashore and nest predation by introduced mammalian predators.

Cape Lookout National Seashore

Breeding: ~ 60 pair

Non-breeding: 60-100

Location Description: Directly south of Cape Hatteras National Seashore, Cape Lookout National Seashore includes 56 miles of contiguous, undeveloped barrier islands. These islands are the most remote on the coast of North Carolina. Cape Lookout is primarily a breeding site. In the fall a flock of about 60 birds forms at the north end of the Park. By the end of November most of these birds have migrated south or moved into the nearby Back Bay marsh system.

Ownership and Conservation Status: This site is owned and managed by the National Park Service. Management concerns at this site include increased recreational use of the seashore and nest predation by introduced mammalian predators.

Back Bay

Breeding: Present, numbers unknown.

Non-breeding: 250

Location Description: Back Bay is bounded on the south and east by Cape Lookout National Seashore and on the north and west by Rachel Carson NERR and Morehead City. Back Bay is shallow and contains salt marsh and oyster beds. This bay is an important Oystercatcher wintering site in North Carolina with 200-250 birds using the area. Primary roost sites in the bay include Horse Island, Bottle Run Point, and Phillips Island.

Ownership and Conservation Status: Horse Island and adjacent marsh habitat are part of the Rachel Carson National Estuarine Research Reserve. Coastal reserves in North Carolina are managed by the Division of Coastal Management. Bottle Run Point is owned by the National Park Service. Phillip's Island is privately owned. The Beaufort/Morehead City area is one of the state's fastest growing regions. Back Bay sees heavy boat traffic and visitor use on the islands in

the summer months. During the winter the area is relatively free of disturbance. Phillips Island is the only unprotected roost site within the complex.

Lower Cape Fear River

Breeding: 40-55 pairs

Non-breeding: 200-300

Location Description: The lower Cape Fear River contains significant wintering and breeding habitat for American Oystercatchers. Foraging habitat includes sand flats, mud flats and marshes south from "The Basin" to Cape Fear Point including dredge spoil islands in the river. The site is located on the eastern bank of the lower Cape Fear River, south of Wilmington and east of Southport. It includes an area from "The Basin" south to Cape Fear Point, including open water, sand flats, mud flats, marshes east of the main river channel, and adjacent waters of the Cape Fear River. Thousands of shorebirds (19 species) stop over during migration and winter in the area, utilizing the extensive tidal flats, marshes, and beach. Oystercatchers nest on dredge spoil islands near the mouth of the river, including Battery Island, Pelican Island, and Ferry Slip Island. Major roost sites include Battery Island and an old seawall adjacent to the Fort Fisher ferry terminal. At very high tides as many as 250 Oystercatchers roost on this seawall.

Ownership and Conservation Status: Approximately 10,000 acres are conserved as part of the NC State Park system and NC Division of Coastal Management. This includes all marshes, Zeke's Island, Bluff Island and portions of Bald Head Island. The majority of Bald Head and Middle Island are privately owned. The dredge spoil islands in the river are owned and managed by NJ Audubon. Human activity, introduced predators, and loss of habitat on dredge spoil islands through successional change are significant concerns at this site.

South Carolina

Cape Romain National Wildlife Refuge

Breeding: 225 pairs

Non-breeding: 1800-1900

Location Description: Cape Romain NWR encompasses nearly 65,000 acres of coastal creeks, bays, salt marsh, and barrier islands. This refuge is the heart of the winter range of the American Oystercatcher, supporting almost 20% of the total population. Most of these birds roost in large flocks on shell rakes along the Intracoastal Waterway.

Ownership and Conservation Status: The Refuge is owned by the USFWS. The Intracoastal Waterway and adjacent shell rakes are managed by the US Army Corp of Engineers.

Folly Island

Breeding: unknown

Non-breeding: 195

Location Description: Folly Island is a small barrier island located about 15 miles southeast of Charleston, SC. The primary roost site is a pair of long docks on a tidal creek adjacent to an extensive salt marsh. The north end of the island is undeveloped and is used as a feeding area by shorebirds.

Ownership and Conservation Status: Most of the island is privately owned and developed as a residential community. The west end of the island is a county park. Continued development and increased human presence could threaten the value of this site as a winter roost and feeding area.

North Edisto River

Breeding:

Non-breeding: 237

Location Description: Roosts at this site are on a series of shell rakes along the lower part of the North Edisto River. These shell rakes are backed by extensive salt marsh and mudflats.

Ownership and Conservation Status: Shell rakes and marshes along the North Edisto River are State owned.

Trenchard's Inlet

Breeding: unknown

Non-breeding: ~ 650

Location Description: This major roost site is on a remote shell rake behind Fripp Island.

Ownership and Conservation Status: The shell rake and surrounding salt marsh are owned by the State of South Carolina.

Beaufort River Islands

Breeding: unknown

Non-breeding: 137

Location Description: Several marsh islands in the Beaufort river are used by wintering oystercatchers for feeding and roosting. The islands are directly adjacent to the city of Beaufort.

Ownership and Conservation Status: Unknown

Intracoastal Waterway near Hilton Head

Breeding: unknown

Non-breeding: 145

Location Description: The Intracoastal Waterway passes along the West side of Hilton Head Island. Wintering Oystercatchers use this area for feeding and roosting. Primary roost sites are shell rakes at the mouth of the May River on Barataria Island.

Ownership and Conservation Status: The shell rakes along the ICW are owned by the US Army Corp of Engineers. Barataria Island is privately owned.

Georgia

A recent estimate placed the state breeding population of American oystercatchers at 100 pairs (Winn 2000). Oystercatchers nest on all of Georgia's barrier beaches except on St Simon's, Jekyll, and Tybee islands. Development and recreational use of these islands precludes breeding for any beach nesting species (Winn, pers. comm.).

Little Tybee Island

Breeding: unknown

Non-breeding: 150

Location Description: Important feeding and roosting areas include sandflats at the mouth of Little Tybee Creek along the southeast end, and shell rakes along the Bull River on the west side of the island. At least 150 Oystercatchers overwinter at this site.

Ownership and Conservation Status: Little Tybee Island is owned and managed by the Georgia Department of Natural Resources.

Doboy Sound

Breeding: ~ 10 pairs

Wintering: 170

Location Description: Doboy sound is located to the west of Sapelo Island and north of Wolf Island. Backed by large expanses of intertidal marsh, the long shell rakes bordering this sound provide important roosting sites for migrating and wintering Oystercatchers. The same rakes are used for nesting during the breeding season.

Ownership and Conservation status: The marshes and shell rakes are owned by the State of Georgia and protected by state law.

Altamaha Delta

Breeding: present, numbers unknown

Non-breeding: 450

Location Description: The Altamaha Delta is the single most important site for migrating and wintering shorebirds in Georgia. High counts of 450 oystercatchers have been recorded during September and October migration. Interpretation of sightings of color-banded oystercatchers suggests that individuals are moving through during fall migration, with numbers stabilizing around 200-250 for the winter. Given the turnover rate it is reasonable to think that at least 10% of the oystercatchers in North America use this site every year. Important roost sites in the delta include the south end of Wolf Island, Little Egg Island, Little Egg Island Bar, and the north end of Little St. Simons Island. Extensive marshes, sandflats and oyster beds throughout the delta are used for feeding.

Ownership and Conservation Status: Most of the Altamaha Delta is conserved. The marshes and shell rakes are owned by the State of Georgia and protected by state law. Wolf Island is part of Wolf Island NWR, while Little Egg Island and Little Egg Island Bar are owned and managed by the Georgia DNR. Only the north end of Little St. Simons Island is privately owned.

Cumberland River, St. Andrew's Sound

Breeding: Unknown

Non-breeding: 110

Location Description: A group of shell rakes at the confluence of the Cumberland River and St. Andrew's sound are used as a winter roost site.

Ownership and Conservation Status: The marshes and shell rakes along the Cumberland River and St. Andrew's sound are owned by the State of Georgia.

Florida

Intracoastal Waterway near Amelia Island

Breeding: unknown

Non-breeding: ~200

Location Description: Shell rakes along the Intracoastal Waterway behind Amelia Island are used as a roost site for the largest wintering flock of Oystercatchers in northeast Florida.

Ownership and Conservation Status: The Intracoastal Waterway and adjacent shell rakes are managed by the US Army Corp of Engineers. This site may be threatened by encroaching residential development on nearby private land.

10,000 Islands region, Everglades National Park

Breeding

Non-breeding: 150

Location Description: Although the 10,000 islands are primarily mangrove, along the outer edge lie a few small keys with sandspits and beaches. These small islands are used as winter roosting sites. In the winter about 150 Oystercatchers use the islands between Cape Romano and Gullivan key.

Ownership and Conservation Status: This site is within Everglades National Park.

Tampa and Hillsborough Bay

Breeding: 120 pair

Non-breeding: 250-300

Location Description: The Tampa Bay area is heavily developed. Most of the oystercatchers nesting in this area use dredge spoil islands or the few remaining protected beaches. This site is

clearly important to oystercatchers in Florida as it contains 1/3 of the known nesting population in the state. Wintering numbers are substantial as well. Again, the birds make use of protected land as virtually everything else is developed.

Ownership and Conservation Status: Alafia Bank and several major dredge spoil islands in Hillsborough Bay are managed by Audubon of Florida. Passage Key NWR and Egmont Key NWR are owned by the USFWS. Shell Key County Preserve, Honeymoon Island State Park, and Anclote Bar State Park are all publicly owned lands.

Cedar Keys

Breeding: Present, unknown numbers

Non-breeding: 300-500

Location Description: The Cedar Keys are a group of small islands on the NW coast of Florida. Cedar Keys National Wildlife Refuge surrounds the small town of Cedar Key. Abundant oyster beds and numerous small islands for roosting and nesting make this an important site for oystercatchers.

Ownership and Conservation Status: Most of the winter roost sites are within Cedar Keys NWR, although the birds make extensive use of habitat owned by the town of Cedar Key

Lower Suwannee River National Wildlife Refuge

Breeding: Present, numbers unknown.

Non-breeding: 280

Location Description: Several small islands along the remote coast of this NWR are used as winter roost sites. The extensive marshes and tidal flats of the refuge provide excellent foraging habit.

Ownership and Conservation Status: USFWS

Horseshoe Beach jetties

Breeding: unknown

Non-breeding: 160

Location Description: The small town of Horseshoe Beach is located in the big bend area of Florida's west coast. Two long rock jetties extend out into the gulf to create a boat channel. These jetties are used as a winter roost site.

Ownership and Conservation Status: Owned by the town of Horseshoe Beach.

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APPENDIX 1: CONSERVATION RANKINGS FOR AMERICAN OYSTERCATCHER

U.S. Shorebird Conservation Plan Status and Scores:

Population size estimate: 11,000; reliability of estimate-- good

Priority Score: 4 = High Priority

Population trend: 3 = Apparently stable or status unknown

Population Size: 5 = <25,000

Threats Breeding: 4 = Significant potential threats exist

Threats Non-breeding: 4 = Significant potential threats exist

Breeding Distribution: 3 = 5 – 9.9% of North America

Non-breeding Distribution: 4 = Local = 50,000 - 200,000 sq. mi., or ≤ 1,000 mi. of coast

Nature Serve Rank: G5: Secure, due to recent range expansion.

American Bird Conservancy Green List: Restricted distribution/low population

APPENDIX 2: STATUS OF AMERICAN OYSTERCATCHER

All thirteen states along the Atlantic Coast of the United States list American Oystercatcher as either officially threatened or endangered, or as a Species of Greatest Conservation Need in their state wildlife action plans.

The following states list the American Oystercatcher as a Species of Greatest Conservation Need:

Maine - Species of greatest conservation need, tier 1
Massachusetts - Species of greatest conservation need
Rhode Island - Species of greatest conservation need
Connecticut - Species of greatest conservation need
New York - Species of greatest conservation need
New Jersey - Species of greatest conservation need
Maryland - Species of greatest conservation need

States that have officially designated status for American Oystercatcher

Delaware - State endangered, tier 1
Virginia - Species of greatest conservation need, tier 2
South Carolina - Special concern, highest level
North Carolina – Significantly rare
Georgia - State listed Rare
Florida - Special concern

APPENDIX 3: PROPOSED CONSERVATION, MANAGEMENT, AND RESEARCH PROJECTS**Table 1.** Summary of Conservation Actions, Estimated Costs, Cooperating Partners, and Anticipated Outcomes

<u>Conservation Action</u>	<u>Estimated Cost</u>	<u>State/Cooperating Partners</u>	<u>Anticipated Outcomes</u>
<i>Conservation Actions for Breeding Habitat</i>			
A. Identify and protect emerging new habitats (sandbars and sand-spits).	\$5,000/ongoing	<i>Massachusetts</i> Monomoy Island NWR	Habitat Conservation: Identification of key areas of breeding habitat where protection and management activities can be directed.
	\$50,000/yr for 3 yrs	<i>Georgia</i> Georgia DNR	
	\$40,000/yr for 3 yrs	<i>Florida</i> FWC (potential partners include FL Cooperative Fish & Wildlife Research Unit)	
B. Identify and protect key existing habitat areas that are vulnerable (some identified under <u>Important Breeding and Wintering</u> sites)	\$40,000/yr for 3 yrs	<i>Florida</i> FWC (potential partners include FL Cooperative Fish & Wildlife Research Unit)	Habitat Conservation: Identification of key areas of breeding habitat where protection and management activities can be directed.
C. Manage existing protected areas to reduce predation on nests and chicks	\$10k/year for 5-10 years	<i>Massachusetts</i> MA Audubon	Increased Population: Reduce the rate of nest loss, thus increasing nest and chick survival rates.
	\$25,000/year -ongoing	<i>Massachusetts</i> Mass. Division of Fisheries and Wildlife, U.S. Dept. of Agriculture -Wildlife Services, and the towns of Chatham and Nantucket	
	\$3,000/year - ongoing	<i>Massachusetts</i> Monomoy Island NWR	
	\$107,000/year – ongoing	<i>Virginia</i> USDA/WS; USFWS; VDGIF; TNC	
	\$7,000/year - ongoing	<i>Virginia</i> USFWS (ESVNRW) (Seasonal predator management interns)	
	\$50K/yr for 3 years	<i>North Carolina</i> NCWRC	
	\$160,000 (total) for 3 year project	<i>Georgia</i> University of Georgia, National Park Service, Georgia DNR	
	\$15,000/yr ongoing	<i>Florida</i> FWC	

<u>Conservation Action</u>	<u>Estimated Cost</u>	<u>State/Cooperating Partners</u>	<u>Anticipated Outcomes</u>
D. Manage existing protected areas to reduce human disturbance	\$10k/year for 5-10 years	<i>Massachusetts</i> MA Audubon (see table for sites and partners)	Increased Population: Reduce the rate of disturbance of breeding habitat, thus increasing nest and chick survival rates.
	\$12,000/year - ongoing	<i>Massachusetts</i> Monomoy Island NWR	
	\$25,000/year - ongoing	<i>South Carolina</i> SC DNR and Clemson University	
	\$25,000/year - ongoing	<i>Georgia</i> University of Georgia, National Park Service, Georgia DNR	
	\$40,000/yr for 3 yrs for Conservation Biologist \$5,000/yr ongoing for sign posting/maintenance	<i>Florida</i> FWC and Audubon	
E. Create and maintain new habitat (dredge spoil opportunities)	\$10k/year for 5-10 years	<i>Massachusetts</i> MA Audubon (see table for sites and partners)	Increased Population: Increase amount of breeding habitat, thus increasing reproductive rates.
	\$1 million (money available through Corps funds)	<i>North Carolina</i> NCWRC, USACOE, NC Audubon, NCDOT	
	??	<i>Massachusetts</i> Monomoy Island NWR	
	Cost included in Conservation Biologist hire	<i>Florida</i> FWC and USACOE	
F. Outreach campaign about impacts of human activities on beach-nesting birds and dune ecosystems	\$5,000/year for 3 years	<i>Virginia</i> USFWS, VDGIF, TNC, VDCR, Center for Conservation Biology at the College of William and Mary, USDA/WS, Utah State University, VA Museum of Natural History, VACZMP	Increased Population: Reduce the rate of disturbance of breeding habitat, thus increasing nest and chick survival rates.
	\$5,000/year on going	<i>South Carolina</i> SC DNR	
	\$87,000 (total) for 2.5 year project	<i>Georgia</i> University of Georgia, National Park Service, Georgia DNR	

<u>Conservation Action</u>	<u>Estimated Cost</u>	<u>State/Cooperating Partners</u>	<u>Anticipated Outcomes</u>
	\$10,000 for 1 year	<i>Florida</i> FWC, Audubon, local marina associations, local touring companies, airboat associations, local fishing & kayak associations	
<i>Conservation Actions for Non-breeding Habitats</i>			
A. Identify and protect vulnerable key areas (some identified under <u>Important Breeding and Wintering</u> sites)	\$575K to purchase Phillips Island	<i>North Carolina</i> NCWRC, NC Audubon, NC Coastal Land Trust	Habitat Conservation: Identification of key areas of wintering habitat where protection and management activities can be directed and where currently absent.
	1K per yr. for 5 years	<i>Florida</i> Doris and Patrick Leary, Fernandina Beach, FL	
	\$50,000/yr for 3 yrs	<i>Florida</i> FWC (potential partners include FL Cooperative Fish & Wildlife Research Unit)	
B. Identify and manage shell rakes/monitor disturbance	\$30,000/yr for 3 years	<i>Georgia</i> Georgia DNR	Increased Population: Reduce the rate of loss of wintering habitat, resulting in improved annual survival rates and population trend.
	\$1,000 per yr. for 5 years	<i>Florida</i> Doris and Patrick Leary, Fernandina Beach, FL	
	Cost associated with the first 3 yrs is included above (\$50k), plus \$20,000/yr for 7 yrs	<i>Florida</i> FWC (potential partners include FL Cooperative Fish & Wildlife Research Unit)	
C. Manage existing protected areas to reduce human disturbance	\$2,500/yr ongoing	<i>Florida</i> FWC (potential partners include Audubon)	Increased Population: Reduce the rate of disturbance on wintering habitat, resulting in improved annual survival rates and population trend.
	\$25,000/year ongoing	<i>Georgia</i> Georgia DNR	
D. Outreach campaign to Marinas targeting recreational boaters and their impacts on populations and habitat	\$10,000 for 1 year	<i>Florida</i> FWC, Audubon, local marina associations, local touring companies, airboat associations, local fishing & kayak associations	Habitat Conservation: Develop broader public support for and participation in the protection and management of non-breeding habitat.
<i>Address critical knowledge gaps that limit effective management</i>			
A. Reduce critical knowledge gaps regarding demographics and limiting	\$20k/year for 5-10 years	<i>Massachusetts</i> MA Audubon	Improved Knowledge for Better Implementation: Improved understanding

<u>Conservation Action</u>	<u>Estimated Cost</u>	<u>State/Cooperating Partners</u>	<u>Anticipated Outcomes</u>
factors (see specific questions in plan).	\$5,000	<i>Massachusetts</i> Monomoy Island NWR	of limiting factors, and how to manage for them.
	\$50,000/ongoing	<i>New Jersey</i> Rutgers, The State University of New Jersey	
	\$50,000/year for 2 years	<i>Virginia</i> USFWS, TNC, VDGIF	
	\$45,000/year for 2 years	<i>South Carolina</i> SC DNR and Clemson University	
	\$30K/year for 3 years	<i>North Carolina</i> NCWRC	
	\$152,000 (total) for 3.5 year project	<i>Georgia</i> University of Georgia, National Park Service, Georgia DNR	
	\$75,000/year for 5 years for reproductive success study \$40,000/year for 4 years for beach nourishment and raking study \$25,000/year for 2 years for feasibility study on predator control	<i>Florida</i> FWC (potential partners include universities, USACOE)	
	1K per yr. for 5 years	<i>Florida</i> Doris and Patrick Leary, Fernandina Beach, FL	
B. Determine population trend and monitor population size and trend	\$20k/year for 10 years	<i>Massachusetts</i> MA Audubon	Assess effectiveness of management activities: Improved ability to implement adaptive management.
	\$100,000/year-ongoing	<i>Massachusetts</i> Mass. Division of Fisheries and Wildlife, The Trustees of Reservations, Nantucket Conservation Foundation, USFWS, MA Audubon Society, and Lloyd Center for Environmental Studies	
	\$12,000 per year for two years	<i>New Jersey</i> Rutgers, The State University of New Jersey	

<u>Conservation Action</u>	<u>Estimated Cost</u>	<u>State/Cooperating Partners</u>	<u>Anticipated Outcomes</u>
	\$20,000/year for one year (every 5 years – next survey scheduled for 2008)	<i>Virginia</i> VDGIF, TNC, USFWS, CCB	
	\$5,000/year for 2 years	<i>South Carolina</i> SC DNR and Clemson University	
	\$25,000/year for 10 years	<i>Georgia</i> University of Georgia, National Park Service, Georgia DNR	
	\$1,000 per yr. for 5 years	<i>Florida</i> Doris and Patrick Leary, Fernandina Beach, FL	
	\$50,000/yr for 20 yrs	<i>Florida</i> FWC, Audubon	
C. Combined genetics/stable isotope study to determine connectivity and movement between populations	\$15,000/year for 4 years	<i>North Carolina</i> North Carolina State University, National Park Service, National Science Foundation	Improved knowledge of population structure: Helps identify at risk populations and where to focus conservation resources.
D. Foraging studies during breeding and non-breeding seasons.	\$10,000/year for five years	<i>New Jersey</i> Rutgers, The State University of New Jersey	Improved Knowledge for Better Implementation: Determine critical foraging areas/habitats/prey species.
	\$40,000/year for 3 years	<i>Virginia</i> TNC, VDGIF, USFWS	
E. Breeding status and biology of AMOYs on Chesapeake Bay shorelines and islands	\$40,000/year for 2 years	<i>Virginia</i> VDGIF, TNC, USFWS, CCB	Collect baseline productivity data for AMOYs breeding in the Chesapeake Bay; identify factors limiting reproductive success.
G. Egg/chick rearing program	\$10,000/year on going	<i>South Carolina</i> SC DNR and Clemson University	Increased Population: Increase survival rates of abandoned eggs.
H. Initiate long-term breeding banding program	\$30,000/yr ongoing	<i>Florida</i> FWC, Audubon	Improved Knowledge for Better Implementation: Enhanced demographic information gained by long-term mark- resight studies.
I. Quantify disturbance through study incorporating measures of both human presence and resource distribution into population distribution analysis	\$50,000/yr for 5 yrs	FWC (potential partners include FL Cooperative Fish & Wildlife Research Unit and universities)	Improved Knowledge for Better Implementation: Identify critically important conservation issues, distinguish cases where human presence results in significant changes in habitat use.

<u>Conservation Action</u>	<u>Estimated Cost</u>	<u>State/Cooperating Partners</u>	<u>Anticipated Outcomes</u>
J. Comparing nest success in alternate habitats.	\$35,000/yr for 5 yrs	<i>New Jersey</i> Rutgers, The State University of New Jersey	Improved Knowledge for Better Implementation: Improved understanding of limiting factors, and how to manage for them.
K. Coordinator to implement management, monitoring, and limiting factor efforts coastwide.	\$80,000/year ongoing	<i>American Oystercatcher Working Group</i>	Effective Implementation: Coordination of plan partners, implementation of key management efforts, and coordination of coastwide limiting factor studies and monitoring projects.

¹ Cost estimates are rough approximations of funds necessary for carrying out conservation actions.