

**A Species Action Plan for Four
Imperiled Beach-Nesting Birds:**

American oystercatcher (*Haematopus palliatus*)

Snowy plover (*Charadrius nivosus*)

Least tern (*Sternula antillarum*)

Black skimmer (*Rynchops niger*)

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IMPERILED BEACH-NESTING BIRDS ACTION PLAN TEAM

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EXECUTIVE SUMMARY

The Florida Fish and Wildlife Conservation Commission (FWC) developed this plan in response to the determination that the following species be listed as Threatened on Florida's Endangered and Threatened Species List: American oystercatcher (*Haematopus palliatus*), snowy plover (*Charadrius nivosus*), least tern (*Sternula antillarum*), and black skimmer (*Rynchops niger*). These 4 species are collectively referred to in this plan as *imperiled beach-nesting birds* (IBNBs). Because of significant commonality in behavior, habitat, and threats to population stability, the combined management needs of these birds are addressed in this multi-species plan.

The goal of this plan is to improve the conservation status of these 4 species to a point that they can be removed from the Florida Endangered and Threatened Species List and will not again need to be listed. The plan's objectives are:

- I. Maintain minimum annual breeding populations sufficient to warrant removal from the list (as specified in the plan),
- II. Preserve and protect ground breeding sites and to manage sufficient habitat to accommodate population growth, and
- III. Determine the productivity rates needed to achieve population objectives, and maintain a minimum 5-year running average of those rates.

Beach habitat conservation efforts are uniquely challenging with the multitude of complex pressures facing Florida's beaches. Beaches are extremely dynamic systems, and factors (both natural and human-influenced) affecting the reproductive success of beach-nesting birds can change quickly. Physical beach characteristics, rates of erosion and accretion, types and abundance of predators, and storm-related events can affect breeding areas rapidly or over time. Impacts from intense recreational use, development and engineering projects, beach management practices (e.g., beach nourishment, mechanical raking), non-native vegetation, and increased presence of predators also affect beach habitat conditions. Additionally, sea level rise and the consequential [coastal squeeze](#) may further limit the amount of available habitat, and will likely exacerbate these threats in the future.

Conservation actions designed to address these threats are outlined in this plan. Actions include:

- Protecting, restoring, enhancing, and creating habitat;
- Providing guidance to land managers on beneficial management practices;
- Continuing and refining population monitoring;
- Conducting research to fill important data gaps;
- Designing rules and a permitting structure to support management actions;
- Developing an incidental take permitting system;
- Developing incentives for property owners to manage for IBNBs;
- Educating people who recreate, live, or work on beaches; and
- Working with other entities to implement protections or expand management options.

Successful conservation and management of beach-nesting birds through implementation of this plan requires the cooperation of Florida residents and visitors; local, state, and federal governmental agencies; non-governmental organizations; business interests; universities and researchers. Many of the actions proposed in this plan are dependent upon growing capacity

within the FWC and entities that manage IBNB sites, in addition to cooperation from partners and stakeholders. This plan proposes development of a comprehensive Shorebird Program in FWC.

This plan details the actions necessary to improve the conservation status of the imperiled beach-nesting birds. A summary of this plan will be included in the Imperiled Species Management Plan (ISMP), in satisfaction of the management plan requirements in Chapter 68A-27, Florida Administrative Code, Rules Relating to Endangered or Threatened Species. The ISMP will address comprehensive management needs for 60 of Florida's imperiled species and will include an implementation plan; rule recommendations; permitting standards and exempt activities; anticipated economic, ecological, and social impacts; projected costs of implementation and identification of funding sources; and a revision schedule. The imperiled species management planning process relies heavily on stakeholder input and partner support. This level of involvement and support is also critical to the successful implementation of the ISMP. Any significant changes to this plan will be made with the continued input of stakeholders.

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GLOSSARY OF TERMS AND ACRONYMS

ACP: Area Contingency Plan developed to address removal of oil and hazardous substances from waterways. The ACP geographically defines regional environmental and socio-economic resources that require priority protection.

Active Nest: A nest that is currently in use, as evidenced by an incubating adult, a clutch of eggs, or a brood of nestlings (chicks too young to leave the nest).

Area of Occupancy: The area within its extent of occurrence (see Extent of Occurrence), which is occupied by a taxon, excluding cases of vagrancy. This reflects the fact that a taxon will not usually occur throughout the area of its extent of occurrence, which may contain unsuitable or unoccupied habitats (as defined by the International Union for the Conservation of Nature [IUCN]).

Beach: The expanse of sand adjacent to or along the shoreline generally considered to extend landward from the mean low water line to the line of permanent vegetation or marked change in physiographic form.

Beach Raking: Mechanical grooming of sand and removal of manmade debris and natural wrack from sandy beach areas.

Bird Stewards: Volunteers trained to assist with the protection of the imperiled beach-nesting birds (IBNBs) at nesting sites by educating beach-goers and preventing disturbance to nesting birds. Bird stewards coordinate with natural resource managers and law enforcement, when necessary, to promote compliance with posted areas. They may also assist Florida Fish and Wildlife Conservation Commission (FWC) staff and natural resource managers with monitoring efforts and site-specific adaptive management strategies.

Breeding Season: The portion of the year in which breeding behavior occurs. Although variable, for Florida's beach-nesting birds, breeding generally begins in February (Gulf Coast) or March (Atlantic Coast) and extends through August, with peak nesting activity from May to July.

Breeding Site (Nest Site, Nesting Site): A beach segment, spoil island, shell rake (emergent bars consisting of oysters or other shells), rooftop, or other artificial or natural geographic body that currently or historically supports nesting and/or brood rearing by imperiled beach-nesting birds.

Brood: One or more young birds hatched and reared together, and dependent upon adults for feeding, sheltering, and/or safety.

Brood-Rearing Habitat: Areas that beach-nesting birds select for rearing their chicks. Brood-rearing locations may be as far as several miles from the nest location, and are generally

characterized by sparse vegetation or other cover to provide protection from weather and predators, and by abundant prey to meet the requirements of rapidly-growing young.

BSR: Biological status review report, the summary of the biological review group's findings. Includes an FWC staff recommendation on whether or not the species status meets the listing criteria in Rule 68A-27.001, Florida Administrative Code (F.A.C.). These criteria, based on International Union for Conservation of Nature (IUCN) criteria and IUCN guidelines, are used to help decide if a species should be added or removed from the Florida Endangered and Threatened Species List. In addition, FWC staff may provide within the report a biologically justified opinion that differs from the criteria-based finding.

CCCL: Coastal Construction Control Line

Chick: A young bird that is not yet flight-capable, and that depends on its parents for food, shelter and/or safety.

Clutch: A group of eggs produced by a female in a single breeding attempt.

Coastal Squeeze: A phenomenon that occurs when the landward migration of coastal habitats in response to sea level rise is blocked by manmade features, resulting in loss or degradation of those habitats.

Colony: A congregation of 1 or more pairs of breeding birds that nest and roost in close proximity at a particular location. Colonies can contain multiple species.

CWA: Critical Wildlife Area, an area designated in rule (Rule 68A-14, Florida Administrative Code [F.A.C.]) by the Florida Fish and Wildlife Conservation Commission (FWC). Such a designation requires landowner concurrence; it authorizes FWC to post all or a portion of the area closed to trespass by people, pets, vehicles, and/or vessels for the purpose of protecting congregations of wildlife from human disturbance; a legal description of the area and closure dates are included in the Establishment Order.

CWCI: Coastal Wildlife Conservation Initiative, an FWC-led effort to improve collaboration within and among partner agencies, local governments, conservation groups, businesses, and other stakeholders on a host of issues related to coastal wildlife. The structure of CWCI consists of regional working groups, which prioritize local focal issues, and the FWC's CWCI Planning and Policy Teams, which provide technical expertise and work to address issues of statewide scale.

DEP: Florida Department of Environmental Protection

Disturb: To agitate or bother a beach-nesting bird to the degree that it causes or is likely to cause, based on the best scientific information available, 1) injury to the bird; 2) a decrease in its productivity by substantially interfering with normal breeding, feeding or sheltering

behavior; or 3) nest or brood abandonment, by substantially interfering with breeding, feeding or sheltering behavior.

Dune: Accumulations of windblown sand on the backshore of the beach, usually in the form of small hills or ridges and marked by the presence of low-growing vegetation.

Extent of Occurrence: The geographic area encompassing all observations of individuals of a species, including intervening areas of unoccupied habitat. Synonymous with range. See also Area of Occupancy (as defined by IUCN).

F.A.C.: Florida Administrative Code. The Department of State's Administrative Code, Register and Laws Section is the filing point for rules promulgated by state regulatory agencies. Agency rulemaking is governed by Chapter 120, Florida Statutes, the Administrative Procedures Act. Rules are published in the Florida Administrative Code.

Forage: To search for, acquire, and ingest food.

FPS: Florida Park Service, operated under the Florida Department of Environmental Protection's Division of Recreation and Parks.

FSA: Florida Shorebird Alliance, a statewide partnership of government and non-government organizations committed to advancing shorebird and seabird conservation in Florida. The FSA coordinates partners to identify and address important needs with regard to research, management, education, outreach, and public policy.

FSD: Florida Shorebird Database, the statewide monitoring database for shorebirds and seabirds. A standard protocol is followed to collect and enter data online at www.FLShorebirdDatabase.org.

FWC: Florida Fish and Wildlife Conservation Commission, the state agency constitutionally mandated to protect and manage Florida's native fish and wildlife.

FWC Region: The 5 administrative regions of the Florida Fish and Wildlife Conservation Commission (Northwest, North-Central, Northeast, Southwest, South).

FWRI: Florida Fish and Wildlife Research Institute, the research branch of the FWC.

GIS: Geographic Information System

Habitat: The area used for any part of the life cycle of a species (including foraging, breeding, and sheltering).

Harass: An intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering.

Harm: An act that actually kills or injures fish or wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

IBNB: Imperiled Beach-Nesting Birds. For purposes of this plan, IBNBs include the American oystercatcher (*Haematopus palliatus*), snowy plover (*Charadrius nivosus*), least tern (*Sternula antillarum*), and black skimmer (*Rynchops niger*).

IBNB Region: Six biological regions established in this plan to delineate management objectives for each IBNB species.

INRMP: Integrated Natural Resources Management Plan, the mechanism by which military installations plan the management of natural resources on their properties.

ISMP: Imperiled Species Management Plan

ITP: Incidental Take Permit

IUCN: International Union for Conservation of Nature, a professional global conservation network.

LMR: Land Management Review

Local Government: Any public administrative office, agency, or governmental body of an area smaller than a state. Local government generally includes municipal (town, city), county, and regional agencies.

MBPP: Migratory Bird Protection Policy of the U.S. Army Corps of Engineers.

MBTA: Migratory Bird Treaty Act (16 U.S.C. 703–711), the federal statute that protects nearly all native birds, their eggs and nests. Specifically, the statute makes it unlawful to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird."

MOU: Memorandum of Understanding

Natal Colony: The colony (site) from which an individual bird hatched and fledged.

Nest: A structure or place chosen by birds in which to lay and incubate eggs. The nests of beach-nesting birds are typically shallow depressions, or scrapes, in the sand that may be lined with small shell fragments or other debris.

Nest Site (Nesting Site): See Breeding Site.

NGO: Non-Governmental Organization

Population: The total number of individuals of the taxon. Population numbers are expressed as numbers of mature individuals only (as defined by IUCN).

Posted Area: An area posted by the staff or authorized agents of FWC or the managing entity for the purpose of protecting beach-nesting birds.

Posting: Placement of informational signs and posts to delineate buffer areas around 1 or more nests of beach-nesting birds or other critical habitat. Posting may include cord, twine, or rope strung between posts to form a symbolic fence. While not providing any significant physical barrier to entry, posting around nests delineates areas where people and/or pets should not enter. Areas are posted to prevent disturbance to eggs, young, or adults, and to provide an area where adults and/or chicks can rest, forage, and seek shelter from human disturbance.

Precocial (precocial young): Young that hatch from the egg covered in down and with well-developed legs. Soon after hatching they are able to feed themselves, but still require substantial parental care.

Predation (depredation, predated): To be killed or destroyed by a predator.

Productivity Rate: The number of chicks fledged divided by the number of breeding pairs (# fledglings/# breeding pairs).

Reproductive Success: The number of fledglings produced annually by 1 breeding pair.

Roosting Site: An area where seabirds and/or shorebirds gather on the beach to rest.

Scrape: A shallow, inconspicuous depression in the sand created by a breeding pair of birds during courtship and in preparation of egg-laying.

SNPLWG: Snowy Plover Working Group

Subpopulation: Geographically or otherwise distinct groups in the population between which there is little exchange, as defined by IUCN.

Successful Nest: A nest that has produced at least 1 fledgling during a single breeding season.

Symbolic Fencing: See Posting.

Take: As defined in 68A-27.001(4), F.A.C. "To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in such conduct." The term "harm" in the definition of take means an act that actually kills or injures fish or wildlife. Such act may

GLOSSARY OF TERMS AND ACRONYMS

include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. The term "harass" in the definition of take means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns that include, but are not limited to, breeding, feeding, or sheltering.

USACE: United States Army Corps of Engineers

USCG: United States Coast Guard

USFWS: United States Fish and Wildlife Service, the federal agency mandated to protect and manage the nation's native freshwater fish and wildlife resources.

Vehicle: Any device in, upon, or by which any person or property may be transported or drawn, including automobiles, trucks, motorcycles, tractors, trailers, buses, motor homes, golf carts, all-terrain vehicles, Segways, or campers, whether motor-drawn or not. This definition does not include non-motorized bicycles.

Wrack (Wrack line, beach wrack): Lines or clumps of organic material deposited on the beach along the edge of the tide line, generally consists of sea grasses, shells, macroalgae, and other marine debris.

INTRODUCTION

The Florida Fish and Wildlife Conservation Commission (FWC) developed this plan in response to the determination that the American oystercatcher (*Haematopus palliatus*), snowy plover (*Charadrius nivosus*), least tern (*Sternula antillarum*), and black skimmer (*Rynchops niger*) – collectively referred to in this plan as *imperiled beach-nesting birds* (IBNBs) – be recommended for listing as Threatened on the Florida Endangered and Threatened Species List.

Because of significant commonality in behavior, habitat, and threats to population stability, the combined management needs of these birds are addressed in this multi-species plan. Florida is also home to other species of beach-nesting birds that face similar threats (see [Appendix 1](#)). When implemented, many actions outlined in this plan are likely to benefit those species and other coastal wildlife.

Biological Background

Habitat

In Florida, IBNBs are primarily found along sandy beaches, inlets, and estuaries. Least terns and black skimmers are also found in interior portions of Florida, particularly around freshwater lakes and manmade bodies of water. Breeding habitat includes sparsely vegetated beaches, spoil islands (especially for the American oystercatcher), and gravel rooftops (American oystercatcher, least tern, and black skimmer). American oystercatchers' foraging habitats include sandy beach shorelines, estuaries, lagoons, impoundments, mollusk beds, shell rakes, and other tidal areas. Snowy plovers forage in a variety of coastal habitats including washovers; mudflats; sandflats; wrack lines; sparsely vegetated dunes; and shorelines of coastal ponds, lagoons, and salt marshes. Least terns and black skimmers forage in shallow waters immediately offshore and within estuaries, lagoons, and impoundments; they will also forage in bodies of fresh water.

The wrack line is an important habitat component for IBNBs at various life stages. Coastal vegetation such as sea oats (*Uniola paniculata*), railroad vine (*Ipomoea pescaprae*), and other native beach grasses (e.g., *Panicum amarum*) also provides important foraging and sheltering areas for IBNB chicks.

Food

American oystercatchers primarily eat bivalve mollusks. Oystercatchers use their long bill to pry open or perforate the shells of their prey. Fish, crustaceans, and marine worms are also important food sources. Snowy plovers are visual predators and feed predominantly on terrestrial and aquatic invertebrates, including insects, spiders, crustaceans, mollusks, and their eggs. Least terns and black skimmers primarily eat small fish but may occasionally feed on crustaceans. Least terns plunge dive for their prey after spotting them from the air. Black skimmers fly just above the water's surface, dragging the lower bill through the water; the upper bill reflexively closes when prey is encountered.

Breeding Behavior

Breeding season for beach-nesting birds (IBNBs and others) is generally March to August, although snowy plovers may begin to breed in February and chicks of several species may still be present into September. Beach-nesting birds typically nest on open or sparsely vegetated beaches, laying a clutch of eggs in a shallow scrape in the sand, shells, or within a vegetation clump. However, some beach-nesting birds are increasingly nesting at other sites, perhaps in response to alteration of their natural

habitat. IBNB nests have been documented on sand mines, phosphate mines (temporary mining spoil sites), restoration sites, construction sites, causeways, and dredge spoil islands—the latter being a particularly important habitat for American oystercatchers. American oystercatchers, black skimmers, and least terns also nest on flat, gravel rooftops (Zambrano and Smith 2003, Gore et al. 2007). Least terns are particularly dependent on this manmade habitat. Recently, least terns were recorded nesting on 2 non-gravel rooftops as well (Warraich et al. 2012). Development, vegetation succession, and human recreational activities in coastal areas are all likely reasons why least terns are increasingly nesting in alternative locations such as rooftops, agricultural fields, parking lots, and bare lands associated with airports and mines (Thompson et al. 1997, Gore et al. 2007, Zambrano and Warraich 2012).

American oystercatchers in Florida nest in shallow scrapes in sand, shell, gravel, or low vegetative substrate. Nests are near the water, but typically further from the shoreline than those of other beach-nesting birds. In addition to natural beaches, American oystercatchers nest on spoil islands, and occasionally on rooftops and shell rakes. Typical clutch size is 3 eggs, which hatch after 27 days. Breeding occurs from March to August and pairs may re-nest if the initial clutch is lost. Adults tend to the chicks until they fledge, usually around 35 days. While some young forage independently for small invertebrates, they are still largely dependent on adults for food after they fledge. Nest-site fidelity is relatively high for American oystercatchers in Florida, and it is common for a pair to nest at the same location where they nested during the previous breeding season. However, persistent disturbance may cause them to abandon nest sites or move to less favorable habitats (e.g., areas with higher predator densities). While American oystercatchers are territorial solitary nesters, territories may be closely packed in desirable habitat.

In Florida, the snowy plover breeds only on the Gulf Coast. Breeding occurs on barrier islands and coastal beaches and nests are located on open, dry sand, generally near the dune line, with access to the interdunal areas and within sight of the Gulf. Average clutch size is 3 eggs. Snowy plovers will lay multiple nests and rear multiple broods throughout the season, following successful or failed nesting attempts (Page et al. 2009, Pruner 2010, Pruner et al. 2011). Typically, after a successful hatch, females abandon the brood and locate a new mate (Warriner et al. 1986, Paton 1995, Fraga and Amat 1996, Pruner 2010). Males will locate a new mate after the young successfully fledge, or if a brood is lost (Page et al. 2009, Pruner 2010). Snowy plover chicks are precocial and leave the vicinity of the nest soon after hatching. The young forage for insects and other invertebrates, and consume invertebrate prey provided by parents. Parents guide young chicks to foraging areas, often covering distances up to several km (Pruner and Johnson 2010). Flightless snowy plover chicks are extremely vulnerable to predators. Cryptic coloration and sentinel parents help protect them until they fledge, at approximately 4 weeks of age (Page et al. 2009). Although snowy plover chicks are very mobile shortly after hatching, they require frequent brooding by their parents until they are able to regulate and maintain their own body temperature (Nichelmann and Tzchentke 2002).

Least terns deposit their eggs in shallow depressions or scrapes in the substrate, possibly lined with pebbles, grasses, or coquina shells. Egg-laying usually begins in late April or early May. The clutch ranges from 1 to 3 eggs and incubation is typically 19 to 25 days (Thompson et al. 1997). Least terns nest in colonies ranging in size from a few breeding pairs to many hundreds (Gore 1996), and may often be found nesting with other seabirds such as black skimmers (*Rynchops niger*) or roseate terns (*Sterna dougallii*) (Gore et al. 2007, Zambrano and Warraich 2012). Nesting adults may defensively

dive at and defecate on humans and other intruders in their nesting territory (Thompson et al. 1997). Least tern chicks are solely dependent upon their parents for provision of food (fish).

Black skimmers nest in colonies ranging in size from a few to several hundred pairs. As with least terns, colonies may form in conjunction with other nesting seabirds. Breeding behavior generally starts in May, when skimmers gather in potential nesting habitat and both sexes begin digging shallow scrapes in the sand. Skimmer colonies are notoriously unsettled at this stage and the colony may move several times before egg-laying is initiated. Egg-laying begins 7 to 10 days after the nest is scraped. Eggs are laid at 1- to 2-day intervals and clutches consist of 3 to 4 eggs. Incubation, lasting from 21 to 25 days, begins when the first egg is laid, so hatching is asynchronous. Both sexes incubate the eggs. Brooding begins as soon as the chicks hatch, and the young are brooded continuously during the first week by both parents. Like least terns, black skimmer chicks depend on their parents to provide them with food.

Distribution

Florida's black skimmers, snowy plovers, and American oystercatchers include resident breeding populations as well as individuals that migrate to the state during the winter. Least terns are strictly migratory, arriving in Florida during the spring for summer breeding.

American oystercatchers breed along the east coast of Florida south to Palm Beach County and on the Gulf Coast from Lee County to Dixie County and from Jefferson County to Bay County (Douglass and Clayton 2004, Florida Shorebird Database [FSD] 2012, Zambrano and Warraich 2012) ([Figure 1](#)). Their range extends north to Maine and west to the Baja California peninsula, but is restricted to coastal areas (Nol and Humphrey 2012).

The snowy plover's breeding range in Florida is restricted to barrier islands and coastal beaches on the Gulf Coast (Himes et al. 2006, FSD 2012) ([Figure 2](#)) from Perdido Key (Escambia County) to Marco Island (Collier County). Snowy plovers do not breed in the Big Bend area, and most breeding pairs occur in the Panhandle (Florida Fish and Wildlife Conservation Commission [FWC] 2003, Himes et al. 2006). Florida's snowy plovers are partially migratory (Himes et al. 2006). In general, the winter distribution overlaps the breeding distribution in Florida, extending along the Gulf Coast from the Panhandle to southwest Florida, except in the Big Bend area.

Least terns breed in most coastal counties in Florida as well as in some interior counties (Stevenson and Anderson 1994, Gore et al. 2007, FSD 2012, Zambrano and Warraich 2012) ([Figure 3](#)). Least terns winter in Central and South America, moving north to breeding grounds during the summer months (Stevenson and Anderson 1994).

Black skimmers historically nested along much of Florida's coastline north of Charlotte Harbor on the Gulf Coast and north of Brevard County on the Atlantic Coast. However, nesting along the entire east coast of Florida is now rare, and occurs with limited reproductive success (Stevenson and Anderson 1994, Gore et al. 2007, FSD 2012, Zambrano and Warraich 2012). Black skimmers now nest as far south as Collier County on the Gulf Coast ([Figure 4](#)).

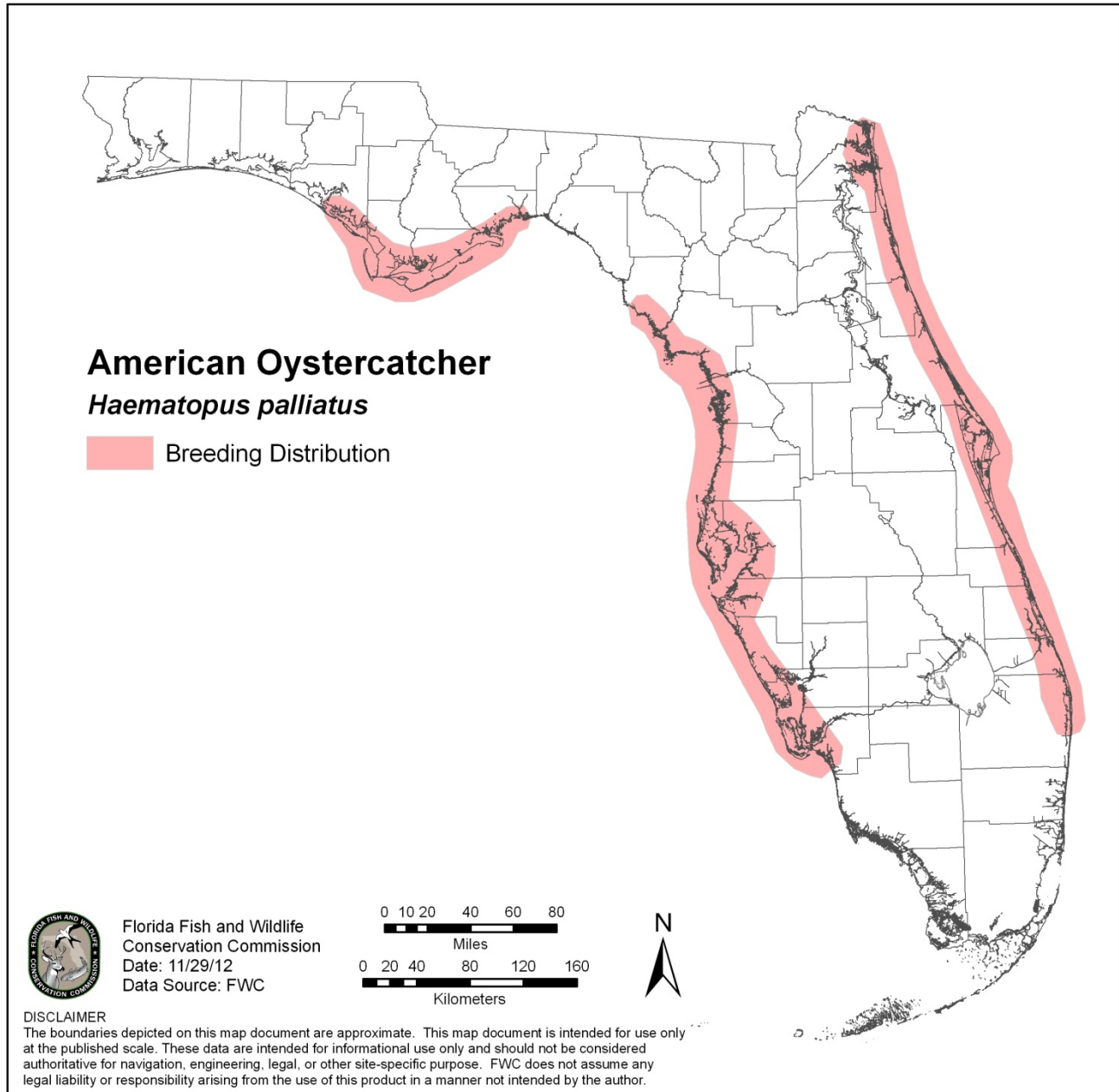


Figure 1. American oystercatcher breeding distribution in Florida.

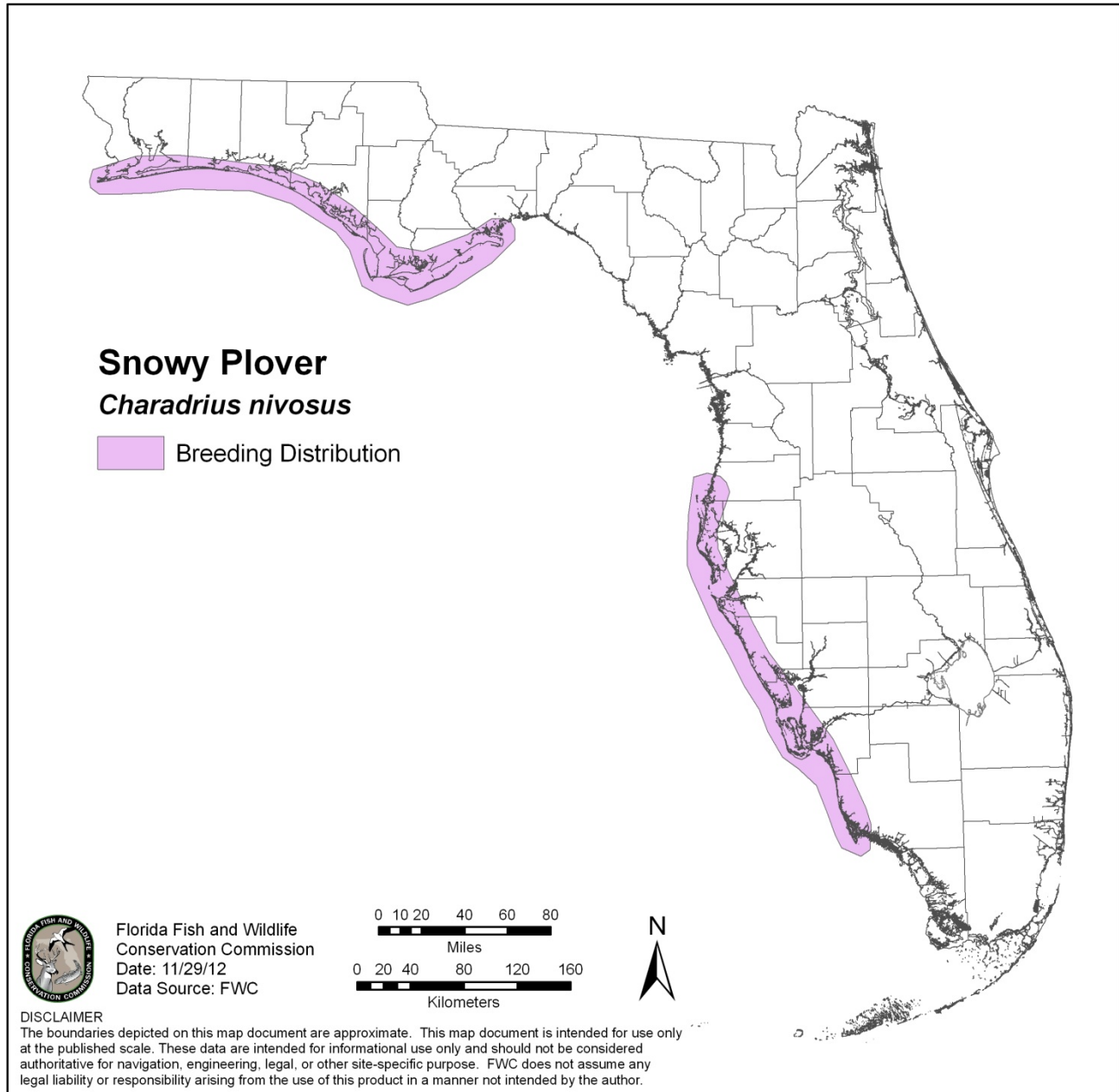


Figure 2. Snowy plover breeding distribution in Florida.

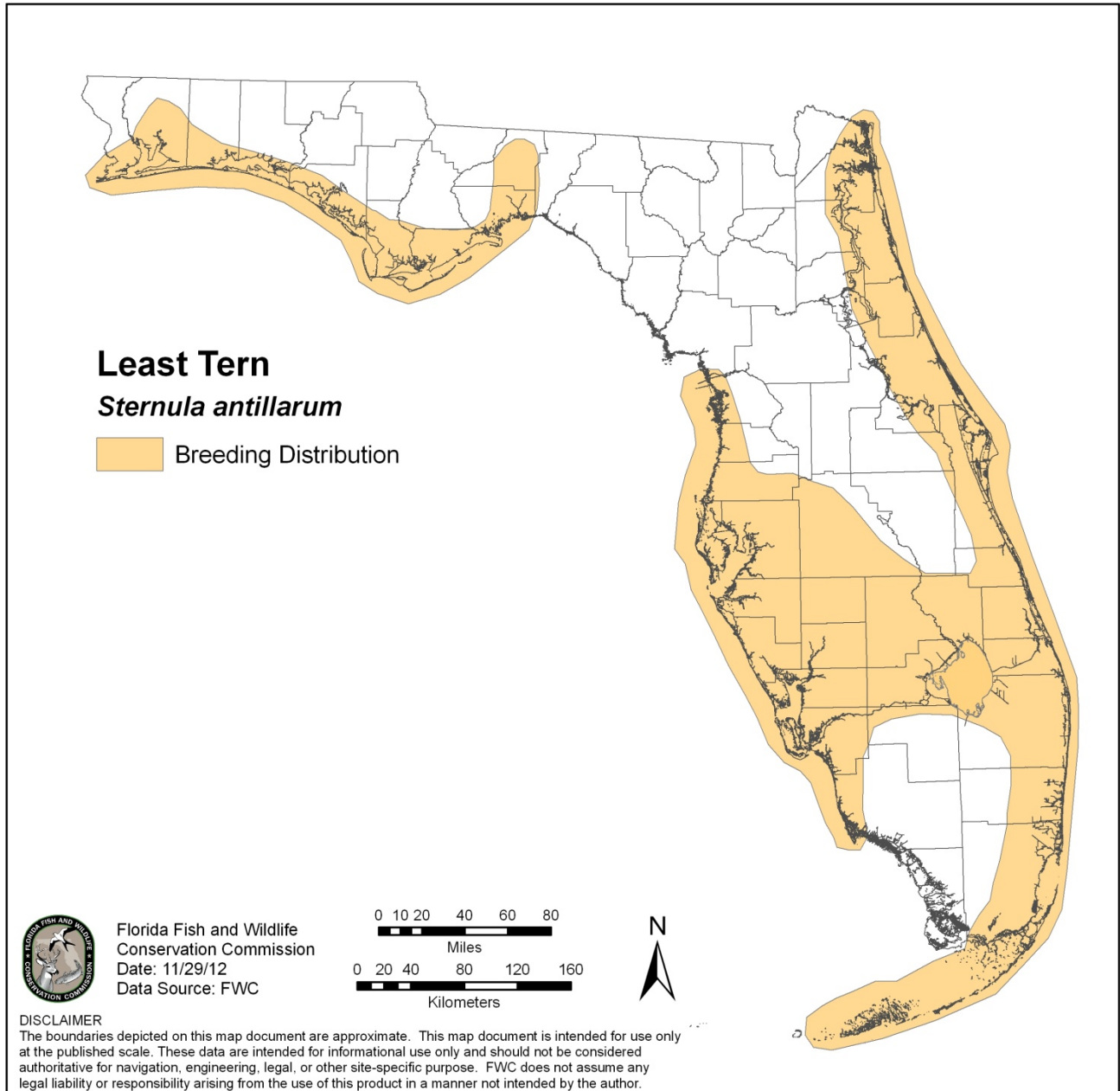


Figure 3. Least tern breeding distribution in Florida.



Figure 4. Black skimmer breeding distribution in Florida.

Conservation History

Seabirds and shorebirds were among the many species exploited for the millinery (hat) trade in the late 19th and early 20th centuries. In 1918, the establishment of the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712) provided measures to prohibit the take of non-game birds (including their nests and eggs) native to North America, effectively ending the commercial harvest of seabirds and shorebirds within the United States. However, least terns winter outside the United States in Central and South America, where they are not afforded protection under the MBTA.

In 1975, the Florida Game and Fresh Water Fish Commission (predecessor to the FWC) listed the least tern and American oystercatcher as Threatened and the snowy plover as Endangered. In 1979, FWC reclassified the American oystercatcher as a Species of Special Concern and in 1984 reclassified the snowy plover as Threatened. In 1994, the black skimmer was listed as a Species of Special Concern.

Between 1977 and 1993, the FWC established 12 Critical Wildlife Areas (CWAs) around the state that included IBNB nesting habitat. CWA designation allows FWC staff to close these areas to trespassing. Most CWA establishment orders specified closure dates of 1 April to 31 August to protect nesting seabirds. By the mid-1990s, local efforts to post other important beach-nesting bird sites began increasing, generally as collaborations between resource professionals, land managers, and concerned citizens. These collaborations also resulted in increased protections on some public lands, largely due to citizen advocacy.

By 2002, informal partnerships between resource managers, government agencies, non-governmental organizations (NGOs), and concerned citizens began developing regionally. The Suncoast Shorebird Partnership met formally for the first time in 2002. The St. Johns Shorebird Partnership and the Panhandle Shorebird Working Group were organized in 2006. [Bird steward](#) programs became a key function of regional partnerships. In 2005, FWC launched the web-based Beach-Nesting Bird Database. Between 2005 and 2008, contributors entered over 5,400 observations (Burney 2009).

With funding from the State Wildlife Grants program, FWC hired a statewide Shorebird Partnership Coordinator in 2007. This position allowed FWC to cultivate additional regional partnerships to improve conservation through cooperative efforts between key agencies, organizations, and individuals involved with the management, monitoring, and stewardship of shorebirds and seabirds. A statewide partnership network, the Florida Shorebird Alliance (FSA), was created. As of 2013, 12 active regional partnerships coordinate monitoring and protection across Florida. The FSA maintains an email distribution list of approximately 1,200 contacts.

The Snowy Plover Working Group (SNPLWG) was formed in 2007 (Lott and Fischer 2011). This group continues to meet regularly to collaborate on snowy plover and other shorebird conservation efforts in Florida. Partners from across the state also participate in various other shorebird conservation groups, including the American Oystercatcher Working Group and the Spoil Island Working Group.

In 2011, the FWC launched a statewide monitoring protocol and replaced the Beach-Nesting Bird Database with the Florida Shorebird Database (FSD). FWC continues to work with partners to refine and improve the database and monitoring protocol and to encourage expansion of monitoring efforts. Between 2011 and 2012, partners entered over 11,800 records into the FSD.

Threats and Recommended Listing Status

Threats

IBNB populations are declining due to significant habitat modification, disturbance by humans, severe weather events, and elevated predation levels. Coastal habitats critical to IBNBs have been significantly impacted by development, coastal engineering (dune, inlet, and shoreline stabilization), non-native vegetation, human activities such as beach driving, recreational activity and mechanical raking, and increased presence of domestic and non-native animals. The scale of threats to Florida's coastal ecosystems will increase as the number of people living in coastal counties increases (predicted to double from 12.3 million to more than 26 million by 2060; FWC 2008a) and the impacts of climate change intensify (e.g., sea level rise, stronger weather events, disruption of weather and ocean patterns). Natural sources of habitat loss (e.g., erosion, vegetation succession), sea level rise, and the consequential [coastal squeeze](#) will further limit the amount of available habitat and will likely exacerbate these threats in the future.

Historically large black skimmer and least tern colonies in Florida have fragmented into smaller colonies, likely in response to habitat degradation. Colonies characterized by less-dense or low numbers of nesting pairs may be slower to initiate breeding, have lower average clutch sizes, and respond less quickly to threats (e.g., predators) or changes in conditions (Coulson 2002). Therefore, the loss of larger, high-density colonies of black skimmers and least terns in Florida is of concern.

Beach-nesting birds view people and pets as threats to their nests and young, and will react defensively. Disturbances that cause adult birds to flush (take flight) or leave their nests threaten the survival of their young. When adult birds are actively defending a nest, their eggs and chicks are vulnerable to the sun, wind, and rain. In fact, nestlings have died from sun exposure in as few as 25 minutes (Gochfeld and Burger 1994). Defensive actions by nesting adults may also attract the attention of opportunistic predators. Repeated disturbance of foraging or resting birds may also impact their survival, hindering their ability to maintain fat storage necessary for migration and reproduction.

In addition to indirect mortality of shorebirds due to human disturbance, some activities cause direct mortality. Beach driving, for example, can crush eggs and flightless young outside of posted areas and, in some cases, kill adults (A. Kropp, FWC, personal communication). Peak recreational pressure on holidays (e.g., Memorial Day and Independence Day) leads to increased risk of disturbance, accidental trampling, or predation. Mechanical beach raking, a relatively common practice on some beaches, may prevent birds from nesting and result in direct take of IBNB nests (E. Forys, Eckerd College, personal communication).

Predation is a significant threat to IBNB populations. Raccoons (*Procyon lotor*), coyotes (*Canis latrans*), crows (*Corvus* spp.), laughing gulls (*Larus atricilla*), cats, opossums (*Didelphis virginiana*), feral hogs (*Sus scrofa*), and rats (*Rattus* spp.) are known predators of IBNB eggs and chicks, and their populations have responded positively to increased human presence and development (Engeman et al. 2010, Pruner et al. 2011). Predation from growing colonies of gulls may also threaten IBNBs (O'Connell and Beck 2003, Hunter et al. 2006). Additionally, ghost crabs (*Ocypode quadrata*), herons, owls, raptors, and non-native species such as fire ants (*Solenopsis invicta*) and monitor lizards (*Varanus niloticus*) are emerging as potential, though poorly understood, threats.

Recommended Listing Status

In 2010, the FWC directed staff to evaluate the status of all species listed as Threatened or Species of Special Concern that had not undergone a status review in the past decade. To address this charge, staff conducted a literature review and solicited information from the public on the status of each IBNB. The FWC convened a biological review group (BRG) of experts on the IBNBs to assess the biological status of these species by using criteria specified in Rule 68A-27.001, Florida Administrative Code (F.A.C.). This rule includes a requirement for BRGs to follow the Guidelines for Application of the International Union for Conservation of Nature (IUCN) Red List Criteria at Regional Levels (Version 3.0) and Guidelines for Using the IUCN Red List Categories and Criteria (Version 8.1). FWC staff developed initial drafts of a Biological Status Review report (BSR) for each species, which included the BRG's findings and a preliminary listing recommendation from staff. The drafts were peer-reviewed, and the reviewers' input was incorporated into the final [BSR Reports](#).

All 4 IBNBs met criteria sufficient to be listed as Threatened on the Florida Endangered and Threatened Species List. See the [BSR Reports](#) for additional details.

American oystercatcher.—Met the following criteria for listing as Threatened:

- Criterion C Population Size and Trend. The current population is estimated at fewer than 500 breeding adults, based on known statewide productivity rates and an assumption of 85% annual survival of breeding adults, and a continued decline is projected.
- Criterion D Population Very Small or Restricted. Population is estimated at fewer than 500 breeding adults.

Snowy plover.—Met the following criteria for listing as Threatened:

- Criterion B, Geographic Range. The extent of occurrence is less than 20,000 km² (7,722 mi²) and the area of occupancy is less than 2,000 km² (772 mi²). Snowy plovers occur in less than 10 locations, and the quality of their habitat is continuing to decline due to increased recreational pressures and associated management practices.
- Criterion C, Population Size and Trend. The current population is estimated to consist of at least 444 breeding adults, and all mature individuals are in 1 subpopulation. Based on estimates of statewide productivity rates, a continued decline is projected.
- Criterion D, Population Very Small or Restricted. The current population is estimated to be approximately 444 breeding adults.

Least tern.—Met the following criteria for listing as Threatened:

- Criterion A, Population Size Reduction. Rooftops represent nesting substrate for 80% of the breeding population, and there has been an estimated 70% decline in the number of nesting individuals on rooftops and a 23% decline in the number of occupied rooftops over 10 years. There has also been a documented population decline over the previous 10 years.
- Criterion B, Geographic Range. The area of occupancy is less than 2,000 km² (772 mi²). The area, extent, and quality of habitat has been observed to decline and is projected to continue to do so. Decline in breeding locations is projected to continue. The number of mature individuals has also declined.
- Criterion E, Quantitative Analysis. A Vortex model using published survival rates and current productivity rates from several regions indicates a 100% chance of extinction in 100 years if current productivity rates continue.

Black skimmer.—Met the following criteria for listing as Threatened:

- Criterion A, Population Size Reduction. A population size reduction of 30% is projected over the next 10 years and over 3 generations based on extremely low productivity rates, the ongoing observed declines documented in the Tampa Bay area and northeast Florida; and competition with and predation by crows and increased populations of gulls.
- Criterion B, Geographic Range. The extent of occurrence is less than 20,000 km² (7,722 mi²), and the number of locations is fewer than 10. A continuing decline of habitat quality is projected, and productivity appears to be below rates required for stability, inferring a future decline in number of mature individuals.
- Criterion C, Population Size and Trend. The population estimate is 3,672 breeding adults. A continuing decline is projected based on productivity rates, documented declines, and anticipated competition and predation. All skimmers in Florida are part of a single subpopulation.

CONSERVATION GOALS AND OBJECTIVES

Goal

Improve conservation status of the American oystercatcher, snowy plover, least tern, and black skimmer to a point that these species can be removed from the Florida Endangered and Threatened Species List and will not again need to be listed.

Objectives

The American oystercatcher, snowy plover, and black skimmer have both breeding and wintering populations in Florida. Objectives focus on protecting and monitoring nesting sites, where IBNBs are particularly susceptible to direct harm and disturbance. Monitoring is crucial for measuring the effectiveness of conservation efforts and progress toward achieving the plan objectives. It is more difficult to quantify the benefits of protecting wintering habitat to these species, however, year-round protection will contribute to improved conservation throughout these species' ranges. Consequently, there are multiple references to protecting wintering and migrating birds throughout the plan.

I. Maintain a minimum statewide annual breeding population of:

- 500 pairs of American oystercatchers
- 500 pairs of snowy plovers
- 13,000 pairs of least terns
- 4,000 pairs of black skimmers

These population levels are referred to as *target populations* and include pairs nesting on the ground, rooftops, and other sites.

Rationale

American oystercatcher.—Maintaining a minimum of 500 breeding pairs would remove this population from the definition of a “very small or restricted” population under the IUCN criteria used to determine status. Douglass and Clayton (2004) documented 391 probable breeding pairs during a 2001 statewide survey. A 2010 survey estimated 170 breeding pairs statewide (Brush 2010), showing a 56% loss. Accurate population estimates prior to 2001 are not available. A minimum target population of 500 breeding pairs is considered to be in alignment with historic populations and represents progress towards recovery.

Snowy plover.—Maintaining a minimum of 500 pairs of snowy plovers would remove this population from the definition of a “very small or restricted” population under the IUCN criteria. Historic population data for snowy plovers in Florida are not available. However, anecdotal accounts indicate that snowy plovers were previously common (Cherrie 1897). In addition, because they share the same breeding habitat and threats as the other IBNBs, we infer similar rates of decline. Recent research indicates that the statewide population of snowy plovers includes at least 222 breeding pairs, split into 2 regions (Himes et al. 2006, [Figure 2](#)). Due to the cryptic nature of this species during the breeding season, baseline population numbers represent a minimum. Population objectives account for the possibility that increased numbers could result from more intense monitoring, not true population growth. Therefore, data collection in order to conduct a valid population viability analysis and realign population objectives is critical.

Least tern.—There has been a steep decline in the Florida breeding population of least terns (Zambrano and Warraich 2012, E. Forys, unpublished data) since statewide surveys between 1998 and 2000 estimated a mean of 12,562 breeding pairs (Gore et al. 2007). Historical accounts of least terns in Florida describe them as common and abundant (Scott 1887). The Southeast U.S. Regional Waterbird Conservation Plan (Hunter et al. 2006) suggests that population objectives should be liberal, due to decreasing average colony size and rapidly disappearing gravel rooftop “habitat” that supports the majority of Florida’s nesting least terns. Restoring the population to 1998-2000 levels embodies this approach. To achieve this objective, it will be necessary to first establish a 5-year running average of at least 0.7 fledge/pair annually (see [Objective III](#)).

Black skimmer.—The 1998 through 2000 mean annual population was estimated at 1,689 pairs (Gore et al. 2007) nesting in about 22 ground colonies and 14 rooftop locations statewide. This represents a significant decline from the 1970s population estimate of 2,250 pairs (Clapp et al. 1983). Local population declines of 32% in the Tampa Bay region from 2002 to 2010 (E. Forys, unpublished data) and 91.6% in the northeastern region of the state from 1970s to 2010 (M. Borboen, Audubon Florida, unpublished data) suggest that the population has been in a steep decline. Setting a target population in the absence of strong historical data is challenging, but based on the considerations below, a target population of 4,000 pairs was chosen. This target may warrant adjustment as more current data on population size and trends become available.

- The most current comprehensive estimate of < 2,000 pairs (Gore et al. 2007) represents a very limited population made especially vulnerable by the fact that these are colonial breeders, nesting in a relatively small number of sites (approximately 36);
- Reproductive success in colonial nesting seabirds is highly variable and population stability is dependent on episodic “good years” in which there are adequate numbers of breeding adults to produce a robust cohort (Weimerskirch 2002); and
- The Southeastern U.S. Regional Waterbird Conservation Plan recommends increasing the Florida population by a factor of 2.5 (Hunter et al. 2006).

II. Manage suitable habitat:

- Preserve and protect ground breeding sites in the state; and
- Manage sufficient habitat, natural and manmade, to accommodate population growth as distributed in [Figure 5](#).

Rationale

This objective addresses IUCN Criteria B, Geographic Range and D, Population Very Small or Restricted. To achieve the target populations outlined in Objective I, all ground-breeding sites require protection, and additional breeding sites are necessary to accommodate population growth. In addition to achieving overall population objectives, maintaining adequate distributions is critical to reducing population vulnerability. Prior surveys (cited per species, below) were used to approximate the historic relative distribution of each species. These surveys serve as a guide for the distribution of the target populations shown in [Figure 5](#).

Since gravel rooftops currently serve as the primary nesting habitat for the least tern, conservation of the species in the short term is dependent upon protecting them when they occupy this habitat. Because gravel roof construction is being phased out, actions within this plan are designed to restore ground-nesting habitats. This will accommodate IBNB population growth and compensate for the loss of rooftop habitat.

American oystercatcher.—The relative distribution of the American oystercatcher target population was derived from the percent of breeding American oystercatchers recorded in each IBNB region (illustrated in [Figure 5](#)) during the 2001 comprehensive statewide survey (Douglass and Clayton 2004).

Snowy plover.—The relative distribution of the target snowy plover population identified for each IBNB Region ([Figure 5](#)) was derived from the distribution of breeding snowy plovers found in the 2002 comprehensive statewide survey (Lamonte et al. 2006). That survey found 72% of the breeding population in the Panhandle and 28% in southwest Florida (Lamonte et al. 2006). This distribution is consistent with the 2006 survey that found approximately 80% of the state population (at least 177 pairs) in the Panhandle and 20% of the population (at least 45 pairs) in southwest Florida (Himes et al. 2006). The Panhandle population appeared to be relatively stable, while the Southwest population appeared to be in decline (Himes et al. 2006).

Least tern.—The relative distribution of the least tern target population identified for each IBNB Region ([Figure 5](#)) was derived from the mean number of unique least tern ground-breeding sites per region during the 1998-2000 statewide survey (Gore et al. 2007).

Black skimmer.—The relative distribution of the black skimmer target population identified for each IBNB Region ([Figure 5](#)) was derived from the mean number of unique sites per region during the 1998-2000 survey (Gore et al. 2007) and the research conducted by Clapp et al. (1983) in the late 1970s.

III. Determine the productivity rates needed to achieve population objectives, and maintain a minimum 5-year running average of those rates. Annual productivity rates should exceed:

- American oystercatchers – 0.5 fledges/pair
- Snowy plovers – 1.0 fledge/pair
- Least terns – 0.7 fledges/pair
- Black skimmers – unknown (productivity rate necessary to achieve population objective to be determined)

Rationale

Currently available science supports these productivity rates to maintain populations at a stable level. Productivity rates are important objectives to track because population numbers can be very difficult to accurately assess, and population numbers alone can mask an impending decline. The lag time between lost productivity and measurable population declines can be significant in long-lived species. Monitoring productivity can illuminate a population threat prior to a detectable decline. Productivity rate objectives can address population trends on smaller temporal and spatial scales than can be achieved by population-size objectives alone. These productivity rates may need adjustment based on information obtained through more rigorous population analysis.

American oystercatcher.—American oystercatchers are a long-lived species with a low reproductive rate. In their study of population dynamics of American oystercatchers in North Carolina, Simons and Schulte (2008) provided a demographic model that incorporated data from studies spanning from 1995 to 2008. Absent changes in adult survival rates or possible effects from hurricane events on reproductive success, their model for the North Carolina population determined that a stable population of American oystercatchers would need a productivity rate of 0.39 fledges/pair. A

productivity rate of 0.5 fledges/pair is considered a reasonable rate for stabilization and growth of the Florida population of American oystercatchers.

Snowy plover.—To achieve the goal of this plan, productivity rates of snowy plovers in the Northwest IBNB region must be sufficient to maintain or gradually increase the population, and productivity rates in the Southwest IBNB region must provide for population recovery and growth. Estimates for the productivity rates needed for population stability vary from 0.889 to 1.0 fledges/male (Page et al. 1977, Nur et al. 1999). To err on the side of caution, the more conservative estimate of 1.0 fledges/pair is used in [Objective III](#).

Least tern.—Due to the species' relatively long generation time (between 9.63 and 20 years), an understanding of annual productivity rates is instrumental for predicting future population trends (Massey et al. 1992, Thompson et al. 1997). Least tern productivity can vary greatly between sites and years, and the productivity rate necessary to maintain or increase the Florida population has not been conclusively established. However, research outside of Florida indicates that a productivity rate of at least 1.0 fledge/pair is necessary for population growth (Aron 2005). To maintain a stable population thereafter, research supports a minimum maintenance level of 0.51 to 0.7 fledges/pair (Kirsch 1996, Kirsch and Sidle 1999, U.S. Fish and Wildlife Service [USFWS] 2006). To err on the side of caution, the more conservative estimate of 0.7 fledges/pair is used in [Objective III](#).

Black skimmer.—Similar to the other IBNBs, an understanding of annual productivity rates is instrumental for predicting future population trends for black skimmers. Productivity levels needed to maintain the population of black skimmers in Florida are currently unknown. Recommended actions for determining the rate required to achieve the goal of this plan are described in the [Monitoring and Research](#) section of this plan.

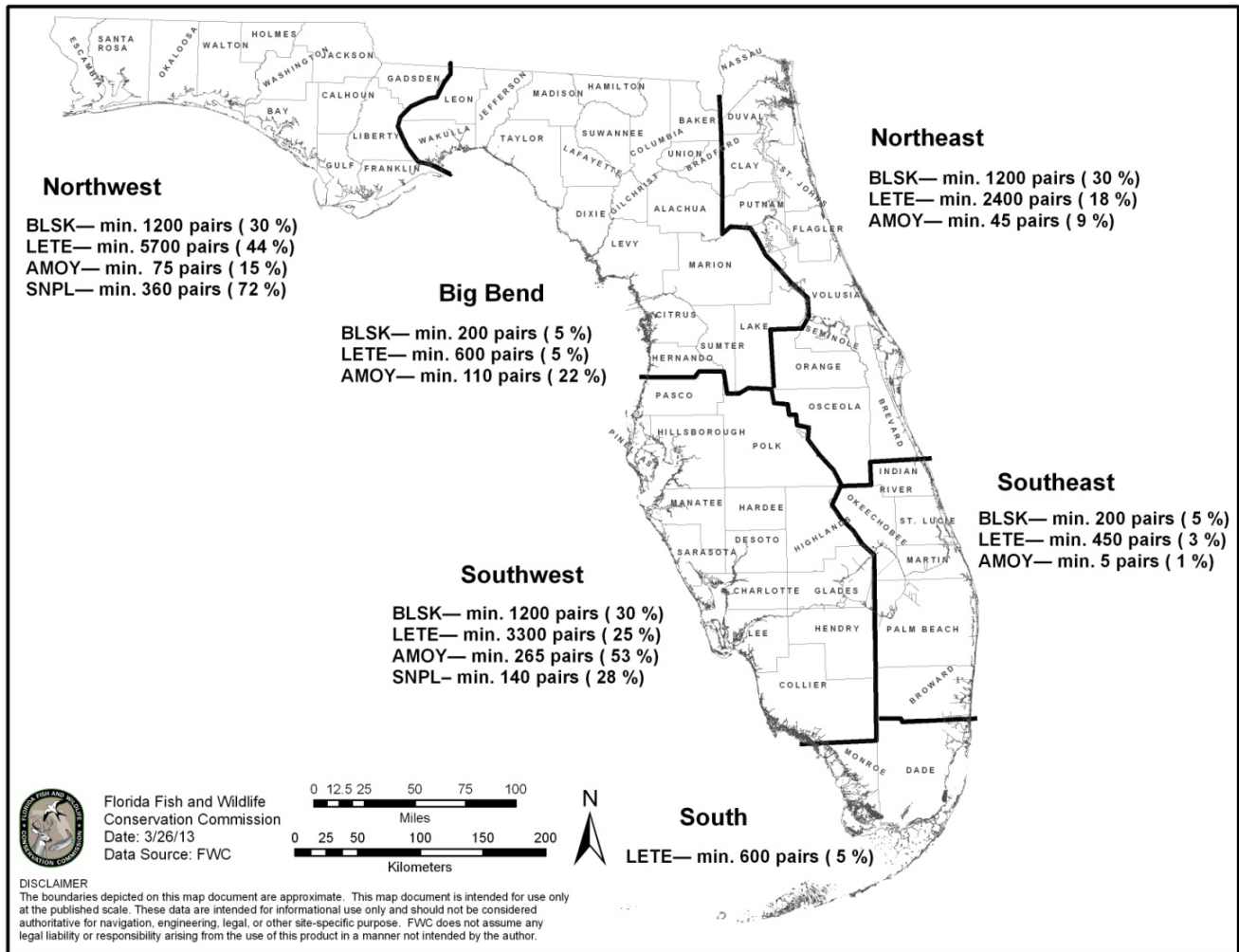


Figure 5. Imperiled beach-nesting bird management regions with population objectives for each species (black skimmer [BLSK], least tern [LETE], American oystercatcher [AMOY], and snowy plover [SNPL]). Management regions loosely based on the coastal regions outlined in Gore et al. (2007), and species distributions based on previous surveys (cited under [Objective II](#)). Percentages listed after each species represent percent of the target populations outlined in [Objective I](#). The regions outlined here are referred to in this plan as *IBNB Regions*.

CONSERVATION ACTIONS

The following sections describe the conservation actions that will make the greatest contribution toward achieving the conservation objectives. Actions are grouped by category (e.g., Habitat Conservation and Management, Population Management). Each action's priority, urgency, potential funding sources, likely effectiveness, identified partners and leads for implementation are identified in the Conservation Action Table ([Table 2](#)).

Action 1 Grow current shorebird conservation efforts into a comprehensive Shorebird Program.

A Shorebird Management Program is needed to fulfill these functions:

- Provide cohesion, direction, consistency, and an adaptive approach to statewide conservation efforts;
- Seek, garner, and maintain funding;
- Provide technical assistance to land owners, land managers, and the conservation community;
- Provide commenting and permitting support;
- Work with local governments, NGOs, landowners, and others to develop and implement pertinent actions outlined in this plan;
- Integrate IBNBs into the incidental take permitting (ITP) system;
- Design and implement monitoring and research projects; and
- Continue the development and growth of the FSA.

Collectively, the actions presented in this plan are a framework for expansion of existing shorebird/seabird conservation efforts. Much of the expansion proposed in this plan is contingent upon available resources. Potential funding mechanisms (e.g., oil spill-related funding, ITP program) should be explored and pursued.

Although the FWC will continue to lead shorebird/seabird conservation efforts, most on-the-ground implementation will be accomplished through partnerships with local, state and federal governments, private landowners, and NGOs. Proactive input and feedback from partners will also be critical as this program expands and improves.

Habitat Conservation and Management

Habitat Conservation

Action 2 Annually identify sites to be prioritized for conservation attention in each IBNB Region (see [Figure 5](#)).

[Objectives I and II](#) of this plan depend on effectively targeting conservation efforts. The first step toward achieving these objectives is identifying sites around the state that either currently support IBNBs or could, with management, support them. Because of the dynamic nature of IBNB habitat, this process needs to be repeated annually. Historic records, species experts, and FSA partners including land managers, resource professionals, and members of the conservation community can provide valuable input into this process. If currently-used sites are not sufficient to meet IBNB regional goals, additional sites (where IBNBs have historically nested or where there is potential nesting habitat) can be managed in order to attract breeding IBNBs.

Reliable monitoring is necessary to identify newly occupied areas or emerging habitat. Thus, expanding monitoring coverage and reporting to the FSD is a critical step to identifying and protecting new areas.

As new breeding sites are identified, it is important to evaluate their threats and management needs. Factors affecting reproductive success can change quickly, changing management needs. IBNBs are often attracted to accreting beaches and previously-disturbed areas once the primary disturbance is removed. Ensuring timely protection in these newly-identified and emerging habitats will support recovery efforts.

Action 3 Work with landowners, land managers, and local governments to implement seasonal restrictions where necessary in public recreation areas that overlap important IBNB habitat.

Recreational beach use can be a primary source of disturbance to breeding, roosting, and foraging IBNBs. In areas where IBNBs are near public access points, volleyball courts, or other beach uses, seasonal closures can be effective at minimizing disturbances (Lafferty et al. 2006). Dates on closures and restrictions may be determined on a year-to-year basis by land managers in consultation with FWC staff, and should be based on site-specific data. Educational materials and outreach should accompany access or beach-use restrictions where appropriate (see [Education and Outreach](#)). FWC and FSA partners have developed educational materials that may be useful, and information may also be customized to specific sites and activities.

Action 4 Develop and implement site-specific adaptive management plans to benefit IBNBs.

Site-specific IBNB management plans can provide land managers of both public and private lands with information on how to manage habitat for the maximum benefit of IBNBs. Developed in close coordination with the land managers, these plans will consider the characteristics, challenges, needs, and resources specific to individual sites containing IBNB habitat (or potential habitat). Site-specific management plans should include a strong education component for those lands with high public use. They may also include plans for reducing predation and disturbance, and enhancing or restoring habitat. Actions such as posting, seasonal restrictions, vegetation management, and predator-control measures might be outlined, and maps of habitat and management zones could be provided where helpful. Land managers and partners should review these plans annually, and modify them as necessary to ensure an adaptive approach. A comprehensive technical assistance program (a component of [Action 1](#)) designed to assist land managers with the development of site-specific management plans would provide a valuable resource to both public and private land managers.

Action 5 Create artificial habitat.

The protection of natural nesting habitat will always be a top priority. However, efforts to manage and restore existing rooftop and natural beach sites will likely be insufficient to meet population growth objectives. Options for creating new artificial habitat should be explored. American oystercatchers, least terns, and black skimmers will use spoil islands (created by depositing dredged material) and other artificial habitat (Kushlan and White 1983, Hovis and Robson 1989, FSD 2012, Lewis Environmental Services 2012). Other creative options include barges, rafts (see Margeson 2012), elevated platforms, and abandoned bridges. Nesting success in some of these artificial habitats is unknown and warrants additional research ([Action 26](#)). Collaboration between FWC, navigation

districts, United States Army Corps of Engineers (USACE), Port Authorities, USFWS, the Florida Department of Environmental Protection (DEP), the mining industry, and other entities responsible for management of dredge and temporary mining spoils and shore-stabilization projects is necessary to identify opportunities to create artificial nesting habitat for IBNBs.

Action 6 Encourage management at unmanaged breeding sites and other important habitat.

Many breeding sites occur on unmanaged state lands, meaning they do not receive direct management from a state agency such as the Florida Park Service (FPS) or the FWC. These lands are under the jurisdiction of DEP's Division of State Lands, and do not have staff or funds dedicated to their management. Pursuing funding for management activities or assigning management authority at these unmanaged state lands would likely improve conditions, especially if wildlife conservation is identified as the primary objective for the area. A statewide assessment should be conducted to identify unmanaged state lands that contain important IBNB habitat. Options for assigning management and resources to those areas should be explored.

Where breeding sites occur on private property, resource management agencies could seek to obtain permission from the property owner for management authority or pursue conservation easements (see [Action 38](#)). Where such properties are for sale, FWC and the FSA can partner with organizations such as USFWS, Audubon, The Nature Conservancy, FPS, local governments or DEP's Coastal Management Program to purchase them.

Habitat Management

Action 7 Restore and/or enhance habitat to support productive breeding.

Restoration of breeding habitat should focus on areas that currently support or have strong potential to support IBNBs. These include historic nesting areas, beach areas backed by ephemeral pools, and areas with limited human disturbance and low predator populations.

While some beach-nesting birds require periodic overwash – a natural coastal process – to create open, sandy areas for breeding, recurrent overwash can be problematic if eggs or young are continually lost. Carefully-evaluated restoration measures may enhance breeding sites that experience high rates of loss due to overwash or lose significant habitat due to erosion.

Where IBNBs are unable to nest due to lack of open, sandy beach, this type of habitat should be restored. Reversing succession through vegetation management is an option that can be explored in areas where other conditions exist to support successful breeding (i.e., low occurrence of predators, low risk of human disturbance). Any vegetation management should be conducted in a manner that minimizes impact to coastal features and carefully considers the needs of all coastal wildlife, as well as the natural processes of the entire coastal system. During development of site-specific management plans (see [Action 4](#)), vegetation management may be considered among the tools available to maintain or create sandy beach areas for nesting. Non-native vegetation should be removed from areas where it makes habitat unsuitable.

Restoration through vegetation management should not be confused with traditional beach-raking practices. Beach raking is a common activity that often leads to loss of beach features such as wrack,

shells, driftwood, and macroalgae that are beneficial to IBNBs and other wildlife, and to stabilization of the beach itself. Beach raking also disrupts the natural berm and swale morphology of the beach produced by sand accumulation through tides and winds. The Snowy Plover Working Group's [Guidelines for Beach Raking](#) (SNPLWG 2012) provide guidance for minimizing loss of beach-nesting birds when a raking program is in place.

Implementation of this action is dependent on close coordination with land managers from local, state, and federal governments, NGOs, and private lands. An example of current effort is the [Spoil Island Working Group](#), created by DEP's Coastal and Aquatic Managed Areas to manage 137 spoil islands included in the Indian River Lagoon management plan (located in Brevard, Indian River, St. Lucie, and Martin counties). The working group currently includes members from the FWC, other state agencies, counties, and NGOs. Members cooperatively administer recreational and wildlife habitat-management activities such as removing non-native vegetation, restoring native vegetation, and stabilizing shorelines to prevent erosion. FWC's participation in this group could improve active or potential IBNB breeding sites. Similar working groups should be established along Florida's west coast, and perhaps in others areas of the state, to ensure that spoil island management benefits IBNBs, where feasible. Creating or improving suitable nesting habitat on spoil islands should be a primary focus of any spoil island working group.

Action 8 Provide enforceable protections to breeding, foraging, and roosting sites where appropriate and feasible.

The FWC will first try to protect breeding, foraging, and roosting sites through educational postings and outreach. Since educational signage is not enforceable, if human disturbance persists, sites can be protected by counties or other land management agencies through their own enforceable *No Trespassing* or similar signs. If enforceable protections are not available at the local level, the establishment of CWAs, conservation easements, Memoranda of Understanding (MOU), and other means may be necessary. CWAs are established with cooperation and concurrence from a participating landowner or land manager. FWC can then close these sites, making trespassing an enforceable violation. Currently, several CWAs exist to protect IBNB breeding, foraging, and roosting sites throughout Florida. Memoranda of Understanding (MOU) with IBNB-protection objectives can be established with other land-management agencies.

Action 9 Post active breeding sites annually and pre-post (i.e., post before the birds begin to nest) historically-used breeding sites where appropriate.

Active breeding sites should be posted where there is potential for disturbance. Posting establishes a buffer zone with signs and symbolic fencing to help prevent people, pets, and vehicles from getting harmfully close to beach-nesting bird nests. These birds nest on private and public beaches, owned and managed by a wide array of people and organizations. Thus, coordination with site owners and managers is essential. [Regional shorebird partnerships](#) of the FSA coordinate most posting efforts. Remote locations that receive little to no human disturbance may not need posting. Historically-used breeding sites identified in the [FSD](#) should be pre-posted if birds are expected to return and there is potential for disturbance. [Posting guidelines](#) are available on the [FSA website](#) (Avissar et al. 2012).

Shorebird chicks are precocial and highly mobile within a few hours of hatching. Adults may move flightless young away from the nesting site to brood-rearing habitat. In Florida, broods have traveled

more than 1.6 km (1 mi) in 1 day (R. Pruner, FPS, unpublished data; B. Smith, Sanibel-Captiva Conservation Foundation, unpublished data). Posting brood-rearing sites is critical for reproductive success. When feasible, historical brood-rearing habitat should be pre-posted where there is a potential for human disturbance. Brood-rearing habitat may also be posted near or around colonies and solitary nests. Any posted area should be large enough to provide refuge from disturbance.

Action 10 Ensure that current occurrence data are available to resource managers, permitting agencies, and emergency-response personnel.

Working with managers and environmental agencies, as necessary, to ensure they have access to current population data will enable them to better adapt management appropriately to protect and recover IBNBs. Access to current occurrence data can also improve response and coordination in the event of an oil spill, natural disaster, or other emergency. Achieving this action requires that current and archived occurrence data are collected and readily available to managers and emergency-response personnel.

The FSA, along with both the FWC's Shorebird Partnership Coordinator and FSD Data Analyst positions, are integral to this process. The Shorebird Partnership Coordinator trains partners on data entry and retrieval, and works with partners to encourage prompt and accurate data entry into the FSD so that data are interpretable for real-time management decisions. The FSD Data Analyst, along with a team of FWC staff (the Seashore Team), are responsible for overseeing the availability of data to partners. Assistance with interpreting data may also be necessary for those agencies and land managers unfamiliar with the ecology of IBNBs. As both the Shorebird Partnership Coordinator and the FSD Data Analyst are funded under a time-limited grant, long-term funding for this program is needed to ensure the availability, continuity, and quality of these data (see [Action 1](#)).

Action 11 Minimize predation in areas where it contributes to significant loss.

Ground-nesting birds are extremely vulnerable to ground and avian predators. Site-specific strategies for integrated predator control should be implemented where it is determined that predators are among the primary causes of nest failure.

Trash on beaches and feeding of animals such as raccoons, gulls, and crows may attract these predators and locally increase their populations (Smith and Engeman 2002). Therefore, an integrated predator-control approach should educate beachgoers to avoid feeding wildlife and properly dispose of garbage. This approach will also benefit other species such as marine turtles (*Dermochelys coriacea* and species within Cheloniidae) (Pruner et al. 2011). The United States Department of Agriculture's Wildlife Services may be contracted when resource managers lack the equipment, training, permits, or staff to control predators. County animal control and health departments may assist if concerns with rabies transmission exist. FWC can provide technical assistance to land managers to assess best options for predator control. Additional funding should be explored to defray costs associated with predator control (see [Action 37](#)).

Population Management

Population management is addressed in [Action 22](#) (research techniques for reducing identified population limiting factors) in [Monitoring and Research](#).

Monitoring and Research

Monitoring

Action 12 Continue to implement a standardized, statewide monitoring strategy and work with other agencies and partners to monitor breeding sites.

The FSD is the central data repository for IBNB data and a resource for researchers and managers. Implementing monitoring actions will necessitate FSA expansion to engage partners who may already be monitoring IBNBs but are not fully trained on the standardized protocol ([Breeding Bird Protocol for Florida's Seabirds and Shorebirds](#)) or do not submit data to the FSD.

Action 13 Determine annual statewide breeding population (number of pairs), and the number and statewide distribution of breeding sites.

Conducting annual surveys reduces the potential bias associated with a snapshot-type survey (e.g., once every other year) where annual variation in nesting due to extreme weather events, localized predation, etc. can be better interpreted in the survey results. The breeding population and distribution of IBNBs will be determined annually using data collected by partners according to the [Breeding Bird Protocol for Florida's Seabirds and Shorebirds](#) (FWC 2011).

Action 14 Determine annual productivity for all IBNB species.

Productivity rates are important metrics to monitor because population numbers can be very difficult to assess accurately. In addition, monitoring productivity can illuminate a population threat prior to a detectable decline in population numbers. The lag time between lost productivity and measurable population declines can be significant in long-lived species. Productivity rates can address population trends on smaller temporal and spatial scales than can be achieved by a population size alone. IBNB productivity rates will be determined annually through a sub-sampling approach that uses partner-collected data from selected colonies and nest sites.

Action 15 Identify statewide and site-specific acute threats that limit populations.

Frequent monitoring to assess reproductive success and failure at different stages of breeding activity (i.e., nest survival, chick survival, and fledgling survival) is necessary. This information will inform managers of new threats (or provide better understanding of existing threats) that limit productivity. Some of this information may be obtained using data collected by partners who monitor IBNBs frequently and in accordance with [The Breeding Bird Protocol for Florida's Seabirds and Shorebirds](#) (FWC 2011). Monitoring is also needed to determine the source and extent of adult mortality. An increased mortality rate or a rapid change in causes of mortality should trigger management action to address the threat.

Action 16 Investigate the efficacy, conflicts, and benefits of current Shorebird Conditions in coastal engineering permits.

Monitoring is needed to evaluate the effectiveness of current protections, referred to as *Shorebird Conditions*, provided in coastal engineering permits. Development of a monitoring program is

necessary to assess efficacy, foster accountability of coastal engineering organizations, and produce information that can improve and streamline Shorebird Conditions.

Research

Action 17 Determine productivity levels needed to meet objectives.

Productivity rates outlined in [Objective III](#) were developed using best-available science; however, the precise productivity rates needed to meet [Objective I](#) are unclear. This action is particularly important for black skimmers, where the largest data gap exists on productivity rates necessary to stabilize or increase the population.

Action 18 Measure demographic parameters that limit beach-nesting bird populations.

Little demographic information (e.g., survival, reproduction, mortality, distribution, and movement) exists for beach-nesting birds in Florida. An understanding of how demographic parameters vary in space and time, and in relation to environmental and management factors, is fundamental to the understanding and management of species (Williams et al. 2002).

Future research on IBNBs should continue to focus on the following topics:

- Breeding-site fidelity and movement within and among years.
 - Successful nesting can contribute to IBNB breeding-site fidelity and can be an important factor for continued reproductive success (Burger and Gochfeld 1990, Johnson and Walters 2008, Schulte et al. 2010). Identifying site-specific factors limiting reproduction and site fidelity will inform management decisions.
 - Documenting distribution and understanding the factors contributing to movement patterns are critical to the recovery of IBNBs. For example, the USFWS considers the least terns in California, the interior of the United States, and the U.S. Atlantic/Gulf coasts to be distinct geographic variants. The California and interior populations have been designated as federally Endangered due to population declines related to habitat loss (USFWS 1985*a, b*). The taxonomic status has been a topic of much debate for many years (Patten and Erickson 1996, Massey 1998). There is some evidence of genetic exchange between least terns of the Gulf Coast of Florida and the interior U.S. population (Whittier et al. 2006).
- Breeding-site fidelity and return rates.
 - Although some breeding sites are ephemeral, many are used every year. Research on site fidelity is imperative to long-term protection of active breeding sites.
 - Colony fidelity for banded least tern adults has been documented throughout their nesting range (Atwood and Massey 1988, Renken and Smith 1995). Research is needed on the return rate of breeding adults to their natal colony sites, in order to estimate apparent survival and recruitment of Florida-reared chicks.
- Reproductive success
 - Estimates of reproductive success are necessary to determine long-term population trends, the relative importance of particular nesting locations or colonies, and if sub-populations are replacing themselves or are relying on other populations for recruitment (Burger et al. 1994).
 - Site-specific habitat and breeding features can affect reproductive success. Research should also focus on addressing factors that limit chick and fledgling survival.

- Juvenile rates of survival and dispersal.
 - To predict the viability of avian populations, knowledge of juvenile survival and dispersal rates is important (Stenzel et al. 2007). A statewide banding program focused on juvenile IBNBs would contribute to this knowledge. This program will use capture-recapture methods, where birds are marked uniquely with bands or flags and then released back into the population where they can be re-sighted (Williams et al. 2002).

Action 19 Assess impacts of various types of disturbance at different life stages (e.g., breeding, brood-rearing, non-nesting) for IBNB species.

Many studies have documented the effects of anthropogenic disturbance on shorebird and seabird abundance, behavior, and habitat use patterns (Collazo et al. 1995, Gill et al. 2001, Thomas et al. 2003, Burger et al. 2004, Blumstein et al. 2005, Yasue 2006). Disturbance by humans can be direct (i.e., take of adults, young, eggs) or indirect (i.e., causing adults to leave nests, causing foraging or roosting flocks to relocate). Understanding how disturbance alters distribution and behavior of IBNBs will lead to informed management decisions. Monitoring species' response to site-specific disturbances such as pets (leashed and unleashed) on beaches, fireworks, and recreation activities will allow managers to prioritize management for each site.

Action 20 Identify habitat characteristics and locations of important wintering (non-nesting) areas for American oystercatchers, snowy plovers, and black skimmers.

CWA establishment already protects some wintering sites, and there may be a need for protection of additional wintering sites. Monitoring winter populations is crucial because survival in non-breeding habitats limits shorebird populations (Hitchcock and Gratto-Trevor 1997, Yasue 2006). Winter habitat use may be influenced by prey base, disturbance, beach cleaning, beach nourishment, and other site-specific variables (e.g., tide, weather). Understanding the relationship among site variables helps quantify and define habitat quality for wintering shorebirds and seabirds in Florida, resulting in a better foundation upon which to formulate management recommendations. A statewide monitoring protocol for non-breeding (wintering) birds is currently in development by FWC staff and FSA partners.

Action 21 Research appropriate buffer distances for breeding IBNBs.

Shorebirds and seabirds are highly susceptible to disturbance because of their response to humans and because they frequently use areas with intense human recreational use (Gill et al. 2001). Research has recommended disturbance buffers of about 180 m (about 197 yards) for least tern and black skimmer colonies (Rodgers and Smith 1995). However, disturbance distances are very situational and additional research is needed where data gaps exist. Use of inflexible or excessive buffer distances can be counter-productive. Research in Florida should focus on breeding site and species-specific features to examine the effects of different types of disturbance (e.g. dogs, vehicles, etc.), variable approach speeds, tangential approaches, timing of disturbance in relation to nest stage, and other unknown sources of disturbance.

Additional research on appropriate buffer distances will provide valuable information. At the same time, the FWC and its partners will continue to take practical considerations into account when posting areas, including the needs of recreational users and private landowners. Posted areas rarely block

access points to public beaches and represent a very small portion of the large stretches of public and private lands used for recreation.

Action 22 Research techniques for reducing identified population-limiting factors.

Important areas of research to improve management effectiveness include: evaluating risks from toxicants, improving or creating nesting habitat, controlling disturbance, controlling predation, and techniques for increasing productivity, including captive breeding, reintroduction, and associated techniques. Nest exclosures are a potential management tool that may reduce nest predation. Several studies have reported the use of protective nest-cages as a means of reducing avian and mammalian predation on shorebird eggs (Isaksson et al. 2007, Pauliny et al. 2008). Research results should provide managers with the tools to mitigate for, or reduce, population-limiting threats.

Action 23 Model the impacts of climate change to areas currently supporting IBNBs.

The combined effects of a growing coastal human population, beach erosion, and climate change will require an increase in intensive management of coastal systems. Modeling the potential impact of climate change will inform site-specific management plans for maximum benefit to IBNBs.

Action 24 Refine methods for accurately surveying breeding beach-nesting birds.

The FWC's [Breeding Bird Protocol for Monitoring Florida's Shorebirds and Seabirds](#) (FWC 2011) has a great deal of built-in flexibility. However, information on trends in seabird nesting effort, nesting success, and productivity are dependent on the ability of trained observers to accurately count nesting birds and young. The sources of potential error in the estimates of population size obtained from surveys include variation in time and space as well as detectability (Steinkamp et al. 2003). Accounting for these sources of error and improving monitoring protocols to reduce error will result in more accurate statewide population estimates.

Action 25 Determine the number of breeding pairs and productivity rates of least terns nesting on rooftops compared with ground-nesting pairs.

During the 1998 through 2000 statewide census, rooftops represented 80% of the breeding sites for the least tern in Florida (Gore et al. 2007). A subsequent statewide census in 2010 found least terns nesting on 136 rooftops with a peak of 3,156 pairs (Zambrano and Warraich 2012). We need to re-evaluate these estimates and determine the current number of least terns nesting on rooftops versus ground colonies. Determining differences in productivity will assist in effectively focusing management activities.

Action 26 Evaluate alternative substrates and sites for rooftop-nesting birds.

The construction industry is moving away from using tar and gravel on new rooftops in Florida. As a result, the abundance of suitable nesting rooftops is declining (DeVries and Forsys 2004). From 2000 to 2010, 27% of the gravel rooftop breeding sites in Florida were lost (Zambrano and Warraich 2012). Research on viable alternatives to gravel rooftops will guide conservation efforts. Alternatives may include different substrates for rooftops, platforms, barges, abandoned bridges, and rafts. Research to determine the efficacy of artificial habitats for nesting is also needed.

Action 27 Assess knowledge and attitudes of coastal residents and visitors regarding coastal wildlife, coastal processes, and coastal conservation.

Disturbance by people and pets has negative impacts on IBNBs. In order to change human behaviors that affect IBNBs and their habitat, managers need to better understand the knowledge and attitudes of residents and visitors, with regard to coastal species and impacts of human activity. Findings from social science research, including message-testing to determine which messages are most effective at educating key user groups, can be applied to education and outreach programs (see [Education and Outreach](#)).

Rule and Permitting Intent

Protections

The FWC has the authority to protect beach-nesting birds in accordance with Article IV, Section 9 of the Florida Constitution, Section 379.1025, Florida Statutes, and Rule 68A-1.002, F.A.C. As Threatened species, the American oystercatcher, snowy plover, least tern, and black skimmer are protected under Rule 68A-27.003(2)(e), F.A.C. Under this rule, Threatened species receive blanket protection where no person "...shall take, possess, or sell any Threatened species...or parts thereof or their nests or eggs..." The definition of *take* in 68A-27.001, F.A.C. includes actions that harm or harass Threatened species. Additionally, these birds will remain protected by the MBTA.

Improving Protections

The following issues demonstrate the need to clarify, update, and improve protections:

- The legal definition of harassment as it applies to IBNBs is unclear.
 - Intentional take of beach-nesting birds is a violation under existing rules. However, these rules do not provide clear guidance on what constitutes take in situations that apply to harassment of nesting, loafing, and foraging IBNBs. Rule 68A-27.001(4), F.A.C., states that the term harass is "...an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering."
 - Posting is designed to reduce this type of harassment by notifying citizens of the birds' presence and demarcating a protective buffer zone in nesting, loafing, and feeding areas. Enforcing current rules when people trespass into posted areas has proven difficult since these rules do not clearly state that such actions constitute harassment.
 - Development of enforcement policies (such as those created for the gopher tortoise), which define how harassment protections apply to IBNBs, will make rule intent clearer and more enforceable.
- The FWC's authority to monitor and manage shorebirds on Florida beaches can be challenged because this authority is not articulated in rule where it can be readily referenced by the public, FWC staff, and law enforcement officers. Property ownership on beaches is vague due to the dynamic nature of the coastline and the complexities of laws governing coastal systems. While authority for FWC biological staff to enter non-FWC property for management purposes resides in the Florida Constitution, it is not explicitly codified in rule or law. Because of the unique nature of beach property rights in Florida, however, even privately owned beaches are accessible to the public as a matter of custom. FWC staff and partners have traditionally

accessed those properties when necessary to conduct survey and management activities necessary to protect and conserve these species. Landowners have requested that FWC provide a reference for the agency's authority to conduct these activities. Removal, destruction, and vandalism to posted areas are chronic problems at some important IBNB sites, yet it is unclear what penalties and rules apply in cases where such actions occur.

- Violation of most FWC rules constitute a misdemeanor (criminal infraction), which may carry a financial penalty, jail time, and a permanent record. Officers may therefore be reluctant to cite individuals for minor infractions when they relate to harassment of IBNBs. Lack of enforcement can lead to increased harassment of IBNBs and nest or colony abandonment. Level 1 violations (noncriminal infractions) could be just as effective in protecting IBNBs and could avoid having violators incur unnecessary criminal penalties.
- Except under limited circumstances (e.g., CWAs, federal lands), public and private land managers are unable to obtain permits to post below mean high water because there is no rule that references the authority to restrict navigation for purposes of protecting natural resources. Posting of signs above mean high water generally does not prevent ingress into the buffer necessary to protect IBNBs.

Permitting

Intentional Take.—Permits to take beach-nesting birds for scientific or educational purposes will continue to be considered on a case-by-case basis using criteria outlined in Rule 68A-27.007(2)(a), F.A.C.

Incidental Take.—Permits for incidental take of beach-nesting birds may be issued for otherwise legal activities, including those permitted by local, state, and federal agencies, which may cause take. Such permits should be issued if there will be a scientific or conservation benefit and only upon the applicant's demonstration that the permitted activity will not have a negative impact on the survival potential of the species. FWC lacks permitting guidelines for incidental take of IBNBs.

These guidelines should include:

- A list of activities that can be conducted without an incidental take permit;
- When an incidental take permit is required;
- Consideration of cumulative impacts of multiple beach-modification projects;
- Conservation measures to offset take;
- The process for reviewing, issuing, denying, and revoking permits;
- A process and timeline for updating permitting guidelines to respond to concerns expressed by applicants and other stakeholders; and
- A process for reviewing the effectiveness of conservation measures and/or minimization measures on IBNB recovery and adapting accordingly.

Action 28 Update and strengthen FWC's Shorebird Protection Plan to improve standardized shorebird protections that are included by DEP in beach nourishment and dredging permits.

In 2003, FWC developed a Shorebird Protection Plan and an Agency Position Statement outlining guidance for protecting shorebirds and seabirds during beach nourishment. FWC has worked

cooperatively with DEP's Joint Coastal Permitting staff since 2003 to incorporate conditions in DEP permits that help reduce impacts of beach nourishment activities on shorebirds and seabirds.

Since the inception of this program, new biological information, stakeholder input, and experience has emerged, pointing to a need to update our approach and supporting documents. Experience implementing shorebird protection conditions since 2003 has illustrated the benefits of this program but has also highlighted gaps, inefficiencies, and previously unknown problems. Specifically, permit conditions should be updated to protect mobile chicks outside of posted nesting areas during construction and to prevent take of IBNBs by extending protections and monitoring to the life of the project.

Action 29 Work with DEP to: 1) incorporate consideration of impacts to IBNBs from actions permitted under the Coastal Construction Control Line (CCCL) program, and 2) permit vegetation management without permitting fees or other mitigation requirements where management is for the benefit of IBNBs and the applicant commits to management of such resources.

The DEP CCCL program administers the permitting process for activities including beach raking, use of heavy equipment on the beach, and removal of native dune vegetation. DEP permitting is constrained by legislative mandates that prohibit consideration of the benefits or impacts to IBNBs caused by these permitted activities. This has led to 2 significant hurdles in protecting beach-nesting birds: 1) landowners and land managers are discouraged from managing beaches for beach-nesting birds due to resulting conflicts with DEP's permitting restrictions, and 2) mechanical beach raking is not regulated to fully minimize negative impacts to beach-nesting birds. Streamlining communication between DEP and FWC regarding permit-related concerns, questions, and opportunities to improve wildlife conservation is critical to implementation of this action.

Law Enforcement

Action 30 Annually identify IBNB sites for inclusion into FWC's law enforcement officer work plans.

The enforcement goal is to reduce take, including disturbance. Proactive law enforcement (educating the public), combined with prosecution of violators when appropriate, can reduce take, contribute to increased productivity, and foster recreational practices compatible with wildlife. One means to accomplish this goal is to include patrol of IBNB breeding sites into FWC law enforcement officers' annual work plans. Officer presence at breeding sites is especially important during special events, holiday weekends, and other times when the opportunity for disturbance is highest. A list of IBNB sites recommended by FWC biological staff, which identifies locations, peak disturbance times, site contacts and access information, and enforcement needs, can be provided to the Division of Law Enforcement as necessary.

Action 31 Develop strong coordination between law enforcement officers, non-sworn staff, and FSA partners.

Improved communication between site representatives (land managers, bird stewards, and other partners) and law enforcement officers is imperative to reducing take. Partners can collaborate with law enforcement officers to achieve the enforcement goal (see [Action 30](#)). Partners can alert law

enforcement officers to the locations of sensitive habitat or the presence of cryptic chicks, among other circumstances.

FSA partners (land managers, bird stewards, and others) work to prevent disturbance and take through education and posting. To balance education with enforcement, close coordination is necessary between law enforcement officers and FSA partners. Law enforcement staff, FWC biological staff, and FSA partners can coordinate closely to implement solutions that prevent violations, reduce disturbance, develop strategies to stop take where it occurs, and improve education campaigns and volunteer training to strengthen protection of beach-nesting birds.

Where violations persist, law enforcement officers, FWC biological staff, and FSA partners can strengthen communication to ensure that appropriate protections are put into place. Protections may include increased monitoring or stewardship, improved signage, expanded buffers, or other measures.

Action 32 Provide training opportunities specific to IBNB conservation for law enforcement officers.

Law enforcement workshops may be organized by regional FSA partnerships, conservation organizations, or FWC staff. These workshops are an opportunity for training and creating strategies for improved protection. Law enforcement workshops may include local, state, and federal law enforcement agencies and FSA partners. They should be held annually to discuss newly identified sites and circumstances, and to create strategies for site protection (including defining roles for law enforcement officers and partners).

Incentives and Influencing

The following actions are designed to encourage management practices beneficial to IBNBs and their habitat, and recognize the social and economic benefits of managing areas for IBNBs.

Action 33 Encourage beneficial management practices through guidelines, white papers, and agency position statements as appropriate on various IBNB management issues.

Land managers and landowners should have the information necessary to make informed decisions that benefit IBNBs. Recommended management practices should be made available in a user-friendly format (e.g., checklist). Information outlined in this action can influence and inform managers and other stakeholders, improving IBNB management.

Topics to be included in guidelines, white papers, and agency position statements (as appropriate, based on subject matter) include:

- Beach-raking impacts on beach-nesting birds;
- Beach-driving impacts on coastal wildlife;
- Guidelines for posting shorebird breeding sites (including recommended buffer distances);
- Human disturbance and its impact on coastal wildlife (providing scientific foundation for limiting disturbance to nesting, foraging, and wintering shorebirds and seabirds);
- Photographer impacts on beach-nesting birds;
- Abandoned fishing gear impacts on coastal wildlife;
- Predator control and its role in coastal wildlife management;
- Pets on beaches and their impacts on coastal wildlife;

- Management of rooftop breeding sites (see [Action 39](#));
- Aviation guidelines for areas where low-flying aircraft impact beach-nesting birds;
- Guidelines for coastal engineering projects (see [Action 51](#)); and
- Effects of sea level rise on coastal ecosystems.

Succinct documents should help the public understand the impacts of these activities on IBNBs and the scientific basis for recommendations. These documents may also allow partners to cite expertise when enacting potentially controversial management decisions.

Action 34 Encourage and influence IBNB site management through Land Management Review (LMR) and Unit Management Plan Advisory Group processes on state lands and the Integrated Natural Resources Management Plan (INRMP) process on Department of Defense lands.

FWC currently participates in LMR, Unit Management Plan Advisory Group, and INRMP processes on state and federal lands. LMRs evaluate, among other things, the extent to which management of state lands provides protection to listed species and their habitat. Stakeholders participating in Unit Management Plan Advisory Groups are tasked with reviewing draft state land management plans for appropriate consideration of listed species and activities that may impact them or their habitat. INRMPs (updated every 5 years) are the mechanism by which military installations manage natural resources on their properties. When participating in these reviews, FWC staff should encourage site management consistent with IBNB needs. FWC staff should become aware of revision schedules for sites inhabited by IBNBs and proactively offer recommendations, resources, and technical assistance during the review process.

Action 35 Develop a beach designation system that incorporates management recommendations for IBNBs and promotes the economic value of birding tourism.

Recreational and commercial beach activities comprise an important component of Florida's economy. Ecotourism is a growing segment of the tourism industry, and birdwatchers comprise the largest group of ecotourists (Sekercioglu 2002). Coastal Wildlife Conservation Initiative ([CWCI](#)) partners will develop a voluntary designation system to incentivize beach communities to conduct management activities (e.g., installing closed trash receptacles, posting historic breeding sites) that promote IBNB conservation. Beaches rated as "Bird-Friendly" could use that designation as a marketing tool to boost visitation by ecotourists. The system might include high ranks for beaches that limit specific activities known to disturb IBNBs or maintain buffers between recreation areas and protected wildlife areas. This system could further enhance the economic value of birding tourism by protecting species of interest and appealing to birders that are interested in viewing those species without disturbing them. "Calling cards" with appropriate messaging (e.g., "I visited to see your shorebirds") that tourists can leave at local businesses may help to demonstrate the economic benefit of birding tourism.

Action 36 Develop incentives and cost sharing for landowners to remove non-native plants where they are degrading IBNB habitat.

Non-native plants (e.g., Australian pine [*Casuarina* spp.], carrotwood [*Cupaniopsis anacardioides*], Brazilian pepper [*Schinus terebinthifolius*], and lead tree [*Leucaena leucocephala*]) are often the tallest structures in IBNB nesting habitat and can serve as perches and nesting habitat for avian predators such as crows (*Corvus* spp.). Non-native herbs and groundcover such as Russian thistle (*Salsola* spp.)

or crowfoot grass (*Dactyloctenium* spp.) can degrade nesting habitat by covering otherwise open areas of sand. Funding sources such as the [Florida Invasive Species Partnership](#) should be explored to facilitate their removal. As outlined in [Actions 33](#) and [54](#), expanded options for vegetation management are needed.

Action 37 Develop a funding mechanism to assist land managers with costs of integrated predator control when that is determined to be necessary.

Predator control can be cost prohibitive in some cases. Because predation is often the cause of nest failure, funding options should be explored to assist landowners or managers with costs associated with integrated predator control. Integrated predator control includes lethal control where appropriate, non-lethal control (e.g., predator-proofing trashcans), outreach and education to modify human behavior, and predator monitoring. This may be best accomplished by coordinating with the sea turtle conservation community and CWCI to identify grants and other sources of funding, since integrated predator control will likely benefit multiple coastal species.

Action 38 Support conservation easements as a means for protecting beach-nesting birds.

Direct purchase of land can be economically impractical, especially for coastal properties. Hence, conservation easements have become an important tool for protecting habitat. Private property owners may gain economic, aesthetic, or practical benefits from conservation easements on their property. For example, a beachfront landowner and local government may agree to increase residential density or building heights on upland portions of a property in exchange for a conservation easement over seaward portions of the land.

Informing local government staff of the opportunities and benefits of conservation easements will be very important. Guidelines and information on incompatible uses (e.g., mechanical raking, intensified recreational use, pets on beaches) should be available to site managers for consideration when recording conservation easements. A site-specific management plan (as outlined in [Action 4](#)) should be developed for each conservation easement containing suitable or potential IBNB habitat. Guidelines outlining desirable habitat characteristics, including minimum size required for use by IBNBs, should be developed. FWC currently assists property owners interested in conservation easements by finding an entity to hold the easement.

Action 39 Utilize outreach, technical assistance, volunteer support, and incentives to encourage building owners to manage for birds nesting on their gravel roofs.

In portions of Florida, least terns and black skimmers now nest predominantly on tar and gravel roofs. While roofs have certain advantages over ground-nesting areas, they also have their own unique challenges. Bird droppings on vehicles are typically not pleasing to building managers. Repairs or other activities on the roof could be restricted while birds are nesting. Furthermore, some roofs do not contain parapets, or lips, which prevent chicks from falling off the roof. Chicks may also fall through drain holes in the parapets or into roof drains that feed directly into sewer lines. Chicks that survive the fall may succumb to predators such as feral cats, die from heat exposure, or starve if not found by the parents or returned to the roof by people.

FWC staff and FSA partners encourage building owners to manage for roof-nesting species. However, this is not done systematically. As outlined in [Action 1](#), a comprehensive, statewide program to distribute outreach materials, monitor roof colonies, return fallen chicks to the roof, cover drains with hardware, and assist with designing or building chick fences on rooftops without parapets will strengthen conservation of roof-nesting birds.

The Landowner Incentive Program has shared costs of roof repair, modification, and replacement with building owners. Additional fiscal incentives (such as USFWS Partners for Fish and Wildlife and USFWS Coastal Program) may provide financial support for wildlife management on gravel roofs. In addition to monetary incentives, positive recognition through FSA and partners' websites, newsletters, and press releases can incentivize bird-friendly roof management.

A guidelines document should be developed for management of roof-nesting American oystercatchers, least terns, and black skimmers. This document should include information on:

- Physical rooftop modifications such as installing parapets, screening drains, chick fences; shading structure, and pallets for predator cover;
- Chick-checkers and stewardship programs;
- Increasing gravel depth for rooftops used by black skimmers;
- Preventative maintenance of roofs and air conditioning units before each nesting season; and
- When an ITP is required (see [Permitting](#)).

Action 40 Recognize property owners who maintain concentrations of IBNBs on their properties.

Partners should work together to find suitable incentives for those who support IBNBs on their property (e.g., those who give authorization to pre-post or post on their property). These incentives may include an appreciation program and positive recognition on FSA and partners' websites, newsletters, and press releases.

Education and Outreach

An active conservation education and outreach program will help ensure that the general public, property owners, and conservation partners understand the status of IBNB species and the protections necessary to maintain their populations (Ormsby and Forsys 2010). Outreach results in direct conservation benefits by increasing compliance with protective regulations and posted areas (Forsys 2011, Pruner et al. 2011). Education and outreach can also result in stronger public support for conservation efforts and inspire a conservation ethic in beach visitors and residents.

Action 41 Promote beaches for their wildlife habitat value.

The general public (e.g., beachgoers and boaters) are often unaware that IBNBs nest on open beaches and that certain activities may disturb them. A statewide campaign is needed to educate the public about the consequences of disturbance, habitat loss, fireworks, dogs on the beach, and other threats to IBNBs, and to promote beaches for their wildlife habitat value in addition to their recreational value. FWC products, such as the fishing regulations publication, should be used to increase awareness of IBNB conservation issues.

Changing cultural values and perceptions to foster empathy, tolerance, and appreciation for natural resources is an important and effective strategy to address human impacts to coastal birds. Changing

public perceptions will require the efforts of multiple partners, including FSA, CWCI, FWC's Community Relations Office, [National Oceanic and Atmospheric Administration's Coastal Services Center](#), and environmental educators from various organizations. Websites and brochures can also provide popular, scientific, legal, conservation, and permitting information. Information on coastal residents' and visitors' knowledge of and attitudes about conservation ([Action 27](#)) will be essential to developing effective outreach messages and vehicles.

Bird stewards, FSA partners, or CWCI working groups can encourage beachgoers and boaters to be aware of IBNBs and minimize disturbance. Recreation groups (e.g., kayak clubs) may be able to help disseminate targeted messaging to their members, and relevant guidelines can be distributed to areas where specific activities impact IBNBs (e.g., aviation guidelines posted at regional airports). In areas where recreational or service beach driving is permitted, FWC's [Best Management Practices for Operating Vehicles on the Beach](#) (FWC 2008b) should be distributed to educate beach drivers on impacts and minimization techniques. Partnering with marine turtle permit holders to address education on common threats such as dogs on beaches may be highly beneficial.

Action 42 Help property owners (resort and hotel managers, owners of vacation rental properties) encourage their guests to practice wildlife-friendly beach etiquette.

Beach etiquette, or behavior that respects coastal wildlife and vegetation, is important at all beaches, especially those that support breeding IBNBs. Information, materials, and technical assistance can be provided to property owners interested in posting parts of their property (i.e., providing refuge from disturbance), posting educational signs, or offering educational materials (e.g., brochures) to their guests.

Action 43 Support continuation and development of FSA partnerships for improved conservation and monitoring of IBNBs.

Shorebird and seabird conservation cannot be effectively accomplished by any single agency or organization. The FSA coordinates most of the partnering organizations and individuals who conduct IBNB monitoring, posting, bird stewarding, education, and research in Florida. It is important to provide continuing education and outreach to partners who monitor, survey, and protect shorebirds. Therefore, continued support of the FSA and supporting staff is critical to long-term, efficient IBNB monitoring and conservation efforts (see [Action 10](#)).

Action 44 Maintain and expand bird steward programs.

Disturbance to beach-nesting birds caused by people, pets, and vehicles is often higher on weekends and holidays (Ruhlen et al. 2003). During these peak disturbance times, educational posting may not be adequate to protect beach-nesting birds. Holiday weekends are also a time when coastal law enforcement officers are working at full capacity and focus primarily on human safety. Consequently, effective protection of beach-nesting birds at popular recreation sites calls for bird stewards. Bird stewards carry out 2 important tasks: 1) minimizing disturbance at breeding sites and 2) educating the public about beach-nesting birds. Maintenance and expansion of bird steward programs requires continued public and financial support, as well as strong coordination between bird stewards and law enforcement (see [Action 31](#)).

Action 45 Provide regular training opportunities for personnel who work in IBNB habitats to minimize impacts on beach-nesting birds (e.g., law enforcement officers, marine turtle monitors, lifeguards).

In addition to the many residents and tourists who visit Florida's beaches, there are a number of people, including law enforcement officers, lifeguards and other emergency response personnel, and marine turtle monitors, who work on beaches. These individuals can potentially have the greatest impacts to IBNBs, both beneficial and detrimental, because of the frequency, regularity, and duration of their time on the beach. Identifying and training these potential partners to ensure they are aware of IBNBs can help reduce negative impacts.

Cross-training shorebird and marine turtle monitors will ensure their respective management practices are safe for both taxa. Many individuals are already involved with both marine turtle monitoring and the FSA, and we can continue this positive exchange by inviting marine turtle permit holders to regional shorebird partnership meetings and encouraging FSA partners to work with turtle monitors. Marine turtle educational materials should be provided to FSA partners (e.g., website, presentations at partner meetings), and shorebird sensitivity training (e.g., impacts of beach driving) should be mandated in continuing education of marine turtle monitors.

Outreach and customized materials should target rescue personnel, lifeguards, emergency responders, vendors, municipal workers and others whose work takes place on the beach to ensure IBNBs are considered in their work plans and protocols (see [Action 10](#)).

Coordination with Other Entities

Coordination among the FWC, local governments, and regional, state, and federal agencies is essential for the successful conservation and management of IBNBs in Florida. As FWC manages very little sandy beach habitat, effective partnerships with local governments and other land managers are especially critical. Two FWC-led partnership programs, the FSA and the CWCI, are key components to full implementation of this plan. FWC maintains coordinators for each program to ensure effective operation and development. The continued success of these partnership programs is dependent on further development and support. It is also important to recognize opportunities to coordinate with other state and national initiatives that share common goals for these species. For example, the [Atlantic Flyway Shorebird Business Strategy](#), which spans the entire Atlantic flyway from arctic Canada to the southern tip of South America, lists these 4 species as high priority. Because actions identified in that strategy are closely aligned with the goals in this plan, there may be synergistic opportunities to be gained by coordinating these efforts.

Action 46 Maintain and expand the CWCI.

The CWCI is an effort to improve collaboration within and among partner agencies, local governments, conservation groups, businesses, and other stakeholders on a host of issues related to coastal wildlife. It focuses largely on improving intergovernmental coordination. Although the CWCI's scope includes all coastal wildlife species, IBNBs are a priority, and the CWCI has actively cultivated partners to address issues affecting IBNBs. Further support and development of this program is critical for addressing a number of threats facing IBNBs.

Action 47 At sites where coastal roads result in take of IBNBs, ensure managing entities implement effective protection measures.

Maintenance of a road that has been documented to cause (and continues to result in) take of listed species constitutes a violation of Rule 68A-27.003, F.A.C. Regulatory and managing agencies should work together to avoid, minimize, and mitigate for any take associated with coastal roads. Options include use of alternative routes (year-round or seasonally), reduced speed limits, increased enforcement, and other mitigation measures.

Action 48 Assist managing entities with development of guidelines to limit beach driving at sites where vehicles pose a threat to IBNB productivity.

Use of motorized vehicles on or along beaches is a threat to IBNBs and their habitat. Beach driving introduces disturbance to remote areas of beach where human access would be otherwise be limited.. The use of motorized vehicles in IBNB breeding areas may result in loss of eggs, chicks, or adults, and increased flushing rates or stress response by breeding adults. Beach driving may also prevent IBNBs from nesting in otherwise suitable habitat.

Beach driving should be prohibited or restricted at sites where IBNBs are nesting or rearing broods. On beaches with recreational or service driving, land managers should implement prohibitions, restrictions, or minimization measures. Service driving (e.g., marine turtle patrol, law enforcement, and lifeguards) should be restricted to that which is most essential, and drivers should follow FWC's [Best Management Practices for Operating Vehicles on the Beach](#) (FWC 2008b).

Action 49 Facilitate inclusion of IBNB protection measures into permit conditions for all permitted activities and projects in IBNB habitat (including coastal engineering projects, beach raking, beach-driving, special events, and firework displays).

IBNB nests are protected wherever they occur, and should be considered wherever permitted activities are undertaken. Examples of such activities include those regulated by DEP's CCCL program (e.g., coastal armoring, post-storm emergency permitting activities, new construction, rebuilding or redevelopment, public infrastructure, beach berm or dune restoration, beach raking, and special events). As direct and indirect impacts to IBNBs may result from the activities regulated by the CCCL program (see [Action 29](#)), CCCL permitting activities should support the IBNB plan goal and objectives, and at a minimum should not conflict with conservation efforts. Sporting events, film productions, weddings, fireworks and other special events generally require permits from state or local governments, or both. Provisions to protect IBNBs should be incorporated into these permits.

Action 50 Work with local governments and other public land managers to develop management strategies for IBNBs within their jurisdictional areas.

Local governments and other partners should collaborate to manage IBNB populations and breeding habitat. FWC and partners should assist and support local managers with ongoing efforts and development of adaptive approaches to accommodate IBNB needs. Local comprehensive management plans should incorporate strategies for effective conservation, use, and protection of natural resources, including fisheries and wildlife (Chapter 163, Florida Statutes).

The following considerations ([Table 1](#)) may be important to developing site-specific management plans (see [Action 4](#)), and apply to historic, currently occupied, and potential habitat.

Table 1. Land-management considerations for areas containing IBNB habitat.

FWC can provide technical assistance to land managers to:	Evaluate existing and proposed public access points to determine whether they adversely impact beach-nesting bird breeding sites.
	Redirect recreational activities away from breeding areas and consider creation of protected refuge areas or partial beach-area closures.
	Ensure special events and other regulated uses or activities, such as horseback riding, firework displays, beach raking, sporting events, weddings, etc., will not adversely impact or result in take of IBNBs.
	Ensure that conservation easements in IBNB habitats include restrictions or prohibitions on activities that may impact the species.
	Implement and enforce pet prohibitions or restrictions on beaches where IBNBs are present.
	Proactively plan for impacts of sea level rise by protecting areas where sandy beach habitats can migrate inland, and developing plans for managed retreat.
Land managers should become familiar with:	Local FSA partnerships; participation in local partnerships is strongly recommended.
	Locations of beach-nesting bird breeding, roosting, and foraging habitat.
	Locations of IBNB breeding sites.
	Regional and local threats to breeding productivity (local FSA partnerships and the FSD can provide information).
	Strategies and resources that minimize take and disturbance.

Action 51 Work with USFWS to develop recommended practices for coastal engineering projects.

The USFWS and USACE have previously engaged in statewide programmatic consultation regarding the effects of sand placement activities on federally-listed wildlife. These agencies have attempted to assess the impacts of beach nourishment activities on Florida’s imperiled coastal wildlife (Lott et al. 2009). FWC staff can work with the USFWS to include geographic information system (GIS) data for IBNBs and ensure that recommended practices are developed for coastal engineering projects. These practices should include recommendations for minimizing negative impacts to IBNB habitat, disposing of dredge spoil, permitting beach-nourishment projects, and managing those sites for IBNB nesting. USFWS activities with USACE should support the goal and objectives of this plan and, at a minimum, should not conflict with conservation efforts.

Action 52 Work with USFWS and USACE to update and fully implement the USACE Migratory Bird Protection Policy (MBPP) or replace it with an alternate multi-agency agreement that ensures IBNBs and their habitat are protected from impacts associated with federal coastal engineering projects.

The MBPP was developed by the USACE in 1994 in response to a take incident that occurred in association with a dredging project in Tampa Bay. The MBPP was to be implemented for the state of Florida within the USACE's Jacksonville District, not only for construction and maintenance projects, but also as conditions for permits issued by the Regulatory Division where applicable. The purpose of the MBPP is to provide protection to nesting migratory bird species that may be adversely affected by USACE projects while facilitating the disposal of dredged material. Some conditions included in USACE permits and contracts, as specified in the MBPP, are outdated and inconsistent with FWC's Shorebird Protection Plan and current conditions used statewide by Florida regulatory agencies. The MBPP should be updated based on current available science and made consistent with state permit conditions.

Action 53 Ensure IBNB nesting sites, and other important congregation sites, are fully included in updates of United States Coast Guard (USCG) Area Contingency Plans (ACPs) (federal, state, and local).

The [Oil Pollution Act of 1990 \(OPA 90\)](#) required the development of ACPs for all coastal areas of the United States through Area Committees, organized by the USCG and composed of regional federal, state, and local stakeholders. The ACP was developed to address removal of oil and hazardous substances from waterways. The ACP geographically defines regional environmental and socio-economic resources that require priority protection. The USCG's ACPs include a partnership with FWC to develop an [ArcIMS \(Internet Map Server\) website](#) that contains data used in planning and response activities, including an environmental layer (mangroves, salt marsh, Environmental Sensitivity Index, shoreline, primary wildlife areas, etc.).

FWC staff can work with the USCG to ensure that data on important IBNB areas and breeding status from the FSD are included in the environmental data layer for ACPs (see [Action 10](#)). Recommended practices for emergency response and clean-up efforts in IBNB areas should be provided to response teams. FWC can facilitate the exchange of this information and engage key FSA partners that may have critical site-specific information.

Action 54 Collaborate with DEP CCCL regulatory program and appropriate local governments to develop and implement vegetation management plans at sites where appropriate and necessary to maintain nesting habitat for IBNBs.

Shoreline hardening, coastal development, and recreational pressures can inhibit the movement of IBNBs into new, accreting sandy beaches, or out of eroding beaches and beaches where vegetation has become too dense to allow nesting. It may be practically and financially onerous for land managers to shift IBNB conservation efforts to alternate locations. For this reason, strategic removal of dune vegetation at some historic IBNB breeding sites may be an effective method to ensure the continued use of those breeding sites (see [Action 7](#)).

Collaboration with DEP and local government that have coastal regulatory permitting requirements is necessary to effectively evaluate removal or abatement of vegetation in back beach areas for the purpose of improving IBNB habitat. All vegetation-control activities conducted in nesting areas should minimize the impact on protected dune vegetation such as sea oats (*Uniola paniculata*) and other important coastal features. [Action 29](#) may be a precursor to implementing this action.

Table 2. Imperiled Beach-Nesting Birds Conservation Action Table
American oystercatcher, Snowy plover, Least tern, Black skimmer

NOTE: An explanation of acronyms used is below the table.

Objective(s) Addressed	Team Assigned Priority Level	Action Item Number	Action Items	Conservation Action Category	Ongoing, Expanded or New Effort?	Authority	Man Power	Estimated Cost To Implement	Funding Source(s)	Lead for Implementation: FWC Program(s) and/or Section(s)	External partners	Likely Effectiveness	Feasibility	Urgent?
1,2,3	1	1	Grow current shorebird conservation efforts into a comprehensive Shorebird Program.	Habitat Conservation & Mgmt	EXPANDED	YES	NO	\$100k+	Grants, Legislature, ITP, Unknown	HSC, SCP	FSA partners	Likely	Feasible with additional funding.	While implementation of this action is not critical to the immediate survival of the species, it is the foundation upon which almost all of the subsequent actions depend. Therefore, it is likely critical to the long-term survival of the species.
1,2,3	1	2	Annually identify sites to be prioritized for conservation attention in each IBNB Region (see Figure 5).	Habitat Conservation & Mgmt	EXPANDED	YES	YES	\$0-25k	Trust Fund, Existing Budget	HSC, SCP	FSA partners	Very Likely	It can be done through the FSA partnership. Feasible upon implementation of Action 1. Current staff can do a basic job. With dedicated staff from Action 1, this action can be accomplished more thoroughly.	Yes. Lack of action could result in immediate take.
1	1	3	Work with landowners, land managers, and local governments to implement seasonal restrictions where necessary in public recreation areas that overlap important IBNB habitat.	Habitat Conservation & Mgmt	EXPANDED	NO	YES	\$0-25k	Existing Budget	HSC, SCP	FSA partners	Very Likely	This is already taking place to a certain extent so it would just need expanding. With dedicated staff from Action 1, this action can be expanded.	Yes. Lack of action could result in immediate take.
1,2,3	1	4	Develop and implement site-specific adaptive management plans to benefit IBNBs.	Habitat Conservation & Mgmt	NEW	YES	NO	TBD	Unknown	HSC, SCP	FSA partners	Likely	It can be done but will be time consuming.	No
1,2	5	5	Create artificial habitat.	Habitat Conservation & Mgmt	EXPANDED	YES	NO	\$100k+	Grants, unknown	HSC, SCP	FSA, FIND, NGOs, local governments, DEP	Difficult	This will be difficult to accomplish for all 4 species (on a scale that contributes to population and habitat objectives) in that it may require significant funding, permits, dedicated staff, and management, as well as subsequent monitoring to ensure success.	No
1,2	1	6	Encourage management at unmanaged breeding sites and other important habitat.	Habitat Conservation & Mgmt	NEW	YES	NO	\$100k+	Unknown	HSC, SCP	FSA partners	Difficult	This will be difficult because FWC does not have management authority for most of these properties and FWC does not currently have existing funds for land management on new lands.	Yes. Lack of action could result in immediate take.
1,2	2	7	Restore and/or enhance habitat to support productive breeding.	Habitat Conservation & Mgmt	NEW	NO	NO	\$100k+	Grant, Legislature, Existing Budget	HSC, SCP	FSA, DEP, agencies with oversight of spoil islands and navigable waters, working groups and partners	Difficult	This will be difficult because of potential complex coordination required with many organizations, but it is feasible with continued effort.	Yes. Lack of action could result in immediate take for sites where loss of eggs and chicks is caused by disturbance and other human-induced impact, and where loss is preventable through improved management.
1,3	1	8	Provide enforceable protections to breeding, foraging, and roosting sites where appropriate and feasible.	Habitat Conservation & Mgmt	NEW	YES	NO	TBD	Existing Budget	HSC, SCP, LE	USFWS, NPS, local governments	Somewhat likely due to need for additional training for law enforcement personnel and gaps in existing rules.	It is more feasible at breeding sites but will be less feasible for foraging and roosting sites.	Yes. Lack of action could result in immediate take.

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1,2,3	1	9	Post active breeding sites annually and pre-post (i.e., post before the birds begin to nest) historically-used breeding sites where appropriate.	Habitat Conservation & Mgmt	EXPANDED	YES	YES	\$25-50k	Trust Fund, Existing Budget	HSC, SCP	FSA partners	Likely	This is already taking place to a certain extent so it would just need expanding	Yes. Lack of action could result in immediate take.
1,2	2	10	Ensure that current occurrence data are available to resource managers, permitting agencies, and emergency-response personnel.	Habitat Conservation & Mgmt	ONGOING	YES	Yes, based on funding	\$25-50k	Trust Fund, Existing Budget	HSC, FWRI, SCP	FSA partners	Very Likely	This is already taking place to a certain extent so it would just need expanding	Not urgent, but time-sensitive and is very important especially during emergencies and permit applications.
1,3	1	11	Minimize predation in areas where it contributes to significant loss.	Habitat Conservation & Mgmt	EXPANDED	YES	NO	\$100k+	Trust Fund, Existing Budget, Unknown	HSC, SCP	FSA, USDA	Difficult	This may be difficult due to funding needs and to potential controversy from the local public.	Yes. Lack of action could result in immediate take.
1,2,3	2	12	Continue to implement a standardized statewide monitoring strategy and work with other agencies and partners to monitor breeding sites.	Monitoring & Research	ONGOING	YES	Yes, contingent on funding	\$50-100k	Grant	HSC, FWRI	FSA partners	Very Likely	This is already taking place, continuing the program and expanding staff will be central to the success of this management plan.	Not urgent. Standardized monitoring is imperative to determine if we are meeting the objectives of this plan and to focus management and conservation.
1,2	2	13	Determine annual statewide breeding population (number of pairs), and the number and statewide distribution of breeding sites.	Monitoring & Research	EXPANDED	YES	YES	\$0-25k	Existing budget	HSC, FWRI	FSA partners	Very Likely	This is necessary to determine if we are meeting the objectives of this plan. However, data quality of partner data may not be reliable enough to meet the action's objective.	Not urgent; Monitoring distribution and BNB populations is imperative to determine if we are meeting the objectives of this plan and to focus management and conservation.
3	2	14	Determine annual productivity for all IBNB species.	Monitoring & Research	EXPANDED	YES	NO	\$50-100k	Existing budget	HSC, FWRI	FSA partners	Very Likely	This is necessary to determine if we are meeting the objectives of this plan, but we may need expanded staffing to get productivity for all IBNB species.	Not urgent; Monitoring productivity is imperative to determine if we are meeting the objectives of this plan and to focus management and conservation.
1,3	1	15	Identify statewide and site-specific acute threats that limit populations.	Monitoring & Research	EXPANDED	YES	YES	\$0-25k	Grant	HSC, FWRI	FSA partners	Likely	This is feasible at the site specific level and can be expanded statewide through communication within the monitoring network	Yes; Monitoring mortality of adults as well as production limiting factors concurrently with population will enable managers to determine if there is a population limiting threat.
1,3	3	16	Investigate the efficacy, conflicts, and benefits of current Shorebird Conditions in coastal engineering permits.	Monitoring & Research	NEW	YES	NO	\$50-100k	Existing budget	HSC, SCP	DEP, USACE	Very Likely	This is feasible.	Potentially urgent.
3	2	17	Determine productivity levels needed to meet objectives (see Objective III).	Monitoring & Research	NEW	YES	NO	\$50-100k	Grant	FWRI	FSA, Universities	Difficult	This will be challenging but possible with increased monitoring at specific sites statewide	Not urgent, but in order to be able to delist the species we need to know what level of productivity is needed in order to justify an increase management and protection.
1,3	3	18	Measure demographic parameters that limit beach-nesting bird populations.	Monitoring & Research	NEW	YES	NO	\$100k+	Grant	FWRI	FSA, Universities	Likely	This is feasible, some work is already being done at smaller scales and can be expanded to other areas.	Not urgent, but more information about the breeding behavior of the IBNB species will focus management and protection of these species.

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1,2,3	3	19	Assess impacts of various types of disturbance at different life stages (e.g., breeding, brood-rearing, non-nesting) for IBNB species.	Monitoring & Research	EXPANDED	YES	NO	\$50-100k	Grant	FWRI	FSA, Universities	Likely	Much research is available, this is feasible at the site specific level.	Not urgent; More information about the breeding behavior of the IBNB species will focus management and protection of these species.
1,2	4	20	Identify habitat characteristics and locations of important wintering (non-nesting) areas for American oystercatchers, black skimmers, and snowy plovers.	Monitoring & Research	EXPANDED	YES	YES	\$0-25k	Existing budget, Unknown	FWRI	Universities	Very Likely	We have some information and it is feasible to expand the FSD to include non-nesting IBNB species.	No
1,2,3	3	21	Research appropriate buffer distances for breeding IBNBs.	Monitoring & Research	NEW	YES	NO	\$25-50k	Grant	FWRI	FSA, Universities	Likely	Some research is available and this is feasible at the site specific level.	No
1,2,3	3	22	Research techniques for reducing identified population-limiting factors.	Monitoring & Research	NEW	YES	NO	\$50-100k	Grant	FWRI	FSA, Universities	Likely	This is feasible and could be done in collaboration with a University.	No, but it could be.
1,2	5	23	Model the impacts of climate change to areas currently supporting IBNBs.	Monitoring & Research	NEW	YES	NO	TBD	Unknown	FWRI, Information Science and Management	Multiple agencies, Universities	Difficult	This is feasible and should be done at the site specific level using some of the resources currently available for the state.	No, but it could be.
1	2	24	Refine methods for accurately surveying breeding beach-nesting birds.	Monitoring & Research	NEW	YES	YES	\$0-25k	Existing budget, Grant	FWRI, HSC	FSA partners	Likely	This is feasible and there are resources available to determine the best method for estimating populations of IBNB using specific survey methods.	No
1,3	5	25	Determine the number of breeding pairs and productivity rates of least terns nesting on rooftops compared with ground-nesting pairs.	Monitoring & Research	EXPANDED	YES	NO	\$50-100k	Grant	FWRI	FSA, Universities	Likely	This is feasible at a colony specific level with coordinated effort and intense monitoring.	No
2	1	26	Evaluate alternative substrate and sites for rooftop-nesting birds.	Monitoring & Research	EXPANDED	YES	NO	\$25-50k	Grant	FWRI	FSA, Universities	Likely	This is feasible in cooperation with a University and ????	Yes; suitable rooftops are disappearing and greater than half the population is currently nesting on roofs.
1,2	4	27	Assess knowledge and attitudes of coastal residents and visitors regarding coastal wildlife, coastal processes, and coastal conservation.	Monitoring & Research	NEW	YES	NO	TBD	Unknown	FWRI, HSC	FSA, Universities	Very Likely	This is feasible through partnerships.	No
1,2,3	3	28	Update and strengthen FWC’s Shorebird Protection Plan to improve standardized shorebird protections that are included by DEP in beach nourishment and dredging permits.	Protections & Permitting	EXPANDED	NO	YES	\$0-25k	Existing Budget	SCP, FWC's Legal Department	DEP	Likely	Feasible. The legwork is done, but we need FWC to endorse and DEP to adopt.	No. This action, in itself, will not address a specific threat comprehensively. It is part of a larger package that needs to be implemented to improve conservation and address the cumulative impacts to these species.
1,2	1	29	Work with DEP to: 1) incorporate consideration of impacts to IBNBs from actions permitted under the Coastal Construction Control Line (CCCL) program, and 2) permit vegetation management without permitting fees or other mitigation requirements where management is for the benefit of IBNBs and the applicant commits to management of such resources.	Protections & Permitting	EXPANDED	NO	YES	\$0-25k	Existing Budget	SCP, FWC's Legal Department	DEP	Likely	Feasible.	Yes. Ongoing practices are resulting in take and need to be rectified.

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1,3	1	30	Annually identify IBNB sites for inclusion into FWC law enforcement officer work plans.	Law Enforcement	EXPANDED	YES	YES	\$0-25k	Existing budgets	SCP, FWC's Seashore Team	FSA partners	Somewhat likely	Feasible	Not urgent, but very important and lack of enforcement may result in take at some places.
1,3	2	31	Develop strong coordination between law enforcement officers, non-sworn staff, and FSA partners.	Law Enforcement	EXPANDED	YES	YES	\$0-25k	Additional funding not required to implement in most cases	LE, SCP, and Imperiled Species	FSA partners, other law enforcement	Likely. Relationships already exist in many areas.	Feasible, continued effort.	Not urgent, but very important because it could improve enforcement (and reduce take) at some places.
1,3	2	32	Provide training opportunities specific to IBNB conservation for law enforcement officers.	Law Enforcement	ONGOING	YES	YES	\$0-25k	Multiple sources	LE, SCP	FSA partners, other law enforcement	Likely	Feasible. There are training officers in every region already.	No
1,2,3	2	33	Encourage beneficial management practices through guidelines, white papers, and agency position statements as appropriate on various IBNB management issues.	Incentives & Influencing	EXPANDED	YES	YES	\$0-25k	Existing Budget	HSC, SCP	FSA partners	Very Likely	Feasible	Not urgent, but ensuring good practices are followed can help avoid take and improve habitat.
1,2,3	1	34	Encourage and influence IBNB site management through Land Management Review (LMR) and Unit Management Plan Advisory Group processes on state lands and the Integrated Natural Resources Management Plan (INRMP) process on Department of Defense lands.	Incentives & Influencing	ONGOING	NO	YES	\$0-25k	Existing Budget	HSC, SCP	DEP, DOD	Somewhat likely	Feasible	Not urgent, but ensuring good practices are followed can help avoid take and improve habitat.
1,2,3	5	35	Develop a beach designation system which incorporates management recommendations for IBNBs and promotes the economic value of birding tourism.	Incentives & Influencing	NEW	YES	YES	\$0-25k	Unknown	HSC, SCP	FSA partners, local governments, tourism development councils	Somewhat likely	Feasible	No
2	4	36	Develop incentives and cost-sharing for landowners to remove non-native plants where they are degrading IBNB habitat.	Incentives & Influencing	NEW	YES	YES	TBD	Grants, ITP Process, unknown	Landowner Assistance Program	Florida Invasive Species Partnership	Somewhat likely	Difficult	No
1,3	1	37	Develop a funding mechanism to assist land managers with costs of integrated predator control when that is determined to be necessary.	Incentives & Influencing	NEW	YES	NO	TBD	Grants, ITP Process, unknown	HSC, SCP	FSA partners	Likely	Difficult; This may be difficult due to funding needs and to potential controversy from the local public.	Yes; predators can be important causes for low productivity in some locations and managing them can be costly.
1,2,3	3	38	Support conservation easements as a means for protecting beach-nesting birds.	Incentives & Influencing	EXPANDED	NO	YES	\$0-25k	Existing Budget	HSC: Landowner Assistance Program & SCP	FSA partners, local governments, land trusts	Likely	Somewhat feasible.	No
2	2	39	Utilize outreach, technical assistance, volunteer support, and incentives to encourage building owners to manage for birds nesting on their gravel roofs.	Incentives & Influencing	EXPANDED	YES	NO	\$50-100k	Existing Budget, grants, TBD	HSC, SCP	FSA partners	Likely	Feasible, if additional seasonal staff are provided to work directly with property owners.	Yes. Lack of action could result in immediate take. This action is equivalent to posting at ground colonies.
2	3	40	Recognize property owners who maintain concentrations of IBNBs on their properties.	Incentives & Influencing	NEW	YES	YES	\$0-25k	Existing Budget	HSC, SCP	FSA partners	Somewhat likely	Feasible	No
2	3	41	Promote beaches for their wildlife habitat value.	Education & Outreach	NEW	YES	YES	TBD	Existing Budget, grants	Community Relations, HSC, SCP	FSA partners	Somewhat likely	Somewhat feasible.	No

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2	3	42	Help property owners (resort/hotel managers, owners of vacation rental properties) encourage their guests to practice wildlife-friendly beach etiquette.	Education & Outreach	NEW	YES	YES	TBD	Grants	SCP	FSA partners	Somewhat likely	Somewhat feasible.	Not urgent, but this directly educates the people who intend to recreate on beaches. Lack of action could result in immediate take.
1, 3	1	43	Support continuation and development of FSA partnerships for improved conservation and monitoring of IBNBs.	Education & Outreach	EXPANDED	YES	Yes, contingent on funding	\$50-100K	Grants	SCP	FSA partners	Very Likely	Very feasible. Relationships already exist, dependent on future funding.	Yes. Without partner support, monitoring and posting goals are unlikely to be met. Lack of action could result in immediate take.
1,3	1	44	Maintain and expand bird steward programs.	Education & Outreach	EXPANDED	No (Audubon is leading effort)	Yes, pending FWC volunteer coordinator availability.	\$100K+	Grants, existing budget	SCP	FSA partners	Very Likely	Very feasible. Programs already exist in many parts of the state.	Yes. Bird stewards provide direct education and protection benefits for nesting birds. Lack of action could result in immediate take.
1, 3	1	45	Provide regular training opportunities for personnel who work in IBNB habitats to minimize impacts on beach-nesting birds (e.g., law enforcement officers, marine turtle monitors, lifeguards).	Education & Outreach	EXPANDED	YES	NO	\$50-100K	Existing Budget, grants, unknown	SCP	FWC Law Enforcement, sea turtle permit holders, coastal managers	Very Likely	Feasible. Programs already exist in many parts of the state. We just need more people to help implement.	Yes. Since these personnel are in the habitat every day, it is critical that they are aware of nesting IBNBs and how to avoid negatively impacting them. Lack of action could result in immediate take.
2	3	46	Maintain and expand the CWCI.	Coordination with Other Entities	EXPANDED	YES	Yes, contingent on funding	TBD	Existing budget, Grant	SCP	USFWS, DEP, local municipalities, USACE	Somewhat likely	Very feasible. Relationships already exist, dependent on future funding.	No. This action itself is not urgent, but it is a way to bridge effective working relationships with coastal managers.
2	1	47	At sites where coastal roads are resulting in take of IBNBs, ensure managing entities implement effective protection measures.	Coordination with Other Entities	ONGOING	NO	Yes, contingent on funding	\$0-25k	Managing entity (may assess tolls or entrance fees to cover costs)	SCP	NPS, DEP, FDOT, managing entities	Very Likely	Very feasible. It can be done and is practical, however requires greater cooperation from managing entity and public support.	Yes. Lack of action could result in immediate take.
2,3	1	48	Assist managing entities with development of guidelines to limit beach-driving at sites where vehicles pose a threat to IBNB productivity.	Coordination with Other Entities	ONGOING	NO	YES	\$0-25k	Existing budget	SCP	NPS, DEP, Landowners/managers, and emergency responders	Somewhat likely	Somewhat feasible. Can be done, but concerns about follow up to ensure compliance.	Yes. Lack of action could result in immediate take (could vary by site)
1,2,3	1	49	Facilitate inclusion of IBNB protection measures into permit conditions for all permitted activities and projects in IBNB habitat (including coastal engineering projects, beach raking, beach-driving, special events, and firework displays).	Coordination with Other Entities	EXPANDED	NO	Yes, contingent on funding	\$50-100K	New funding (Perhaps an ITP program)	SCP	DEP, municipalities	Very Likely	Difficult	Yes. Lack of action could result in immediate take.
1,2,3	1	50	Work with local governments and other public land managers to assure conservation of IBNBs within their jurisdictional areas.	Coordination with Other Entities	EXPANDED	NO	Yes, contingent on funding	\$100k+	Same funding as Action 1	SCP, OED	Landowners/managers (DEP, NPS, local municipalities, DOD, NGOs)	Very Likely	Feasibility varies by municipality and localized political and public support.	No. This action itself is not urgent, but it is a way to bridge effective working relationships with coastal managers.
2	1	51	Work with USFWS to develop recommended practices for coastal engineering projects.	Coordination with Other Entities	NEW	NO	NO	\$25-50k	Unknown	SCP	USFWS, DEP, USACE, local municipalities	Very Likely	Feasible for us to develop BMPs, but implementation will be difficult.	No, but addressing impacts of coastal engineering is critical to addressing impacts on IBNB species.

Table 2. Imperiled Beach-Nesting Birds Conservation Action Table
American oystercatcher, Snowy plover, Least tern, Black skimmer

Objective(s) Addressed	Team Assigned Priority Level	Action Item Number	Action Items	Conservation Action Category	Ongoing, Expanded or New Effort?	Authority	Man Power	Estimated Cost To Implement	Funding Source(s)	Lead for Implementation: FWC Program(s) and/or Section(s)	External partners	Likely Effectiveness	Feasibility	Urgent?
1,2,3	3	52	Work with USFWS and USACE to update and fully implement the USACE Migratory Bird Protection Policy (MBPP) or replace with an alternate multi-agency agreement that ensures IBNBs and their habitat are protected from impacts associated with federal coastal engineering projects.	Coordination with Other Entities	EXPANDED	NO	NO	\$0-25k	Unknown	SCP	USFWS, DEP, USACE	Somewhat likely	Feasibility depends on partner support.	No. Getting this policy renewed is not as urgent as having them avoid take.
1,2,3	1	53	Ensure IBNB nesting sites, and other important congregation sites, are fully included in updates of United States Coast Guard Area Contingency Plans (federal, state, and local).	Coordination with Other Entities	ONGOING	YES	YES	\$0-25k	Existing budget	SCP, FWRI	Coast Guard, Emergency Responders, USFWS, DEP, NPS	Very Likely	Very feasible.	Yes. Lack of action could result in immediate take.
2	2	54	Collaborate with DEP CCCL regulatory program and appropriate local governments to develop and implement vegetation management plans at sites where necessary to maintain nesting habitat for IBNBs.	Coordination with Other Entities	ONGOING	NO	YES	TBD	Unknown - actual vegetation mgmt costs would be built into site-specific plans. Might be different for public vs. private lands.	SCP	DEP, land managers	Likely	Somewhat feasible. Relationship already exists, but agency constraints difficult to resolve.	No

Acronyms used in this table:

- BMP:
- Best Management Practices
- CCCL:
- Coastal Construction Control Line
- CWCI:
- Coastal Wildlife Conservation Initiative
- DEP:
- Florida Department of Environmental Protection
- DOD:
- Department of Defense
- FDOT:
- Florida Department of Transportation
- FIND:
- Florida Inland Navigation District
- FSA:
- Florida Shorebird Alliance
- FWC:
- Florida Fish and Wildlife Conservation Commission
- FWRI:
- Fish and Wildlife Research Institute, the research branch of the Florida Fish and Wildlife Conservation Commission
- HSC:
- Habitat and Species Conservation, a Division of the Florida Fish and Wildlife Conservation Commission
- IBNB:
- Imperiled beach-nesting bird(s)
- INRMP:
- Integrated Natural Resources Management Plan
- ITP:
- Incidental Take Permit
- LE:
- Law enforcement
- LMR:
- Land Management Review
- MBPP:
- Migratory Bird Protection Policy
- NGO:
- Non-governmental organization(s)
- NPS:
- National Park Service
- OED:
- Office of the Executive Director
- SCP:
- Species Conservation Planning, a Section of the Florida Fish and Wildlife Conservation Commission's Division of Habitat and Species Conservation
- TBD:
- To be determined
- USACE:
- United States Army Corps of Engineers
- USDA:
- United States Department of Agriculture
- USFWS:
- United States Fish and Wildlife Service

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APPENDICES**Appendix 1. Breeding shorebirds and seabirds reported in Florida Shorebird Database (20 Focal Species)**Focal shorebird species (6):

American oystercatcher – *Haematopus palliatus*

Black-necked stilt – *Himantopus mexicanus*

Killdeer – *Charadrius vociferus*

Snowy plover – *Charadrius nivosus*

Willet – *Tringa semipalmata*

Wilson's plover – *Charadrius wilsonia*

Focal seabird species (14):

Black skimmer – *Rynchops niger*

Bridled tern – *Onychoprion anaethetus*

Brown noddy – *Anous stolidus*

Brown pelican – *Pelecanus occidentalis*

Caspian tern – *Hydroprogne caspia*

Gull-billed tern – *Gelochelidon nilotica*

Laughing gull – *Leucophaeus atricilla*

Least tern – *Sternula antillarum*

Magnificent frigatebird – *Fregata magnificens*

Masked booby – *Sula dactylatra*

Roseate tern – *Sterna dougallii*

Royal tern – *Thalasseus maxima*

Sandwich tern – *Thalasseus sandvicensis*

Sooty tern – *Onychoprion fuscatus*