

SPECIES PROFILE

Roseate Tern

Sterna dougallii

Federal Listing: Endangered

State Listing: Endangered

Global Rank: G4

State Rank: S1

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ELEMENT 1: DISTRIBUTION AND HABITAT

1.1 Habitat Description

Roseate terns nest on small rocky or sandy islands, barrier beaches, salt marshes, and rarely on the mainland (USFWS 1989, Kress and Hall 2004). Most colonies are close to shallow-water foraging areas with sandy bottoms, bars, or shoals (Gochfeld et al. 1998). In the Northeast, roseate terns nest within common tern colonies (Nisbet 1989, USFWS 1998). Within these mixed colonies, roseate terns usually select habitat with dense vegetation or the protection of rocks and driftwood (Burger and Gochfeld 1988). They will also use artificial nest sites (e.g., boxes and half-buried tires) (Spendelov 1982).

Roseate terns forage over shallow sandbars, shoals, inlets, or schools of predatory fish, often in mixed flocks with other terns (Safina 1990, Shealer and Burger 1993, 1995). Roseates feed on at least 15 species of small marine fish but prefer sand lance (*Ammodytes* spp.) (Gochfeld et al. 1998, Kress and Hall 2004). Feeding studies at New Hampshire's Seavey Island have documented sand lance (*Ammodytes* spp.), white hake (*Urophycis tenuis*), Atlantic herring (*Clupea harengus*), and American Pollock (*Pollachius virens*) as key forage species (NHA and NHFG unpublished data 2003-2004). Foraging distance is variable (300 m² to 30 km²) and depends on local prey availability. Roseate terns will travel farther than common terns to feed (Gochfeld et al. 1998, Kress and Hall 2004).

1.2 Justification

Since records were first taken in 1870, the roseate tern has dwindled somewhat in the region (USFWS 1988). This population nested from Nova Scotia to Virginia in the late nineteenth century but has been lost from all south of Long Island's south shore. The roseate tern was listed under the Endangered Species Act in 1987. At the time of listing, there were approximately 3,000 pairs nesting on 21 islands (10 islands with over 10 pairs) in the Northeast. Since then, restoration efforts have had a limited effect; populations continue to fluctuate around 3,700 pairs between New York and Nova Scotia (Roseate Tern Recovery Team (RTRT) 2004). Currently, the estimated numbers of nesting pairs in this region remains 3,700 on 19 islands (10 islands with over 10 pairs). Trend data from the last ten years show a population decline of 10% in spite of continued management (RTRT minutes 2004).

There have been recent large declines in southern New England and Long Island. Most sites on Long Island's south shore have been lost, and a significant Long Island Sound colony is greatly reduced (USFWS 1998, Kress and Hall 2004). In contrast, the cold water Gulf of Maine roseate population has been steady during this period. The Seavey Island roseate tern colony grew from 1 pair in 2001 to 112 pairs in 2004 (NHFG and NHA unpublished data). Thus, it is important to evaluate these smaller, cold-water populations for their potential to aid in recovery goals. More than 85% of the entire northeastern population currently nests on 4 islands between Buzzard's Bay and Long Island, New York, leaving the entire population increasingly vulnerable. Preservation of populations adapted to variable climates is critical in a time of global climate change.

The concentration of roseate terns in several large colonies, due to predation and loss of nesting sites,

is the primary threat to the species (USFWS Roseate Tern Recovery Plan). Expanding gull populations have taken over many of the offshore islands that once supported terns, and other islands have been lost to erosion. Roseates were forced to nest at inshore islands where the habitat quality was lower and the risk of predation from multiple predators was high.

In the northeastern United States, eggs, chicks and adults are eaten by 11 avian, 10 mammalian, 1 reptile, and 2 ant species (Nisbet 1989). Additional limiting factors may include inadequate foraging resources, competition for nest sites, contaminant impacts, imbalanced sex ratio, and insufficient funds to adequately protect existing colonies. Inclement weather may also harm northeastern roseate tern populations. Little is known about factors affecting the population on its wintering grounds (Gochfeld et al. 1998). In managing for roseate terns the needs of other coastal island species including common tern, Arctic Tern, common eider, black guillemot and purple sandpiper are also addressed

1.3 Protection and Regulatory Status

The roseate tern is protected in the United States under the Migratory Bird Treaty Act of 1918, which prohibits the taking of bird, nest, and eggs. The roseate tern is also protected under the United States Endangered Species Act of 1973 and was listed as an endangered species on 2 December 1987. In April 1985, the Canadian population of the roseate tern was designated as threatened by the Committee on the Status of Endangered Wildlife in Canada.

In New Hampshire, the roseate tern is listed as an endangered species and protected under RSA 212. Seavey Island, the only current nesting location for roseate terns in New Hampshire, is managed by NHFG. Seavey Island is posted as an endangered species breeding site and the public is restricted from 1 May to 1 September. Seavey Island is actively managed through the breeding season, and biologists are present at the colony from late April to August.

1.4 Population and Habitat Distribution

In New Hampshire, the only current nesting of roseate terns occurs at Seavey Island, Isles of Shoals. The island has been intensively managed for terns since 1997. One pair of roseate terns successfully nested

on Seavey Island in 2001 and the population quickly grew to include 112 pairs in 2004. The Seavey Island colony represents approximately 3% of the entire northeastern population and close to 40% of the roseate terns breeding in the Gulf of Maine.

1.5 Town Distribution Map

Not completed for this species.

1.6 Habitat Map

The New Hampshire GRANIT System was used to identify coastal islands. Very small islands were grouped to the nearest adjacent neighboring islands. In total, 96 polygons were grouped into 48 islands, which in turn were clustered into 15 conservation units. Each conservation unit was then defined by parameters such as size, shoreline, development, distance from known and potential contaminant sources, and the distances to the nearest aquaculture operations, oil spill response staging areas, recreational fishing areas, marinas and public beaches. New Hampshire Department of Environmental Services provided the locations of known contamination sources, heliports, oil spill response staging areas, recreational fishing, marinas, and aquaculture facilities.

1.7 Sources of Information

Basic natural history information in this profile was largely gathered from the literature cited in element 5. Information on habitat and distribution was gathered from scientific literature, recovery conservation plans, technical field reports, published literature, NHA and NHFG Seavey Island data, New Hampshire Bird Records data, Gulf of Maine Seabird Working Group (GOMSWG) and Roseate Tern Recovery Team (RTRT) discussion and minutes. Information for mapping was provided as cited in 1.6.

1.8 Extent and Quality of Data

Roseate terns have been closely monitored in the region for more than 20 years. The Seavey Island roseate tern population has been intensively studied since recolonization in 2001. In New Hampshire, a census is taken at all current and recently occupied tern-nesting sites during June. Censuses were taken at the Isles of Shoals in 1977, 1985, 1995, and one is

planned for 2005.

In 2004, nesting habitat parameters were measured on Seavey Island to develop habitat and vegetation profiles. This study is part of a habitat management plan to enhance nesting opportunities. Roseate tern foraging habitat is largely unknown in New Hampshire. In 2004, a brief study suggested that some foraging occurs near Seavey Island, but critical foraging areas remain undocumented. Few data exist on staging areas for roseate terns before or after the breeding period, or on migration and wintering habitat.

1.9 Distribution Research

- Continue intensive monitoring of roseate terns on Seavey Island and characterize breeding habitat
- Evaluate other islands at the Isles of Shoals for suitable tern habitat, especially historic sites (Lunging and Duck Islands)
- Identify priority habitats and potential restoration sites
- Document significant foraging and staging areas
- Band Seavey Island roseate tern chicks with field-readable bands to provide information on recruitment and intercolony movement. Develop protocol to systematically re-sight banded birds and coordinate with other islands for data exchange. Understand movement patterns of the roseate tern within the Gulf of Maine using the marked known aged population. Evaluate annual interchange of birds between GOM and “warm water” group.
- Research migration routes
- Research winter habitat use and distribution

ELEMENT 2: SPECIES/HABITAT CONDITION

2.1 Scale

Fifteen conservation units have been identified for coastal islands. All 9 islands at the Isles of Shoals are recognized as separate units.

2.2 Relative Health of Populations

The only New Hampshire population of roseate terns occurs on Seavey Island, Isles of Shoals. This population has been intensively monitored since 2001 when the first pair nested; in 2004, 112 pairs nested (table 1). Productivity has averaged 0.93 chicks per pair be-

tween 2001 and 2004 (table 2). This remains below the northeastern average of more than 1.1 chicks per pair. Fewer than 1 chick per pair is considered low but can be seen in small or newly formed colonies (Nisbet 1989, Gochfeld et al. 1998).

Seavey Island is now 1 of 2 colonies in the cold waters of the Gulf of Maine that number over 100 pairs; the other is Eastern Egg Rock in Muscongus Bay, Maine, which had 110 pairs in 2004. Seavey Island and Eastern Egg Rock are now the fifth largest colonies in the Northeast.

Roseate terns have not nested on any other islands at the Isles of Shoals since the late 1940s. The last known breeding on Lunging Island was in 1944 (Borrer and Holmes 1990). Anecdotal evidence from Duck Island describes tern breeding in the “thousands”. Both Lunging and Duck Island are potential breeding habitat but support large herring and great black-backed gull colonies.

The potential for roseate tern recolonization outside the Isles of Shoals is low. Inshore tern colonies contend with predation, disturbance, and the attendant disruptions of nesting habitats. Few inshore islands have the dense vegetation or rocky outcrops that roseates prefer to nest in. In addition, roseates only nest in common tern colonies of significant size. The largest common tern colony outside of Seavey Island rarely supports more than 12 pairs.

The objective for recovery in this species is to increase the Northeast nesting population to a minimum of 5,000 pairs with at least 6 large colonies (over 200 pairs) with high productivity (at least 1.0 fledged young per pair). A secondary objective is to expand the number of roseate tern breeding colonies to 30 or more sites. At present, there are only 4 sites larger than 200 pairs, and they all experience fluctuating productivity. The concentration of nearly all the roseate (100%), Arctic (100%), and common terns (98%) at one site in New Hampshire puts tern populations at great risk.

2.3 Population Management Status

The Seavey Island roseate, common and Arctic tern colony is managed intensively. Biologists live on the island throughout the breeding season, controlling predators, monitoring colony productivity, and implementing public outreach. Visitation is restricted from 1 May to 1 September to minimize disturbance.

Managers encouraged roseate terns to recolonize Seavey Island by using tern attractants and controlling gull populations. Gull control at Seavey Island consisted of dogs (late April), pyrotechnics, regular circumnavigation of the island beginning 30 minutes before sunrise and continuing until 30 minutes after sunrise, and the placement of a large rock in any gull nest cups (NHA and NHFG unpublished reports 1997-2003). Tern attraction techniques included the placement of decoys in suitable habitat along with the broadcast of tern colony sounds (Kress 1983). Common terns nested at this site in the first year of restoration efforts (1997).

Gull predation continues, but is dealt with successfully. Resident tern biologists intervene throughout the breeding season, and specialist predatory gulls are removed from the island. During summer, tern biologists regulate visitation and guide educational visits from Shoals Marine Lab, Star Island, and various other conservation organizations. Lighthouse renovation is scheduled to begin in 2005, and coordination with tern project biologists, New Hampshire Parks and Recreation oversight staff, and construction personnel will be imperative to avoid any disturbance to the terns.

2.4 Relative Quality of Habitat Patches

Seavey Island provides the best habitat for roseate terns in New Hampshire. A survey was initiated in 2004 to develop habitat and vegetation profiles for roseate nest sites. This study will evaluate the capacity of the site to support more roseate tern nesting and to document habitat changes. The quality of foraging habitat and prey availability on Seavey Island is largely unknown.

Duck Island and Lunging Island still have good potential for tern nesting, though the presence of gulls makes colonization problematic. Smuttynose Island once supported one of the largest gull concentrations at the Isles of Shoals, and the presence of raccoons and gulls makes this site unsuitable for tern nesting. A large gull colony exists on Appledore Island, where a research station is operated from April to October. However, rats, muskrats, raccoons, and human disturbance make this island unsuitable for terns.

2.5 Habitat Patch Protection Status

Seavey Island was deeded to the State of New Hampshire after the White Island Light was automated in 1987. White and Seavey Islands have been managed by the Department of Resources and Economic Development (DRED) Parks and Recreation Division as part of Odiorne State Park since 1993. A Memorandum of Agreement on tern restoration exists between DRED – Parks Division and the NHFG. Seavey Island is managed by NHFG as an endangered species nesting area and is afforded both state and federal protection under endangered species law.

The Coastal Islands National Wildlife Refuge purchased Duck Island in July 2003. This island will be managed for its wildlife resources, protected as a seabird colony, posted for closure during the breeding season, and evaluated for habitat management and restoration (B. Benedict, USFWS, personal communication). Privately owned Lunging Island is not protected beyond current shoreline and wetland regulations. Smuttynose Island is privately owned but was protected in August of 2001 by a conservation easement held by the Coastal Islands National Wildlife Refuge. This conservation easement allows the refuge to manage the site for wildlife resources (B. Benedict, USFWS, personal communication). Islands in the Piscataqua River, and Great and Little Bays are not suitable for roseate terns because of their proximity to the mainland.

2.6 Habitat Management Status

Seavey Island is managed for terns through the NHFG and NHA Tern Restoration partnership. Restoration efforts from 1997 to 2004 have focused on intensive management to eliminate gull nesting and to control predation, and have allowed re-colonization by common terns.

There has been a shift in the Seavey Island vegetation from yarrow and seaside goldenrod to tall dense grasses. Although the height of the grass makes the habitat more suitable for roseate terns, the density can cause problems for movement of both adults and chicks as the season progresses. In 2005, approximately 100 feet of boardwalk were laid through the grassy area to give more structure and opening to the nesting habitat, and to allow biologists access to this part of the island.

Other islands identified in section 2.4 as having the potential for tern recolonization need to have baseline habitat assessments. If determined to be suitable for restoration efforts, a habitat restoration plan would need to be developed and implemented.

2.7 Sources of Information

Information on habitat and distribution was gathered from scientific literature, recovery conservation plans, technical field reports, published literature, NHA and NHFG data, GOMSWG, and Roseate Tern Recovery Team (RTRT) discussion and minutes. Information for mapping was provided as cited in 1.6.

2.8 Extent and Quality of Data

Seavey Island has been monitored intensively since 1997. Census and productivity numbers have been determined since roseate terns began nesting in 2001. Chick provisioning data were collected in 2004. Baseline habitat data for roseate tern nesting sites were also collected in 2004. It will be important to expand on these data to determine the habitat parameters in preferred nesting areas.

2.9 Condition Assessment Research

Monitoring

- Continue intensive monitoring of roseate terns on Seavey Island
- Continue to monitor productivity. Use established methods as outlined by the Roseate Tern Recovery Plan to determine productivity on a yearly basis

Research and Assessment

- Characterize roseate tern breeding habitat on Seavey Island. Determine the habitat parameters in preferred nesting habitat. Evaluate the need for vegetation management to maintain and/or increase roseate habitat on Seavey Island.
- Conduct habitat assessments at the other historical Isles of Shoals islands
- Identify and characterize preferred foraging habitat/sites. Evaluate vulnerability of principal foraging sites to human related over-use issues.
- Assess available foraging resources by conducting

foraging studies. Establish protocol to study the relationship of prey availability and productivity. Identify prey availability during the courtship and egg-laying stage to determine impacts on clutch size. Identify inter-annual and inter-colony variation in prey and the potential effects on productivity. Develop understanding of how foraging effort affects reproduction.

- Assess potential impacts of an oil spill near Seavey Island

Research and Survey

- Identify important staging areas for Gulf of Maine roseate terns and the proportion of the population aggregating at staging/roosting areas. Conduct staging area counts through re-sighting of banded GOM birds, and determine the proportion of the population aggregating at staging/roosting areas. Build baseline information of the use of staging sites by NH and ME roseate terns. Determine if pre-migratory staging areas are a vulnerable population bottleneck.
- Identification and habitat assessment of important wintering areas

ELEMENT 5: REFERENCES

5.1 Literature

- Borror, A.C., and D.W. Holmes. 1990. Breeding Birds of the Isles of Shoals. Shoals Marine Laboratory, New York, New York, USA.
- Brody, Samuel D. 1998. Evaluating the role of site selection criteria for Marine Protected Areas in the Gulf of Maine. Gulf of Maine Council on the Marine Environment.
- Burger, J., and M. Gochfeld. 1988. Nest site selection: comparison of Roseate and Common Terns in a Long Island, New York colony. *Bird Behavior* 7: 59-66.
- Chardine, J.W. 1990. Newfoundland: Crossroads for Marine Birds and Shipping in the North Atlantic. Proceedings: The Effects of Oil on Wildlife. Newfoundland.
- Clement, J., and M. Janowicz (Editors). 2003. Aquaculture Physical Remediation: Workshop Proceedings. Gulf of Maine Council on the Marine Environment, www.gulfofmaine.org

- Collie, J.S., G.A. Escanero, and P.C. Valentine. 1997. Effects of bottom fishing on the benthic megafauna of Georges Bank. *Marine Ecology Progress Series* 155: 159-172.
- Donehower, C. 2003. Predation rate and predatory behavior of large gulls on Eastern Egg Rock. Unpublished Report. National Audubon Society.
- Drury, W.H. 1973. Population changes in New England seabirds. *Bird-Banding* 44: 267-313.
- Foss, C. Editor. 1994. *Atlas of the Breeding Birds in New Hampshire*. New Hampshire Audubon, Dover, New Hampshire, USA.
- Gochfeld, M., J. Burger, and I.C.T. Nisbet. 1998. Roseate Tern (*Sterna dougallii*). In *The Birds of North America*. No. 370 (A. Poole and F. Gill, eds.). The Birds of North America Inc. Philadelphia, Pennsylvania, USA.
- Goodale, W. 2000. The importance of lobster bait in Penobscot Bay gull diet. Unpublished Report. College of the Atlantic.
- Gulf of Maine Council on the Marine Environment. 2002. Action Plan 2001-2006. Gulf of Maine Council on the Marine Environment.
- Gulf of Maine Council Habitat Restoration Subcommittee. 2004. The Gulf of Maine Habitat Restoration Strategy. Gulf of Maine Council on the Marine Environment.
- Hays, H., P. Lima, L. Monteiro, J. DiCostanzo, G. Cormons, I.C.T. Nisbet, J.E. Saliva, J.A. Spendelow, J. Burger, J. Pierce, and M. Gochfeld. 1999. A nonbreeding concentration of Roseate and Common Terns in Bahia, Brazil. *Journal of Field Ornithology* 70:455-464.
- Kress, S.W. 1983. The use of decoys, sound recordings, and gull control for re-establishing a tern colony in Maine. *Colonial Waterbirds* 6:185-196.
- Kress, S.W., and C.S. Hall. 2004. *Tern Management Handbook – Coastal Northeastern United States and Atlantic Canada*. U.S. Department of Interior, Fish and Wildlife Service, Hadley, Massachusetts, USA.
- New Hampshire Office of State Planning Coastal Program. 1996. A vision for the New Hampshire coast. National Oceanic and Atmospheric Administration. 61pp.
- Nisbet, I.C.T., and J.A. Spendelow. 1999. Contribution of research to management and recovery of the Roseate Tern: Review of a twelve-year project. *Waterbirds* 22:239-252.
- Nisbet, I.C.T. 2000. Disturbance, habituation and management of Waterbird colonies. *Waterbirds* 23:
- Pierce, V. 1991. Pathology of Wildlife following a #2 Fuel Oil Spill. *The Effects of Oil on Wildlife: Research, Rehabilitation, and General Concerns*. BRRC, TSB, IWR.
- Safina, C., R.H. Wagner, D.A. Witting, and K.J. Smith. 1990. Prey delivered to Roseate and Common Tern chicks; composition and temporal variability. *Journal of Field Ornithology* 61: 331-338.
- Shealer, D.A., and J. Burger. 1993. Effects of interference competition on the foraging activity of tropical Roseate Terns. *The Condor* 95: 322-329.
- Shealer, D.A., and J. Burger. 1995. Comparative foraging success between adult and one-year-old Roseate and Sandwich Terns. *Colonial Waterbirds* 18: 93-99.
- Shealer, D.A., and S.W. Kress. 1994. Postbreeding movements and prey selection of roseate terns at Stratton Island, Maine. *Journal of Field Ornithology* 65: 349-362
- Spendelow, J.A. 1982. An analysis of the temporal variation, and the effects of habitat modification on, the reproductive success of Roseate Terns. *Colonial Waterbirds* 5:19-31.
- Spendelow, J.A., J.D. Nichols, I.C.T. Nisbet, H. Hays, G.D. Cormons, J. Burger, C. Safina, J.E. Hines and M. Gochfeld. 1995. Estimating annual survival and movement rates of adults within a metapopulation of Roseate Terns. *Ecology* 76: 2415-2428.
- Tripp, B., M. Ernst and D. Keeley (Editors) 2004. Establishing research priorities in the Gulf of Maine. Final Report. GOMC-RARGOM Theme Meeting.
- Tyrell, M.C. 2005. *Gulf of Maine Habitat Primer*. Gulf of Maine Council on the Marine Environment, www.gulfofmaine.org. vi+54 pages
- USFWS. 1989. Recovery Plan for Roseate Tern (*Sterna dougallii*). Northeast Population. Newton Corner, Massachusetts, USA.
- USFWS. 1998. Roseate Tern Recovery Plan – Northeastern Population, First Update. Hadley, Massachusetts, USA.

5.2 Data Sources

New Hampshire Bird Records

Appendix A: Species Profiles - Birds

New Hampshire Audubon and New Hampshire Fish and Game 1997 – 2004 Seavey Island Summary Reports.

Hunt, P. 2004. A regional perspective on New Hampshire's Birds of Conservation Priority: Objectives, threats, research needs, and conservation strategies. Unpublished report.

Roseate Tern Recovery Team Minutes 2000-2004
Gulf of Maine Seabird Working Group Minutes 1997 – 2004.