SPECIES PROFILE

Salt Marsh Sharp Tailed Sparrow

Ammodramus caudacutus

Federal Listing: Not listed
State Listing: Special concern
Global Rank: G4
State Rank: S3B
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Element 1: Distribution and Habitat

1.1 Habitat Description

In New Hampshire, saltmarsh sharp-tailed sparrows (hereafter, saltmarsh sparrow) inhabit salt marshes, which are grass-dominated tidal wetlands existing in the transition zone between ocean and upland (Niering and Warren 1980) (see Salt Marshes habitat profile). They breed in marshes where smooth cordgrass, saltmeadow grass, and blackgrass are bordered by cattail, reed, and marsh elder (Greenlaw and Rising 1994). Sparrows forage on the ground in dense, wet grasses (e.g., cordgrass, blackgrass), areas of wrack, and edges of ditches, pools, and salt pannes (Greenlaw and Rising 1994). Their diet consists mainly of adult and larval insects, spiders, and amphipods. Grass seeds and herbaceous plants become an important part of their diet during fall migration (Greenlaw and Rising 1994).

1.2 Justification

Saltmarsh sparrows were designated a species of high conservation priority by Partners in Flight (Breeding Tier I). In New Hampshire, the saltmarsh sparrow is a species of special concern. Saltmarsh sparrows have a restricted breeding range with 90% occurring in the Northeast (DiQuinzio et al. 2001). Therefore, protecting saltmarsh sparrow populations and their breeding habitat in the Northeast is critical to global survival of this species. Few data exist on population trends and threats, especially in New Hampshire. No long-term studies of this species have been conducted in New Hampshire. Habitat loss and degradation are probably the most pressing threats to salt marsh sparrows in New Hampshire.

Saltmarsh sparrow breeding success is related to the size of habitat patches (Shriver et al. 2004). Large patches of good-quality salt marsh habitat must be available across the landscape for sparrow populations to persist and grow. Invasive reeds and grasses, such as cattails and common reed, have replaced typical salt marsh vegetation in marshes where undersized culverts and other structures restrict tidal flooding (Sinicrope et al. 1990, Burdick et al. 1997, Brawley et al. 1998). Areas of invasive plants in and around salt marshes decrease available habitat for saltmarsh sparrows because they are not suitable habitat.

The current lack of knowledge regarding saltmarsh sparrow populations in New Hampshire and threats to these populations parallels that for other closely related salt marsh birds, such as Nelson's sharp-tailed sparrow and seaside sparrow. Additional research and monitoring may allow this salt marsh guild to serve as an indicator of marsh health, the effects of marsh degradation, and the success of habitat restoration and other management practices.

1.3 Protection and Regulatory Status

- The Migratory Bird Treaty Act of 1918 legally protects saltmarsh sparrows from the take, transport, and use of the species, including eggs, nests, and feathers.
- NHDES regulates human impacts on salt marshes. Activities that may involve filling, dredging, or destroying wetlands are subject to strict guidelines and require approved permits before work can commence (RSA 482-A).

1.4 Population and Habitat Distribution

Saltmarsh sparrows breed on the Atlantic Coast of North America from southern Maine to North Carolina (Sibley 1996). Saltmarsh sparrows inhabit salt marshes in southeastern New Hampshire (Gavutis 1994, NHBR, McElroy and Babbitt, unpublished data). Data collected in 2004 indicate 3 distinct breeding clusters: Great Bay, Rye, and a small portion of the Hampton salt marshes (McElroy and Babbitt, unpublished data). The distribution and patchiness of saltmarsh sparrow populations have changed over the last century because of large-scale changes in their habitat.

1.5 Town Distribution Map

Not completed for this species.

1.6 Habitat Map

1.7 Sources of Information

A literature review was conducted to obtain information on saltmarsh sparrow habitat, populations, distribution, and status. NHA database of bird records provided historical information on the distribution of saltmarsh sparrows in New Hampshire. Detailed information on current population distribution and status came from data collected in 2004 by researchers from UNH.

1.8 Extent and Quality of Data

Historical bird records from NHA consist of sightings reported by birders. Although this information is vital for understanding historical distribution, it does not offer an accurate view of population size or confirmed breeding locations throughout the state. The most extensive dataset to date comes from UNH researchers. It includes confirmed breeding locations and population estimates throughout the state, but covers only one year. Long-term trends in population locations and sizes in New Hampshire are still unknown.

1.9 Distribution Research

A long-term survey of salt marsh habitat specifically for saltmarsh sparrows (i.e., point counts conducted during breeding season at established points) is needed to determine distribution of the species in New Hampshire. Long-term surveys are necessary because the quality of salt marsh habitat changes over time, potentially affecting saltmarsh sparrow populations from one breeding season to the next.

Element 2: Species/Habitat Condition

2.1 Scale

The New Hampshire conservation units for saltmarsh sparrow are Great Bay and Portsmouth and Coast (including Rye, Hampton, and Seabrook).

2.2 Relative Health of Populations

In New Hampshire, the abundance of saltmarsh sparrows during the breeding season is estimated at approximately 275-300 individuals (McElroy and Babbitt, unpublished data). Because a long-term survey of saltmarsh sparrows has not yet been implemented and Breeding Bird Survey routes do not sufficiently cover salt marshes, data on population trends are not available. Data collected during the 2004 breeding season showed sparrows at the following locations, categorized by breeding activity (Confirmed Breeding = nests found and/or fledglings observed; Possible Breeding = adults present throughout season, singing activity, no evidence of nests and/or fledglings; Potential Breeding = a few birds present feeding at some point in the season, no evidence of any current breeding activity) (table 1). Estimated Relative Abundance (ERA) categories are also included.

2.3 Population Management Status

Currently no population management efforts focus on saltmarsh sparrows in New Hampshire (see Salt Marshes habitat profile).

2.4 Relative Quality of Habitat Patches

Saltmarsh sparrows tend to breed in large (greater than 20 hectares), unrestricted, *Spartina*-dominated marshes with pannes, pools, and creeks or ditches for foraging (Greenlaw and Rising 1994, McElroy and Babbitt, unpublished data). However, sparrows may occupy marshes that do not meet those criteria and may be absent from marshes that do meet the crite-

ria. Consequently, any salt marsh in New Hampshire could provide key ecological attributes. For example, small marshes might not be suitable nesting habitat but may serve as important stopover sites. More research is needed to understand the factors that determine habitat quality for salt marsh sparrows.

2.5 Habitat Patch Protection Status

See Salt Marshes habitat profile (element 2.5)

2.6 Habitat Management Status

See Salt Marshes habitat profile (element 2.6)

2.7 Sources of Information

A literature review was performed to obtain information on research and habitat management. Research by UNH scientists provided information on the population and management status. Information on habitat protection, restoration, and management came from the New Hampshire Coastal Program's website.

2.8 Extent and Quality of Data

Currently, the most extensive dataset comes from researchers at UNH and includes confirmed breeding locations and population estimates throughout the state. However, this dataset covers only one field season. Therefore, a long-term study is needed for an adequate assessment of population health and habitat suitability.

2.9 Condition Assessment Research

Long-term monitoring of saltmarsh sparrow populations is essential for knowledge of population dynamics, trends, and ecology. Monitoring will provide valuable data to increase understanding of the threats to saltmarsh sparrow and the effects of habitat management efforts.

Surveys are needed to determine abundance of saltmarsh sparrows at sites used by the species. This will provide a more accurate assessment of marshes that rank high in priority for protection or conservation. Because this species is non-territorial, point-count surveys and similar methods cannot accurately estimate population abundance. A long-term mark-recapture banding effort would provide a more accurate estimate of sparrow abundance at key sites.

A long-term dataset of presence/absence and abundance estimates at marshes throughout New Hampshire could serves as the basis for a GIS map of locations with high densities of breeding birds. This information is critical for conservation and research efforts for saltmarsh sparrows in New Hampshire and for understanding habitat suitability for this species.

Element 3: Species and Habitat Threat Assessment

3.1.1 Development (Habitat Loss and Conversion)

See Salt Marshes habitat profile

3.1.2 Development (Fragmentation)

See Salt Marshes habitat profile

3.1.2 Altered Hydrology (Tidal Restriction), Transportation Infrastructure

See Salt Marshes habitat profile

3.2.2Introduced Species (Introduced Plants), Development (Habitat Loss and Conversion)

(A) Exposure Pathway

Disturbance to a site, such as the construction of a road restricting tidal flow, can exacerbate the spread of invasive plants (Niering and Warren 1980, Benoit and Askins 1999). In New Hampshire's salt marshes, the most threatening invasive species is common reed (*Phragmites australis*) (NHCP). Purple loosestrife (*Lythrum salicaria*) and narrow-leaf cattail (*Typha angustifolia*) also can disrupt the salt marsh plant community (NHCP). Increased runoff of fresh water and storm water from developed land surrounding the marsh causes lower soil salinities in the marsh, changes in soil saturation levels, sedimentation, and increased erosion. These conditions promote the spread of invasive species (NHCP).

(B) Evidence

Dense, monotypic stands of common reed provide unsuitable or less preferable habitat and food for many wildlife species (Roman et al. 1984). According to Benoit and Askins (1999), saltmarsh sparrows, a species normally found in *Spartina* grasses, are unlikely to use a marsh dominated by tall, thick stands

of common reed. The density of the reed stands may reduce foraging success or make prey inaccessible (Benoit and Askins 1999). Benoit and Askins (1999) found that saltmarsh sparrows were much less abundant in brackish mixture, cattail, and common reed survey plots than in short-grass meadow plots.

3.2.3 Altered Hydrology (Mosquito Ditching), Altered Natural Disturbance

(A) Exposure Pathway:
By the 1930s, about 90% of salt marshes from Maine to Virginia had been ditched for mosquito control (Reinert et al. 1981, Clarke et al. 1984, Post and Greenlaw 1994). The ecological impacts of parallel or grid ditching include reduced flood duration, lowered water table, changes in species composition throughout the marsh, and reductions in invertebrate populations. Today, ditching to eliminate breeding sites of the salt marsh mosquito (*Aedes sollicitans*) is viewed as totally unnecessary and ineffective (Reinert et al. 1981). However, old ditches still affect salt marsh hydrology and health.

(B) Evidence
Mosquito ditching reduces the abundance of cordgrass, an essential habitat feature for breeding saltmarsh sparrows, by draining standing water on the marsh surface (Brawley et al. 1998). Therefore, ditched marshes are potentially less suitable for saltmarsh sparrows because they are drier and may not provide a sufficient food supply of invertebrates. In a study of avian use of ditched and unditched marshes in Rhode Island, the density of saltmarsh sparrow females was higher in unditched marshes (53.4 females/100 hectares) than in ditched marshes (34.5 females/100 hectares) (Reinert et al. 1981).

3.2.4 Mercury, Non-Point Source Pollution

(A) Exposure Pathway
Deposition and biomagnification of mercury in aquatic ecosystems is a major environmental issue (Shriver et al. 2002, Kamman et al. 2004). Mercury is emitted into the atmosphere from the combustion of fossil fuels, medical waste, and municipal waste and then deposited on the landscape (Kamman et al. 2004). Ultimately, mercury accumulates in watersheds and bioaccumulates to upper trophic levels in wetland and other aquatic systems (Kamman et al. 2004). Salt marshes receive pollution and stormwater runoff from lakes, rivers, storm drains, roads, and construction areas (NHCP). Saltmarsh sparrows are insectivorous during the breeding season, feeding primarily on immature and adult insects, supplemented by other arthropods and small mollusks (Greenlaw and Rising 1994). It is possible that saltmarsh sparrows are harmed by mercury deposition and could be indicators of methylmercury availability in New England salt marshes (Shriver et al. 2002).

(B) Evidence
The Biodiversity Research Institute in Maine has conducted numerous studies on methylmercury exposure in birds (BRI: www.briloon.org). Elevated methylmercury levels in birds have the potential to disrupt behavior, physiology, and reproductive success (Lane and Evers 2005). Recently, saltmarsh sparrows have become an increasing conservation concern. Researchers at the Biodiversity Research Institute are conducting studies to assess mercury exposure and risk to saltmarsh sparrows and other passerines breeding in New England salt marshes (see Shriver et al. 2002, Lane and Evers 2005). Lane and Evers (2005) found elevated levels of mercury in saltmarsh sparrow blood sampled at several sites from Maine and Massachusetts. In 1998-2000, 5 birds at Scarborough Marsh in Scarborough, Maine, had foot and/or beak deformities (Lane and Evers 2005).

3.2.5 Sources of Information

Information on threats to saltmarsh sparrows was obtained from a literature review, New Hampshire Coastal Program, NHNHB, and Biodiversity Research Institute in Gorham, Maine.

3.3 Extent and Quality of Data

Threats to saltmarsh sparrows have only recently gained significant attention from researchers and managers. It is well documented that historical marsh degradation from human activities is correlated with decreases in sparrow populations. However, researchers studying the effects of mercury and wetland restoration are attempting to evaluate the significance of these new threats to saltmarsh sparrows and other salt marsh nesting birds. Therefore, although the po-

tential for these threats to occur and affect sparrow populations is documented, continued research of these threats and their impacts on sparrow populations is warranted.

3.4 Threat Assessment Research

Threats to saltmarsh sparrow populations are currently being investigated and documented throughout the northeast in Maine, Massachusetts, Connecticut, and Rhode Island (see references for published studies). Researchers at UNH have started to examine threats to the state's sparrow populations, but more research is needed. For example, the impact of invasive plant species and the impact of increased human disturbance of habitats surrounding marshes (e.g., increased road density and noise) are two important areas for future research.

More research is needed to determine the effects of methylmercury on saltmarsh sparrow populations in New Hampshire. The effect of methylmercury has become a widespread regional ecological and human health concern. The Biodiversity Research Institute has started to investigate the effects of mercury on salt marsh birds in New England, but research is needed in New Hampshire. Salt marsh birds are species of high conservation priority regionally due to habitat loss and degradation. However, mercury may pose an increasing threat to these populations. Once mercury effects have been assessed through scientific research, conservation actions can be implemented to combat the issue.

Element 4: Conservation Actions

4.1.1 Protecting remaining salt marsh habitat and surrounding upland buffer habitat, Habitat Protection (See Saltmarsh Habitat Profile)

(A) Conservation Performance Objective
For saltmarsh sparrows, the salt marsh and upland buffer protection performance objective is to maintain a *Spartina*-dominated, tidal system with suitable nesting and foraging habitat. The objective for each individual site is to maintain salt marsh structure, function, and value for saltmarsh sparrow habitat. At sites currently occupied, or that could potentially be occupied, by saltmarsh sparrows, the objective would be to maintain the current habitat structure and function. The ultimate goal for the performance objective is to preserve salt marsh habitat with structure and function that does or potentially could maintain a breeding population of saltmarsh sparrows.

(B) Performance Monitoring:
Performance monitoring should be conducted at as many salt marshes (larger than 15 hectares for saltmarsh sparrows) as possible, or at sites of high priority or concern, on a regular basis. For saltmarsh sparrows, monitoring and research should focus on: habitat use (migration/breeding), abundance, density, breeding and nesting activity, nest success, foraging success, and site population trends.

(C) Ecological Response Objective
The desired ecological response to salt marsh protection is persistence of saltmarsh sparrow populations (current or new) with stable or increasing densities at all potential sites. This response should be immediate at natural, undisturbed sites that are protected from further human disturbance and development.

(D) Response Monitoring
The response indicator for successful marsh protection is stabilizing or increasing population trends at occupied sites. Therefore, the most essential and basic monitoring tool for this response is conducting bird surveys. Bird surveys, such as standardized point counts, conducted during the breeding season on an annual basis, can determine presence or absence at a particular site. Nest monitoring is also beneficial and more reliable than surveys at confirming a site as a breeding and nesting location. These data should initially be collected every breeding season until long-term population information for all potential sites in New Hampshire is obtained and trends are deemed stable or increasing. At this point, monitoring frequency could be reduced—for example, sampling at each site during 1 breeding season every 3 years.

4.1.2 Restoring degraded salt marshes back to Spartina-dominated systems, Restoration and Management (See Salt Marsh Habitat Profile)

(A) Conservation Performance Objective
Specifically for saltmarsh sparrows, the salt marsh restoration performance objective is to create a *Spartina*-dominated, tidally-influenced system with suit-

able nesting and foraging habitat. The objective for an individual site is to establish marsh structure and function comparable to that of natural, undisturbed marsh systems occupied by saltmarsh sparrows. With limited quantifiable data on time period for restoration success, Warren et al. (2002) suggests that full restoration of ecological functions, including sparrow breeding, can occur within 2 decades. Therefore, the ultimate goal for the performance objective is to create habitat with salt marsh structure and function that potentially could sustain a breeding population of saltmarsh sparrows, within 20 years of restoration.

(B) Performance Monitoring
Annual performance monitoring should be conducted at all restoration sites, including pre-restoration monitoring, if feasible. If pre-restoration monitoring is not possible due to time constraints or severity of marsh degradation, then reference site monitoring is acceptable. All monitoring and research activities should be conducted at reference sites and restoration sites to to allow assessment of restoration success. Monitoring should be performed until at least 15-20 years after restoration to determine long-term outcomes. For saltmarsh sparrows, monitoring and research priorities for assessing restoration success include: habitat use (migration/breeding), abundance, density, breeding and nesting activity, nest success, foraging success, and site population trends.

(C) Ecological Response Objective:
The desired ecological response to marsh restoration is colonization of restored sites by saltmarsh sparrows and stable or increasing populations over time. This response should be observed within approximately 15-20 years after restoration (Warren et al. 2002). Ultimately and ideally, saltmarsh sparrow abundance and population trends should be comparable to that of similar reference sites. Successful marsh restoration, in terms of saltmarsh sparrows, will be measured by the colonization and continued presence of successfully breeding sparrows (i.e., source population, or stable or increasing population size).

(D) Response Monitoring:
The response indicator for successful marsh restoration is the colonization and continued presence of successfully breeding saltmarsh sparrows. Therefore, like habitat protection, the most essential and basic monitoring tool for this response is bird surveys. Bird surveys such as standardized point counts conducted during the breeding season on an annual basis can determine presence or absence of the species. Nest monitoring is also beneficial in determining nest success at a restored site. These data should initially be collected every breeding season until long-term population information for restored sites in New Hampshire is obtained and trends are deemed stable or increasing. At this point, monitoring frequency could be reduced—for example, sampling during 1 breeding season every 3 years.

Element 5: References

5.1 Literature:

Benoit, L. K., and R. A. Askins. 1999. Impact of the spread of Phragmites on the distribution of birds in Connecticut tidal marshes. Wetlands 19:194-208.

Benoit, L. K., and R. A. Askins. 2002. Relationship between habitat area and the distribution of tidal marsh birds. Wilson Bulletin 114:314-323.

Brawley, A. H., R. S. Warren, and R. A. Askins. 1998. Bird use of restoration and reference marshes within the Barn Island wildlife management area, Stonington, Connecticut, USA. Environmental Management 22:625-633.

Broome, S. W., E. D. Seneca, and W. W. Woodhouse, Jr. 1988. Tidal salt marsh restoration. Aquatic Botany 32:1-22.

Burdick, D. M., M. Dionne, R. M. Boumans, and F. T. Short. 1997. Ecological responses to tidal restorations of two northern New England salt marshes. Wetlands Ecology and Management 4:129-144.

Clarke, J. A., B. A. Harrington, T. Hruby, and F. E. Wasserman. 1984. The effect of ditching for mosquito control on salt marsh use by birds in Rowley, Massachusetts. Journal of Field Ornithology 55: 160-180.

DiQuinzio, D. A., P. W. C. Paton, and W. R. Eddleman. 2001. Site fidelity, philopatry, and survival of promiscuous saltmarsh sharp-tailed sparrows in Rhode Island. Auk 118:888-899.

DiQuinzio, D. A., P. W. C. Paton, and W. R. Eddleman. 2002. Nesting ecology of saltmarsh sharp-tailed sparrows in a tidally restricted salt marsh. Wetlands 22:179-185.

Gavutis, G. W., Jr. 1994. Sharp-tailed Sparrow (*Am-*

modramus caudacutus). Pages 324-325 *in* C. Foss, editor. Atlas of breeding birds in New Hampshire. New Hampshire Audubon, Concord, New Hampshire.

Greenlaw, J. S., and J. D. Rising. 1994. Sharp-tailed Sparrow (Ammodramus caudacutus). Number 112 *in* A. Poole and F. Gill, editors. The birds of North America. The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA.

Hunt, P. 2004(Draft). A regional perspective on New Hampshire's birds of conservation priority: objectives, threats, research needs, and conservation strategies. New Hampshire Audubon, Concord, New Hampshire.

Johnson, R. G., and S. A. Temple. 1990. Nest predation and brood parasitism of tallgrass prairie birds. Journal of Wildlife Management 54:106-111.

Kamman, N. C., P. M. Lorey, C. T. Driscoll, R. Estabrook, A. Major, B. Pientka, and E. Glassford. 2004. Assessment of mercury in waters, sediments, and biota of New Hampshire and Vermont lakes, USA, sampled using a geographically random design. Environmental Toxicology and Chemistry 23: 1172-1186.

Lane, O., and D. Evers. 2005. Developing a geographic exposure profile of methylmercury availability in salt marshes of New England. Report BRI 2005-04 submitted to the Maine Department of Inland Fisheries and Wildlife, Maine Department of Environmental Protection, and Rachel Carson National Wildlife Refuge. Biodiversity Research Institute, Gorham, Maine.

Mitsch, W. J., and J. G. Gosselink. 2000. Wetlands. Third edition. John Wiley & Sons, Inc., New York, New York, USA.

NHCP (New Hampshire Coastal Program). New Hampshire Department of Environmental Services, Concord, New Hampshire. NHCP home page: http://www.des.state.nh.us/Coastal/ Accessed 2004 November.

NHNHB (New Hampshire Natural Heritage Bureau). 2004. Natural communities of New Hampshire. http://www.nhdfl.org/formgt nhiweb/Documents/NaturalCommunitiesWeb.pdfAccessed 2004 November.

Niehaus, A. C., S. B. Heard, S. D. Hendrix, and S. L. Hillis. 2003. Measuring edge effects on nest predation in forest fragments: do finch and quail eggs tell different stories? American Midland Naturalist 149:335-343.

Niering, W. A., and R. S. Warren. 1980. Vegetation patterns and processes in New England salt marshes. BioScience 30:301-306.

Post, W., and J. S. Greenlaw. 1994. Seaside sparrow (Ammodramus maritimus). Number 127 *in* A. Poole and F. Gill, editors. The birds of North America. The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA.

Reinert, S. E., F. C. Golet, and W. R. DeRagon. 1981. Avian use of ditched and unditched salt marshes in southeastern New England: a preliminary report. Presented at the 27th Annual Meeting, Northeastern Mosquito Control Association, Nov. 2-4, 1981, Newport, Rhode Island.

Roman, C. T., W. A. Niering, and R. S. Warren. 1984. Salt marsh vegetation change in response to tidal restriction. Environmental Management 8: 141-150.

Shriver, W. G., D. Evers, and T. Hodgman. 2002. Mercury exposure profile for sharp-tailed sparrows breeding in coastal Maine salt marshes. Report BRI 2002-11 submitted to the Maine Department of Environmental Protection. BioDiversity Research Institute, Gorham, Maine.

Shriver, W. G., T. P. Hodgman, J. P. Gibbs, and P. D. Vickery. 2004. Landscape context influences salt marsh bird diversity and area requirements in New England. Biological Conservation 119:545-553.

Sibley, D. 1996. Field identification of the sharp-tailed sparrow complex. Birding 28:197-208.

Sinicrope, T. L., P. G. Hine, R. S. Warren, and W. A. Niering. 1990. Restoration of an impounded salt marsh in New England. Estuaries 13:25-30.

Warren, R. S., P. E. Fell, R. Rozsa, A. H. Brawley, A. C. Orsted, E. T. Olson, V. Swamy, and W. A. Niering. 2002. Salt marsh restoration in Connecticut: 20 years of science and management. Restoration Ecology 10:497-513.

5.2 Data Sources:

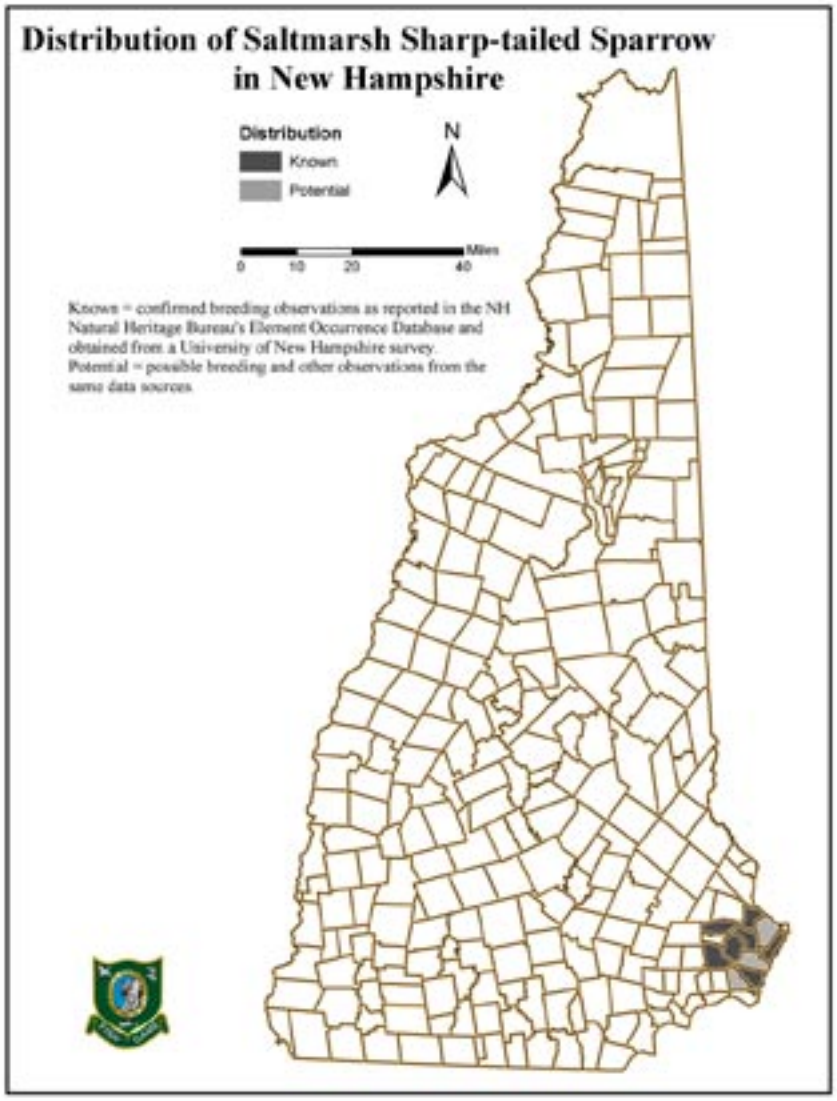
NHBR. New Hampshire Bird Records, New Hampshire Audubon, Concord, New Hampshire.

PIF (Partners in Flight). Species assessment database. Bird conservation regions: breeding scores for BCR 30 and BCR 14. PIF homepage: http://www.rmbo.org/pif/pifdb.html

Element 6: List of Figures

Table 1. New Hampshire salt marshes with saltmarsh sharp-tailed sparrows during the 2004 breeding season (McElroy and Babbitt, unpublished data).

MARSH	TOWN	BREEDING	ERA
Bay Road	Newmarket	Confirmed	16 – 30
Pierce Point	Greenland	Confirmed	< 15
Drakeside Road	Hampton	Confirmed	31 – 50
Hampton Beach	Hampton	Confirmed	> 100
Squamscott River	Newfields	Confirmed	16 – 30
Fairhill Marsh	Rye	Confirmed	31 – 50
Rye Beach	Rye	Confirmed	16 – 30
Chapman's Landing	Stratham	Confirmed	16 – 30
Sagamore Creek	Portsmouth	Possible	< 15
Awcomin Marsh	Rye	Possible	16 – 30
Hampton River	Hampton	Potential	< 15
Little River	North Hampton	Potential	< 15


Distribution of Saltmarsh Sharp-tailed Sparrow in New Hampshire
Distribution
Known
Potential
N
0
10
20
40
Miles
Known = confirmed breeding observations as reported in the NH Natural Heritage Bureau's Element Occurrence Database and obtained from a University of New Hampshire survey.
Potential = possible breeding and other observations from the same data sources