THE CONSERVATION OF TIDAL MARSH BIRDS

Guiding action at the intersection of our changing land and seascapes

Compiled Overview Report for the 2012 Field Season

A collaborative project of

The Maine Department of Inland Fisheries and Wildlife, the University of Maine, the University of Connecticut, and the University of Delaware

In cooperation with

The Connecticut Department of Energy and Environmental Protection, the Delaware Department of Natural Resources and Environmental Control, the Maryland Wildlife and Heritage Service, and Maryland/DC Audubon.

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Other Partnerships

This project is entirely dependent on a large network of stakeholders and collaborators who have provided access to historical data, logistic support for field work, and permission to access land. Numerous field assistants also helped with data collection, both past and present. Successful completion of the study would not be possible without their cooperation and help. A complete list of partners will be provided in the final report after project completion.

BACKGROUND

Tidal marshes are ecotonal systems that dominate the transition zone between terrestrial and marine communities in eastern North America (Reinold 1977, Mitsch and Gosselink 1993). Where they occur, tidal marshes perform many key services for humans. Tidal marsh is critical for absorbing the energy of ocean storms and preserving shorelines (Daiber 1986), improving water quality in bays and estuaries (Heinle and Flemer 1976, Valiela and Teal 1979, Dame et al. 1986, Valiela et al. 2000, Koch and Gobler 2009), providing nutrients to marine foodwebs (Odum 1969), and supplying critical habitat for both the reproduction of a suite of ocean species (Boesch and Turner 1984) and for non-breeding use by an entire community of migratory birds appreciated by birders and sportsmen alike (Master 1992, Erwin 1996, Brown et al. 2002). Furthermore, the shoreline of eastern North America possesses the highest level of vertebrate biodiversity and endemism of any tidal marsh region worldwide (Greenberg and Maldonado 2006).

The global importance of and local services provided by tidal marshes justifies conservationists' attention, but it is their high risk of degradation and loss that necessitates detailed information to prioritize and coordinate conservation actions. Climate change may impact the unique bird assemblage found in tidal marshes by increasing the frequency (Resio and Hayden 1975, Hayden 1981) and intensity (Emanuel 1987, Bacon and Carter 1991, Knutson 1998) of storm surges. Tidal flooding is a well-documented determinant of successful reproduction in tidal marsh birds (Gjerdrum et al. 2005, Greenberg et al. 2006, Shriver et al. 2007, Gjerdrum et al. 2008, Bayard and Elphick 2011); both sea-level rise and climate change are likely to increase this threat to many tidal marsh endemics, most of which nest on the marsh surface.

In the face of habitat degradation and loss expected to affect tidal marshes given climate change predictions, a group of academic, government, and non-profit ecologists have formed the Saltmarsh Habitat and Avian Research Program (SHARP) to gather information to aid the conservation of this ecosystem. The project will determine each state's responsibility for the conservation of tidal marsh bird species and provide a platform for long-term monitoring of the tidal marsh bird community within the non-barrier-island Atlantic coastline (corresponding to Bird Conservation Region 30 plus the Maine coast from Cape Elizabeth to Lubec; hereafter BCR30^{+}). Using a multi-tiered approach, we will collect detailed population and demographic data for bird species using tidal marsh habitat in BCR30^{+} and use these data to prioritize the importance of tidal marshes, at state and regional scales.

This report describes in detail the work conducted during the project's second field season and compiles information already reported upon by awardee states. One additional summer (2013) of field work at our demographic study sites is funded through out Multistate State Wildlife Grant. In addition 2013-14 will be spent analyzing data from all components of the study and beginning to write up results for publication in the peer-reviewed literature.

TIER SUMMARIES

Tier 1 – Filling Knowledge Gaps about Bird Use of High Marsh Communities

The goal of Tier 1 is to map the abundance and distribution of all bird species using high tidal marsh habitat of BCR30^{+} during the breeding season.

Approach – We conducted bird surveys using both passive and broadcast point count methods along the coast of BCR30^{+}. To give a more complete assessment of tidal marsh birds along the northeast coast and to facilitate comparisons with historical data sets, we extended survey effort geographically beyond BCR30 to encompass marshes from Casco Bay in Maine (the northern limit of BCR 30) to the Canadian border (Figure 1). We divided the entire study area into 9 subregions.

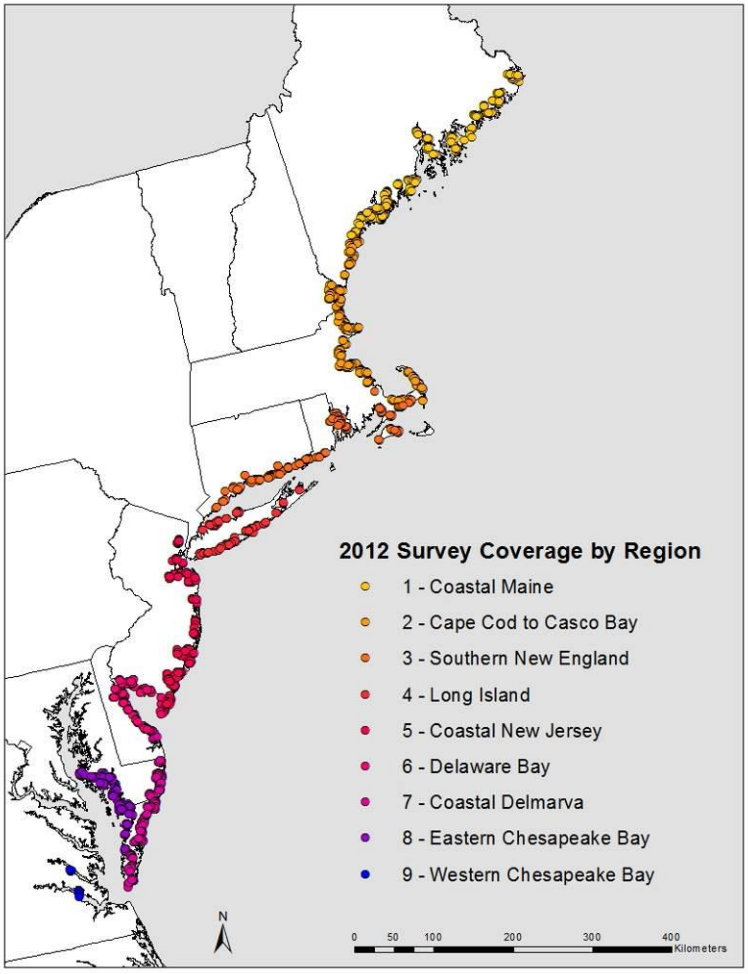

Figure 1. Distribution of survey effort within nine subregions of BCR30^{+} for the Saltmarsh Habitat and Avian Research Program (SHARP), 2012.

Point count surveys consisted of a five-minute passive period followed by a series of broadcast calls for secretive marsh birds. The total time to complete a point count ranged from 8 to 13 min, depending on the number of species included in broadcast calls for a given subregion. During this time all bird species detected by sight or sound that were using tidal marsh habitat were recorded. Surveys were completed between one half hour before sunrise and 1100 h.

Partnerships – We partnered with several agencies and conservation organizations to accomplish our Tier 1 goals. Some of these partnerships should yield information above and beyond our obligations under our SWG award, thus benefiting the saltmarsh bird resource further than anticipated. Adrienne Kovach and Jen Walsh (University of New Hampshire) collected point count data at 21 points in New Hampshire. Luanne Johnson (BiodiversityWorks) collected data at 13 points on Martha's Vineyard that were otherwise inaccessible to SHARP staff due to their island location. Dana Fillipini (National Park Service) collected data at 5 points in Boston Harbor and Cape Cod National Seashore. Erin King (USFWS) conducted point counts at 55 points in coastal Rhode Island. Point count data for 111 points on Long Island and portions of New York were collected by Steve Papa (USFWS), Lauren Puccia (Town of Babylon), Derek Rogers (The Nature Conservancy), Alison Kocek (SUNY-ESF), Michael Farina (Town of Hempstead), Lindsey Ries (National Park Service) and Kerri Dikun (Audubon New York). Audubon New York also funded a technician to be directly supervised by SHARP staff to expand coverage in Long Island Sound. In New Jersey, Chris Davis (NJ DEP) conducted point counts at 66 points in the southern portion of the state, and Paul Castelli (USFWS) conducted point counts at 86 points in E.B. Forsythe National Wildlife Refuge (NWR). Susan Guiteras (USFWS) collected data at 16 points in Bombay Hook NWR and Annie Larson (USFWS) collected data at 3 points in Prime Hook NWR, Delaware. Rick McCorkle (USFWS) conducted point counts at an additional 7 points along the Leipsic River in Delaware. Mary Elfner (VA Audubon) conducted point counts at 7 points in Virginia's western Chesapeake Bay. These various collaborations resulted in an additional 309 points visited 2-3 times over the 2012 field season. Many other collaborators supported SHARP efforts through field and logistic support, including USFWS, NPS, the University of New England, New Hampshire Fish and Game Department, Marine Biological Laboratory, Massachusetts Audubon, New York City Audubon, Maryland Ornithological Society, and the Smithsonian Migratory Bird Center.

Results – Surveys were conducted at a total of 1,707 points (Table 1), 47 more than in 2011. 1,569 of the 2012 points were also sampled in 2011. Each point was surveyed on at least two occasions and most were visited three times throughout the survey period. At least 10 days elapsed between consecutive surveys at individual points.

Raw occurrence data are summarized in Table 1, illustrating the frequency with which each focal species was detected in each state. Additional analysis of survey data will be conducted during 2013-14.

Table 1. Number of survey points visited in 2012 and proportion of those points where each of the focal high marsh species was detected, for each of the ten states currently included in the SHARP sampling scheme.

State	Survey points	Occurrence (% points where detected)					
		American Black Duck	Clapper Rail	Willet	Nelson's Sparrow	Saltmarsh Sparrow	Seaside Sparrow
ME	305	13.1	0	21.6	45.9	13.4	0
NH	62	0	0	33.9	8.1	12.9	0
MA	256	4.3	0.4	45.7	5.5	28.5	1.6
RI	54	0	1.9	59.3	0	59.3	3.7
CT	90	5.6	26.7	58.9	0	36.7	14.4
NY	111	0.9	45.0	64.9	0	41.4	27.0
NJ	339	11.5	70.5	65.2	0.3	39.8	56.3
DE	93	5.4	62.4	59.1	0	16.1	63.4
MD	221	30.8	57.0	52.9	1.8	30.8	76.9
VA	176	8.0	92.0	69.9	2.3	25.0	35.2
Total	**1707**	**10.7%**	**38.7%**	**51.4%**	**9.9%**	**29.0%**	**31.1%**

Preliminary Analysis - Remote sensing is a potential way to quickly and economically predict occurrence and abundance of bird species in the face of a rapidly changing land-sea interface. To develop these tools for managers across this broad region, we used vegetation indices such as the Normalized Difference Vegetation Index (NDVI), the Normalized Difference Moisture Index (NDMI) as well as Thematic Mapper (TM) band values from Landsat images collected within the time frame of our surveys to predict marsh bird species occurrence in our study area. In the analyses conducted to date, we found significant differences in NDVI and NDMI values between survey points where Willets were detected versus survey points where they were not (Welch's t-test, $p=0.01$ and $p< 0.0001$, respectively). We also found significant differences in NDVI and NDMI values at survey points where sharp-tailed sparrows (Nelson's and Saltmarsh Sparrows) were detected versus points where they were not (Welch's t-test, $p < 0.0001$, $p=0.004$ respectively). These preliminary results are the beginning of a larger analysis of NDVI, NDMI, and TM band values to develop a cost-effective tool for monitoring marsh-bird populations in the northeast.

Anticipated Changes – Due to newly obtained funding sources, SHARP surveys will be repeated in Long Island Sound marshes during 2013, as part of a larger project focused

on identifying sentinels of climate change in the region and better understanding the effects of saltmarsh transgression due to sea-level rise. In addition, an attempt to more fully explore the upriver extent of the Nelson's Sparrow range will occur in select tidal rivers from Massachusetts to Maine in 2013. Otherwise, SHARP surveys will not continue in 2013 unless additional funding becomes available.

Tier 2 – Contemporary Surveys of Historical Sites

The goals of the second tier are two-fold: A) to repeat surveys in the area studied extensively by Hodgman et al. (2002) and Shriver et al. (2004) to provide a contemporary comparison for the southern surveys from Tier 1, and B) to estimate changes in bird distribution and abundance over time across sites where historical data exist.

Approach – Our approach to Tier 2 uses the same sampling frame as Tier 1. However, in Tier 2 our analyses differ in that we will use historical data as reference points for the dynamics of the saltmarsh bird community.

Results – For our entire BCR30^{+} study area, we have assembled historical saltmarsh bird data from 14 sources, spanning 10 states, and totaling 3,006 points (Figure 2). During the 2012 field season, 457 of our survey points were at locations for which historical bird counts are available (26% of the total number of points; Table 2). No analyses including historical data have been completed to date. A significant effort to bring these varied datasets into a common format, however, is scheduled for 2013.

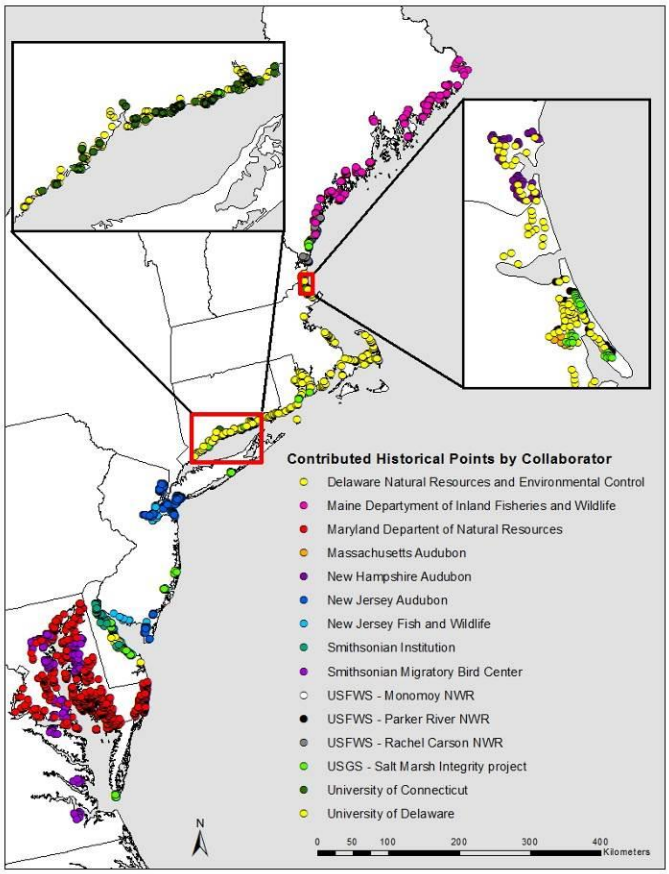

Figure 2. Distribution of historical survey points for saltmarsh birds for which data have been provided to the Saltmarsh Habitat and Avian Research Program (SHARP). A subset of these points have been surveyed during our current research (26% of the SHARP survey points) to allow comparisons between current and historical abundance and distribution.

Table 2. Summary of historical point count data currently available for analysis and number of historical points resurveyed by SHARP during the 2011 and 2012 field seasons.

State	Historical points contributed	Historical points re-surveyed (2011)	Historical points re-surveyed (2012)
ME	698	123	122
NH	22	19	19
MA	296	47	48
RI	64	18	19
CT	287	56	57
NY	32	8	8
NJ	481	25	32
DE	181	57	53
MD	617	73	86
VA	328	14	13
Total	**3006**	**440**	**457**

Tier 3 – Assessing Geographic Trends in Demography

The goal of Tier 3 is to understand how demographic rates for Species of Greatest Conservation Need vary across BCR30. The data requirements for determining such rates prevent us from sampling as extensively as for Tiers 1 and 2. Instead, we have centered our work in several focal areas spanning BCR30 for intensive study of demographic parameters.

Approach – In 2010-11, we established sites for intensive demographic studies in Maine, Connecticut, and New Jersey, supplemented by collaborators' sites in New Hampshire, Massachusetts, and Rhode Island. In 2012, we added sites in New York. This geographic scope will provide insight into the biology of saltmarsh breeding birds, given variation in climate, vegetation, predators, and other aspects of the saltmarsh ecosystem across BCR30. Sampling for Saltmarsh Sparrow is especially comprehensive as our study sites span the species' breeding range.

In each area, we established focal plots for intensive study. In 2012, we collected demographic information at four plots in Maine, two in New Hampshire, two in Rhode

Island, five in Connecticut, four in New York and three in New Jersey. Plots varied in size depending on access constraints and marsh size, but most were 10-25 ha in size.

Field crews searched each plot for nests on a regular basis, and conducted systematic mist-netting using a standardized protocol at regular intervals throughout the breeding season. In addition, we conducted opportunistic netting to capture adults as they arrived on the breeding grounds and targeted females that were associated with nests discovered during nest searches. All nests were monitored using a standardized protocol in order to track nest success and to gather information on the causes of nest failure. All captured birds were banded, measured, and released in order to gather information on survival rates and potential factors that might affect survival. Further mist-netting was also conducted during the breeding season along a transect from Lubec, Maine to Rhode Island, during spring and fall migration at our sites in Connecticut, and at a number of sites on the wintering grounds. This supplemental banding – conducted as part of two graduate student studies – resulted in many additional birds being banded and in recaptures of birds that were also caught during the breeding season and has contributed important information for our survival analyses.

Results – All study plots were monitored for nesting from May through August 2012. Across the different sites, we found a total of 652 nests of the six focal species (Table 3), bringing the project total to 1153 nests. All nests were monitored to determine nest fates and fledgling production.

Table 3. Number of nests found for each focal tidal marsh species during the 2012 field season.

Study area	American Black Duck	Clapper Rail	Willet	Nelson's Sparrow	Saltmarsh Sparrow	"sharp-tailed" sparrow*	Seaside Sparrow	Totals
ME	0	0	12	23	78	72	0	**185**
NH	0	0	0	4	49	23	0	**76**
MA	1	0	7	0	12	-	0	**20**
RI	0	0	1	0	26	-	0	**27**
CT	2	6	31	0	66	-	18	**123**
NY	0	0	1	0	29		6	**36**
NJ	1	2	17	0	90	-	75	**185**
Total	**4**	**8**	**69**	**27**	**350**	**95**	**99**	**652**

* At northern study sites, Nelson's and Saltmarsh Sparrows hybridize; consequently, not all "sharp-tailed" sparrow nests can be assigned to species.

Across all sites we banded a total of 95 Nelson's Sparrows, 1193 Saltmarsh Sparrows, 158 unidentified "sharp-tailed" sparrows, and 310 Seaside Sparrows (Table 4). Across all three sparrow species, we had 695 recaptures of birds banded earlier in the field

season or during previous banding work. These recapture data will be used in mark-recapture models to estimate survival rates.

In addition to the summer banding on our demography plots, students from the University of New Hampshire conducted breeding season mist-netting along a transect from Lubec, Maine to Rhode Island, capturing an additional 159 sharp-tailed sparrows. Similarly, all of our Connecticut study sites were visited at least once during the spring and once during the fall as part of another student project, resulting in the banding of an additional 228 Saltmarsh Sparrows, 59 Seaside Sparrows and 33 Nelson's Sparrows. Migration banding also produced 115 additional Saltmarsh Sparrow recaptures and 21 additional Seaside Sparrow recaptures. These supplemental banding activities were not part of our standard sampling scheme, but provide extra information that will enhance our survival analyses.

Table 4. Summary of sparrow banding data from demographic plots during the 2012 field season (excludes supplemental banding).

Study area	Nelson's Sparrow	Saltmarsh Sparrow	"sharp-tailed" sparrow*	Seaside Sparrow	% of females attending nests	Total # sparrow recaptures
Maine	70	275	129	0	64%	155
New Hampshire	18	63	29	0	78%	118
Massachusetts	0	153	0	3	75%	52
Rhode Island	0	73	0	0	8%	45
Connecticut	7	206	0	36	39%	201
New York	0	69	0	20	27%	17
New Jersey	0	354	0	251	31%	107
Total	**95**	**1193**	**158**	**310**	**-**	**695**

* At northern study sites, Nelson's and Saltmarsh Sparrows hybridize; consequently, not all birds can be assigned to species.

Photo Credits

Cover by Mo Correll; stone wall, *Juncus gerardii*, Saltmarsh Sparrow by Alyssa Borowske; conducting point count survey by Matt Jones; sparrow nest by Kate Ruskin; Clapper Rail nest by Chris Field; Nelson's Sparrow by Chris Elphick.

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