Saltmarsh Sparrow. Ray Hennessy

Goal Statement

The Saltmarsh Sparrow (Ammospiza caudacuta) is a Species of Greatest Conservation Need in Connecticut. This document is intended to provide those interested in salt marsh and Saltmarsh Sparrow conservation with information that will help with conservation implementation. It identifies areas containing salt marsh that are good candidates for restoration, enhancement, and/or conservation to provide persistent high-quality Saltmarsh Sparrow nesting habitat in the next 6 years in addition to long-term salt marsh resilience.

Saltmarsh Sparrow Objectives from the Atlantic Coast Joint Venture (ACJV)

The ACJV’s Saltmarsh Sparrow Conservation Plan (Hartley and Weldon, 2020) identifies state-by-state population and habitat goals for the Saltmarsh Sparrow based on a goal population of 25,000 birds; this goal is lower than published population estimates as of 2011/2012 (Wiest et al. 2019) due to the projected impacts of sea-level rise on nesting success of the species (Field et al. 2017). Connecticut’s breeding Saltmarsh Sparrow population is estimated to be 2.7% of the global population; its population goal was therefore calculated as 2.7% of the regional population goal of 25,000 birds. Habitat goals listed in the table below are the minimum acres of high-quality habitat (defined below) needed to support the state’s population goal. The short-term habitat goal sets a realistic target for the next 6 years (by 2030); the long-term habitat goal is set to achieve and sustain the state’s Saltmarsh Sparrow population goal.

<table>
<thead>
<tr>
<th>State</th>
<th>2011/2012 Population Estimate*</th>
<th>State’s %</th>
<th>Population Goal (Indiv)</th>
<th>2030 high marsh goal (ac)**</th>
<th>Total marsh needed to meet 2030 goal (ac)**</th>
<th>Long-term (2069) High Marsh Goal** (ac)</th>
<th>Total marsh needed to meet 2069 goal (ac)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecticut</td>
<td>1,600 (+/-800)</td>
<td>2.7%</td>
<td>668</td>
<td>742</td>
<td>2,061</td>
<td>2,180</td>
<td>6,056</td>
</tr>
<tr>
<td>Regional</td>
<td>60,000</td>
<td>25,000</td>
<td>22,943</td>
<td>63,731</td>
<td>79,603</td>
<td>221,119</td>
<td></td>
</tr>
</tbody>
</table>

* Goals reflect acreage of high-quality habitat defined as habitat capable of supporting population growth

** Acreage based on the assumption that ~36% of tidal marsh acreage is high marsh (Correll et al. 2019)
High-quality Habitat for Saltmarsh Sparrows

High-quality habitat is defined as conditions that allow sufficient reproductive success to support a stable or growing Saltmarsh Sparrow population. Conservation should focus on preserving, restoring, or enhancing high-quality breeding habitat which has the following characteristics:

- High marsh patches with the lowest flooding frequency which provide a relatively safe window of at least 24 days with limited flooding. Flooding frequency is directly related to elevation, which can be linked to ditching in Connecticut marshes; on many unditched marshes in this area the marsh platform can be higher than ditched marsh (Warren et al. 1993, LeMay 2007). On ditched marshes the highest ground is often along the creek edge where levees provide cover of *Spartina patens*, while the marsh platform is a lower-elevation basin predominantly composed of short form *Spartina alterniflora*.

- Extensive and dense *S. patens* vegetation with a deep, well-developed thatch layer; the presence of *Juncus gerardii* can also indicate low flooding rates. *J. gerardii* is generally found on the highest ground adjacent to the upland where groundwater discharge creates oligohaline to mesohaline water chemistry. It is generally not found on salt marsh levees but is often the dominant grass on the levees of brackish mesohaline marshes like Great Island.

- The highest quality high marsh habitat is most often found in the least modified marshes, such as those without ditching, or that are downstream, or free of tidal restrictions like road crossings.

Marsh Identification and Prioritization Process

Marsh parcels were identified and characterized by the Connecticut Tidal Wetlands Working Group. The group includes biologists, wetland scientists from both Connecticut Department of Energy and Environmental Protection (CT DEEP) and academia, and regulators from Army Corps of Engineers, Environmental Protection Agency, and National Marine Fisheries Service. This group has been in existence for over 20 years and meets annually to discuss and implement beneficial coastal wetland restoration/enhancement projects. The selected marshes were then reviewed, and content honed by a group of partners with Saltmarsh Sparrow and tidal marsh expertise specific to Connecticut. The original document was completed April 2022, with content updated for version 2.0 in May 2024.

The information in this document including spatial delineations of priority marshes are available as part of a regional set of marsh restoration priorities for the Saltmarsh Sparrow. This information is available to view on the ACJV Saltmarsh Sparrow mapper.
Restoration Technique Definitions

The following terms are used repeatedly throughout this document to identify opportunity for different techniques at identified marshes, including in the “attributes” section. *This information is meant to identify opportunity and potential for these restoration techniques at each site but is not meant to be prescriptive.* A formal site assessment and design is always necessary to identify specific next steps and restoration strategies within each marsh parcel.

**Sediment placement**
Placement of material (including sediments from dredging efforts) on the marsh platform. Includes thin-layer placement, thick-layer placement, beneficial use of dredged sediments, formation of hummocks/microtopography, etc.

**Repair hydrology - runnelling / channel creation**
Modification of marsh platform using shallow channel creation to remove or prevent ground water saturation at the marsh surface that results in marsh vegetation death and marsh subsidence. Excavated peat is reused to create structured microtopography.

**Repair hydrology - tidal restriction mitigation**
Removal or modification of large-scale tidal restrictions such as road crossings, culverts, bridges, etc. to restore tidal flow.

**Repair hydrology - address ditch plugs**
Adjustment of ditch plugging on marsh platform to improve hydrology.

**Repair hydrology - ditch remediation**
Adjustment of human-made ditches on the marsh platform to improve hydrology.

**Repair hydrology - berm, embankment, or levee modification**
Removal or alteration of berms, stonewalls or embankments to restore hydrology of marsh platform and marsh migration corridor.

**Land acquisition / protection for marsh migration**
Purchase or easement of land to protect for eventual marsh migration.

**Facilitated marsh migration**
Active assistance of marsh migration through modification of the environment.

**Invasive plant species mitigation (Phragmites australis, etc.)**
Removal or mitigation of invasive plants.

**Living shoreline development**
Development of nature-based features to promote shoreline stabilization.

**Wildlife herbivory mitigation**
Removal or management of wildlife due to overgrazing. Wildlife includes deer, horses, crabs, geese, etc.

**Stormwater mitigation**
Management of stormwater inputs to reduce water, nutrients, and sediment.

**Additional ecological assessment needed**
Additional monitoring and site assessment is necessary to determine specific next steps or assess existing restoration efforts at this site.
Priority Marshes

The following marshes have been prioritized for ongoing restoration planning and action to support the Saltmarsh Sparrow in Connecticut.
Existing Conditions
Barn Island is a highly studied coastal system on the Atlantic coast. It is jointly owned by CT DEEP, Avalonia Land Conservancy LLC, and the Davis family. The current restoration issues revolve around tidal restrictions into the five impoundments and extensive mosquito ditching throughout the marsh. The ditched portions of the marsh cannot retain and capture the fine sediments that are brought in with tidal exchange, while the unditched marsh is able to capture these sediments and maintain higher elevation than the ditched marsh. The ditched marsh continues to get more saturated over time, while the unditched marsh maintains natural levees that form along waterways from sediment deposits through cycling of pooling and breaching. Unditched marsh constitutes the majority of high marsh in the site.

Existing Projects
CT DEEP: Worked with Ducks Unlimited to develop designs and implement modification water control structures/culverts. This was completed in 2022 to remove restrictions within four impoundments. Restoration removed undersized culverts, replacing them with suitably sized culverts to increase tidal exchange. There is still work to be done on the largest impoundment. This work was supported by an Environmental Protection Agency grant. Best contact; Min Huang (Min.Huang@ct.gov), Bri Benvenuti (bbenvenuti@ducks.org)

Existing Sparrow Data
Saltmarsh Sparrows are present and confirmed breeding at this site (SHARP 2021/2022; SHARP 2023). This is also a long-term demographic research site through the University of Connecticut.

Recommended Management / Next Steps To Management Action
• Improve hydrology through selective runnelling to improve hydrology and promote vegetation growth.
• Experiment with ditch infilling in non-primary ditches.
• Experiment with enhancing creek-side levees by adding material.
• Assess the condition of ditches to assess aggrading and occurrence of S. patens on ditch side.
• Additional ecological assessment needed in tandem with experimental manipulations
• Experiment with facilitated marsh migration.
## Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sediment placement</td>
<td>N</td>
</tr>
<tr>
<td>Repair hydrology - runnelling / channel creation</td>
<td>Y</td>
</tr>
<tr>
<td>Repair hydrology - tidal restriction mitigation</td>
<td>Y</td>
</tr>
<tr>
<td>Repair hydrology - address ditch plugs</td>
<td>Y</td>
</tr>
<tr>
<td>Repair hydrology - ditch remediation</td>
<td>Y</td>
</tr>
<tr>
<td>Repair hydrology - berm, embankment, or levee modification</td>
<td>Y</td>
</tr>
<tr>
<td>Land acquisition / protection for marsh migration</td>
<td>Y</td>
</tr>
<tr>
<td>Facilitated marsh migration</td>
<td>Y</td>
</tr>
<tr>
<td>Invasive plant species mitigation (Phragmites australis, etc.)</td>
<td>Y</td>
</tr>
<tr>
<td>Living shoreline development</td>
<td>N</td>
</tr>
<tr>
<td>Wildlife herbivory mitigation</td>
<td>N</td>
</tr>
<tr>
<td>Stormwater mitigation</td>
<td>Y</td>
</tr>
<tr>
<td>Additional ecological assessment needed</td>
<td>Y</td>
</tr>
</tbody>
</table>

*A saltmarsh sparrow finds refuge in some short-form Spartina alterniflora. Ray Hennessy*
SALS detections 2021 - 2022

- Present
- Absent

Priority Marshes

Protected
- State
- Federal
- NGO
- Other
- Unprotected

Barn Island
Great Island Marsh Complex (Great Island, Upper Island, Black Hall, Lieutenant River) – 746 acres (302 ha)

Existing Conditions
This marsh complex is jointly owned by CT DEEP, The Nature Conservancy, and various private landowners. There are large, healthy stands of J. gerardii (Great Island), Invasive Phragmites australis (hereafter Phragmites) present, and the marsh is ditched.

Existing Projects
CT DEEP: Restoration work has been proposed at the southwest corner of Great Island. Support is still needed for all aspects of the project. Best contact: (Min.Huang@ct.gov)

Audubon Connecticut: Proposed work at their new Roger Tory Peterson Estuary Center (100 Lyme St, Old Lyme) on the Lieutenant River. Support is still needed for all aspects of the project. Best contact: Corrie Folsom O'Keefe (cfolsom.okeefe@audubon.org)

Existing Sparrow Data
Saltmarsh Sparrows present (eBird 2023) and confirmed breeding at this site (Elphick et al. 2009).

Recommended Management / Next Steps To Management Action
• Manage Phragmites.
• Experiment with enhancement of primary ditches and closure of secondary ditches (e.g. remediation or other methods).
• Measure bank elevations and vegetation communities of plugged ditches.
• Experiment with enhancing creek-side levees by adding material landward to widen levees (i.e. creating micro-topography).
• Assess aggrading and occurrence of S. patens on ditches.
• Additional ecological assessment needed in tandem with experimental manipulations

Attributes
Sediment placement Y
Repair hydrology - runnelling / channel creation Y
Repair hydrology - tidal restriction mitigation N
Repair hydrology - address ditch plugs Y
Repair hydrology - ditch remediation Y
Repair hydrology - berm, embankment, or levee modification Y
Land acquisition / protection for marsh migration N
Facilitated marsh migration N
Invasive plant species mitigation (Phragmites australis, etc.) Y
Living shoreline development N
Wildlife herbivory mitigation N
Stormwater mitigation Y
Additional ecological assessment needed Y
Large stands of Phragmites cover portions of Great Island Marsh. Sharon Hahn Darlin, Creative Commons
Ragged Rock Marsh – 324 acres (131 ha)

**Existing Conditions**
This marsh is jointly owned by CT DEEP and numerous private landowners. The outer portion of this system is separated from the main marsh by a north-to-south running creek and the marsh is unditched. The rest of the site is ditched to some extent. *Phragmites* is present.

**Existing Projects**
There are no restoration projects at this site.

**Existing Sparrow Data**
Saltmarsh Sparrows present (eBird 2018) but breeding has not been confirmed.

**Recommended Management / Next Steps To Management Action**
- Manage *Phragmites*.
- Assess elevations between unditched and ditched portions of the marsh.
- Additional ecological assessment needed in tandem with experimental manipulations.
- Experiment with berm, embankment, or levee modification.
- Experiment with runnelling and/or channel creation.

**Attributes**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sediment placement</td>
<td>Y</td>
</tr>
<tr>
<td>Repair hydrology - runnelling / channel creation</td>
<td>Y</td>
</tr>
<tr>
<td>Repair hydrology - tidal restriction mitigation</td>
<td>N</td>
</tr>
<tr>
<td>Repair hydrology - address ditch plugs</td>
<td>Y</td>
</tr>
<tr>
<td>Repair hydrology - ditch remediation</td>
<td>Y</td>
</tr>
<tr>
<td>Repair hydrology - berm, embankment, or levee modification</td>
<td>Y</td>
</tr>
<tr>
<td>Land acquisition / protection for marsh migration</td>
<td>N</td>
</tr>
<tr>
<td>Facilitated marsh migration</td>
<td>N</td>
</tr>
<tr>
<td>Invasive plant species mitigation (<em>Phragmites australis</em>, etc.)</td>
<td>Y</td>
</tr>
<tr>
<td>Living shoreline development</td>
<td>N</td>
</tr>
<tr>
<td>Wildlife herbivory mitigation</td>
<td>N</td>
</tr>
<tr>
<td>Stormwater mitigation</td>
<td>Y</td>
</tr>
<tr>
<td>Additional ecological assessment needed</td>
<td>Y</td>
</tr>
</tbody>
</table>

*Ragged Rock Marsh. Keith Thom, Creative Commons*
Hammock River Marsh Complex – 309 acres (129 ha)

Existing Conditions
This is the highest priority for restoration in the state. The marsh is owned by CT DEEP and various private landowners. The Hammock River marsh complex has numerous agricultural features (ditching, embankments) as well as several tidal restrictions. Tide gates that run under Beach Park Rd impede full tidal flushing and effectively raise the water table by not allowing all the water in the marsh to exit during outgoing tides.

Existing Projects
CT DEEP: Partnering with Ducks Unlimited, Town of Clinton, U.S. Fish and Wildlife Service Coastal Program, and NOAA Restoration Center to replace an existing bridge, widen its span to mirror that of the Hammock River, and install four self regulating tide gates. Once construction is completed, the tide gates will allow managers to test the hypothesis that tides can be dampened during the nesting period to increase nesting success of saltmarsh sparrows and other tidal marsh nesting birds. Estimated cost of design, permitting, and construction is approximately $9,500,000. Funds have been secured for all project phases (design, permitting, construction). This project, when completed, will positively impact over 250 acres of salt marsh. Additional support is still needed for implementation and monitoring. Best contact: Bri Benvenuti (bbenvenuti@ducks.org), Min Huang (Min.Huang@ct.gov)

Existing Sparrow Data
Saltmarsh Sparrows are present and confirmed breeding at this site in very high densities (Ducks Unlimited 2023). This site was also monitored by the University of Connecticut in the early 2000s.

Recommended Management / Next Steps To Management Action
- Replace the bridge and install self-regulating tide gates under Beach Park Rd. This will remove the restriction (bridge) and facilitate restoration through a slow drying of the marsh by allowing less water into the system so that the water behind the gates will fully exit on the outgoing tide cycle, and test whether dampening spring tides through the gate will increase nesting success.
- Evaluate and upgrade additional crossings at Beach Park Road (pipe culvert), Causeway Road, and Route 1.
- Improve hydrology through selective runnelling and/or ditch remediation to improve hydrology, sedimentation and promote vegetation growth.
- Additional ecological assessment needed in tandem with experimental manipulations
- Experiment with berm, embankment, or levee modification
- Clinton Harbor (adjacent to marsh) is dredged regularly. Explore the possibility of sediment placement.
Attributes

- Sediment placement: Y
- Repair hydrology - runnelling / channel creation: Y
- Repair hydrology - tidal restriction mitigation: Y
- Repair hydrology - address ditch plugs: Y
- Repair hydrology - ditch remediation: Y
- Repair hydrology - berm, embankment, or levee modification: Y
- Land acquisition / protection for marsh migration: N
- Facilitated marsh migration: N
- Invasive plant species mitigation (*Phragmites australis*, etc.): Y
- Living shoreline development: N
- Wildlife herbivory mitigation: N
- Stormwater mitigation: Y
- Additional ecological assessment needed: Y
Hammock River Marsh Complex
Hammonassett Marsh Complex – 679 acres (275 ha)

Existing Conditions
This marsh is owned by CT DEEP. There is a need for Integrated Marsh Management (Rochlin et al. 2012) in some areas of the system. The Hammonassett marsh complex has numerous agricultural features (ditching, embankments) as well as several tidal restrictions with deteriorating infrastructure. Additionally, there is significant erosion occurring at various areas within the estuary.

Existing Projects
**Audubon Connecticut**: Partnering with CT DEEP, Parks, U.S. Fish and Wildlife Coastal Program, and Ducks Unlimited on conceptual designs for living shoreline and to conduct experimental manipulations of ditches, and remove several restricting culverts. Funding exists for designs and permitting; support still needed for implementation and monitoring. Best contact: Corrie Folsom O’Keefe (efolsom.okeefe@audubon.org), Roger Wolfe (roger.wolfe@ct.gov)

Existing Sparrow Data
Saltmarsh Sparrows detected, negative growth rate for Saltmarsh Sparrows (Field et al. 2017, 2018). This is also a long-term demographic monitoring plot for The University of Connecticut.

Recommended Management / Next Steps To Management Action
- Evaluate and address tidal crossings/restrictions.
- Assess and improve hydrology through selective runnelling and/or ditch remediation to improve hydrology, sedimentation, and promote vegetation growth.
- Experiment with enhancing creek-side levees by creating microtopography.
- Evaluate and address erosion through living shoreline.
- Evaluate future potential for sediment placement.
- Additional ecological assessment needed in tandem with experimental manipulations.
- Experiment with berm, embankment, or levee modification.

Attributes
- Sediment placement: Y
- Repair hydrology - runnelling / channel creation: Y
- Repair hydrology - tidal restriction mitigation: Y
- Repair hydrology - address ditch plugs: Y
- Repair hydrology - ditch remediation: Y
- Repair hydrology - berm, embankment, or levee modification: Y
- Land acquisition / protection for marsh migration: N
- Facilitated marsh migration: N
- Invasive plant species mitigation (*Phragmites australis*, etc.): Y
- Living shoreline development: Y
- Wildlife herbivory mitigation: N
- Stormwater mitigation: N
- Additional ecological assessment needed: Y
Hammonasset Marsh Complex
**Existing Conditions**
This marsh is owned by CT DEEP and numerous private landowners. Tidal restrictions in the western section of this marsh complex (Sluice Creek) are resulting in loss of high marsh and conversion to low marsh and low marsh to panne. Grid ditching throughout the marsh complex.

**Existing Projects**
**CT DEEP:** Partnering with Ducks Unlimited, Town of Guilford, CT Waterfowl Association, and University of Connecticut to cut a new channel, thus bypassing the restriction/marina. This will restore 127 acres to high marsh. Final design and permit submission are complete. Support is still needed for implementation and monitoring. Best contact: Min Huang (min.huang@ct.gov)

**Existing Sparrow Data**
Saltmarsh Sparrows detected and confirmed breeding at this site (SHARP 2021/2022; SHARP 2023). The University of Connecticut has demographic data for the Sluice Creek portion of the marsh in the early/mid 2000s and from 2021-2024.

**Recommended Management / Next Steps To Management Action**
- Experiment with creating microtopography
- Experiment with runnelling / channel creation
- Experiment with berm, embankment, or levee modification

**Attributes**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sediment placement</td>
<td>Y</td>
</tr>
<tr>
<td>Repair hydrology - runnelling / channel creation</td>
<td>Y</td>
</tr>
<tr>
<td>Repair hydrology - tidal restriction mitigation</td>
<td>Y</td>
</tr>
<tr>
<td>Repair hydrology - address ditch plugs</td>
<td>Y</td>
</tr>
<tr>
<td>Repair hydrology - ditch remediation</td>
<td>Y</td>
</tr>
<tr>
<td>Repair hydrology - berm, embankment, or levee modification</td>
<td>Y</td>
</tr>
<tr>
<td>Land acquisition / protection for marsh migration</td>
<td>Y</td>
</tr>
<tr>
<td>Facilitated marsh migration</td>
<td>N</td>
</tr>
<tr>
<td>Invasive plant species mitigation (Phragmites australis, etc.)</td>
<td>Y</td>
</tr>
<tr>
<td>Living shoreline development</td>
<td>N</td>
</tr>
<tr>
<td>Wildlife herbivory mitigation</td>
<td>N</td>
</tr>
<tr>
<td>Stormwater mitigation</td>
<td>Y</td>
</tr>
<tr>
<td>Additional ecological assessment needed</td>
<td>Y</td>
</tr>
</tbody>
</table>
Honorable Mention

The following marsh was identified by the partner group as important to keep in mind due to past or future work. For more information on Honorable Mention marshes please reach out using the contact information provided at the end of this document.

Great Meadows Marsh, Stewart B. McKinney NWR - 368 acres (149 ha)

Great Meadows marsh is part of Stewart B. McKinney NWR and has been in active restoration for the past 15 years. Restoration is now complete and ongoing monitoring is occurring for Saltmarsh Sparrows. As part of the Great Meadows restoration, project partners wanted to build elevated sediment hummocks in the area utilized by Saltmarsh Sparrows to increase high marsh cover for nesting purposes. The hummocks are small mounds of soil (14 in total, mean footprint = 272 m²) built up above the surrounding marsh and experimentally planted with high marsh grasses. Partners of the restoration are exploring whether the hummocks could provide nesting habitat.

Two years before the restoration, refuge staff (with the support of partners) surveyed the area to record areas where Saltmarsh Sparrows nested before the restoration. The creation of the hummocks was designed to have minimal impact on the historical nesting areas of the Saltmarsh Sparrow. The refuge partnered with the University of Connecticut to monitor the historical nesting site of the sparrows and the newly created hummocks.

Seedlings of marsh plants are staged for planting at Great Meadows Chris Elphick
Best Practices For Marsh Management For Saltmarsh Sparrow

The lands listed below are large parcels of existing tidal marsh that hold potential for management action to benefit the Saltmarsh Sparrow. Any management actions should follow best practices to not irreparably harm existing Saltmarsh Sparrow habitat. Necessary precautions include:

- Consult local land managers and owners before any monitoring or management action is planned.
- Initially limit management impact to a small portion of the high marsh (e.g. <25%).
- Conduct all management action outside the window of active Saltmarsh Sparrow breeding season (avoid May – September annually).

*Hummocks created at Great Meadows Marsh in Stewart B. McKinney NWR. Chris Elphick*
Policy

Challenges
Federal-level permitting of coastal wetland projects is a significant challenge and bottleneck towards progress. This bottleneck is not unique to Connecticut. Further, personnel shortages within CT DEEP are making it difficult to conduct coastal wetland work in-house. This capacity issue adds time to projects and increases overall costs due to outsourcing these efforts that could be done more cheaply by the state.

Potential Solutions
Compiling permitting barriers that are common across states (e.g. US Army Corps Of Engineers, Environmental Protection Agency, Fish and Wildlife Service, National Marine Fisheries Service) will help facilitate high-level discussions amongst administrators and determine whether the process can be streamlined for certain activities and for activities proposed by certain agencies.

Monitoring
Any habitat restoration efforts should be monitored both pre-construction and post-construction to measure change and determine whether management goals have been met. This monitoring will ideally include an array of ecological metrics including (but not limited to) hydrology, vegetation, bird community, and elevation specific to tidal marshes in Connecticut. It is integral to build upon the existing knowledge base for salt marsh restoration in this area by collecting robust pre- and post- monitoring data to understand the impact of marsh adaptation techniques and support the permitting process for new locations. Post-management monitoring should ideally extend at least 3-5 years and up to 10 for bird monitoring specifically.

The ACJV, SHARP, and Ducks Unlimited recently released recommendations for monitoring saltmarsh sparrows at restoration sites which includes a decision tree for deciding timelines, level and type of monitoring, and spatial distribution of data collection locations.

Acknowledgments
Thank you to working group members Shimon Anisfeld (Yale University), Bri Benvenuti (Ducks Unlimited), Chris Elphick (University of Connecticut), Chris Field (CT DEEP), Min Huang (CT DEEP), Ken Metzler (University of Connecticut), Suzanne Paton (USFWS), Ron Rosza (retired), Jim Turek (NOAA), Roger Wolfe (CT DEEP), Harry Yamalis (CT DEEP), and Roman Zajak (University of New Haven) who all contributed to the contents of this document. Thank you to the Saltmarsh Habitat and Avian Research Program (SHARP) for providing detection data for Saltmarsh Sparrows which informed our sparrow data sections for each marsh.
References


