Tern restoration in Cape Cod, Massachusetts: Past, Present and Future

Ellen Jedrey, Coastal Waterbird Program
Outline

• Brief history of the Coastal Waterbird Program at Mass Audubon
• Focal species: Least Terns
• How renourishment projects relate to past and present Least Tern restoration
• Examples:
  – Tern Island
  – Dead Neck Sampsons Island
• Management considerations for beach renourishment and use of electric fencing
• Future research and projects
Conservation and Protection for over 100 years

In 1896, the Massachusetts Audubon Society was formed to protect shorebirds, wading birds and seabirds from overhunting by market gunners, in part due to the millinery trade.
Coastal Waterbird Program:
Focal Species
CWP monitors and protects 90 of the ~150 coastal nesting sites in Massachusetts.
Coastal Waterbird Program Goals

• Conserve and protect Massachusetts coastal ecosystems through informed management based on research

• Monitor and protect rare and threatened coastal birds
How CWP accomplishes these Goals

• Conduct field based research and monitoring of shorebirds, seabirds and coastal habitats
• Consult with federal, state, and local governments, and private landowners, and provide management recommendations for coastal birds
• Manage and protect nesting sites
• Provide educational programs and advocacy for coastal conservation issues
CWP protection provides benefits for migratory and wintering species of birds and coastal ecosystems.
Coastal Bird Challenges: Natural and Human Related

- Storms
- High tides
- Predation
- Coastal development
- Off-road vehicles
- Crowded beaches
Natural History: Least Tern (*Sterna antillarum*)

- Listed as a Species of Special Concern in Massachusetts and is state listed throughout most of its range on the Atlantic Coast
- ~40,000 pairs on Atlantic Coast (estimate from late 1980s)

Natural History: Least Tern (*Sterna antillarum*)

- A long-lived seabird (up to 24 years); therefore population declines may take many years to be recognized
- Nests in colonies usually, 10s to 100s of pairs
- On New England coast, dependent upon dynamic coastal processes to provide nesting habitat
- Are adapted to respond to changes habitat quickly and will shift entire colonies to new sites; can renest up to 3-4 times in response to tidal overwash, predation, etc.
Natural History:
Least Tern (*Sterna antillarum*)

Foraging Habitat
Bays
Lagoons
Estuaries
River mouths
Tidal Marshes
Lakes

Preferred Prey
Juvenile (and larval?) Herring, Hake, Sand lance
Other small fish 2 - 9 cm
Aquatic invertebrates
Insects

Unpublished data provided by Carolyn Mostello, MA Natural Heritage and Endangered Species Program.
Typical Response of Least Terns to Renourished Beaches

- Terns arrive in May, and often immediately settle in areas after renourishment occurs (projects not conducted after April 1 in MA).
- #s of pairs of Least Terns usually increase for the first 1-3 years after renourishment, followed by a decline over the next 2-3.
- Declines could be due to predators keying in on sites, encroachment of vegetation, abandonment, etc.
During the past 19 years, CWP has consulted on many dredging operations in MA. Most projects are small-scale, sponsored by local towns and private landowners. Guesstimate: roughly 80% of the beaches CWP monitors have had some kind of dredging and/or renourishment operation during the past 70+ years, mostly for navigation and tidal flushing. CWP has not initiated requests for renourishment projects for restoration; instead projects are initiated by landowners, towns, etc. Therefore, renourishment projects and dredging are of high priority and concern to Mass Audubon and CWP staff.
1st Dredging Project Coastal Waterbird Program (Tern Project) was involved with: Tern Island
Tern Island, Chatham, MA

- History of Island under Mass Audubon management
- History of Dredging
- History of Tern Colonization of the Island
- Electric Fencing
Tern Island, Chatham

300 feet
Tern Pairs Nesting at Tern Island, Chatham, Massachusetts, 1970 - 2005

Dredge Spoils Deposited
Dead Neck Sampsons Island, Osterville, MA

• History of Island under Mass Audubon management
• History of Dredging
• History of Tern Colonization of the Island
• An Example of the Use of Electric Fencing as a tool for future Management
Dead Neck Sampsons Island

Sampsons

Dead Neck
Pairs of Terns Nesting at Dead Neck Sampsons Island
Osterville, Massachusetts, 1970 - 2005

Year

# of Nesting Pairs
0 50 100 150 200 250 300 350 400 450 500

Common Terns
Least Terns
Roseate Terns

Dredge Spoils Deposited
Sampsons
Dredge Spoils Deposited
Dead Neck

Legend:
- Common Terns
- Least Terns
- Roseate Terns

[Graph showing the number of nesting pairs of Common, Least, and Roseate Terns at Dead Neck Sampsons Island from 1970 to 2005, with notable peaks and trends indicated.]
Dredging Operations: a response to protecting homes and safe navigation

Dead Neck at Start of Dredge Work
Pre and Post Dredging

Dead Neck (Looking East to West)

Before - 2 Feb 98

After - 17 July 99

Typical Service Profile

Typical After Profile

Photos by Cote Photography
Longshore Sand Transport

Sand From Here

Moves to Here

Dead Neck Looking East
Planted Vegetation
on Dead Neck
Vegetation and Fencing,
Dead Neck
Figure showing dramatic response of breeding Least Tern pairs, however numbers have declined due to veg encroachment and predation
Dead Neck Sampsons Island

Sampsons

Dead Neck
Planting and fencing did not occur
Number of Pairs of Nesting Least Terns and Common Terns on the Sampson's Island Portion of Dead Neck/Sampson's Island, Osterville, MA 1999 - 2005
<table>
<thead>
<tr>
<th>Year</th>
<th># Least Tern Pairs</th>
<th># Common Tern Pairs</th>
<th>Total # Tern Pairs</th>
<th>Least Tern Productivity</th>
<th>Common Tern Productivity</th>
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<tbody>
<tr>
<td>1998</td>
<td>40</td>
<td>16</td>
<td>56</td>
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<td>No data</td>
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<tr>
<td>1999</td>
<td>67</td>
<td>20</td>
<td>87</td>
<td>Excellent</td>
<td>0</td>
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<tr>
<td>2000</td>
<td>378</td>
<td>5</td>
<td>432</td>
<td>Good</td>
<td>Good</td>
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<tr>
<td>2001</td>
<td>237</td>
<td>30</td>
<td>400</td>
<td>Good</td>
<td>Poor</td>
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<tr>
<td>2002</td>
<td>283</td>
<td>168</td>
<td>674</td>
<td>Average</td>
<td>Average</td>
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<tr>
<td>2003</td>
<td>117</td>
<td>126</td>
<td>302</td>
<td>Poor</td>
<td>Very Poor</td>
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<tr>
<td>2004</td>
<td>85</td>
<td>54</td>
<td>144</td>
<td>Very Poor</td>
<td>Very Poor</td>
</tr>
<tr>
<td>2005</td>
<td>59</td>
<td>203</td>
<td>278</td>
<td>Excellent</td>
<td>Very Poor</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>&gt; 1.0 chicks/pair (Sampsons)</td>
<td>~.13 chicks/pair (Sampsons)</td>
</tr>
</tbody>
</table>
Diagram of Electric Fencing Erected on Sampson’s Island, 2005

Total Area
~155,220 ft²

~324 ft

~480 ft
Electric Fencing and Solar Panel Unit; developed by Premier1 for sheep farmers

Cost: ~ $5000 for area similar in size

Safe; used in areas with high visitation

Easy to install and maintain: 1 person can erect >1500 ft of fencing in about 1/2 hour!
Management Considerations for Renourished Beaches

• It is **vital** that all planning for renourishment operations include pre-, during and post-construction monitoring for coastal birds and the surrounding ecosystem; incorporate study design if possible
• Post-construction management (i.e. veg control, predator control) will be needed to ensure that newly created areas do not create habitat sinks
• Piping Plover and other species considerations
• Non-lethal predator management MUST be adaptive; there is no “one” solution to predator control
• Long-term plans and site-specific goals should be developed for sites where dredging and renourishment will occur in the future
• Regional plans should be developed
Future Projects and Research

• MA Landowner Incentive Program (LIP) has provided funding for work with electric fencing and monitoring at 5 Mass Audubon owned sites in 2006

• Pending funding, we hope to initiate our first foraging studies on Least Terns at four Mass Audubon sites in 2006, as well as more detailed productivity and mapping at all sites

• Obtain more detailed nest site information for birds using dredge spoil for nesting sites and areas adjacent to foraging (effects of dredging on fish populations and Least Terns as monitors of local forage fish populations?)

• Compilation and analysis of 20 field seasons of data (ongoing)
Thank You

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