Assessing the island’s coastal resilience through a conservation lens

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Conservation land on Nantucket
Conservation land on Nantucket
Climate-change related conservation action

Goals

• Identify and assess risks and vulnerabilities
• Identify and protect conservation assets
• Ensure connectivity of climate refugia
• Develop management and conservation strategies for vulnerable sites
• Prioritize management and conservation action
Climate change related conservation action

(Figure adapted from Glick et al. 2011)
Sea level rise - inundation
Sea level rise - inundation

9.25ft SLR by 2100
Zone of influence

9ft. SLR
+ 0.5 mile buffer

Analytic zone
Rare Species

• 71 species with state or federal protection
  • 20 invertebrates
  • 37 plant species
  • 14 animals

• 207 total habitat maps
Rare Species

- 71 species with state or federal protection
  - 20 invertebrates
  - 37 plant species
  - 14 animals
- 207 total habitat maps

Northern Harrier

Eastern Silvery Aster

MESA Status

- Watch List: 4%
- Endangered: 25%
- Special Concern: 46%
- Threatened: 25%
Rare Species Index

Purple Tiger Beatle

Prickly Pear Cactus
Potential Impact

• Determine the rare species habitats at risk in the “zone of influence”
Impacted Rare Species Habitats

- Ten: 25%
- Nine: 27%
- Five: 28%
- Six: 2%
- Seven: 0%
- Zero: 13%
- Two: 3%
- Three: 1%
- Four: 1%

Legend:
- NotConservedFewerRareSpecies
- DevelopedwithRareSpecies
- NOTConservedRareSpecies
- <all other values>
- Sum_listed_Val
- <Null>
## Conservation Status

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conserved</strong></td>
<td>Conserved public and private lands, significant natural areas and a conservation focus</td>
<td>3</td>
</tr>
<tr>
<td><strong>Moderately-conserved</strong></td>
<td>Land with open space but without a clear conservation focus. However, there are restrictions as to land use and development.</td>
<td>2</td>
</tr>
<tr>
<td><strong>Non-conserved</strong></td>
<td>Lands that have open space, but not a conservation focus</td>
<td>1</td>
</tr>
<tr>
<td><strong>All other land</strong></td>
<td>All other private and municipal lands, impervious surfaces, and roads.</td>
<td>0</td>
</tr>
</tbody>
</table>

The table shows the different categories of land conservation status along with their descriptions and ranks. The map on the right illustrates the distribution of these categories across the area.
Conservation Status

- Conserved: 52%
- Non-conserved open: 11%
- Moderately Conserved: 10%
- Developed: 27%
Conservation Status in the ZOI

- Conserved: 46%
- Non-conserved open: 30%
- Moderately Conserved: 15%
- Developed: 9%
Climate change related conservation action

(Figure adapted from Glick et al. 2011)
Vulnerability

- Conserved with **HIGH** rare species index
- Conserved with **LOW** rare species index
- Unconserved with **LOW** rare species index
- Unconserved with **HIGH** rare species index
- Developed
Conservation strategy

Adaptive Capacity

Potential Impact

Resilient
Low management intervention

Susceptible
Habitat and species focused management

Resistant
Low management intervention

Sensitive
Intensive management intervention necessary
Conservation strategy

Resilient
Low management intervention
- Maintain connectivity
- Monitor and manage for rare, and specialist species

Susceptible
Habitat and species focused management
- Prevent stressors that degrade habitat & biodiversity

Resistant
Low management intervention
- Expand protected areas

Sensitive
Intensive management intervention necessary
- Expand protected areas
Vulnerability

Conserved with **HIGH** rare species index

Conserved with **LOW** rare species index

Unconserved with **LOW** rare species index

Unconserved with **HIGH** rare species index

Developed
Privately owned land that isn’t protected but has high conservation value and in a vulnerable area
Vulnerability

Conserved with **HIGH** rare species index

Conserved with **LOW** rare species index

Unconserved with **LOW** rare species index

Unconserved with **HIGH** rare species index

Developed
Privately owned land that isn’t protected but has high conservation value and in a vulnerable area.
20 years of habitat change on Nantucket

1998 Vegetation habitats by The Nature Conservancy
Habitat Change on Nantucket since 1998

The chart shows the acres of change in various habitats on Nantucket since 1998. The habitats are represented on the x-axis, and the change in acres is shown on the y-axis. The data indicates a significant increase in sand land, with other habitats showing more modest changes.
Habitat Change on Nantucket since 1998

The bar chart shows the percentage change in various habitats on Nantucket since 1998.

- Coastal Dune Community: Large decrease
- Coastal Shrubland: Moderate decrease
- Salt Marsh: Significant decrease
- Tidal Flat: Small decrease
- Sandplain Grassland: Moderate decrease
- Coastal Beach Strand: Small decrease
- Maritime Forest on Upland: Very small decrease
- Sand: Large increase
- Developed Land: Very large increase

The chart indicates a significant shift towards developed land, with a decrease in coastal and wetland habitats.
Priority and vulnerable habitats

- Vulnerable coastal habitats
- Priority resilient habitats
- Sand
- All other habitats
Conservation Management Recommendations

• Ensure “moderately” conserved properties remain or improve

• Move as many parcels as possible from non-conserved open space to conserved or moderately conserved

• Prioritize parcels of known resilience

• Prevent additional stressors
  • Non-native invasive species
  • Over-use

• Maintain connectivity
Future Work

• Include conservation easement data
• Refine maps
• Include multiple SLR scenarios
• Add in SLAMM model
Thank you

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