Updates on the behavior, interaction rates, bycatch & mortality of sea turtles in Mid-Atlantic waters

NEFSC Sea Turtle Program and our collaborators
Outline

Behavior

Interaction Rates

Estimated Bycatch and Mortality
Outline

Behavior

Interaction Rates

Estimated Bycatch and Mortality
Dive Behavior

- Observed loggerheads
  - diving to sea floor
  - diving to deep, cold water (~50m, ~10ºC).

- http://www.seaturtle.org/tracking/

This is a joint project between the NOAA NMFS, BOE, FWS, Navy, and the sea scallop industry through their research set aside program. Coonamessett Farm Foundation with the assistance of Viking Village Fisheries and the F/V Kathy Ann and the sea scallop industry through their research set aside program.
Forage Behavior & Buoyancy

- Eat in water column and on bottom
- Positively buoyant at surface and negatively buoyant on bottom.

This is a cooperative project lead by Coonamessett Farm Foundation with the assistance of Viking Village Fisheries and the F/V Kathy Ann and the sea scallop industry through their research set aside program.
Forage Behavior & Buoyancy

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Outline

Behavior

Interaction Rates

Estimated Bycatch and Mortality
Bycatch Analysis


NEFOP

- Northeast Fishery Observer Program
- Observers document
  - vessel and gear characteristics
  - weather and habitat conditions
  - time spent fishing
  - fishing location
  - catch composition
Observed Hauls

NEFOP observed ~24,000 tows in bottom trawl fish & scallop gear in Mid-Atlantic June 1994-Dec 2008.

Only 1 observed turtle caught in a “typical” TED, thus rate analysis restricted to no TEDs.

Draft results from Warden in review.
Observed Turtles

Draft results from Warden in review.
Turtle Size

Haas (2010)
### Observed Loggerheads

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>N</th>
<th>% N</th>
<th>% days fished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (m)</td>
<td>≤50</td>
<td>100</td>
<td>89%</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>&gt;50</td>
<td>12</td>
<td>11%</td>
<td>67</td>
</tr>
<tr>
<td>SST (°C)</td>
<td>≤15</td>
<td>30</td>
<td>27%</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>&gt;15</td>
<td>85</td>
<td>73%</td>
<td>39</td>
</tr>
<tr>
<td>Mesh size (cm)</td>
<td>≤7</td>
<td>15</td>
<td>13%</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>7–15</td>
<td>93</td>
<td>83%</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>≥15</td>
<td>4</td>
<td>4%</td>
<td>21</td>
</tr>
<tr>
<td>Target species</td>
<td>croaker</td>
<td>51</td>
<td>46%</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>summer flounder</td>
<td>31</td>
<td>28%</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>scallop</td>
<td>13</td>
<td>12%</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>long-finned squid</td>
<td>6</td>
<td>5%</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>short-finned squid</td>
<td>1</td>
<td>&lt;1%</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>large-mesh multispecies</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>monkfish</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>other</td>
<td>10</td>
<td>9%</td>
<td>17</td>
</tr>
</tbody>
</table>

Draft results from Warden in review.
Draft results from Warden in review.
Draft results from Warden in review.
Outline

Behavior

Interaction Rates

Estimated Bycatch and Mortality
Bycatch rate \times Fishing effort = Estimated Bycatch
(noTED, observable) **Loggerhead Bycatch Rates**

<table>
<thead>
<tr>
<th>Rate</th>
<th>Effort</th>
<th>Bycatch (~300/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 37°N</td>
<td>2.06</td>
<td>0.74</td>
</tr>
<tr>
<td>37-39°N</td>
<td>0.04</td>
<td>0.18</td>
</tr>
<tr>
<td>&gt; 39°N</td>
<td>&lt;0.01</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Draft results from Warden in review.
Draft results from Warden in review. Dark Gray=fish + scallop effort
Estimated Mortality

Bycatch $\times$ mortality rate = mortality

From Murray (2008)… of the documented loggerhead interactions….

• 43% were dead, injured, resuscitated, or of unknown condition.
• 57% were alive and uninjured.
Summary Outline

Behavior
Water column and bottom

Interaction Rates
Highest in warm, shallow, southern waters

Estimated Bycatch and Mortality
~300 loggerhead / year
~40% injury & mortality
Questions?