Horseshoe Crab Monitoring & Tagging Training Session

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Life Cycle

Older juveniles and young adults migrate to deeper water

Young juveniles reside on intertidal flats

Larvae hatch in 2 to 4 weeks

Eggs develop in a nest on a beach

After adults reach sexual maturity (9-10 years), they return to beaches to spawn in late spring to early summer

Males patrol areas near beaches and intercept the females as they come ashore to spawn

Females excavate a nest in sand and deposit 4,000 eggs. Males fertilize eggs as they are deposited. Females may spawn multiple times laying up to 80,000 eggs (Delaware Bay estimates)
**Limulus polyphemus**

- Adults spawn on protected beaches in May-June

- In Delaware Bay, eggs are an important food resource for migrating shorebirds

- *Limulus* amoebocyte lysate (LAL) is produced from blood
  
  LAL is the standard test used to screen all medical equipment that comes in contact with blood or spinal fluid

- Commercial fisheries (1850’s to 1950’s) for fertilizer & animal feed. Peak harvests in Delaware Bay reached 4 million crabs annually

- Commercial bait fishery for American eel and whelk (1980’s to present)
2008 surveys
MA: 24 beaches; RI: 5 beaches; CT: 36 beaches

Regional spawning survey locations 2008

Committee for the Conservation of the Horseshoe crab
Spawning Surveys
http://www.gso.uri.edu/mjjp/

- New and full moons in May & June
- 3 Night & 3 day high tides during each moon period
- All surveys on same days and tides
- Coin flip decides which end of beach to start
- Random number between 1 & 10 for placement of 1st quadrat
- Short beaches - quads are back-to-back (~200m)
- Long beaches - quads are separated by 10m
- Count crabs in 5 x 5m quadrats along stretch of beach
- Aim for 40-60 quadrats per survey
Spawning Survey Data
http://www.gso.uri.edu/mjjp/

- Location, time of surveys (am or pm), weather conditions
- Number of female & male crabs in each quadrat
- Cluster size
  - Pairs = 1 female & 1 male - noted as 1F+1M
  - Cluster of 3: 1 female & 2 males - noted as 1F+2M
  - Cluster of 4: 1 female & 3 males - noted as 1F+3M
  - Single males
  - Single females
- If more than 1/2 the crab is in the quadrat it is counted
- Any tags observed
- Quadrats with no crabs - enter “0” on sheet
- If quadrat can’t be surveyed (rocky, too turbid) put “X” on sheet
Data Example

data sheets available on web:  http://www.gso.uri.edu/mjjp/

<table>
<thead>
<tr>
<th>Clusters</th>
<th>1F+1M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singles</td>
<td>1M</td>
</tr>
<tr>
<td>F 1</td>
<td>M 2</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Clusters</th>
<th>1F+3M</th>
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</thead>
<tbody>
<tr>
<td>Singles</td>
<td></td>
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<tr>
<td>F 1</td>
<td>M 3</td>
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<thead>
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<th>1F+1M,1F+3M</th>
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<tbody>
<tr>
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<tr>
<td>F 2</td>
<td>M 4</td>
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<tbody>
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<td></td>
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<tr>
<td>F</td>
<td>M</td>
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</table>

<table>
<thead>
<tr>
<th>Clusters</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singles</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>M</td>
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= No crabs

= Quadrat not surveyed
USFWS Cooperative Tagging Program

• Record sex of crab
• Measure prosomal width – widest point of shell across the bottom (in mm)
• Record tag number, date
• Record tag location (GPS coordinates if possible), waterbody, state
• Tag on LEFT side if possible
  • Swap area with alcohol before drilling
  • Dip drill or awl in iodine solution between crabs
  • Tag as low on prosoma as possible without tag extending past edge
  • Double check tag number to avoid mis-read numbers
• Return tag data sheet
Horseshoe Crab Tagging

<table>
<thead>
<tr>
<th>Date</th>
<th>Tag #</th>
<th>Sex</th>
<th>Prosomal Width (mm)</th>
<th>Tagging Location (Beach name)</th>
<th>Waterbody</th>
<th>State</th>
<th>Lat/Long coordinates (if available)</th>
</tr>
</thead>
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**Your organization**: example: Provincetown Center for Coastal Studies

**Contact**: designation a person I can contact if I have questions concerning the data.

**Date**: date crabs were tagged

**Tag #**: complete tag number – all digits

**Sex**: M (male) or F (female)

**Prosomal width**: size of crab in mm

**Tag location**: beach where tagged – be specific

**Waterbody**: general waterbody (Cape Cod Bay, Pamet River, East Harbor, etc)

**State**: state (MA, RI, CT, etc)

**Lat/Long coordinates**: it is extremely useful if you can provide lat/long coordinates, even if they are off of Google Earth, it’s much more specific than “East Harbor Beach”

**Return data sheet**: make a copy of the data sheet & mail back to me, if you enter the data into Excel, please send me both the digital Excel data & the raw field data sheet.

Please return to: MJ James-Pirri, Box 8, Graduate School of Oceanography, University of Rhode Island, South Ferry Rd., Narragansett, RI 02882 (401)-874-6617. Please retain a copy of the data sheet.
Information to remember when you see a tagged crab:

**Tag Number**: located on the bottom of the tag

**Date**: Date you saw the crab

**Where**: Where was the crab – be specific, use nearest streets, boat landings, or local landmarks. If possible provide GPS coordinates (you can get coordinates from Google earth).

**Alive or Dead**: was the crab alive or dead?

**Do Not Remove Tags on live animals** (if the crab is dead you can remove the tag).

**Reward**: You will receive a pewter reward pin & Certificate of Participation for reporting tagged crabs.
2010 Survey Schedule

- May 11, 13, 15 - new moon
- May 25, 27, 27 - full moon
- June 10, 12, 14 - new moon
- June 24, 26, 28 - full moon
Survey Coordinators

• Cape Cod area - Cynthia Franklin, Volunteer Coordinator, Mass. Audubon
cfranklin@massaudubon.org
• Buzzards Bay area – Vin Malkoski, – MA DMF – vincent.malkoski@state.ma.us
• Rhode Island area & Cape Cod NS - MJ James-Pirri – URI – mjjp@gso.uri.edu
• Connecticut/Rhode Island area – Project Limulus, Sacred Heart Univ. –
  www.ProjectLimulus.org