

INSTRUCTIONS: HORSESHOE CRAB SPAWNING SURVEY

Delaware National Estuarine Research Reserve
Kitts Hummock Beach, Ted Harvey Wildlife Conservation Area, North Bowers
Beach

PREPARATION FOR THE SURVEY: CLOTHING AND ACCESSORIES

- ❑ Wear appropriate clothing for weather and wet conditions at the water's edge. Insect repellent may be needed.
- ❑ A headlamp with a red-light filter is preferred to avoid insects.
- ❑ Work gloves may be useful if there are high densities of crabs on the beach.
- ❑ Closed toe shoes are required! We recommend water shoes, old sneakers, or rain boots. Do not wear flip flops or sandals.

SURVEY PROTOCOL: SETUP

Arrive at the St. Jones Reserve at your designated call-time. Here you will sign in, meet your group, and your Site Captain will pick up the following materials:

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| ❑ 5 Headlamps and one flashlight per group | ❑ 1 set of directions to the access point |
| ❑ 3 clipboards | ❑ 2 quadrats |
| ❑ 1 Beach Site Sheet | ❑ 1 First Aid Kit |
| ❑ 1 Random Number Table | ❑ 1 box of pencils |
| ❑ 2 Tally Forms | ❑ 1 Pencil sharpener |
| ❑ 1 set of instructions | |
- ❑ Arrive at the beach at least 30 minutes before high tide. *If thunderstorms are present do not go onto the beach!*
 1. **Record the time you arrive in the space marked ARRIVAL AT SITE on the Beach Site Sheet.** The Up or Down Bay starting location will be predetermined by a coin-flip.
 2. **Fill out the Beach Site Sheet as completely as possible.** Addresses and phone numbers of each survey team member are important in case we have questions about the data. Even if the weather prevents you from doing the survey, please fill out the survey sheet with all possible information and explain why the survey could not be completed.
 3. **Determine your pace count.** Count the number of steps it takes you to walk the length (14m on North Bowers, 20m on Ted Harvey and Kitts Hummock) using your normal stride. Do this three times and take the average.

4. **Determine your survey starting location.** Use the random number sheet to choose two random numbers from 0-19 (0-14 on North Bowers) that will mark where the first quadrat is laid for each team. Record your starting quadrat locations on both the Beach Site Sheet and the Tally Sheet.
5. **When the tide turns, record your starting time on the Beach Site Sheet where it says START OF SURVEY.**

PLACING THE QUADRATS AND COUNTING HORSESHOE CRABS

- ❑ You will survey in groups of at least two people, the Counter and Recorder. The Counter and Recorder will remain consistent throughout the survey, no role switching.
 - ❑ The “horseshoe crab line” you will follow is not a straight line and may be above or below the water line.
 - ❑ If you run into a section of peat, continue to lay down quadrats, but make a note of the stretch of peat on the data sheet. If you “run out of beach” and cannot go any further on the beach, but are not done with 50 quadrats, please note this on the tally sheet. Do not just put zeros.
 - ❑ If tagged horseshoe crabs are found while surveying call for help from the Site Captain or Tag Spotter to fill out information on the Tagged Horseshoe Crab datasheet. Alternatively, you can record a quick video of the tag to fill out the datasheet after the survey’s completion.
1. Place quadrat at the starting location determined by the random number table. Be sure to hold onto the quadrat or place your foot on it so that it will not float away.
 2. **Count all the crabs in the quadrat.** A horseshoe crab is counted if it is right-side up and more than half of its body is inside the quadrat.
 - When there are numerous animals, try to minimize disturbance to the spawning horseshoe crabs though you may have to dig around to account for all horseshoe crabs present. Spawning females may be partially buried in the sand while laying eggs. **DO NOT LIFT UP A PARTIALLY BURIED HORSESHOE CRAB!**
 - **Count the animals of each sex separately.** Males tend to be smaller, more numerous and active, and have a curved front of their carapace. Females tend to be larger, less active, and have a flat front of their carapace.

- **Report zero (0) when there are no horseshoe crabs in the quadrat.** Do not try to move the quadrat from the pre-selected location just to include one or more nearby animals. An accurate count is most important.
- 3. **Report your count of each sex to the recorder who will record the information on the Tally Sheet.** Do not pick up the quadrat and move to the next location until you know the recorder has recorded all information for your present quadrat.
- 4. **Complete the 14m or 20m pace count to the next quadrat location.** Repeat the counting protocol.
- 5. **Continue until you have sampled 50 quadrats.** If you run out of beach, make a note of this; do not return to the beginning and start again.

ONCE YOU ARE FINISHED SURVEYING

- ☐ Record the time in the space marked END OF SURVEY on the Beach Site Sheet.
- ☐ Leave the beach after the survey is completed.
- ☐ **The Site Captain will return datasheets and backpacks to the St. Jones Reserve.**

**St. Jones Reserve
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