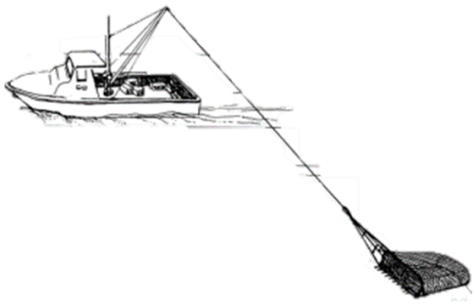
The Chesapeake Bay Blue Crab Winter Dredge Survey

How Maryland DNR Turns Crab Counts into Baywide Abundance Estimates for Fisheries Management



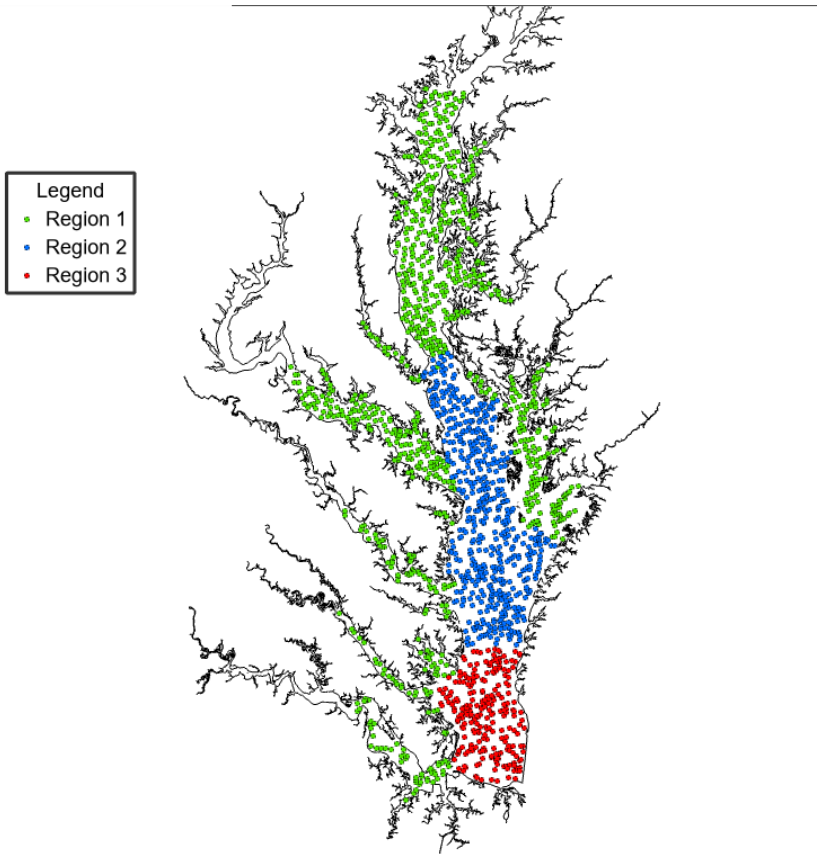
PURPOSE

The Blue Crab Winter Dredge Survey is a collaborative effort between the Maryland Department of Natural Resources (DNR) and the Virginia Institute of Marine Science (VIMS) to annually sample the blue crab population throughout the Chesapeake Bay. The data collected through this effort are **the primary source for assessing the status of the stock** and informing fishery management decisions.

FIELD METHODS

Sample Sites

To sample the blue crab population, scientists and experienced watermen dredge for crabs throughout the Bay as they lie dormant, burrowed in the sediment for the winter. A total of **1,500 randomly chosen sites across three regions** of the Bay are sampled each year, accounting for differences in habitat type.



Sample Methods

At each sample site, scientists **record the size, sex, and any other notable characteristics** (e.g., female maturity, sponge, peeler, etc.) of each crab. When looked at as a whole, the crab counts from each site in the survey provide a representative snapshot of the current crab population in the Chesapeake Bay.

Resampling

Historically, blue crabs are a warm-water species, which is why they "hibernate" during the winter when water temperatures drop in the Chesapeake Bay. Although this hibernation-like behavior can help crabs survive the cold winters, crabs can still succumb to overwintering mortality, particularly if the low temperatures are extreme.

To **account for this natural overwintering mortality** when sampling the blue crab population, sample sites that had high crab counts early in the winter are resampled in late winter, and the number of dead crabs is recorded. This gives scientists an estimate of the proportion of the crab population that dies from overwintering mortality each year.

CALCULATING ABUNDANCE

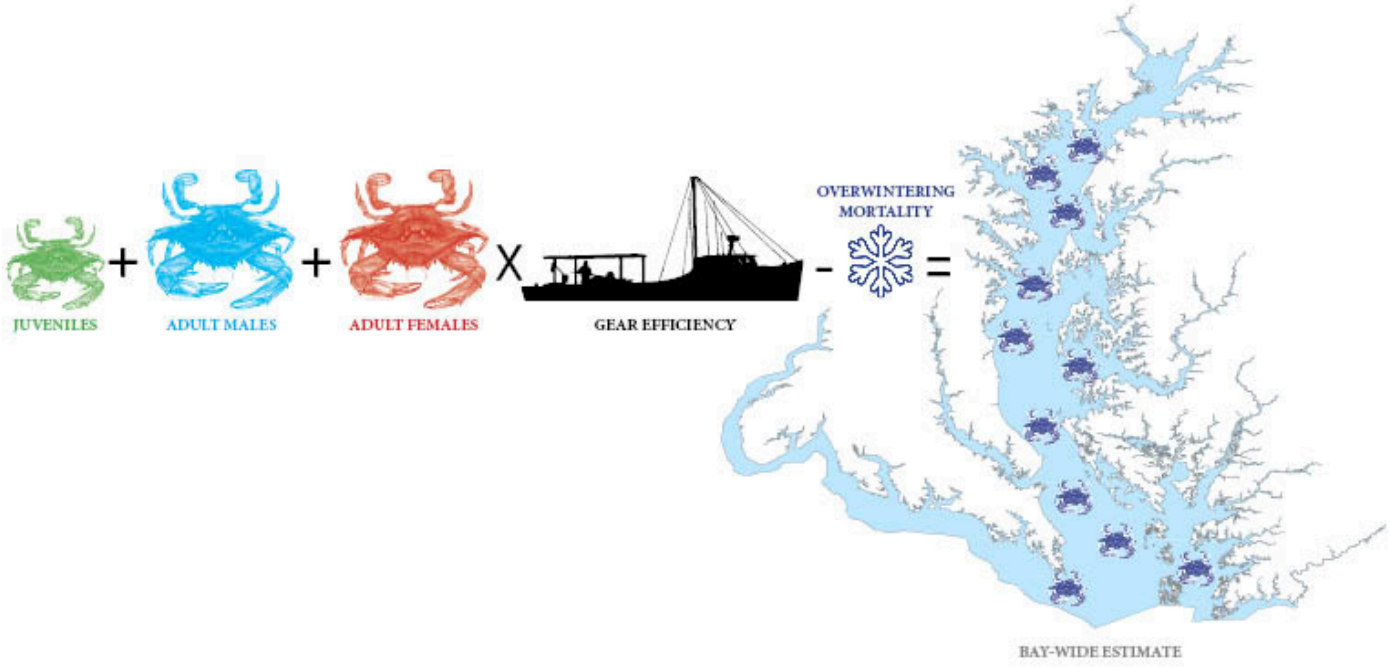
Because scientists cannot physically count every single crab in the Chesapeake Bay to determine the population size, crab counts from the Winter Dredge Survey are used to estimate abundance. **The average number of juveniles, adult males, and adult females caught in each region of the Bay are scaled up to the size of the region** and then summed to obtain Baywide population estimates.

During Winter Dredge Survey sampling, the dredge does not catch 100% of the crabs that are present at each sample site 100% of the time. Therefore, the **abundance estimates are further corrected to account for the sampling gear efficiency**, or how well the dredge catches crabs.

For example: If 4 crabs were caught at a site and the estimated efficiency of the dredge is only 50% (based on previous efficiency experiments), meaning that, on average, the dredge only catches about 50% of the crabs that are present, the corrected count for that site would be 8 crabs.

By accounting for the efficiency of the gear, scientists can obtain more accurate Baywide population estimates.

Overwintering mortality is also taken into consideration when calculating annual abundance estimates. The estimated proportion of **crabs that died over the winter is subtracted from the estimated population abundance** to obtain a final count of the number of crabs that are alive in the Chesapeake Bay at the beginning of the crabbing season in April.



CALCULATING HARVEST RATE

Blue crab commercial harvest is reported to the management jurisdictions through harvest reports. Having estimates of the total population size and the number of crabs harvested allows scientists and managers to **estimate the harvest rate, or the proportion of the crab population removed by fishing, in a given year.**

FISHERY MANAGEMENT

Management of the Chesapeake Bay blue crab population is **based on the number of adult females present each year and the harvest rate of adult females.** Fishery managers aim to meet a target female abundance and harvest rate each year to ensure a sustainable population. The Winter Dredge Survey estimates for female abundance and harvest rate inform management decisions about crabbing regulations for the upcoming season.

If the number of females is low, managers may choose a more cautious approach to the season by reducing catch limits or shortening the season to limit harvest. If abundance is higher, harvest restrictions may be relaxed.