

Evaluating Policy Solutions for a Green Crab Market in Maine



Eve Fischer - Environmental Planning and Policy
University of Maine at Farmington

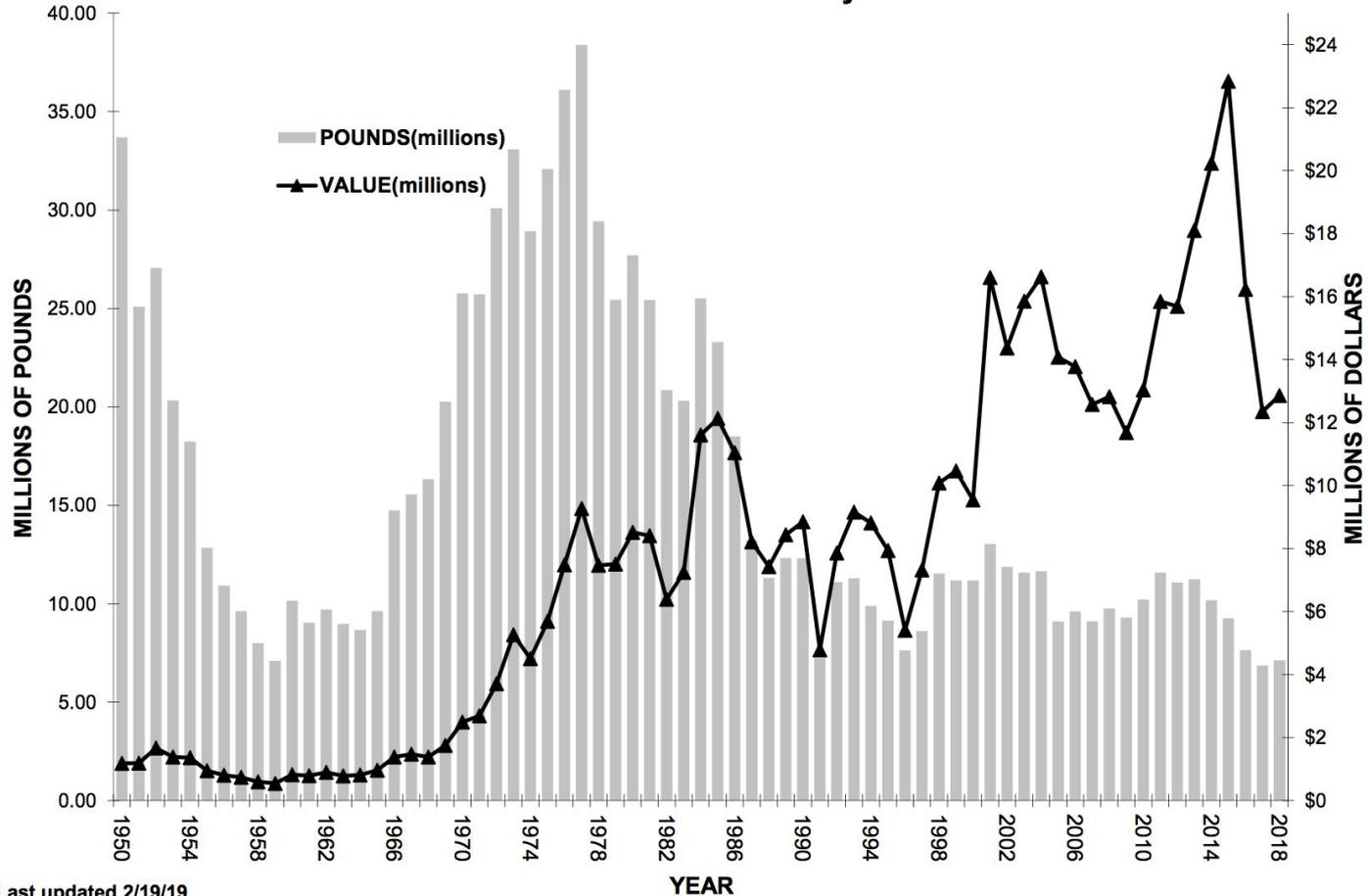
Photo credit: UMF

Background

- Rapid reproduction: 185,000 eggs at once
- Larvae are transported by currents
- Tolerate a very wide range of temperatures and salinities
- Destroy critical eelgrass bed habitat
- Aggressive predators of soft shell clams, other shellfish, and juvenile lobsters
- Outcompete native crab species
- Severe impact on clamming industry

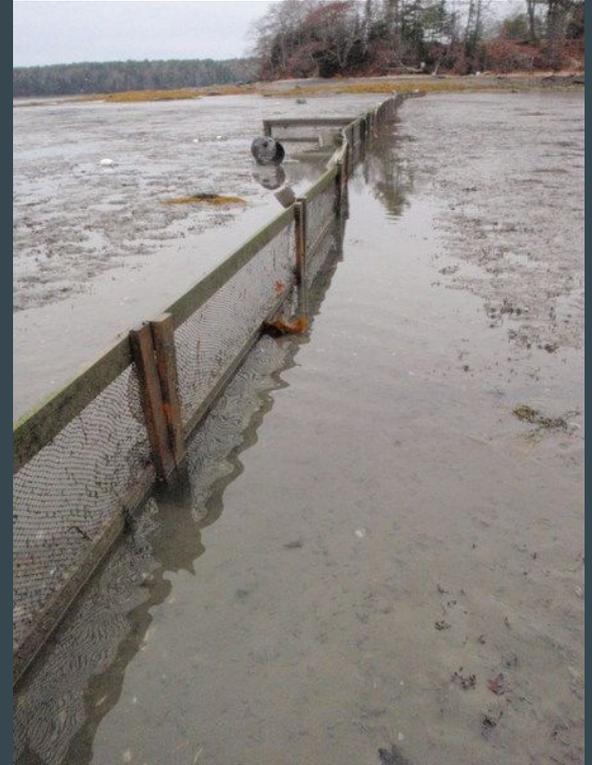


STATE OF MAINE SOFTSHELL CLAM LANDINGS *2018 Data Preliminary*



Last updated 2/19/19

Netting and Fencing



Previous Efforts and Drawbacks to Physical Removal

- Focus on eelgrass replanting and targeted removal of green crabs
 - Ipswich bounty program
 - Gone Crabbin' program
- Labor intensive and not sustainable long-term strategies
- Ineffective due to their high rate of reproduction and factors like the Hydra Effect



The Hydra Effect

- Discovered in a study from the University of California, Davis that was published in March 2021
- Researchers eradicated 90% of green crabs from an area, but one year later the population had exploded to almost 3x its original size
- Determined it was because green crabs cannibalize their young, so when most of the adults were killed, many more of the young survived to take their place



Maine Green Crab Task Force

- Composting program
- Trap loan program
- Targeted removal
- Taskforce member Fiona DeKoning referred to the task force as a useful tool to get people to work on the issue at the time that was a valuable endeavor even if it didn't produce a clear solution



Green Crab Markets

- Creates a self supporting incentive to remove green crabs from the water continuously
- Provides supplementary income to interested harvesters
- Diversifies Maine's fisheries
- Potentially would take pressure off clam and lobster populations
- Could bring green crab populations to a lower level



Asian Carp

- Example of an existing invasive species culinary market
- Moving up the Mississippi, threaten to infest the Great Lakes
- Harm recreational river industries and commercial fishing
- Affected states have used a series of grant programs and government aid to establish a functioning market for value added carp products



Lionfish

- Invasive species from the Pacific prevalent in Florida
- Voracious predator, harms native fish populations and coral reef health
- Venomous spines make it difficult to catch and process
- State sponsored incentivized derbies
- Partnerships with local grocery stores



Green Crab Market Analysis

- Canadian study: breakeven price per pound of \$1.32 (\$1.04 USD) for a softshell green crab fishery
- UNE study: \$1/lb for a hardshell fishery
- Existing green crab bait markets: \$0.40-0.50/lb
- NOAA report: \$3/crab (about \$30/lb) going price selling softshell green crabs to restaurants



Barriers to Market Expansion

- Transportation of invasive species across state lines
- Processing challenges
 - Small crab size that prevents standard hardshell picking
 - Lack of knowledge around softshell green crab harvesting
- Lack of an existing market/supply chain for green crabs in Maine
- Disconnect from existing bait markets in other states



Massachusetts Green Crab Management

- Overall goal of easy access to green crab fishing and high rates of removal
- Letter of Authorization program
- Ipswich Bounty program
- Removal from edible crabs list
- Connection to bait markets in Southern New England and New York
- State funds for market development



Green Crab Bioplastics

- Work by Audrey Moores, a Professor at McGill University
- Developed a method for creating chitosan bioplastic products from the chitin substance found in crustacean shells without harsh chemicals
- Partnered with Kejimikujik National Park in Nova Scotia to apply her technique to green crabs
- Huge innovation and great use for green crabs



Softshell Technique

- Traditional method for culinary use in Italy, where green crabs are native
- Allows entire crab to be eaten, removing the need to pick or process the meat
- The most profitable way to harvest green crabs for culinary use



Identifying Premolt Crabs

- Softshell harvesting requires identifying crabs that are about to molt and holding them until they do
- Gray shadows appear around the underbelly plates of premolt crabs
- Challenging task but can be taught
- Marissa McMahan of Manomet teaches workshops for seafood harvesters on how to identify premolt green crabs



A Field Guide to Pre-molt Green Crabs

"Imminent"

The carapace of crabs likely to molt in the next 1-3 days looks cloudy and washed out on the back (dorsal side). Where the abdomen meets the carapace, the crab is soft to the touch (see arrows). (*C. maenas*).

Note the pale, washed out look of the abdomen and platelets of an "imminent" molt crab. The shadowy white line on the ventral side of "pre-molts" shown in **2** is faded or lost. Often "imminent molt" crabs are lethargic. (*C. aestuarii*).



MOLTING

Note loss of color in the old shell, and the significantly more vivid color of the "new" crab.



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"Soft-shell"

Desired product! Crabs that are soft-shell (molted in the last 12-24 hours) are obvious because (1) they are soft to the touch, and (2) typically bright green or yellow-green. They should be removed from water and put on ice immediately to prevent shell hardening.

MORE PRE-MOLT EXAMPLES



OTHER THINGS TO KNOW



FEMALE

The abdomen is much rounder and broader on a female than a male.



MALE

Note the pointed, spear-shaped abdomen of the male.



FEMALE WITH EGGS

Eggs are held under the abdomen. Females can carry up to 165,000 eggs at one time.





Source: Manomet

Recommendations for Maine

- Provide funding that supports green crab innovation, training, education, and market development
- Promote communication between states on green crab market goals
- Avoid putting resources towards removal efforts that lack a self-perpetuating element such as a market
- Encourage widespread recreational green crab harvest

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