

# Arctic Surfclam Research at Timber Cove, Gouldsboro

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Arctic surfclams have been the focus of research at the Downeast Institute (DEI) for about the last decade. We discovered that while they occur naturally in our offshore waters, they will grow and survive in our intertidal zone in the same place where soft-shell clams and hen clams grow. Our efforts are continuing, and designed to develop techniques to raise this species of surfclam in mudflats to diversify the kinds of shellfish that are available to both commercial and recreational clammers. The project in Timber Cove, near the eastern boundary of Gouldsboro, is part of a comparative experiment that also is being carried out in Mud Hole Cove on Great Wass Island in the town of Beals. That is, identical field trials are underway at both intertidal locations with the encouragement and assistance of local clammers to examine factors such as initial size and stocking density on surfclam growth and survival with the goal of producing commercial quantities of 1.5- to 2-inch animals.

Arctic surfclams, *Mactromeris polynyma* (Fig. 1), look a lot like their cousins – the Atlantic surfclam, *Spisula solidissima*. Both are among a group of commercially-valuable marine bivalves that live burrowed shallowly in soft sediments. These clam species are members of a larger group of surfclams (Family Mactridae) that contain over 40 genera that are found from the tropics to the coldest marine habitats on earth.

Atlantic surfclams, also known as hen clams, bar clams, or sea clams, are frequently found in sandy or sandy-mud substrates near extreme low tide levels on many shores along the Maine coast. In addition, they are the basis of an extensive subtidal fishery in the Mid-Atlantic Bight off the coasts of New Jersey and Delaware. On the other hand, Arctic surfclams are found more subtidally in the Gulf of Maine where they live at depths 100- to 200-feet of below the surface of the water in soft bottoms. Historic records indicate that Arctic surfclams once occurred within Cobscook Bay (far eastern Maine), although it is unclear whether this species still exists in that embayment today. Arctic surfclams have a circumboreal, or pan-arctic, distribution, and are found not only in the Gulf of Maine in places such as Stellwagen Bank but also in the Gulf of St.

Lawrence, Scotian Shelf and Grand Banks (Atlantic Canada) where a commercial fishery exists that generates over \$60 million annually. In addition, Arctic surfclams occur in the northern Arctic and Pacific oceans from Point Barrow to southeast Alaska where they can be found in the intertidal zone.

Adult Arctic surfclams are large (up to 160 mm in length, or 6.3 inches), and typically are slow growers that can live up to 60 years. Like other bivalves, they reproduce by broadcasting their gametes (eggs and sperm) into the water column where external fertilization occurs and where their larvae spend up to three weeks before settling to the bottom. Arctic surfclams are unusual bivalves in one sense, and one photo tells you all you need to know (Fig. 2). They have a purple-colored foot that when steamed, fried, or otherwise cooked turns a brilliant shade of reddish-orange. The cause of this unique coloration comes from the ability of this particular clam species to concentrate in the tissues of its foot (as well as its mantle and siphons) xanthophyll pigments from wild or cultured phytoplankton (microscopic algae) it consumes. (Xanthophyll pigments are proteins that have both structural and functional roles in photosynthesis of algae as well as terrestrial vascular plants.) These pigments are what give salmon and shrimp their reddish coloration. Typically, the foot is the only part of the harvested surfclam that reaches the consumers (Fig 3.), but one of our project goals is to change that, so that people understand that the whole clam is nutritious and good to eat.

Over the past decade, DEI has received research funding from the National Science Foundation (<https://www.youtube.com/watch?v=Mx01wtAC7J0>), Maine Economic Improvement Fund, and United States Department of Agriculture, Maine Technology Institute, and the National Sea Grant Office.

For the current project, we have placed cultured surfclam seed (~ ½-inch to 1-inch in length) at several planting densities in 2- or 4-ft<sup>2</sup> wooden boxes that contain a thin layer of beach sand (Fig. 4). The bottom of each box has a fine mesh to exclude predators such as milky ribbon worms, sandworms, or bloodworms from entering from below. Box tops are covered with a protective screening to deter other would-be predators such as fish, birds, and crabs from consuming the small surfclams. Sixty boxes (Fig. 5) were established at Timber Cove and Mud Hole Cove in

early June 2022. These will remain in place for a year when we will assess growth and survival rates.

To learn more about this project visit this site (<https://downeastinstitute.org/wp-content/uploads/2021/07/first-annual-report-sare-arctic-surfclams-downeast-institute.pdf>), and to learn more about previous work in eastern Maine and elsewhere, visit this site (<https://downeastinstitute.org/research/arctic-surf-clams/>).

**Figure 1.** From <https://www.marinespecies.org/aphia.php?p=image&pic=69823&tid=156863>



**Figure 2.** (Photos by B. Beal)



**Figure 3.** <https://www.clearwater.ca/en/seafood-industry/clams/arctic-surf-clams/>





**Figure 4.** (Photo by B. Beal)



**Figure 5.** (Photo by B. Beal)

