

What Does the Future Hold for Maine's Lobster Industry?

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Abstract

The Maine lobster industry is one of the most successfully managed fisheries in the world. Catches have been at record high levels since the 1990s due to favorable environmental factors, regulations enacted over a period of years, and the conservation ethic of fishermen. The industry faces problems that threaten its future: shell disease, climate change, increased regulations to protect right whales, and economic uncertainty. Several approaches could help protect the lobster industry, including enacting lower trap limits, expanding markets for live and processed lobster, and increasing in-state processing capacity. The latter two are already underway, but prospects for lower trap limits are uncertain.

BACKGROUND

If you were to ask an average person in the United States what comes to mind when they hear the word “Maine,” we would venture to guess that many, if not most, would say “lobster.” Lobster is the most valuable fishery in the country, and the vast majority of lobsters landed in the United States are caught in Maine. In this article, we will describe the current state of the Maine lobster industry and discuss what the future might bring for this iconic industry.

Lobsters have been part of the New England diet since early Colonial times, as they were for Native Americans before that. John Smith of Virginia, who visited Monhegan and mid-coast Maine in the early 1600s, enthusiastically described the abundance of lobsters that could be taken easily in any bay. Lobsters were an important food source for coastal New England residents, but lobstering remained as a local subsistence fishery until the 1820s. Unlike most fish, lobsters must be shipped live. Commercial exploitation of lobster began with the development of the lobster smack, a sailing vessel with seawater tanks in its hold that made it possible to ship live lobsters inexpensively to East Coast markets. Smacks began operating in southern Maine in the early 1820s and

became common along the central coast by the 1840s (Martin and Lipfert 1985: 13). The industry was given a further boost by the development of lobster canning in the 1840s. By the 1860s, seasonal lobstering was a good source of income, and there were fleets of boats in almost every harbor along the Maine coast. Canning ultimately ended, in part because of the devastating effects on the lobster population by overexploitation for the canneries and the subsequent imposition of regulations on taking small juvenile lobsters and large breeding lobsters.

The lobster industry still has a significant role in Maine's economy. In 2019, in spite of somewhat lower landings compared with several previous years, the overall value of lobster landings remained fairly stable at \$485.4 million (Overton 2020a). There were about 4,800 commercial licensed lobstermen in 2018–2019 and about 1,400



Lobster traps in foreground, lobster smacks in background.

Wentworth, Bertrand H, photographer. “Drying the Sails,” Gardiner Maine, ca. 1915. Photograph. <https://www.loc.gov/item/2012646420/>.

student, apprentice, and recreational license holders.¹ Besides direct employment in fishing, the industry supports a wide range of ancillary businesses ranging from fuel and bait dealers to boat builders, trap suppliers, wholesale distributors, and processors. A recent study of the economic impact of the state's lobster distribution supply chain estimated that wholesale distributors, processors, wharfs, pounds, and co-ops contributed \$967.7 million to Maine's economy and supported more than 5,500 jobs in 2016 (Donihue 2018: 12).²

The Maine lobster fishery is one of the world's most successful fisheries. Despite decades of increasingly heavy fishing pressure, lobster catches have grown to record high levels. We never have landed so many lobsters. This situation has continued for a period of years. Since the mid-1940s, when the modern enumeration system went into effect, Maine's annual lobster catches have steadily increased almost every year, from 19.1 million pounds in 1945 to an annual average of 23.8 million pounds in the period from the 1950s through 1980s, and an average of 37.5 million pounds in the 1990s. The sharpest increases have been since 2000, with catches ranging from 57.2 million pounds in 2000 to a high of 132.5 million pounds in 2016. Catches declined somewhat in 2017–2019, but were still over 100 million pounds each year (Figure 1).

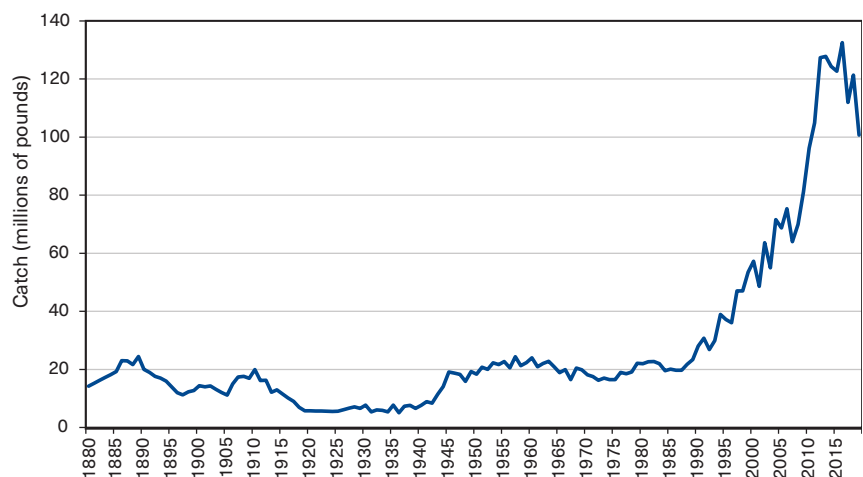
While biologists and others familiar with the industry are far from agreement on the reasons for these large catches, there is a growing consensus that three factors are responsible. The first is favorable water temperatures, which control larval settlement success. The past few decades have seen high August water temperatures, resulting in a high number of larvae landing on the bottom in good condition. Conversely, when August water temperatures are low, as they were in the 1920s and 1930s, there is high mortality on larvae and smaller catches in future years (Acheson 2006; Acheson and Steneck 1997). The second factor contributing to lobster abundance is decreased predation by large groundfish such as cod and haddock. Large groundfish have been increasingly scarce in inshore

waters due to overfishing. Larger catches of lobster appear to correlate with small numbers of large groundfish (Acheson 2006). The third factor is the conservation ethic of the industry itself and various regulations that have been enacted over the years. People involved with the lobster industry believe it is important to conserve the lobster resource for themselves and future generations. With this in mind, fishermen have developed and supported rules to control access to the resource by limiting their own exploitation rates. There are three different types of rules:

1. Informal rules of territoriality (i.e., where people from each harbor are allowed to set traps) and informal practices by fishermen within harbor gangs to monitor each other's behavior (Acheson 1988, 2003)
2. State laws passed by the Maine Legislature and enforced by the marine patrol within the state's three-mile limit
3. Federal regulations governing fishing in offshore waters beyond three miles from shore out to 200 miles

Current state conservation laws have two broad sets of aims. First, there are laws aimed at protecting lobsters at vulnerable points in their life cycle. These include minimum (3.25-inch) and maximum (5-inch) size limits to protect juveniles and larger breeding lobsters; a law prohibiting

FIGURE 1. Maine Lobster Landings, 1880–2019 (millions of pounds)



Source: Maine Department of Marine Resources, "Historical Maine Lobster Landings." <https://www.maine.gov/dmr/commercial-fishing/landings/documents/lobster.table.pdf>

taking egg-bearing females, and associated with that, the “V-notch” law, which requires fishermen to cut a “V” notch in the tail of egg-bearing females before returning them to the water; a law requiring escape vents on traps to allow undersized lobsters to escape; and a law requiring biodegradable panels on traps that will rot out if traps are abandoned or lost (so-called ghost traps). Second, there are regulations to control fishing effort. These include trap limits (current state trap limit is 1,200) and limited entry rules to govern how many fishing licenses may be issued.

Comanagement of the fishery was initiated through state legislation in 1995, with authority for managing the fishery shared between industry and government. The Zone Management Law established seven zones along the coast and gave control over certain aspects of management to lobster license holders in each zone (e.g., trap limits, limited entry), while reserving most management power for the Maine Department of Marine Resources (DMR) and the legislature (Acheson et al. 2000).³ Currently, fishermen in six of the zones have enacted trap limits of 800, and in one zone it is 600—well below the 1,200 maximum allowed by the state.

Lobster fishing in federal waters, from 3 out to 200 miles, is governed by regulations administered by the Atlantic States Marine Fisheries Commission (ASMFC). People wishing to fish in these waters need a federal lobster license as well as a state license. Currently, only about 20 percent of Maine lobster fishermen have this offshore license. Most Maine lobster fishermen do not go offshore, and those fishermen who do have larger boats fish offshore mainly in the winter when lobsters are scarce in inshore waters. Offshore federal waters are divided into fishing areas, with different sets of lobster regulations in each. The federal waters off Maine are in Area 1. Most of the regulations are the same as the state's inshore regulations. All lobsters must be brought ashore live (no parts or meat). Fishermen using gear or methods other than traps offshore are limited to catching 100 lobsters per day.

PROBLEMS FACING THE INDUSTRY

While the lobster industry has had remarkable success since World War II, there are signs that it will face growing problems in the future. These problems stem from a number of sources. Some are so serious they could end the industry.

Shell Disease

Epizootic shell disease produces unsightly pits, growths, and lesions so that the affected lobsters cannot be sold as high-quality dinner lobsters. Shell disease not only increases lobster mortality, but also greatly reduces the value of the catch. The meat is still good, so lobsters with shell disease can be boiled, and the meat picked out and used for stews, salad, or Newburg. But the meat brings a greatly reduced price compared to the live animals with unblemished shells (Robert Bayer, 2018 and 2019, personal communication). In addition, shell disease reduces recruitment by lowering larval settlement success.

To date, shell disease has had little effect on the lobster population in Maine and waters farther north, but it has had disastrous effects on catches and stocks in Rhode Island waters and Long Island Sound. In Rhode Island between 2008 and 2013, the number of inshore lobster boats declined 30 percent while the number of traps declined 38 percent. During this decade, informants say, an estimated 30 percent of Rhode Island fishermen were put out of business, and many of those remaining had their incomes from the fishery severely reduced. The number of lobsters with shell disease caught in Maine is currently small, only 6 percent to 7 percent in egg-bearing females. There are fewer affected lobsters in the eastern part of the Gulf of Maine. Still, Reardon and colleagues say, “ESD is present on lobsters throughout the nearshore of the Gulf of Maine” (2018: 903). Not only is it found throughout the Gulf, but there is a general feeling that the prevalence of shell disease could increase greatly under the right conditions. Shell disease is a significant concern for all in the lobster industry.

Climate Change

The world's climate is changing rapidly, affecting events at the global level. Recent years have seen a rise in atmospheric warming resulting in increases in storms, retreating ice, and record sea level rise (Fernandez et al. 2020). Rainfall is increasing in frequency and severity, affecting everything from coastal flooding to sea level rise. The Gulf of Maine has experienced rapid warming. Summer conditions in the Gulf now last about two months longer than in 1982 (Fernandez et al. 2020). There is also less mixing of ocean levels, which affects plankton levels and productivity. Most importantly, there is a shift of lobster northeast. This shift is at least partially due to

warming temperatures although some of the northward shift is because of “dieoffs and disease” (Fernandez et al. 2020: 20). As a result, concentrations of lobsters that used to be found in Maine waters are now found in Canadian waters and can no longer be taken by American lobstermen. Moreover, lobster larval settlement is declining, which will result in smaller lobster recruitment in the future. At the same time, warm-water species are expanding northward into areas of the Gulf of Maine where they were rarely found before (Trotter 2018). Le Bris et al. (2018) predict that continued warming in the next 30 years will lead to a decline in lobster abundance.

Changes in herring movements are also occurring, which is significant because herring has historically been the prime baitfish for lobster fishing. Large schools of herring are seeking cooler and deeper waters, causing them to shift northeast. Some fishermen believe this will continue to increase the scarcity of bait. Increases in water temperature do not portend a positive future for Maine lobster fishermen, though continued proactive conservation efforts can dampen the negative impacts of warming (Le Bris et al. 2018).

In addition, the oceans and Gulf of Maine are experiencing increased acidification due to increases in carbon dioxide mixing with seawater to form carbolic acid. The increase in acid reduces the ability of mollusks and crustaceans to build healthy shells. Fortunately, this increased acidification has little or no effect on lobsters or their ability to grow shells, and it does not contribute to shell disease. However, recent research suggests that increases in carbolic acid probably affect molting and reproduction in lobsters (Waterman 2018).

Right Whales

For the past 25 years, the lobster industry has had to contend with efforts to preserve the right whale. The National Marine Fisheries Service is charged with protecting all stocks of marine mammals including four species of whales in the Gulf of Maine. In addition, animals whose populations are at a low level, such as right whales, can be listed under the Endangered Species Act. Under the act, it is illegal to molest or kill even one of the



Back Cove, New Harbor, Maine

Photograph credit: Ann Acheson

animals. North Atlantic right whales, whose population has dwindled to around 400,⁴ can die if they become entangled in lobster or other fishing gear.

The lobster industry's problems with right whales began in 1996 when Max Strahan, who had petitioned the federal government to list the spotted owl as an endangered species in the Pacific Northwest, sued the Commonwealth of Massachusetts under the Endangered Species Act to prevent whales from being killed by lobster gear. A federal judge ruled in favor of the plaintiffs and ordered Massachusetts to come up with a plan to prevent right whales from being harmed by lobster fishing gear. The regulation that resulted banned fishing with only one trap on a line and the use of polypropylene line. It required that all buoy lines attached to fixed gear have breakaway sections. In 1997, the National Marine Fisheries Service and industry groups came up with a modified plan, which included gear modification as well as restricted fishing in critical habitat areas and called for the formation of disentanglement teams (Acheson 2003).

Since the early 1990s, there have been many refinements to regulations concerning right whales. The changes begin with a lawsuit by industry or an environmental group to a government agency. After months of conflict, an agreement is reached, resulting in a revised set of rules; the 1997 lawsuit is one example of this process. Another is

going on in 2020 due to a suit by conservation organizations. The federal judge hearing the case ruled in their favor and found that the federal government was not doing enough protect right whales from being entangled in lobster fishing gear. The next phase of the case will decide if new gear restrictions are needed (Schreiber 2020).

No one is happy with this situation. Fishermen feel they are being unfairly targeted because most whales are killed by ship strikes, and the proposed rules are too draconian and do nothing to curb the ships. Environmentalists argue the law is still not being enforced and that whales are still being killed by lobster gear. The Maine lobster industry believes its whale protection plan is not being given enough credit for reducing risk to the whales. Maine's proposed plan for nearshore waters includes reducing the number of buoy lines by setting a minimum number of traps on each line, with the minimum increasing further from shore, and requiring weak points in buoy lines to help entangled whales break free (Overton 2020b).

The fishing industry does not discount the possibility of being put out of business by environmentalists. They know that one plan called for "the removal of all lines in the water that are capable of entangling right whales" (Stevens 2000: a8). Such a plan would make it "impossible to fish with traps, which would end the industry," said Leroy Bridges, President of the Downeast Lobsterman's Association (Stevens 2000: a8).

Markets, Tariffs, and Other Economic Matters

Lobster fishermen have faced economic problems for a number of years, which they describe as a cost/price squeeze (Acheson 2013). Prices paid to fishermen for their catches are low, reflecting the fact that catches have been high since the 1980s. At the same time, the costs of running their businesses are rising. The cost of bait has increased astronomically. Between 2003 and 2013, the cost of bait increased 500 percent in response to reductions in the quota fishermen are allowed to catch (Acheson 2013). Some lobster fishermen were spending over \$30,000 for bait. If anything the bait situation now is worse now than in 2013 because federal regulators have reduced the allowable catch of herring by 80 percent (Whittle 2019).

Other costs to fishermen have also skyrocketed. Fuel prices increased from \$1.50 per gallon in 2002 to \$5.00 per gallon in 2010. It has declined recently, but the uncertainty about fuel prices remains a concern. In addition,

boats and fishing gear have become prohibitively expensive. A new 36-foot lobster boat, which might have cost \$125,000 in 1998, can cost upwards of \$400,000 in 2020. The decline in revenue combined with markedly higher costs has put many fishermen in precarious financial straits.

One good economic study points out that there have recently been large year-to-year swings in lobster prices, quantities, and revenues (Tannen 2020). These swings, Tannen argues, can be explained in terms of supply-demand analysis. Several external factors (e.g., water temperature, changes in consumer income, changes in size of exports) affect the supply of lobsters. Over the past few years, "rebounding prices paid to fishermen . . . suggests the increased size of lobster harvests has been accompanied by a similar growth in demand," with much of that growth coming from Canada, Europe, and China (Tannen 2020: 2). However, the growth and sustainability of export demand has been seriously challenged by retaliatory tariffs on US seafood by China in 2018. Compounding the problem, China dropped tariffs on Canadian lobster, and the EU likewise reduced tariffs on Canadian lobster (Tannen 2020).

Over the past year, many people in the press and industry blamed the Chinese tariffs on lobster for the industry's problems. The tariff has not helped, but economic problems in the industry antedated the tariffs of the Trump administration by several years. Chinese tariffs, in and of themselves, have not resulted in economic problems for fishermen. However the tariffs, in combination with other factors, depressed the price paid for lobster and have resulted in losses for fishermen in some years (Tannen 2020).

In 2020, the market for lobsters has been reduced again by the COVID-19 pandemic. Not only had the Asian market already been shrinking due to the Chinese-American trade wars, but the European market also contracted due to the pandemic. After China, the second largest importer of lobsters is Italy. The entire country was self-quarantined, resulting in Italy's lobster market "falling through the floor" (Billings 2020: 10). At the same time, the Canadian market for lobsters in Asia and Europe has also declined.

IS THERE HOPE FOR THE FUTURE?

The future of the Maine lobster industry looks problematic. There appear to be no cures for several of the problems threatening the industry. Nothing can be done to ensure shell disease does not increase greatly in the Gulf of Maine. Likewise, the lobster industry can do nothing to stop increases in water temperature that will cause continued movement of concentrations of lobsters to Canadian waters. Moreover, the issue of protections for the right whale will continue. It is a virtual certainty that the Endangered Species and Marine Mammal acts will not be abolished any time soon. However, the cost/price squeeze in the industry may be more amenable to action.

Trap Limits

One possible solution that could help with several problems is to enact lower trap limits. In the 1990s, many older fishermen suggested that if every fisherman halved the number of traps fished, they would catch as many lobsters over the course of the year. Their income would remain the same, but their costs for bait, fuel, and traps would be reduced greatly. Moreover, they could probably get by with smaller and less costly boats (Acheson 2003).

A recent study came to the same conclusion that these fishermen had years before. It reported that in the period from 2007 to 2013, there was a decrease of 10.5 percent in total traps in Maine, but landings per trap grew by 124 percent, and there was a 100.2 percent increase in landings (Myers and Moore 2020: 11). The same study noted that Maine lobster fishermen used eight times as many traps to catch about twice as many lobsters as Canadian fishermen in the adjacent area. Moreover, these Canadian lobster fishermen have a limited fishing season (November through May) while Maine fishermen can fish year round (Myers and Moore 2020).

A significantly lower trap limit could also help with the right whale problem because it would reduce the number of lines in the water, thereby reducing the risk of whale entanglement.

Lobster Marketing

Dealing with fluctuations in supply and demand and changing prices has been a chronic problem in the Maine lobster industry. Beginning in the 1990s, the problem was exacerbated by huge catches that were difficult to market at

a profit. The imposition of tariffs by China and the EU only increased the problem.

Decreased demand from China and the EU led the lobster industry to search for new markets for live lobsters, ranging from Southeast Asia to Qatar and Dubai (Overton 2018). Maine also increased its exports of lobster to Canada, where lobster is not subject to the Chinese and EU tariffs. Some of this lobster is processed, but a lot is resold as live lobster in China and Europe. According to Overton (2019), “increased U.S. lobster sales to Canada offset all but \$14.4 million of America’s China losses over the last year, helping to blunt the impact of the China tariff on U.S. dealers.” Marketing lobster directly to Europe has the promise of again becoming profitable, with the August, 2020 announcement of a trade deal between the US and the EU that eliminates all tariffs on US lobster, putting US lobster dealers on equal footing with Canadian dealers for the first time since 2017 (Overton 2020d).

To expand markets for both live and processed lobster, the Maine Lobster Marketing Collaborative (MLMC), funded by Maine lobster harvesters, dealers, and processors, was established in 2013 by the state legislature. The MLMC’s 2020 plan was to build on its supply chain promotion focus of 2019, including resources for dealers and wholesalers, such as informational webinars targeting seafood distributors and food service representatives (Chase 2020). With the COVID-19 pandemic shutting down traditional markets such as restaurants and institutional food service, the organization shifted its focus to try to drive demand among those who could still buy lobster through retail outlets such as grocery stores, seafood markets, and direct delivery (Overton 2020c).

Another way to deal with supply-and-demand issues is to expand processing of lobsters. Beginning with the glut of lobsters in the 1990s, increasing numbers of soft-shell lobsters were boiled and the meat turned into a variety of frozen products that were sold to supermarkets, restaurants, cruise lines, and institutional buyers. There were a few processors in Maine, e.g., Shucks in Richmond and Portland Shellfish and Cozy Harbor in Portland, but most lobsters for processing were sold to Canadian companies and processed by the more than 30 Canadian plants (Fishermen’s Voice 2011).

A positive development for the Maine lobster industry over the last decade has been an expansion of in-state lobster-processing capacity. In 2019 alone, three new

plants were scheduled to open or expand operations: one in Bucksport (Greenhead Lobster Company) (Sambides 2019), another in Gouldsboro (East Coast Seafood) (Trotter 2019), and still another in Saco (Ready Seafood) (MaineBiz 2019). Having increased in-state processing could increase lobster sales and prices paid to fishermen, dealers, and others in the industry. 🦞

NOTES

- 1 Maine has a tiered lobster license system. The three primary license types are distinguished by the number of additional crew allowed on the boat. Class I allows no additional crew; Class II allows one additional crew; and Class III allows two additional crew. A fourth type of commercial license is the student license, which allows the holder to fish up to 150 traps and is available for full-time students under age 23. There is also a recreational license that allows holders to put in up to five traps for personal use. In 2018–2019, the most licenses were in classes I, II, and III. People who wish to obtain a commercial license must first complete an apprenticeship program in the zone where they wish to fish. Students who complete the apprentice program before the age of 18 can obtain a commercial license immediately, but all others must go on a license waiting list for their zone.
- 2 This study of the supply chain did not include retail establishments or restaurants. Adding these businesses makes the economic impact even greater.
- 3 Zone councils were delegated the ability to control entry into the fishery in their zone by recommending an entry-to-exit ratio (exit ratio) to the commissioner of DMR for rulemaking through the Zone Council referendum voting process (GMRI 2012: 15). Limited-entry zones may be established by recommending an exit ratio to the DMR commissioner for approval, whereby new licenses are issued based on the number of trap tags retired the previous year, derived from licenses that are not renewed. Most zones in 2012 had a five-to-one license exit-to-entry ratio, meaning one license could be issued for five that were not renewed (GMRI 2012). This system has led to long waiting periods for individuals on the list to obtain licenses. The Gulf of Maine Research Institute study (GMRI 2012) estimated that the average time of people on the waiting list was six years. A bill was introduced in the Maine Legislature in 2019 and carried forward to 2020 to deal with the long waiting periods and allow those who had been on the wait list for 10 or more years to be granted licenses. The bill did not pass as written, but was amended to a resolve that “requires the Department of Marine Resources to provide . . . a report that evaluates the limited-entry zone system by February 15, 2021” (129th Legislature, Chapter 116, Resolves, H.P. 29 - L.D. 28). In particular, it requires the DMR to examine the long waiting period for entry to fish in the limited-entry zones and to update the 2012 GMRI study.
- 4 <https://www.fisheries.noaa.gov/species/north-atlantic-right-whale>

REFERENCES

- Acheson, James M. 1988. *Lobster Gangs of Maine*. Hanover, NH: University Press of New England.
- Acheson, James M. 2003. *Capturing the Commons: Devising Institutions to Manage the Maine Lobster Industry*. Hanover, NH: University Press of New England.
- Acheson, James M. 2006. “Lobster and Groundfish Management in the Gulf of Maine: A Rational Choice Perspective.” *Human Organization* 65(3): 240–252. <https://www.jstor.org/stable/44127426>
- Acheson, James. 2013. “Co-management in the Maine Lobster Industry: A Study in Factional Politics.” *Conservation and Society* 11(1): 60–71. <https://doi.org/10.4103/0972-4923.110936>
- Acheson, James M., and Robert Steneck. 1997. “Bust and then Boom in the Maine Lobster Industry: Perspectives of Fishers and Biologists.” *North American Journal of Fisheries Management* 17(4): 826–847. [https://doi.org/10.1577/1548-8675\(1997\)017<0826:BATBIT>2.3.CO;2](https://doi.org/10.1577/1548-8675(1997)017<0826:BATBIT>2.3.CO;2)
- Acheson, James M., Terry Stockwell, and James A. Wilson. 2000. “Evolution of the Maine Lobster Co-management Law.” *Maine Policy Review* 9(2): 52–62. <https://digitalcommons.library.umaine.edu/mpr/vol9/iss2/7/>
- Billings, Cathy. 2020 “COVID-19 Pandemic Disrupts the North Atlantic Lobster Industry.” *The Lobster Newsletter* 33(1): 10–12.
- Chase, Chris. 2020. “Maine Lobster Marketing Collaborative Announces Its 2020 Strategy.” *Seafood Source*. <https://www.seafoodsource.com/news/supply-trade/maine-lobster-marketing-collab-announces-its-2020-strategy>
- Donihue, Michael. 2018. *Lobsters to Dollars: The Economic Impact of the Lobster Distribution Supply Chain in Maine*. Final Report of the Lobsters to Dollars Economic Study. Waterville, ME: Colby College. <http://www.colby.edu/economics/lobsters/Lobsters2DollarsFinalReport.pdf>
- Fernandez, Ivan J., Sean Birkel, Julia Simonson, Bradford Lyon, Andrew Pershing, Esperanza Stancioff, George Jacobson, and Paul Mayewski. 2020. *Maine's Climate Future 2020 Update*. Orono: University of Maine. <https://climatechange.umaine.edu/climate-matters/maines-climate-future/>
- Fishermen's Voice. 2011. “Lobster Processing: The Straight Story.” *Fishermen's Voice* 16(10). <https://www.fishermensvoice.com/archives/1011LobsterProcessingTheStraightStory.html>
- GMRI (Gulf of Maine Research Institute) . 2012. *An Independent Evaluation of the Maine Limited Entry Licensing System for Lobster and Crab*. Portland, ME: GMRI. https://www.gmri.org/sites/default/files/resource/evaluationoflobsterlimitedentry2012_2.pdf
- Le Bris, Arnault, Katherine E. Mills, Richard A. Wahle, Yong Chen, Michael A. Alexander, Andrew J. Allyn, Justin G. Schuetz, James D. Scott, and Andrew J. Pershing. 2018. “Climate Vulnerability and Resilience in the Most Valuable North

- American Fishery." *PNAS* 115(8): 1831–1836. <https://doi.org/10.1073/pnas.1711122115>
- MaineBiz. 2019. "Maine's Largest Lobster Processing Plant Opens." *MaineBiz*, September 6, 2019. <https://www.mainebiz.biz/article/maines-largest-lobster-processing-plant-opens>
- Martin, Kenneth R., and Nathan R. Lipfert. 1985. *Lobstering and the Maine Coast*. Bath, ME: Maine Maritime Museum.
- Myers, Hannah, and Michael Moore. 2020. "Reducing Effort in the U.S. American Lobster (*Homarus americanus*) Fishery to Prevent North Atlantic Right Whale (*Eubalaena glacialis*) Entanglements May Support Higher Profits and Long-term Sustainability." *Marine Policy* 118. <https://doi.org/10.1016/j.marpol.2020.104017>
- Overton, Penelope. 2018. "Lobster Exporters Looking Around the World for New Markets to Stem Losses." *Portland Press Herald*, December 13, 2018. <https://www.pressherald.com/2018/12/13/lobster-dealers-look-to-new-markets-new-products-to-stem-export-losses/>
- Overton, Penelope. 2019. "'We Just Can't Compete with Canada Right Now': Tariffs Drive Down U.S. Lobster Exports to China by 46%." *Portland Press Herald*, August 11, 2019. <https://www.pressherald.com/2019/08/11/we-cant-compete-with-canada-right-now-tariffs-drive-down-u-s-lobster-exports-to-china-by-46/>
- Overton, Penelope. 2020a. "Though Maine's Lobster Harvest Was the Smallest in 9 Years, Value Remained Steady." *Portland Press Herald*, March 6, 2020. <https://www.pressherald.com/2020/03/06/lobster-harvest-smallest-in-9-years-but-value-increased/>
- Overton, Penelope. 2020b. "Maine Says Its Plan to Protect Whales from Lobster Gear Is Better than Feds Think." *Portland Press Herald*, February 13, 2020. <https://www.pressherald.com/2020/02/12/maine-says-its-whale-plan-is-better-than-feds-think/>
- Overton, Penelope. 2020c. "Maine Fishermen Seek Relief, New Markets to Navigate 'Economic Disaster'." *Portland Press Herald*, April 23, 2020. <https://www.pressherald.com/2020/04/23/maine-fishermen-seek-economic-relief-new-markets/>
- Overton, Penelope. 2020d. "European Union Drops Tariffs on U.S. Lobster." *Portland Press Herald*, August 21, 2020. <https://www.pressherald.com/2020/08/21/european-union-drops-tariffs-on-u-s-lobster/>
- Reardon, Kathleen M., Carl J. Wilson, Patrick M. Gillevet, Masoumeh Sikaroodi, and Jeffrey D. Shields. 2018. "Increasing Prevalence of Epizootic Shell Disease in American Lobster from the Nearshore Gulf of Maine." *Bulletin of Marine Science* 94(3): 903–921. <https://doi.org/10.5343/bms.2017.1144>
- Sambides, Nick. 2019. "It's Lost Much of Its Overseas Business, But a Lobster Firm is Opening in Bucksport." *Bangor Daily News*, August 26, 2019. <https://bangordailynews.com/2019/08/26/news/hancock/its-lost-much-of-its-overseas-business-but-a-lobster-firm-is-starting-up-in-bucksport/>
- Schreiber, Laurie. 2020. "Lobstermen Rally to Fight Right Whale Ruling." *The Working Waterfront* 34(4): 1,3.
- Stevens, Lorelei. 2000. "Whale Report Triggers Alarm among Lobstermen." *Commercial Fisheries News* (February): a8.
- Tannen, Michael. 2020. "Tariffs, Environmental Change, and the Maine Lobster Industry: A Case Study." *Research in Business and Economics Journal* 14:1–17. <https://www.researchgate.net/publication/341606068>
- Trotter, Bill. 2018. "Scientists Say Maine's Lobster Boom Won't Last. Here Are the Fisheries Coming Next." *Bangor Daily News*, May 12, 2018. <https://bangordailynews.com/2018/05/12/business/fisheries/scientists-say-maines-lobster-boom-wont-last-here-are-the-fisheries-coming-next/>
- Trotter, Bill. 2019. "Lobster Firm to Invest in Gouldsboro Plant after Closure of Connecticut Facility." *Bangor Daily News*, January 17, 2019. <https://bangordailynews.com/2019/01/17/news/hancock/lobster-firm-to-invest-in-gouldsboro-plant-after-closure-of-connecticut-facility/>
- Waterman, Melissa. 2018. "Ocean Acidification May Affect Lobster Molt, Reproduction." *Landings*, August. <https://mlcalliance.org/2018/08/12/ocean-acidification-may-affect-lobster-molt-reproduction/>
- Whittle, Patrick. 2019. "Bait Crisis Could Take the Steam out of Maine's Lobster Industry This Summer." *Bangor Daily News*, March 31, 2019. <https://bangordailynews.com/2019/03/31/news/bait-crisis-could-take-the-steam-out-of-maines-lobster-industry-this-summer/>



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