The lobster gangs of Maine in a changing fishery

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22 May 2020

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Abstract

This thesis examines two key aspects of the lobster fishery in the Mount Desert Island region: territoriality and working waterfronts.

The lobster fishery is historically highly territorial, as fishermen from the same harbors would maintain control over fishing grounds by consistently setting their gear in the same area and protecting them against outsiders. In the last two decades, a sharp increase in the number of license holders has led to the redefinition of territorial lines in the inshore waters of Frenchman Bay. Bar Harbor fishermen, who traditionally retained control over most of the Bay, have lost a large portion of their territory to the emerging harbors overlooking the head of Frenchman Bay. Interviews with local lobstermen identified the student license program as a key factor in the increase of fishermen and the shift in values that allowed for territorial lines to be disrespected.

The increase in license holders was mentioned as a reason for the growth of the offshore fishery around Mount Desert Rock, too. The growth was also spurred by the lack of other fisheries that can be targeted by Maine fishermen. As lobstering remains the only option for those whose livelihood depends on fishing, captains have been forced to follow the lobsters in their seasonal migration to deeper offshore waters in the winter. As the offshore fishery attracts increasing numbers of lobstermen, a sense of territoriality has begun to arise. However, its underlying rules are diverging from those of traditional harbor territories as fishermen tolerate sharing the grounds with captains from harbors other than their own.

Lastly, the Town Pier of Bar Harbor is presented as a case study for working waterfronts in Maine, and specifically as an example of a public facility that is currently facing user conflict issues. Bar Harbor fishermen share the Town Pier facilities with other recreational and commercial users; the recent growth of cruise ship visitations to Bar Harbor has been cause of tensions as fishermen feel their needs are being set aside in favor of those of cruise ships. The practical reality of the shared waterfront is indicative of a shift in values in the town of Bar Harbor, which, some argue, seems to be losing its connection to its fishing heritage.

in loving memory of

Brian ‘Duke’ Levesque Jordan

1986 – 2020

Thank you for showing me love, care,
and what a true fisherman is.

Acknowledgements

This project was supported by the Maine Sea Grant Program Development fund.

I would like first and foremost to acknowledge my committee, Chris Petersen, Natalie Springuel and Kourtney Collum, for the support, advice and encouragement they showed from the very beginning. You have all pushed me to do my best, reconsider my assumptions and embrace my beliefs. Thank you.

Thank you to Davis Taylor for his invaluable advice as I was writing what became Chapter 3, and for his endless curiosity about commercial fishing. I never thought I would ever take an Economics class, and at the end of our work together I was left wanting to learn more.

I will never thank Stevie Burns enough for trusting a greenhorn like me to be his full-time sternman for the entire season. I would have never been able to understand lobstering and lobstermen as well as I can now if he had not taken a chance on me and welcomed me on the Julie B. I also want to thank Ann Burns for showing me kindness and enthusiasm for everything I did, chatting with me in the early morning hours, and always letting me into her house no matter how thick with bait and mud my clothes were.

I am thankful to all the fishermen that agreed to be interviewed. Time is a valuable and limited resource, especially for those who fish, and I was continuously amazed by how many agreed to dedicate hours to answering my questions without a second though. I would also like to acknowledge all the fishermen that let me into their world and treated me like one of their own throughout the whole season. I never once felt out of place, and I learned something about fishing and being a fisherman from each and every one of you.

As always, thank you to my Italian family – mamma, papá, Chiara, Pietro, nonna and Andrea – for supporting me from afar and always being interested in my work and my world, no matter how different from yours it might be. I would have sent you a lobster every week if I could have, but since the logistics were a little complicated, I decided to eat them on your behalf instead.

Lastly, I want to thank my American family. Wyatt, Kenna, Cardi, Peaches, Olive and Ted – I could not have asked for better company while writing a thesis during a pandemic lockdown. Josh, thank you from the bottom of my heart for standing by me throughout my journey as an inexperienced sternman and graduate student. Although no words can really express what it meant to me, you should know that your support, encouragement and enthusiasm for my work have kept me going this whole time and made me feel confident that I can give back to a world that has given me so much.

A person feels less underwater when supported by so many buoys
P. Greenberg

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List of Abbreviations

ASMFC	Atlantic States Marine Fisheries Commission
DMR	Department of Marine Resources
EEZ	Exclusive Economic Zone
FMP	Fisheries Management Plan
GBK/GOM	Georges Bank/Gulf of Maine lobster stock
MDI	Mount Desert Island
MLA	Maine Lobstermen's Association
NMFS	National Marine Fisheries Service
nmi	Nautical mile
NOAA	National Oceanic and Atmospheric Administration
SNE	Southern New England stock
WWAPP	Working Waterfront Access Protection Program

My personal journey to this project

for whatever we lose(like a you or a me)
it's always ourselves we find in the sea
e e cummings

Like many others before me, I was caught in what Jacques Cousteau called the sea's net of wonder. It happened while I was below the surface, in crystal clear waters, thousands of miles away from my very urban hometown of Milan, Italy. I did not grow up near the ocean. I did not grow up in a fishing family, or a sailing family, or really an ocean family at all. I grew up riding waves of traffic on my Vespa and diving into subway trains.

I always yearned for a life in nature, but it took me over 20 years to understand what that meant for me and to find the courage to go out and seek it. It was a wonderful, joyful journey that took me to some of the most incredible places on Earth. I was and am endlessly grateful to have had the privilege to undertake it, but I would be amiss if I did not acknowledge that it was painful, too. I may have never felt at home in Milan, but I could navigate its streets with my eyes closed and had found my honey holes and safe harbors. With no charts to help me in my journey, I had to run aground a few times before I found my course. But the further I went, the more I came to long for and appreciate the comfort of a mooring – somewhere that I could steam back to at the end of every day and that anchored me in one place. Prospecting had been fun, educational, inspiring and hardening, but above all it made me learn the value that comes with truly *being* in one place; not just physically being present in it, but developing a deep and intimate knowledge of its character, its habits, its quirks and its every part. My yearning for an adventurous life in nature had turned into an unquenchable curiosity for the life of those who truly *are* in a place. What does it mean for a life to revolve around one single body of water? For a person to be able to understand its tides, currents, seasons with no charts or scientific models? It takes a lifetime to develop that sort of relationship with a place, to build that sort of a *sense of place*. Sometimes, I think my curiosity is simply impatience. I could not wait a lifetime to find out what that meant, so I figured that living among those who had a sense of place would have had to suffice.

My lack of a sense of place had also exposed to me how essential an element it actually is in building a harmonious and balanced relationship with the natural world, although I was and am aware that its presence alone is not enough to guarantee success. I have often made the argument that the ultimate goal of conservation should be a sustainable relationship between humans and the environment, and that it should not presuppose a separation between the two. I do not believe conservation should be about safeguarding "wild" nature against human greed; I would rather focus on how to prevent greed from arising by nurturing appreciation and gratitude for nature in humans, and I think developing a sense of place is key in this sense.

"In the end we will conserve only what we love, we will love only what we understand, and we will understand only what we are taught.". This famous statement by Baba Dioum, a Senegalese environmentalist and forest ecologist, may have lost a little of its power as it became an overused conservation mantra all over the world, but there is still truth to it – and to me, it talks about the importance of a sense of place. Not to mention the wide literature that argues for the same point; van Putten et al. (2018), for example, emphasize how people's attitudes and

behaviors are influenced by their emotional bond to a place; the stronger the tie, the more likely communities are to adopt sustainable and pro-environmental behaviors.

This, I realized, is what I wanted to dedicate myself to. I wanted to learn from those who had a sense of place (whether they referred to it in these terms or not) and understand how it impacted their relationship with nature. Specifically, I wanted to learn from those whose lives were tied to the ocean through food production. After much wandering, I washed up on the sand bar of Bar Harbor, Maine and started to get my bearings. Maine was a wonderful place to be stranded: there is the ocean, and there are people who have made their living from it for decades. Maine fishermen[1] seem to be a dying breed. Small-scale fisheries in the Western world are declining, and fish stocks are often managed at a scale that excludes fishermen. Here in Maine, lobstermen, clammers, wormers, scallopers are found in almost every coastal town, are generally engaged in the policy-making process, and they talk about their fishing grounds as if they were the backstreets of their neighborhood because they are, in fact, their neighborhoods. The nature of the job requires a connection with the place where it occurs; your life depends on those pieces of ocean bottom and what dwells there, and so you care for it, nurture it, learn about it.

Learning as a sternman

One day in early November 2018, I somehow found myself on the Bar Harbor Town Pier at 6 in the morning, waiting to load trays of salted herring on the F/V Julie B (Figure 1). I was wearing my oil gear and holding on to my new pair of rubber gloves. Once the bait was on board, the Julie B steamed across the harbor, past the breakwater, by Cat Island, over Schooner Head Grounds, beyond the 3-mile line and out towards Tucker's Rock. We hauled a few strings of triples, loaded them on the boat and brought them back to the dock. The season was coming to an end and lobsters were slowly moving further offshore, so we only had a few crates to unload on the dealer's tractor trailer waiting for us at the head of the pier. We hoisted the traps onto the truck and drove them over to the yard, where we added them to a seemingly infinite stack of yellow and green wire.

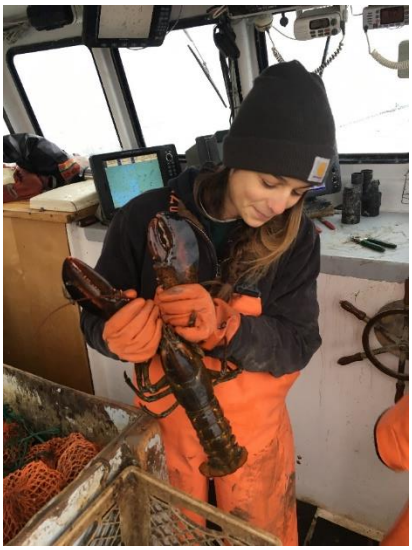

Figure 1 My first day on the Julie B.

[1] In Maine, people engaged in commercial fishing generally self-identify as "fisherman/men" and "lobsterman/men" regardless of their gender. I will also adopt this terminology to refer to male, female and gender nonconforming individuals in line with both popular and academic usage.

When I got back to my car, I was awestruck. I had eagerly been studying James Acheson's *Lobster Gangs of Maine* in the previous week, and now I felt like a few hours on the Julie B had taught me almost as much as the days spent reading. Not that I considered myself a lobstering expert, of course; it had simply dawned on me that to learn about fishing, you have to go fishing. And so I did, in the hope that it would help me gain a better grip on a fisherman's sense of place.

A year later, almost to the day, I found myself in the same circumstances, except that I had almost an entire shedder season as a sternman on the Julie B under my belt. Around that time, a trusted friend recommended a book, *The Power of Kiowa Song*, by Luke Lassiter. I was still reading Part I when I encountered this reflection: "The more you hang around Kiowas, the more you become like them […] The more you're here and singing, the more you'll learn." (Lassiter 1998:52). I smiled, thinking that I knew exactly what he meant – as long as I could substitute "Kiowas" with "fishermen and "singing" with "fishing". Lassiter was an anthropology graduate student working with the Kiowas of Oklahoma, I was a human ecology graduate student working with the lobstermen of Maine – but it seemed like we had gone through very similar experiences. I am still not a lobsterman, but I am, indeed, a little more like them. A season is not long compared to a lifetime, but it still had taught me enough to understand them in a much deeper and more intimate way than a year ago.

I cannot deny that I fell in love with commercial fishing, although I have strived to remain unbiased and recognize that lobstermen have many assets, but also some flaws throughout the entire research process. I do think that part of the reason I fell in love was because in the fishing community I found that sense of place that I was longing for. As I said, I do not come from a fishing family; I am not a fisherman. This is not a project I undertook to celebrate *my* heritage, but there is certainly an element of celebration in the work I conducted. In a world that is becoming increasingly homogenous and forgetful of roots and traditions, I wanted to write about a group of people who are proudly holding on to their unique heritage and identity, and who are at risk of losing both. So much is said about conserving biodiversity of the natural world, but the worth and beauty of human biodiversity should not be forgotten either.

The thesis

All these ideas fed into the development of my thesis. A sense of place is what drove me throughout the entire process. I eventually decided to focus on the two key places in a fisherman's life: their fishing grounds and their waterfront.

Fishing grounds are key in Maine's lobster fishery. The high levels of territoriality can also be read as attachment to those pieces of bottom that have been fished by people belonging to the same group for generations. For fishermen, territories are defined by their ecological characteristics and their productivity, but also by an emotive element of social and cultural memory. I focused on inshore territories because I wanted to understand how they were changing and how deep these changes were, but also to collect and preserve the memory of what inshore territories once used to be and mean. I also wanted to learn and write about the recent rise of offshore territories, because they provide a space for new individual and collective identities to form.

Lastly, I wanted to include working waterfronts as a reminder of fishermen's contribution to local communities. Fishermen are often forgotten by the general public because they are physically distant from the rest of the world; their work is virtually invisible to most of us until

we see the product of their labor in a grocery store refrigerator. Docks, wharves and piers are the place where fishermen go out to sea, but also where they come back to land; they enable fishermen to pursue their livelihood and then return to their lives as community members, but they are also the place where the community can see them and interact with them. I specifically focused on the Town Pier of Bar Harbor for two reasons. As Bar Harbor's identity oscillates between fishing community and tourist destination, so does the fate of its Town Pier as a working waterfront. It is an illustrative example of Maine's struggling working waterfronts that also offers a sliver of hope. It has also become *my* home port, the door through which I stepped into the world of commercial fishing and that helped me to finally build my own sense of place.

Chapter 1: Introduction

The thesis is articulated in three chapters. In Chapter 1, I present the aims and objectives of the study and contextualize the project by building an overview of the lobster fishery. In Chapter 2, I focus on the concept of territoriality in the fishery by reviewing its development and significance and presenting the results of the research I conducted to understand how this feature of the fishery is changing in both inshore and offshore waters. In Chapter 3, I discuss the economic, social, and cultural significance of working waterfronts in Maine and characterize the Bar Harbor Town Pier as a case study of a public waterfront faced with user conflict issues.

Aim & research questions

The overarching aim of this study is to explore and capture the significance of place in the lobster fishery, with a geographic focus on the Mount Desert Island region.

The project examines the following research questions:

1. How and why have traditional inshore lobstering territories in Frenchman Bay changed?
2. How do fishermen explain the expansion of the offshore lobster fishery?
3. What territorial dynamics, if any, are arising in the offshore lobster fishery?
4. What is the social, cultural, and economic value of the town pier for the Bar Harbor fishing and wider community?

Through this project, I hope to understand how Maine lobstermen have contributed to the sustainability of their fishery and the well-being of their communities and document parts of their local history. I also hope to support a positive evolution of the fishery by providing previously undocumented information on some of its newer elements, such as the offshore expansion, that can benefit the development of appropriate management decisions.

The fishery

Lobsters

The American lobster (*Homarus americanus*) (Figure 2) is a species of crustacean native to the Northwest Atlantic Ocean (Figure 2). It is a benthic organism most commonly found in depths between 0 and 50 m (0 – 165 ft) and waters between 5 and 20 °C (41 – 68 °F) (Wahle et al. 2013). Lobsters migrate seasonally along a depth gradient to remain within their preferred water temperature range, meaning they shift from coastal waters (0 – 3 nautical miles) in the summer to near-shore waters (3 – 12 nmi) in the fall and offshore waters (beyond 12 nmi) in the winter (Atlantic States Marine Fisheries Commission 2015; Chang et al. 2010). They grow incrementally in distinct molting events whose frequency increases with rising water temperature (Atlantic States Marine Fisheries Commission 2015). Mature lobsters produce between 8,000 and 100,000 eggs depending on their size; eggs are extruded and held onto the tail by a glue-like substance for 10-11 months. Once they hatch, larval lobsters go through three molting stages before settling on the bottom; after 5 to 7 years and 25 to 27 additional molts, they reach adulthood (NOAA Fisheries 2019).

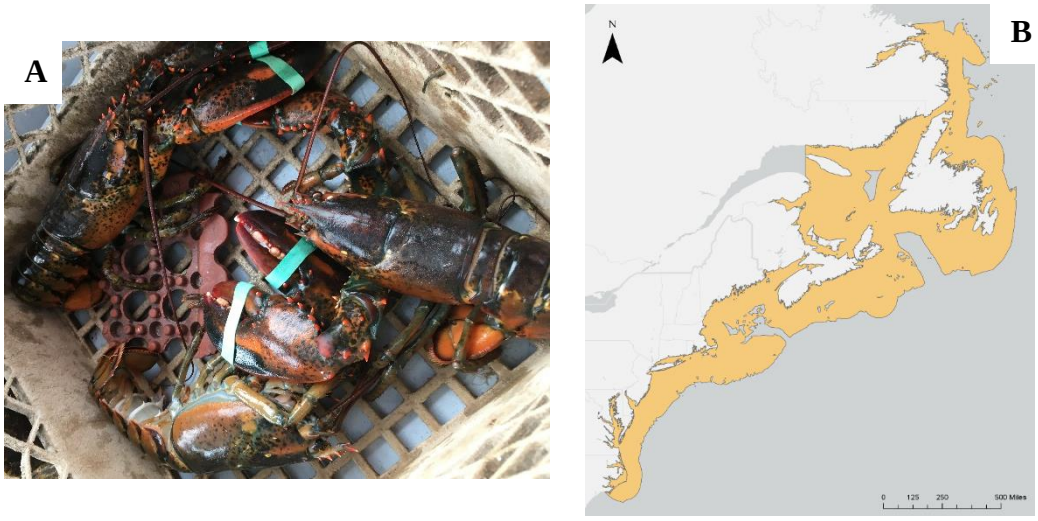

Figure 2 Three American lobsters with banded claws on a fishing vessel (A) and their habitat range (B). Data source for (B): Wahle et al., 2013.

The lobster population is ranked as a species of Least Concern by the International Union for the Conservation of Nature (Wahle et al. 2013). In US waters, the population is divided into two biological stocks, the Southern New England (SNE) stock and the Gulf of Maine/Georges Bank (GoM/GBK) stock, which is targeted by Maine fishermen. According to the Atlantic States Marine Fisheries Commission (ASMFC) 2015 Stock Assessment, the SNE stock is depleted but not overfished, while the GoM/GBK has grown and has been fished within sustainable levels since the 1995 Stock Assessment. There are numerous reasons to explain the increase, such as effective brood stock protection, lobstermen's zealous compliance with conservation measures and the depletion of natural predators with the collapse of many groundfish species (Steneck et al. 2011). At the same time, the Gulf of Maine is warming at a faster than average rate (Pershing et al. 2015) and that triggers concerns such as changes in lobster population structure, higher risk of disease and a mass migration northeastward along

the coast and towards offshore grounds in search of deeper and colder waters (Steneck et al. 2011). Landing data and fishermen observations have confirmed a spatial shift in population, while research has found that female size at maturity decreases with increasing water temperatures (Waller et al. 2019).

Lobstering

Figure 3 Setting traps on the F/V Julie B, May 2019.

Past, present and future

Lobsters were traditionally hand-harvested by native Wabanaki tribes to be used as bait and fertilizer; as European settlers moved in, they used lobsters as a food source, but never held it in high regard. Lobstering as a commercial fishery started around the 1820s (Acheson 1988). By the end of the 19th century, it was established as Maine's highest-grossing marine fishery, even surpassing the colossal groundfish fishery in value of catch. (O'Leary 1996). Landings experienced a sharp decline between 1920 and 1940, largely due to extremely high levels of illegal fishing (Acheson and Steneck 1997). This led to the introduction of a series of management measures and the development of strong conservation ethics among lobstermen, both of which allowed the resource to recover to pre-bust levels (Acheson and Steneck 1997; Figure 4). Since then, catches have been increasing and have been at record high levels almost every year since the 1980s, making lobstering an exceptional example of a fishery whose landings continue to increase after over a century of extraction (Steneck et al. 2017; Figure 4)

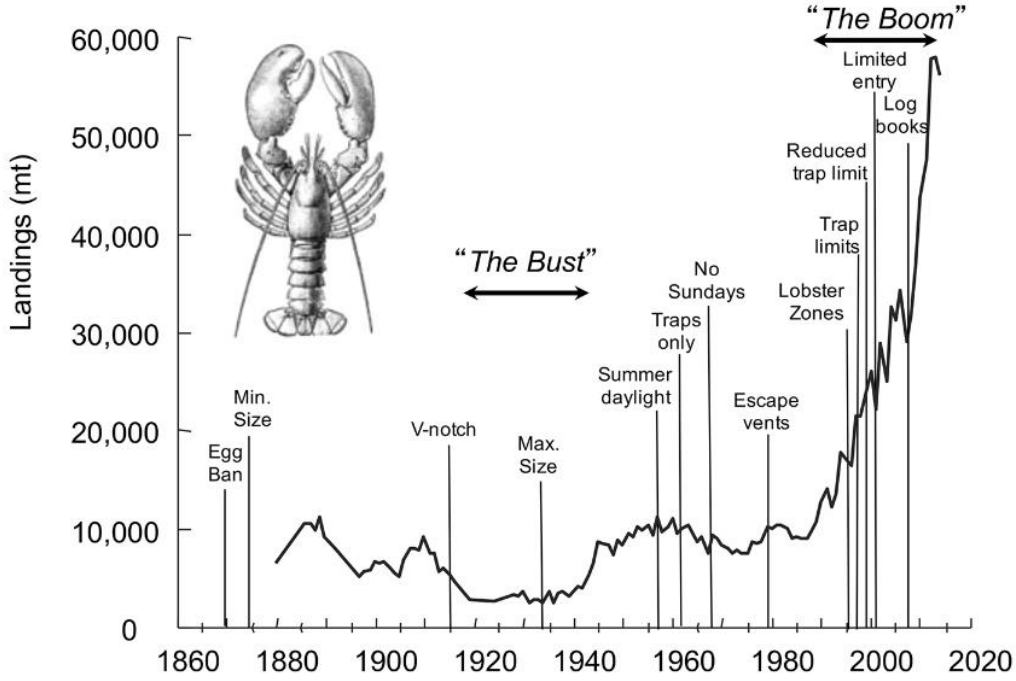

Figure 4 Landings data and conservation measures timeline for the American lobster fishery. Figure from Steneck et al. 2017.

Today, lobsters hegemonically dominate Maine's fishing economy (Figure 5). With the collapse of the groundfish stocks in the 1990s and the decline of other traditional fisheries, lobsters have remained the largest and most profitable year-round option for Maine fishermen (Stoll, Beitl, and Wilson 2016). Of the approximately 9,000 commercial fishing licenses issued in Maine, 6,224[2] of them are for lobstering (Department of Marine Resources 2018); in 2019, the lobster fishery accounted for 73% of the total value of Maine's commercial landings, which equates to over $490 million, and for 47% of its weight in live pounds of all landed fisheries (preliminary data; Department of Marine Resources 2020c).

[2] This number includes the 299 apprentice licenses issued as part of the apprenticeship program (see below).

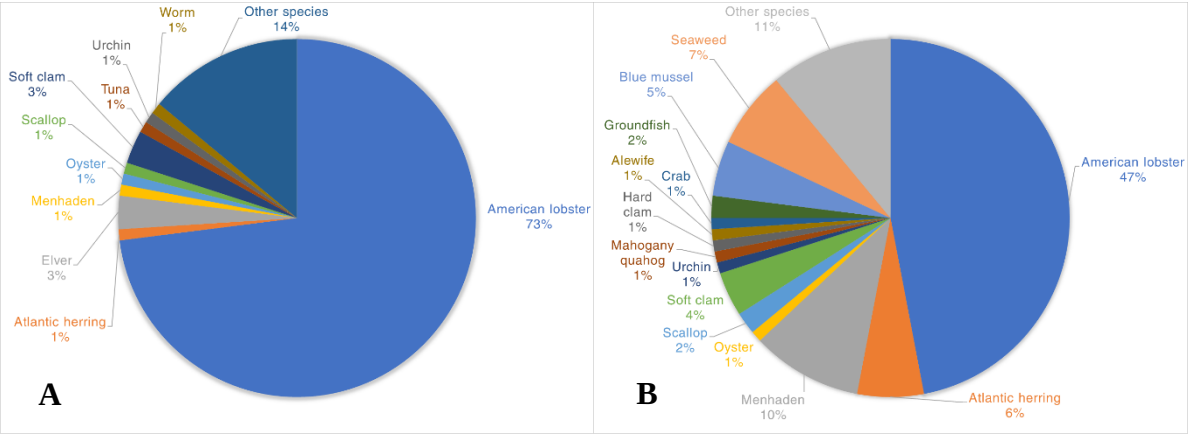

Figure 5 Lobsters are the dominant fishery in Maine, both for landings value (A) and poundage (B). The figure shows preliminary data for the 2019 season from the Department of Marine Resources.

As staggering as its ex-vessel[3] value is, it is crucial to remember that it is only a raw measure of the fishery's direct impact on the local economy. Its total economic impact would also include its indirect and induced effects, which would reflect the value of the activities generated or supported by lobstering, from income spent by captains and crews to revenue of gear manufacturers, boat builders, bait suppliers and lobster dealers operating in regional, national and international markets, as well as the lobster cuisine economy. No comprehensive assessment of the industry's full impact has been published yet; an overview of partial studies of the working waterfront economy is found in Chapter 3.

Although the fishery has thrived in the last few decades, it is reasonable to expect a change in its upward trajectory in the foreseeable future. This is due first and foremost to natural fluctuations in population dynamics and fishing success – a phenomenon that is generally understood by both scientists and fishermen and that has many contributing factors, both ecological and social. These fluctuations may simply mean a slight decline or flattening of the landings curve, although their impact could be exacerbated by the impact of global environmental change.

Managing the fishery

Because the large habitat range of lobsters crosses numerous State lines, the primary managing authority over the resource is the interstate compact known as the Atlantic States Marine Fisheries Commission (ASMFC). The current version of the Fisheries Management Plan (FMP) for lobsters was published in 1997 (Lockhart and Estrella 1997) by the ASMFC. The FMP is not based on a quota[4] system, but rather on a combination of effort control[5] and stock

[3] The ex-vessel value measures the monetary worth of commercial landings as the price per pound at the first point of sale multiplied by the total pounds landed.

[4] A quota is the maximum amount of product in pounds that can be legally landed in a given time period. The quota for a product may be the same for every fisherman engaged in the fishery (e.g., all scallop fishermen in Maine have a daily quota of 15 gallons of scallop meat) or vary by individual license holder depending on factors such as landing history or catch shares (e.g. the New England groundfish fishery).

[5] Effort control policies aim at regulating the amount of time and fishing power (e.g. gear type and size) invested in harvesting seafood.

protection[6]. The ASMFC devolves implementation of the Plan to the relevant state and federal agencies over their respective jurisdictions. States manage the species through their designated marine resources department, such as Maine's Department of Marine Resources (DMR). State Departments have jurisdiction over territorial waters, (0 – 3 nmi). The federal government applies ASMFC regulations from the 3 nmi line to the outer Exclusive Economic Zone (EEZ) boundary (200 nmi) through the National Marine Fisheries Service (NMFS).

State departments have the power to adapt the Interstate FMP to local social and ecological characteristics, provided their directives do not contradict, defy or oppose the minimum requirements set by the ASMFC. This flexibility has allowed Maine to adopt a co-management structure and embrace local lobstermen's traditional involvement in resource management. Many of the guidelines set by the ASMFC's Plan – such as maximum harvestable size and protection of egg-bearing females – were actually first created and practiced by Maine lobstermen following the bust of the 1920-30s (Acheson and Steneck 1997). The Maine lobster fishery also follows an owner-operator model by law, meaning that the license holder must be the owner of the fishing vessel and must be aboard for all fishing operations (Department of Marine Resources 2019a:25.08.B.5). The model also arguably contributes to the long-term sustainability of the fishery, as it increases ownership and stewardship among license holders and it reduces the risk of absentee corporate ownership and fleet consolidation, which have often caused overfishing, unsustainable practices and community displacement (Donkersloot and Carothers 2017; Greer 1995; Squires and Wiber 2018; The Fleet Visioning Project 2005).

[6] Stock protection regulations are in place to protect key life stages of a species (e.g. sexually mature individuals) in the subpopulation (stock) targeted by harvesters.

Maine's co-management model entails shared powers and responsibilities between the DMR and the fishermen. It was institutionalized in 1995 with the Zone Management Law; the system divides the coast in seven Lobster Management Zones (or Zones for short; Figure 6), each of which contains roughly the same number of licensed lobstermen and is run by its own Lobster Zone Council.

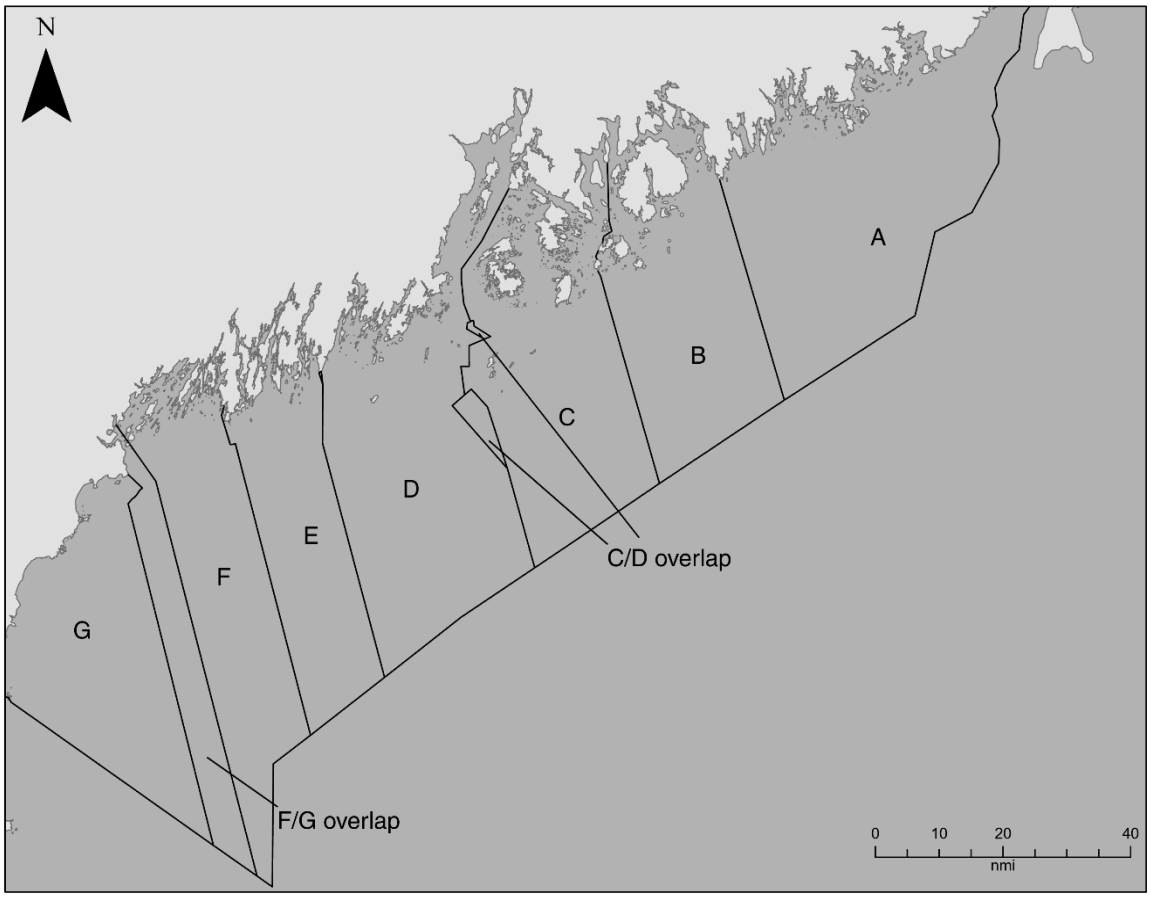

Figure 6 Lobster Management Zone boundaries, extending to 40 nmi. Data source: Department of Marine Resources.

Lobster Zone Councils are composed of elected license holders and can deliberate over the maximum number of traps permitted for each individual; the number of traps permitted on a single line ("trawl limit"); the time of day during which lobster fishing is allowed; and the number of lobstermen allowed in each Zone through entry-to-exit ratios (Table I). Provided the Councils' decisions are deemed reasonable by the Commissioner of the DMR and in line with ASMFC guidelines, they are ratified into official regulation for the respective Zones. All Zones must abide to the remaining conservation rules pertaining to brood stock protection and minimum and maximum sizes as set by the ASMFC (Table II). The DMR remains responsible for issuing State licenses (following Zone rules pertaining entry-to-exit ratios), monitoring landings, enforcing the law and conducting research on lobster biology and ecology. License holders have to declare their primary fishing Zone, but are also allowed to fish 49% of their traps in any other Zone as long as they affix a secondary tag to the traps (Department of Marine Resources 2019a:25.08.A.3).

Table I Trap limits and entry-to-exit ratios for each Lobster Management Zone. Entry-to-exit ratios represent the number of licenses to be retired (exit) before a new license can be issued (entry). Zone B, where the study took place, is emphasized in bold. Its entry-to-exit ratio is 1:3, meaning that for every three licenses retired, one will be issued.

Zone	***Trap limit***	***Entry-to-exit ratio***
A	800	1:3
B	**800**	**1:3**
C	800	1:1
D	800	1:5
E	600	1:5
F	800	1:5
G	800	1:5

Table II State-wide conservation measures.

Management measure	***Rule***	***Goal***
Minimum carapace size	3-¼”	Protect juvenile individuals
Maximum carapace size	5”	Protect highly fecund individuals
Possession of egg-bearing female	Prohibited	Protect brood stock
V-notch marking requirements	Mandatory for all egg-bearing females	Mark and identify brood stock
V-notch possession	Zero tolerance	Protect brood stock
Escape vent	Rectangular vent not less than 1-15/16” by 5-3/4" or two circular vents not less than 2 7/16" in diameter	Protect juvenile individuals

Zones extend out to 40 nmi, with partial overlap with federal waters. These are also divided into management sections, called Areas (Figure 7). Like Lobster Management Zones, each Area has a certain degree of flexibility in adapting the ASMFC’s guidelines as long as they abide to the minimum standards (Table III). Fishing in federal waters require a separate permit issued by the NMFS, but as of 1999 the agency has set a moratorium on new licenses; the existing permits remain valid and can be transferred between individuals and across State and county lines. The majority of Maine lobstermen choose to fish Area 1, for which there are 1,601 permits in circulation (NOAA Fisheries 2019).

Table III Federal conservation measures. Area 6 is contained within NY State waters and as such is subject to partially different regulations.

Management measure	***Area 1***	***Area 2***	***Area 3***	***Area 4***	***Area 5***	***Area 6***	***Outer Cape Cod***
Trap limit	800	800	1,945	1,440	1,440	N/A	800
Minimum carapace size	3-¼”	3-$^{3}/_{8}$”	3-$^{17}/_{32}$”	3-$^{3}/_{8}$”	3-$^{3}/_{8}$”	3-$^{1}/_{4}$”	3-$^{3}/_{8}$”
Maximum carapace size	5”	5-$^{1}/_{4}$”	6-$^{3}/_{4}$”	5-$^{1}/_{4}$”	5-$^{1}/_{4}$”	5-$^{3}/_{8}$”	6-$^{3}/_{4}$”
V-notch marking requirements	Mandatory for all egg-bearing females	Mandatory for all egg-bearing females	Mandatory for all egg-bearing females	Mandatory for all egg-bearing females	Mandatory for all egg-bearing females	N/A	None
V-notch possession	Zero tolerance	< $^{1}/_{8}$”	< $^{1}/_{8}$”	< $^{1}/_{8}$”	< $^{1}/_{8}$”	< $^{1}/_{8}$”	< $^{1}/_{8}$”

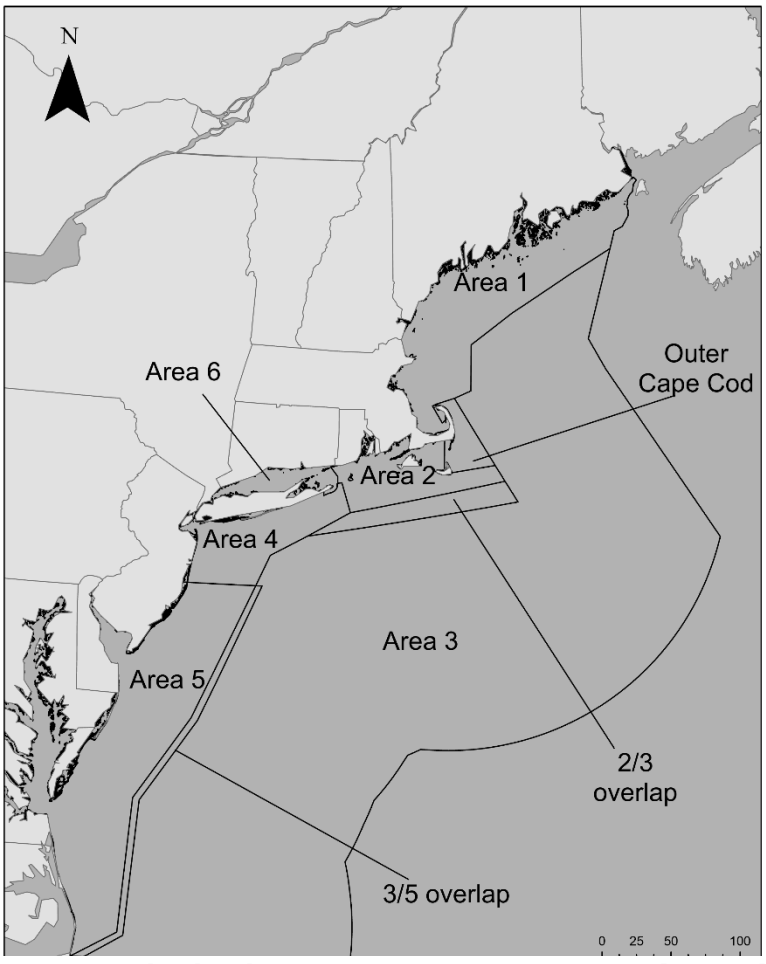

Figure 7 Federal Lobster Management Areas, extending to the EEZ boundary at 200 nmi. Data source: NOAA Fisheries.

Maine lobster licenses are non-transferable, meaning that they cannot legally be sold or used by anyone but the person it was originally issued to. New state licenses are issued through the apprenticeship program, which aspiring license holders can join in two ways, either as student or as apprentice license holders. Both paths require 1,000 logged hours and 200 days at sea over a minimum of 24 months certified by a sponsoring active license holder; in both cases, the license issued upon completion is for the same Zone in which the apprenticeship was conducted. However, the two paths differ in other aspects that are often cause of debate. The student license program was created as part of the Zone Management Law with the goal of facilitating entry into the fishery for the local youth; individuals aged 8 – 23 are eligible to participate[7]. Student license holders can fish their own traps as soon as they get the student license and can log time spent tending their gear towards completion of the program requirements. Physical presence of their sponsor during work is not required; they simply have to sign off completed log sheets. This effectively eliminates the need for student license holders to work as crew for another license holder, which, by contrast, is the only way apprentices can accumulate their sea time. The student program works through a tier-system that gradually increases the number of traps student lobstermen can fish (Table IV). Upon completion of all requirements, student licenses are automatically converted to full commercial licenses with an initial 300-trap limit; new license holders can build up the number of traps in yearly increments of 100 units until they reach their Zone's maximum limit. Apprentice license holders, on the other hand, are put on a waiting list and are issued their commercial license and the initial 300 traps according to their Zone's entry-to-exit ratio. Because the yearly number of licenses resigned is very low, waiting times for those on the list have extended beyond what policymakers had envisioned when the law was first written (Robin Alden, personal communication, July 30, 2019). The number of people who have been waiting for over a decade is so high (grand total of 55 out of 274 in 2019), that a bill was recently proposed to automatically issue a license after 10 years on the waiting list (Overton 2019). The bill was not passed and was even opposed by the industry's largest association, the Maine Lobstermen's Association (MLA), on the basis of protecting the resource from excessive fishing efforts. This, of course, caused great frustration and discontent among those on the list.

Table IV Trap limit tiers for student license holders (Department of Marine Resources 2017).

Age	***Maximum number of traps***
8 – 10 years old	10
11 – 13 years old	50
14 – 22 years old	150

Fishing in federal waters require a separate permit issued by the NMFS, but as of 1999 the agency set a moratorium on new licenses to control fishing efforts; the existing permits remain valid and can be transferred between individuals and across State and county lines. The majority of Maine lobstermen choose to fish Area 1, for which there are 1,601 permits in circulation (NOAA Fisheries 2019).

[7] Verification of at least part-time enrolment at a post-secondary institution is required for individuals aged 18 and over.

Lobstermen

There are currently 4,830 commercial lobster licenses and 1,095 student licenses in Maine, for a total of 5,925 individuals licensed to sell lobsters in the State. The available socioeconomic data on the fishery is scarce and obsolete; a 2005 survey by the Gulf of Maine Research Institute reports the median age for lobstermen in New England to be 50 years old[8] (Gulf of Maine Research Institute 2008), compared to Maine's median age of 45.1 (U.S. Census Bureau 2010a). The same survey estimated the median annual household income for Maine lobster fishing families to be $71,013, or 37.5% higher than the median annual household for the whole of the United States population in 2004 ($44,389) (Gulf of Maine Research Institute 2008). The recent boom in lobster landings has translated to high profits for fishing families, but incomes dependent on resource extraction and global markets are by nature fluctuating and unpredictable. Moreover, lobstermen have high overhead costs to sustain, such as boat payments and bait and fuel bills, both of which has been increasing, which makes their financial resources less stable than it might seem (Steinback and Thunberg 2006).

The lobster fishery is not only famous for its lobsters, but for its lobstermen, too. The identity of many communities on the coast of Maine is tied to fishing, with an even stronger tie with lobstering in particular developing in the last few decades (Daniel et al. 2008). The image of rugged lobstermen hauling traps along the coast of Maine is so deeply rooted in the nation's collective imagination that anthropologist James Acheson, a pioneer of lobstermen ethnography, went so far as to say that "if sophisticated urbanites chuckle at the rustics on the Maine docks, they do so with a tinge of envy, for the lobster fishermen embodies many of our most cherished virtues. He is, along with the farmer and rancher, the quintessential American." (1988:2). Acheson's fieldwork in the 1970s and 1980s extensively covered the social and cultural dimensions of the lobster fishery, with a geographic focus on communities in Midcoast Maine. Arguably, his most important contribution to understanding the fishery was his description of "harbor gangs" and their territorial disputes.

The towns and harbors overlooking Maine's numerous rocky coves, inlets, and bays were ideal home ports for lobstermen, whose target species could generally be found close to shore in shelter-rich habitats and, thanks to its sedentary behavior, efficiently fished with fixed gear, such as traps (Wilson, Yan, and Wilson 2007). At the same time, coastal waters are often spatially restricted environments that cannot support intense fishing efforts. Lobstermen quickly understood the benefits of limiting the number of boats targeting an area in favor of fishing success and long-term preservation of the resource (Waring and Acheson 2018); this idea, combined with the geographic features of the coast and the ecology of lobsters, prompted the development of a fishery that was highly territorial. The geomorphology of the coast made it easy to establish imaginary boundaries within which lobstermen could claim control of the fishing grounds; this went hand in hand with protecting these territories from outsiders (Acheson 1988). A fisherman's home port was the deciding factor over whether they would be allowed to fish a certain area or decidedly kept out; lobstermen from the same harbor naturally gravitated towards each other, forming groups that Acheson famously renamed "harbor gangs". Harbor gangs would defend their territory against intruders by leaving threatening messages, molesting gear and cutting traps off their buoy lines if necessary (Acheson 1988). They would also be stewards for a healthy and robust fishery by self-imposing conservation measures, especially following the decline of the resource in the 1940s. Regulations such as v-notching

[8] The study area included Maine, New Hampshire, Massachusetts and Rhode Island (GMRI, 2008).

(marking) of egg-bearing females and inclusion of an escape vent for sublegal lobsters to leave traps unharmed came into existence as a collaboration between fishermen and resource managers (Acheson 1997).

Today, much of what Acheson observed still holds true. Although changes in territoriality are at the heart of this study, it is undeniable that the notion of harbor territories is still a stronghold of the fishery. Lobstermen remain fiercely proud of their conservation ethics and their active role in protecting the resource, and the Maine Marine Patrol recognizes their efforts and high level of compliance with rules and regulations (Thomas Reardon, Marine Patrol Officer, personal communication, May 10, 2019).

The importance of these informal rules and traditional practices has also been recognized as crucial to the health of the fishery in academic circles. In his later work, Acheson argued that the lobster industry is a real-life example of Ostrom's theory of common-pool resources, which posits that under a set of eight design principles, groups of individuals can successfully cooperate to achieve sustainable and long-term management of a shared resource. These preconditions, or "design principles" (Ostrom 1990:89–90), are structural elements of resource governance that are found in both formal and informal elements of the lobster fishery – such as clearly defined boundaries (territories, Lobster Management Zones) and a community-led policing system (self-governance, environmental stewardship) (Ostrom 1990:90).

The active role of lobstermen in shaping the landings' upward trajectory supports the argument that the fishery should be considered a socio-ecological system (Berkes 2003). Socio-ecological theory rejects the notion of managed natural resources as entities isolated from the surrounding ecological and social systems, and instead proposes an integrated system where human (social) and natural (ecological) components interact in complex and mutually influencing ways (Berkes and Folke 1998). It also calls for a focus on system resilience as opposed to efficiency or productivity, advocating that a system's ability to self-organize and adapt should be nurtured by management (Berkes 2003). Adoption of a socio-ecological approach in fisheries management is recommended since it suits the complex, nonlinear and adaptive nature of fisheries better than traditional single-species management plans (Berkes 2003). As part of this complexity, it recognizes the importance of fishing communities and community wellbeing in creating and maintaining system resilience (St. Martin and Hall-Arber 2008), and in this sense emphasizes the importance of identifying and addressing threats to this element of the system (Berkes 2003). In the context of lobster fishing in Maine, the notion of the fishery as a socio-ecological system underlies its co-management structure, which harnesses the crucial role of Maine lobstermen in shaping the fishery, its structure, its practices and its resilience. However, research on the fishery is still heavily focused on its ecological components (e.g., the Sea Grant American Lobster Initiative primarily funds biological and ecological studies, see Maran 2019) and only a handful of scholars work to understand the strengths and weaknesses of its social element – the lobstermen (e.g. Johnson et al. 2014; McClenachan, Scyphers, and Grabowski 2020; Stoll et al. 2016).

To understand the challenges and obstacles that Maine lobstermen face today means to understand the fishery's vulnerabilities. This knowledge is crucial to develop adequate support systems and adapt the management structure where necessary. Some of these challenges are directly related to fishing, while others are wider social issues that affect individuals outside of the fishing community, too.

Inability to diversify is arguably the largest source of vulnerability for Maine fishermen and coastal communities at large (Stoll et al. 2016). Whereas traditionally they would have been able to maintain their livelihood by moving between fisheries according to seasonality, population health and demand curves, Maine fishermen are now virtually forced to choose between fishing for lobsters or not fishing. Since 1977, the licensing system of the State of Maine has become increasingly complex and fractioned beyond the lobster fishery. As Figure 8 shows, whereas there once used to be 5 license categories – some of which encompassed a wide variety of species (e.g. orange group in Figure 8) – there are now 23 separate license types, each of which bears different costs and prerequisites. Acquiring a license can be cost prohibitive or, in some cases, extremely unlikely due to limited entry regulations. Although intended to improve the health of all the fisheries, the process ultimately decreased individual fishermen's access to marine resources, the potential to diversify their income and their capacity to respond to environmental fluctuations (Stoll et al. 2016). Entry into the most lucrative fisheries (lobster, scallop and elver; see Figure 5) is strictly limited by law, and the few remaining open access fisheries seldom provide sufficient income to rely on. Such a restrictive system, together with the biological decline of many targeted species, has created an overdependence on the lobster fishery which could lead to widespread socio-economic collapse should the resource decline dramatically (Steneck et al. 2011). Because Maine coastal communities are extremely dependent on fishing (Johnson et al. 2015), the economic losses borne by fishermen would have devastating ripple-down effects throughout the entire local economy; the cultural identity of fishermen is also at risk in this context since they have few available options to earn a living as harvesters.

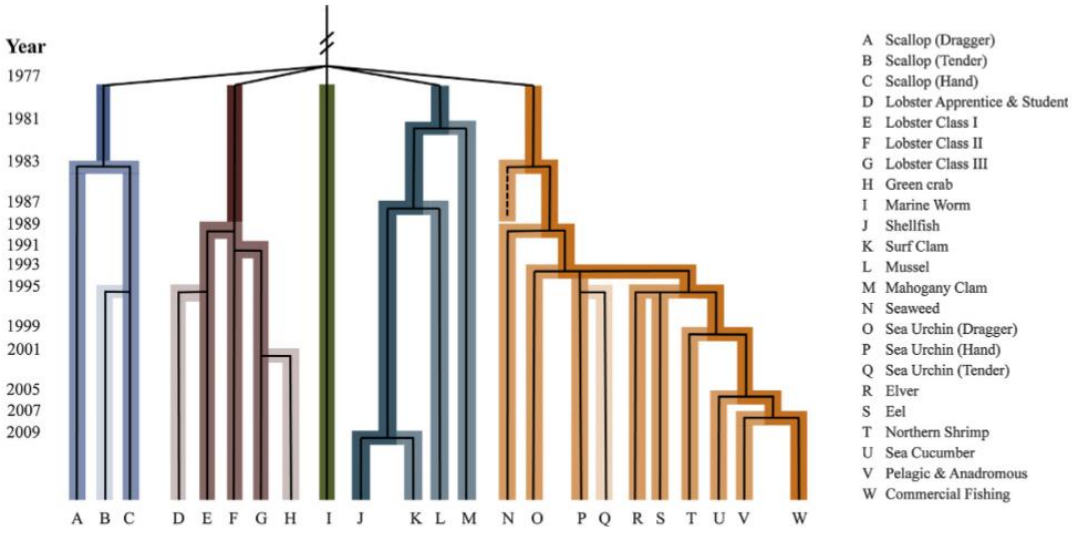

Figure 8 Evolution of the licensing system in Maine. Colors denote license type; subdivisions are represented in lighter colors. Licenses for tribal residents and under 18/over 70 are not included (except for lobster). Figure from Stoll et al. 2016.

Another looming threat for fishermen is the progressive disappearance of working waterfronts, which literally prevents fishermen from accessing their place of work. The loss of working waterfronts in Maine is lamented as a serious problem by fishermen, researchers, non-profit and State agencies alike (for example, Brogan 2018; Colgan 2004; Coombs 2020; Department

of Marine Resources 2016; Island Institute 2007). Solving the issue is a long-term, multi-stakeholder process that requires place-specific actions to accommodate each community's political, social, geographic and economic characteristics. Chapter 3 focuses specifically on working waterfronts and provides an extensive analysis and bibliography on the topic.

The financial resources of Maine lobstermen may be less stable than the high immediate profits of the fishery may suggest. Although catches have been growing and so have profits, overhead costs have also risen. In particular, the price of herring, the most popular type of bait, has skyrocketed in recent years, going from $14/bushel in 2006 (New England Fishery Management Council 2006) to $40 in 2016 (Whittle 2017), and as much as $80 in 2019 (French 2019). This was caused by a rise in demand and a concurrent sharp drop in supply following a decline of the Gulf of Maine herring stock and a consequent 70% reduction in the herring fishery quota (National Marine Fisheries Service and National Oceanic and Atmospheric Administration 2019). Although alternative, cheaper baits such as pig hide or menhaden have become more prominent, the issue has certainly affected lobstermen's profits.

Hopeful that the growing catches will continue to generate profits, numerous lobstermen have entered into debt typically to buy larger and faster boats, with the intention of strengthening their businesses, keeping up with the competition and maximizing their capacity to exploit the lucrative offshore waters (Albeck-Ripka 2018). Even a relatively small decline in landings due to natural stock fluctuations could cause huge financial losses, not to mention the disastrous consequences of a potential dramatic decline due to forces such as climate change.

Fishermen are also very vulnerable to substance abuse issues. The nationwide opioid epidemic has hit Maine and Maine's fishing industry particularly hard. Of the 396 fatal overdoses registered in Maine in 2019, 304 were linked to opioids (Thistle 2020). The Island Institute (2019) reports that the rate of death from opioid overdose is 5 times higher in individuals involved in fishing, farming and forestry than any other occupation and Commissioner Keliher of the DMR has openly recognized it as a serious problem in the industry, although not one that can be addressed by a blanket solution (Overton 2017). Fishermen are more likely to engage in drug use due to a variety of reasons, such as the ready availability of cash in the industry, the physical and mental pressures brought on by working long, strenuous and monotonous hours (that sometimes require use of opioid medication for pain management purposes, which can develop into abuse) and a tendency by captains and other crew members to tolerate substance use as long as it does not interfere with the ability to work (Overton 2017). They are also less likely to seek or be able to access treatment due to the often-incompatible schedules of fishing and recovery centers, making it easier to find the substance than receive support. Although a number of grassroots initiatives have sprouted in recent years to complement the help offered by treatment centers (Overton 2017), substance abuse remains a crippling disease for many fishermen, who may put their lives and those of others at risk by working under the influence and struggle to support their families and communities emotionally and economically.

All of these pressures are exacerbated by the uncertain outcome of the current conflict between the Maine lobster industry, the National Oceanic and Atmospheric Administration (NOAA), and a group of environmental non-governmental organizations (ENGOs) surrounding the future of endangered North Atlantic right whales (*Eubalaena glacialis*, right whales for short). With only about 400 right whales remaining, the species is listed as Endangered by the

International Union for Conservation of Nature and federally protected by the Endangered Species Act (ESA) and the Marine Mammals Protection Act (MMPA). Climate-driven changes in ocean circulations are causing spatial shifts in the population of the *Calanus finmarchicus* copepod, a critical food supply for right whales (Record et al. 2019). This, in turn, has caused a shift in right whales' seasonal foraging patterns and pushed them into areas that were previously not considered essential habitat, and therefore lacking measures against ship strikes and gear entanglement (Record et al. 2019). This has arguably caused a spike in mortalities that prompted ENGOs to initiate a series of lawsuits under the premise that NOAA is violating the ESA and the MMPA. The federal agency has sought to reduce the risks to right whales through its Take Reduction Team (TRT), a multi-stakeholder group whose task is to achieve a 60% risk reduction in serious risk and mortality and that heavily focuses on the alleged impact of Maine lobster gear.

Much of the controversy surrounding the targeting of Maine's lobster industry stems from the lack of evidence that a significant number of right whales is currently found in Maine waters (Davis et al. 2017). Until 2008, the western Gulf of Maine was an important feeding ground for right whales (Record et al. 2019); since then, because of the shift in food source distribution it has become more of a migration corridor between their new feeding habitats in the Gulf of St. Lawrence, Canada and Cape Cod Bay, MA (Mayo et al. 2018; Simard et al. 2019). Their presence in Maine waters is therefore limited both in time and number of individuals; and the actual overlap with the fishing grounds is minimal and virtually restricted to offshore areas (Department of Marine Resources 2019b). However, according to both industry groups and the Department of Marine Resources, the TRT's proposal calls for "drastic" changes in lobster gear configuration that would affect both fishermen's safety at sea and financial expenses (MLA Staff 2019)[9]. An amended plan that integrates the local needs of Maine fishermen, developed by the DMR following consultation with Lobster Zones constituents, was rejected by NOAA in January 2020 as short of meeting the 60% risk reduction target (Waterman 2020). In the meantime, a federal court ruled against NOAA in one of the lawsuits brought forward by ENGOs (Keliher 2020b) The consequences of the court decision for the fishery are unknown, but could potentially worsen the severity of the proposed rule changes. Many fishermen believe that even prior to the court decision, the proposed rules would have deeply changed the face and future of lobstering, force hundreds of license holders to re-evaluate their business plans and push many others to reconsider their involvement in the fishery.

Finally, at the time of writing, the impact of the COVID-19 pandemic has risen as a new stressor on global markets and Maine lobstermen. Efforts to slow the spread of the disease have included limiting movements of goods and people, which has resulted in a steep drop in seafood exports and local supply to restaurants, hotels, and tourism industry (Rappaport 2020a). Although direct marketing to Maine residents have provided some economic relief (Rappaport 2020b), the DMR Commissioner has requested harvesters to refrain from landing product with no market to preserve the resource and prevent economic losses (Keliher 2020a). The economic crisis that is affecting and will affect millions of people worldwide even once the health emergency is resolved will likely continue to impact Maine lobstermen, too.

[9] The main changes would require weaker ropes and longer trawls, which could endanger fishermen as the combination of the two increases the likelihood of lines breaking as they are being hauled.

Within a socio-ecological system framework, fishermen can also be a source of strength and resilience for the fishery. Steneck et al. (2017) draw attention to the consistent historical viability of lobstering, even at times where other fisheries struggled ecologically or economically, and present it as a possible indicator of inherently high levels of resilience. This can partly by explained by lobstermen's commitment to environmental stewardship, both in terms of historical and contemporary self-regulation and compliance with current conservation rules (Acheson and Gardner 2014), but also by their tenacity, ingenuity and resolution to maintain their cultural identity as 'fishermen' (Johnson et al. 2014). A desire to maintain this identity has often been the leading force in accepting and adapting to change – without it, fishing becomes "just a job" and it is much easier to become disheartened by the endless difficulties and abandon it (Johnson et al. 2014).

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Chapter 2: Territories

The centrality of territoriality in the lobster fishery was characterized by anthropologist James Acheson in his seminal monograph *The Lobster Gangs of Maine* (Acheson 1988). Acheson observed that lobstermen from the same harbor clustered in groups that he named "harbor gangs"; each gang obtained and maintained control over an area, or territory, from which they generally attempted to exclude other gangs.

Later work argued that the fishery was an example of a successful common-pool resource (Acheson 2003; Dietz, Ostrom, and Stern 2003). According to economist Elinor Ostrom, sustainable extraction of a natural resource can be achieved outside of private property or centralized government regimes through the common-pool resource structure (Ostrom 1990), which is in direct opposition to Hardin's theory of the "tragedy of the commons". Hardin claimed that in a shared resource system individuals inevitably attempt to maximize their self-interest over the common goal of maintaining a viable resource, thus leading to decline or depletion of the resource itself (1968).

Conversely, common-pool resources, such as fish stocks or timber, are goods that are accessible to a defined group that retains communal ownership over them. Outsiders cannot access the resource through a series of mechanisms embedded in the system, and group members must follow communally defined rules to extract the good, which prevents the risks theorized by Hardin. Ostrom identified eight preconditions required to establish a common-pool resource system; these include in particular "Define clear group boundaries", which refers to the need to determine the limits of both the user group (e.g. who is allowed to fish) and the resource (e.g. where fishing is allowed). The definition of boundaries effectively excludes some people from accessing and extracting a resource, thus characterizing it as common-pool as opposed to open access. In the case of the lobster fishery, the clear definition of group boundaries is obtained through the official Lobster Zones, which limit access to the resource both geographically and numerically (through entry-to-exit ratios), but also through the informal harbor territories described by Acheson, which achieve the same result at a smaller scale. Defined group boundaries is not the only common-pool resource precondition met by the lobster fishery; for example, its co-management structure fulfills the third principle, "Ensure that those affected by the rules can participate in modifying the rules" by empowering fishermen in the decision-making process, while the self-policing and territorial defense enacted by lobstermen respect the fifth characteristics, "Develop a system, carried out by community members, for monitoring members' behavior".

This chapter embraces the notion of territories as key elements of the fishery's common-pool resource structure and, consequently, of their contribution to the sustainability of lobstering; through this lens, the study aims to understand how the reality of territoriality has evolved from the model Acheson developed by examining lobstering in Midcoast Maine. By shifting the geographical focus to the Mount Desert Island region, I examine how and why traditional lines in the inshore waters of Frenchman Bay have been reshaped in the last two decades; and I investigate if and how the rise in number of lobstermen who target non-traditional offshore fishing grounds has triggered the development of offshore territories. Having presented the current state of the fishery in Chapter 1, I begin by contextualizing the historical development of territoriality based on publicly available data. I then present the results of the interviews I conducted with lobstermen from the study area and analyze them through a cultural modeling lens.

Literature review

Until the late 1990s, Maine lobstermen would concentrate their activity during "shedder season", when lobsters have just molted, and their high activity levels lead to better catches in coastal waters (0 – 3nmi). Shedder season roughly overlaps with summer and early fall; come winter, most fishermen would target other species, such as scallop, shrimp or urchin (Acheson 2003). Unlike lobsters, that move to deeper, further offshore waters to remain within their preferred temperature gradient (Mills et al. 2013), these other species remain close to shore even as winter progresses. For fishermen, it was easier and more profitable to shift fisheries than to "chase" lobsters offshore; those that lobstered year-round would shift their gear to near-shore waters (3 – 12 nmi) as the season progressed, and only a handful ventured further than 10 nmi offshore (Acheson 1988).

During shedder season, lobsters are abundant, but also spatially constrained in small areas. Lobstermen began self-organizing into informal and unregulated harbor territories as early as the 1910s to maximize fishing efficiency (Waring and Acheson 2018). Fishermen from the same harbor would consistently target the same area as a cohesive group and protect it against outsiders. Territoriality developed to keep harvesting sustainable, fishing safe, and competition under control by limiting the number of fishermen setting traps in a given area (Acheson 1988). Proximity to shore made it easy to set and find boundaries using landmarks, and observance of these informal territorial lines was largely based on respect of fellow lobstermen's livelihoods (Acheson 1988). Those who broke the informal rules and attempted to encroach on another harbor's territory were warned off with increasingly violent methods – from verbal threats to gear molestation and eventually trap cutting for repeat offenders. The practice of trap cutting is what generally prevented conflicts from escalating: retaliation on both sides could lead to gear wars, which could become costly. For some groups, however, the need to expand their territory was worth the financial losses: fishermen from harbors up rivers and bays were generally much more spatially limited than those with easy access to the open ocean, and often tried to push territorial lines. Generally, the degree of control that each group had on its territory was inversely related to distance from the harbor; past 3 nmi, in the near-shore fishing grounds, a significant degree of mixing between neighboring harbors was tolerated, likely due to the smaller number of fishermen who were active in winter (Acheson 1988).

Territories and territorial tensions have existed as long as lobstering has, and they remain a reality in the fishery today, even if some practices – such as trap cutting – are illegal. Anecdotal observations suggest that boundaries have been pushed even more strongly in the last 15-20 years as the substantial increase in catches has intensified fishing efforts. License holders have been fishing more traps and more people have joined the fishery. The prospect of high profits has pushed many young people to join the student license program, which has made the fishery easily accessible even to those individuals whose families or home communities were not traditionally involved in lobstering. Many commercial fleets of harbor towns located near estuaries vastly outgrew their limited territories and resorted to pushing territorial lines at the expenses of more traditional harbors.

In Zone B, the number of total tags (a proxy for number of traps in the water) grew from 235,982 in 1997 (average of 365 per license) to 324,870 in 2018 (average of 623 per license) (Department of Marine Resources 2018)[10]. There has also been a marked increase in number

[10] Excluding student licenses and student trap tags.

of student licenses, which went from 52 in 1997 to 168 in 2018. The effects of the intensified efforts have been felt in the wider Mount Desert Island region and have reshaped the territorial lines of Frenchman Bay, as anecdotally reported by numerous local fishermen in both casual conversations and a series of interviews conducted by the Eastern Maine Skippers Program students from Mount Desert Island High School in 2018 (Springuel et al. 2019).

Around the late 1990s, winter fishing in offshore waters had also become more prominent, partly thanks to advances in boat building and navigation technologies and partly due to the decline of alternative fisheries (Schreiber 2016). Offshore lobstermen now regularly set their gear far beyond the 10-mile line that Acheson had observed as the traditional offshore limit.

It is estimated that approximately 20% of the State's fleet holds a federal permit for lobstering in Area 1 (Schreiber 2016). The percentage is large enough that self-regulatory behaviors to limit the number of boats in one given area have likely arisen – in other words, territories and modes of defense are probably forming offshore, too. However, the harbor-based model described by Acheson probably cannot easily be transferred to these newer fishing grounds. Not all lobstermen can obtain federal permits due to the 1999 moratorium, so the likelihood of an entire harbor fishing the same offshore waters is low. However, because federal permits are transferable, their distribution and concentration in a given area can change over time, leading to localized increases even if the overall number of permits remains the same. If territories are forming or have formed, they might be more similar to the mixed areas in near-shore waters. There are also uncertainties surrounding the modes of boundary definition. Acheson observed that landmarks were often used to demarcate areas inshore; this method, however, may not be as effective offshore where the ability to see and recognize landforms is significantly reduced. Moreover, the traditional methods of territorial defense (i.e., trap cutting) may not be as practical anymore. Beyond the 6 nmi line, and especially beyond the 12 nmi line, fishermen have to significantly increase the number of traps per buoy by "trawling up" (

Table **V**)[11]. At an average cost of $100 per trap, losing a 15-trap trawl can cost a minimum of $1,500, a much heavier loss than having a few traps cut inshore. This might deter fishermen from engaging in trap cutting from fear of retaliation and the consequent financial burden they would have to bear.

[11] Gear configuration rules are currently under review as part of the Atlantic Large Whale Take Reduction Team's efforts to minimize right whale entanglement. The proposed changes will significantly affect the number of minimum and maximum traps per trawl.

Table V Trawl limits for Zone B (Department of Marine Resources 2019a:25:04).

Distance from shore	*Minimum number of traps/buoy*	*Maximum number of traps/buoy*
0 – exemption line[12]	1	3
Exemption line – 6 nmi	3	3
6 nmi – LORAN-C 25675 line	5	5
LORAN-C 25675 line – 12 nmi	5	None
12 nmi – border of Lobster Management Area 1	15	None

Territories and the potential changes in how fishermen understand and interact with them could have a significant impact on the sustainability of the fishery. Many scholars believe that the resource has remained healthy despite the intense fishing efforts partly due to the values and traditions upheld by lobstermen (Acheson 2003; Ostrom 2007; Steneck et al. 2017; Wilson et al. 2007). In particular, an approach embracing Ostrom's body of work emphasizes how the definition and defense of strict boundaries is a key condition for a common-pool resource to be managed successfully, i.e. to avoid over-extraction and maintain long-term access (Ostrom 1990). The creation of Lobster Management Zones by the Maine Department of Marine Resources (DMR) in 1997 was built upon the traditional harbor territories as managers themselves recognized the significant effects of lobstermen's self-policing and stewardship on the continued health of the lobster population (Robin Alden, personal communication, 30 July 2019). Although there is no evidence that changes in the structure of inshore and offshore territories could lead to a dissolution of the common-pool resource structure, it remains a potential outcome the consequences of which could considerably affect the resilience of the lobster resource.

The evolution of inshore territories and the growth of offshore lobstering have happened at a time where a multitude of factors came together, making it difficult to understand causal relationships. In particular, the degree to which climate change is affecting and will affect lobster population dynamics and the future of the fishery is unclear. The Gulf of Maine is warming at a much higher rate than most other ocean bodies (Pershing et al. 2015), and the warmer temperature are already pushing lobsters towards the cooler waters of the northeastern regions of their habitat range (Le Bris et al. 2018). For now, this has benefitted the catches of Downeast Maine lobstermen, but it may only be a matter of time until all coastal waters of Maine become too warm for lobsters (Steneck and Wahle 2013). Deeper offshore waters, where temperatures remain more stable than in shallow coastal areas, may offer a refuge for the shifting population. The effects of climate change on lobster distribution could therefore possibly explain the growth of the offshore fishery and the demise of the inshore territorial lines: as fishermen intensify their offshore efforts to follow the lobsters, the inshore waters are left undefended against encroachment.

[12] See Appendix II for definition of "exemption line".

In this chapter, I present the results of a study that applied a cultural model approach to understand the changes in inshore territories and the evolution of the offshore fishery from a lobstermen's perspective with a focus on the Mount Desert Island region.

I adopt Quinn and Holland's definition of a cultural model as "[…] presupposed, taken-for-granted models of the world that are widely shared […] by members of a society and that play an enormous role in their understanding of that world and their behavior in it." (1987:4). Cultural models consist of a number of interconnected schemas through which individuals frame experiences, understand and interpret those experiences, and form a response to them (Paolisso and Maloney 2000). A certain degree of variation between cultural models among social groups is to be expected and can be traced back to sociodemographic, economic, and political factors.

Application of cultural model theory to multi-stakeholder environmental issues can promote communication and collaboration between groups by exposing the beliefs and values supporting different interpretations of the same phenomenon (Paolisso, Weeks, and Packard 2013). This is crucial for management structures that embrace socio-ecological system theory and recognize the link between supporting resource users and improving the resilience of the resource. The application of such an approach is being increasingly recognized as a particularly effective strategy in fisheries management (Berkes and Folke 1998 offers a selection of examples in this sense) and the DMR is well-equipped to integrate it in its co-management structure for the lobster fishery. However, its efficacy can be hindered if input from the fishermen is lost in translation because of divergent cultural models (Paolisso and Maloney 2000). This can occur both with fishermen's traditional ecological knowledge, which is often ignored in favor of scientific knowledge, and their understanding of the social forces at play between resource users, which is generally inaccessible to outsiders. Adopting a cultural model lens can also reveal and explain how resource users' behaviors may change through the process of cultural evolution (Waring and Acheson 2018) and help correct management strategies that may rely on outdated assumptions. Studies that adopt a cultural model approach can support socio-ecological systems by clarifying and empowering resource users' observations, allowing for behavioral changes, and identifying target areas of need to management agencies.

In the Results section, I present three cultural models that I elucidated through interviews and participant observation. The first one consists of fishermen's understanding of the dynamics underlying territorial changes in the inshore waters of Frenchman Bay. The second offers fishermen's explanation for the emergence and rapid growth of the offshore portion of the lobster fishery, while the third one presents the emerging sense of territoriality found among offshore lobstermen.

Methods

Data collection began in June 2019 and was completed in March 2020. Methods included semi-structured ethnographic interviews with 15 fishermen and mapping, supported by continuous participant observation over a 10-month period. All research was conducted under approval of the College of the Atlantic's Ethical Research Review Board. Participation in interviews and mapping sessions was subject to informed consent (Appendix I).

Study sites

Fieldwork took place in the wider Mount Desert Island region, including harbors in the northern portion of Frenchman Bay and the Cranberry Islands (Figure 9). The study sites are located in Hancock County, ME for administrative purposes and in Zone B for fishery management purposes. Participants listed the towns in Table VI as their home ports.

Figure 9 The Mount Desert Island region and study sites.

Table VI - Home ports of interview subjects.

Subregion	*Home port*	*Waterfront*
Mount Desert Island	Bar Harbor	Bar Harbor Town Pier
	Northeast Harbor	Northeast Harbor
Cranberry Isles	Islesford	Cranberry Isles Fishermen's Coop
Upper Frenchman Bay	Lamoine	Lamoine State Park
	Hancock	Hancock Point

Mount Desert Island: Bar Harbor and Northeast Harbor

Mount Desert Island (MDI) is the largest island off the coast of Maine (280 km^2) and is connected to the mainland by a bridge. The island is administratively organized into the four towns of Bar Harbor, Mount Desert, Southwest Harbor and Tremont, which are further divided into villages. Fishing has traditionally been a major source of income and sustenance for year-round MDI residents (Johnson et al. 2015), although high tourism fluxes and the presence of Acadia National Park and of academic and research institutions (College of the Atlantic, Jackson Laboratory and Mount Desert Island Biological Laboratory) offer alternative employment opportunities that are rarely found elsewhere in coastal Hancock County. Modern commercial fishing was well-established by 1861, the first year for which fishing logs are available from the Frenchman's Bay Custom House District (Alexander et al. 2009). Until approximately 20 years ago, most fishermen on the island held a variety of licenses, such as for groundfishing, lobstering, shrimping, herring, urchining and scalloping; however, with the decline and closure of many of these fisheries, fishermen are now virtually limited to lobstering, scalloping and clamming (Johnson et al. 2015). There are numerous harbor towns on Mount Desert Island, but access to the water is challenging due to competition with tourism and recreational water-based activities. (Johnson et al. 2015).

Bar Harbor, with a population of 5,235 (U.S. Census Bureau 2010b), has been a notable commercial fishing harbor as early as the 1860s (Alexander *et al.*, 2009). Currently, 0.9% of the population works in a farming, fishing or forestry occupation (U.S. Census Bureau 2010b). Like most other harbors in Maine, the Bar Harbor fleet has lost its diversity over time and is now entirely comprised of lobster boats. Two Bar Harbor fishermen also hold scallop permits and a few subsidize their income through the tuna and halibut fisheries. There are currently 23 full-time[13] lobstermen in Bar Harbor. Lobster landings in 2019 amounted to 1,123,229.90 lbs, or 0.93% of total State landings. The ex-vessel value was estimated at $5,769,740.68 (1.17% of State total).

Northeast Harbor is Mount Desert town's largest village and harbor by population. The town of Mount Desert has a total population of 2,053, 8.5% of which is engaged in farming, fishing or forestry (U.S. Census Bureau 2010b). Landings data for 2019 are not yet available for Northeast Harbor; in 2018, the Northeast Harbor fleet landed 1,602,695.77 lbs of lobsters (1.59% of State total), valued at $7,046,330.02 (1.45% of State total). The commercial fleet is comprised of approximately 10 boats, but the number grows significantly in the winter season

[13] In this study, I define full-time fisherman as somebody whose primary income is fishing and part-time fishermen as those for whom fishing provides a supplemental income or student license holders who are not working full time yet.

(October – May) as year-round fishermen from nearby harbors move to Northeast Harbor to take advantage of its more sheltered conditions and its closer proximity to the offshore fishing grounds (Figure 10).

Figure 10 A view of Northeast Harbor in early May 2020.

Cranberry Isles: Islesford

Islesford is the hamlet on the island of Little Cranberry, which in turn is part of the Cranberry Isles town. Islesford is one of the 15 year-round offshore island communities off the coast of Maine and has the largest year-round population of the Cranberry Isles, fluctuating between 70 and 90 residents (David Thomas, personal communication, 25 April 2019). It lies approximately 2 nmi off the southern coast of MDI and is 0.81 km^2 in size. Like many other offshore Maine islands, its population swells in summer with the influx of seasonal residents. Islesford's history of fishing dates back to its first European settlers in the mid-eighteenth century. 27 out of the 29 fishermen of Islesford are part of the local fishing co-op, Cranberry Isles Fishermen's Co-op (Bruce Fernald, personal communication, 25 April 2019; Figure 11). Landings for Islesford are the Co-op's proprietary data and therefore not publicly available.

Figure 11 The Cranberry Isles Fishermen's Co-op dock.

Upper Frenchman Bay: Lamoine and Hancock

The towns of Lamoine and Hancock are located on the northern coastline of Frenchman Bay. Lamoine is a small bedroom community of 1,602 individuals, 1.5% of which are engaged in farming, fishing or forestry (U.S. Census Bureau 2010c). It is located on the peninsula between the Jordan and Skillings River estuaries and is home to Lamoine State Park, which most commercial fishermen from the town use as their waterfront. Hancock is a larger town located on the peninsula east of Lamoine, between the Skillings River and Taunton Bay. Its population is 2,394, 1.3% of which are in farming, fishing or forestry. There is no single large waterfront that hosts a sizeable fleet; Hancock fishermen are scattered between smaller harbors and wharves found along the coast of the peninsula.

Both towns have extensive mudflats along their shoreline which support commercial shellfish harvesting (Department of Marine Resources 2020c). Open water fishing, including lobstering is not a long-standing tradition for either town and has only recently become more prominent. Landings in 2019 amounted to 410,338.84 lbs. (0.34% of the State total) for Lamoine and 344,586.5 lbs. (0.28% of the State total) for Hancock (Department of Marine Resources 2020c). The total value was $2,118,739.75 (0.43% of the State total) and $1,649,649,96 (0.34% of the State total) respectively.

Data collection

The study included three phases of participant observation. For the first phase, I worked as a full-time sternman[14] on the F/V Julie B, out of Bar Harbor, from late May to mid-December 2019. I became familiar with the reality of inshore lobstering, from tending traps and shifting gear to interactions at the dock and on the water. For the second phase, I worked as a crew member on three different boats for a total of six days at sea during the winter season. This exposed me to the reality of offshore fishing in winter and gave me a sense of the environment and conditions offshore crews work in, as well as the differences with inshore lobstering. The

[14] "Sternman" is the traditional term used for deckhands on lobster boats in Maine. See footnote 1 for gender inclusiveness of the term.

third phase was ongoing for the duration of fieldwork. I attended a range of events relevant to the lobster industry (Table VII). These included meetings of the Zone B Council, where I could observe the co-management system in action.

Table VII – Industry events attended during participant observation

Event	*Date*	*Location*
Zone B Council meeting	June 4, 2019	Trenton
Zone B, District 2 meeting	June 19, 2019	Bar Harbor
Bass Harbor Boat Races	June 23, 2019	Bass Harbor
Downeast Zones regional meeting	November 4, 2019	Ellsworth
Zone B Council meeting	January 15, 2020	Bar Harbor
Fishermen's Forum	March 7, 2020	Rockport

By immersing myself in their world and demonstrating dedication and effort to learn the reality of their livelihood and lifestyle, I showed local lobstermen that I valued them, their input and their knowledge. Over the course of the season, I observed a distinct shift in fishermen's attitude towards me, which translated to trusting and honest conversations once I moved to the interview phase. This was particularly important as Maine lobstermen often associate academia and research with feelings of betrayal and alienation (Ebel et al. 2018). I also became familiar with the expressions and terminology used by fishermen, which improved communication and proved invaluable during analysis.

Upon completion of the first phase of participant observation, I began the interview phase. I conducted a total of 15 semi-structured interviews with fishermen from the harbors listed in Table VI. I selected initial interviewees based on the knowledge of the fishing community I gained through participant observation; additional participants were mostly recruited by combining previous knowledge with a purposive sample design aimed at targeting a representative demographic section of the fishery. A few were reached through snowball sampling. I adopted age and home port as baseline demographic variables. Interviews were recorded upon written consent of participants. The participant pool included both lobstermen that fish year-round (and are therefore offshore for at least part of the year) and lobstermen that limit fishing to shedder season (and can therefore keep their gear within near-shore waters), although only captains holding full commercial licenses (i.e. no student fishermen or sternmen) were interviewed. The interview phase of data collection was affected by COVID-19 social distancing guidelines which prevented me from conducting additional interviews with fishermen from Upper Frenchman Bay towns.

All interviews included questions about demographics and fishing history. Further questions focused on the dynamics of territoriality between local fleets, such as location and importance of territorial lines and defense strategies. I discussed offshore fishing with year-round lobstermen only, and I reserved questions about territoriality in Frenchman Bay for participants from Bar Harbor and the Upper Frenchman Bay towns, since fishermen from other MDI harbors do not typically set gear in the Bay.

Interviews were transcribed and coded using MAXQDA 2020 (VERBI GmbH 2020), following a codebook that used both a priori and in vivo themes (Appendix III). In line with cultural modeling theory, I focused in particular on indigenous terms and recurring topics while

coding (Paolisso and Maloney 2000). Interviews were confidential, and as such I redacted participant's names or used pseudonyms and only reported their home port and generic age range. I chose to maintain confidentiality to avoid exposing individual opinions that could result controversial and damage participants' reputation or result in conflicts with other fishermen. I also edited quotes for clarity by eliminating verbal ticks.

Lastly, I collected spatial data of fishing territories to obtain visual references for the changes described in the interviews. Using Acheson's maps of Midcoast territories as a model (Figure 12), I developed a simple method to obtain similar results that was loosely based on Tobias' body of work with indigenous land use (2009). Mapping occurred as part of the semi-structured interviews. Participants were asked to draw the general area they identified as their home port's territory on NOAA charts #13318 and #13312 **(**Appendix IV). In addition to drawing their current territory, Bar Harbor fishermen were also asked to draw the traditional boundaries from 15 – 20 years ago to map the changes caused by territorial encroachment. Hand-drawn maps were digitized and georeferenced using ArcGIS Pro (Esri 2020). Individual data was collated to display territorial boundaries and intensity of fishing efforts.

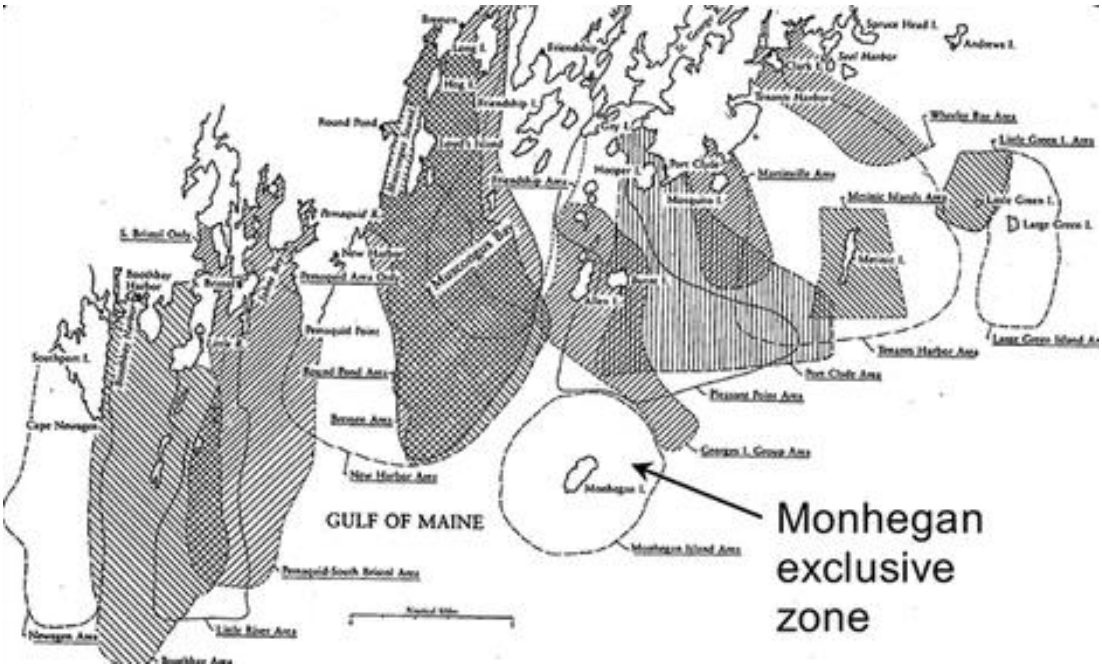

Figure 12 Acheson's map of territories in Midcoast Maine (Acheson, 1988).

Results

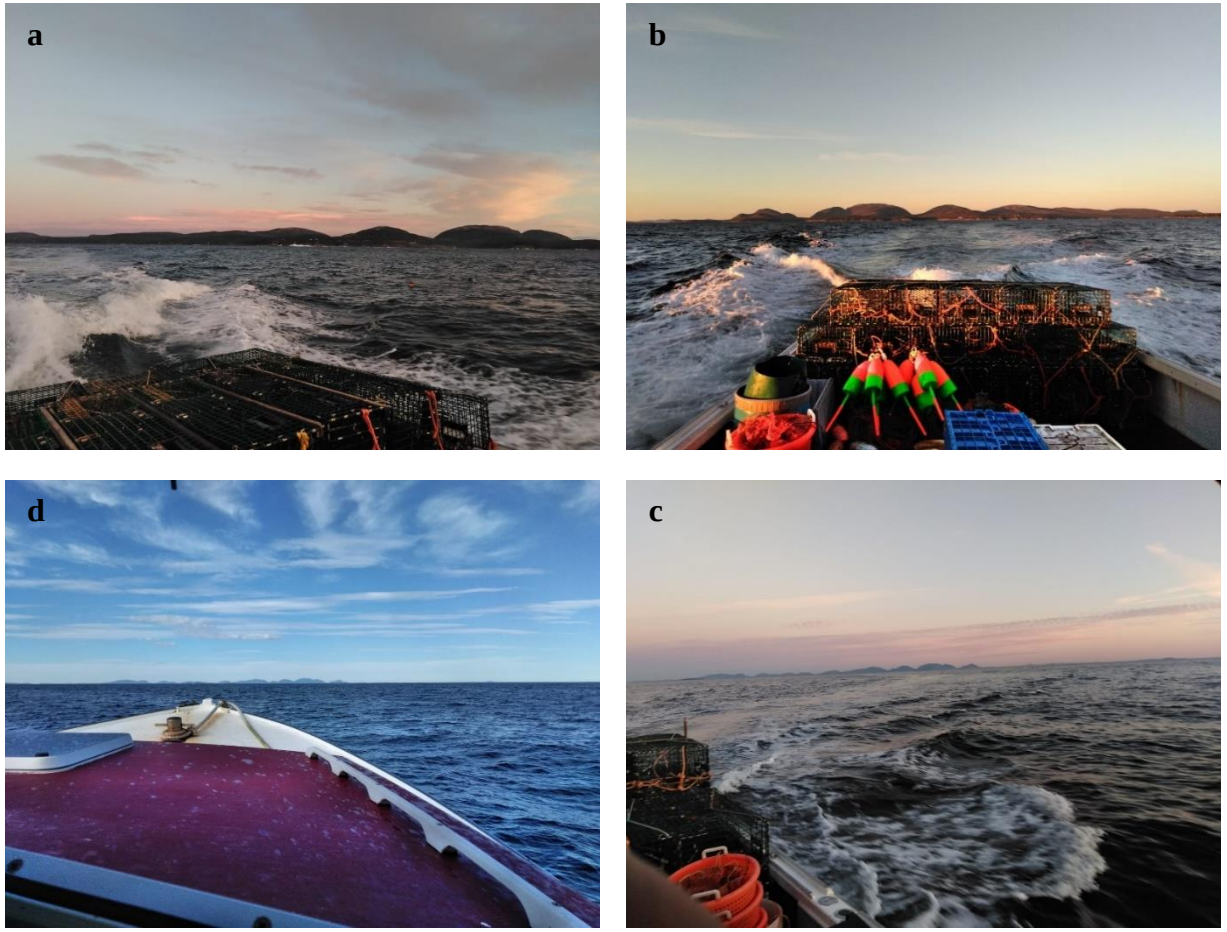

Figure 13 A visual reference of the spatial extent of the lobster fishery of MDI. Clockwise, from top left: (a) a view of MDI from within the 3-nmi line; (b) from a piece of bottom named Tucker's Rock (approx. 5 nmi offshore); (c) from the Eastern Maine Shelf Weather Buoy (approx. 12 nmi offshore); and (d) from Mount Desert Rock (approx. 18 miles offshore). The following sections will explain the significance of these distances. All photos taken from the F/V Tigger by the author; Tucker's Rock photo courtesy of J. Kane.

The extent of the area examined in this study, based on data shared by the fishermen, spans from the estuaries in northern Frenchman Bay to the border with Area 3 at 40 nmi offshore (Figure 14). This large swath of ocean is administratively divided at 3 nmi between the State of Maine and the federal government. Although the 3 nmi line is an important reference point for all maritime users and also in use in Maine lobstering regulations, fishermen have developed their own reference system that is better aligned with their understanding, use, and knowledge of the ocean.

Based on the literature and on fieldwork observations, but prior to interviews, I had identified three broad areas that are recognized by fishermen in the MDI region. Fishermen usually refer to State waters (0 – 3 nmi) as "inshore" or "up inside" (Figure 13). These coastal waters are the historical heart of the lobster fishery and the most productive during shedder season. By management definitions, waters beyond 3 nmi are considered "offshore" (Figure 13); however, lobstermen generally assume offshore waters to begin past the Eastern Maine Shelf Weather Station, or "the weather buoy", which is roughly 12 nmi from the coast of MDI (Figure 13 and Figure 14). The area between 3 and 12 nmi is referred to as the "middle ground" by many lobstermen, is typically fished during late summer and early fall and falls under the broader definition of "inshore waters". Waters beyond 12 nmi are unanimously considered "offshore". The majority of offshore fishermen set their gear between the weather buoy and the grounds immediately south of Mount Desert Rock ("the Rock"; Figure 13 and Figure 14), which has historically been at once a focal area and the southernmost boundary of the offshore fishery.

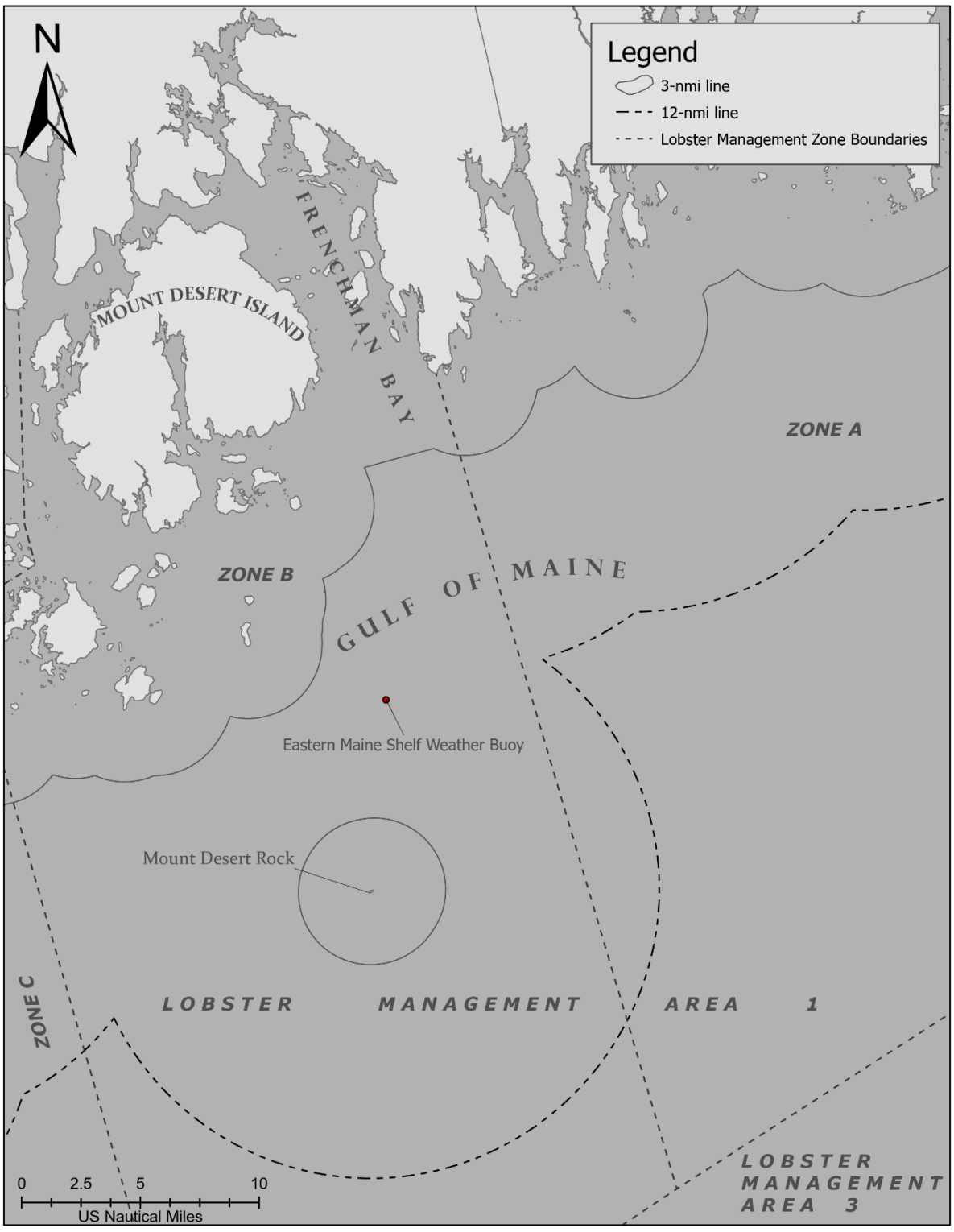

Figure 14 Extent of the study area and relevant reference points.

Interviews and participant observation integrated with the mapping data provide additional information regarding the social dynamics at play in each territorial section. They also highlighted how, although independent from each other in many ways, territorial developments in one section (e.g. up inside) often trigger change in another (e.g. offshore).

I used themes from the interview codebooks as the basis for the identification of these cultural models:

1) Fishermen's cultural model of changes in inshore territories;
2) Fishermen's cultural model of the growth of the offshore fishery; and
3) Fishermen's cultural model of the emergence of offshore territoriality.

The themes were identified as the underlying cognitive domains that generated the explicit statements made by participants reported in the following sections, where I also present the spatial data regarding territorial changes.

Fishermen's cultural model of changes in inshore territories

> *But, in the beginning, there weren't many people that fished up here. There was a few out of South Gouldsboro, couple out of Hancock, couple out of Sorrento, one or two out of Lamoine. Then as these guys get going, a lot of kids got going and now they're older, they're in their 20s. And there's not much bottom up there for fishing longer into the season, so they all start to come down. They really took over at Egg Rock, and I just quit fishing there, 'cause there were so many people there and so many snarls.*
>
> *Bar Harbor fisherman, in their 60s*

Bar Harbor fishermen traditionally claimed the northern section and the western half of Frenchman Bay, while Sorrento, South Gouldsboro and Winter Harbor controlled the eastern half; in the last 20 to 25 years, the number of fishermen from Upper Frenchman Bay harbors such as Lamoine and Hancock ("Bay fishermen") became large enough to push territorial lines and take control of a significant portion of Bar Harbor's territory. Bay fishermen can now undisputedly set their traps from the river estuaries to the northern side of the Porcupine Islands and in the central portion of the Bay around Egg Rock (Figure 15). They have exclusive control of the areas surrounding the estuaries, but they share their southern territories with Bar Harbor fishermen (Figure 15). Many of them believe that the current boundary configuration is unlikely to change, since Bay fishermen have reached their goal: they now have access to a large enough territory to support their fleet.

Figure 16 *Spatial distribution of Bar Harbor (left) and Upper Bay (right) captains in Frenchman Bay. The lightest shades indicate that only one fisherman marked the area; darker shades indicate an increasingly higher number of captains*The current territories of Bar Harbor and Bay fishermen are depicted in Figure 16, but with the additional representation of the spatial distribution of individual captains within the harbor territories. In other words, each harbor territory should be read as a heat map, where deeper shades of color indicate areas in which higher numbers of fishermen *from the same harbor* set their gear. In accordance with the confidentiality nature of the study, data provided by individual fishermen was collated and is no longer discernible from the others. Both maps show a relatively homogenous distribution

of effort, in accordance with the nature of inshore territoriality where harbor gangs tend to cluster within a strictly defined area.

Analysis of interview data identified the three schemas underlying a fisherman cultural model of territorial changes in Frenchman Bay (Figure 17). These are: increase in number of Bay fishermen, financial considerations, and impact of the student license program.

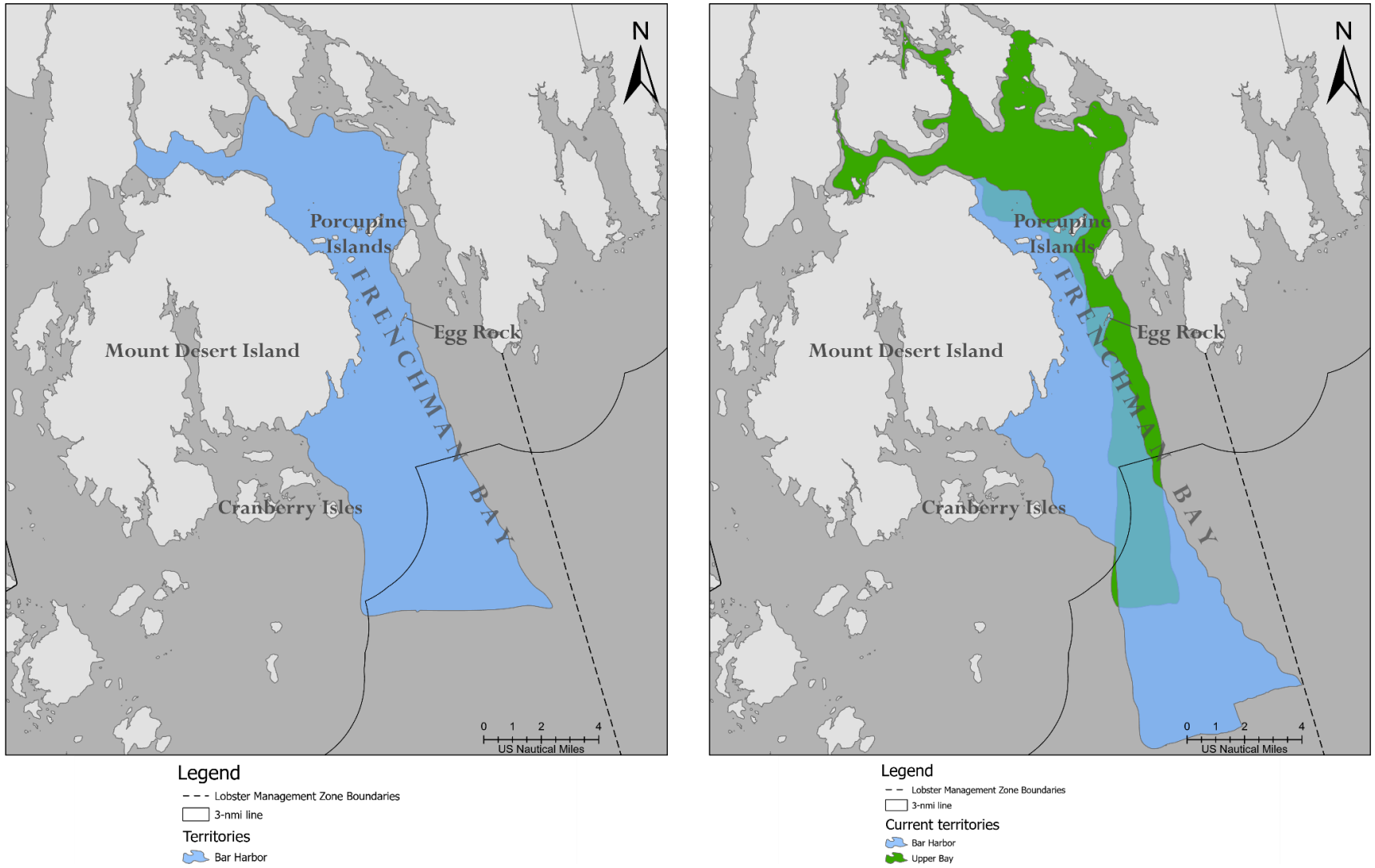

Figure 15 Traditional Bar Harbor territory (left) compared to the current situation (right) where Bar Harbor and Bay fishermen share a large portion of Frenchman Bay. The eastern side of Frenchman Bay is controlled by harbors that were not included in this study and as such their territories are not represented.

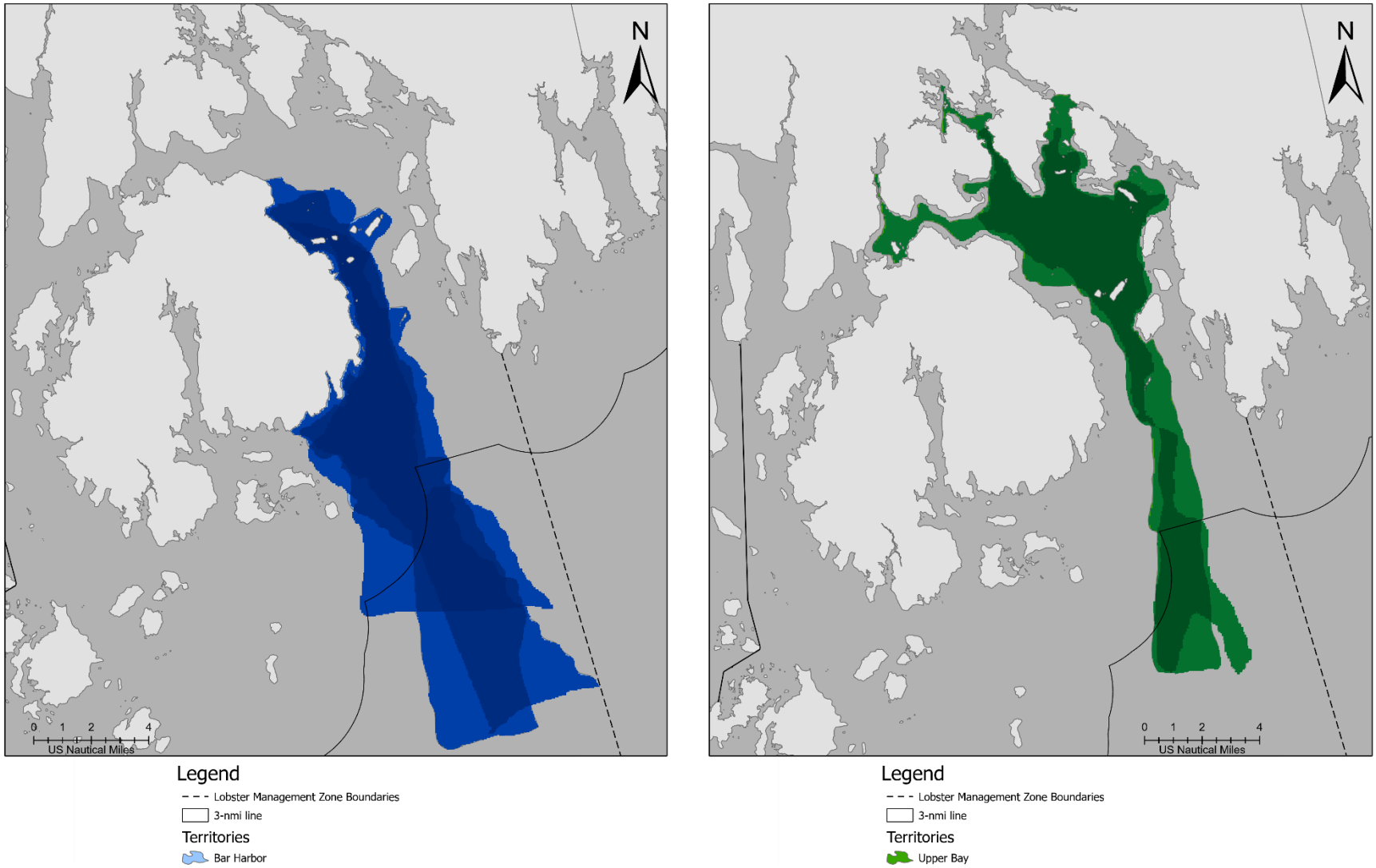

Figure 16 Spatial distribution of Bar Harbor (left) and Upper Bay (right) captains in Frenchman Bay. The lightest shades indicate that only one fisherman marked the area; darker shades indicate an increasingly higher number of captains, with the darkest shade representing the total number of participants interviewed (Bar Harbor *n* = 9, Upper Bay *n* = 2).

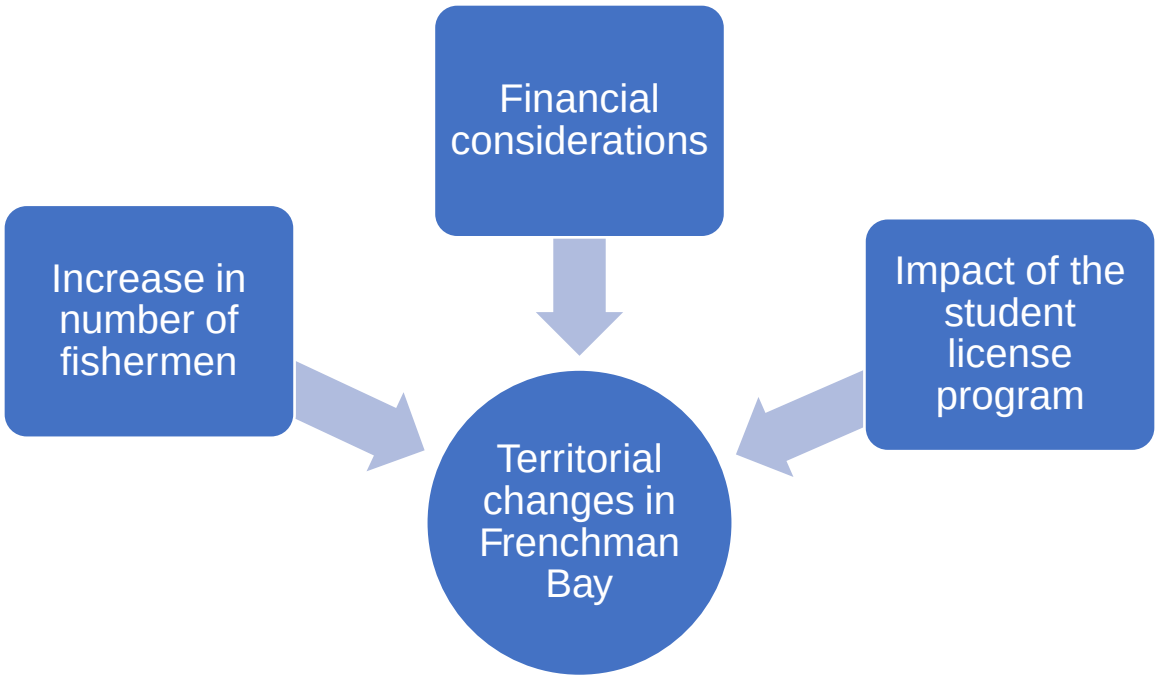

Figure 17 Cultural model of fishermen's explanation of territorial changes in Frenchman Bay.

Increase in number of Bay fishermen

Bar Harbor fishermen unanimously agreed that the number of Bay fishermen began to rise significantly in the late 1990s and early 2000s. Before then, the handful of lobstermen from those harbors did not necessarily have exclusive control of any areas and mostly fished around the estuaries along with Bar Harbor fishermen. Relationships between the two groups were less conflictual, and for the most part each side treated the other with respect. This Bar Harbor participant even recounts a Bay fisherman, now retired, who before the 1990s was allowed to set gear in some of Bar Harbor's most prized bottom:

> *Skip, he was a real nice guy. He had a 37' boat out of Sorrento. He was pretty careful where he fished, but everybody liked him. No one was gonna cut him anyway. And he actually was probably the only guy from up the Bay that was allowed to ever fish Cod Ledge.*
>
> *Bar Harbor fisherman, in their 60s*

Now, the Bay fleet includes approximately 40 boats, divided between Lamoine, Hancock, Sullivan and Sorrento. The rapid growth in the fleet was explained by both Bar Harbor and Bay fishermen as a result of the upward trajectory of lobster landings in the last 40 years, which translated to high profits for those involved in the fishery. Lobstering became an attractive career choice outside of the traditional circles of fishing families, especially thanks to the accessibility of the student license program. Many Bay fishermen entered the fishery through the student license program and seamlessly transitioned onto the full commercial license upon program completion.

In a territorial framework, the Bay fishermen acts as one cohesive unit, as if they were all part of the same harbor gang, even though they are scattered between towns. A fisherman from Hancock noted:

> *This is all pretty much one big thing. We don't have any harbors, really. Sorrento is the only harbor that we have. There's Lamoine guys, there's the few that fish out of Hancock, there's the few that fish out of Sullivan and there's these guys, but that's Sullivan too. But we're all just blended together.*
>
> *Hancock fisherman, in their 20s*

This explains why so many Bar Harbor participants reported being overwhelmed by the advance of Bay fishermen, who were described as coming "in swarms" by a Bar Harbor captain. Being a smaller group of 23 boats, Bar Harbor lobstermen were hindered in their ability to oppose a fleet double their size and were gradually pushed out of the northern and western edges of their traditional territory.

Financial considerations

Many Bar Harbor participants noted that Bay fishermen also drew strength from their higher financial flexibility. Bar Harbor fishermen bear higher living costs and business expenses simply because of where they live. The majority of Bay fishermen are also young (20 – 30 years old on average) and do not have many of the financial responsibilities sustained by the older Bar Harbor fishermen (40 – 50 years old on average), such as supporting a family. They can concentrate more of their economic resources into fishing and, for example, replace lost gear. By contrast, Bar Harbor fisherman may not have the ability to add the purchase of costly new traps to their existing financial commitments. Because of their limited capacity to rebound from gear loss, Bar Harbor fishermen had little incentive to initiate or engage in prolonged trap cutting and were left with few ways to effectively deter Bay fishermen from their advance, which eventually resulted in significant territorial losses. This participant from Bar Harbor reflects on the contrasting impact of losing gear to trap wars ("getting tuned up") between young Bay fishermen and themselves at their age:

> *If you take as well as the fishery has done in the last 10 years, the influx of student licensing program, with no responsibilities in life other than lobstering, you know what? Someone could get tuned up for 100 traps. They don't care, they just go buy 100 more. The battle is over. It's gotten relentless that way. I know when I was a kid coming up through and I was struggling, and the fishery wasn't as strong, I'd pay attention to what I was doing, because if got tuned up I was gonna feel it. Now, it's just no big deal.*
>
> *Bar Harbor fisherman, in their 40s*

A few Bar Harbor captains also mentioned fear of intervention from the Marine Patrol as an additional reason to adopt a cautious approach with territorial disputes. Trap cutting is a criminal violation and as such can be punished by revoking or suspending a captain's lobster license on top of jail time and monetary compensation (Trotter 2019). For Bar Harbor fishermen, the financial consequences of potentially losing their license was not worth retaining control over the lost territories.

Lastly, in a few cases the bottom was given up because of its low productivity. If the cost of protecting an area through trap wars was higher than its profitability, Bar Harbor fishermen often simply allowed Bay fishermen in and sometimes relinquished control altogether.

Impact of the student license program

Bay fishermen explained that their primary reason behind pushing boundaries was that their traditional territory was no longer sufficient to support the larger fleet. To ensure that they all had a chance to make a living from fishing, Bay lobstermen needed to expand their territory and maximize their catches by trying to claim the most productive areas in Frenchman Bay. The underlying assumption is that as fishermen, they are entitled to access any area where lobsters are abundant. A young Bay captain – whose father spearheaded the territorial expansion – repeatedly expressed this concept during the interview:

> *I'm gonna make a living, so, I'm gonna be putting my traps where the lobsters are.*
>
> *It's kinda hard, because everyone has a right to fish, just there's only so much bottom available.*
>
> *[My father] knew there were lobsters there, so he went there.*
>
> *Lamoine fisherman, in their 20s*

This, however, clashes with a central tenet of the fishery: the right to fish has to be earned; simple possession of a lobster license does not mean permission to fish any area undisturbed. This concept dominated Acheson's model of territoriality and is captured in the following quote. The participant argues that although traditional territorial lines are not officially recognized, they should nonetheless be respected; they then dismiss those who associate a Maine lobster license to the ability to fish anywhere in Maine (presumably using "Maine" as a simplification of the Lobster Zone structure) and note that previous generations of lobstermen would have agreed with them, emphasizing the historical nature of these ideas.

> *And I know we don't own the bottom, but there's no respect anymore either. People just think, "I got a State of Maine [lobster] license, this is the State of Maine.". It's like, alright, well, your grandfather wouldn't have said it like that, you know what I mean?*
>
> *Bar Harbor fisherman, in their 60s*

The contrast between the two attitudes indicates a significant shift in values. The older generation would have never assumed that "everyone had a right to fish" and that anyone could set gear where lobsters abounded; new fishermen had to earn that right by proving their work ethic, their respect of rules, traditions and more experienced captains, and also with a little luck that determined their home port, family name and social connections (Acheson 1988). Anyone who deviated from the norm was likely to be punished by the established lobstermen. Many Bar Harbor fishermen expressed outrage at this significant generational shift in values, which was well captured by this captain:

> *I personally can't even believe the audacity of some people. Really?! I can pick a couple names [of Bar Harbor fishermen] out of the hat that are dead and gone now, but I tell you what, if they were still fishing, [the Bay fishermen] wouldn't be [fishing in the traditional Bar Harbor bottom]! No. [...]But that generation is gone. And [it's] a different mindset, a different attitude.*
>
> *Bar Harbor fisherman, in their 40s*

The same participant, however, also admitted not wanting to expose themselves to the consequences of fighting off Bay fishermen because of the financial considerations reported above. Although they embraced traditional rules and mourned their demise among younger fishermen, they felt that the wider social system had changed too drastically to justify significant financial losses in defense of traditions. Moreover, the participant – like a few others in Bar Harbor – also had the capacity and resources to shift the epicenter of their operations towards the middle ground and offshore waters, which is not as common among the younger and less experienced Bay captains. For the participant, the most efficient decision to avoid overcrowding in inshore waters was moving further offshore rather than protecting traditional territories.

Fishermen almost unanimously identified the student license program as the main reason for the change in values that they broadly referred to as "lack of respect". The student license program has been instrumental in opening the fishery to young people, especially those who do not belong to fishing families, like many Bay captains. It also raised a generation of fishermen who did not have to accrue much experience to obtain their license, because they could fulfill the program's requirements without direct supervision. Student license holders are generally exposed to comparatively easier fishing conditions: they usually fish in sheltered waters around harbors during shedder season, when weather conditions are mild and lobsters are easy to catch. Therefore, although student license holders gain the experience of running their own fishing operation from a young age, they are limited in their ability to develop a solid skillset and a well-rounded knowledge of lobster fishing culture.

Conversely, prior to the introduction of the limited entry licensing system and of the student license and apprenticeship programs most fishermen would learn the trade by working as sternmen for other captains until they had the financial means and experience to start their own operation. Since the limited entry system has been instituted, those who are too old to enroll in the student license program but still wish to enter the fishery can do so through the apprenticeship program, which essentially requires applicants to work as sternmen. By working on somebody else's boat, prospective captains are able to observe proper fishing techniques, insights into local oceanographic conditions and knowledge about boat handling and repairs at sea from an experienced lobsterman; they experience the seasonal cycles of the fishery and learn to navigate the social fabric of lobstering, its traditions and its hierarchies. Many captains saw their time as sternmen as the most educational and beneficial experience in their career. This participant missed the deadline to complete the student license program and spent 7 years on the waiting list for their full commercial license, during which they worked as somebody else's crew:

> *I don't think I would be where I am if I [had not ended up on the waiting list]. And that's just from the technicalities of fishing, because then there [are] the socio-economic issues that come with the fishery. Might have a license, but that doesn't necessarily mean that everyone's gonna let you fish, fish where you want, when you want, how you want. And there's a certain level of respect that you need to earn and being that year-round deckhand for so long, you're year-round, going in good weather, bad weather, good fishing, bad fishing. Putting in that time, putting in that effort, riding it out. And so when it came time that I got my license, I was able to get up and running, off my feet. I think that helped me get people to know who I was, knew my work ethic, what my*

drive was and how I wanted to fish. […] That was monumental, to have that experience.

Islesford fisherman, in their 30s

Here, the participant expresses awareness and acceptance of the fact that holding a license is not the only prerequisite to enter the fishery; he also strongly emphasizes how working as a sternman is necessary to acquire the embodied cultural and social capital[15] needed to be a capable captain and to be accepted by the rest of the fleet.

Older fishermen partly perceive the consequences of the deficient practical skills of student lobstermen and young captains as a material expression of lack of respect. For example, inexperience in calculating the impact of tides may cause traps to be set on top of another fisherman's gear, which usually results in time-consuming and labor-intensive snarls. Experienced fishermen do not appreciate being followed or imitated by novices (Acheson 1988), especially if it creates inconveniences such as snarls; however, it is a common occurrence as young captains attempt to replicate their older counterpart's catches. This exacerbates the adversarial relationship between Bar Harbor and Bay fishermen in some of the most productive areas, as I observed during my fieldwork in the channels between the Porcupine Islands, which is shared between the two groups. In the following quote, a fisherman explains how snarls are formed and how they can offer information on fishermen's attitude towards each other.

Say you're fishing a 20-fathom warp[16], and we're all fishing 20-fathom warp[s], everyone else's buoy is gonna swing the same, with the tide and stuff, so there won't be any snarls. But if someone comes in with a 30[-fathom warp], that person will swing way more and then it's snarled up and then it will make a mess. And you can easily tell who is fishing like everyone else and trying, and who has a clue and who doesn't have any idea about it and who just doesn't care.

Lamoine fisherman, in their 20s

The participant distinguishes between people who make an effort to avoid causing others disruption, those who have not yet learned how to do so and, most importantly, those who are not interested in being cooperative. Distinguishing between the last two categories in a real-life example of improperly placed gear is largely based on observations and experience of other captain's fishing style as well as their reputation.

Based on the emerging cultural model, lobstermen understand the changing inshore territories in light of the increase in number of fishermen, the differing financial stability of Bar Harbor and Bay captains, and the impact of the student license on the respect of traditional values.

[15] The concepts of cultural and social capital were proposed by sociologist Pierre Bourdieu as complementary to that of economic capital. Embodied cultural capital comprises of a person's knowledge and skills acquired through socialization (e.g. learning the most productive fishing grounds); social capital consists of the opportunities and resources an individual has thanks to their network of social relationships (e.g. being allowed to fish the most productive grounds thanks to a good reputation).

[16] A fathom is 6 feet ("20-fathom warp" = 60 feet of line). Lobstermen measure the length of their lines in fathom and refer to their gear set-up by the length of the vertical line that connects the buoy to the first trap.

Offshore lobstering: spatial findings

> *What do I love about offshore fishing ... freedom, for one. Within reason, I mean, we do have legal boundaries set by the State that limit where I can go, whether it's east or west or south, there's only so far and wide that I can fish. But it's a pretty big area, and so coming from inshore, stepping out into this offshore area, it feels like a tremendous amount of freedom, to use all of your fishing instincts, all of your tactics that you've learned and developed to go and find lobsters. There's thousands of square miles that you can hunt, so to speak. So I really love and enjoy that, especially in the winter. There's less fishermen on the water, so steaming out in the morning, it's cold, I'm looking around, I'm not seeing a lot other lights, a lot other boats. And so there's this sense of freedom and independence that comes with it. Knowing that there's other guys out there, but it's very few compared to the number that fish in the summer. So you feel a little bit alone, and there's some pride in that, and some excitement in that. Almost like you're headed out to conquer something, and nobody else is doing it. That's sort of the uplifting side of it, it's rewarding. But it doesn't come without a challenge. Typically the weather is bad, or unpleasant. You know, fishing in 25 mph winds in 65, 70 degree weather is nothing compared to 25 mph winds in 10 degrees. It's a completely different type of psychological and physical challenge. It's harder to move, it's harder to work, even your mental capacity slows down a little bit. But it's a challenge that I like and to some degree, lobstering is very repetitive. In a sense, you're doing the same thing over and over again and so when you throw something a little different into the mix, like cold, or weather, it's like, "Oh, this is a new challenge". It makes the job feel a little bit different. [..] Was I enjoying it? Not directly in the moment, but at the end of the day I did. You kinda get a smile on your face when the day is done, the boat's on the hook and you think, "We just did that.".*
>
> *Islesford fisherman, in their 30s*

Lobstering beyond the 12-nmi line, or in what lobstermen call “offshore” waters, began in the 1970s and 1980s as a handful of captains (including some participants) started fishing the productive grounds around Mount Desert Rock (see Figure 14) in winter. The practice became relatively common in the late 1990s, when the first large wave of lobstermen joined the initial group. At the time, most captains would still closely follow lobsters’ seasonal migrations by shifting their gear from inshore to the middle ground to offshore as summers went into winters. In the last 5 to 10 years, a few fishermen have continued to push the extent of the winter fishing grounds to the limit with Area 3 (40 nmi offshore). This spatial expansion is accompanied by a change in lobstermen’s seasonal movements. An increasing number of captains now forgo bringing their gear back up inside during shedder season, and instead limit their seasonal shifts between the middle ground and offshore waters; Although fishing may be slower in the warmer months, staying offshore and in the middle ground guarantees consistent catches throughout the year and is still worthwhile financially. Those who fish to the limit with Area 3 generally stay offshore year-round, and some may never bring their traps much further north than Mount Desert Rock. For some of them, “offshore” takes on a different meaning as they extend the southern boundary of “middle ground” out to the Rock.

The offshore grounds fished by lobstermen from Bar Harbor, Islesford and Northeast Harbor are depicted in Figure 18. The charts used during data collection did not cover past 7 nmi south of Mount Desert Rock. There is therefore no data available for the grounds fished out to the Area 3 limit. The 40-nmi line, however, is marked in the extent indicator to give an idea of the full geographic spread of the fishery.

The offshore grounds of Bar Harbor lobstermen with the additional representation of the spatial distribution of individual captains through the heat map layout are represented in Figure 19. The same confidentiality measures delineated for Figure 16 apply; however, compared to their spatial distribution inshore, fishermen from the same harbor target a larger geographic spread in offshore waters. This is in line with the different definition of territorial boundaries that is adopted in offshore waters and delineated in the following sections.

The interview data concerning the offshore fishery were the bases for the identification of the two cultural models presented below.

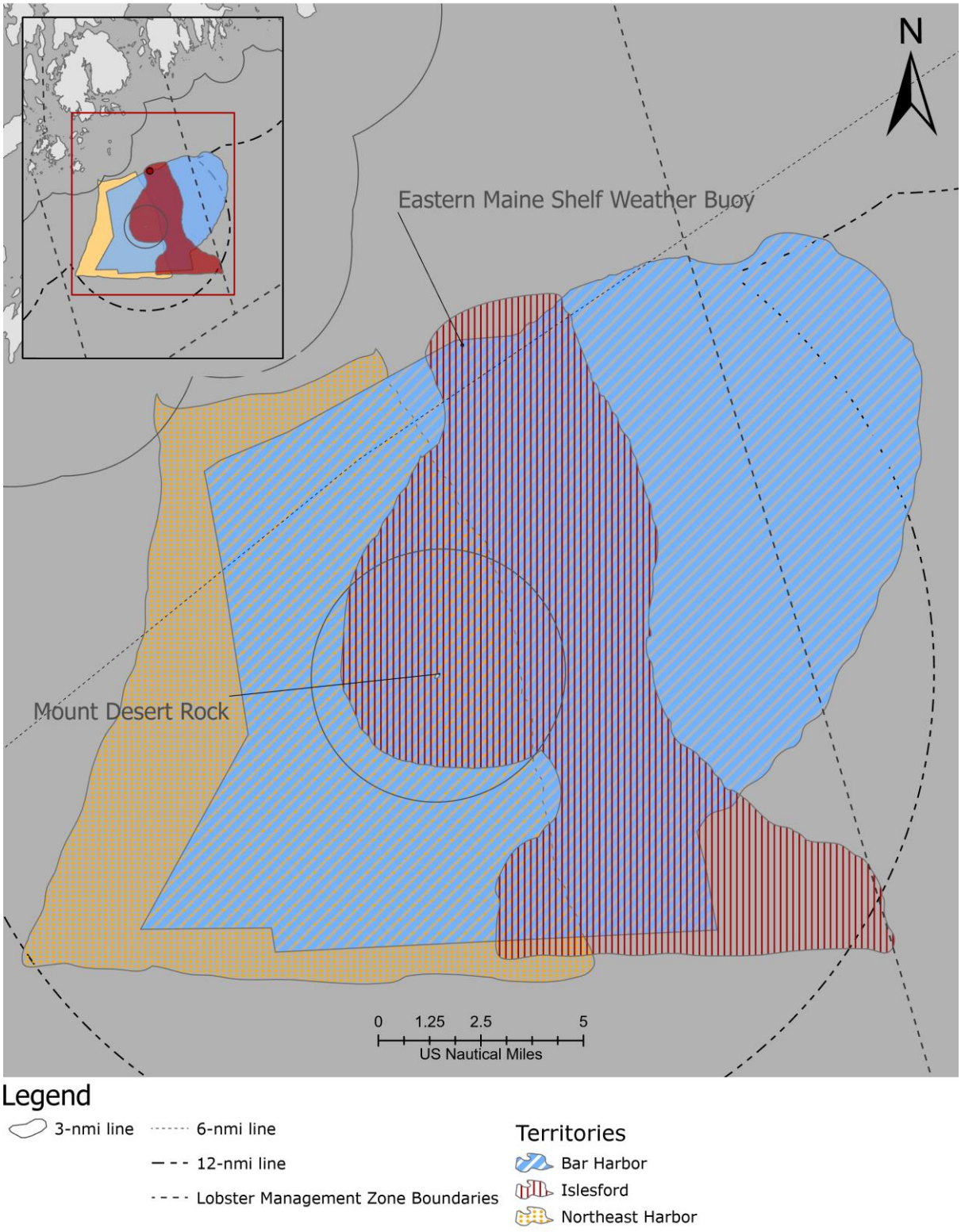

Figure 18 Offshore territories. Notice areas of overlap between harbors.

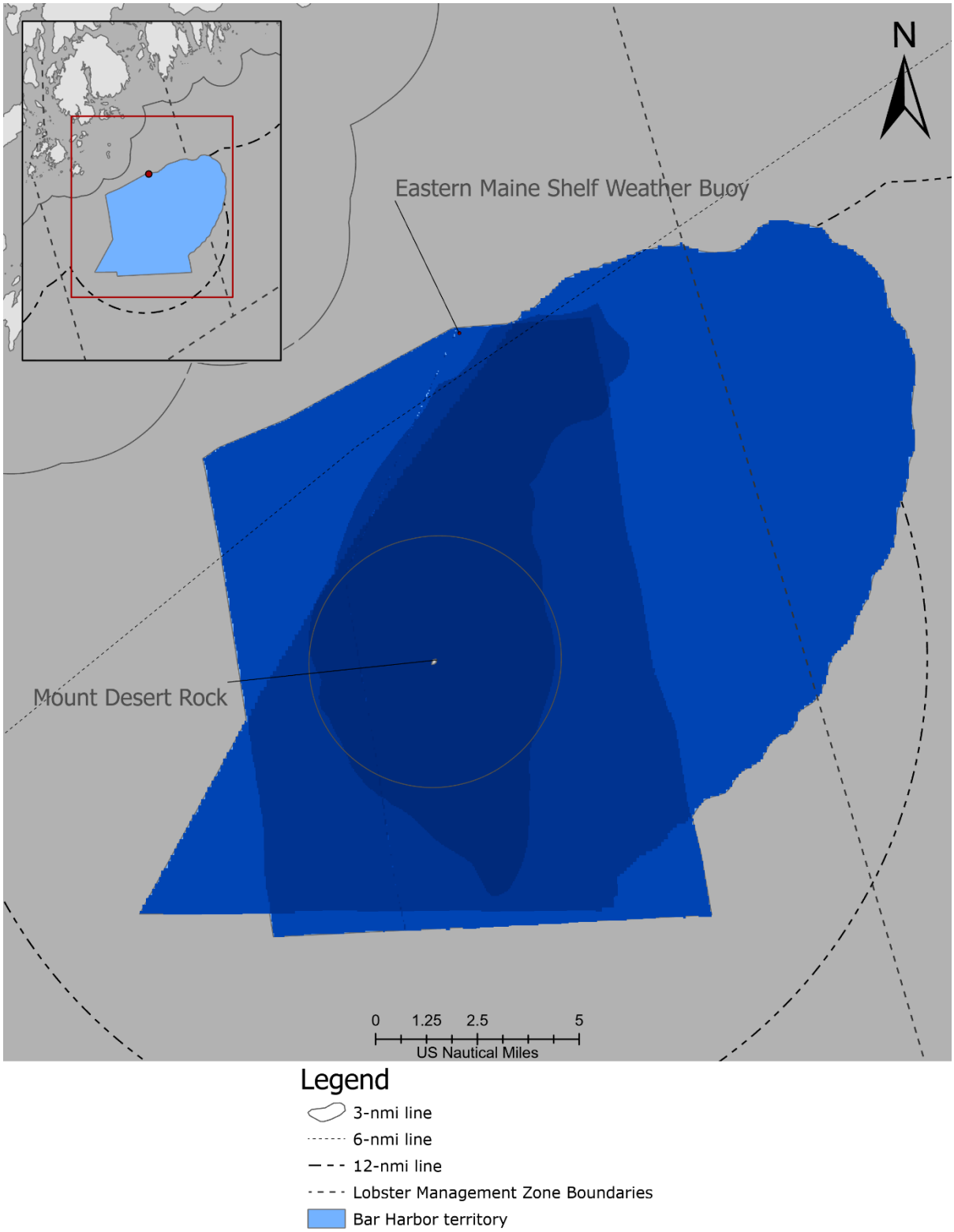

Figure 19 Spatial distribution of Bar Harbor captains in offshore waters around Mount Desert Rock. The lightest shades indicate that only one fisherman marked the area; darker shades indicate an increasingly higher number of captains, with the darkest shade representing the total number of participants interviewed (Bar Harbor *n* = 4)

Fishermen's cultural model of the growth of the offshore fishery

This cultural model offers a fishermen's explanation for the emergence and growth of offshore lobstering based on the two schemas: preservation of fishermen's identity in the face of declining options, and avoiding overcrowded areas (Figure 20).

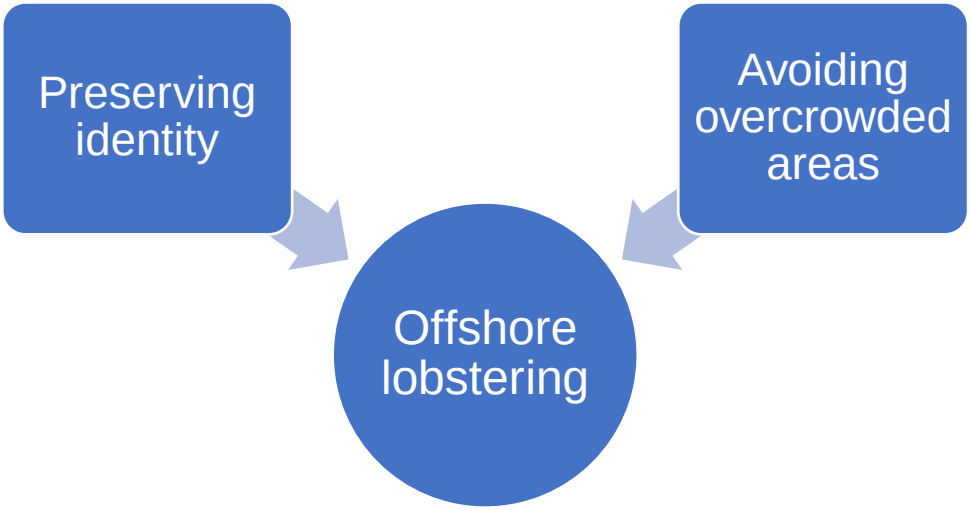

Figure 20 Cultural model of fishermen's understanding of the growth of offshore lobstering.

Preserving fishermen's identity

For decades, the income of Maine fishermen reflected the ocean's natural cycles; it fluctuated as different species came and went and was never dependent on one single fishery. As options began to dwindle around the mid-1990s, fishermen had to restructure their livelihoods around lobsters, and devote their time on the water to following them in their seasonal movements. This was indicated by participants as the predominant reason for the growth of the winter offshore fishery and emerged as the most powerful factor in shaping the socio-economic reality of the lobster fishery today along with the student license program. With no other options available, but unwilling to give up their identity as fishermen, many fishermen were almost forced into year-round lobstering and, as a consequence, offshore lobstering in the winter[17]. In the following quote, a participant implies a causal relationship between the lack of other options and the necessity to go lobstering in the winter:

> *[In the past], there were other things to do in the winter. There's very little scalloping now. Even though there is scalloping, it is still on a quota deal. Three buckets, you know. You can make a living, it's not a great living. Shrimping's gone completely. Urchining's not like it was. And that's how a lot of people got into lobstering anyway.*
>
> *Bar Harbor fisherman, in their 60s*

[17] As the quote mentions, the scallop fishery is still open from December 1st to March 31st. However, very few fishermen were able to keep their licenses through changes in the system and entry is now limited through a restrictive lottery. The daily quota of 15 gallons ("three buckets") of scallop meat and the relatively short season mean that the fishery is generally only a source of supplemental income for license holders. For more information, see Department of Marine Resources 2020a.

This participant, who had been able to shift between fisheries when younger, repeatedly connected the necessity to engage in winter lobstering with the decline of other fisheries. Younger participants, who had little to no choice to engage in different fisheries in their lifetimes, were almost resigned to the lack of other options: the choice to go lobstering in winter was already assumed to be the only one, and they focused more heavily on the necessity to go offshore in winter to maintain their fishing livelihood, as these quotes illustrate:

> *Well, I have a family. I have to make a paycheck year-round. And if you wanna make a year-round paycheck lobstering, [offshore is] where you have to go. Or you scallop in the wintertime. I did better lobstering.*
>
> *Bar Harbor fisherman, in their 40s*

> *The State [i.e. within 3 nmi, inshore] fishery is just so seasonal. And unpredictable. There's good summers and bad summers and typically the State water fishery is over by November, and if you don't have the fall to make up for a bad summer, it's a long winter and a long, cold spring before you have an income again.*
>
> *Islesford fisherman, in their 30s*

> *This time of year, during the winter, [offshore is] where the lobsters are. I still catch some lobsters [in inshore waters in the winter], it's nowhere near as much as how much is offshore. And I still gotta use the same amount of bait. Still gotta pay my guys good, and in order to keep good help all year long, you need to pay them all year long, or you gotta try to find people, new people each year.*
>
> *Lamoine fisherman, in their 20s*

It should be noted that no participant mentioned abandoning fishing and switching to other career options as a way to ensure a year-round income. The idea of simply not fishing anymore was not entertained; the shared assumption was that fishing was going to remain the primary livelihood, even if it involved offshore lobstering in winter. The few participants who did not fish in the winter did so because they had no means to go offshore *yet* (e.g. no federal permit, inexperience, inadequate boat) or *anymore* (old age). They either stretched their shedder season earnings through the year, relied on other household sources of income or picked up non-fishing jobs that were considered strictly secondary and supplemental. This suggests that for all of them, fishing is not just a job, but a foundational element of their identity. This has repeatedly been observed among small-scale fishermen worldwide (e.g. Berkes 2003; Gustavsson and Riley 2018; Khakzad 2017) and reiterates Johnson et al's observation (2014) that fishermen's sense of identity is a source of adaptation and resilience: when the only way left to be a fisherman and make a living became lobstering, they found a solution by venturing further and further offshore.

Avoiding overcrowded areas

The lack of other options was the main driver behind the first, large wave of offshore lobstering in the 1990s and remains the ultimate reason why fishermen go offshore in winter. The recent trend of not returning up inside in summer, however, has been fueled by the overcrowding of

inshore waters described earlier. These participants openly connect congestion to avoiding fishing up inside in summer:

> *It's gotten so crowded inshore [here meaning "up inside"], some guys don't wanna deal with this, so they don't even bother coming in, hardly.*
>
> *Bar Harbor fisherman, in their 60s*

> *I don't even fish [up inside] anymore, it's just so hectic. I stay offshore a little more.*
>
> *Bar Harbor fisherman, in their 40s*

Incidentally, this created a feedback loop where the more fishermen left inshore waters, the less were left to defend them against encroachment, which in turn increased congestion and likely pushed even more captains offshore.

At the same time, the general growth of the fishery has also resulted in more boats fishing offshore: participants who had begun going offshore in the late 1990s noted that they went from two or three to at least six or seven other boats working around them. Although this density is still lower than that of inshore fishing, the spatial footprint of each offshore lobsterman is larger due to the regulated practice of "trawling up" beyond the 6-nmi line (see

Table **V**). The higher number of traps per buoy means that far fewer fishermen are needed to saturate the same area and create the risk of dangerous, heavy snarls. As fishermen distanced themselves from others to gain fishing bottom and avoid gear entanglements, they extended the boundaries of the offshore fishery beyond the traditional grounds of Mount Desert Rock and onto the border with Area 3. Fishermen belonging to this newly formed group are aware that they are venturing into previously unexplored lobster grounds, much like the first offshore captains of the 1970s. Many of them remain offshore (in the fishermen's sense; beyond the 12-nmi line, i.e. beyond the middle ground) year-round, generally because the benefits of minimizing shifting gear outweigh the costs on not fishing the prime inshore grounds at the height of shedder season, as noted by this participant:

> *A lot of guys have gone to just fishing offshore now, because they only miss out on really a month of good fishing. It's a lot more work to bring all your traps in and then bring them out.*
>
> *Northeast Harbor fisherman, in their 20s*

This additional expansion has only begun in the last 5 to 10 years, and as such its social dynamics are still emerging. This fisherman, who has been fishing around the Rock since in 2006 and in the last couple of years has been pushing his boundaries towards the 40-nmi line, reflects on how this portion of the fishery is still a novelty, even for those involved in it:

> *[There's] this new offshore fishery that's kinda gone from Mount Desert Rock, which is always kind of where it used to stop, now there's this whole other area beyond. Another 15, 20 miles before you get to Area 3. And that's where the real offshore fishing happens in the wintertime now. We're all still figuring it out, 'cause most of the guys that fish there, this is fairly new to them. There was never a traditional fishery there, you know what I mean? There was*

traditional fish dragging and stuff, but lobster fishing, not as much. So I think everyone is still kinda working out how they fit into it.

Islesford fisherman, in their 30s

The undefined nature of this portion of the fishery is particularly reflected in its territorial system, which has not yet been consolidated. More generally, territoriality in the offshore fishery at large is still emerging, as explored in the following section.

Fishermen's cultural model of the emergence of offshore territoriality

There is now a large enough number of fishermen in offshore waters that a sense of territoriality has begun to form, although it is not a well-consolidated collective concept yet. Participants offered diverging accounts of the reasons and principles behind offshore territoriality, as opposed to the generally unanimous explanation of why and how inshore territories exist. Nonetheless, I identified three schema that are at the foundation of an emerging cultural model of offshore territoriality (Figure 21): harbor mixing, mutual respect and definition and enforcement of territorial lines.

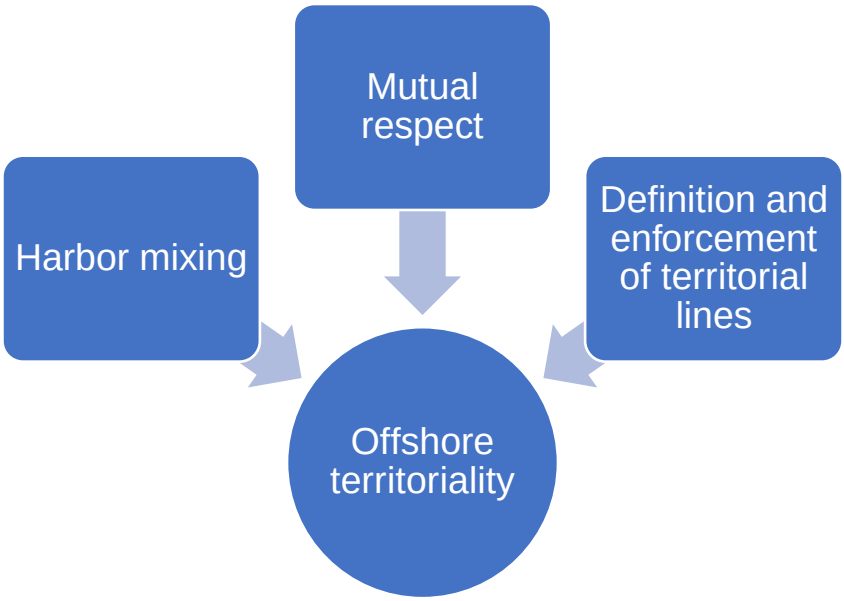

Figure 21 Cultural model of fishermen's sense of territoriality in offshore waters.

Harbor mixing

As anticipated, the role of harbors in forming offshore territories is not as prominent as other factors. Sharing bottom with fishermen from different harbors is normalized and generally not a cause of conflict. In a way, this is the continuation of the gradual dissolution of harbor boundaries observed by Acheson as fishermen moved from inshore to near-shore waters; logically, it should follow that the mixing of harbors would be even higher offshore. Historically, this can also be understood in light of the slow build-up of the offshore fleet. The first offshore lobstermen in the 1970s and '80s were few, far between and from a variety of home ports, so that no one harbor could form a strong enough group to lay claims on any areas. Being the first ones to fish those grounds, they had no traditions to fall back on to justify territorial rights or disputes, so mixing and sharing were common; by the time the offshore fleet grew in the 1990s and 2000s, mixing and sharing had become the norm and have remained so to this day. The higher degree of mixing is easily observed in the delineation of territorial

boundaries (Figure 18). Whereas inshore territories are more clearly centered on each group's harbor and often follow bottom contour lines, offshore territories are much more generic, show more variation between fishermen of the same harbor and much larger overlaps between different harbors (Figure 18). The only apparent spatial trend is that fishermen tend to target grounds that are due south from their harbors, likely to minimize steaming times. This participant remarks the difference between inshore and offshore territories and the higher degree of mixing in offshore waters:

> *Inshore is well-defined, ask anybody and they'll tell you where the lines are. You get offshore, [it] becomes a little more complicated. The further out you go, it becomes hard to define. At least [around Mount Desert Rock], there's a lot of mixing going on of guys from different harbors fishing next to each other. Guys from different counties, different Lobster Management Zone, all kinda mixing to some degree in certain areas or another.*
>
> *Islesford fisherman, in their 30s*

The participant emphasizes the more inclusive attitude in the offshore fishery, where even fishermen from different Lobster Management Zones are tolerated, although many participants voiced concerns over the high numbers of Zone C fishermen fishing in Zone B. Taking advantage of the rule that allows license holders to fish 49% of their traps in a Zone other than their declared one, numerous fishermen from Deer Isle-Stonington, which is located in Zone C, set their gear in the profitable Mount Desert Rock grounds and beyond. Participants also expressed an interest in seeing increased levels of law enforcement in offshore waters to ensure that Zone C fishermen were respecting the 49% limit; although patrolling the vast offshore areas is not easy, the recent addition of a 46' vessel to the Maine Marine Patrol fleet will support officers in the task (Rappaport 2019)[18].

Many participants connected the disproportionate numbers of Zone C fishermen to the federal permit system, which is not conducive to preventing overcrowding of the most productive grounds. As one fisherman puts it:

> *You shouldn't take a federal permit from Kittery and be able to use it in Eastport, 'cause all that does is put a bunch of permits in the area where the lobsters are, 'cause the guys that can't catch anything offshore are gonna sell theirs and get rid of it, just like a lot of kids in Zone B bought permits that originated from somewhere else. […] And the permit comes up, and it puts a lot of people in one area. [W]hat it should've been was, you had to buy a permit for a certain area, and that was where it was. Rather than, when fishing gets bad elsewhere, taking all the permits […] and putting them in the area that fish, 'cause it's just gonna wipe it out and shorten, [you know] good fishing there.*
>
> *Bar Harbor fisherman, in their 60s*

Federal permits, unlike State licenses are transferable and valid within the entirety of their Area. However, productivity is unevenly distributed within each Area, so permit holders who

[18] Maine Marine Patrol Officers are the enforcing authority in federal waters as deputy National Marine Fisheries Service Federal Enforcement Agents (Department of Marine Resources 2016a).

have little access to productive offshore grounds are likely to be selling their permits, while captains who are close to good offshore grounds are likely to seek and buy permits, thus mirroring the uneven lobster distribution with uneven lobstermen presence.

Mutual respect

The concept of respect is key to understanding the emerging offshore territories. Respect has always been a core value of the lobster fishery, but many participants felt that it was being lost in the inshore fishery due to the impact of the student license program. However, its prominence seems to be renewed in the offshore fishery and central to determining access to territories.

Among offshore lobstermen, the focus is on mutual respect rather than on respecting traditions. Respect is generally gained by fishing in a way that does not interfere with other captains – leaving enough space between trawls, accounting for tides and currents and not molesting their gear. Also central is the mutual recognition of the hardships endured to be successful offshore; in the quotes below, participants reflect on the large economic investments, trying working hours and extreme physical and mental exhaustion that come with offshore lobstering:

> *There's a little more respect offshore than there is inshore. You see a lot of people come and go offshore. They think it's the end of the rainbow, you know. They think the grass is always greener. But they don't realize, when you go offshore, the weather's bad. Even a good day offshore, that's a bad day inshore. A lot of guys won't even leave the mooring. I've watched a lot of people come and go. It's a lot more work outside. And you have to be very efficient to get a lot of traps hauled. You're hauling a lot of rope, and if you're don't know what you're doing, you're not gonna do well.*
>
> *Bar Harbor fisherman, in their 40s*

> *[I]t is a hundred times harder than inshore lobster fishing. I mean, the rewards, you can catch some lobsters, but you really gotta know what you're doing. You really gotta work for it. It's a constant battle, every day. Fishing trawls especially, fishing around other people, working with the tide is just insane out there. You're dealing with weather pretty much every time you're out there, especially when you get 40, 50 miles out, there's always weather. And then you know, you have your regular things that you would have inshore, too. Issues with the boat, but if something happens, you're that far off. It's just a lot. There's a whole other level to it. You really have to be locked in mentally.*
>
> *Islesford fisherman, in their 30s*

Their personal experience of these challenges makes them more sympathetic to fellow offshore lobstermen. If a captain and their crew prove to withstand all that, they are worthy of respect. On the other hand, fishermen who are not committed to the work are more likely to suffer consequences of their absence:

> *[Y]ou know the ones that aren't tending their gear. They don't get shown respect, you know. People won't unwind with them, they won't take the time to lift their gear off like you would with somebody who's tending their gear. Some of those guys won't tend their gear for a couple months. When the weather*

turns, they just quit, but all their gear is still left for you to work around. Those guys don't get shown respect.

Bar Harbor fisherman, in their 40s

This captain is hinting that fishermen who neglect their offshore gear are at risk of losing it by intervention from others. Another participant recounted that their involvement in territorial disputes offshore was limited to a single instance in which they had had to fight off a captain described as "a real sociopath" who had been cutting off other fishermen's trawls for no reason. In this sense, the right to fish a certain area is dependent upon a fisherman's social and embodied cultural capital rather than their harbor of origin. Territories are broadly defined and controlled by mixed groups of captains that mutually respect each other because of their demonstrated skills and values.

Definition and enforcement of territorial lines

The use of landmarks to define territorial boundaries has been supplanted by technology; as fishermen now use GPS to navigate, they also rely on it to identify territorial lines (some older lobstermen still refer to the LORAN-C grid to achieve the same goal).

As expected, the more extreme measures of territorial defense (i.e. trap cutting) are less frequently adopted than inshore, especially in waters beyond the 12-nmi line where a minimum of 15 traps to a trawl is required. Fishermen are more wary because of the much higher financial burden they could inflict on another captain and, in turn, could suffer themselves due to retaliation; this concern alone seems to have encouraged respectful behavior and avoidance of trap cutting.

Although fishermen's interpretation of territoriality offshore is still evolving and is not as clearly defined as inshore, three elements of their cultural model emerged: a higher degree of harbor mixing, the importance of mutual respect and the modalities of defining and enforcing territorial lines.

Discussion

Inshore lobstering

The student license and the concept of "good fisherman"

The cultural model of the evolution of Frenchman Bay's territories identifies the student license program as a key driver of change. Its popularity among young people has contributed to the overwhelming increase in number of Bay fishermen, and fishermen who belong to older generations, fishing families, or both consider its structure responsible for fostering a lack of respect for traditional boundaries and values.

Although participants appreciated the value of the student license program in supporting the younger generation of lobstermen, those who did not personally benefit from it consider it at best ineffective at forming experienced and responsible captains. The student license program clashes with the traditional model of transmission of fishing knowledge and skills and is uprooted from the social and cultural contexts that shaped lobstering's customary behaviors.

As a form of local ecological knowledge (LEK)[19], fishermen's knowledge is markedly rooted in empirical observation and experience and transmitted orally (Johnson 1992). It integrates practical skills, such as setting traps and reading oceanographic patterns, and values, such as the often-mentioned respect, in a system that has to be embedded in the social context of fishing to be effective (Neis et al. 1999); by removing student license holders from the social context of working as a deckhand, it eliminates an essential component of the educational experience and, in this sense, fails them.

Viewed through Bourdieu's capital framework (1986), student license holders are not given the possibility of acquiring and developing adequate levels of objectified cultural capital (practical skills) and embodied cultural capital (values). The lack of experience of many student lobstermen is often compensated by the advanced technology now available and the tremendous abundance of lobsters in inshore waters during shedder season, which helps them obtain relatively successful catches. This, however, is not sufficient to counteract the importance of apprenticeships; Neis et al. (1999) emphasize the differences in skill sets and ability to develop LEK between fishermen who participate in an apprenticeship and those that do not. This explains the study participants' complaints about, for example, student license holders not reading tides correctly and creating trap snarls.

Although objectified cultural capital can eventually be obtained and nurtured in ways other than learning from a mentor – such as simply continuing to fish for an extended period of time – it is more difficult to accrue embodied cultural capital, which, by proving that the socio-cultural structure has been embraced (Gustavsson et al. 2017), helps lobstermen achieve good social status and earn the respect of others. Gustavsson uses the term "good fisherman" (2017) to describe those individuals who possess and are observed to have good skills and also comply with the informal agreements commonly found in small-scale fisheries. Her account of a "good fisherman" is line with the concept of a Maine lobsterman who offers and receives respect.

Should the licensing system remain unchanged, it is reasonable to assume that the number of captains who participated in the student license program will increase, while the older

[19] Local ecological knowledge is broadly defined as an integrated system of knowledge, insights and beliefs about a natural resource or environment that has been acquired through extensive observation and prolonged (typically multi-generational) use (Huntington 2000; Neis et al. 1999).

generation of lobstermen who learned by working as sternmen will phase out. New licenses will also be issued to those who completed the apprenticeship program, although more slowly because of the limited entry system. This could cause a systemic shift in the understanding of a "good fisherman" as captains with high levels of embodied cultural capital are replaced by those who did not necessarily have the chance to accrue it. In this sense, the impact of the student license program could be exacerbated by two concurring phenomena currently shaping the future of the fishery: the expansion offshore, whose effects are examined below, and the application of advanced electronics such as GPS and fish finder technology.

Thanks to the navigation instruments' precision and accuracy, fishermen can more easily find and return to the most productive grounds – an ability that was traditionally acquired through years of observations, attempts and trained intuition. This reliance on technology to find specific locations further diminishes the apparent value of apprenticeships, since a combination of independent learning and technology could, in the long term, provide equally adequate skills and knowledge to be a successful fisherman. This, however, comes at the cost of deteriorating LEK, which is known to be eroded by the adoption of modern technology (Ludwig and Macnaghten 2019).

It is also likely that should the concept of "good fisherman" evolve so will that of the embodied cultural capital needed to be considered one. As seen in the results of this study, the relative importance of the concept of respect and the significance of territorial boundaries is already dwindling. Another characteristic that has historically been a source of pride for Maine lobstermen is their environmental stewardship, which for decades has resulted in very high levels of compliance with conservation measures such as v-notching and legal size limits. The study produced no evidence that these are currently being forsaken or downplayed. Data collected through both interviews and participant observation did not reveal any systematic changes in compliance levels or value attributed to the conservation measures nor any emerging trends in this direction. Regardless of age, provenance and fishing history, the participants unanimously agreed to the importance of protecting the resource by controlling fishing efforts. However, future developments in this sense cannot be excluded yet. Recent work conducted by Mazur (2020), for example, has already found perceptions of the importance of v-notching to be fading.

Altering the student license program is, of course, a possibility, although one that is not currently being openly entertained by the DMR. A participant, who persuasively argued against the current structure of the program, also offered an interesting proposal that could address its shortcomings:

> *The student licensing program is the crux of the problem. […] Kids are just graduating high school at age 17 or 18, getting their hours, whether they really did or not, no way to prove it really, and they just get 300 traps. And the fishery has been good enough, in all reality, as opposed to 30 years ago, [that] as long as they just start off with a smaller boat, 300 traps, they can actually make a little bit of money, with low overhead, and they just get turned loose. And then they get 100 traps a year till they get 800, and honestly speaking, they have no respect. […] I think the student program is good, I think it's cool, but I just don't think they should be able to put in 200 days and 1,000 hours and get a license. […] Once you've completed that, we're not gonna put you on the waitlist, but you're gonna put 4,000 hours in and 400*

days on the stern with a 1099 to prove it. So you're forced into at least a couple of years [of working as a sternman], and now you're gonna learn where you're supposed to be, territory-wise. You're gonna learn who's who, you're gonna learn some respect, you're actually gonna learn some stuff you did not learn dinking around the harbor in a skiff around the moorings. Some real time problems, weather, breakdowns, under the supervision of an experienced captain […] I mean, every buoy color that frustrates the shit out of me is the product of a student license. There's no question about it. And so that's really where that problem is and that needs to be fixed, and I'm probably not very popular for saying that, [and I even have] a son, you know? But at the same time, maybe because I'm a full-time fisherman and always have been, as opposed to some carpenter that had a son get a license, I'm not gonna let my son go out there on his own until I know he can handle it. The only way I really know that he can handle it is if he spends some time with me.

Bar Harbor fisherman, in their 40s

The participant's idea expands the student license program by including the additional requirement of working as a sternman for 1 – 2 years. The participant also suggests a stricter monitoring system (attaching a copy of the official tax form typically issued to deckhands to the logged hours) to corroborate the time at sea logbooks presented to the DMR. This would supposedly curb the common practice of inflating hours and days at sea to meet requirements more quickly. I find the idea particularly well-articulated, as it covers the importance of working as a sternman to acquire both objectified and embodied cultural capital. The participant mentions both value-based (e.g. "*you're gonna learn some respect*") and experiential (e.g. "*weather*, *breakdowns*") lessons that student fishermen cannot access through the program in its current structure, but that would occur daily while working alongside "*an experienced captain*". He also reiterates the notion that the shift in attitude in the younger generation of lobstermen is connected to the fact that non-traditional families are now likely to join the fishery even if they are generally unfamiliar with its cultural capital.

The future of Bar Harbor

The other issue rising from the loss of territory in Frenchman Bay is the future of Bar Harbor as a fishing community. Although its sizeable and successful fleet currently has access to a sufficiently large territory, its prospects are not as encouraging given the challenges of living in an increasingly gentrified community and the lack of younger captains (20 – 30 years old; there are, however, a few student license holder who may remain in the fishery). This is exacerbated by the restricted options for waterfront access in the town. The identity and current state of Bar Harbor as a fishing community are explored in Chapter 3, along with an analysis of some of these issues.

Offshore lobstering

Lack of options and fishermen's identity

The fishermen's cultural model of the evolution of the offshore fishery highlights the vulnerable state of Maine's fishing community, which is overly reliant on a single resource and limited in its capacity to diversify. The issue of declining access is lamented by harvesters (Brewer 2012) and scholars alike. Stoll et al. (2016) argue that the flourishing of license categories that began in the early 1980s had the unintended consequence of limiting fishermen's mobility and adaptability. The number of license types grew from 5 in 1981

(lobster, scallop, shellfish, worm and general commercial fishing for all other species) to 23 in 2014 (see Figure 6), but the introduction of limited-entry systems for the most lucrative fisheries (lobster, scallop, elver) reduced fishermen's ability to diversify their activities. This was exacerbated by the downsizing of other fisheries due to either biomass decline or market fluctuations (e.g. the sea urchin fishery). The consequences of the lack of options are very impactful.

Firstly, the lobster fishery may be strong and successful now, but it is still under numerous stressors that could cause its potential demise. For example, the record-high densities of lobsters increases their susceptibility to diseases, such as shell disease (Steneck et al. 2011), while climate change may eventually cause water temperatures to become unbearable for the species (Stoll, Fuller, and Crona 2017). Stressors outside of the ecological realm should also be considered. Regulatory changes at the governance level may be too drastic for the fishery to continue to operate at its present capacity and scale; many worry that the ongoing discussions surrounding the relationship of the fishery with the endangered right whale may lead in this direction. There are also economic factors creating uncertainty. Any significant market fluctuation, such as the contraction of the global seafood trade due to the COVID-19 pandemic, may have too strong an impact on the overcapitalized fishery for it to successfully rebound. Should the lobster fishery collapse or be significantly downsized, thousands of people would be left with no other option in fishing.

Parallel to the lack of mentorship in the student license program and the increased reliance on technology, reduced access to licenses will affect the creation and development of LEK among fishermen. The ability to shift between fisheries granted fishermen access to a variety of ecosystems and, consequently, to a suite of learning opportunities that would lead to a fine-scale yet generalized understanding of the local ocean environment as opposed to the increasingly specialized knowledge of lobstermen today (Johnson 1992; Stoll et al. 2016). Fishermen are generally very knowledgeable about interactions between their target species and the environment, since it directly affects fishing success (Neis et al. 1999); however, because the knowledge is acquired through repeated exposure and experience, not being able to target a species means not being able to learn about it. The younger generation of Maine fishermen, who have mostly only been able to target lobsters, are likely extremely knowledgeable about lobsters, but probably not as versed in shrimp, groundfish or urchin ecology.

It is difficult to propose solutions to the lack of diversification, since both Maine fishermen and fisheries managers operate in an environment that is restricted in its resource availability. However, cultivating diversity and flexibility is key to improving a socio-ecological system's resilience (Berkes 2003); finding or nurturing alternatives to lobstering should be a priority for management officials and fishermen alike. Fisheries that are currently closed, such as shrimp or groundfish, may not have reached optimal stock levels for commercial operations to resume; fishermen should be involved in the stock assessment data collection process, for example through initiatives such as Maine Center for Coastal Fisheries' Sentinel Survey program (Maine Center for Coastal Fisheries n.d.). Examining the licensing system of other currently open fisheries could highlight opportunities for expanding or facilitating access, if the health of the stock allows. The DMR, for example, is currently in the initial stages of considering an apprenticeship program for the scallop fishery that would ease the presently limiting lottery-based model (C Guenther, personal communication, 26 February 2020). The potential of

emerging fisheries targeting invasive species (such as green crab *Carcinus maeanas*) or species migrating due to climate change (such as black sea bass *Centropristis striata*) should not be underestimated and investigated in a timely fashion.

Aquaculture is also becoming increasingly attractive as a source of supplemental income and economic diversification for many fishermen. Organizations such as Maine Sea Grant and the Island Institute are enthusiastically supporting aquaculture and those interested in it with the specific goal of reducing the vulnerability created by the overreliance on lobsters (Island Institute 2018; Maine Sea Grant 2020).

Lastly, fishermen's ingenuity should not be underestimated as driving force of resilience and adaptability. The strong attachment to their livelihood, identity and community has been identified as a crucial in finding alternative and innovative ways to continue to be fishermen (Johnson et al. 2014). These will likely be highly differentiated and dependent on personal characteristics and capabilities, and as such difficult to predict, but remain nonetheless an important resource.

Offshore territoriality

With regards to the emerging sense of territoriality offshore, it is too early in the development of this portion of the lobster fishery to draw conclusions on what its impact on the sustainability of the resource will be – although the fact that fishermen are already self-policing effort by excluding those who fish irresponsibly is an encouraging finding in this sense.

From a social point of view, it appears that the shift from respecting traditions and other harbors to respecting each other on an individual basis may be strengthening the bridging social capital[20] of offshore lobstermen; despite the various complaint about the presence of Zone C fishermen, a few participants also mentioned improved communication and a stronger sense of camaraderie outside of what is traditionally lobstermen's social circle – their harbor or, at most, neighboring harbors. One fisherman emphasized the importance of social media platforms and the role of the recently formed Lobster Union 207 to bring together lobstermen across Zones and along the entire coast. In a way, then, the expansion of the offshore fishery and the development of mixed territories might have positive consequences for those involved: higher levels of social capital have been found to increase fishermen's resilience, success and safety at sea (Gustavsson and Riley 2018), and if fishermen are indeed coming together across Zones they will be better able to act as a unified front against future adversities.

Limitations of the study

This study was firstly limited in its geographic approach. My work was focused on Zone B lobstermen in the MDI region; the conclusions I drew may not be applicable to the rest of the State, and the opinions shared by the participants may not be shared by lobstermen of other areas or Zones.

More generally, a limit of the study was the necessity to generalize fishing styles, needs and techniques in the context of a fishery that is renowned for being incredibly diverse. Each boat is unique and each captain has their own methods and business models; my description of the movements between inshore and offshore waters is the result of collating and averaging a

[20] Social capital is a person's opportunities and resources arising from their network of social relations (Bourdieu 1986); bridging social capital refers to those relationships that connect individuals from separate social groups (Patulny and Svendsen 2007).

season’s worth of observations on the water, informal conversations and semi-structured interviews – but the reality of lobstering is too complex to be accurately described in its thousands of facets.

Lastly, the impact of COVID-19 did not allow me to collect as many interviews with Bay fishermen as initially planned. Although I have attempted to compensate for this shortcoming through my participant observation phase and previous conversations, a wider participant pool would have provided a more refined and detailed analysis of their point of view.

A note about lobstermen and right whales

The relationship between Maine lobstermen and endangered right whales is not the focus of this study, but it remains the most pressing issue for the fishery, and no discussions about the future of lobstering can steer away from it. All the participants, who were interviewed at different stages of the regulatory and judicial processes surrounding the right whale issue, expressed deep concern and fear about the outcome of these discussions. When I first began fieldwork in the summer of 2019, the DMR had just began to consult fishermen to build a proposal that would satisfy the Take Reduction Team goals while also acknowledging Maine lobstermen's ideas, needs and specificities. On April 9, 2020, U.S. District Judge James Boasberg ruled that the National Marine Fisheries Service violated the Endangered Species Act by underestimating the impact of the lobster industry on right whales, while NOAA rejected the DMR's proposal in January 2020 (Waterman 2020). The future of the fishery is uncertain, and some fear it may not even have a future.

The topic and findings of this study are current and relevant, but should be read in a framework of uncertainty and potential drastic changes. Since the proposed gear configuration rules heavily target the offshore fishery, some participants predicted its growth would come to halt as many fishermen would return to inshore waters to avoid the cumbersome regulations. If this was to happen, the current inshore crowding would be further exacerbated with unknown consequences for the social and ecological sustainability of the fishery.

As part of my participant observation, I attended two Zone Council meetings that included whale regulation discussions in the agenda. Although fishermen are able to participate in lobster management within the State, they are not given the opportunity at the federal level. I witnessed a lot of anger, frustration, disillusionment and a feeling of being powerless – which revealed the shortcomings of management models that do not empower and involve resource users. The federal government may not be currently equipped to incorporate co-management in its agencies' approach, it should nonetheless uphold its duty to "provide for the sustained participation of fishing communities and minimize adverse economic impacts on those communities" as stated in the Sustainable Fisheries Act (1996) and better acknowledge and engage with Maine lobstermen.

Conclusions

Fisheries are highly adaptable and dynamic systems that are continuously morphed by interacting social and ecological forces (Berkes et al. 2001). The purpose of this study was to elucidate fishermen's interpretation of two significant social phenomena that emerged as influential on the state of the lobster fishery in the Mount Desert Island region: the impact of the student license program and the consequences of the low diversification potential for Maine fishermen. Firstly, the explanations offered regarding the reconfiguration of territorial lines in the inshore waters of Frenchman Bay drew attention to the possible adverse impacts of the student license program on nurturing "good fishermen" in the traditional sense of the concept, which emphasizes abidance to the historical values of the fishery. Secondly, participants identified the low diversification potential of Maine fishermen as the primary driver of the growth of the offshore lobster fishery, which has virtually become the only viable occupation that guarantees a year-round income as well as preservation of the collective and individual identities of fishermen. Offshore lobstering is also offering a space for these identities to evolve, as lobstermen have the chance to explore new fishing grounds and work in a more socially diverse environment than in the strict inshore territories.

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Chapter 3: The Town Pier: the working waterfront of Bar Harbor, ME

> *I think fishing brought Maine to Maine. We wouldn't be here if it wasn't for the groundfish, the country itself wouldn't have been there. [...] It's what the East Coast was founded on. I think it brings everything [to Bar Harbor].*
>
> *Bar Harbor fisherman, in their 30s*

The issue of working waterfronts in Maine is a recurring topic of discussion among those involved in fisheries sustainability in the State. Working waterfronts, those places where people access the sea for work, are central to both Maine's identity and its economy, but they are at risk of disappearance as urban development, gentrification, and tourism rapidly advance along the coast (Snyder 2011). In 2007, only 20 of Maine's 5,300 miles of coastline offered consistent and reliable water access to commercial fishermen (Island Institute 2007); the mileage is likely to have diminished since. Any further loss might result in fishermen literally not having a place to moor their boats, go to work, and earn a living.

A blanket solution to working waterfront issues is not recommended, because the socio-economic specificity of each coastal community requires a careful analysis of its most pressing issues and the development of locally appropriate plans of action (Coombs 2020). There is value, however, in sharing the results of place-specific case studies that highlight successes and failures; exchanging ideas and approaches between communities can foster creativity and offer examples to follow and models to adapt.

This chapter focuses on the Town Pier of Bar Harbor as a case study of a working waterfront faced with a difficult set of user-conflict circumstances. I will build an argument to prioritize traditional working waterfront uses, with an emphasis on commercial fishing, over emerging waterfront opportunities, such as tourism, by bringing together theories of sense of place, community well-being and local economies as well as the existing literature on the significance of Maine's working waterfronts.

I begin by contextualizing the Town Pier of Bar Harbor within the broader picture of Maine's working waterfronts. I present data surrounding working waterfronts' contribution to the State's economy as well as reflections on their social and cultural importance. I then introduce the Bar Harbor Town Pier, discuss its economic, social and cultural significance, identify current threats and finally present recommendations for local policymakers for future resource allocation.

This chapter embraces the concept of fisheries as socio-ecological systems and builds upon the notion that long-term sustainability of such systems requires the incorporation of human dimensions research into management decisions (Hausmann et al. 2016; Khakzad 2017; Masterson et al. 2017; van Putten et al. 2018). I combine a literature review surrounding the issue of working waterfronts in Maine with a series of interviews I conducted with Bar Harbor residents and Town Pier stakeholders to build an argument in favor of traditional working waterfront preservation.

The results will be shared with the Town of Bar Harbor and its Harbor Committee in the hope that it will support both in developing successful working waterfront policies, as well as with groups engaged in working waterfront issues and research such as the Maine Coast Fishermen's Association and Maine Sea Grant.

Maine's working waterfronts

With over 5,300 miles of coastline, the ocean is a central feature of Maine. The sea always provided coastal Mainers with a sense of place and identity as well as economic opportunities. The interface between water and land, the working waterfronts, became and still are a material expression of this multifaceted relationship for many coastal communities.

'Working waterfront' generally refers to any point of access to the ocean that is used by water-dependent businesses; common examples of these businesses include commercial fishing, aquaculture, boat building, water transportation and water-based recreational activities, although an emphasis is often put on extractive industries when the term is used (Coombs 2020). Waterfront access for commercial fishermen is not solely limited to piers and wharfs, but also to paths and roads that lead to intertidal flats, where species such as soft-shell clams, periwinkles and bloodworms are harvested. There is also a suite of enterprises generally referred to as "water-enhanced businesses", that do not need access to the water to function but benefit from a waterfront location – such as hotels and restaurants. However, in this chapter I am arguing that commercial fishing is a sector of the working waterfront economy that should be prioritized due to its economic significance, its historical and cultural importance, and its inability to exist outside of a working waterfront setting.

The coast of what is now called Maine has historically been tied to fishing. The native Wabanaki tribes fished and harvested cod, lobster and softshell clams among other species (Springuel 2016). In the early 17th century, European colonists established many settlements along the coast to gain control over its productive codfishing grounds; many ports and harbors thriving today were born as fishing outposts during this period (Springuel, Leavenworth, and Alexander 2015). By the 1860s, commercial fishing had already become a sizeable sector of Maine's economy and a structured and diversified enterprise: Maine boasted more active vessels than Massachusetts, and the fleet targeted both offshore and inshore grounds (Alexander et al. 2009). Since then, commercial fishing continued to grow, and even following the collapse of the cod fishery and the decline of many other commercial species (e.g. sea urchin, shrimp) between the 1980s and 1990s, Maine remained a leading state in seafood production and has been included in the top 10 States for total commercial landings for the last 19 years (NOAA Fisheries 2018).

In recent years, aquaculture has become a prominent actor in Maine's working waterfronts. Following approval of the first aquaculture lease in 1973, the industry developed in size and structure and now counts 176 active leases (Maine Aquaculture Association 2016; State of Maine Department of Marine Resources 2020); its total contribution to the state's economy in 2016 amounted to $137.6 million and 1,078 full- and part-time jobs (Cole, Langston, and Davis 2017). The economic importance of aquaculture almost tripled between 2007 and 2016, and many organizations along the coast now recognize it as a crucial opportunity against the uncertainty created by climate change and its impacts on wild fisheries (Island Institute 2018; Maine Sea Grant 2020).

Working waterfronts are also a platform for service industries such as recreation and tourism. Since its rapid growth in the 19th century, tourism in Maine continues to grow as the range of activities offered evolves and diversifies. Nature and lighthouse cruises, fishing trips, kayak tours and cruise ship stopovers are some examples of how visitors benefit from working waterfronts. In coastal Maine, the relative importance of industries in the Arts, Entertainment

and Recreation sector, which includes tourism, is 23% above the State's average (Island Institute 2020), which hints at the importance of tourism in coastal communities.

Working waterfronts under threat

Maine's fisheries are not just changing on the water – whether it is because of the ecological effects of climate change or the social consequences of the offshore expansion in lobstering – but on land, too. The wider social fabric in which they are embedded is transforming, as coastal communities become more globally connected and gentrified. This is generally found to exacerbate a community's vulnerability, as "traditional" residents and activities are forced out and social networks are fragmented (Colburn and Jepson 2012). The loss of working waterfronts is a symptom of this fragmentation, and in a socio-ecological system framework it should be taken as seriously as resource decline or global environmental change.

The loss of working waterfronts is recognized as a serious threat to Maine's ocean-based livelihoods by numerous entities, including the State government (as reported by, for example, Island Institute, 2007; Snyder, 2011; Springuel et al., 2007). The Island Institute reports that 55% of waterfront access points are privately owned; these properties are often at serious risk of conversion to non-water dependent uses, generally driven by gentrification and development (Thompson, Johnson, and Hanes 2016). Many waterfront owners feel pressured into or are forced to sell their land since its relatively stable value is an attractive alternative to the fluctuating income offered by water-dependent activities (Coombs 2020). New owners seldom plan to maintain their waterfront as dedicated to water-dependent businesses, and often convert it to private uses or not honor informal agreements that traditionally allowed harvesters to use the property as an access point (Island Institute 2007). This can be an unsurmountable challenge for fishermen, who quite literally might have nowhere else to go to conduct their business.

The State and the people of Maine have recognized this phenomenon as a serious challenge and have, on two occasions, voted to prioritize the cultural heritage and the long-term economic benefits of working waterfronts over the immediate profits of non-water dependent businesses. There are currently two major tools available to protect and preserve working waterfronts. In 2005, residents of Maine overwhelmingly supported the application of current-use taxation to waterfront properties through a referendum (Snyder 2011). Current-use taxation provides tax relief by calculating property taxes based on their use as a working waterfront rather than at their highest and best use. This generally translates to a 10 to 20% reduction in tax value (Snyder 2011). The second tool was an expansion of the State's Land for Maine's Future program to provide funding for purchasing property development rights. The Working Waterfront Access Protection Program (WWAPP) was initially allotted $6.75 million to create easements that would ensure waterfront properties would remain working waterfronts in perpetuity (Snyder 2011); since then, numerous re-allocations have been approved, including over $1 million in funding in 2019.

These tools have significant potential, but their application has not been as successful as anticipated. The most recent data show that only 86 out of 888 eligible properties have taken advantage of the current-use taxation program, while only 26 have been protected under WWAPP (Coombs 2020). In both cases, the limited number of properties enrolled in each program is likely due to incompatibility issues between their strict requirements and the unique features of every working waterfront in Maine (Coombs 2020), which points to the importance

of approaching each threatened waterfront through a local and place-based lens. In the case of WWAPP, funding constraints have also limited the program from protecting more properties.

Loss of waterfront access can also take the form of user conflict, especially in the 45% of properties that are publicly owned (Island Institute 2007) and have to be shared between extractive activities and recreational businesses. As activities on the waterfront intensify, spaces can become overcrowded, facilities overused, and one or more user groups may be pushed out or at a significant disadvantage in the use of the facilities**.**

Much of the difficulties involved in preserving working waterfronts stem from an excessive emphasis on immediate economic benefits when assessing the significance of an industry, which is generally the methodology used by policymakers when allocating resources (Roach, Rubin, and Morris 1999). A truly well-rounded assessment would include and equally consider qualitative evaluations that incorporate the significance of a place or activity towards the development of individual and collective wellbeing (Khakzad and Griffith 2016). In this paper, I present data on both aspects of working waterfront in Maine – their economic contribution and socio-cultural significance – to build an argument in favor of their preservation and the prioritization of traditional activities with a focus on as commercial fishing.

The working waterfront economy

A working waterfront economy encompasses all activities requiring access to the water, such as commercial fishing, aquaculture, boat building, water-based tourism and recreation, mineral and gas extraction, and transportation. Accurate and comprehensive economic data should provide complete assessments of each waterfront activity's direct, indirect, and induced effects[21] – which, together, should form a picture of Maine's working waterfront economy.

However, despite the importance of such datasets, no comprehensive study of Maine's working waterfront economy is available to date. Only one case study, for the Casco Bay waterfront, has been published (Wallace et al. 2017); and partial data is available for one or more specific aspects of the working waterfront economy (e.g. Colgan, 2004; Donihue, 2017; Roach et al., 1999).

These partial reports do demonstrate the significance of working waterfronts for Maine's economy. They also share important considerations that should be taken into account by policymakers when making decisions surrounding working waterfronts. Colgan, for example, conducted a comparative analysis between residential development of oceanfront properties and a selection of working waterfront activities (seafood processing, marinas, boat building and lobster fishing; though multiplier[22] effects were not calculated for lobster fishing due to lack of data to estimate added value). His results show that although residential development

[21] Direct effects are the results of the money spent by, in this case, waterfront businesses, such as salaries, supplies, raw materials, and operating expenses. This spending promotes additional activity in the local economy, which is measured through indirect and induced effects. Indirect effects measure the increase in spending of businesses who benefitted from waterfront businesses' direct effects. For example, hardware stores will purchase more products after fishermen buy their supplies. Induced effects are the results of increased personal income and consequent expenditures caused by the direct and indirect effects. For example, crew members will eat at the local diner after payday.

[22] Multipliers are quantifiers that capture the size of indirect and induced effects.

was a significant source of revenue, activities associated with the working waterfront contributed between $15 and $23 million more to the 2001 Gross State Product (2004). Colgan also reiterates the additional economic benefits associated with the long-term nature of working waterfront activities: whereas the contribution of construction projects is typically a one-off, the contribution of working waterfront activities is repeated year after year, even if at fluctuating levels (2004). Colgan's study is limited in the sense that the economic value of working waterfront activities is underestimated due to the unavailability of multiplier data for the lobster fishery; moreover, the report only compares the selected working waterfront activities with one alternative (residential development) and does not consider other potential uses of waterfront properties (e.g. restaurants).

Another study shifted the focus to lobster dealers, a sector of the seafood production business that is not as visible but nonetheless critical, and that also relies on working waterfronts for at least part of its operations. Donihue (2017) estimated that the wholesale lobster distribution chain contributed $967.7 million and 5,500 jobs in 2016; although lobster remains the dominant fishery in the State, other targeted species were not considered in this study but would further increase the contribution of seafood dealers in Maine's economy. Donihue's report is the first to assess the importance of the seafood dealer sector, which is an element of the working waterfront economy that is less visible than commercial fishing, but nonetheless significant. However, since the focus of the study is limited to the impact of lobster dealers, it does not provide a complete assessment of the seafood dealer sector's contribution to Maine's working waterfront economy.

Recently, the National Oceanic and Atmospheric Administration (NOAA) developed the most comprehensive tool to date to explore the working waterfront economy. Economics: National Ocean Watch (ENOW) compiles datasets that encompass direct, indirect and induced effects of various working waterfront industries at the state, regional and national level. Although ENOW refers to these activities as "ocean economy", the six sectors it considers essentially overlap with this chapter's definition of "working waterfront economy" (Table VIII). I will therefore adopt the term "working waterfront economy" when presenting ENOW data for the sake of consistency.

Table VIII Sectors of the working waterfront economy (National Oceanic and Atmospheric Administration, 2019).

Sector	*Definition*
Marine Construction	"Activities associated with dredging navigation channels, beach renourishment, and dock building."
Living Resources	"Commercial fishing, aquaculture, and seafood processing and markets."
Offshore Mineral Extraction	"Oil and gas exploration and production, as well as limestone, sand, and gravel mining in the coastal and marine environment."
Ship and Boat Building	"Construction, maintenance and repair of ships, recreational boats, commercial fishing vessels, ferries, and other marine vessels."
Tourism and Recreation	"A wide range of businesses that attract or support ocean-based tourism and recreation: eating and drinking places, hotels and lodging, scenic water tours, aquariums, parks, marinas, boat dealers, recreational vehicle parks and campsites, and associated sporting goods manufacturing."
Marine Transportation	"Businesses engaged in the traffic of deep-sea freight, marine passenger services, marine transportations services, warehousing, and the manufacture of navigation equipment."

Although more comprehensive than the reports mentioned above, ENOW still suffers from a serious limitation. Because of the difficulties involved in tracking their economic contribution, ENOW only provides the number of self-employed individuals in the ocean economy and overlooks their direct, indirect and induced effects. Even though it is openly acknowledged as a shortcoming (National Oceanic and Atmospheric Administration 2019b:17), it is important to stress the importance of developing methods that include the economic impact of self-employed individuals to avoid losing the contribution of Maine's commercial fishermen and their crew. Because state regulations mandate the majority of Maine's fishing boats be owner-operated, active fishing license holders are then, by necessity, self-employed. Moreover, because crew members are compensated through catch shares as opposed to wages, they are also considered self-employed (Department of Commerce et al. 2018). The contribution of commercial fishing is likely to be missed in ENOW statistics as a direct result of excluding self-employment data.

Despite this limitation, ENOW still provides the best and most accurate estimate of the overall value of Maine's working waterfront economy. According to ENOW, Maine's working waterfront economy generates $2.9 billion in gross domestic product (GDP) and $1.9 billion in wages. It accounts for 51,182 jobs and 6,980 self-employed individuals, for a total of 58,162 jobs. Table IX reports further details on Maine's working waterfront economy.

Table IX - Significance of Maine's working waterfront economy at the State level (National Oceanic and Atmospheric Administration 2019a).

Metric	*Value, Maine's working waterfront economy*	*Value, Maine's overall economy*
Jobs created (excl. self-employed)	51,182	8.5% of State's employment
Wages	$1.9B	7.3% of State's wages
Average annual wage	$36,602	$43,160
Contribution to GDP	$2.9B	4.9% of State's GDP
GDP growth	+6.8%	+2.0%
Annual change in employment	+5.6%	+1.3%

The shortcomings of the existing economic analyses reveal how incomplete and inaccurate published economic data can be. Commercial fishing is one of the main sources of employment in Maine's coastal communities, both directly and through the creation of ancillary businesses (e.g. seafood dealers, boat builders etc.). These businesses, too, are often not appropriately evaluated because of lack of data, which further undervalues the importance of fishing by reducing its indirect and induced effects. Many reports openly acknowledge these limitations (see, for example, Colgan, 2004 and National Oceanic and Atmospheric Administration, 2019), but nonetheless no comprehensive assessment of commercial fishing's economic impact is available yet.

The benefits of collecting working waterfront-specific data are clear, such as providing more accurate information for policymakers involved in resource allocation, identifying and encouraging thriving sectors or supporting those in need; however, due to a lack of interest, resources or both they are not currently available, and much research has to rely on data that is sparse, obsolete or incomplete.

Working waterfronts as community spaces

The concept of "fishing community" is too often used strictly in relation to economic reliance on fishing, although it should also consider social and cultural dependency (Brookfield, Gray, and Hatchard 2005). In other words, a community may be socially and culturally dependent on fishing if its values, traditions and character have been shaped by its relationship with fishing – which can be said about most towns dotting the coast of Maine. Values such as independence, mutual support and self-sufficiency, which are commonly found among fishermen (Acheson 1988), permeate the fabric of the wider community and, over time, become essential elements of its identity (Khakzad and Griffith 2016). In this sense, even towns or cities such as Bar Harbor, ME or Portland, ME, remain fishing communities in character even if their economy has diverged from a heavy dependency on fishing (Figure 22).

Figure 22 The Portland waterfront is a vibrant hub for commercial fishing and is fighting to preserve its unique small wharves against the advance of urban development. For more information on the Portland's fishing community efforts to preserve their working waterfront, see e.g. Springuel, 2019.

This is essentially the social and cultural value of fishing – which cannot be quantified and is therefore often difficult to integrate into policy-making discussions (van Putten et al. 2018). However, its significance is materialized in a key place of the world of commercial fishing: the working waterfront. Working waterfronts are the most obvious physical structures through which fishermen interact with the natural environment, as well as their literal connection with the wider community. Over time, working waterfronts become the material embodiment of fishing culture, and come to represent the identity of fishing communities through the development of a sense of place (Khakzad 2017). Eventually, the symbolic role of docks and piers becomes detached from fishing, and they simply become social spaces that bring together the community at large (Khakzad and Griffith 2016). There are endless examples of waterfronts being the physical and social hearts of Maine communities, the places where people converge and connect with each other regardless of their involvement in the fishing industry (see, for example, Coombs 2020; East and Daigle 2004; Lauer 2001; Snyder 2011; Town of Harpswell and Maine Sea Grant 2005). The significance of such an entity for a community should not be underestimated, for place attachment and a sense of place are well-known to foster environmental stewardship (Hausmann et al. 2016; van Putten et al. 2018) as well as community well-being and resilience (Masterson et al. 2017). To save the working waterfront means to protect all this, too.

There are benefits other than maintaining collective identities to preserving working waterfronts as community spaces. Working waterfronts are hubs where fishermen can exchange ideas and learn about new opportunities, which is vital to keep the industry innovative and resilient at a time when global environmental change is challenging many of the traditional ways of fishing. Lauer (2001), for example, emphasizes how dockside conversations about the emerging urchin fishery contributed to its boom in the late 1980s; current topics of discussion may include, for example, aquaculture. Waterfront conversations also offer fishermen a chance

to protect their interests and defend their industry, for example by exchanging information on seafood prices or bait availability.

The socio-cultural value of working waterfronts bolsters their economic importance, too. Recently, a surge in so-called "heritage tourism" has amplified interest in "unique and authentic experiences" tied to traditional livelihoods, such as fishing (Khakzad 2017:455). The longing for exposure to "simpler times", which are commonly associated with extractive industries and small communities, makes coastal towns and fishing villages particularly attractive to tourists (Khakzad 2017); visitors specifically seek exposure to the embodiments of fishing culture, such as wharves and piers (Ropars-Collet, Leplat, and Le Goffe 2016), and tend to report higher levels of satisfaction when able to access these places (Daniel et al. 2008).

Caution should be taken when mingling commercial fishing with tourism. Tourism could damage the authenticity of fishing communities at the expenses of its members by caricaturizing and commodifying their heritage and identity (Khakzad 2017). Although exposure to the reality of commercial fishing can increase understanding and strengthen public support for the industry, it can also force fishermen and fishing communities to re-shape their identity and appearance to be more appealing to outsiders and fit the narrative that is shared with the wider public (Thompson 2012). There is also a risk of displacement of essential fishing activities in order to accommodate the needs, wishes and simplistic views of tourists. Property owners who choose to buy waterfront land to enjoy "fishing views", such as a dock or a clamflat, do not often realize that this will expose them to strong smells, loud noises, uncomfortable schedules and other "nuisances" such as clammers crossing their lawn to access the intertidal flats. As one fisherman from Boothbay Harbor, a popular tourist destination and active fishing port in Maine, explains in the short documentary Where It All Starts (Cardoso 2019):

> *People have asked me before, "Well, don't tourists come to see the boats, come to see the fishermen?". Yes, but they also come to stay in a waterfront hotel. And they also don't like when at 4:30 in the morning they're woken out of bed by a lobster boat starting and lights turning on, or by the stinky bait next door. There's sort of a line, you know, I think people do want to come see us, but I think that's to a point.*

Khakzad (2017) warns against this kind of tourism and presents in turn the possibility of "community based cultural tourism", which prioritizes the quality of life of locals instead. This would include actions such as ensuring that community needs are met over those of tourists, and commercial activities such as fishing are guaranteed the space and facilities needed to function even if they might be unsightly.

Information about the social and cultural value of working waterfronts is hard to come by. It is generally qualitative in nature and related to expressions of social memory – such as photos, oral history interviews, and material objects – which further limits its inclusion in policy-making processes. Projects such as The First Coast and NOAA Voices from the Fisheries, which collect oral histories from fishing communities to preserve "collective coastal memories" and " enrich our understanding of the nation's fisheries and their impacts" (The First Coast 2018; Voices Oral History Archives n.d.), are trying to close the data gap, but still a framework to effectively incorporate the social importance of places into fisheries management needs to be developed (van Putten et al. 2018). Moreover, although qualitative data points to

the positive relationship between exposure to the world of commercial fishing and tourism spending and satisfaction, there is currently no framework to quantify this phenomenon and accurately assess the overall value of the commercial fishing industry by including the interaction with tourism. (Daniel et al. 2008).

The Bar Harbor Town Pier

From its location on the western shore of Frenchman Bay, Bar Harbor has developed a varied working waterfront economy. Although tourism is Bar Harbor's largest industry, commercial fishing is still a significant activity in the town (Johnson et al. 2015) and has long been, in fact, an attraction for many visitors who are interested in seeing fishermen at work as well as expecting to eat local seafood.

The main point of access to the water in downtown Bar Harbor is the municipal Town Pier (Figure 23), a concrete structure located in the inner harbor that serves local and visiting recreational users and commercial fishermen. No aquaculture operations are based off the Town Pier. Commercial operations also use the Hadley Point waterfront, which is located approximately 8 miles north of the Town Pier.

Daily operations on the Town Pier are overseen by the Harbormaster; long-term maintenance and management decisions are taken by the Harbor Department and the Town Council under advice of the Harbor Committee.

As a publicly owned facility, the Town Pier is somewhat unusual along the coast of Maine, where 55% of the points of access are on private property (Island Institute 2007). This means that some of the issues presented above are not relevant. High property taxes and risk of conversion to non-water uses are not significant threats for the Town Pier, which instead is under pressure to provide adequate space for the contrasting needs of the fishing and tourism industries. This should not be seen as a lesser problem, since competition with recreational users is still considered one of the leading causes of loss of waterfront access for commercial activities in the State (Snyder 2011).

Figure 23 Aerial photo of the Bar Harbor Town Pier. Source: Google Maps.

Currently, the Pier facilities include parking space (Figure 23) that is available to any visitor, regardless of their intention to use the waterfront. The Town of Bar Harbor introduced paid parking in the entire downtown area in the summer of 2019; this includes the Pier parking lot, although some categories of frequent users (including commercial fishermen) are required to pay a fixed fee instead. The Pier has two points of entry for land-based motorized vehicles: an entrance on the southeast corner through Agamont Lane and an entrance on the southwest corner through West Street. Once on the pier, traffic circulation follows a one-way system. During the summer, access to the pier on days where cruise ships are in port is regulated by a stationed police officer as described later in this section.

The Harbormaster office is located in the southwest corner of the Town Pier (Figure 23). At the head of the pier (Figure 23) there are two electric hoists that are available for public usage. The eastern hoist was paid for by the Town, while the western hoist was purchased collectively by the fishermen and then donated to the Town. There are no permanent fueling facilities on the Pier; instead, two private companies sell fuel on specific days of the week by sending their trucks in the early morning hours. This service is used by fishermen and two tour boats that operate out of the Atlantic Oceanside resort's private dock.

The waterfront structures of the pier include floats on both the east and west side. The west side includes two 16'x24' floats that are commonly jointly referred to as Fisherman's Float (Figure 23), because their use is restricted to commercial fishing operations. A separate finger float of 8'x120' runs perpendicular to the Fisherman's Float (Figure 23). This is used for dinghy dockage on the inner side and short-term dockage of any vessels on the outer side; the Harbormaster boat is also docked on the outer side of the finger float. The east side includes two 16'x96' floats (Figure 23) that can be reserved for overnight stays or used for short term dockage of non-passenger private vessels. On the eastern side of the pier there is also a public launching ramp (Figure 23). The exposure of the harbor and the ramp conditions limit its usage to certain tide levels and wind directions. The ramp itself is a very simple structure that offers little to no protection and is generally only used to launch or haul smaller vessels. There are no other public resources to support commercial fishing, such as bait sheds or gear storage facilities, on the Town Pier or anywhere within the Town of Bar Harbor's boundaries; all shoreside fishing activities are conducted on private land.

The mooring field in the inner harbor is located between the head of the pier and Bar Island (Figure 24). It includes 44 moorings, over half of which are leased to commercial fishermen. Many fishermen also keep a lobster car[23] and/or a trap float[24] in the mooring field. Moorings are currently considered at their limit due to a lack of available parking space on land rather than physical constraints of the harbor (Town of Bar Harbor 2007); when a mooring becomes available, it is assigned based on the waiting list kept by the Harbormaster.

[23] A lobster car is a submerged enclosure used to hold lobsters in seawater while waiting for sale or transportation.
[24] A trap float is a floating platform used to temporarily store lobster traps on the water when they need maintenance or re-rigging.

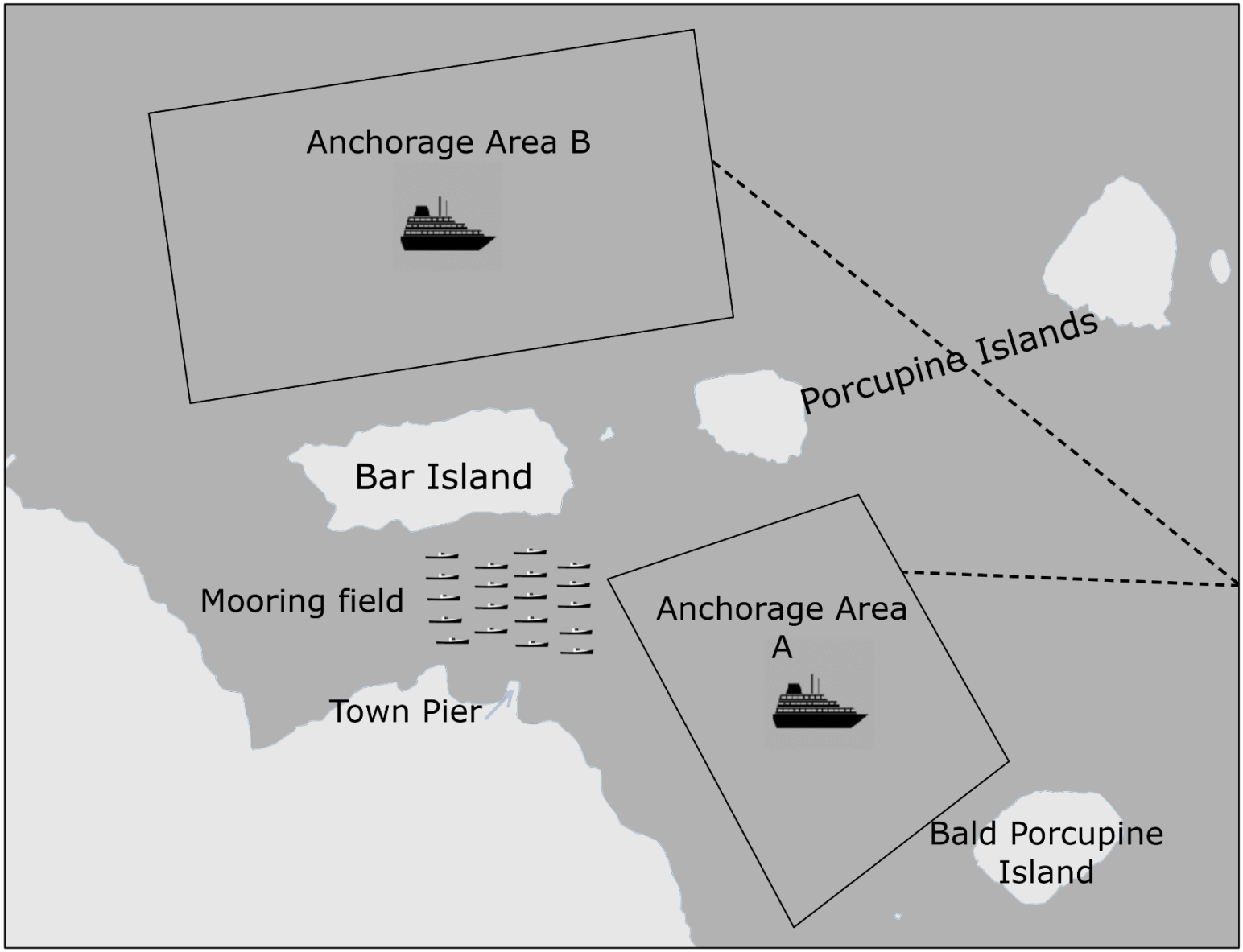

Figure 24 Map of the Bar Harbor mooring and anchorage areas in Frenchman Bay.

The western side of the Town Pier is located directly opposite privately owned docks (Figure 23). These are owned and used by the Bar Harbor Whale Watch Company to conduct passenger operations. Cruise ship companies also use the private docks for their tendering operations for a set fee. Although neither of these businesses use the Town Pier to access the water, they still interact with Town Pier users both on land and on the water.

On land, many guests of Bar Harbor Whale Watch Co. use the Town Pier parking lot. The entrance to the Town Pier by West Street is also used as a parking area by tour buses for cruise ship passengers. In an attempt to alleviate congestion caused by the parked tour buses, the Town of Bar Harbor implemented a new traffic management system in the summer of 2019 by redirecting all vehicles around Agamont Park to the eastern entrance to the Pier and effectively reserving the western entrance for cruise ship operations. Commercial fishermen were informally exempted from the re-routing to facilitate transportation of traps, lobster crates and other gear, a solution that was considered successful by the Bar Harbor Police Department and workable by many fishermen, as reported in interviews.

On the water, the proximity of the Town Pier to the private docks creates higher boat traffic between the mooring field and the cruise ship anchorages areas (Figure 24). Although the area is generally sufficient for boats to conduct docking operation smoothly, the higher traffic created by cruise ship tenders has caused collisions, fishing gear damage and general nuisance in the past for other users.

As a central community space for Bar Harbor residents and an easily accessible public facility, the Town Pier is also a destination in and of itself. The Town Pier gives residents and visitors alike the unique opportunity to witness the realities of commercial fishing in Maine. During the summer, the Pier is bustling with people coming to observe boats steaming in, crating up and selling their catch. Locals often come down to see their Town's fleet at work and to hang out, and visitors take advantage of the views of fishermen at work. The lobster fishery attracts thousands of visitors to Maine every summer. Their experience is generally limited to eating lobster or observing fishing boats from afar; in Bar Harbor, visitors have the chance to stand side by side and interact with the lobstermen themselves – an opportunity that Daniel et al. (2008) found to increase the likelihood of return visits and purchases in town, as well as overall satisfaction with their trip to Maine. In other words, the Town Pier of Bar Harbor is the embodiment of Daniel's "cultural experience composed of visiting a fishing village" and the perfect example of how commercial fishing brings additional contributions to the economy thanks to its appeal on the tourism industry (Daniel et al. 2008).

The Town Pier is limited in its expansion and improvement by space constraints and budget limitations; further resource allocation decisions should be made on the bases of the overall significance of the two major industries using the Town Pier – commercial fishing and cruise ship tourism. The following sections present the available data on both. Although the Bar Harbor Whale Watch Co. also uses some of the Town Pier facilities – primarily parking – data on their activities is proprietary and cannot be accessed. Private recreational boaters also use the Town Pier, but their contribution is limited to mooring fees and is small enough to be considered negligible. It should be noted, however, that both groups add pressure to the use of Town Pier infrastructure.

The economic importance of the Bar Harbor Town Pier

Data on the working waterfront economy is often sparse, inaccurate, and often obsolete, and its quality decreases with its scale. This applies to the data presented in this section, too, which was collected in 2016. Although the value of fishing landings is published every year by the DMR, studies on cruise ships are not commissioned on a yearly basis. The most recent cruise ship report for the town of Bar Harbor was published in 2016, which is why I adopted it as the reference year when researching the economic data regarding both commercial fishing and cruise ships.

Commercial fishing

The dominant fishery in Bar Harbor, like in the rest of the State, targets American lobsters (*Homarus americanus*). The Bar Harbor commercial fleet is composed entirely of lobstermen, although two of them also hold active scallop licenses. There are 23 full-time and 10 part-time lobstermen in Bar Harbor. Of the 23 full-time captains, 10 employ one crew member and 12 employ two; one captain fishes alone, for a total of 57 full-time fishermen. Six captains lobster year-round, while the rest of the fleet does not fish in the winter season – except for the aforementioned scallop license holders. However, all captains fishing year-round move their boats to Northeast Harbor for the winter (approximately November through May) to take advantage of the more sheltered conditions.

Table X reports landings statistics for the town of Bar Harbor as recorded by the DMR. All species landed are reported in Table X**,** but it is important to note that soft-shell clams and elvers are not harvested in the open ocean and do not require use of the Town Pier. The two Bar Harbor captains who fish for scallops land their catch in Northeast Harbor, where the fleet relocates in winter to minimize exposure to adverse weather conditions. Therefore, only the value of lobster landings should be considered when assessing the contribution of the Town Pier to the town's economy.

Table X - Landings data for Bar Harbor, ME in 2016 (Department of Marine Resources 2016).

Species	*Value (USD)*	*Weight (lbs)*
American lobster	$5,819,351	1,270,383
Soft-shell clam	$37,695	13,442
Elver	$64,857	47
Total	$5,921,903	1,283,872

Bar Harbor lobstermen use the Town Pier to sell their catch, too, since dealers are allowed to conduct buying operations *in loco* (Figure 25). Many fishermen also sell part of their catch to local restaurant for cash, which is virtually impossible to track.

Figure 25 Selling lobsters to the dealer at the Bar Harbor Town Pier.

As residents of Bar Harbor, fishermen shop at local businesses, thus reinvesting part of their earnings into the local economy. However, there are no expenditure data specific to Bar Harbor fishermen to calculate their indirect and induced economic contributions. NOAA's Northeast Region Commercial Fishing Input-Output Model[25] (Steinback and Thunberg 2006) is the most appropriate tool available to understand the economic interdependencies between commercial fishing and other industries, although it has two weaknesses. Firstly, the model was prepared in 2006; since then, expenditures for Maine lobstermen have changed, sometimes dramatically. Bait prices, for example, went from $14 per bushel of herring in 2006 (New England Fishery Management Council 2006) to $40 in 2016 (Whittle 2017), and as much as $80 in 2019 (French 2019), causing proportional adjustments in the percentage distributions reported in Table XI. Secondly, the NOAA Model is built around fishing regions rather than States, which affects its accuracy and resolution. According to their definition, Maine is part of the Northern inshore lobster sector. The estimated expenditure percentages are reported in Table XI.

[25] An input-output model represents the flows of economic activity within a region. The model captures what each sector must purchase from other sectors in order to produce goods or services.

Table XI - Expenditure percentages estimates for Northern Inshore lobstermen in New England (Steinback and Thunberg 2006:6).

Expenditure categories	*Percentage distribution*
Proprietary income (i.e. profit for the license holder)	32.21%
Employee compensation	14.00%
Bait	12.11%
Gear replacement	7.93%
Repair and maintenance: fishing gear	5.66%
Boat principal payment	5.43%
Fuel & lubricants	4.87%
Repair and maintenance: vessel & engine	4.73%
Vehicle	3.28%
Boat insurance	2.29%
Interest payment: vessel	1.81%
Miscellaneous trip supplies	1.72%
Moorage, dockage, haulout	1.03%
Shorefront property expenses	0.88%
Taxes	0.59%
Crew insurance	0.49%
Licenses, permits	0.29%
Short term loan principal payment	0.28%
Groceries	0.21%
Bank service charge	0.11%
Interest payment: short term loan	0.09%

For boat and gear maintenance, items that are not available in town can generally be found in a 20-mile radius from Bar Harbor and rarely need to be shipped from out of State. Similarly, fishermen buy their bait from the Bar Harbor Bait Company, located on Mount Desert Island, or from other local dealers – often other fishermen involved in bait fisheries. These businesses, along with others that are needed by fishermen to support and maintain their operations, are generally locally owned and have been an important component of Maine's economy for decades. Thus, while specific figures for indirect and induced economic effects of lobster fishing based in Bar Harbor are not available, the values are likely to be relatively high.

Moreover, virtually all fishermen are residents of the State of Maine and of the Town of Bar Harbor. They therefore pay taxes to both entities. As users of the pier, commercial fishermen are also expected to pay seasonal fees to cover parking, dinghy dockage and mooring. These are respectively $5, $35 and $45, for a total of $85 paid directly to the Town of Bar Harbor.

Lastly, the impact of Bar Harbor fishermen on local tourism should not be forgotten. As mentioned in the previous section, visitors stopping at the Town Pier have the opportunity to observe and engage with the local fleet and the dealers. This experience is highly sought after and often mentioned as a highlight of a trip to Maine (Daniel et al. 2008) – and is not one that is easily found elsewhere, since few waterfronts on the coast are public and easy to access. The value of the cultural experience enjoyed by tourists is very difficult to monetize, but it should not be overlooked when estimating the economic and financial connections between fishing

and tourism enterprises (Thompson 2012) – not to mention, of course, the very real economic benefits brought forward by the lobster cuisine market (Daniel et al. 2008).

The specific circumstance of tourists observing fishermen at the Pier is also an example of a sustainable approach to heritage tourism (Khakzad 2017). Even though fishermen might not be prioritized in terms of access to space and quality of facilities on the Town Pier, they are not asked to adapt their operations to accommodate tourist movement. In fact, tourists are encouraged to be respectful and keep at the appropriate distance when entering fishermen's workspace through signs affixed on the hoists.

Cruise ships

The cruise ship industry has grown to be a prominent element of Bar Harbor's working waterfront economy in the last 18 years (Figure 26). Whereas 2002 saw a total of 64 ships (Gabe et al. 2017), there were 197 scheduled visits for the 2020 season (Bar Harbor Harbormaster 2020)[26]. The rise in numbers and the fact that 32% of passengers are so-called "repeat visitors" (i.e. they have been on at least two cruise visits to Bar Harbor) are both indicators that the cruise ship industry is well-established in Bar Harbor (Gabe, Lynch, and McConnon 2006). Peak cruise ship season is in the early Fall (September – October), although the first visitations occur as early as April (Charlie Phippen, personal communication, October 21, 2019). This has effectively contributed to extending the tourist season in Bar Harbor by three months, with obvious consequences in terms of profits and employment for the town.

[26] As part of statewide safety guidelines to limit the spread of COVID-19, Governor Mills issued an order to only allow ships with 50 passengers or less to access Maine ports between May and September 2020 (Office of the Governor 2020).

Figure 26 A cruise ship anchored in Bar Harbor photographed from the F/V Julie B.

In 2016, 105 of the 117 scheduled cruise ships visited Bar Harbor[27], for a total of approximately 169,000 passengers (CruiseMapper 2019). Ships vary in size from mega-cruises of up to 4,000 passengers (Bar Harbor Harbormaster, 2020; by comparison, the 2010 Census reports a population of 5,235 for Bar Harbor, U.S. Census Bureau, 2010) to small luxury cruises with 100 – 200 people onboard. They tend to arrive in the morning (7 – 8 am) and leave in the late afternoon (5 – 7 pm) (Bar Harbor Harbormaster 2020). A few of the smaller ships sometimes stay in port overnight. About 70% of passenger disembark the ship (Gabe et al. 2017). Once on land, they can visit the town at their leisure or join cruise ship-sponsored bus tours or other shore excursions.

The Bar Harbor Harbormaster office oversees day-to-day management of cruise ship visitations; long-term planning is done in conjunction with the Town, under advice of the Cruise Ship Committee, a group of elected Bar Harbor residents that discuss cruise ship related issues. Passenger caps are in place to avoid overcrowding and excessive pressure on the Town facilities. During the summer, 3,500 cruise ship visitors are allowed in port; the number rises to 5,500 in the "shoulder season" (May – June and September – October), which occurs outside of tourism peak season (Charles Phippen, personal communication, October 21, 2019).

The rise in cruise ship visitations has been somewhat polarizing for Bar Harbor residents, as summarized in Seelye's article for the New York Times (2017), as well as residents of other towns overlooking Frenchman Bay. Some groups question the impact of cruise ships on water quality in Frenchman Bay, a matter that has been resolved as a non-issue by repeated seasonal studies (Disney, Charabati, and Farrell 2014; Disney and Farrell 2015; Leeper 2012; The MDI Water Quality Coalition 2004; Wolf et al. 2018). Others are concerned about the ship's potential effect on air quality. The significant increase in traffic congestion on cruise ship days

[27] Adverse weather is the leading reason for cancellations (Gabe et al. 2017).

has also been cause of worry for local infrastructure. Some local families worry about Bar Harbor primarily catering to tourists instead of residents (Seelye 2017). The worry is rooted as much in material reasons (e.g., most stores selling tourist goods and only operating in the summer season) as in value-based ones (e.g., losing the character and fabric of a year-round community as residents are pushed out of the town). Others, however, perceive the higher number of visitors as a benefit to local businesses, while a third group struggles between wanting to optimize the economic benefits of cruise ship tourism and maintaining the Town Pier accessible by a variety of users (Seelye 2017).

The economic contribution of the extra 169,000 people visiting Bar Harbor is certainly substantial. The Town of Bar Harbor, Maine Port Authority and Cruise Maine USA co-commissioned an examination of the economic impact of cruise ship visitations in 2016 (Gabe et al. 2017). The report was based on passenger expenditure surveys, thus excluding other sources of economic contributions such as "[…] spending of crew and—among other things—the purchases made by the ships (i.e., cruise lines), fees for services by local ship agents, dockage fees for the tenders, payments to local ship pilots, payments for ship maintenance and repairs, and payments for services provided by government agencies", as well as fees paid for cruise-ship sponsored and other locally run tours (Gabe et al. 2017). However, passenger service fees collected by the Town amounted to $344,325 in 2016 (Bar Harbor Cruise Ship Committee 2018).

The report estimated the contribution of passenger expenses to the Bar Harbor economy be $20.2 million. The result was obtained by applying an IMPLAN (Impact Analysis for Planning) model for multiplier effects to the passenger expenditure data (Gabe et al. 2017). A breakdown of the results, including jobs created, is reported in Table XII.

Table XII - Economic impact of the cruise ship industry on the Town of Bar Harbor (Gabe et al. 2017).

Based on expenditure per passenger survey data where n *of passengers = 2,167*

	Direct impact	**Multiplier effects**	**Total impact**
Spending	$14,963,520	$5,280,046	$20,243,566
Employment	329	50	379
Labor income	$3,813,346	$1,571,449	$5,384,795
Total (spending and passenger fees)		$20,587,891	

These results can be contextualized within the overall contribution of the cruise ship industry to the State of Maine by looking at a 2019 study conducted by the consulting agency dpa and commissioned by the Maine Office of Tourism and CruiseMaine. (2019). Although the two studies are not completely consistent in their methods, their approaches are similar enough to allow for a conservative and cautious comparison.

Firstly, the dpa's sample size of passengers in Bar Harbor (n = 1,248) was significantly smaller than that of Gabe et al.; moreover, the dpa included crew spending and cruise ship sponsored tours in the calculations, which were not considered for the Bar Harbor study. However, the dpa adjusted the value for cruise ship sponsored tours to reflect the approximate amount (50%) that stays in Maine's economy (dpa 2019:25). To estimate the total economic impact, the two studies adopted similar calculations. The average spending for each disembarked passenger

was derived from survey results; it was then multiplied by the number of disembarked passengers to get the value of direct spending. Gabe et al. used observed counts of passengers getting off the ship and survey information relative to time of disembarkment (Gabe et al. 2017); the dpa assumed a 94% disembarkation rate as measured by CruiseMaine (dpa 2019). Both studies used IMPLAN models to calculate multiplier effects; while Gabe et al. report the sources used to build the model, the dpa refers to an appendix that could not be located. Lastly, the dpa administered surveys in 2018; for its results to be compared to the Bar Harbor study, they need to be converted to the 2016 real dollar value. The results reported here are in 2016 real dollar value as calculated by the Areppim online real dollar value converter (Areppim 2008).

Keeping these limitations in mind, the dpa results generally support Gabe et al.'s findings that the economic contribution of cruise ships to Bar Harbor is significant. The dpa found Bar Harbor to be the busiest cruise ship port in Maine, followed by Portland and Rockland (Table XIII). The total estimated contribution of passengers and crew for the State was $27.6 million in direct spending; this is adjusted to $32 million with multiplier effects. The study also calculated that the industry created 398 full-time equivalent jobs in the State of Maine (dpa 2019), compared to 329 full- and part-time jobs in Bar Harbor alone (Gabe et al. 2017).

Table XIII - Maine ports by number of cruise ship visitors (dpa 2019).

Port	*Berth capacity (higher than actual occupancy)*
Bar Harbor	387,711
Portland	253,190
Rockland	7,219
*All others (*n = *6)*	17,687
Total	665,807

Based on dpa figures, passengers visiting Bar Harbor represent 58.2% of total cruise ship visitors to Maine; assuming equal spending habits and average prices in all ports, the same percentage should apply to the total economic value, meaning that the cruise ship industry in Bar Harbor contributed approximately $18.6 million and 231 jobs to the town's economy. The dpa study found the contribution of the industry to be smaller than Gabe et al.'s report, even though the first considered more spending categories than the latter ((***Table XIV***).

Table XIV Comparative summary of the economic contribution of cruise ships to the Bar Harbor economy according to Gabe et al. (2016) and dpa (2019). Results from the dpa study are adjusted to 2016 dollar value.

	Gabe et al. (2016)	*dpa (2019)*
Total economic impact	$20.2 million (only includes passenger spending)	$18.6 million (also includes crew spending and cruise ship sponsored tours)
Jobs created	379	231

Because the IMPLAN model used by the dpa study is unavailable, it is difficult to reconcile the $1.6 million difference in results between the two reports and understand how Gabe et al.'s estimated contribution is higher than the dpa's result, even though the first study considered

fewer spending categories. Although both studies found the cruise ship industry to offer a significant contribution to the Bar Harbor economy, it remains an uncertain estimate that warrants further research and a more consistent methodology.

Each waterfront community is unique in its socio-economic characteristics; a user conflict situation such as that of Bar Harbor might call for different solutions in different towns. Having access to locally relevant, long-term and consistent data would be beneficial for the municipality's governance and would ensure a more informed approach to the matter. The Town of Bar Harbor, for example, would likely benefit from having access to the results of a multi-year comparative study that assesses the economic impact of commercial fishing and the cruise ship industry with a consistent methodology for both industries.

Prioritizing the local economy

A simplistic analysis would point towards the cruise ship industry as the more valuable element of Bar Harbor's working waterfront economy (***Table XV***), since it generates higher revenues than commercial fishing. Local policymakers could embrace this conclusion and prioritize resource allocation for cruise ship visitations, with the goal of further increasing the Town's revenue by enlarging its capacity for visitors. This could eventually lead to fishermen being pushed out of the Town Pier, an outcome in line with the general trend along the coast and with traditional neoclassical economic principles, which downplay social, cultural and political factors in favor of quantitative metrics centered on efficiency.

Table XV Summary of the economic contribution of commercial fishing and cruise ship industries in Bar Harbor, ME.

	Commercial fishing	*Cruise ship industry*	
Source	DMR, 2020	Gabe et al. 2017	dpa, 2019
Direct impact ($)	5,819,351	18,776,866	N.A
Total impact ($)	N/A	20,587,891	18,600,000 (estimated

However, it should be remarked that $5.8 million is a gross underestimation of commercial fishing's contribution to the Bar Harbor economy since it does not include its indirect and induced effects. The results reported in Table XV are based on incomplete data; any conclusion drawn directly from them would be inaccurate. This shortcoming once again highlights the necessity to collect more comprehensive information on the working waterfront economy.

Moreover, a pure focus on monetary gain is not the only possible economic framework in which to read the data and assess the significance of each industry. There are a suite of economic concepts and ideas that may not be as commonly applied as traditional neoclassical principles, but that emphasize the role of the economy as a tool to achieve social wellbeing beyond profit. These concepts refer to business clusters and the theory of eco-localism, which embed social metrics into their economic models.

The underlying assumptions of business clusters and eco-localism are the following: 1) revenue by itself is not a sufficient indicator of an industry's true contribution to a place's economy and overall well-being and 2) any business or sector should always be considered as a part of a wider socio-economic network and not as a self-contained entity. The idea of business clusters emphasizes the importance of this inter-business connectivity, which Porter considers as vital

as a company's internal structure to its economic success (1998). In their simplest definition, clusters are "geographic concentrations of interconnected companies and institutions in a particular field" (Porter 1998:3). Commercial fishing in Maine is a perfect example of such a cluster (Lauer 2001): fishing cannot exist by itself; it requires a suite of related businesses that include, among others, seafood dealers, hardware stores, banks and legal firms. In Maine, the importance of the commercial fishing industry is such that numerous ancillary businesses have flourished – most of which are locally owned and embedded in the community. This captures the social value of clusters, which is emphasized by Sugden et al. and recognized as an element needed for the very success of a cluster itself (2006:69). Obviously, any industry benefits from and contributes to the success of related businesses, including tourism and the cruise ship sector. The fundamental difference is that the cruise ship sector is not locally rooted in coastal Maine, which causes these inter-business links to be weaker and less impactful on the local community.

Many residents of Bar Harbor translate this concept to the idea of year-round vs. seasonal businesses, the first being considered more beneficial to the island community at large. A strong example in this sense is the origin of the workforce for each sector. Because commercial fishing is a year-round industry, it creates a wide variety of employment opportunities for those that reside on Mount Desert Island (and coastal Maine in general) all year. This includes both jobs in the fishing industry itself and in the supporting businesses that form the cluster. The tourism and cruise ship industries, on the other hand, are concentrated in the summer and early fall months, and do not always represent a viable option for residents that need a steady income through the year. Much of the workforce that is employed in tourism is seasonal and often not from Maine – and is therefore perceived as less embedded and, in some cases, detrimental to the local community wellbeing. This perception of seasonal workforce as, often disregarded as an uninformed fear of change, is actually reflected in cluster theory and identified as an essential element for local economic growth (Curtis 2003).

Curtis adds to the importance of locally rooted businesses through an eco-localism lens. Eco-localism is an economic theory that focuses on the "economy of place" and promotes economic practices that support achievement of an ecological balance (Curtis 2003). Curtis (2003:85) claims that "place matters" for an economy to be sustainable and successful, both socially and ecologically. "Placeless" enterprises are more likely to drain local financial and natural resources and abandon an area once it ceases to be profitable; by contrast, an industry inserted in an established local cluster has more potential to be resilient and adaptable to changes, and therefore more likely to safeguard the community's economy (Curtis 2003). In an eco-localism framework, the economy should be subordinate to the local community and that values such as "health of the community, stewardship of nature, affection for and commitment to place […]" (Curtis 2003:86) lead to a better quality of life than traditional economic variables such as income or levels of consumption. These ideas resonate with van Putten et al.'s observation (2018) that harnessing the emotional bond that people have with specific places successfully encourages attitudes, behaviors and activities that build a long-term sustainability between communities and their surrounding environment. Their study specifically mentions the importance of a sense of place in common-pool resources settings, such as many marine socio-ecological systems (van Putten et al. 2018) and the Maine lobster fishery (Acheson 2003). Although these ideas may be presented as novel and unconventional, they are in fact surprisingly in line with values commonly associated with fishing communities, such as "[…]

independence, interdependence, security and self-reliance" (Curtis 2003:86), and would therefore be appropriately applied to a small-scale fishing economy such as Maine's, which is described by Hanna (1998:192--193) in these terms: "[the] isolation [of many Maine coastal communities] fosters independence and an ethic of self-sufficiency. At the same time, isolation creates social and economic interdependencies within the community".

Both business clusters and eco-localism stress the importance of places for the economic success of an industry and of the community, while also noting that social wellbeing should be considered as equally important. The following section focuses on what the Town Pier represents socially, culturally and emotionally for the people of Bar Harbor.

The social and cultural importance of the Bar Harbor waterfront

To capture the role of the Town Pier in the lives of Bar Harbor residents, I conducted 8 interviews with local fishermen, a lobster dealer, a member of the Harbor Committee and a person involved in harbor management and maintenance. I also included an interview with a Bar Harbor fisherman conducted by the Mount Desert Island High School Eastern Maine Skippers students in 2018. Interviews were confidential, and as such I have redacted the participants' names, specified a general age range and tried to characterize their occupation and relationship with the Pier without revealing their identity. I made minor edits to their quotes for the sake of clarity.

The Town Pier has provided access to the ocean to Bar Harbor residents since the late 1800s. As it changed through the decades to continue to satisfy the needs of the ever-changing fleet, it always remained a place where the fishing community could come together. The community dimension of the Town Pier is reflected in the emotional attachment that many residents feel towards it, as well as their appreciation for what it represents: the hard work of Bar Harbor's fishermen through the decades and their contribution to the socio-economic well-being of Bar Harbor. This translates to a desire to keep the Town Pier as a community space and a thriving working waterfront, which includes attending to the needs of fishermen before those of other, less frequent users. As one member of the Harbor Committee noted:

> *The only people who complained about [the fishermen presence at the Town Pier] in a sense, were people in that CLIA report[28]. They're not from here. People really like the fishermen. As a general sense, what I hear from people, locals, that's their place. That's their pier, and they should be able to have good access and parking, and things like that. I don't really feel, from anyone I talk to, resentment against the fishermen. I don't pick that up from locals, at all. And the visitors, also, they're like, "Oh, the fishermen!". They like it, they look around at the boats, and the lobster traps and yeah, it's something that people like.*
>
> *Harbor Committee member, in their 60s*

Fishermen, too, remain proud of their heritage and their role in the social fabric of Bar Harbor, even if some feel unwelcome in a town that is increasingly dedicating the waterfront to other businesses. The emotional bond with the waterfront was clear in many of the interviews

[28] The Cruise Line Industry Association (CLIA) commissioned a report at the request of the Town of Bar Harbor to explore alternative traffic management systems to support cruise ship passenger operations at the Town Pier (Operations & Maritime LLC 2019).

conducted, which truly highlighted the Town Pier as the focal place of the fishing community. As one fisherman stated:

> *For me it started when we were groundfishing. That was really when my connection to the Bar Harbor Town Pier started. We'd bring the boats in, we'd tie up and as the tide would come and go, the boats would rise and fall and we'd just be on them working, mending our nets, or just hanging out. It was a really cool thing. So many people used to come down, I met a lot of tourists that would come every year, and every summer they'd come down and wait for us. They'd see the boat and they'd come down and, "Hey, how was your winter?". I'd catch up with them. I just always really enjoyed being around that dock, you have that camaraderie that I talked about with the other fishermen. You know, they're coming and going, you get the dirt on somebody, or the scoop on the fish, or perhaps you overhear a hot tip. Whatever it is, it's more than just, for me, a place that I work [in]. I don't know how many afternoons or nights or windy mornings, if we didn't fish I would sit down there, especially when I first started lobstering, it was probably 10 or 12 of us, in one harbor, all from the same high school that graduated around the same time. And so anytime that we didn't fish, that's where we would group up. So it was really special, it was a special time to have all those people all doing the same thing together […] We have a pride and a sense of being of where we are and where we wanna be.*
>
> *Fisherman, in their 30s*

Although groundfishing in Bar Harbor declined in the early 2000s, the participant began working as a fisherman at an early age and was therefore able to experience the industry in its last years. The friendly atmosphere and the sense of community among fishermen was even recognized by outsiders, such as this employee of one of the local lobster dealers who buy lobsters at the Town Pier:

> *In Bar Harbor […] there's police officers standing right there, watching the bus line [at the Town Pier]. There's a harbormaster right there. And there's every reason in the world [for fishermen] to behave yourself. And I don't know if that has anything to do with it, or if [the fishermen] really do respect and care about each other as much as I would think. From what I saw, they do. They really do care about each other. One of my fishermen, lent his boat to one of the fishermen [who sells to the other dealer] because his boat had a leaky packing nut in the steering. And that's unbelievable camaraderie. I've never seen anything like it. You certainly won't see it [in another harbor where the participant had worked].*
>
> *Lobster dealer, in their 30s*

Many of the participants interviewed recalled a strong sense of camaraderie, a welcoming atmosphere and a cathartic energy connected to the Town Pier. It was mentioned as a place of work, play, party, leisure and habits. People recalled time spent at the Pier with their loved ones or with other regular visitors, whether it was locals, summer residents or tourists. All these testimonies point to the strong sense of place that Bar Harbor fishermen and residents have in

relation to the Town Pier, which should be protected and encouraged just as much as economic growth.

The Town Pier as a working waterfront

In the framework of promoting social wellbeing and local economies, it is essential to maintain the Town Pier as a community space and a working waterfront by supporting its commercial fishing fleet, both materially and socially. The interviews highlighted some areas in which fishermen felt support from the town would have benefited them.

Infrastructure and facilities

From a material point of view, Bar Harbor fishermen interviewed were generally content with the state of the Town Pier, although some suggestions to improve its facilities were put forward.

The lack of dedicated parking space for fishermen was mentioned by all participants as an obstacle to the smooth running of operations. This is in line with Coombs' observation that parking is considered "a source of conflict and potential barrier" (2020:10) by fishermen all along the coast, corroborating the Island Institute's classification of adequate parking as a key criteria for "prime working waterfront" (2007). The comprehensive plan published by the Town of Bar Harbor in 2007 explicitly stated the following as a strategy: "Continue setting aside, and consider increasing, parking on the Town Pier for commercial fishermen." (Town of Bar Harbor 2007:III.A-44), but the goal has not been reached yet. Parking has become a town-wide issue in Bar Harbor, especially during the summer, but reserving some space for fishermen on the Pier could significantly improve their working conditions by guaranteeing access to their boats throughout the day:

> *[…] if it's a day that you're not fishing and you're just doing maintenance on your boat, and you need to run up the hardware store, or you need to run back to your shop and grab something, the second you pull out of that spot, someone pulls in and now you haven't got a place to park. So I guess if they wanted to do that, it would be neat to pick a section and just go whoop, fishermen parking only. And that's that.*
>
> *Fisherman, in their 40s*

.

Ongoing maintenance of the hoists was another point raised by fishermen. The two hoists are often pushed to their load limit (500 and 200 lbs) as fishermen use them to load heavy barrels of bait on boats. Maintenance of the hoists and other Pier infrastructure, which are Town property, is paid for through the Harbor Department yearly budget, which is approved by the Town meeting voters. The Harbormaster oversees the hiring of marine contractors; any maintenance job below $25,000 can be assigned at his discretion, while more costly operations have to be put out to bid. A person involved in harbor maintenance noted:

> *[The hoists] are very costly mechanical devices that are not well cared for by the users, but they're the ones that complain the most when something goes wrong with them. I can't police abuse, unless I observe it. And it's a lot of abuse of those mechanical devices that goes on unseen. They're overloaded, the controls are dropped on the ground, ripped off because they were hung on the back of a truck, and the truck drives off and the control gets yanked out of the post. That type of thing.*
>
> *Harbor maintenance person, age unknown*

Fishermen and dealers, who use the hoists to load full lobster crates in their trucks, are generally appreciative of the continuous effort to maintain the hoists in working conditions, but they would like to see heavier-duty machines installed:

> *For the most part, the [hoists] are ill-equipped. They're not quite big enough. There's plenty of options for that, but I recognize that there isn't a surplus of money available for fixing this sort of things, or making them better for the commercial fishermen. They're not necessarily designed for the commercial fishermen per se. […] Ultimately, the best way to improve the pier would be to upgrade the [hoists] to something overbuilt for what they're using it for. Unfortunately, this is gonna require continuous maintenance, like they're already dealing with. [The maintenance contractors] and [the Harbormaster] do a wonderful job networking with each other to make sure that the [fishermen] at least stay working. They may not have the authority or the capacity to change what's going on down there, but as far as I'm concerned, they did an absolutely fabulous job keeping up with the maintenance on those things. They kept them working all summer long. And we pulled a lot of lobsters and a lot of traps over that pier, all year long.*
>
> *Lobster dealer, in their 30s*

Better maintenance of the structural elements of the Pier, such as floats and pilons, was also identified as necessary pending budget restrictions. Lastly, the launching ramp was mentioned as inadequate for safe launching, hauling out and docking of boats by a few participants:

> *The ramp just stops. You can't even back a boat in half the time. There's no cleat or anything to tie to on that boat ramp, there's not even fenders, it's all rock walls. If you weren't a fisherman, and we showed you the adversities that we have to go through just to get to work every day, people would really take a step back and say, "Wow, it's more than you have to deal with.".*
>
> *Fisherman, in their 30s*

Some fishermen drew comparisons between the Town Pier and other working waterfronts on Mount Desert Island, most of which offer better facilities and more services for commercial fishermen. However, they also recognized that these waterfronts are privately owned and therefore better positioned to cater to commercial fishermen's specific and sometimes expensive needs. These benefits generally come with higher usage fees, too, which many participants preferred to forgo in favor of the low overhead cost of working out of the publicly owned Town Pier.

Regardless of their satisfaction with the Pier conditions, participants unanimously agreed that the strained relationship with cruise ships was the most serious and urgent problem to solve, pointing to user conflict as the most pressing threat to a thriving Bar Harbor working waterfront.

Cruise ships and fishermen

The most common complaint was the congestion of the Pier as large sections of it were reserved for tour buses and cruise ship passenger operations (Figure 27), which prevented easy movement on and off the Pier for fishermen and residents alike:

It's frustrating, because they just come in and take over, and the fishermen don't really have access. The pier is so congested, they take up so much room loading people that everybody loses parking and we can't get our trap trailers down there. They'll let us through, but it's just a hassle. It's closed off during the day. It's a public pier. It makes no sense to me. And if you can get through, you have to go up and around this little square that's got cars parked on either side of the street, people everywhere, and you're trying to move a giant trap trailer with 100 traps on it, down through traffic and ... people just don't realize what it takes to catch their seafood. And I think if they did, they would have a lot more respect for us.

Fisherman, in their 30s

[…] they've just taken the whole Pier, Main Street and West Street over. And I'm not happy with that as a citizen of Bar Harbor. Not necessarily how it affects me doing my work. I think everybody should be fighting that, not just the fishermen.

Fisherman, in their 60s

Figure 27 Cruise ship buses blocking the West Street entrance to the Town Pier in October 2019.

Issues with crowding extended to the docking area, since the Pier's Fishermen's Float is directly opposite the private dock used by cruise ship tenders. Tender operators often have little boat-handling experience and sometimes cause damage to moorings or lobster cars, cut off lobster gear, hit fishing vessels or create excessive wake in the docking area due to inappropriate boat handling techniques. Aside from the economic losses caused by the damage inflicted, cruise ship tenders generally create worse and more difficult working conditions for fishermen, as explained by this fisherman:

We can't even change the oil on our boats when there's a cruise ship day, because the shuttle boats running back and forth, they roll you right upside

down if they don't run into you. I've been hit three times tied to the dock in there by shuttle boats. I've watched several other boats be hit. The police boat gets hit daily. The area's not big enough, it's not built for that.

Fisherman, in their 40s

This should not be interpreted as a generally conflicting relationship between tourists and fishermen. Fishermen and dealers do not mind sharing the space around the hoists with visitors who are interested in seeing dockside operations such as selling lobsters or loading traps. Although this may increase crowding on the pier and sometimes slow down work, the significance of this opportunity is crucial and well-understood by fishermen and dealers alike, who appreciate having the chance of educating tourists about the reality of seafood production as captured in these quotes:

I have so many people that have put their heads down over the dock to see what we're doing, and all we're doing is hoisting out bait barrels out […]and I always tell my crew to don't be mouthy, embrace it, they're curious, they like you, they want to know about us.

Fisherman, in their 40s

It's nice to get people from other states and other countries come up and talk to you about what you're doing. You don't get that on a private dock. But the people are really friendly and it's fun to talk to them and explain to them what we're doing and how we're trying to protect our industry, and ultimately what they can do to support it.

Lobster dealer, in their 30s

The material conflicts created by the overwhelming presence of cruise ships – such as collisions and congestion on the Town Pier – are symptomatic of the Town of Bar Harbor's waning social support for fishermen and the fishing industry. Fishermen are concerned with the Town's uneven attitude towards fishing and tourism; many of them feel that Town officials are discounting Bar Harbor's heritage and identity as a fishing community, unlike many locals who still embrace it, and are not dedicating adequate resources to the fishing fleet. A fisherman points out the difference between Town government and town residents and expresses his perception of the Town Council's view of the fishermen:

When I say "the Town" I'm not talking about the locals of the town either, I'm talking about Town government. That's what I'm talking about. Town Council, that sort of stuff. I feel like we don't count for much down there. And not that we should be put on a pedestal, or treated differently, but I mean, you're in a coastal Maine community, which is halfway a fishing community.

Fisherman, in their 40s

The participant thinks that Bar Harbor's social and cultural dependency on fishing is not being adequately recognized by the Town governance, which is especially troublesome since public support is key to the continued existence of working waterfronts and access for commercial fishermen (Snyder 2011). Although fishermen are not being pushed out yet, they are forced to operate in a very restricted space with little prospects of expansion. They are restricted in their

ability to develop their businesses or enlarge the fleet and, should conditions on the Town Pier continue to worsen, they could eventually be left with nowhere to go. This participant expresses disbelief at the fact that fishermen are struggling to find room to work in a coastal Maine town:

> *If we got nowhere to go, we can't be fishing. We're tied to this one spot, and if something happens to that, then that's it. We can't even tie up skiffs sometimes, because there's not enough room. We can't even put another skiff float in, in Bar Harbor, Maine? You know, you tell that to somebody, "Oh, they told me I can't have a boat because there's no place to tie up my skiff.". That' s the most ludicrous thing I've ever heard. How many millions and millions of dollars are coming in, and you can't spend whatever on a simple float? Just simple, basic things that we need to get to where we're going?*
>
> *Fisherman, in their 30s*

The gradual exclusion of fishermen from the waterfront not unique to Bar Harbor and is arguably found in any coastal community in Maine where working waterfronts are being lost in favor of private homes, recreational facilities or other water-based industries such as cruise ships. A few fishermen felt that this attitude shift had been ongoing for a few decades as tourism became increasingly prominent, and the gradual nature of the process was of particular concern to them. Because the loss of working waterfront in Bar Harbor has been diluted over time, it has been less apparent to the public and more difficult to resist.

> *We've already lost so much that all we can really do is salvage what little bit is left. It's impossible to save the working waterfront [for commercial fishing] with how much it's worth now [for other uses] And it's sad, it's inevitable. Even if you get a generation with somebody that says, "I'm gonna hang on to this wharf", maybe the next generation in 2030 is gonna sell. That's how it's been. We lose something all the time, but it happens so gradually that people don't [realize]. You know, just since I started fishing how things have changed around the wharf and things that we had access to. We still had an ice plant, we still could beach out at Stewman's, you used to be able to pull right in there. That was just the place to beach out your boat, you didn't have to ask anybody. When I first came around [working as a fisherman, about 20 years ago], we had Young's Wharf. They were still buying lobsters right in Bar Harbor. And all that's gone now.*
>
> *Fisherman, in their 30s*

Fishermen noted feeling unwelcome and overlooked in what is not only their traditional place of work, but also the material expression of their identity. Many fishermen expressed feelings of anger, frustration, resignation and sadness, which arose both out of the perceived attitude from the Town and its materialization in the physical state of the Town Pier:

> *I think for what the fishermen bring to the community, not only in terms of being local, being able to live local, but keeping their kids in school, they really don't care about us. Especially in Bar Harbor, we have a really piss poor set up. It's the best way to put it. The dock's a mess, just for the aesthetic part of it, all those cruise ships coming here, that pier is really pathetic. I know I said I have an emotional connection to it, I do, to the place, but it's really*

sad that half the time the pilons are always broken, you [can't] even tie the boat up.

Fisherman, in their 30s

[Fishing brings] morals, moral value [to Bar Harbor], you know, the fact that fishing is so heritage based. I believe in evolution and I believe in change, but I also believe that not everything always has to change, you know? When we take the cruise-ship issue that we have in Bar Harbor, that is so massive and taking precedence over all of us, now you start to lose the moral value of a small coastal community. What its roots are, what it's supposed to be, what it should be.

Fisherman, in their 40s

The impact of such an emotional burden should not be underestimated, especially in the context of a social group whose mental health is already at risk due to the trying nature of their job and the numerous other stressors they face (Coombs 2020; see Chapter 1 for some of the obstacles currently faced by the Maine's fishing community). The consequences of losing their livelihood are particularly intense for fishermen, given the strong ties between their job and their personal identity (Coombs 2020), as testified by the lingering aftermath of the collapse of the New England groundfish fishery. Scyphers et al. (2019) reported "severe psychological distress […] and social disruption in fishing communities" (p. 22912) affected by the closure of the fishery. The patterns of distress were still recorded in up to 35% of the study's population five years after the collapse was declared. It is reasonable to assume that similar social disruption could arise from severe working waterfront loss (or any other major event that would significantly affect fishing communities).

Loss of identity could also occur as a direct result of unsustainable tourist practices, as emphasized by Khakzad (2017); this is very relevant in the case of Bar Harbor since commercial fishing already is an extremely popular tourist attraction. It is difficult to find a balance between the positive outcomes of exposing visitors to commercial fishing (heightened awareness of the reality of seafood production, stronger support for the industry, enhanced economic advantages as delineated by Daniel et al., 2008) and the potential negative consequences of commodifying a way of life. This complex equilibrium is understood differently by different fishermen. Some think tourism will offer fishing a level of protection, given the high interest of visitors in the industry:

He [local businessman involved in tourism] was supportive of the fishermen, he said "People come down here to see you". So I don't foresee they're gonna get rid of us. Because we are a tourist attraction.

Fisherman, in their 60s

Others, however, were worried that the Town of Bar Harbor already saw fishing first and foremost as a tourism resource:

I hate to say it, I mean there's thirty boats in that harbor, but it doesn't feel like a fishing harbor anymore. It feels like a tourist attraction and we're just … there.

Fisherman, in their 40s

Some think that this shift in attitude towards the town's fishing fleet has had an impact on the significance of the Town Pier for the wider Bar Harbor community. As it increasingly became a tourist hub, locals were gradually displaced from the Town Pier and lost some of their connection to it, as mentioned in the first quote. The high influx of cruise ship visitors was identified as particularly damaging in this sense in the second quote.

> *I think a lot of townspeople, that's not just the opinion of a fisherman either, think that with cruise ships coming like they do, it's not the Town Pier anymore. It's just not. Bar Harbor's grown, everything changes, change is part of life, whatever. But we are still a small coastal community and your Town Pier is your Town Pier, you know? There's a lot of older folks that just like to go sit on the Pier, throw some bread to the seagulls. They can't do that. It's that simple. So there really does need to be some change there.*
>
> *Fisherman, in their 40s*

> *Things have gotten so hectic over the years, compared to what they used to be. They used to be quite laid back, but you don't even have that anymore, 'cause in the summertime it's so damn busy down there, partly because of the cruise ships, well, mainly because of the cruise ships, that a lot of people, they still go down around it every day, check things out, but they don't spend the time they used to.*
>
> *Fisherman, in their 60s*

Nonetheless, fishermen do not appear to be resigned to what they perceive as an adverse attitude from the Town yet. They are proudly aware of what their industry has done for the town beyond its economic contribution and still fiercely attached to their identity. These characteristics have been identified before as key in developing high levels of resilience among the fishing industry (Johnson et al. 2014) and are likely to be a crucial asset in the fight to preserve working waterfronts.

> *If you take that away, just because something is making more money you're gonna lose the town, the fiber and the fabric of it, and what they're coming here to see. There's no amount of money that you can really place on the culture that fishing brings to the community.*
>
> *Fisherman, in their 30s*

As this participant implies, the stakes in the preservation of working waterfronts are invaluable elements of a community, the nurturing of which should be prioritized by policymakers and town officials. However, what this report aimed to show was that preserving working waterfronts and supporting commercial fishing would also foster deeply rooted economic growth.

The future of the Town Pier

As the Town of Bar Harbor continues to manage and deliberate over the use and state of the Town Pier, I hope that the material presented in this chapter will offer a theoretical framework that highlights the importance of commercial fishing for the town of Bar Harbor and data on the benefits for the local economy and the community's wellbeing. Should more comprehensive data become available, it could be integrated in the analysis and strengthen the argument.

Although the study was limited by the lack of data on the economic value of commercial fishing and working waterfronts in Bar Harbor and, more broadly, in Maine, the available information framed through a business cluster and eco-localism lens suggests that upholding support to the commercial fishing industry, as opposed to waning it in favor of the cruise ship sector, would be beneficial towards fostering local economic growth. Examples include the potential for new opportunities in Maine's commercial fishing cluster, such as expanding the seafood processing capability to retain the value added chain in the State (Canfield 2013), the importance of the "fishing village" experience for tourism satisfaction and spending (Daniel et al. 2008) and the consistent, year-round income offered by commercial fishing jobs.

These conclusions are reinforced by the evident emotional connection held by Bar Harbor fishermen towards the Town Pier, which fosters community bonding, a sense of place and environmental stewardship. These positive attitudes are likely to decline as feelings of displacement take over, which again suggests the importance of preserving and supporting the role of the Town Pier as Bar Harbor's working waterfronts.

It is important to stress that this report does not call for a shutdown or a substantial downscaling of the cruise ship industry in Bar Harbor. It simply argues for a more balanced and open-minded allocation of resources based on factors that are not simply quantitative, but also social and cultural. Examples of such an approach could include the following:

1) Ensuring Town Pier facilities are adequate for and prioritize the needs of the local commercial fishing fleet by addressing the issues reported in this chapter, such as:
    a. Instituting fishermen's parking spots;
    b. Strengthening the hoists;
    c. Substituting pilons at the head of the pier; and
    d. Finding an alternative solution to the current boat ramp.
2) Considering solutions to minimize, mitigate or reimburse the damage caused by cruise ships and tenders;
3) Funding and conducting robust economic assessment studies of the working waterfront economy that consider more holistic economic theories;
4) Improving communication with local fishermen about the use and development of the Town Pier.

These recommendations should be framed in the exciting and unique opportunity that has recently arisen for the Town of Bar Harbor. In February 2019, the Town purchased a six-acre waterfront property known as "the Ferry Terminal", located roughly 1.5 miles from the Town Pier. From 1997 to 2009, the property was used by the private company Bay Ferries to connect Bar Harbor to Yarmouth, Nova Scotia and it was set up to welcome and process large numbers of visitors headed downtown or to Acadia National Park. In the current plan, Bay Ferries will downsize its operation, leaving room for other waterfront activities to take place (Pritchard

2019). In this sense, the Town has been considering the possibility of moving cruise ship tendering operations from the Town Pier to the Ferry Terminal. One of the reasons behind the proposal is to alleviate overcrowding at the Town Pier. The option is being explored by Bar Harbor's Harbor and Cruise Ship Committees, although at the time of writing the process had been put on hold due to the COVID-19 pandemic. Before strict public health measures were put in place, the Harbor Committee had been working on renovation proposals as well as on the possibility of dedicating part of the property to other working waterfront uses such as commercial fishing, which was widely supported by residents in the initial planning stages. The Harbor Committee organized in subcommittees to better tackle the different elements of the large renovation project; one, termed Working Waterfront Subcommittee, is explicitly dedicated to exploring how the Ferry Terminal could serve the commercial fishing fleet. A Committee member remarked:

> *The reason that the Working Waterfront [Subcommittee] was added was specifically to acknowledge and to investigate what the fishermen want.*
>
> *Harbor Committee member, in their 60s*

The Ferry Terminal represents an exception in the State-wide trend of loss of publicly accessible waterfront properties, and it offers Bar Harbor an opportunity to reverse its historical attitude towards preserving the working waterfront. Four years before the Town bought the property, Johnson et al. called Bar Harbor "[…] an example for other island fishing communities in terms of *what not to do*. The town once had an active waterfront with a large town wharf, but this property was sold and turned into Stewman's Lobster Pound – a restaurant. Today, much of the waterfront property in Bar Harbor is devoted to restaurants or hotels." (2015, p. 48, emphasis added). The Town now has the chance to become an example of *what to do* and how to carefully share resources between conflicting uses. The Harbor Committee in particular is genuinely dedicated to prioritizing social wellbeing of the local community over simple economic revenue; hopefully, some of the concepts and data presented in this chapter will support them in the decision-making process, and the commercial fishing fleet of Bar Harbor will not suffer the fate of many others along the coast.

However, the enthusiasm for the Ferry Terminal opportunity should be balanced by the awareness that any plan for its usage will inevitably have some drawbacks, some of which are being discussed by the Harbor Committee. For example, if cruise ship operations were to be moved to the Ferry Terminal, many of the restaurants and gift shops opposite the Town Pier would likely suffer noticeable losses as they will no longer be immediately visible to cruise ship passengers as they disembark. Moreover, there are concerns about management of tour bus traffic at the Ferry Terminal. The property is directly accessed from the busy Route 3, one of the main arteries of Mount Desert Island. Buses driving into and out of the Ferry Terminal would likely interfere or be impeded by the heavy summer traffic flow, and it currently would be complicated to install a traffic management system such as traffic lights because of the road configuration.

Nonetheless, these challenges should not prevent the Town of Bar Harbor from collaborating with all waterfront users – which include fishermen, aquaculturists, recreational boaters, tour operators, cruise ship companies and town residents – to explore the best possible solution that

would enhance Bar Harbor’s economic and social wellbeing and embrace its heritage as a coastal community.

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Chapter 4: Conclusions

The study findings, although varied in nature, all connect back to the importance of a sense of place and identity in Maine coastal communities.

The evolving territorial lines in the inshore waters of Frenchman Bay are seen by fishermen as a symptom of a changing characterization of a "good fisherman" partly because of the student program. The formative value of the student program is questioned by fishermen belonging to the older generation, who believe that experiential learning under the guidance of an established captain is essential to raise responsible lobstermen. The sense of responsibility and environmental stewardship is part of a lobsterman's identity and pride, which may be lost as more captains are not given a chance to nurture it.

The growth of offshore lobstering and the desire to maintain the Bar Harbor Town Pier as a working waterfront both stem from a strong attachment to the collective identities of Maine fishermen and Maine fishing communities. Lobstermen began going offshore to maintain a fishing lifestyle despite the decline of available options; the fishermen of Bar Harbor are fighting to preserve their working waterfronts in face of a Town that is increasingly economically dependent on tourism and forgetful of its fishing heritage. The future of Bar Harbor as a fishing community is uncertain: the fleet is aging, gentrification is creating financially challenging living and working conditions, and the conflict with cruise ships is possibly undermining resources for commercial fishermen on the waterfront; this is exacerbated by the current discussions surrounding right whales entanglements in fishing gear, which could result in a devastating outcome for lobstermen all along the coast of Maine. The consequences of a potential dissolution of Bar Harbor's identity as a fishing community (and of any other coastal Maine town) could be extremely serious: the case of the collapsed New England groundfishery should act as a warning of the significant social and psychological distress caused by the closure or significant downsizing of a key fishery.

Nonetheless, commercial fishing remains a year-round industry that directly and indirectly creates a wide variety of employment opportunities for MDI residents, as well as a coveted attraction that is likely to increase the revenue generated by tourism on the island. Bar Harbor fishermen are aware of their popularity among tourists, and appreciate being able to interact with them as an opportunity to sharing the reality of harvesting seafood.

A reconsideration of the role and importance of commercial fishermen, whose relationship with the marine environment is too often depicted as simply profit-driven, should be an element of extending support to an industry that greatly contributes to the Maine communities' wellbeing, but is currently facing numerous threats. Interestingly, the current COVID-19 pandemic might offer a chance to reshape the public image of commercial fishermen as part of a wider, much needed reconsideration of food production networks and economic structures.

The future of the seafood industry in general, and in Maine in particular, is riddled with uncertainties as many fishermen are currently struggling with the closure or significant downsizing of the usual wholesale channels (Douglas 2020; Overton 2020a). Financial support from the federal government has so far been inadequate and slow to reach Maine fishermen, despite the heartfelt appeal of Governor Mills to President Trump to expand support to the fishing and aquaculture industries (Mills 2020).

Nonetheless, many fishermen have been coping with the depressed international and domestic markets by turning to small-scale, local retail sales, but these will likely be insufficient to absorb the high lobster landings as shedder season advances (Overton 2020b). Fishermen engaged in other fisheries, such as groundfish or scallops, face similar conundrums with the added stress of risking to lose their license should they not fill their current quota (Overton 2020b).

The stalling of the economy will be extremely disruptive to thousands of families across Maine, the United States and the world; but efforts should be made to take this opportunity to address its structural flaws and inequalities and put in practice alternative models and principles that assign equal value to community well-being and economic revenue. This should include a reconsideration of the current food production networks in general and of seafood production in particular. The health, sustainability and strength of wild American fisheries have been undermined for decades as trade policy pushed consumers towards cheaper imported seafood products, with sometimes tragic consequences for the fishermen and fishing communities that depended on them (Greenberg 2014). A return to consuming local seafood would be beneficial for the health of consumers and ocean ecosystems, would reduce the environmental impact of the seafood chain and would empower and strengthen small fishing communities such as Maine's coastal towns (Campbell et al. 2014; McClenachan et al. 2014); all this could be achieved through alternative and community-oriented consumption models such as Community Supported Fisheries (CSF), which are becoming increasingly successful throughout the United States (Campbell et al. 2014).

Fostering a direct connection between consumers and seafood harvesters may create the conditions to emphasize the importance of small-scale, local fisheries for the health of communities and of the oceans. Fishermen are uncomfortable with the negative framing that is often applied to their livelihood, as this participant noted:

> *I would really like the language around fishermen and the persona that people have, that we're all just rich and that we don't appreciate the environment, that we're out there just polluting and taking and raping, I feel like we get a really bad rap. Most of us are stewards of the ocean. Most fishermen I know don't throw any plastic in the water. If we see something drifting, we pick it up.*
>
> *Bar Harbor fisherman, in their 30s*

As an extractive activity, commercial fishing inevitably has an impact on the natural environment that has the potential to be disruptive if not managed appropriately. However, it has been repeatedly proven that fisheries where harvesters are empowered and involved in the management of the resource are more likely to achieve and maintain sustainability. The investment of fishermen in preserving the resource on which their livelihoods depend should not be underestimated, and instead should be harnessed as it has been so far in Maine's lobster fishery.

Appendix I: Consent Form

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Title of Study: Holding on to a good thing: the lobster gangs of Maine in a changing fishery
Investigator: Giulia Cardoso, Graduate Student, College of the Atlantic, Bar Harbor, ME, (207) 610 4978, gcardoso20@coa.edu

.....

Introduction

You are being asked to participate in a research study about the lobster fishery in coastal Maine. You were selected as a possible participant because another participant or collaborator identified you as a lobster fisherman. I ask that you read this form and ask any questions that you may have before agreeing to participate in this study. The purpose of the study is to learn more about the changing territorial dynamics in the inshore and offshore lobster fishery, as well as the evolution of lobster population dynamics through fishermen's observations. In understanding more about these aspects of the fishery, I hope I can support those engaged in it in advocating for appropriate management changes wherever necessary. Ultimately, this research may be prepared as a Master's thesis and exhibition, submitted as a report to the Maine Department of Marine Resources, published in a research journal, presented as a poster and/or talk at events and conferences and archived in oral history databases such as NOAA Voices from the Fisheries.

Description of the Research Methods

If you decide to participate in this study, you will be asked to talk about your experience as a lobster fisherman in coastal Maine and your knowledge of the inshore and offshore fishery as part of a recorded interview. Interviews will likely last between one and two hours, with a potential follow-up interview to collect clarifying information. You will also be asked to share information regarding fishing territories by drawing them on a paper chart.

Optional Additional Participation

As part of this project, I hope to photograph and film participants as they work on the water, as well as take a photograph at the end of the interview. This portion of the project is entirely optional and does not affect participation in the other components. Should you agree to be photographed and/or filmed on the water, you will be asked to sign a separate form.

Risks/Discomforts of Being in this Study

The study has the following risks. First, some of the questions may address illegal activity, specifically trap cutting and gear tampering. You may choose not to answer these questions and will not be required to disclose information that could lead to identifying individuals who engage in such activities. If you choose to share identifying information, I will keep these confidential and will remove them from any publishable product. All information you will be willing to share with me will be contextualized in the historical and traditional practices of lobster fishing. You will also be asked to draw the general areas in which you set your traps and characterize the relationship between fishing territories you are familiar with and the home ports of the fishermen who use them. You will not be required to disclose information regarding a specific individual's fishing grounds nor about the productivity of the fishing grounds you set your traps in. Any data about areas and locations will only be used as part of an aggregated data set to avoid sharing any information that you would like to keep to yourself regarding particular fishing sites. If you are interested in learning more about how the data will be used, I can provide you with an in-depth written explanation. Lastly, there may be risks of discomfort with sharing information that you feel could threaten or damage your and other lobstermen's livelihood. This could also create a sense of worry regarding your professional or personal interactions with other lobstermen, should they think your contribution to the project might threaten or damage the fishery. The intent of the project is not to harm or threaten the fishery in any way and precautions are taken to avoid that result; this is clearly communicated and explained to all involved individuals. At any point in the process, you can request for me to remove any names or identifying information from your interview. You have the right to withdraw your participation from the project at any time.

Confidentiality

The records of this study will be kept strictly confidential. Research records (interview transcripts, notes and charts) will be kept in a locked file, and all electronic information will be coded and secured using a password protected file. I will create pseudonyms and identifying codes whose key will only be accessible to me in order to protect your identity. I will not include any information in any report or other types of publicly accessible products that would make it possible to identify you.

Payments

There will be no payment for participation in this study.

Right to Refuse or Withdraw

The decision to participate in this study is up to you. You may refuse to take part in the study at any time without affecting your relationship with the investigators of this study or College of the Atlantic. You have the right to not answer any question, as well as to withdraw completely from the study at any point during the process. Should you choose to do so, I will

destroy all and any data you have shared with me and will not include it in the final publishable products.

Right to Ask Questions and Report Concerns

You have the right to ask questions about this research study and to have those questions answered by me before, during or after the research. If you have any further questions about the study, at any time, feel free to contact me, Giulia Cardoso, at gcardoso20@coa.edu or by telephone at (207) 610-4978.

If you have any problems or concerns that occur as a result of your participation, you can report them to College of the Atlantic's Ethical Research Review Board (ERRB) at errb@coa.edu.

Consent

Your signature below indicates that you have decided to participate as a research subject for this study, and that you have read and understood the information provided above. You will be given a signed and dated copy of this form to keep, and you may contact me at any point to make changes to or withdraw your consent from any portion of this project.

.....

Recording

1. I agree to be audio recorded for this interview:

Name (print): _____

Signature: _____ Date: _____

Signature of Investigator(s): _____Date: _____

2. I agree to be interviewed, but I do *not* want the interview to be recorded:

Name (print): _____

Signature: _____ Date: _____

Signature of Investigator(s): _____Date: _____

Mapping

1. I agree to share information about fishing territories by drawing them on a paper chart

Name (print): _____

Signature: _____ Date: _____

Signature of Investigator(s): _____Date: _____

2. I do *not* agree to share information about fishing territories

Name (print): _____

Signature: _____ Date: _____

Signature of Investigator(s): _____Date: _____

Appendix II: Definition of Zone B exemption line

From the Department of Marine Resources Regulations book:

Chapter 25

Lobster and Crab regulation

25.04 Lobster Trawl Limits

Part B.2.3

Off Hancock County and within the following areas. Beginning at the Southern tip of Schoodic Point at 44° 19.900’ N and 068° 03.609’ W; thence running a Magnetic compass course of 174° to latitude 44°9.44'N and longitude 067°57.54'W; thence running in a southwesterly direction along the Maine Six Mile Line, as described in DMR Chapter 75.01 A-6, to its intersection with the lobster Zone B/C line at 43° 54.452’ N and 068° 25.708’ W; thence following the B/C line to latitude 44° 01.376’ N and 068° 28.396’ W; thence running a westerly Magnetic compass course of 286°to the point of intersect with the line described in subsection 2, paragraph B; and then following that line north to its point of origin 40 miles true north of from the lighthouse at Robinson’s Point, Isle Au Haut, Knox County.

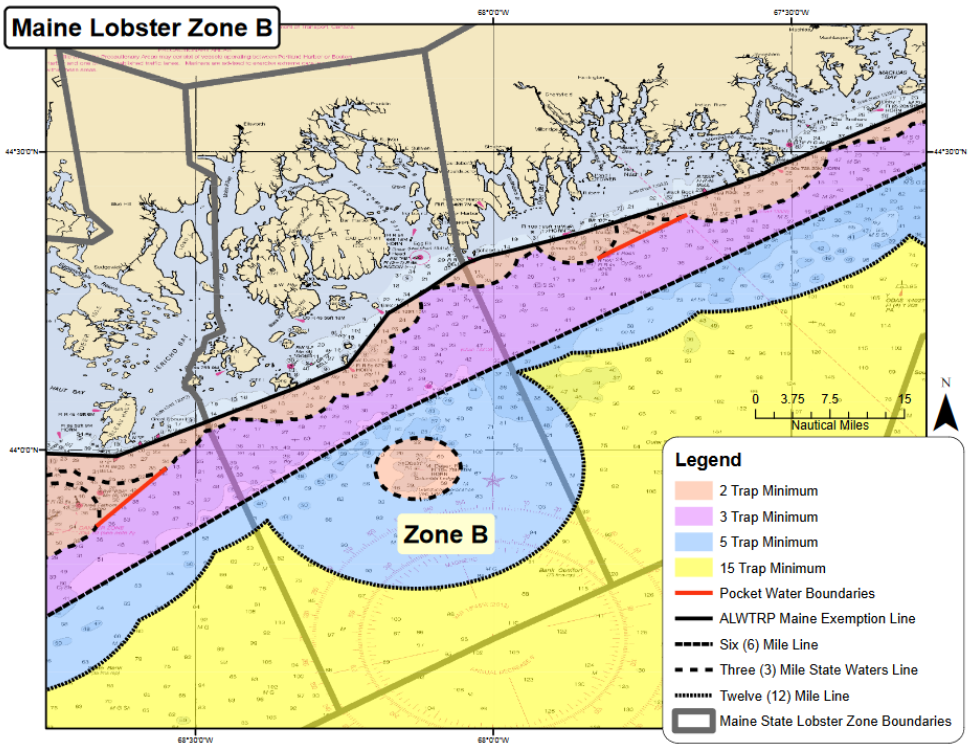
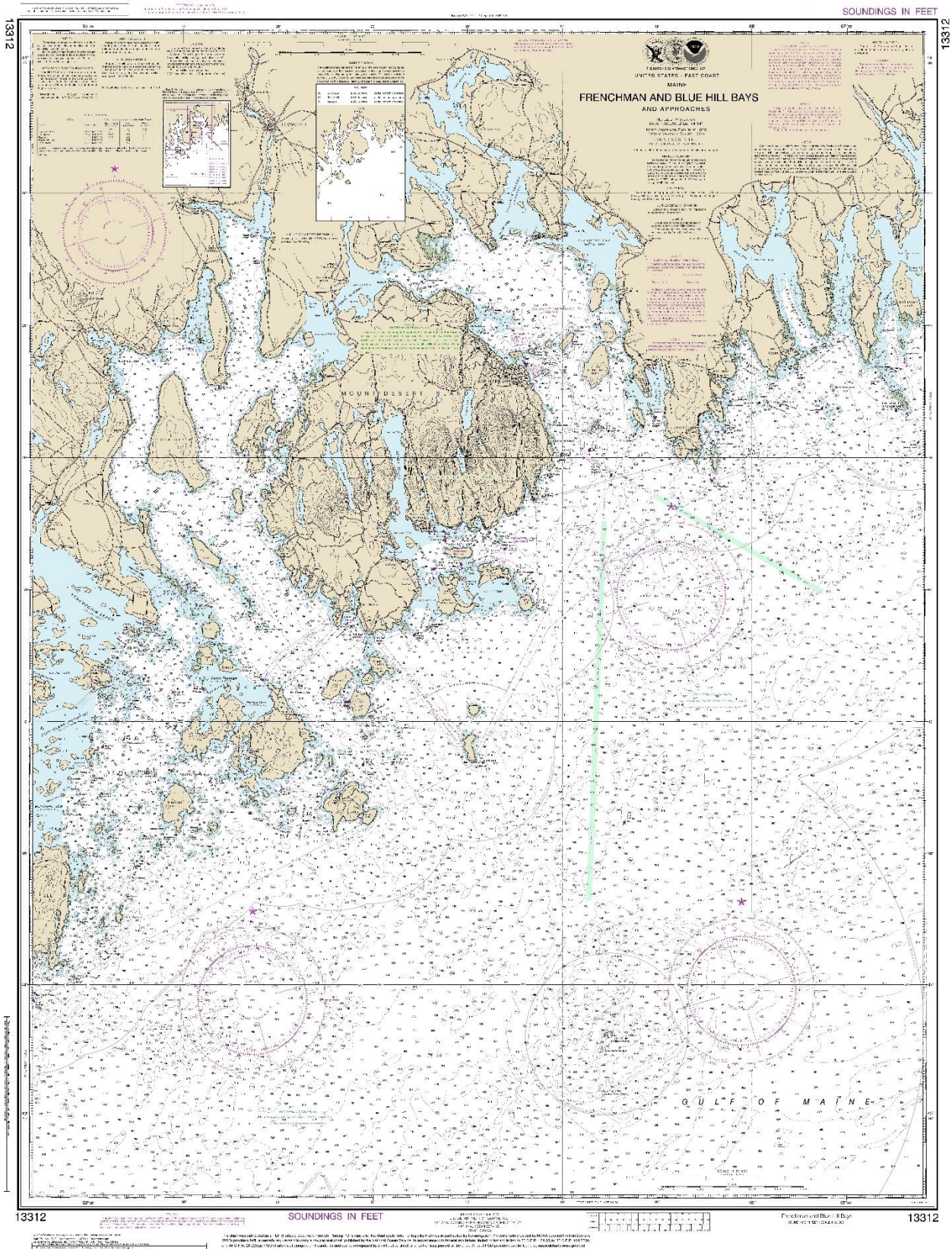


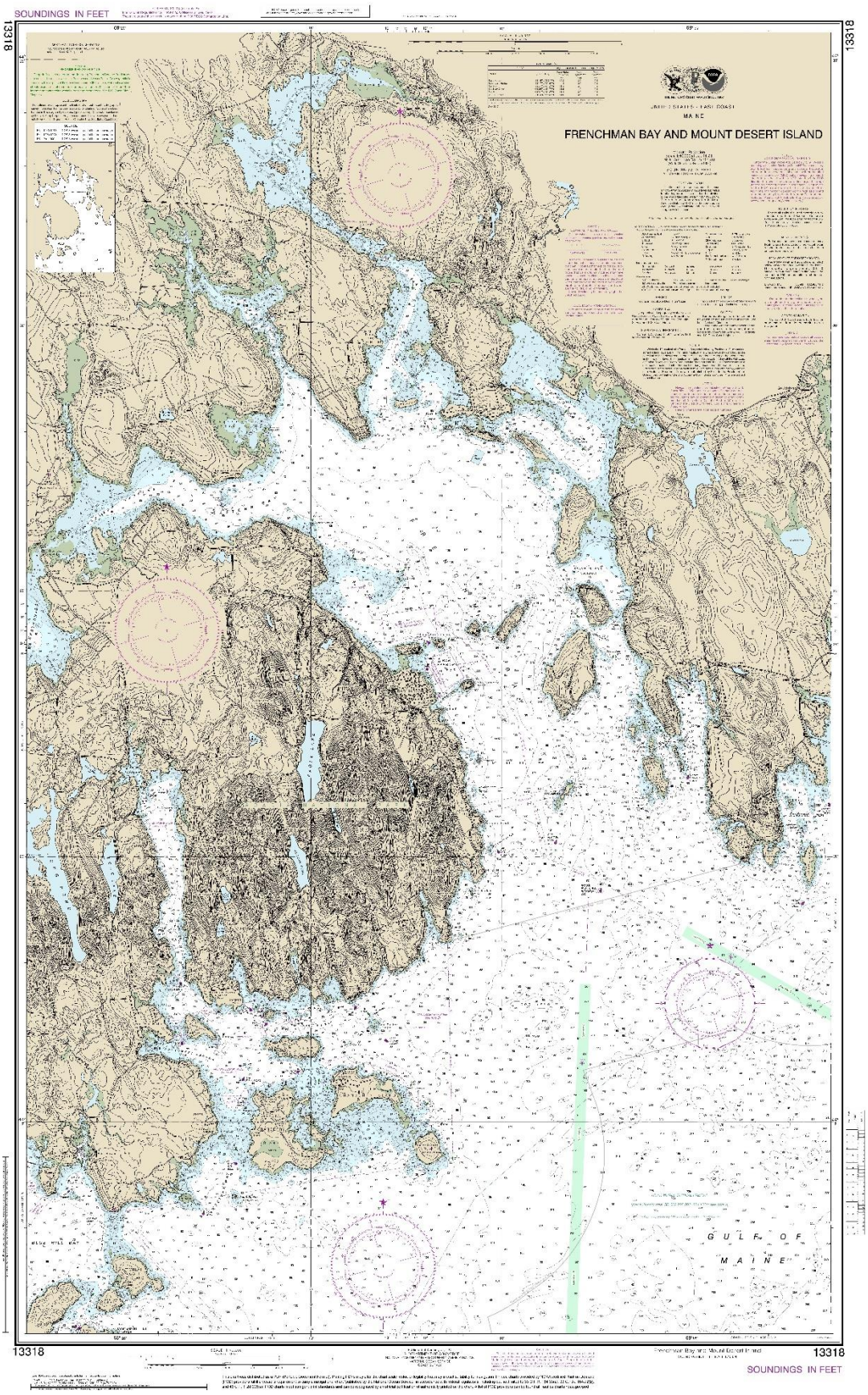
Figure 28 Trawling up requirements in Zone B. The exemption line is marked as "ALWTRP Maine Exemption Line".

Appendix III: Codebook

1. Going offshore
    a. Lack of alternatives
    b. Chasing lobsters
    c. Inshore crowding
2. Offshore territories
    a. Definition
    b. Zone mixing
    c. Harbor mixing
    d. Unwelcome fishermen
    e. Respected fishermen
3. Good fisherman
    a. Experience
    b. Respect
        i. Traditions and rules
        ii. Towards others
4. Inshore territories
    a. Upper Bay encroachment
    b. Reasons for no pushback
    c. Impact of student license

Appendix IV: NOAA Charts




SOUNDINGS IN FEET
13318
13318
FRENCHMAN BAY AND MOUNT DESERT ISLAND
MAINE
G U L F O F
M A I N E
13318
13318
SOUNDINGS IN FEET