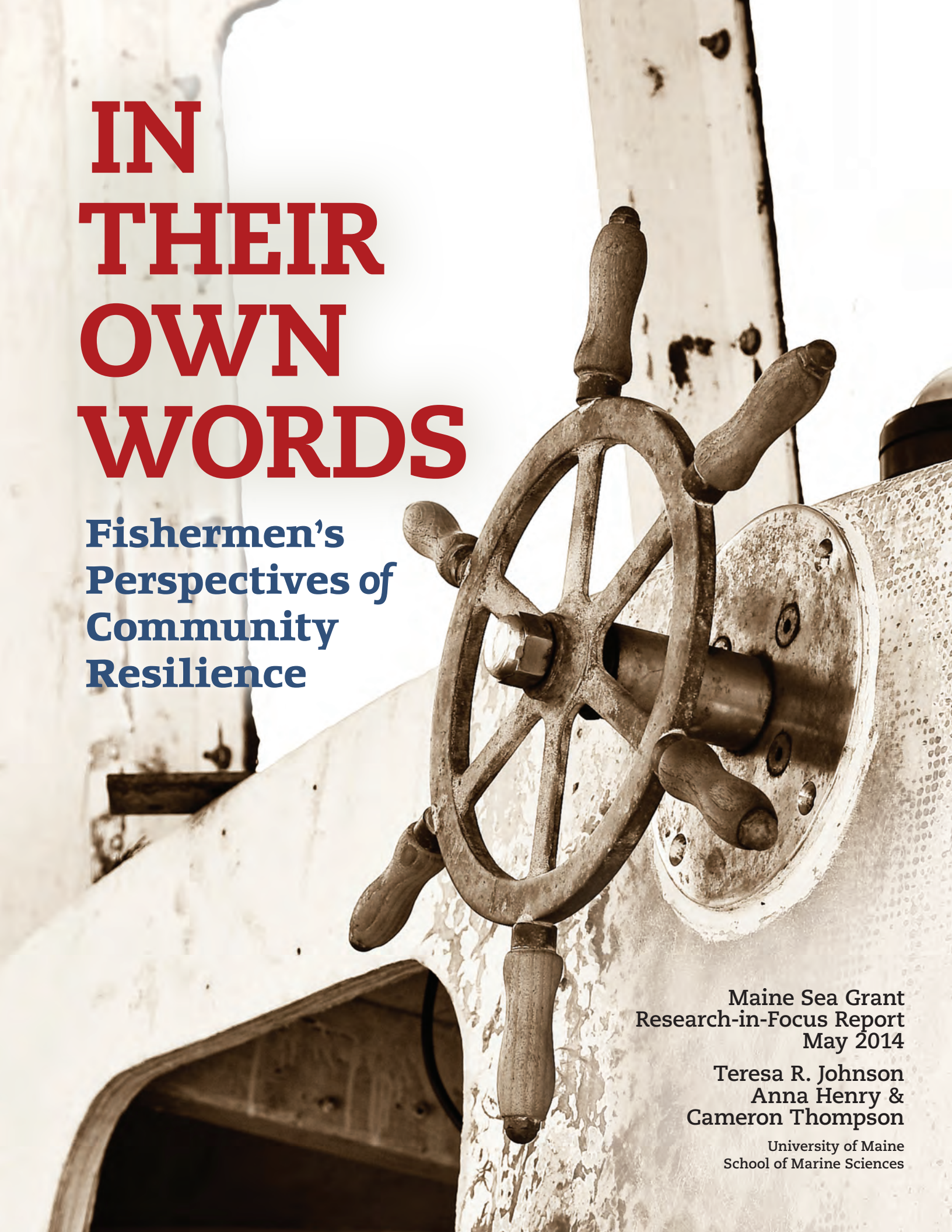
IN THEIR OWN WORDS

Fishermen's Perspectives *of* Community Resilience



Maine Sea Grant
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Summary

Maine's fishing communities are experiencing the cumulative effects of fish stock depletion, state and federal regulations, coastal development and demographic changes, and rising fuel and energy costs.

Legally, federal fisheries managers must minimize adverse economic impacts of fishery regulations on fishing communities, yet too often data with which to do this are insufficient (Ingles and Sepez 2007). For example, National Standard 8 of the Magnuson Stevens Fishery Conservation and Management Act, the federal legislation governing the management of marine resources in the U.S., requires that managers "take into account the importance of fishery resources to fishing communities" and "provide sustained participation of" and "minimize adverse economic impacts on" such communities (Clay and Olson 2008). The National Environmental Policy Act also requires social impact assessments of federal actions, including the cumulative effects of action on the "human environment." In response to these legal mandates and data gaps, social scientists have begun to develop and refine methodological approaches for defining fishing communities and conducting social impact assessments. An important component of social impact assessment is understanding the vulnerability and resilience of fishing communities (Clay and Olson 2008).

In 2010-2012, with funding from Maine Sea Grant, we explored how those living within fishing communities understand their resilience. We were especially interested in understanding the particular threats fishermen are facing and how they are responding to them. This report summarizes our findings, with additional background information on resilience and recommendations for Maine communities.

A **FISHING COMMUNITY** is substantially dependent on or substantially engaged in the commercial, recreational, or subsistence harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors based in such a community.

Introduction

An important component of assessing the impact of marine resource regulations on fishing communities is understanding their vulnerability and resilience. Research methods and theories of vulnerability and resilience span more than three decades and multiple disciplines, including anthropology, sociology, human geography, economics, and disaster research. Recently, resilience concepts have spread to studies of social-ecological systems and global environmental change. Vulnerability and resilience highlight the role of people, in relation to each other and to the environment, in creating and coping with risk (Clay and Olson 2008).

Resilient systems are often characterized as redundant, flexible, diverse, autonomous, strong, adaptable, collaborative, innovative, variable, modular (not overly connected), and efficient (except where efficiency eliminates redundancy; Godschalk 2003; Walker and Salt 2006).

Resilience acknowledges, rather than resists, change. In fisheries, such change can be gradual, as in the decline of fish populations over decades or centuries, or as abrupt as the early lobster molt in 2012. Surprise and crisis can create space for reorganization, renewal, and novelty as well as provide opportunities for new ways of social self-organization for resilience. But resilience is not always desirable. For fishing communities in particular, there is the question of whether community resilience is always the same as fishing-community resilience. Might a community best retain its overall resilience by letting go of the fisheries connection, and who should decide (Robards and Greenberg 2007)?

VULNERABILITY is a community's susceptibility to loss from a given event or situation, and is comprised of three components: the degree, duration, or extent of a community's exposure to a threat, perturbation, hazard or stress; the sensitivity or degree that the community will be affected if exposed; and adaptive capacity or resilience. Fishing community resilience is a fishing-dependent community's ability to cope with external stresses and disturbances as a result of social, political, and environmental change (See Adger et al. 2005

Some definitions of resilience

Resilience determines the persistence of relationships within a system and is a measure of the ability of these systems to absorb changes and still persist (Holling 1973).

Resilience is the capacity for innovation and renewal (Hamel and Valikangas 2003).

Resilient communities understand the hazards they face, take specific and coordinated actions to reduce their vulnerability, and develop response and recovery plans to facilitate a quick response and effective long-term recovery should a disaster occur (Collini 2008).

Resilience is a conceptual framework for understanding how persistence and transformation coexist in living systems, including human societies…Resilience is the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks (Folke et al. 2011).

Resilience is not about how fast things bounce back, but the ability for any recovery. How much disturbance and change can a system take before it loses the ability to retain its identity (Zolli 2012)?

Kathlyn Tenga-González

Methods

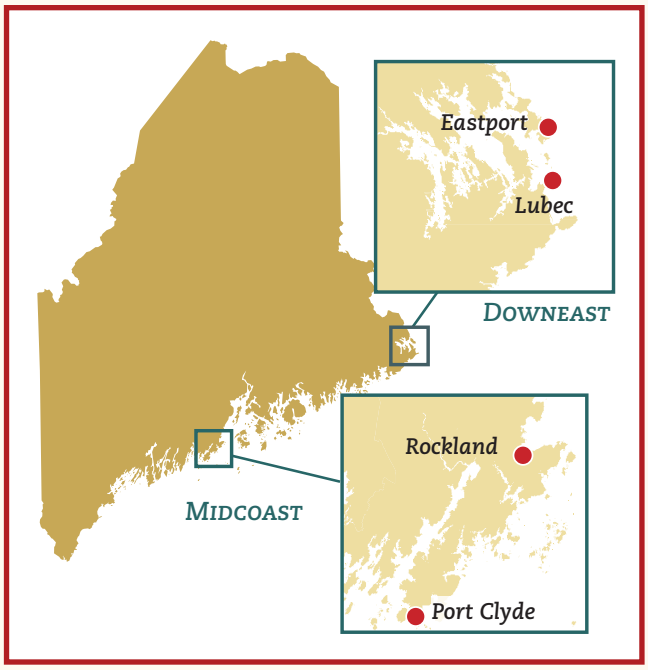
There is no widely accepted mechanism for measuring resilience, although this is an active area of research. We can improve our ability to detect thresholds, to monitor trends and focus on "slow" variables. We can evaluate a community's capacity to adapt in the past as an indicator of current adaptive capacity (Collini 2008).

Some assessments attempt to find "indicators" or "drivers" of vulnerability and resilience using existing data on demographics, government systems, economics, and environmental conditions (Jepson and Jacob 2007, Tuler et al. 2008, Colburn and Jepson 2012). While this approach potentially provides low-cost and rapid assessment capability, groundtruthing data is still important. Understanding these indirect or secondary data requires ethnographic research on the practices of fishermen and the context in which those fishermen live. From our perspective, we are most interested in the particular threats Maine fishermen are facing and responding to, information that cannot be captured in secondary data, although the indicator approach is a valuable starting point for social impact analysis. Marshall (2007) and colleagues, in assessing social resilience to institutional or policy change in northern Australian fishing dependent communities, identified four resilience components: (1) perception of risk in approaching change, (2) ability to plan, learn, and organize, (3) perception of the ability to cope with change, and (4) level of interest in adapting to change. Our research follows these findings and views fishermen's perceptions as a starting point to assess how members of fishing communities perceive resilience to social, environmental, and institutional change.

Between September 2010 and June 2012, we conducted 18 semi-structured interviews (Bernard 2005) and 26 oral history interviews (Ritchie 2003), and three focus groups with fishermen and other community members, combined with 37 household surveys and 29 interviews with local businesses, numerous site visits, and informal interviews in four Maine fishing communities. Maine Sea Grant's Marine Extension Team and community leaders assisted in the initial selection of key informants, who identified additional informants (a "snowball" sampling approach) to ensure representation of the diverse fisheries in the study area. Interviews, ranging from one to two hours, were audio-recorded for preservation, sharing (with permission), and analysis. All oral history interviews and six of the semi-structured interviews were transcribed verbatim. For the remaining semi-structured interviews, we took detailed notes following the interview guide. We used QSR International's NVivo 9 qualitative data analysis software to analyze all data collected in this project. Following a modified grounded theory approach (Glaser and Strauss 1967, Strauss and Corbin 1990), data analysis occurred through the coding and re-coding of the data, followed by additional research necessary to better understand the themes that emerged in the analysis. Focus groups and follow-up discussions served to groundtruth our findings. Oral histories from this project have been archived with the Maine Folklife Center and NOAA's Voices from the Fisheries project.

Maine Fishing Communities: Four Snapshots

This research focused on four Maine fishing communities: Eastport, Lubec, Rockland, and Port Clyde (Johnson et al. 2013a,b,c,d). Eastport and Lubec are isolated and rural with high poverty rates; Port Clyde is isolated and rural with low poverty, while Rockland is more urbanized and diversified.



All communities have experienced significant social and ecological change. Fishermen in these communities historically had access to groundfish, lobsters, herring, clams, shrimp, and scallops, among other species, and they could respond to annual and seasonal shifts in markets and resource abundance (Hall-Arber et al. 2001, Brewer 2011). Natural resource declines and subsequent regulations limiting access to key fisheries, such as groundfish, urchins and scallops, have reduced opportunities for fishermen to switch fisheries (Hall-Arber et al. 2001). Today, Maine's commercial fishing industry is highly dependent on a single species; more than 65% of the value of Maine's fish and seafood landings is from lobsters (Steneck et al. 2011, DMR 2013). These communities are significantly vulnerable should the lobster resource decline or policies be implemented that otherwise significantly limit the harvest in this fishery.

Catherine Schmitt

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Some of the highest tides in the world surround the rural and isolated communities of **Eastport** and **Lubec**, which were once the center of a thriving sardine canning industry. By the 1960s, however, there were only two canneries left, and the last cannery in the region closed in 1983. McCurdy's Smokehouse in Lubec, the last herring smokehouse of its kind in the U.S., closed in 1991. Population in these communities has mirrored the rise and fall of the herring fishery and associated fish processing plants. The loss of the herring and canneries led to considerable social change and resulted in the increased unemployment and poverty and outmigration seen today. The remaining fishermen in this area remain relatively diversified today, primarily targeting scallops, urchins, lobsters and clams, with other important fisheries being periwinkles, worms, seaweed, and sea cucumbers. Fishermen receive support from a local nonprofit organization, the Cobscook Bay Resource Center. These communities seek alternative economic opportunities besides fishing in order to keep their communities viable, such as renewable energy and tourism.

Statistics for the four study communities. Data Source: US Census.

	Maine	Lubec	Eastport	Rockland	Port Clyde
population	1,328,000	1,359	1,331	7,297	2,591
% population change since 1960	+37	-37	-48	-17	+63
median age (years)	43	54	55	44	52
% older than 65	29	28	27	20	25
median income	$46,993	$27,292	$30,600	$29,592	$39,777
% unemployment	6.5	8.8	7.2	5.7	8.6
% families in poverty	8	11	12	12	9
% houses less than $100,000	22	49	50	20	8

Full community profiles are available at seagrant.umaine.edu/research/projects/fishing-community-resilience

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More centrally located and accessible, **Rockland** is more populated and urbanized than the other three communities. The city's population is declining and aging less compared to the other communities and the city has a comparatively lower unemployment rate. Known as "the lobster capital of the world," Rockland was also once the center of an industrialized groundfish fleet and processing sector. Groundfishing was mostly gone by 1990. Following the collapse of the fishing industry beginning in the 1980s, Rockland experienced a period of decline, followed by revitalization. The fishing community is a small component of a larger, gentrified, tourist community with a revitalized downtown. Today, fishermen in Rockland are less diversified than those in Cobscook Bay; the major fisheries are lobster and herring. Fishermen are less organized here compared to the other communities.

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Port Clyde is considerably more isolated than Rockland but less so than the Downeast communities. Unlike other areas, the population in Port Clyde has been increasing, partly due to an influx of seasonal and seasonal-turned-permanent homeowners with significantly more wealth compared to the other fishing communities in this study. Key fisheries are lobster, groundfish, and shrimp. Fishermen in Port Clyde have shown high levels of resilience and have adapted to change through organizing and community support, however an increasing dependence on lobster has created potential future vulnerabilities.

Threats & Vulnerability

Catherine Schmitt

To understand how fishermen perceive their resilience, we first have to understand the threats they face. Although interrelated, these threats can be broadly divided into four categories: environmental, economic, regulatory, and demographic. Threats were similar across the study communities despite different social, economic, historical, and environmental contexts, although in a few cases, differences did exist and we note them in our presentation of the results below.

Environmental Wherever ecosystems have been undermined, the ability to adapt and regenerate has been severely eroded, increasing the chance that hazards become disasters (Adger et al. 2005). It makes sense that communities that depend on natural resources are more sensitive to environmental threats, including threats that influence food supply (Kofinas and Chapin 2009).

The vulnerability of Maine's fishing communities is clearly visible in the increasing dependence on a single species, the American lobster. Although the lobster fishery has seen a consistent increase in landings over the last few decades, fishermen spoke often of potentially disastrous consequences of future unknown environmental changes, such as pollution or new diseases, that could affect the lobster population, or how a decline in herring stocks might affect the bait supply. However, resource decline is not just the result of some future unknown consequence. Fishermen also view it as an existing threat based on observed trends and past experience ("social memory," see Box on page 15): overharvesting causes resource declines, as improved technology and intensified effort increase harvest pressure on fisheries resources to an unsustainable level.

"[Herring] spawning habits and their patterns have all changed — their migratory patterns. Twenty years ago, I could tell you pretty much on any given week of the year where the herring would be but that's all gone now…" —Rockland fisherman

"Lobster fishing has never been better than it has been in the last 15–20 years, how long is it gonna last, that's the big question. Nobody knows the answer." —Port Clyde fisherman

"So lobster stocks collapse…this town's screwed because we're not diverse enough to handle something like that and probably in the '90s when it was diverse, it was scallopers, draggers, lobstermen, all of the above, and everybody made a living doing a little bit of everything but now it's basically all their eggs are in lobstering except for a scattered few." —Port Clyde fisherman

"We're looking at declines in forage fish all the way around—herring and menhaden. I think down the road that's going to become an issue. They're not going to put traps out with no bait in them." —Port Clyde fisherman

"The loss of the groundfish…now (there) is really no groundfishing in eastern Maine… And so more people are lobstering here and there's quite a bit more pressure now in the scallop fishery, urchin fishery because of that. So where before you had a greater choice for diversification, spread out in the fisheries and now there's greater impact on just a few fisheries which it makes it much harder for those to be sustainable." —Eastport resident

Economic Fishing is more expensive than it used to be. Increasing costs of fuel, bait, gear, and maintenance make it difficult for fishermen to profit from their catch. These costs potentially can be offset by an increase in prices fishermen receive for their product, but often these prices do not rise at a comparable rate, as demonstrated during the 2012 lobster season. Underlying this are concerns about the industry's vulnerability due to its dependence on lobster fishing. Fishermen are also affected by general economic conditions of the country, which during poor economic times are exacerbated locally by the isolation and lack of economic opportunities available in fishing communities.

> *"It's funny, this place has always been in a depression, people don't notice it, recessions depressions or whatever, it's always been that way, people work hard clamming, and fishing, it's all hard work mostly." —Lubec resident*

> *"If prices go down like they did in the lobster fishery, it becomes almost unsustainable with other prices, fuel prices particularly, going up. [It] becomes almost impossible to then earn a living." —Eastport fisherman*

Regulatory Fishermen view regulations, imposed in response to the resource declines described above, as arbitrary rules that are constantly changing. Fishermen feel they don't have the freedom to fish in ways that are best for the harvester and the resource. Fishermen respond or adapt to regulations by altering how, where, when and what they fish. Some fishermen, however, report having little choice but to live with new regulations, suggesting they may be less resilient. In other words, regulations prevent fishermen from responding appropriately to change, especially in cases where resources are managed at the state or federal, rather than local, level. Fishermen often state that they hope effort controls are temporary, while acknowledging that regulations rarely are relaxed. In addition, many fishermen feel that they do not have the time to be involved in the regulatory process and, even if they do, their attempts to influence it are often futile. Participation in fisheries management does not, for some, appear to be a productive way to respond to the threats they face. This is in part due to participation in fisheries management being costly—either travel costs to meetings or lost revenue from a day or two not fishing.

Regulatory attempts to restrict effort in response to resource declines have also had the effect of changing the demographics of the fishing communities. In particular, limited access or moratoriums on licenses have resulted in an aging fishing population as young fishermen are locked out of fisheries.

> *"You know, kids can't get a license, so I mean it's gonna die." —Eastport fisherman*

Demographic The demographics of fishing communities as a whole have changed drastically. Many fishermen point to the influx of "people from away" as a threat to the fishing community, especially in terms of access to the waterfront. Throughout the coast of Maine, the demand for shorefront property has led to an increase in property values and associated taxes. "Local" or long-time residents are unable to purchase property in their communities, or those who already own property are displaced by high taxes. The result is fishermen moving away from the shore, to back roads where housing and taxes are affordable. Their access to the water is thus consolidated as they lose waterfront property with private docks. At the same time, other uses compete for waterfront space as the productive value of fishing is decreasing. The uncertainty of future access to the waterfront and the fisheries is a significant threat expressed by fishermen in these communities.

> *"Tourism…I mean Rockland has changed…their culture has changed, obviously. The plants have closed, and, like I said before, we've added the museums, and the museum has grown. The main street is a lot different than it was, say, when I grew up here, you know, with all the different types of culture, you know, a lot of nice, upscale restaurants and boutiques." —Rockland resident*

Response & Resilience

Resilience means survival. "Still fishing." This was the meaning of resilience most frequently expressed by fishermen in this study. To fishermen, survival means simply still being able to go fishing, in contrast to earning a livelihood outside of fishing. Despite numerous threats over the years, like resource declines and regulations, many are still here. But survival is tenuous. Maine fishermen have survived, but that does not mean they will continue to do so.

> *"Well, they have had a lot of changes over the years, the price of fuel going up astronomically, the price of bait going up astronomically, but not the price of their catch going up astronomically, and they're still in business. Some have been weeded out, but others have survived." —Rockland resident*

In contrast to adapting for "survival," such as through diversification (see below), resilience was also expressed as simply "getting by" in response to economic conditions, such as volatile fuel costs or low fish prices, by using less bait, driving boats slower to minimize fuel expenses, or putting off maintenance and repair or even non-fishing expenses such as health insurance.

"Getting by" refers to the quality of life: fishermen are not doing great, but they are not doing too bad either, and that is okay.

> *"We have seen bad times before, will see them again. If you don't expect as much because of upbringing and work you've had, then you don't need as much." —Port Clyde fisherman*

Being resilient—surviving or getting by—means "saving for a rainy day," "tightening up your belt," or "knuckling down" during hard times. Fishermen know their trade goes in cycles, so they don't spend beyond their means in anticipation of bad years. Not all fishermen do this well, however, and this is viewed as contributing to some of the financial problems in the industry, especially younger fishermen who may have grown up with "different visions of how you get by."

Some fishermen are "practical"—flexible and able to respond quickly to change. Some of these responses are temporary reactions to short-term conditions (and once the crisis is over, they return to their normal activities), but longer-term strategies could lead to innovations and creativity, such as new fishing techniques.

Resilience means being optimistic. For many fishermen, the fact that they are "still here"—that there are still people fishing, dragging for urchins and scallops, hauling lobster—by itself suggests a past capacity to adapt and an optimism about the future.

But there is a limit. Once a threshold of impacts or vulnerability is reached, fishermen and the broader community begin to lose hope, affecting their ability to respond to problems or invest in the future. In Eastport and Lubec, the collapse of the sardine industry led to increased poverty and outmigration of youth that increased poverty further as the population began to age. This impacted the social identity and community support fishermen receive, and has contributed to a general lack of optimism about the future.

When asked to reflect on the future of their communities, fishermen responded with stories of drugs and alcoholism, social dysfunction created by economic hardship. This appears more pronounced in more remote, isolated areas. The cumulative effect of losing optimism can impact the social identity of the community, further degrading resilience and fishermen's ability to survive.

New economic opportunities can revive a sense of optimism. In Eastport, for example, optimism around the development of tidal energy and its future prospects may be a source of resilience.

Resilience means diversity. One way to survive and foster optimism is to diversify. Fishermen in Maine have long pursued diverse fishing strategies, and this is particularly true in eastern Maine, possibly due to the few economic opportunities in the area.

> *"They'll go from beating nails to painting someone's house to wrinkling [harvesting periwinkles] and probably all in the same day. Whatever it takes to feed the family." —Lubec resident*

> *"Yeah. We're fairly creative. We'll find something like the whelks. We'll find something else to fish for pretty much. Periwinkles. They've been big in the last seven or eight years. Now the seaweed industry. We've never really had—well, for so many years we really had no industry so we've had to get creative to make a living if you want to stay here. And yeah, so they're very resilient, very creative." —Lubec fisherman*

> *"Now I've never went behind [in my payments]. I've never been behind on anything in my life. I always seem to think that there's plenty of stuff to do and there's plenty of money to be made if you just want to get out there and do it. You've just kind of got to set your ego aside and get in there and do whatever it takes. Today, my thing is I do everything that nobody else wants to do..." —Rockland fisherman*

Fishermen maintain or increase their diversity of target species in response to anticipated threats. Their own experience or their ancestral memories (see box on social memory, page 15) tell them to expect fish stocks to be cyclical, that there are good years and bad years. In this way, fishermen's resilience is from being proactive and expecting change. Alternatively, some fishermen may only diversify when something goes wrong; i.e., an unexpected stock collapse, loss or emergence of a market due to global forces, or restrictive fishery regulations.

Diversifying, and thus being resilient, requires creativity and innovation. It means finding something else to fish for, like periwinkles or seaweed, or trying out new gear or fishing methods, whatever it takes to survive. While in eastern Maine few fishermen engage in only one fishery, in the Midcoast region they have found themselves nearly completely dependent on lobsters, making diversification all the more difficult as most fisheries are regulated with some kind of limited access program.

Catherine Schmitt

Fishermen also diversify beyond fishing: they have a back-up plan to get by during difficult times. Diversification can still involve fishermen's skills and expertise as captains and fishermen, such as working for aquaculture and shipping companies, or running whale-watching tours. Also important are jobs that fishermen turn to outside of the fishing sector, such as building houses, driving trucks, cutting firewood, or other construction work. Most of these jobs are part-time or seasonal.

Living within "fishing communities" are people who do not fish, and they also create alternative economic opportunities outside of fishing, such as tourism, the arts, and alternative energy development. This economic diversity is seen by some fishermen as a source of community resilience.

Kathlyn Tenga-González

"We are probably one of the most resilient former fishing communities because of our talented workforce and tourism. The strengths are in the diversity of our community."
—Lubec town official

The implications of economic diversification outside of fishing, and the gentrification that they may stimulate, are uncertain. Our findings hint that demographic changes and related gentrification can have a positive effect, providing new jobs and economic impact. Tourism and service sectors employ fishermen during the off-season or provide supplemental income. New residents with time and money help support local fishermen and the broader community, because they want to protect the cultural and aesthetic qualities that first drew them to the region (as has been the case in Port Clyde).

Still, questions remain. Will changes further threaten fishermen's access to the waterfront? Will the community still be a fishing-dependent community? Does the resilience of the community come at the expense of fishermen? For some, these changes are welcome; for others, there is great concern that fishermen will be marginalized even further in the community.

Resilience means community identity. When asked, "If you could live your life over again, would you still fish?" an overwhelming majority of fishermen responded in the affirmative. The loss of fishing would impact their well-being. Their identity as fishermen pushes them to make the necessary changes to adapt to new social and environmental conditions, to be resilient.

Resilience in individual fishermen and the fishing industry contributes to overall community resilience, and vice versa. Fishermen indicated that fishing is part of their community's social identity and this prevents them from giving up during hard times. They find a source of resilience in the community's history and dependence on fishing, and thus the importance of maintaining fishing traditions. Adaptability and a sense of place have been found to be strong predictors of resilience (Boon et al. 2012).

In some cases, the broader community includes entities who provide organizational and financial support for fishermen to respond to change, helping them bounce back after difficult times. In Port Clyde, the Island Institute has strengthened the fishing community's capacity to get through a shift to a new management regime (catch shares) and low stock abundance, helping them develop a new marketing brand, a community-supported fishery, a groundfish sector, and permit bank. The Cobscook Bay Resource Center plays a lesser but similar role in Eastport, as does the Cobscook Community Learning Center in Lubec.

In Port Clyde, the broader community has embraced the fishermen's local marketing initiative; without their willingness to pay more for fresh, local fish, fishermen would not benefit from the

program, which helps them during these times of low volume harvests. Fishermen also want to see a future for their community, and many currently do not because there are few opportunities for new fishermen to enter the fishery. This may contribute to the loss of social identity and resilience.

Some individuals view resilience at the community level in ways that may not include fishing. In Rockland, for example, some view the city as resilient because new economic opportunities in the art and tourism sectors emerged following the fisheries crisis, despite leaving the fishing industry with a questionable future. In Rockland, the community's history of shipbuilding and lime production, as opposed to fishing, may contribute to a multifaceted identity that has allowed the current diverse economy to prosper.

Catherine Schmitt

Recommendations for increasing resilience in Maine fishing communities

Restore and monitor ecosystem health and diversity. The most important requirement for resilient fishing communities is healthy ecosystems that support abundant resources. A resilient ecosystem has capacity to absorb disturbance (hurricanes, flooding, sea-level rise, harmful algal blooms, etc.) and still retain its basic function and structure (Collini 2008). Yet there is no such thing as an "optimal" or "steady" state. The more we attempt to optimize elements of a complex system of humans and nature for some specific goal, such as "maximum sustainable yield," the more we diminish that system's resilience (Walker and Salt 2006). As resilience is about being ready for and embracing change, research and monitoring are needed to know when changes are needed, or when we are approaching thresholds. Diverse, healthy ecosystems provide the raw material or building blocks on which adaptation can act, increasing the range of options available and providing redundancy (Kofinas and Chapin 2009).

Evaluate layers of federal-state-local management. Redundancy (fragmentation and duplication of institutions, authority, policies, and functions) is often perceived as inefficient, yet redundancy is an important aspect of resilience (Folke et al. 2005). There is a lot of evidence that polycentric management institutions are more sustainable. Maine fishermen have had some experience with co-management, such as in the lobster and urchin fisheries, but more work needs to be done to make these management systems more effective. Many fishermen interviewed in this study described a need for local management that takes into account local practices and knowledge and creates incentives for conservation. Local knowledge can enhance state and federally supported research aimed to monitor changes in ecosystems. There are ecological arguments made for making sure that the scale of management matches the scale of the resource. Resilience could be enhanced by creating a management regime that integrates multiple perspectives and knowledge about how a system functions.

"It's completely mismanaged. If you let local people manage their resources, they know how much pressure certain species can take." —Lubec fisherman

"We'd like to be able to have this bay ourselves and to manage it…And yes, boats could come here but they'd have to abide by a certain—our conservation rules and they'd have to do something to get a license to fish here. Maybe they'd have do some conservation, you know?" —Lubec fisherman

Increase diversity of fishing opportunities. Diversification is becoming more and more difficult due to regulations in response to declining resources, perhaps suggesting fishermen are reaching a threshold in their ability to adapt. This is a significant concern for the majority of Maine's fishing communities that depend on a single resource, American lobster. The Maine lobster fishery is cited as an example of "a social-ecological system that finds itself trapped in an undesired basin of attraction that has become so wide and deep that reconfiguration becomes extremely difficult and movement out of it painful, requiring social and ecological capacity" (Folke et al. 2011). Fishermen and fisheries managers and scientists can and must explore ways to address limited entry issues and create opportunities for new entrants.

Increase diversity of economic activity. Tourism and creative arts enterprises take advantage of coastal Maine's limited summer season, creating economic opportunities while maintaining working waterfronts and other traditional aspects of the fishing community (see below). Some communities have unique opportunities associated with their natural setting to diversify beyond fishing, as Eastport has done with downtown revitalization, tidal power generation, and its deepwater port.

Pursuing such diverse avenues can facilitate recovery of communities after fisheries-related disturbance, especially if the economic activity is locally based. Some researchers have suggested that communities with small, locally-owned businesses (like fishing) have civic advantages, such as stronger social networks and more engaged citizens, that make them resilient to changes: "There's much to be said for the value of doing business with people who know us and whose success is intimately tied to the well-being of the community" (Mitchell 2013).

Fishing Community Resilience: The Role of Heritage Tourism

In natural resource-dependent communities where resources are in decline, tourism often becomes a hopeful avenue for economic development, triggering fears of commodification of the place and its people. Some of the fishermen interviewed as part of this research talked about tourism as a way their communities have diversified, and thus become more resilient.

Catherine Schmitt

Tourism will never replace the cultural, social, and economic roles of declining natural resources, and no one is proposing that it should. But tourism that highlights the culture that emerged as a result of that natural resource has a role to play in the future revitalization of such communities.

Market trends show that travelers increasingly decide where to go based on their social values. They are looking to connect with real people, participate in local traditions, and leave feeling good about how they spent their money. These trends present opportunities to grow tourism that nets positive impacts on people, culture, and nature, as well as economy. A heritage tourism project that effectively uses interpretation (collecting and sharing experiences through storytelling, music, poetry, theater, exhibits, etc.) can help a community emerge from a collective community experience of tragedy or loss, toward an ability to engage in cultural preservation, and even revival.

Fishermen are concerned about the lack of young people entering their industry. There are opportunities in emerging marine sectors that would prepare a young workforce for future fisheries-related work on the water, but training programs are needed to address the new types of jobs on the waterfront (Faghin et al. 2013).

Preserve and enhance the working waterfront. In order to survive—keep fishing—fishermen need access to and from the water. Existing infrastructure requires maintenance and upkeep; and some communities such as Lubec are in dire need of new docks and other infrastructure. Communities should identify opportunities to create new multi-use access to the water as well as protecting existing access, since working waterfront that has been converted to non-compatible uses is unlikely to return to working waterfront.

"You have to have fishermen owning the property. If not, you're very vulnerable and you don't know what the future holds." —Port Clyde fisherman

"It just amazes me this town doesn't have a real community dock where the boats can tie up. Most of them are on moorings, which is no safe haven. They need to get out in a skiff to get to the boat, which is dangerous. You're talking January and February here with the northeast wind, it's dangerous." —Lubec fisherman

Natalie Springuel

In the Canadian province of Newfoundland, tourism has helped maintain and support fishing community identity, an important aspect of resilience. When a government-imposed moratorium on cod fishing resulted in economic, social, and cultural collapse, many communities turned to tourism activities that emphasize their rich fishing heritage and stunning coastal environment. Despite criticism about the commodification of their culture, Newfoundlanders routinely express feelings of pride, hope, and joy, along with grief about a past that has gone by, when engaging with tourists or discussing tourism (Springuel 2010).

On the St. Joseph River in Michigan, various forms of interpretation (signs, maps, re-enactment, exhibits, tours) empowered the community's voice, whether by prompting discussion among locals or by positioning residents to be better historical arbiters or guides for those visiting their maritime landscape (Chiarappa and Szylvian 2009).

In Agua Blanca, Ecuador, the development of tourism has led to a general recovery of social memory. The community's sensitivity to the past is nurtured by the tourists' questions and the need for tour guides to provide the appropriate responses (Ruiz-Ballesteros 2011).

While difficult to measure, engaging in heritage tourism efforts like Maine's Downeast Fisheries Trail can support new ideas that help fishing communities strengthen their economy based on the values that they seek to maintain into the future.

—Natalie Springuel

Catherine Schmitt

Infrastructure needs and concerns are affected by other factors influencing coastal community resilience such as climate change and sea-level rise. "Resilience thinking" is starting to shape how urban planners think about updating antiquated infrastructure, much of which is robust in the face of normal threats like equipment failures but fragile in the face of unanticipated shocks. Combating these kinds of disruptions isn't just about building higher walls, it's about accommodating the waves (Zolli 2012). Working waterfront preservation and enhancement activities thus need to account for changing environmental conditions.

Working waterfronts also need public support (see recommendation on communicating heritage below).

Communicate the importance of fishing heritage and waterfront access to permanent residents, seasonal residents, and visitors. Resilience of individual fishermen and the fishing industry is tied to the community's identity as a "fishing community." Regional and national identities inhere strongly in livelihoods like fishing when "labor in its full capitalist form has not totally replaced kinship and community as the means of organization production" (LiPuma 1992 cited in Clay and Olson 2008). The robustness of fishing-dependent communities may be interwoven with their identity as "fishing communities." Just as "fishing communities" are vulnerable to disturbances that profoundly affect the ecological basis of their identity, this same collective identity may foment a sense of community that may encourage collective action in response to a disaster. In addition to providing a platform for adaptation and innovation, collective identity may serve as an entry point for alternative fisheries-based livelihood strategies, such as tourism (DiGiano and Racelis 2011).

As non-fisheries sector employment becomes increasingly more important, there is a risk that fishermen's well-being and social identity will be impacted, along with their optimism in the future, resulting in a loss of resilience. Even with restored fisheries, with more boats on the water and greater access to fishing grounds, if fishermen are not able to maintain the intangible parts that are so central to their being, their community, there may be an appearance of revitalization on the outside but a struggling core.

For example, Port Clyde residents understand the importance of tourists and "people from away," and appreciate the support they have given to the community. However there is a resounding skepticism about how long that support will last and what the community will look like if the attitude of new residents changes.

Because Maine's fishing communities have a strong sense of place, people are motivated to enhance ecosystem and community resilience. But given the demographic changes occurring in these communities, education and outreach are necessary to maintain heritage and traditions that define individual fishing communities. Accessing social memory, through activities such as oral histories and public history research and interpretation, can help communities avoid the "perils of landscape amnesia," mobilize community involvement, and equip citizens with greater contextual understanding of historical issues that shaped the waterfront (Chiarappa and Szylvian 2009). Participation in identifying and fostering personal and cultural attachment to place will have to broaden beyond the past to include stakeholder groups who may have different views, but still have a commitment to the place or the power to make decisions (Chapin et al. 2012).

Social Memory: The Role of Creative Arts and Culture

Social (or collective) memory links past individual and community experiences, for example with fisheries management practices and rules, with present and future policies. When confronted with change or crisis, social memory gives us options for moving forward, creating a framework for novelty, reorganization, innovation, experimentation, and conflict resolution while maintaining our underlying values. Fishermen and other key members of the industry draw on social memory when they participate in management decisions, organize, or develop new markets. To be successful, they must also have access to (or participate in) generating knowledge on ecosystem dynamics (Folke et al. 2005 and citations therein).

Social memory provides a wealth of ideas on how communities have responded to and adapted to changes in the past, extending the range of potential future options beyond those that dominate the current system. Social memory can be particularly important in times of crisis (Kofinas and Chapin 2009).

Social memory bridges long-term processes like fisheries declines and climate change and the short-term decisions and actions people made in response (Pillatt 2012). In this way, it can be a part of diversifying local economies by encouraging innovation and welcoming a diversity of ideas and talents. Social memory can also help people appreciate their relationship to nature, a strong motivation for ecosystem stewardship and sustainability. And here lies the role of arts and culture: music, literature, theater, and other arts activate social memory of our relationship with nature and provide space for reflection (Kofinas and Chapin 2009). Monet's London paintings are an accurate souvenir of the perils of air pollution, a constant reminder of how polluted the city was in its glory days as the capital of the world (Thornes and Metherell 2004). An outdoor dramatic production of the human experience of Lake Michigan's shore created a political constituency for the preservation of the dunes, and helped a community work through some pressing decisions about its waterfront (Chiarappa and Szylvian 2009). Poets keep alive the memory of the sardine canneries that once dominated the economy of many Maine fishing communities (Schmitt 2011).

Catherine Schmitt

—Catherine Schmitt

References

Adger, W.N., T.P. Hughes, C. Folke, S.R. Carpenter, and J. Rockstrom. 2005. Social-ecological resilience to coastal disasters. *Science* 309:1036-1039.

Bernard, H.R. 2011. *Research Methods in Anthropology: Qualitative and Quantitative Approaches*, Fifth Edition. Lanham, MD: AltaMira Press.

Boon, H.J., J. Millar, D. Lake, A. Cottrell, and D. King. 2012. Recovery from Disaster: Resilience, Adaptability and Perceptions of Climate Change. Gold Coast, Australia: National Climate Change Adaptation Research Facility.

Brewer, J. 2011. Paper fish and policy conflict: catch shares and ecosystem-based management in Maine's groundfishery. *Ecology and Society* 16(1):15.

Chapin, F.S., A.F. Mark, R.A. Mitchell, and K.J.M. Dickinson. 2012. Design principles for social-ecological transformation toward sustainability: lessons from New Zealand sense of place. *Ecosphere* 3(5):40.

Chiarappa, M.J., and K.M. Szylvian. 2009. Heeding the landscape's usable past: public history in the service of a working waterfront. *Buildings & Landscapes: Journal of the Vernacular Architecture Forum* 16:86-113.

Clay, P.M., and J. Olson. 2008. Defining "fishing communities": vulnerability and the Magnuson-Stevens Fishery Conservation and Management Act. *Human Ecology Review* 15:143-160.

Colburn, L.L., and M. Jepson. 2012. Social indicators of gentrification pressure in fishing communities: a context for social impact assessment. *Coastal Management* 40:289-300.

Collini, K. 2008. Coastal Community Resilience: An Evaluation of Resilience as a Potential Performance Measure of the Coastal Zone Management Act, Final Report of the CSO Coastal Resilience Steering Committee. Coastal States Organization.

DiGiano, M.L., and A.E. Racelis. 2011. Robustness, adaptation and innovation: forest communities in the wake of Hurricane Dean. *Applied Geography* 33:151-158.

DMR. 2013. 2012 Commercial Landings Summary Report. Augusta, ME: Department of Marine Resources.

Faghin, N. 2013. Sense of the Symposium. Tacoma, WA: Working Waterfronts and Waterways National Symposium on Water Access.

Folke, C., T. Hahn, P. Olsson, and J. Norbertg. 2005. Adaptive governance of social-ecological systems. *Annual Reviews of Environmental Resources* 30:441-473.

Folke, C. et al. 2011. Reconnecting to the biosphere. *Ambio* 40:719-738.

Glaser, B.G., and A.L. Strauss. 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. New York: Aldine Publishing Company.

Godschalk, D.R. 2003. Urban hazard mitigation: creating resilient cities. *Natural Hazards Review* 4:136-143.

Hall-Arber, M., C. Dyer, J. Poggie, J. McNally, and R. Gagne. 2001. New England's Fishing Communities, MITSG 01-15. Cambridge, MA: MIT Sea Grant College Program.

Hamel, G., and L. Valikangas. 2003. The quest for resilience. Harvard Business Review (September 2003):52-63.

Holling, C.S. 1973. Resilience and stability of ecological systems. *Annual Review of Ecological Systems* 4:1-23.

Ingles, P., and J. Sepez. 2007. Anthropology and fisheries management in the United States. *NAPA Bulletin* 28:1-13.

Jepson, M., and S. Jacob. 2007. Social indicators and measurements of vulnerability for Gulf Coast fishing communities. *NAPA Bulletin* 28:57-68.

Johnson, T., A. Henry, and C. Thompson. 2013a. Fishing Community Profile: Eastport. Orono, ME: Maine Sea Grant College Program.

Johnson, T., A. Henry, and C. Thompson. 2013b. Fishing Community Profile: Lubec. Orono, ME: Maine Sea Grant College Program.

Johnson, T., A. Henry, and C. Thompson. 2013c. Fishing Community Profile: Port Clyde. Orono, ME: Maine Sea Grant College Program.

Johnson, T., A. Henry, and C. Thompson. 2013d. Fishing Community Profile: Rockland. Orono, ME: Maine Sea Grant College Program.

Kofinas, G.P., and F.S. Chapin. 2009. Sustaining livelihoods and human well-being during social-ecological change, pp. 55-75 in *Principles of Ecosystem Stewardship* (F.S. Chapin et al., eds.). New York: Springer.

Marshall, N.A. 2007. Can policy perception influence social resilience to policy change? *Fisheries Research* 86:216-227.

Mitchell, S. 2013. Locally owned businesses can help communities thrive—and survive climate change. grist.org/cities/locally-owned-businesses-can-help-communities-thrive-and-survive-climate-change/

Pillatt, T. 2012. From climate and society to weather and landscape. *Archaeological Dialogues* 19:29-74.

Ritchie, D.A. 2003. *Doing Oral History: A Practical Guide*. New York: Oxford University Press.

Robards, M.D., and J.A. Greenberg. 2007. Global constraints on rural fishing communities: Whose resilience is it anyway? *Fish and Fisheries* 8:14-30.

Schmitt, C. 2011. Long may they run. *Maine Boats, Homes & Harbors*, Winter 2011:74-81.

Springuel, N. 2010. Fishing for Tourists: The Newfoundland Cod Crisis and the Role of Tourism in Community Revitalization. Orono, ME: Maine Sea Grant College Program.

Steneck, R.S., et al. 2011. Creation of a gilded trap by the high economic value of the Maine lobster fishery. *Conservation Biology* 25:904-912.

Strauss, A., and J. Corbin. 1990. *Basics of Qualitative Research: Grounded Theory, Procedures and Techniques*. Newbury Park, CA: Sage Publications.

Thornes, J.E., and G. Metherell. 2004. Monet's 'London Series' and the cultural climate of London at the turn of the twentieth century, pp. 141-160 in *Weather, Climate, Culture* (Strauss, Sarah, ed.). New York: Berg Publishers.

Tuler, S., J. Agyeman, P.P. da Silva, K.R. LoRusso, and R. Kay. 2008. Assessing vulnerabilities: integrating information about driving forces that affect risks and resilience in fishing communities. *Human Ecology Review* 15:171-184.

Walker, B.H., and D.A. Salt. 2006. *Resilience thinking: sustaining ecosystems and people in a changing world*. Washington, DC: Island Press.

Zolli, A. 2012. *Resilience: Why Things Bounce Back*. New York: Free Press.

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